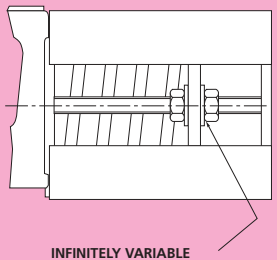
STANDARD FEATURES



7. **Variable Position Load Pin Carrier**. The position of the load pin is determined and set during manufacture to achieve the design load and travel requested.

   For supports other than those with very small movement provided, a variable position load pin carrier is fitted; this provides potential for additional load adjustment. By moving the carrier closer to the fulcrum, the supporting effort will be increased and the travel provided decreased. By moving the carrier in the opposite direction, the supporting effort is decreased, and the travel provided increased. This provides maximum flexibility in situations where changes to the required supporting effort can occur.

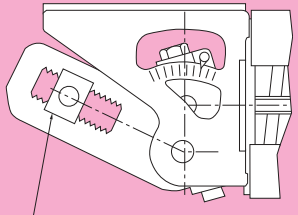
   Once the carrier is repositioned, there is still the +/–20% load adjustment available.

   Variable position load pin carriers are fitted to supports whose total movements provided are greater than the following values:

   C1: 120 mm, C2: 120 mm,

   C3: 120 mm, C4: 160 mm, C5: 100 mm, C6: 130 mm,

   C7: 180 mm.

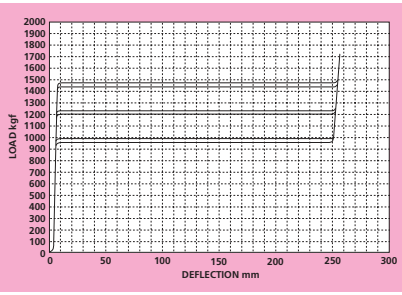


8. **Bearings**. The bearings used are PTFE dry bearings and are enclosed to stop the ingress of dirt and dust. No maintenance or lubrication is required.

9. **Name Plate**. Each support is supplied with a deeply engraved nameplate giving the following data:

   The serial number allocated to each support is unique and will allow traceability of the support details for many years. As a double safeguard against loss or overpainting of nameplate, etc., each support is steel stamped with the customer's reference mark.

10. **Testing**. Every unit is tested in our calibrated test rigs to prove mechanical performance. Deviation is recorded and graphical reports are available if requested. Our standard range of constants deliver supporting effort to within +/-5% of the specified design load. Our standard documentation includes a certificate of works test for mechanical performance and a certificate of conformity for materials and manufacture.



11. **High Performance Supports.** We offer supports that will operate with minimal friction and hysteresis. These supports are available by special request and will deliver supporting effort to within +/-2% of the specified design load. Over an adjusted range of +/-10% of the design load the supports remain within +/-2% of the adjusted load. These supports have precision load adjustment scales and utilise fine pitched threads for the load adjustment mechanism allowing for very accurate adjustment of the support in situ.

12. **Corrosion Protection.** All springs are plastic coated to give maximum corrosion protection. Threaded parts are supplied hot-dipped galvanised while carbon steel parts are painted with one coat of high-build acrylic semi-gloss paint. Other options are available by request.

CONSTANT EFFORT SUPPORTS

INSTALLATION AND ERECTION

Types HS, HD, VS, VD, HBM, VBM, VIS, VID & VIBM:

1. Make fast upper and lower suspension connections ensuring the hanger rod is directly over the required point of attachment remembering that the lower suspension rod should not be more than 5 deg. from the vertical in any condition.

2. All supports are sent to site locked in the D.T.S. (Despatched to site) position shown on the contract drawing. To ensure the support is taking load correctly, adjust the turnbuckle until the pipework is at the correct elevation.

   If the supporting system is in balance, the locking nuts holding the spring compression plate will be easily moved and should be parked at opposite extremities of the locking rods (away from the moving spring plate). If the locking nut nearest to the lever arm will not rotate, then the support is overloaded and positive adjustment on the load adjuster is required until the nut just becomes free; the support is then in balance.

   If the nuts furthest from the lever arm will not rotate, the support is providing too much supporting effort, and negative load adjustment is required until these nuts just become free.

3. When the system is subject to cold pull, the support is delivered locked in the D.T.S. position. Prior to cold pull, the support must be unlocked to allow the support to travel and 'assist' with the cold pull.

   On completion of the cold pull, the indicator reading should be that shown as P.T.E. (Prior to Thermal Expansion) on the contract drawing. It is also possible to achieve the cold pull movement by means of the support turnbuckle with the support remaining locked, in this instance D.T.S. = P.T.E.

4. If the pipework is subject to lagging, hydrostatic testing or acid cleaning after installation of the supports, the supports should remain locked until these operations are complete.

5. IT IS IMPERATIVE THAT A FINAL CHECK OF ALL SUPPORTS IS CARRIED OUT TO ENSURE THAT THEY ARE ALL UNLOCKED PRIOR TO THERMAL EXPANSION TAKING PLACE, AND TO ENSURE THAT THEY ARE SET IN THEIR CORRECT P.T.E. POSITIONS.

6. Supports must not be used for purposes other than that for which they have been designed. They must not be used for rigging and erection purposes. They should be handled as pieces of semi-machinery and stored indoors in a dry environment.

Types HBMCS & VBMCS

1. The same procedures as above apply except that the transference of the load to the support is done by means of the adjuster nut which is situated below the load pad instead of by means of the turnbuckle.

MAINTENANCE

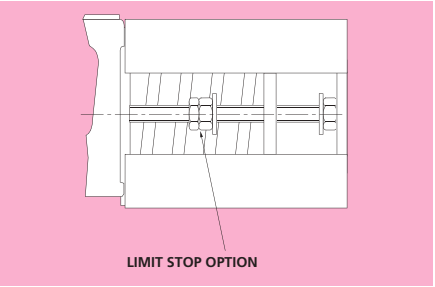
It is recommended that supports are inspected every six months for the following:

1. That no debris or tools are impairing the correct operation of the support.

2. That position of the travel indicator is as anticipated in the design. If this is not the case, the pipework engineer should be notified.

OPTIONAL FEATURES

1. Limit Stops. The infinitely variable locking/balancing device may be enhanced to precisely limit spring travel. Additional nuts welded in position are used to limit movement to a specified amount.



2. The construction of Constant Effort Supports makes the application of special paint finishes a simple matter.

3. For low temperature applications suitable grades of carbon steel are used to suit the specified temperature range. Where necessary the material used for spring coils is also changed to an appropriate grade of steel.

4. For extreme corrosive conditions, extra-thick body section can be supplied.

5. Fully galvanised supports are available where required. Due to the construction of the units, no welding takes place after galvanising.

6. For extended life in offshore or other situations subject to highly corrosive conditions, supports are available in various grades of stainless steel with the spring coil from 17/4 PH (precipitation hardened) stainless steel.

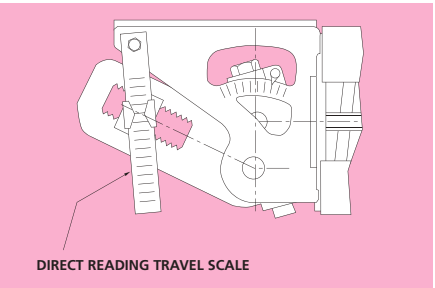
   Please check with our design department for dimensional information.

7. In Cryogenic applications supports are available manufactured entirely in austenitic stainless steel.

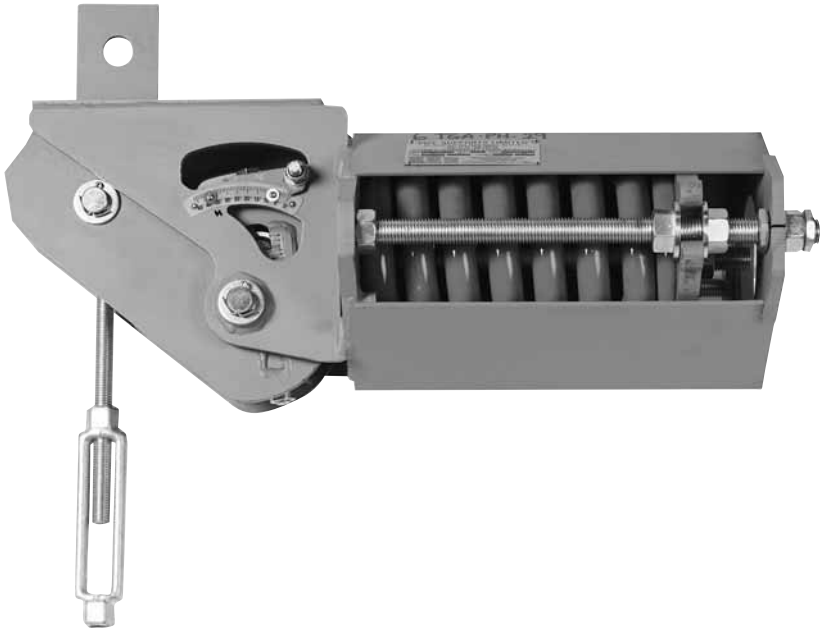
   Please check with our design department for dimensional information.

8. For types **HBMC** and **VBMC**, where lateral loading greater than 25% of the maximum operating load is envisaged, PTFE covered load pads should be specified.

9. Direct Reading Travel Indicator. For precise setting of the support position, a direct reading indicator, giving the travel position in mm is available upon request.

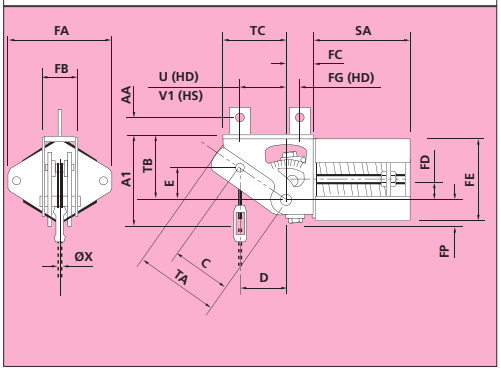


A more detailed erection and maintenance procedure is available on request.

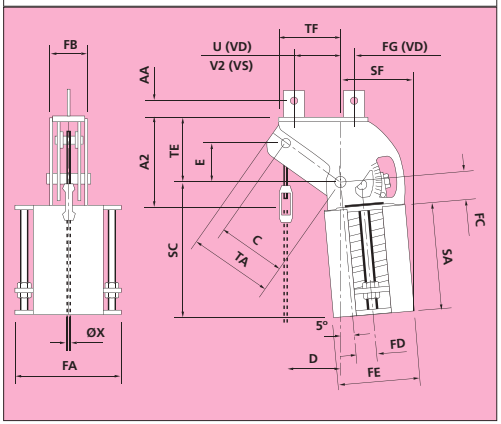


TURN OUT THIS PAGE FOR DIAGRAMS OF
CONSTANT EFFORT SUPPORTS: SUSPENDED TYPES

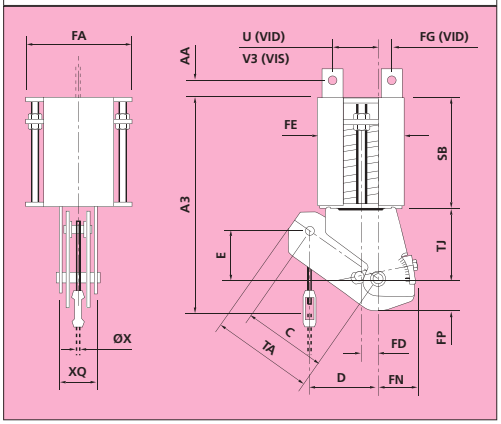
TYPES HD & HS



TYPES VD & VS

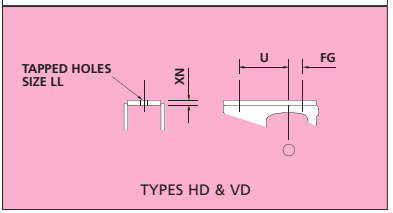


TYPES VID & VIS

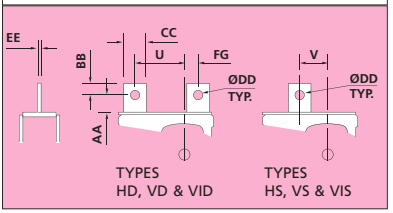


ALTERNATIVE TOP SUSPENSION STYLES

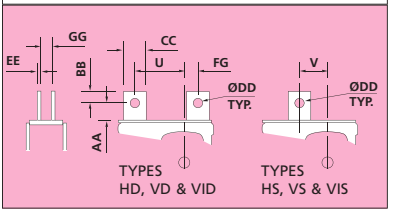
STYLE TS1 (TYPES HD & VD)



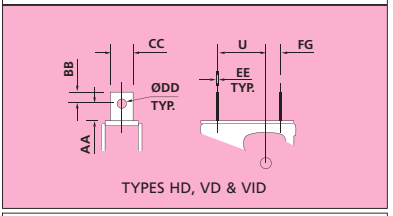
STYLE TS2 (ALL TYPES)



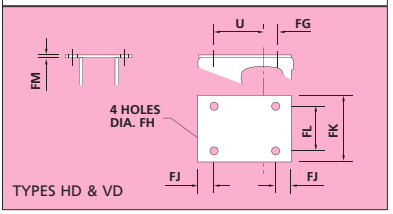
STYLE TS3 (ALL TYPES)



STYLE TS4 (TYPES HD, VD & VID)



STYLE TS5 (TYPES HD & VD)



CONSTANT EFFORT SUPPORTS: BASE MOUNTED TYPES
ARE LOCATED ON PAGE 170

CONSTANT SUPPORT SELECTION CHART (LOADS IN NEWTONS)

SIZE / TRAVEL	C1-1	C1-2	C1-3	C1-4	C2-5	C2-6	C2-7	C3-8	C3-9	C3-10	C4-11	C4-12	C4-13	C4-14	C4-15	C5-16	C5-17	C5-18	C5-19	TRAVEL
40	724	1001	1316	1837	2307	3242	4182	4615	6484	8364	11074	14767	19674							**40**
50	579	801	1052	1470	1846	2593	3346	3692	5187	6691	8859	11813	15739	21256	29658					**50**
60	482	667	877	1225	1538	2161	2788	3076	4322	5576	7383	9844	13116	17714	24715	33506	42495			**60**
70	413	572	752	1050	1318	1852	2390	2637	3705	4779	6328	8438	11242	15183	21184	28719	36425	44830	56038	**70**
80	362	501	658	919	1154	1621	2091	2307	3242	4182	5537	7383	9837	13285	18536	25130	31872	39227	49033	**80**
90	322	445	585	817	1025	1441	1859	2051	2882	3717	4922	6563	8744	11809	16477	22337	28330	34868	43585	**90**
100	289	400	526	735	923	1297	1673	1846	2593	3346	4430	5907	7869	10628	14829	20104	25497	31381	39227	**100**
110	263	364	478	668	839	1179	1521	1678	2358	3041	4027	5370	7154	9662	13481	18276	23179	28528	35661	**110**
120	241	334	439	612	769	1081	1394	1538	2161	2788	3691	4922	6558	8857	12358	16753	21248	26151	32689	**120**
130	223	308	405	565	710	997	1287	1420	1995	2574	3407	4544	6053	8176	11407	15464	19613	24139	30174	**130**
140	207	286	376	525	659	926	1195	1318	1852	2390	3164	4219	5621	7592	10592	14360	18212	22415	28019	**140**
150	193	267	351	490	615	864	1115	1231	1729	2230	2953	3938	5246	7085	9886	13402	16998	20921	26151	**150**
160	181	250	329	459	577	810	1046	1154	1621	2091	2769	3692	4918	6643	9268	12565	15936	19613	24517	**160**
170	170	236	310	432	543	763	984	1086	1526	1968	2606	3475	4629	6252	8723	11826	14998	18460	23074	**170**
180	161	222	292	408	513	720	929	1025	1441	1859	2461	3281	4372	5905	8238	11169	14165	17434	21793	**180**
190	152	211	277	387	486	682	880	972	1365	1761	2331	3109	4142	5594	7805	10581	13420	16516	20646	**190**
200	145	200	263	367	461	648	836	923	1297	1673	2215	2953	3935	5314	7415	10052	12749	15691	19613	**200**
210	138	191	251	350	439	617	797	879	1235	1593	2109	2813	3747	5061	7061	9573	12142	14943	18679	**210**
220	132	182	239	334	420	589	760	839	1179	1521	2013	2685	3577	4831	6741	9138	11590	14264	17830	**220**
230	126	174	229	320	401	564	727	803	1128	1455	1926	2568	3421	4621	6447	8741	11086	13644	17055	**230**
240	121	167	219	306	385	540	697	769	1081	1394	1846	2461	3279	4428	6179	8377	10624	13076	16344	**240**
250	116	160	210	294	369	519	669	738	1037	1338	1772	2363	3148	4251	5932	8041	10199	12553	15691	**250**
260	111	154	202	283	355	499	643	710	997	1287	1704	2272	3027	4088	5704	7732	9807	12070	15087	**260**
270	107	148	195	272	342	480	620	684	961	1239	1641	2188	2915	3936	5492	7446	9443	11623	14528	**270**
280	103	143	188	262	330	463	597	659	926	1195	1582	2110	2811	3796	5296	7180	9106	11208	14009	**280**
290	100	138	181	253	318	447	577	637	894	1154	1527	2037	2714	3665	5113	6932	8792	10821	13526	**290**
300	96	133	175	245	308	432	558	615	864	1115	1477	1969	2623	3543	4943	6701	8499	10460	13076	**300**
310					298	418	540	595	837	1079	1429	1905	2539	3428	4784	6485	8225	10123	12654	**310**
320					288	405	523	577	810	1046	1384	1846	2459	3321	4634	6282	7968	9807	12258	**320**
330					280	393	507	559	786	1014	1342	1790	2385	3221	4494	6092	7726	9509	11887	**330**
340					271	381	492	543	763	984	1303	1737	2315	3126	4362	5913	7499	9230	11537	**340**
350					264	370	478	527	741	956	1266	1688	2248	3037	4237	5744	7285	8966	11208	**350**
360					256	360	465	513	720	929	1230	1641	2186	2952	4119	5584	7083	8717	10896	**360**
370					249	350	452	499	701	904	1197	1596	2127	2872	4008	5433	6891	8481	10602	**370**
380					243	341	440	486	682	880	1166	1554	2071	2797	3902	5290	6710	8258	10323	**380**
390					237	332	429	473	665	858	1136	1515	2018	2725	3802	5155	6538	8046	10058	**390**
400					231	324	418	461	648	836	1107	1477	1967	2657	3707	5026	6374	7845	9807	**400**
410								450	633	816	1080	1441	1919	2592	3617	4903	6219	7654	9567	**410**
420								439	617	797	1055	1406	1874	2531	3531	4787	6071	7472	9340	**420**
430								429	603	778	1030	1374	1830	2472	3449	4675	5930	7298	9122	**430**
440								420	589	760	1007	1342	1789	2416	3370	4569	5795	7132	8915	**440**
450								410	576	743	984	1313	1749	2362	3295	4467	5666	6974	8717	**450**
460								401	564	727	963	1284	1711	2310	3224	4370	5543	6822	8528	**460**
470								393	552	712	942	1257	1674	2261	3155	4277	5425	6677	8346	**470**
480								385	540	697	923	1231	1639	2214	3089	4188	5312	6538	8172	**480**
490								377	529	683	904	1205	1606	2169	3026	4103	5204	6404	8005	**490**
500								369	519	669	886	1181	1574	2126	2966	4021	5099	6276	7845	**500**
510											869	1158	1543	2084	2908	3942	4999	6153	7691	**510**
520											852	1136	1513	2044	2852	3866	4903	6035	7544	**520**
530											836	1114	1485	2005	2798	3793	4811	5921	7401	**530**
540											820	1094	1457	1968	2746	3723	4722	5811	7264	**540**
550											805	1074	1431	1932	2696	3655	4636	5706	7132	**550**
560											791	1055	1405	1898	2648	3590	4553	5604	7005	**560**
570											777	1036	1381	1865	2602	3527	4473	5505	6882	**570**
580											764	1018	1357	1832	2557	3466	4396	5411	6763	**580**
590											751	1001	1334	1801	2513	3407	4322	5319	6649	**590**
600											738	984	1312	1771	2472	3351	4250	5230	6538	**600**
610																3296	4180	5144	6431	**610**
620																3243	4112	5061	6327	**620**
630																3191	4047	4981	6226	**630**
640																3141	3984	4903	6129	**640**
650																3093	3923	4828	6035	**650**
660																3046	3863	4755	5943	**660**
670																3001	3806	4684	5855	**670**
680																2956	3750	4615	5769	**680**
690																2914	3695	4548	5685	**690**
700																2872	3642	4483	5604	**700**
710																2831	3591	4420	5525	**710**
720																2792	3541	4359	5448	**720**
730																2754	3493	4299	5374	**730**
740																2717	3446	4241	5301	**740**
750																2680	3400	4184	5230	**750**

SIZE	C1-1	C1-2	C1-3	C1-4	C2-5	C2-6	C2-7	C3-8	C3-9	C3-10	C4-11	C4-12	C4-13	C4-14	C4-15	C5-16	C5-17	C5-18	C5-19	

DO NOT SELECT TYPES **VS**, **VD** OR **VBM** ABOVE THE BLACK LINE.
DO NOT SELECT TYPES **HS** OR **VIS** BELOW THE RED LINE.
REMEMBER TO ADD OVERTRAVEL ALLOWANCE TO PIPE MOVEMENT BEFORE SELECTING SUPPORT SIZE.

CONSTANT SUPPORT SELECTION CHART (LOADS IN NEWTONS)

SIZE TRAVEL	C6-20	C6-21	C6-22	C6-23	C7-24	C7-25	C7-26	C7-27	C7-28	C7-29	C8-30	C8-31	C8-32	C9-33	C9-34	TRAVEL
40																**40**
50																**50**
60																**60**
70																**70**
80	63743	79679														**80**
90	56661	70826	87170	108963	122583	163444										**90**
100	50995	63743	78453	98066	110325	147100										**100**
110	46359	57948	71321	89151	100295	133727	167159									**110**
120	42495	53119	65378	81722	91937	122583	153229	183875	224736							**120**
130	39227	49033	60349	75436	84865	113154	141442	169730	207448	248938						**130**
140	36425	45531	56038	70048	78803	105071	131339	157607	192631	231157						**140**
150	33996	42495	52302	65378	73550	98066	122583	147100	179789	215746	294200					**150**
160	31872	39840	49033	61292	68953	91937	114922	137906	168552	202262	275812	344765				**160**
170	29997	37496	46149	57686	64897	86529	108162	129794	158637	190364	259588	324485	389382	432646	519176	**170**
180	28330	35413	43585	54481	61292	81722	102153	122583	149824	179789	245166	306458	367749	408610	490332	**180**
190	26839	33549	41291	51614	58066	77421	96776	116131	141938	170326	232263	290328	348394	387105	464526	**190**
200	25497	31872	39227	49033	55162	73550	91937	110325	134841	161810	220650	275812	330974	367749	441299	**200**
210	24283	30354	37359	46698	52536	70048	87559	105071	128420	154104	210142	262678	315214	350238	420285	**210**
220	23179	28974	35661	44576	50148	66864	83579	100295	122583	147100	200591	250738	300886	334318	401181	**220**
230	22172	27714	34110	42638	47967	63956	79946	95935	117253	140704	191869	239837	287804	319782	383738	**230**
240	21248	26560	32689	40861	45969	61292	76614	91937	112368	134841	183875	229843	275812	306458	367749	**240**
250	20398	25497	31381	39227	44130	58840	73550	88260	107873	129448	176520	220650	264780	294200	353039	**250**
260	19613	24517	30174	37718	42433	56577	70721	84865	103724	124469	169730	212163	254596	282884	339461	**260**
270	18887	23609	29057	36321	40861	54481	68102	81722	99883	119859	163444	204305	245166	272407	326888	**270**
280	18212	22765	28019	35024	39402	52536	65670	78803	96315	115578	157607	197009	236410	262678	315214	**280**
290	17584	21980	27053	33816	38043	50724	63405	76086	92994	111593	152172	190215	228258	253620	304344	**290**
300	16998	21248	26151	32689	36775	49033	61292	73550	89894	107873	147100	183875	220650	245166	294200	**300**
310	16450	20562	25307	31634	35589	47452	59314	71177	86994	104393	142355	177943	213532	237258	284709	**310**
320	15936	19920	24517	30646	34477	45969	57461	68953	84276	101131	137906	172383	206859	229843	275812	**320**
330	15453	19316	23774	29717	33432	44576	55720	66864	81722	98066	133727	167159	200591	222878	267454	**330**
340	14998	18748	23074	28843	32448	43265	54081	64897	79318	95182	129794	162242	194691	216323	259588	**340**
350	14570	18212	22415	28019	31521	42029	52536	63043	77052	92463	126086	157607	189128	210142	252171	**350**
360	14165	17706	21793	27241	30646	40861	51076	61292	74912	89894	122583	153229	183875	204305	245166	**360**
370	13782	17228	21204	26504	29818	39757	49696	59635	72887	87465	119270	149088	178905	198783	238540	**370**
380	13420	16775	20646	25807	29033	38710	48388	58066	70969	85163	116131	145164	174197	193552	232263	**380**
390	13076	16344	20116	25145	28288	37718	47147	56577	69149	82979	113154	141442	169730	188589	226307	**390**
400	12749	15936	19613	24517	27581	36775	45969	55162	67421	80905	110325	137906	165487	183875	220650	**400**
410	12438	15547	19135	23919	26908	35878	44847	53817	65776	78932	107634	134542	161451	179390	215268	**410**
420	12142	15177	18679	23349	26268	35024	43780	52536	64210	77052	105071	131339	157607	175119	210142	**420**
430	11859	14824	18245	22806	25657	34209	42762	51314	62717	75260	102628	128285	153942	171046	205255	**430**
440	11590	14487	17830	22288	25074	33432	41790	50148	61292	73550	100295	125369	150443	167159	200591	**440**
450	11332	14165	17434	21793	24517	32689	40861	49033	59930	71915	98066	122583	147100	163444	196133	**450**
460	11086	13857	17055	21319	23984	31978	39973	47967	58627	70352	95935	119918	143902	159891	191869	**460**
470	10850	13562	16692	20865	23473	31298	39122	46947	57379	68855	93893	117367	140840	156489	187787	**470**
480	10624	13280	16344	20431	22984	30646	38307	45969	56184	67421	91937	114922	137906	153229	183875	**480**
490	10407	13009	16011	20014	22515	30020	37525	45031	55037	66045	90061	112576	135092	150102	180122	**490**
500	10199	12749	15691	19613	22065	29420	36775	44130	53937	64724	88260	110325	132390	147100	176520	**500**
510	9999	12499	15383	19229	21632	28843	36054	43265	52879	63455	86529	108162	129794	144215	173059	**510**
520	9807	12258	15087	18859	21216	28288	35361	42433	51862	62235	84865	106082	127298	141442	169730	**520**
530	9622	12027	14802	18503	20816	27755	34693	41632	50884	61060	83264	104080	124896	138773	166528	**530**
540	9443	11804	14528	18160	20431	27241	34051	40861	49941	59930	81722	102153	122583	136203	163444	**540**
550	9272	11590	14264	17830	20059	26745	33432	40118	49033	58840	80236	100295	120354	133727	160472	**550**
560	9106	11383	14009	17512	19701	26268	32835	39402	48158	57789	78803	98504	118205	131339	157607	**560**
570	8946	11183	13764	17205	19355	25807	32259	38710	47313	56775	77421	96776	116131	129035	154842	**570**
580	8792	10990	13526	16908	19022	25362	31703	38043	46497	55796	76086	95108	114129	126810	152172	**580**
590	8643	10804	13297	16621	18699	24932	31165	37398	45709	54851	74796	93496	112195	124661	149593	**590**
600	8499	10624	13076	16344	18387	24517	30646	36775	44947	53937	73550	91937	110325	122583	147100	**600**
610	8360	10450	12861	16076	18086	24115	30143	36172	44210	53052	72344	90430	108516	120574	144688	**610**
620	8225	10281	12654	15817	17794	23726	29657	35589	43497	52197	71177	88972	106766	118629	142355	**620**
630	8094	10118	12453	15566	17512	23349	29186	35024	42807	51368	70048	87559	105071	116746	140095	**630**
640	7968	9960	12258	15323	17238	22984	28730	34477	42138	50566	68953	86191	103430	114922	137906	**640**
650	7845	9807	12070	15087	16973	22631	28288	33946	41490	49788	67892	84865	101838	113154	135784	**650**
660	7726	9658	11887	14859	16716	22288	27860	33432	40861	49033	66864	83579	100295	111439	133727	**660**
670	7611	9514	11709	14637	16466	21955	27444	32933	40251	48301	65866	82332	98798	109776	131731	**670**
680	7499	9374	11537	14422	16224	21632	27040	32448	39659	47591	64897	81121	97345	108162	129794	**680**
690	7391	9238	11370	14213	15989	21319	26649	31978	39084	46901	63956	79946	95935	106594	127913	**690**
700	7285	9106	11208	14009	15761	21014	26268	31521	38526	46231	63043	78803	94564	105071	126086	**700**
710	7182	8978	11050	13812	15539	20718	25898	31077	37984	45580	62155	77694	93232	103591	124310	**710**
720	7083	8853	10896	13620	15323	20431	25538	30646	37456	44947	61292	76614	91937	102153	122583	**720**
730	6986	8732	10747	13434	15113	20151	25188	30226	36943	44331	60452	75565	90678	100753	120904	**730**
740	6891	8614	10602	13252	14909	19878	24848	29818	36444	43732	59635	74544	89453	99392	119270	**740**
750	6799	8499	10460	13076	14710	19613	24517	29420	35958	43149	58840	73550	88260	98066	117680	**750**

SIZE	C6-20	C6-21	C6-22	C6-23	C7-24	C7-25	C7-26	C7-27	C7-28	C7-29	C8-30	C8-31	C8-32	C9-33	C9-34	

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CONSTANT SUPPORT SELECTION CHART (LOADS IN kgf)

SIZE	C1-1	C1-2	C1-3	C1-4	C2-5	C2-6	C2-7	C3-8	C3-9	C3-10	C4-11	C4-12	C4-13	C4-14	C4-15	C5-16	C5-17	C5-18	C5-19	
TRAVEL																				TRAVEL
40	74	102	134	187	235	331	426	471	661	853	1129	1506	2006							**40**
50	59	82	107	150	188	264	341	376	529	682	903	1205	1605	2168	3024					**50**
60	49	68	89	125	157	220	284	314	441	569	753	1004	1337	1806	2520	3417	4333			**60**
70	42	58	77	107	134	189	244	269	378	487	645	860	1146	1548	2160	2929	3714	4571	5714	**70**
80	37	51	67	94	118	165	213	235	331	426	565	753	1003	1355	1890	2563	3250	4000	5000	**80**
90	33	45	60	83	105	147	190	209	294	379	502	669	892	1204	1680	2278	2889	3556	4444	**90**
100	30	41	54	75	94	132	171	188	264	341	452	602	802	1084	1512	2050	2600	3200	4000	**100**
110	27	37	49	68	86	120	155	171	240	310	411	548	730	985	1375	1864	2364	2909	3636	**110**
120	25	34	45	62	78	110	142	157	220	284	376	502	669	903	1260	1708	2167	2667	3333	**120**
130	23	31	41	58	72	102	131	145	203	262	347	463	617	834	1163	1577	2000	2462	3077	**130**
140	21	29	38	54	67	94	122	134	189	244	323	430	573	774	1080	1464	1857	2286	2857	**140**
150	20	27	36	50	63	88	114	125	176	227	301	402	535	723	1008	1367	1733	2133	2667	**150**
160	18	26	34	47	59	83	107	118	165	213	282	376	502	677	945	1281	1625	2000	2500	**160**
170	17	24	32	44	55	78	100	111	156	201	266	354	472	638	890	1206	1529	1882	2353	**170**
180	16	23	30	42	52	73	95	105	147	190	251	335	446	602	840	1139	1444	1778	2222	**180**
190	16	21	28	39	50	70	90	99	139	180	238	317	422	570	796	1079	1368	1684	2105	**190**
200	15	20	27	37	47	66	85	94	132	171	226	301	401	542	756	1025	1300	1600	2000	**200**
210	14	19	26	36	45	63	81	90	126	162	215	287	382	516	720	976	1238	1524	1905	**210**
220	13	19	24	34	43	60	78	86	120	155	205	274	365	493	687	932	1182	1455	1818	**220**
230	13	18	23	33	41	57	74	82	115	148	196	262	349	471	657	891	1130	1391	1739	**230**
240	12	17	22	31	39	55	71	78	110	142	188	251	334	452	630	854	1083	1333	1667	**240**
250	12	16	21	30	38	53	68	75	106	136	181	241	321	434	605	820	1040	1280	1600	**250**
260	11	16	21	29	36	51	66	72	102	131	174	232	309	417	582	788	1000	1231	1538	**260**
270	11	15	20	28	35	49	63	70	98	126	167	223	297	401	560	759	963	1185	1481	**270**
280	11	15	19	27	34	47	61	67	94	122	161	215	287	387	540	732	929	1143	1429	**280**
290	10	14	19	26	32	46	59	65	91	118	156	208	277	374	521	707	897	1103	1379	**290**
300	10	14	18	25	31	44	57	63	88	114	151	201	267	361	504	683	867	1067	1333	**300**
310					30	43	55	61	85	110	146	194	259	350	488	661	839	1032	1290	**310**
320					29	41	53	59	83	107	141	188	251	339	473	641	813	1000	1250	**320**
330					29	40	52	57	80	103	137	183	243	328	458	621	788	970	1212	**330**
340					28	39	50	55	78	100	133	177	236	319	445	603	765	941	1176	**340**
350					27	38	49	54	76	97	129	172	229	310	432	586	743	914	1143	**350**
360					26	37	47	52	73	95	125	167	223	301	420	569	722	889	1111	**360**
370					25	36	46	51	71	92	122	163	217	293	409	554	703	865	1081	**370**
380					25	35	45	50	70	90	119	159	211	285	398	539	684	842	1053	**380**
390					24	34	44	48	68	87	116	154	206	278	388	526	667	821	1026	**390**
400					24	33	43	47	66	85	113	151	201	271	378	513	650	800	1000	**400**
410								46	65	83	110	147	196	264	369	500	634	780	976	**410**
420								45	63	81	108	143	191	258	360	488	619	762	952	**420**
430								44	62	79	105	140	187	252	352	477	605	744	930	**430**
440								43	60	78	103	137	182	246	344	466	591	727	909	**440**
450								42	59	76	100	134	178	241	336	456	578	711	889	**450**
460								41	57	74	98	131	174	236	329	446	565	696	870	**460**
470								40	56	73	96	128	171	231	322	436	553	681	851	**470**
480								39	55	71	94	125	167	226	315	427	542	667	833	**480**
490								38	54	70	92	123	164	221	309	418	531	653	816	**490**
500								38	53	68	90	120	160	217	302	410	520	640	800	**500**
510											89	118	157	213	297	402	510	627	784	**510**
520											87	116	154	208	291	394	500	615	769	**520**
530											85	114	151	204	285	387	491	604	755	**530**
540											84	112	149	201	280	380	481	593	741	**540**
550											82	110	146	197	275	373	473	582	727	**550**
560											81	108	143	194	270	366	464	571	714	**560**
570											79	106	141	190	265	360	456	561	702	**570**
580											78	104	138	187	261	353	448	552	690	**580**
590											77	102	136	184	256	347	441	542	678	**590**
600											75	100	134	181	252	342	433	533	667	**600**
610																336	426	525	656	**610**
620																331	419	516	645	**620**
630																325	413	508	635	**630**
640																320	406	500	625	**640**
650																315	400	492	615	**650**
660																311	394	485	606	**660**
670																306	388	478	597	**670**
680																301	382	471	588	**680**
690																297	377	464	580	**690**
700																293	371	457	571	**700**
710																289	366	451	563	**710**
720																285	361	444	556	**720**
730																281	356	438	548	**730**
740																277	351	432	541	**740**
750																273	347	427	533	**750**

SIZE	C1-1	C1-2	C1-3	C1-4	C2-5	C2-6	C2-7	C3-8	C3-9	C3-10	C4-11	C4-12	C4-13	C4-14	C4-15	C5-16	C5-17	C5-18	C5-19	

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CONSTANT SUPPORT SELECTION CHART (LOADS IN kgf)

SIZE	C6-20	C6-21	C6-22	C6-23	C7-24	C7-25	C7-26	C7-27	C7-28	C7-29	C8-30	C8-31	C8-32	C9-33	C9-34	
TRAVEL																TRAVEL
40																**40**
50																**50**
60																**60**
70																**70**
80	6500	8125														**80**
90	5778	7222	8889	11111	12500	16667										**90**
100	5200	6500	8000	10000	11250	15000										**100**
110	4727	5909	7273	9091	10227	13636	17045									**110**
120	4333	5417	6667	8333	9375	12500	15625	18750	22917							**120**
130	4000	5000	6154	7692	8654	11538	14423	17308	21154	25385						**130**
140	3714	4643	5714	7143	8036	10714	13393	16071	19643	23571						**140**
150	3467	4333	5333	6667	7500	10000	12500	15000	18333	22000	30000					**150**
160	3250	4063	5000	6250	7031	9375	11719	14063	17188	20625	28125	35156				**160**
170	3059	3824	4706	5882	6618	8824	11029	13235	16176	19412	26471	33088	39706	44118	52941	**170**
180	2889	3611	4444	5556	6250	8333	10417	12500	15278	18333	25000	31250	37500	41667	50000	**180**
190	2737	3421	4211	5263	5921	7895	9868	11842	14474	17368	23684	29605	35526	39474	47368	**190**
200	2600	3250	4000	5000	5625	7500	9375	11250	13750	16500	22500	28125	33750	37500	45000	**200**
210	2476	3095	3810	4762	5357	7143	8929	10714	13095	15714	21429	26786	32143	35714	42857	**210**
220	2364	2955	3636	4545	5114	6818	8523	10227	12500	15000	20455	25568	30682	34091	40909	**220**
230	2261	2826	3478	4348	4891	6522	8152	9783	11957	14348	19565	24457	29348	32609	39130	**230**
240	2167	2708	3333	4167	4688	6250	7813	9375	11458	13750	18750	23438	28125	31250	37500	**240**
250	2080	2600	3200	4000	4500	6000	7500	9000	11000	13200	18000	22500	27000	30000	36000	**250**
260	2000	2500	3077	3846	4327	5769	7212	8654	10577	12692	17308	21635	25962	28846	34615	**260**
270	1926	2407	2963	3704	4167	5556	6944	8333	10185	12222	16667	20833	25000	27778	33333	**270**
280	1857	2321	2857	3571	4018	5357	6696	8036	9821	11786	16071	20089	24107	26786	32143	**280**
290	1793	2241	2759	3448	3879	5172	6466	7759	9483	11379	15517	19397	23276	25862	31034	**290**
300	1733	2167	2667	3333	3750	5000	6250	7500	9167	11000	15000	18750	22500	25000	30000	**300**
310	1677	2097	2581	3226	3629	4839	6048	7258	8871	10645	14516	18145	21774	24194	29032	**310**
320	1625	2031	2500	3125	3516	4688	5859	7031	8594	10313	14063	17578	21094	23438	28125	**320**
330	1576	1970	2424	3030	3409	4545	5682	6818	8333	10000	13636	17045	20455	22727	27273	**330**
340	1529	1912	2353	2941	3309	4412	5515	6618	8088	9706	13235	16544	19853	22059	26471	**340**
350	1486	1857	2286	2857	3214	4286	5357	6429	7857	9429	12857	16071	19286	21429	25714	**350**
360	1444	1806	2222	2778	3125	4167	5208	6250	7639	9167	12500	15625	18750	20833	25000	**360**
370	1405	1757	2162	2703	3041	4054	5068	6081	7432	8919	12162	15203	18243	20270	24324	**370**
380	1368	1711	2105	2632	2961	3947	4934	5921	7237	8684	11842	14803	17763	19737	23684	**380**
390	1333	1667	2051	2564	2885	3846	4808	5769	7051	8462	11538	14423	17308	19231	23077	**390**
400	1300	1625	2000	2500	2813	3750	4688	5625	6875	8250	11250	14063	16875	18750	22500	**400**
410	1268	1585	1951	2439	2744	3659	4573	5488	6707	8049	10976	13720	16463	18293	21951	**410**
420	1238	1548	1905	2381	2679	3571	4464	5357	6548	7857	10714	13393	16071	17857	21429	**420**
430	1209	1512	1860	2326	2616	3488	4360	5233	6395	7674	10465	13081	15698	17442	20930	**430**
440	1182	1477	1818	2273	2557	3409	4261	5114	6250	7500	10227	12784	15341	17045	20455	**440**
450	1156	1444	1778	2222	2500	3333	4167	5000	6111	7333	10000	12500	15000	16667	20000	**450**
460	1130	1413	1739	2174	2446	3261	4076	4891	5978	7174	9783	12228	14674	16304	19565	**460**
470	1106	1383	1702	2128	2394	3191	3989	4787	5851	7021	9574	11968	14362	15957	19149	**470**
480	1083	1354	1667	2083	2344	3125	3906	4688	5729	6875	9375	11719	14063	15625	18750	**480**
490	1061	1327	1633	2041	2296	3061	3827	4592	5612	6735	9184	11480	13776	15306	18367	**490**
500	1040	1300	1600	2000	2250	3000	3750	4500	5500	6600	9000	11250	13500	15000	18000	**500**
510	1020	1275	1569	1961	2206	2941	3676	4412	5392	6471	8824	11029	13235	14706	17647	**510**
520	1000	1250	1538	1923	2163	2885	3606	4327	5288	6346	8654	10817	12981	14423	17308	**520**
530	981	1226	1509	1887	2123	2830	3538	4245	5189	6226	8491	10613	12736	14151	16981	**530**
540	963	1204	1481	1852	2083	2778	3472	4167	5093	6111	8333	10417	12500	13889	16667	**540**
550	945	1182	1455	1818	2045	2727	3409	4091	5000	6000	8182	10227	12273	13636	16364	**550**
560	929	1161	1429	1786	2009	2679	3348	4018	4911	5893	8036	10045	12054	13393	16071	**560**
570	912	1140	1404	1754	1974	2632	3289	3947	4825	5789	7895	9868	11842	13158	15789	**570**
580	897	1121	1379	1724	1940	2586	3233	3879	4741	5690	7759	9698	11638	12931	15517	**580**
590	881	1102	1356	1695	1907	2542	3178	3814	4661	5593	7627	9534	11441	12712	15254	**590**
600	867	1083	1333	1667	1875	2500	3125	3750	4583	5500	7500	9375	11250	12500	15000	**600**
610	852	1066	1311	1639	1844	2459	3074	3689	4508	5410	7377	9221	11066	12295	14754	**610**
620	839	1048	1290	1613	1815	2419	3024	3629	4435	5323	7258	9073	10887	12097	14516	**620**
630	825	1032	1270	1587	1786	2381	2976	3571	4365	5238	7143	8929	10714	11905	14286	**630**
640	813	1016	1250	1563	1758	2344	2930	3516	4297	5156	7031	8789	10547	11719	14063	**640**
650	800	1000	1231	1538	1731	2308	2885	3462	4231	5077	6923	8654	10385	11538	13846	**650**
660	788	985	1212	1515	1705	2273	2841	3409	4167	5000	6818	8523	10227	11364	13636	**660**
670	776	970	1194	1493	1679	2239	2799	3358	4104	4925	6716	8396	10075	11194	13433	**670**
680	765	956	1176	1471	1654	2206	2757	3309	4044	4853	6618	8272	9926	11029	13235	**680**
690	754	942	1159	1449	1630	2174	2717	3261	3986	4783	6522	8152	9783	10870	13043	**690**
700	743	929	1143	1429	1607	2143	2679	3214	3929	4714	6429	8036	9643	10714	12857	**700**
710	732	915	1127	1408	1585	2113	2641	3169	3873	4648	6338	7923	9507	10563	12676	**710**
720	722	903	1111	1389	1563	2083	2604	3125	3819	4583	6250	7813	9375	10417	12500	**720**
730	712	890	1096	1370	1541	2055	2568	3082	3767	4521	6164	7705	9247	10274	12329	**730**
740	703	878	1081	1351	1520	2027	2534	3041	3716	4459	6081	7601	9122	10135	12162	**740**
750	693	867	1067	1333	1500	2000	2500	3000	3667	4400	6000	7500	9000	10000	12000	**750**

SIZE	C6-20	C6-21	C6-22	C6-23	C7-24	C7-25	C7-26	C7-27	C7-28	C7-29	C8-30	C8-31	C8-32	C9-33	C9-34	

DO NOT SELECT TYPES **VS**, **VD** OR **VBM** ABOVE THE BLACK LINE.
DO NOT SELECT TYPES **HS** OR **VIS** BELOW THE RED LINE.
REMEMBER TO ADD OVERTRAVEL ALLOWANCE TO PIPE MOVEMENT BEFORE SELECTING SUPPORT SIZE.

C1: DIMENSIONS FOR SIZES C1–1 TO C1–4

MOVEMENT DEPENDENT DIMENSIONS

MOVEMENT PROVIDED mm		40–120	130–210	220–300
TRAVEL RANGE DEPENDENT DIMENSIONS	U	105	105	205
	TA	205	325	446
	TB	135	200	270
	TC	130	130	230
	TD	60	80	100
	TE	135	205	270
	TF	150	215	275
	TG	65	90	110
	TH	65	90	110
	TJ	100	100	128

TOP SUSPENSION DETAILS

DD	14
AA	30
BB	20
CC	50
EE	6
GG	20
LL	M12

FIXED DIMENSIONS

FA	155	FQ	75	XE	14
FB	85	FR	180	XF	190
FC	45	FS	180	XG	105
FD	25	FT	105	XH	55
FE	122	FU	35	XJ	150
FF	6	FV	140	XK	200
FG	35	FW	14	XL	14
FH	14	FX	60	XM	75
FJ	20	FY	80	XN	10
FK	180	FZ	180	XP	100
FL	140	XA	245	XQ	104
FM	6	XB	105	XR	100
FN	75	XC	100		
FP	40	XD	140		

SPRING SIZE DEPENDENT DIMENSIONS

	C1–1	C1–2	C1–3	C1–4
SA	132	150	162	184
SB	142	160	172	194
SC	180	200	210	235
SD	195	215	225	250
SE	195	215	225	250
SF	105	105	105	110

WEIGHTS (kgf)

	C1–1	C1–2	C1–3	C1–4
HS/HD	9	10	10	11
VS/VD	11	11	12	12
VIS/VID	11	11	11	12
HBMCS	11	11	12	12
HBM	9	9	10	10
VBM	10	10	10	11
VBMCS	13	13	13	14
VIBM	10	10	11	11

SINGLE POINT SUSPENSION DIMENSION 'V'

MOVEMENT PROVIDED mm	ALL SIZES		C1–1	C1–2	C1–3	C1–4
	V1	V3	V2	V2	V2	V2
40	41	45				
50	50	55				
60	59	65	58	61	63	65
70	68	74	66	70	73	75
80	76	82	74	78	82	85
90	83	91	81	86	90	94
100	91	99	88	94	99	103
110	98	107	94	102	107	112
120	106	114	100	109	115	121
130	TYPES HS AND VIS ARE NOT USED ABOVE 120mm TRAVEL		106	116	122	129
140			112	122	130	138
150			117	129	137	146
160			123	135	144	153
170			128	141	151	161
180			132	147	157	169
190			137	153	164	176
200			142	158	170	183
210			146	164	176	190
220			150	169	182	197
230			154	174	188	204
240			158	179	194	210
250			162	183	199	217
260			166	188	205	223
270			170	193	210	229
280			173	197	215	235
290			177	201	220	241
300			180	206	225	247

INSTALLED HEIGHT DIMENSIONS **J4** AND **J7** ALLOW ±25mm ADJUSTMENT.

TAKE-OUT DIMENSIONS **A1**, **A2**, **A3**, **J5**, **J6** AND **J8** ALLOW ±75mm ADJUSTMENT AND ASSUME USE OF A STANDARD F228A EYEBOLT.

WHERE SEVERE HEADROOM LIMITATIONS EXIST, DIMENSIONS **A1**, **A2** AND **A3** CAN BE REDUCED AND DIMENSIONS **J5**, **J6** AND **J8** INCREASED AS FOLLOWS BY USE OF A SHORTENED EYEBOLT:

ØX	M12
CHANGE mm	160

NOTE DIA. **X** IS THREADED ISO METRIC COARSE RIGHT HAND AS STANDARD.

NOTE THAT DIMENSIONS **A1**, **A2**, **A3**, **J4**, **J5**, **J6**, **J7** AND **J8** ARE GIVEN AT ZERO ROTATION, THAT IS WITH THE LEVER IN THE UPPERMOST POSITION.

N.B. DIMENSION **TA** IS THE MINIMUM FORWARD CLEARANCE REQUIRED.

C1: DIMENSIONS FOR SIZES C1–1 TO C1–4

MOVEMENT PROVIDED mm	ALL SIZES								C1-1				C1-2				C1-3				C1-4			
	ALL			HS HD	VS VD	HBMCS	HBM	VBM		VIS VID	VBM	VBMCS		VIS VID	VBM	VBMCS		VIS VID	VBM	VBMCS		VIS VID	VBM	VBMCS
	C mm	D mm	E mm	A1 mm	A2 mm	J4 mm	J5 mm	J8 mm	ØX mm	A3 mm	J6 mm	J7 mm	ØX mm	A3 mm	J6 mm	J7 mm	ØX mm	A3 mm	J6 mm	J7 mm	ØX mm	A3 mm	J6 mm	J7 mm
		AT ZERO ROTATION								AT 0° ROTATION				AT 0° ROTATION				AT 0° ROTATION				AT 0° ROTATION		
40	54	44	31	479		307	-279	-279	M12	586		422	M12	604		442	M12	616		452	M12	638		477
50	67	55	38	472		314	-272	-272	M12	579		429	M12	597		449	M12	609		459	M12	631		484
60	80	66	46	464	464	322	-264	-264	M12	571	-134	437	M12	589	-114	457	M12	601	-104	467	M12	623	-79	492
70	94	77	54	456	456	330	-256	-256	M12	563	-126	445	M12	581	-106	465	M12	593	-96	475	M12	615	-71	500
80	107	88	61	449	449	337	-249	-249	M12	556	-119	452	M12	574	-99	472	M12	586	-89	482	M12	608	-64	507
90	120	99	69	441	441	345	-241	-241	M12	548	-111	460	M12	566	-91	480	M12	578	-81	490	M12	600	-56	515
100	134	110	77	433	433	353	-233	-233	M12	540	-103	468	M12	558	-83	488	M12	570	-73	498	M12	592	-48	523
110	147	121	84	426	426	360	-226	-226	M12	533	-96	475	M12	551	-76	495	M12	563	-66	505	M12	585	-41	530
120	161	132	92	418	418	368	-218	-218	M12	525	-88	483	M12	543	-68	503	M12	555	-58	513	M12	577	-33	538
130	174	143	100	475	480	396	-185	-185	M12	517	-80	491	M12	535	-60	511	M12	547	-50	521	M12	569	-25	546
140	187	153	107	468	473	403	-178	-178	M12	510	-73	498	M12	528	-53	518	M12	540	-43	528	M12	562	-18	553
150	201	164	115	460	465	411	-170	-170	M12	502	-65	506	M12	520	-45	526	M12	532	-35	536	M12	554	-10	561
160	214	175	123	452	457	419	-162	-162	M12	494	-57	514	M12	512	-37	534	M12	524	-27	544	M12	546	-2	569
170	228	186	130	445	450	426	-155	-155	M12	487	-50	521	M12	505	-30	541	M12	517	-20	551	M12	539	5	576
180	241	197	138	437	442	434	-147	-147	M12	479	-42	529	M12	497	-22	549	M12	509	-12	559	M12	531	13	584
190	254	208	146	429	434	442	-139	-139	M12	471	-34	537	M12	489	-14	557	M12	501	-4	567	M12	523	21	592
200	268	219	154	421	426	450	-131	-131	M12	463	-26	545	M12	481	-6	565	M12	493	4	575	M12	515	29	600
210	281	230	161	414	419	457	-124	-124	M12	456	-19	552	M12	474	1	572	M12	486	11	582	M12	508	36	607
220	294	241	169	476	476	485	-96	-96	M12	476	-11	560	M12	494	9	580	M12	506	19	590	M12	528	44	615
230	308	252	177	468	468	493	-88	-88	M12	468	-3	568	M12	486	17	588	M12	498	27	598	M12	520	52	623
240	321	263	184	461	461	500	-81	-81	M12	461	4	575	M12	479	24	595	M12	491	34	605	M12	513	59	630
250	335	274	192	453	453	508	-73	-73	M12	453	12	583	M12	471	32	603	M12	483	42	613	M12	505	67	638
260	348	285	200	445	445	516	-65	-65	M12	445	20	591	M12	463	40	611	M12	475	50	621	M12	497	75	646
270	361	296	207	438	438	523	-58	-58	M12	438	27	598	M12	456	47	618	M12	468	57	628	M12	490	82	653
280	375	307	215	430	430	531	-50	-50	M12	430	35	606	M12	448	55	626	M12	460	65	636	M12	482	90	661
290	388	318	223	422	422	539	-42	-42	M12	422	43	614	M12	440	63	634	M12	452	73	644	M12	474	98	669
300	401	329	230	415	415	546	-35	-35	M12	415	50	621	M12	433	70	641	M12	445	80	651	M12	467	105	676

C2: DIMENSIONS FOR SIZES C2–5 TO C2–7

MOVEMENT DEPENDENT DIMENSIONS

MOVEMENT PROVIDED mm		40–120	130–210	220–300	310–400
TRAVEL RANGE DEPENDENT DIMENSIONS	U	105	105	270	270
	TA	209	329	450	583
	TB	140	205	275	350
	TC	130	130	295	295
	TD	70	85	105	120
	TE	140	215	275	350
	TF	155	235	305	370
	TG	80	95	115	135
	TH	80	95	115	135
	TJ	120	120	120	168

FIXED DIMENSIONS

FA	200	FQ	75	XE	14
FB	85	FR	180	XF	190
FC	55	FS	180	XG	105
FD	25	FT	105	XH	55
FE	164	FU	35	XJ	150
FF	6	FV	140	XK	200
FG	35	FW	14	XL	14
FH	14	FX	70	XM	80
FJ	20	FY	90	XN	10
FK	180	FZ	180	XP	110
FL	140	XA	265	XQ	104
FM	6	XB	105	XR	120
FN	80	XC	120		
FP	50	XD	140		

SINGLE POINT SUSPENSION DIMENSION 'V'

MOVEMENT PROVIDED mm	ALL SIZES		C2–5	C2–6	C2–7
	V1	V3	V2	V2	V2
40	42	47			
50	52	58			
60	61	69			
70	71	78			
80	79	88	82	87	88
90	88	98	91	96	99
100	97	107	100	106	109
110	106	116	108	115	118
120	114	125	116	124	128
130	TYPES HS AND VS ARE NOT USED ABOVE 120mm TRAVEL		124	133	138
140			131	142	147
150			139	151	156
160			146	159	165
170			153	167	174
180			160	175	182
190			167	183	191
200			173	191	199
210			180	199	208
220			186	206	216
230			192	214	224
240			198	221	232
250			203	228	240
260			209	235	247
270			215	242	255
280			220	249	262
290			225	255	270
300			230	262	277
310			235	268	284
320			240	274	291
330			245	281	298
340			250	287	305
350			255	293	311
360			259	298	318
370			264	304	324
380			268	310	331
390			272	316	337
400			277	321	343

TOP SUSPENSION DETAILS

DD	14
AA	30
BB	20
CC	50
EE	6
GG	20
LL	M12

SPRING SIZE DEPENDENT DIMENSIONS

	C2–5	C2–6	C2–7
SA	197	172	184
SB	207	182	194
SC	260	235	245
SD	275	250	260
SE	275	250	260
SF	130	130	130

WEIGHTS (kgf)

	C2–5	C2–6	C2–7
HS/HD	16	16	16
VS/VD	18	18	18
VIS/VID	19	19	19
HBMCS	18	18	18
HBM	16	16	16
VBM	17	17	17
VBMCS	20	20	20
VIBM	19	19	19

INSTALLED HEIGHT DIMENSIONS **J4** AND **J7** ALLOW ±25mm ADJUSTMENT.

TAKE-OUT DIMENSIONS **A1**, **A2**, **A3**, **J5**, **J6** AND **J8** ALLOW ±75mm ADJUSTMENT AND ASSUME USE OF A STANDARD F228A EYEBOLT.

WHERE SEVERE HEADROOM LIMITATIONS EXIST, DIMENSIONS **A1**, **A2** AND **A3** CAN BE REDUCED AND DIMENSIONS **J5**, **J6** AND **J8** INCREASED AS FOLLOWS BY USE OF A SHORTENED EYEBOLT:

ØX	M12
CHANGE mm	160

NOTE DIA. **X** IS THREADED ISO METRIC COARSE RIGHT HAND AS STANDARD.

NOTE THAT DIMENSIONS **A1**, **A2**, **A3**, **J4**, **J5**, **J6**, **J7** AND **J8** ARE GIVEN AT ZERO ROTATION, THAT IS WITH THE LEVER IN THE UPPERMOST POSITION.

N.B. DIMENSION **TA** IS THE MINIMUM FORWARD CLEARANCE REQUIRED.

C2: DIMENSIONS FOR SIZES C2–5 TO C2–7

MOVEMENT PROVIDED mm	ALL SIZES								C2–5				C2–6				C2–7			
	ALL			HS HD	VS VD	HBMCS	HBM	VBM		VIS VID	VBM	VBMCS		VIS VID	VBM	VBMCS		VIS VID	VBM	VBMCS
	C mm	D mm	E mm	A1 mm	A2 mm	J4 mm	J5 mm	J8 mm	ØX mm	A3 mm	J6 mm	J7 mm	ØX mm	A3 mm	J6 mm	J7 mm	ØX mm	A3 mm	J6 mm	J7 mm
		AT ZERO ROTATION								AT 0° ROTATION				AT 0° ROTATION				AT 0° ROTATION		
40	54	44	31	484		333	-264	-264	M12	671		518	M12	646		493	M12	658		503
50	67	55	38	477		340	-257	-257	M12	664		525	M12	639		500	M12	651		510
60	80	66	46	469		348	-249	-249	M12	656		533	M12	631		508	M12	643		518
70	94	77	54	461		356	-241	-241	M12	648		541	M12	623		516	M12	635		526
80	107	88	61	454	454	363	-234	-234	M12	641	-39	548	M12	616	-64	523	M12	628	-54	533
90	120	99	69	446	446	371	-226	-226	M12	633	-31	556	M12	608	-56	531	M12	620	-46	541
100	134	110	77	438	438	379	-218	-218	M12	625	-23	564	M12	600	-48	539	M12	612	-38	549
110	147	121	84	431	431	386	-211	-211	M12	618	-16	571	M12	593	-41	546	M12	605	-31	556
120	161	132	92	423	423	394	-203	-203	M12	610	-8	579	M12	585	-33	554	M12	597	-23	564
130	174	143	100	480	490	411	-180	-180	M12	602	0	581	M12	577	-25	556	M12	589	-15	566
140	187	153	107	473	483	418	-173	-173	M12	595	7	588	M12	570	-18	563	M12	582	-8	573
150	201	164	115	465	475	426	-165	-165	M12	587	15	596	M12	562	-10	571	M12	574	0	581
160	214	175	123	457	467	434	-157	-157	M12	579	23	604	M12	554	-2	579	M12	566	8	589
170	228	186	130	450	460	441	-150	-150	M12	572	30	611	M12	547	5	586	M12	559	15	596
180	241	197	138	442	452	449	-142	-142	M12	564	38	619	M12	539	13	594	M12	551	23	604
190	254	208	146	434	444	457	-134	-134	M12	556	46	627	M12	531	21	602	M12	543	31	612
200	268	219	154	426	436	465	-126	-126	M12	548	54	635	M12	523	29	610	M12	535	39	620
210	281	230	161	419	429	472	-119	-119	M12	541	61	642	M12	516	36	617	M12	528	46	627
220	294	241	169	481	481	500	-91	-91	M12	533	69	650	M12	508	44	625	M12	520	54	635
230	308	252	177	473	473	508	-83	-83	M12	525	77	658	M12	500	52	633	M12	512	62	643
240	321	263	184	466	466	515	-76	-76	M12	518	84	665	M12	493	59	640	M12	505	69	650
250	335	274	192	458	458	523	-68	-68	M12	510	92	673	M12	485	67	648	M12	497	77	658
260	348	285	200	450	450	531	-60	-60	M12	502	100	681	M12	477	75	656	M12	489	85	666
270	361	296	207	443	443	538	-53	-53	M12	495	107	688	M12	470	82	663	M12	482	92	673
280	375	307	215	435	435	546	-45	-45	M12	487	115	696	M12	462	90	671	M12	474	100	681
290	388	318	223	427	427	554	-37	-37	M12	479	123	704	M12	454	98	679	M12	466	108	689
300	401	329	230	420	420	561	-30	-30	M12	472	130	711	M12	447	105	686	M12	459	115	696
310	415	340	238	487	487	584	-2	-2	M12	512	138	719	M12	487	113	694	M12	499	123	704
320	428	351	246	479	479	592	6	6	M12	504	146	727	M12	479	121	702	M12	491	131	712
330	442	362	253	472	472	599	13	13	M12	497	153	734	M12	472	128	709	M12	484	138	719
340	455	373	261	464	464	607	21	21	M12	489	161	742	M12	464	136	717	M12	476	146	727
350	468	384	269	456	456	615	29	29	M12	481	169	750	M12	456	144	725	M12	468	154	735
360	482	395	276	449	449	622	36	36	M12	474	176	757	M12	449	151	732	M12	461	161	742
370	495	406	284	441	441	630	44	44	M12	466	184	765	M12	441	159	740	M12	453	169	750
380	509	417	292	433	433	638	52	52	M12	458	192	773	M12	433	167	748	M12	445	177	758
390	522	428	299	426	426	645	59	59	M12	451	199	780	M12	426	174	755	M12	438	184	765
400	535	439	307	418	418	653	67	67	M12	443	207	788	M12	418	182	763	M12	430	192	773

C3: DIMENSIONS FOR SIZES C3–8 TO C3–10

MOVEMENT DEPENDENT DIMENSIONS

		MOVEMENT PROVIDED mm	40–120	130–210	220–300	310–400	410–500
TRAVEL RANGE DEPENDENT DIMENSIONS		U	120	120	270	270	270
		TA	213	306	454	587	721
		TB	155	195	280	355	430
		TC	145	145	295	295	295
		TD	80	90	110	125	145
		TE	155	195	280	355	430
		TF	155	225	315	390	455
		TG	90	100	120	140	165
		TH	90	100	120	140	165
		TJ	155	155	155	155	207
TOP SUSPENSION DETAILS	C3–8	DD	14	14	14	14	14
		AA	30	30	30	30	30
		BB	20	20	20	20	20
		CC	50	50	50	50	50
		EE	6	6	6	6	6
		GG	20	20	20	20	20
		LL	M12	M12	M12	M12	M12
	C3–9	DD	18	14	14	14	14
		AA	36	30	30	30	30
		BB	30	20	20	20	20
		CC	50	50	50	50	50
		EE	6	6	6	6	6
		GG	25	20	20	20	20
		LL	M16	M12	M12	M12	M12
	C3–10	DD	18	14	14	14	14
		AA	36	30	30	30	30
		BB	30	20	20	20	20
		CC	50	50	50	50	50
		EE	6	6	6	6	6
		GG	25	20	20	20	20
		LL	M16	M12	M12	M12	M12

FIXED DIMENSIONS

FA	250	FQ	75	XE	14
FB	89	FR	180	XF	220
FC	65	FS	195	XG	120
FD	50	FT	120	XH	90
FE	198	FU	35	XJ	180
FF	8	FV	140	XK	250
FG	35	FW	14	XL	14
FH	14	FX	85	XM	115
FJ	20	FY	120	XN	12
FK	180	FZ	220	XP	145
FL	140	XA	330	XQ	118
FM	8	XB	120	XR	155
FN	115	XC	170		
FP	60	XD	180		

SPRING SIZE DEPENDENT DIMENSIONS

	C3–8	C3–9	C3–10
SA	211	233	253
SB	223	245	265
SC	280	305	325
SD	300	325	345
SE	300	325	345
SF	175	175	180

WEIGHTS (kgf)

	C3–8	C3–9	C3–10
HS/HD	24	25	26
VS/VD	25	27	28
VIS/VID	27	28	30
HBMCS	27	28	30
HBM	23	24	26
VBM	24	25	27
VBMCS	29	30	32
VIBM	28	29	31

SINGLE POINT SUSPENSION DIMENSION 'V'

MOVEMENT PROVIDED mm	ALL SIZES		C3–8	C3–9	C3–10
	V1	V3	V2	V2	V2
40	43	48			
50	53	60			
60	63	71			
70	73	81	75	77	78
80	83	92	85	87	89
90	92	102	94	98	99
100	101	112	103	107	110
110	110	123	112	117	120
120	119	132	121	127	130
130	TYPES HS AND VIS ARE NOT USED ABOVE 120mm TRAVEL		130	136	139
140			139	145	149
150			147	155	159
160			155	163	168
170			163	172	177
180			171	181	187
190			179	190	196
200			186	198	204
210			193	206	213
220			201	214	222
230			208	222	231
240			215	230	239
250			222	238	247
260			228	246	256
270			235	253	264
280			242	261	272
290			248	268	280
300			254	275	287
310			260	282	295
320			266	290	303
330			272	296	310
340			278	303	318
350			284	310	325
360			290	317	333
370			295	323	340
380			301	330	347
390			306	336	354
400			311	343	361
410			317	349	368
420			322	355	375
430			327	361	381
440			332	367	388
450			337	373	395
460			342	379	401
470			346	385	407
480			351	390	414
490			356	396	420
500			360	401	426

INSTALLED HEIGHT DIMENSIONS **J4** AND **J7** ALLOW ±25mm ADJUSTMENT.

TAKE-OUT DIMENSIONS **A1**, **A2**, **A3**, **J5**, **J6** AND **J8** ALLOW ±75mm ADJUSTMENT AND ASSUME USE OF A STANDARD F228A EYEBOLT.

WHERE SEVERE HEADROOM LIMITATIONS EXIST, DIMENSIONS **A1**, **A2** AND **A3** CAN BE REDUCED AND DIMENSIONS **J5**, **J6** AND **J8** INCREASED AS FOLLOWS BY USE OF A SHORTENED EYEBOLT:

ØX	M12	M16
CHANGE mm	160	160

NOTE DIA. **X** IS THREADED ISO METRIC COARSE RIGHT HAND AS STANDARD.

NOTE THAT DIMENSIONS **A1**, **A2**, **A3**, **J4**, **J5**, **J6**, **J7** AND **J8** ARE GIVEN AT ZERO ROTATION, THAT IS WITH THE LEVER IN THE UPPERMOST POSITION.

N.B. DIMENSION **TA** IS THE MINIMUM FORWARD CLEARANCE REQUIRED.

C3: DIMENSIONS FOR SIZES C3–8 TO C3–10

MOVEMENT PROVIDED mm	ALL SIZES								C3–8				C3–9				C3–10			
	ALL			HS HD	VS VD	HBMCS	HBM	VIBM		VIS VID	VBM	VBMCS		VIS VID	VBM	VBMCS		VIS VID	VBM	VBMCS
	C mm	D mm	E mm	A1 mm	A2 mm	J4 mm	J5 mm	J8 mm	ØX mm	A3 mm	J6 mm	J7 mm	ØX mm	A3 mm	J6 mm	J7 mm	ØX mm	A3 mm	J6 mm	J7 mm
	AT ZERO ROTATION									AT 0° ROTATION				AT 0° ROTATION				AT 0° ROTATION		
40	54	44	31	499		387	-254	-254	M12	722		582	M16	744		607	M16	764		627
50	67	55	38	492		394	-247	-247	M12	715		589	M12	737		614	M16	757		634
60	80	66	46	484		402	-239	-239	M12	707		597	M12	729		622	M16	749		642
70	94	77	54	476	476	410	-231	-231	M12	699	-21	605	M12	721	4	630	M12	741	24	650
80	107	88	61	469	469	417	-224	-224	M12	692	-14	612	M12	714	11	637	M12	734	31	657
90	120	99	69	461	461	425	-216	-216	M12	684	-6	620	M12	706	19	645	M12	726	39	665
100	134	110	77	453	453	433	-208	-208	M12	676	2	628	M12	698	27	653	M12	718	47	673
110	147	121	84	446	446	440	-201	-201	M12	669	9	635	M12	691	34	660	M12	711	54	680
120	161	132	92	438	438	448	-193	-193	M12	661	17	643	M12	683	42	668	M12	703	62	688
130	174	143	100	470	470	462	-175	-175	M12	653	25	647	M12	675	50	672	M12	695	70	692
140	187	153	107	463	463	469	-168	-168	M12	646	32	654	M12	668	57	679	M12	688	77	699
150	201	164	115	455	455	477	-160	-160	M12	638	40	662	M12	660	65	687	M12	680	85	707
160	214	175	123	447	447	485	-152	-152	M12	630	48	670	M12	652	73	695	M12	672	93	715
170	228	186	130	440	440	492	-145	-145	M12	623	55	677	M12	645	80	702	M12	665	100	722
180	241	197	138	432	432	500	-137	-137	M12	615	63	685	M12	637	88	710	M12	657	108	730
190	254	208	146	424	424	508	-129	-129	M12	607	71	693	M12	629	96	718	M12	649	116	738
200	268	219	154	501	501	530	-101	-101	M12	599	79	695	M12	621	104	720	M12	641	124	740
210	281	230	161	494	494	537	-94	-94	M12	592	86	702	M12	614	111	727	M12	634	131	747
220	294	241	169	486	486	545	-86	-86	M12	584	94	710	M12	606	119	735	M12	626	139	755
230	308	252	177	478	478	553	-78	-78	M12	576	102	718	M12	598	127	743	M12	618	147	763
240	321	263	184	471	471	560	-71	-71	M12	569	109	725	M12	591	134	750	M12	611	154	770
250	335	274	192	463	463	568	-63	-63	M12	561	117	733	M12	583	142	758	M12	603	162	778
260	348	285	200	455	455	576	-55	-55	M12	553	125	741	M12	575	150	766	M12	595	170	786
270	361	296	207	448	448	583	-48	-48	M12	546	132	748	M12	568	157	773	M12	588	177	793
280	375	307	215	440	440	591	-40	-40	M12	538	140	756	M12	560	165	781	M12	580	185	801
290	388	318	223	432	432	599	-32	-32	M12	530	148	764	M12	552	173	789	M12	572	193	809
300	401	329	230	425	425	606	-25	-25	M12	523	155	771	M12	545	180	796	M12	565	200	816
310	415	340	238	492	492	629	3	3	M12	515	163	779	M12	537	188	804	M12	557	208	824
320	428	351	246	484	484	637	11	11	M12	507	171	787	M12	529	196	812	M12	549	216	832
330	442	362	253	477	477	644	18	18	M12	500	178	794	M12	522	203	819	M12	542	223	839
340	455	373	261	469	469	652	26	26	M12	492	186	802	M12	514	211	827	M12	534	231	847
350	468	384	269	461	461	660	34	34	M12	484	194	810	M12	506	219	835	M12	526	239	855
360	482	395	276	454	454	667	41	41	M12	477	201	817	M12	499	226	842	M12	519	246	862
370	495	406	284	446	446	675	49	49	M12	469	209	825	M12	491	234	850	M12	511	254	870
380	509	417	292	438	438	683	57	57	M12	461	217	833	M12	483	242	858	M12	503	262	878
390	522	428	299	431	431	690	64	64	M12	454	224	840	M12	476	249	865	M12	496	269	885
400	535	439	307	423	423	698	72	72	M12	446	232	848	M12	468	257	873	M12	488	277	893
410	549	449	315	490	490	726	105	105	M12	490	240	856	M12	512	265	881	M12	532	285	901
420	562	460	322	483	483	733	112	112	M12	483	247	863	M12	505	272	888	M12	525	292	908
430	575	471	330	475	475	741	120	120	M12	475	255	871	M12	497	280	896	M12	517	300	916
440	589	482	338	467	467	749	128	128	M12	467	263	879	M12	489	288	904	M12	509	308	924
450	602	493	345	460	460	756	135	135	M12	460	270	886	M12	482	295	911	M12	502	315	931
460	616	504	353	452	452	764	143	143	M12	452	278	894	M12	474	303	919	M12	494	323	939
470	629	515	361	444	444	772	151	151	M12	444	286	902	M12	466	311	927	M12	486	331	947
480	642	526	368	437	437	779	158	158	M12	437	293	909	M12	459	318	934	M12	479	338	954
490	656	537	376	429	429	787	166	166	M12	429	301	917	M12	451	326	942	M12	471	346	962
500	669	548	384	421	421	795	174	174	M12	421	309	925	M12	443	334	950	M12	463	354	970

C4: DIMENSIONS FOR SIZES C4–11 TO C4–15

MOVEMENT DEPENDENT DIMENSIONS

		MOVEMENT PROVIDED mm	40–80	90–160	170–220	230–300	310–400	410–500	510–600
TRAVEL RANGE DEPENDENT DIMENSIONS		U	155	155	155	155	345	345	345
		TA	188	291	368	470	599	727	855
		TB	200	200	235	295	365	435	510
		TC	205	205	205	205	370	370	370
		TD	115	115	115	130	145	165	180
		TE		200	255	315	375	435	510
		TF		230	280	345	425	505	580
		TG	130	130	130	145	160	180	195
		TH	130	130	130	145	160	180	195
		TJ	195	195	195	195	195	195	226
TOP SUSPENSION DETAILS	C4–11	DD	22	14	14	14	14	14	14
		AA	50	30	30	30	30	30	30
		BB	35	20	20	20	20	20	20
		CC	60	50	50	50	50	50	50
		EE	10	6	6	6	6	6	6
		GG	30	20	20	20	20	20	20
		LL	M20	M12	M12	M12	M12	M12	M12
	C4–12	DD	22	18	14	14	14	14	14
		AA	50	36	30	30	30	30	30
		BB	35	30	20	20	20	20	20
		CC	60	50	50	50	50	50	50
		EE	10	6	6	6	6	6	6
		GG	30	25	20	20	20	20	20
		LL	M20	M16	M12	M12	M12	M12	M12
	C4–13	DD	26	18	18	18	14	14	14
		AA	60	36	36	36	30	30	30
		BB	45	30	30	30	20	20	20
		CC	80	50	50	50	50	50	50
		EE	10	6	6	6	6	6	6
		GG	35	25	25	25	20	20	20
		LL	M24	M16	M16	M16	M12	M12	M12
	C4–14	DD	26	22	18	18	14	14	14
		AA	60	50	36	36	30	30	30
		BB	45	35	30	30	20	20	20
		CC	80	60	50	50	50	50	50
		EE	10	10	6	6	6	6	6
		GG	35	30	25	25	20	20	20
		LL	M24	M20	M16	M16	M12	M12	M12
	C4–15	DD	33	26	22	22	18	18	18
		AA	70	60	50	50	36	36	36
		BB	55	45	35	35	30	30	30
		CC	100	80	60	60	50	50	50
		EE	12	10	10	10	6	6	6
		GG	40	35	30	30	25	25	25
		LL	M30	M24	M20	M20	M16	M16	M16

FIXED DIMENSIONS

FA	330	FQ	100	XE	18
FB	115	FR	225	XF	270
FC	95	FS	240	XG	155
FD	51	FT	155	XH	110
FE	250	FU	35	XJ	220
FF	10	FV	175	XK	315
FG	35	FW	18	XL	18
FH	18	FX	105	XM	155
FJ	25	FY	160	XN	20
FK	225	FZ	300	XP	190
FL	175	XA	415	XQ	148
FM	10	XB	155	XR	195
FN	155	XC	210		
FP	90	XD	250		

SPRING SIZE DEPENDENT DIMENSIONS

	C4–11	C4–12	C4–13	C4–14	C4–15
SA	264	286	312	351	400
SB	284	306	332	371	420
SC	365	390	415	455	505
SD	385	410	435	475	525
SE	385	410	435	475	525
SF	210	210	215	215	220

WEIGHTS (kgf)

	C4–11	C4–12	C4–13	C4–14	C4–15
HS/HD	55	55	60	65	75
VS/VD	60	60	65	70	80
VIS/VID	60	65	70	75	80
HBMCS	60	65	70	75	80
HBM	50	55	60	65	70
VBM	55	55	60	65	75
VBMCS	65	70	75	80	85
VIBM	60	65	70	75	80

SINGLE POINT SUSPENSION DIMENSION 'V'

MOVEMENT PROVIDED mm	ALL SIZES		C4–11	C4–12	C4–13	C4–14	C4–15
	V1	V3	V2	V2	V2	V2	V2
40	43	48					
50	53	60					
60	63	71					
70	73	82					
80	82	93					
90	92	104	95				
100	101	114	104	107	110	112	113
110	111	124	113	117	120	122	124
120	120	135	122	126	130	133	135
130	129	145	131	136	139	143	145
140	138	155	140	145	149	153	156
150	147	165	148	154	159	163	166
160	155	174	156	163	168	173	176
170	TYPES HS AND VIS ARE NOT USED ABOVE 160mm TRAVEL		164	172	177	182	187
180			172	180	187	192	197
190			180	189	196	202	207
200			188	197	205	211	217
210			195	206	213	221	226
220			203	214	222	230	236
230			210	222	231	239	246
240			217	230	239	248	255
250			224	237	248	257	265
260			231	245	256	266	274
270			238	252	264	275	284
280			245	260	272	283	293
290			251	267	280	292	302
300			258	274	288	300	311
310			264	282	296	309	320
320			270	289	304	317	329
330			276	295	311	325	338
340			282	302	319	334	347
350			288	309	326	342	355
360			294	316	333	350	364
370			300	322	341	358	373
380			305	329	348	366	381
390			311	335	355	373	389
400			316	341	362	381	398
410			322	348	369	389	406
420			327	354	376	396	414
430			332	360	382	404	422
440			337	366	389	411	431
450			343	372	396	418	439
460			348	377	402	426	447
470			353	383	409	433	454
480			357	389	415	440	462
490			362	394	422	447	470
500			367	400	428	454	478
510			372	406	434	461	485
520			376	411	440	468	493
530			381	416	446	475	501
540			385	422	452	482	508
550			390	427	458	488	516
560			394	432	464	495	523
570			399	437	470	502	530
580			403	442	476	508	537
590			407	447	482	515	545
600			411	452	487	521	552

INSTALLED HEIGHT DIMENSIONS **J4** AND **J7** ALLOW ±25mm ADJUSTMENT.

TAKE-OUT DIMENSIONS **A1**, **A2**, **A3**, **J5**, **J6** AND **J8** ALLOW ±75mm ADJUSTMENT AND ASSUME USE OF A STANDARD F228A EYEBOLT.

WHERE SEVERE HEADROOM LIMITATIONS EXIST, DIMENSIONS **A1**, **A2** AND **A3** CAN BE REDUCED AND DIMENSIONS **J5**, **J6** AND **J8** INCREASED AS FOLLOWS BY USE OF A SHORTENED EYEBOLT:

ØX	M12	M16	M20	M24	M30
CHANGE mm	160	160	140	140	120

NOTE DIA. **X** IS THREADED ISO METRIC COARSE RIGHT HAND AS STANDARD.

NOTE THAT DIMENSIONS **A1**, **A2**, **A3**, **J4**, **J5**, **J6**, **J7** AND **J8** ARE GIVEN AT ZERO ROTATION, THAT IS WITH THE LEVER IN THE UPPERMOST POSITION.

N.B. DIMENSION **TA** IS THE MINIMUM FORWARD CLEARANCE REQUIRED.

C4: DIMENSIONS FOR SIZES C4–11 TO C4–15

MOVEMENT PROVIDED mm	ALL SIZES								C4–11				C4–12				C4–13				C4–14				C4–15			
	ALL			HS HD	VS VD	HBMCS	HBM	VIBM		VIS VID	VBM	VBMCS		VIS VID	VBM	VBMCS		VIS VID	VBM	VBMCS		VIS VID	VBM	VBMCS		VIS VID	VBM	VBMCS
	C mm	D mm	E mm	A1 mm	A2 mm	J4 mm	J5 mm	J8 mm	ØX mm	A3 mm	J6 mm	J7 mm	ØX mm	A3 mm	J6 mm	J7 mm	ØX mm	A3 mm	J6 mm	J7 mm	ØX mm	A3 mm	J6 mm	J7 mm	ØX mm	A3 mm	J6 mm	J7 mm
	AT ZERO ROTATION									AT 0° ROTATION				AT 0° ROTATION				AT 0° ROTATION				AT 0° ROTATION				AT 0° ROTATION		
40	54	44	31	544		495	-214	-214	M20	823		735	M20	845		760	M24	871		785								
50	67	55	38	537		502	-207	-207	M16	816		742	M20	838		767	M24	864		792	M24	903		832	M30	952		882
60	80	66	46	529		510	-199	-199	M16	808		750	M16	830		775	M20	856		800	M24	895		840	M30	944		890
70	94	77	54	521		518	-191	-191	M16	800		758	M16	822		783	M20	848		808	M20	887		848	M24	936		898
80	107	88	61	514		525	-184	-184	M16	793		765	M16	815		790	M16	841		815	M20	880		855	M24	929		905
90	120	99	69	506	506	526	-176	-176	M12	785	79	766	M16	807		791	M16	833		816	M20	872		856	M24	921		906
100	134	110	77	498	498	534	-168	-168	M12	777	87	774	M16	799	112	799	M16	825	137	824	M20	864	177	864	M20	913	227	914
110	147	121	84	491	491	541	-161	-161	M12	770	94	781	M16	792	119	806	M16	818	144	831	M16	857	184	871	M20	906	234	921
120	161	132	92	483	483	549	-153	-153	M12	762	102	789	M12	784	127	814	M16	810	152	839	M16	849	192	879	M20	898	242	929
130	174	143	100	475	475	557	-145	-145	M12	754	110	797	M12	776	135	822	M16	802	160	847	M16	841	200	887	M20	890	250	937
140	187	153	107	468	468	564	-138	-138	M12	747	117	804	M12	769	142	829	M16	795	167	854	M16	834	207	894	M20	883	257	944
150	201	164	115	460	460	572	-130	-130	M12	739	125	812	M12	761	150	837	M16	787	175	862	M16	826	215	902	M16	875	265	952
160	214	175	123	452	452	580	-122	-122	M12	731	133	820	M12	753	158	845	M12	779	183	870	M16	818	223	910	M16	867	273	960
170	228	186	130	480	500	580	-115	-115	M12	724	140	820	M12	746	165	845	M12	772	190	870	M16	811	230	910	M16	860	280	960
180	241	197	138	472	492	588	-107	-107	M12	716	148	828	M12	738	173	853	M12	764	198	878	M16	803	238	918	M16	852	288	968
190	254	208	146	464	484	596	-99	-99	M12	708	156	836	M12	730	181	861	M12	756	206	886	M16	795	246	926	M16	844	296	976
200	268	219	154	456	476	604	-91	-91	M12	700	164	844	M12	722	189	869	M12	748	214	894	M16	787	254	934	M16	836	304	984
210	281	230	161	449	469	611	-84	-84	M12	693	171	851	M12	715	196	876	M12	741	221	901	M12	780	261	941	M16	829	311	991
220	294	241	169	441	461	619	-76	-76	M12	685	179	859	M12	707	204	884	M12	733	229	909	M12	772	269	949	M16	821	319	999
230	308	252	177	493	513	642	-53	-53	M12	677	187	867	M12	699	212	892	M12	725	237	917	M12	764	277	957	M16	813	327	1007
240	321	263	184	486	506	649	-46	-46	M12	670	194	874	M12	692	219	899	M12	718	244	924	M12	757	284	964	M16	806	334	1014
250	335	274	192	478	498	657	-38	-38	M12	662	202	882	M12	684	227	907	M12	710	252	932	M12	749	292	972	M16	798	342	1022
260	348	285	200	470	490	665	-30	-30	M12	654	210	890	M12	676	235	915	M12	702	260	940	M12	741	300	980	M16	790	350	1030
270	361	296	207	463	483	672	-23	-23	M12	647	217	897	M12	669	242	922	M12	695	267	947	M12	734	307	987	M16	783	357	1037
280	375	307	215	455	475	680	-15	-15	M12	639	225	905	M12	661	250	930	M12	687	275	955	M12	726	315	995	M16	775	365	1045
290	388	318	223	447	467	688	-7	-7	M12	631	233	913	M12	653	258	938	M12	679	283	963	M12	718	323	1003	M12	767	373	1053
300	401	329	230	440	460	695	0	0	M12	624	240	920	M12	646	265	945	M12	672	290	970	M12	711	330	1010	M12	760	380	1060
310	415	340	238	502	512	718	23	23	M12	616	248	928	M12	638	273	953	M12	664	298	978	M12	703	338	1018	M12	752	388	1068
320	428	351	246	494	504	726	31	31	M12	608	256	936	M12	630	281	961	M12	656	306	986	M12	695	346	1026	M12	744	396	1076
330	442	362	253	487	497	733	38	38	M12	601	263	943	M12	623	288	968	M12	649	313	993	M12	688	353	1033	M12	737	403	1083
340	455	373	261	479	489	741	46	46	M12	593	271	951	M12	615	296	976	M12	641	321	1001	M12	680	361	1041	M12	729	411	1091
350	468	384	269	471	481	749	54	54	M12	585	279	959	M12	607	304	984	M12	633	329	1009	M12	672	369	1049	M12	721	419	1099
360	482	395	276	464	474	756	61	61	M12	578	286	966	M12	600	311	991	M12	626	336	1016	M12	665	376	1056	M12	714	426	1106
370	495	406	284	456	466	764	69	69	M12	570	294	974	M12	592	319	999	M12	618	344	1024	M12	657	384	1064	M12	706	434	1114
380	509	417	292	448	458	772	77	77	M12	562	302	982	M12	584	327	1007	M12	610	352	1032	M12	649	392	1072	M12	698	442	1122
390	522	428	299	441	451	779	84	84	M12	555	309	989	M12	577	334	1014	M12	603	359	1039	M12	642	399	1079	M12	691	449	1129
400	535	439	307	433	443	787	92	92	M12	547	317	997	M12	569	342	1022	M12	595	367	1047	M12	634	407	1087	M12	683	457	1137
410	549	449	315	495	495	812	120	120	M12	539	325	1002	M12	561	350	1027	M12	587	375	1052	M12	626	415	1092	M12	675	465	1142
420	562	460	322	488	488	819	127	127	M12	532	332	1009	M12	554	357	1034	M12	580	382	1059	M12	619	422	1099	M12	668	472	1149
430	575	471	330	480	480	827	135	135	M12	524	340	1017	M12	546	365	1042	M12	572	390	1067	M12	611	430	1107	M12	660	480	1157
440	589	482	338	472	472	835	143	143	M12	516	348	1025	M12	538	373	1050	M12	564	398	1075	M12	603	438	1115	M12	652	488	1165
450	602	493	345	465	465	842	150	150	M12	509	355	1032	M12	531	380	1057	M12	557	405	1082	M12	596	445	1122	M12	645	495	1172
460	616	504	353	457	457	850	158	158	M12	501	363	1040	M12	523	388	1065	M12	549	413	1090	M12	588	453	1130	M12	637	503	1180
470	629	515	361	449	449	858	166	166	M12	493	371	1048	M12	515	396	1073	M12	541	421	1098	M12	580	461	1138	M12	629	511	1188
480	642	526	368	442	442	865	173	173	M12	486	378	1055	M12	508	403	1080	M12	534	428	1105	M12	573	468	1145	M12	622	518	1195
490	656	537	376	434	434	873	181	181	M12	478	386	1063	M12	500	411	1088	M12	526	436	1113	M12	565	476	1153	M12	614	526	1203
500	669	548	384	426	426	881	189	189	M12	470	394	1071	M12	492	419	1096	M12	518	444	1121	M12	557	484	1161	M12	606	534	1211
510	683	559	391	494	494	903	211	211	M12	494	401	1078	M12	516	426	1103	M12	542	451	1128	M12	581	491	1168	M12	630	541	1218
520	696	570	399	486	486	911	219	219	M12	486	409	1086	M12	508	434	1111	M12	534	459	1136	M12	573	499	1176	M12	622	549	1226
530	709	581	407	478	478	919	227	227	M12	478	417	1094	M12	500	442	1119	M12	526	467	1144	M12	565	507	1184	M12	614	557	1234
540	723	592	415	470	470	927	235	235	M12	470	425	1102	M12	492	450	1127	M12	518	475	1152	M12	557	515	1192	M12	606	565	1242
550	736	603	422	463	463	934	242	242	M12	463	432	1109	M12	485	457	1134	M12	511	482	1159	M12	550	522	1199	M12	599	572	1249
560	749	614	430	455	455	942	250	250	M12	455	440	1117	M12	477	465	1142	M12	503	490	1167	M12	542	530	1207	M12	591	580	1257
570	763	625	438	447	447	950	258	258	M12	447	448	1125	M12	469	473	1150	M12	495	498	1175	M12	534	538	1215	M12	583	588	1265
580	776	636	445	440	440	957	265	265	M12	440	455	1132	M12	462	480	1157	M12	488	505	1182	M12	527	545	1222	M12	576	595	1272
590	790	647	453	432	432	965	273	273	M12	432	463	1140	M12	454	488	1165	M12	480	513	1190	M12	519	553	1230	M12	568	603	1280
600	803	658	461	424	424	973	281	281	M12	424	471	1148	M12	446	496	1173	M12	472	521	1198	M12	511	561	1238	M12	560	611	1288

C5: DIMENSIONS FOR SIZES C5–16 TO C5–19

MOVEMENT DEPENDENT DIMENSIONS

		MOVEMENT PROVIDED mm	60–100	110–170	180–240	250–330	340–400	410–500	510–600	610–750
TRAVEL RANGE DEPENDENT DIMENSIONS		U	235	235	235	235	235	450	450	450
		TA	218	310	401	519	610	741	872	1068
		TB	280	280	280	325	375	450	525	635
		TC	300	300	300	300	300	480	480	480
		TD	135	135	135	160	160	180	200	225
		TE	230	230	280	350	400	475	525	635
		TF	300	300	300	390	450	530	610	720
		TG	150	150	150	175	175	195	215	240
		TH	150	150	150	175	175	195	215	240
		TJ	255	255	255	255	255	255	255	255
TOP SUSPENSION DETAILS	C5–16	DD	33	26	22	22	22	22	22	22
		AA	70	60	50	50	50	50	50	50
		BB	55	45	35	35	35	35	35	35
		CC	100	80	60	60	60	60	60	60
		EE	12	10	10	10	10	10	10	10
		GG	40	35	30	30	30	30	30	30
		LL	M30	M24	M20	M20	M20	M20	M20	M20
	C5–17	DD	40	33	22	22	22	22	22	22
		AA	80	70	50	50	50	50	50	50
		BB	55	55	35	35	35	35	35	35
		CC	110	100	60	60	60	60	60	60
		EE	15	12	10	10	10	10	10	10
		GG	45	40	30	30	30	30	30	30
		LL	M36	M30	M20	M20	M20	M20	M20	M20
	C5–18	DD	40	33	26	26	26	22	22	22
		AA	80	70	60	60	60	50	50	50
		BB	55	55	45	45	45	35	35	35
		CC	110	100	80	80	80	60	60	60
		EE	15	12	10	10	10	10	10	10
		GG	45	40	35	35	35	30	30	30
		LL	M36	M30	M24	M24	M24	M20	M20	M20
	C5–19	DD	46	33	26	26	26	22	22	22
		AA	90	70	60	60	60	50	50	50
		BB	75	55	45	45	45	35	35	35
		CC	130	100	80	80	80	60	60	60
		EE	15	12	10	10	10	10	10	10
		GG	60	40	35	35	35	10	10	10
		LL	M42	M30	M24	M24	M24	M20	M20	M20

FIXED DIMENSIONS

FA	410	FQ	120	XE	22
FB	141	FR	265	XF	320
FC	110	FS	360	XG	235
FD	92	FT	235	XH	170
FE	319	FU	65	XJ	260
FF	12	FV	205	XK	465
FG	65	FW	22	XL	22
FH	22	FX	140	XM	215
FJ	30	FY	190	XN	25
FK	265	FZ	380	XP	265
FL	205	XA	600	XQ	182
FM	15	XB	235	XR	255
FN	215	XC	305		
FP	100	XD	320		

SPRING SIZE DEPENDENT DIMENSIONS

	C5–16	C5–17	C5–18	C5–19
SA	472	519	538	583
SB	497	544	563	608
SC	590	635	655	700
SD	615	660	680	725
SE	615	660	680	725
SF	305	310	310	315

WEIGHTS (kgf)

	C5–16	C5–17	C5–18	C5–19
HS/HD	120	130	140	150
VS/VD	130	140	150	160
VIS/VID	135	145	155	165
HBMCS	135	145	155	165
HBM	120	130	135	150
VBM	125	135	140	155
VBMCS	145	160	165	175
VIBM	130	140	150	160

SINGLE POINT SUSPENSION DIMENSION 'V'

MOVEMENT PROVIDED mm	ALL SIZES		C5–16	C5–17	C5–18	C5–19
	V1	V3	V2	V2	V2	V2
60	64	73				
70	75	85				
80	86	96				
90	96	107				
100	105	119	110			
110	116	130	121	122	124	125
120	126	141	131	133	134	136
130	135	152	141	143	145	146
140	145	163	151	153	155	157
150	155	174	161	163	166	168
160	164	184	171	173	176	178
170	174	195	180	183	186	189
180	183	205	190	193	197	199
190	193	216	200	203	207	209
200	202	226	209	213	217	220
210	211	236	218	222	227	230
220	220	246	227	232	236	240
230	229	256	237	241	246	250
240	238	266	246	251	256	260
250	TYPES HS AND VIS ARE NOT USED ABOVE 240mm TRAVEL		254	260	265	270
260			263	269	275	279
270			272	278	284	289
280			281	287	294	299
290			289	296	303	309
300			298	305	312	318
310			306	314	322	328
320			314	322	331	337
330			323	331	340	346
340			331	340	349	356
350			339	348	357	365
360			347	356	366	374
370			355	365	375	383
380			363	373	384	392
390			370	381	392	401
400			378	389	401	410
410			386	397	409	419
420			393	405	418	428
430			401	413	426	436
440			408	421	435	445
450			415	429	443	454
460			423	437	451	462
470			430	444	459	471
480			437	452	467	479
490			444	460	475	488
500			451	467	483	496
510			458	474	491	505
520			465	482	499	513
530			472	489	507	521
540			479	496	515	529
550			485	504	522	537
560			492	511	530	545
570			499	518	538	553
580			505	525	545	561
590			512	532	553	569
600			518	539	560	577
610			525	546	567	585
620			531	553	575	593
630			537	559	582	600
640			544	566	589	608
650			550	573	597	616
660			556	579	604	623
670			562	586	611	631
680			568	592	618	638
690			574	599	625	646
700			580	605	632	653
710			586	612	639	661
720			592	618	646	668
730			597	624	652	675
740			603	631	659	682
750			609	637	666	690

INSTALLED HEIGHT DIMENSIONS **J4** AND **J7** ALLOW ±25mm ADJUSTMENT.

TAKE-OUT DIMENSIONS **A1**, **A2**, **A3**, **J5**, **J6** AND **J8** ALLOW ±75mm ADJUSTMENT AND ASSUME USE OF A STANDARD F228A EYEBOLT.

WHERE SEVERE HEADROOM LIMITATIONS EXIST, DIMENSIONS **A1**, **A2** AND **A3** CAN BE REDUCED AND DIMENSIONS **J5**, **J6** AND **J8** INCREASED AS FOLLOWS BY USE OF A SHORTENED EYEBOLT:

ØX	M12	M16	M20	M24	M30	M36	M42
CHANGE mm	160	160	140	140	120	100	80

NOTE DIA. **X** IS THREADED ISO METRIC COARSE RIGHT HAND AS STANDARD.

NOTE THAT DIMENSIONS **A1**, **A2**, **A3**, **J4**, **J5**, **J6**, **J7** AND **J8** ARE GIVEN AT ZERO ROTATION, THAT IS WITH THE LEVER IN THE UPPERMOST POSITION.

N.B. DIMENSION **TA** IS THE MINIMUM FORWARD CLEARANCE REQUIRED.

C5: DIMENSIONS FOR SIZES C5–16 TO C5–19

MOVEMENT PROVIDED mm	ALL SIZES								C5–16				C5–17				C5–18				C5–19			
	ALL			HS HD	VS VD	HBMCS	HBM	VBM		VIS VID	VBM	VBMCS		VIS VID	VBM	VBMCS		VIS VID	VBM	VBMCS		VIS VID	VBM	VBMCS
	C mm	D mm	E mm	A1 mm	A2 mm	J4 mm	J5 mm	J8 mm	ØX mm	A3 mm	J6 mm	J7 mm	ØX mm	A3 mm	J6 mm	J7 mm	ØX mm	A3 mm	J6 mm	J7 mm	ØX mm	A3 mm	J6 mm	J7 mm
	AT ZERO ROTATION								AT 0° ROTATION				AT 0° ROTATION				AT 0° ROTATION				AT 0° ROTATION			
60	80	66	46	609		625	-179	-179	M30	1081		1030	M36	1128		1075								
70	94	77	54	601		633	-171	-171	M30	1073		1038	M36	1120		1083	M36	1139		1103	M42	1184		1148
80	107	88	61	594		640	-164	-164	M30	1066		1045	M30	1113		1090	M36	1132		1110	M36	1177		1155
90	120	99	69	586		648	-156	-156	M24	1058		1053	M30	1105		1098	M30	1124		1118	M36	1169		1163
100	134	110	77	578	528	656	-148	-148	M24	1050	317	1061	M30	1097		1106	M30	1116		1126	M36	1161		1171
110	147	121	84	571	521	663	-141	-141	M24	1043	324	1068	M30	1090	369	1113	M30	1109	389	1133	M30	1154	434	1178
120	161	132	92	563	513	671	-133	-133	M24	1035	332	1076	M24	1082	377	1121	M30	1101	397	1141	M30	1146	442	1186
130	174	143	100	555	505	679	-125	-125	M20	1027	340	1084	M24	1074	385	1129	M30	1093	405	1149	M30	1138	450	1194
140	187	153	107	548	498	686	-118	-118	M20	1020	347	1091	M24	1067	392	1136	M30	1086	412	1156	M30	1131	457	1201
150	201	164	115	540	490	694	-110	-110	M20	1012	355	1099	M24	1059	400	1144	M24	1078	420	1164	M30	1123	465	1209
160	214	175	123	532	482	702	-102	-102	M20	1004	363	1107	M24	1051	408	1152	M24	1070	428	1172	M30	1115	473	1217
170	228	186	130	525	475	709	-95	-95	M20	997	370	1114	M20	1044	415	1159	M24	1063	435	1179	M30	1108	480	1224
180	241	197	138	517	517	706	-87	-87	M20	989	378	111	M20	1036	423	1156	M24	1055	443	1176	M24	1100	488	1221
190	254	208	146	509	509	714	-79	-79	M20	981	386	1119	M20	1028	431	1164	M24	1047	451	1184	M24	1092	496	1229
200	268	219	154	501	501	722	-71	-71	M20	973	394	1127	M20	1020	439	1172	M24	1039	459	1192	M24	1084	504	1237
210	281	230	161	494	494	729	-64	-64	M16	966	401	1134	M20	1013	446	1179	M20	1032	466	1199	M24	1077	511	1244
220	294	241	169	486	486	737	-56	-56	M16	958	409	1142	M20	1005	454	1187	M20	1024	474	1207	M24	1069	519	1252
230	308	252	177	478	478	745	-48	-48	M16	950	417	1150	M20	997	462	1195	M20	1016	482	1215	M24	1061	527	1260
240	321	263	184	471	471	752	-41	-41	M16	943	424	1157	M20	990	469	1202	M20	1009	489	1222	M24	1054	534	1267
250	335	274	192	508	533	785	-8	-8	M16	935	432	1165	M20	982	477	1210	M20	1001	497	1230	M24	1046	542	1275
260	348	285	200	500	525	793	0	0	M16	927	440	1173	M16	974	485	1218	M20	993	505	1238	M20	1038	550	1283
270	361	296	207	493	518	800	7	7	M16	920	447	1180	M16	967	492	1225	M20	986	512	1245	M20	1031	557	1290
280	375	307	215	485	510	808	15	15	M16	912	455	1188	M16	959	500	1233	M20	978	520	1253	M20	1023	565	1298
290	388	318	223	477	502	816	23	23	M16	904	463	1196	M16	951	508	1241	M20	970	528	1261	M20	1015	573	1306
300	401	329	230	470	495	823	30	30	M16	897	470	1203	M16	944	515	1248	M20	963	535	1268	M20	1008	580	1313
310	415	340	238	462	487	831	38	38	M16	889	478	1211	M16	936	523	1256	M20	955	543	1276	M20	1000	588	1321
320	428	351	246	454	479	839	46	46	M16	881	486	1219	M16	928	531	1264	M16	947	551	1284	M20	992	596	1329
330	442	362	253	447	472	846	53	53	M16	874	493	1226	M16	921	538	1271	M16	940	558	1291	M20	985	603	1336
340	455	373	261	489	514	845	61	61	M16	866	501	1225	M16	913	546	1270	M16	932	566	1290	M20	977	611	1335
350	468	384	269	481	506	853	69	69	M16	858	509	1233	M16	905	554	1278	M16	924	574	1298	M20	969	619	1343
360	482	395	276	474	499	860	76	76	M16	851	516	1240	M16	898	561	1285	M16	917	581	1305	M20	962	626	1350
370	495	406	284	466	491	868	84	84	M16	843	524	1248	M16	890	569	1293	M16	909	589	1313	M20	954	634	1358
380	509	417	292	458	483	876	92	92	M16	835	532	1256	M16	882	577	1301	M16	901	597	1321	M20	946	642	1366
390	522	428	299	451	476	883	99	99	M12	828	539	1263	M16	875	584	1308	M16	894	604	1328	M20	939	649	1373
400	535	439	307	443	468	891	107	107	M12	820	547	1271	M16	867	592	1316	M16	886	612	1336	M16	931	657	1381
410	549	449	315	510	535	919	135	135	M12	812	555	1279	M16	859	600	1324	M16	878	620	1344	M16	923	665	1389
420	562	460	322	503	528	926	142	142	M12	805	562	1286	M16	852	607	1331	M16	871	627	1351	M16	916	672	1396
430	575	471	330	495	520	934	150	150	M12	797	570	1294	M16	844	615	1339	M16	863	635	1359	M16	908	680	1404
440	589	482	338	487	512	942	158	158	M12	789	578	1302	M16	836	623	1347	M16	855	643	1367	M16	900	688	1412
450	602	493	345	480	505	949	165	165	M12	782	585	1309	M16	829	630	1354	M16	848	650	1374	M16	893	695	1419
460	616	504	353	472	497	957	173	173	M12	774	593	1317	M16	821	638	1362	M16	840	658	1382	M16	885	703	1427
470	629	515	361	464	489	965	181	181	M12	766	601	1325	M16	813	646	1370	M16	832	666	1390	M16	877	711	1435
480	642	526	368	457	482	972	188	188	M12	759	608	1332	M16	806	653	1377	M16	825	673	1397	M16	870	718	1442
490	656	537	376	449	474	980	196	196	M12	751	616	1340	M16	798	661	1385	M16	817	681	1405	M16	862	726	1450
500	669	548	384	441	466	988	204	204	M12	743	624	1348	M12	790	669	1393	M16	809	689	1413	M16	854	734	1458
510	683	559	391	509	509	1015	231	231	M12	736	631	1355	M12	783	676	1400	M16	802	696	1420	M16	847	741	1465
520	696	570	399	501	501	1023	239	239	M12	728	639	1363	M12	775	684	1408	M16	794	704	1428	M16	839	749	1473
530	709	581	407	493	493	1031	247	247	M12	720	647	1371	M12	767	692	1416	M16	786	712	1436	M16	831	757	1481
540	723	592	415	485	485	1039	255	255	M12	712	655	1379	M12	759	700	1424	M16	778	720	1444	M16	823	765	1489
550	736	603	422	478	478	1046	262	262	M12	705	662	1386	M12	752	707	1431	M16	771	727	1451	M16	816	772	1496
560	749	614	430	470	470	1054	270	270	M12	697	670	1394	M12	744	715	1439	M16	763	735	1459	M16	808	780	1504
570	763	625	438	462	462	1062	278	278	M12	689	678	1402	M12	736	723	1447	M16	755	743	1467	M16	800	788	1512
580	776	636	445	455	455	1069	285	285	M12	682	685	1409	M12	729	730	1454	M16	748	750	1474	M16	793	795	1519
590	790	647	453	447	447	1077	293	293	M12	674	693	1417	M12	721	738	1462	M16	740	758	1482	M16	785	803	1527
600	803	658	461	439	439	1085	301	301	M12	666	701	1425	M12	713	746	1470	M16	732	766	1490	M16	777	811	1535
610	816	669	468	542	542	1117	333	333	M12	659	708	1432	M12	706	753	1477	M12	725	773	1497	M16	770	818	1542
620	830	680	476	534	534	1125	341	341	M12	651	716	1440	M12	698	761	1485	M12	717	781	1505	M16	762	826	1550
630	843	691	484	526	526	1133	349	349	M12	643	724	1448	M12	690	769	1493	M12	709	789	1513	M16	754	834	1558
640	857	702	491	519	519	1140	356	356	M12	636	731	1455	M12	683	776	1500	M12	702	796	1520	M16	747	841	1565
650	870	713	499	511	511	1148	364	364	M12	628	739	1463	M12	675	784	1508	M12	694	804	1528	M16	739	849	1573
660	883	724	507	503	503	1156	372	372	M12	620	747	1471	M12	667	792	1516	M12	686	812	1536	M16	731	857	1581
670	897	734	514	496	496	1163	379	379	M12	613	754	1478	M12	660	799	1523	M12	679	819	1543	M16	724	864	1588
680	910	745	522	488	488	1171	387	387	M12	605	762	1486	M12	652	807	1531	M12	671	827	1551	M16	716	872	1596
690	923	756	530	480	480	1179	395	395	M12	597	770	1494	M12	644	815	1539	M12	663	835	1559	M16	708	880	1604
700	937	767	537	473	473	1186	402	402	M12	590	777	1501	M12	637	822	1546	M12	656	842	1566	M16	701	887	1611
710	950	778	545	465	465	1194	410	410	M12	582	785	1509	M12	629	830	1554	M12	648	850	1574	M16	693	895	1619
720	964	789	553	457	457	1202	418	418	M12	574	793	1517	M12	621	838	1562	M12	640	858	1582	M16	685	903	1627
730	977	800	560	450	450	1209	425	425	M12	567	800	1524	M12	614	845	1569	M12	633	865	1589	M16	678	910	1634
740	990	811	568	442	442	1217	433	433	M12	559	808	1532	M12	606	853	1577	M12	625	873	1597	M16	670	918	1642
750	1004	822	576	434	434	1225	441	441	M12	551	816	1540	M12	598	861	1585	M12	617	881	1605	M16	662	926	1650

C6: DIMENSIONS FOR SIZES C6–20 TO C6–23

MOVEMENT DEPENDENT DIMENSIONS

		MOVEMENT PROVIDED mm	80–130	140–210	220–300	310–410	420–500	510–600	610–750
TRAVEL RANGE DEPENDENT DIMENSIONS		U	290	290	290	290	400	400	400
		TA	276	379	496	639	756	886	1080
		TB	355	355	355	395	460	535	645
		TC	380	380	380	380	450	450	450
		TD	190	190	190	210	210	230	250
		TE	295	295	355	435	500	575	645
		TF	380	380	380	475	550	630	745
		TG	205	205	205	225	225	240	265
		TH	205	205	205	225	225	240	265
		TJ	305	305	305	305	305	305	305
TOP SUSPENSION DETAILS	C6–20	DD	46	40	33	33	33	33	33
		AA	90	80	70	70	70	70	70
		BB	75	55	55	55	55	55	55
		CC	130	110	100	100	100	100	100
		EE	15	15	12	12	12	12	12
		GG	60	45	40	40	40	40	40
		LL	M42	M36	M30	M30	M30	M30	M30
	C6–21	DD	52	40	33	33	33	33	33
		AA	105	80	70	70	70	70	70
		BB	85	55	55	55	55	55	55
		CC	150	110	100	100	100	100	100
		EE	20	15	12	12	12	12	12
		GG	70	45	40	40	40	40	40
		LL	M48	M36	M30	M30	M30	M30	M30
	C6–22	DD	52	46	40	33	33	33	33
		AA	105	90	80	70	70	70	70
		BB	85	75	55	55	55	55	55
		CC	150	130	110	100	100	100	100
		EE	20	15	15	12	12	12	12
		GG	70	60	45	40	40	40	40
		LL	M48	M42	M36	M30	M30	M30	M30
	C6–23	DD	60	46	40	40	33	33	33
		AA	120	90	80	80	70	70	70
		BB	100	75	55	55	55	55	55
		CC	180	130	110	110	100	100	100
		EE	20	15	15	15	12	12	12
		GG	75	60	45	45	40	40	40
		LL	M56	M42	M36	M36	M30	M30	M30

FIXED DIMENSIONS

FA	520	FQ	150	XE	33
FB	177	FR	355	XF	430
FC	160	FS	455	XG	290
FD	111	FT	290	XH	210
FE	394	FU	75	XJ	340
FF	15	FV	265	XK	590
FG	75	FW	33	XL	33
FH	33	FX	200	XM	280
FJ	45	FY	260	XN	40
FK	355	FZ	490	XP	345
FL	265	XA	760	XQ	228
FM	20	XB	290	XR	305
FN	280	XC	380		
FP	150	XD	400		

SPRING SIZE DEPENDENT DIMENSIONS

	C6–20	C6–21	C6–22	C6–23
SA	662	735	782	848
SB	702	775	822	888
SC	830	900	950	1015
SD	855	925	975	1040
SE	855	925	975	1040
SF	380	385	390	395

WEIGHTS (kgf)

	C6–20	C6–21	C6–22	C6–23
HS/HD	270	300	330	370
VS/VD	290	320	350	380
VIS/VID	300	330	360	390
HBMCS	300	330	360	390
HBM	260	290	320	360
VBM	280	310	340	370
VBMCS	320	350	380	410
VIBM	290	320	340	380

SINGLE POINT SUSPENSION DIMENSION 'V'

MOVEMENT PROVIDED mm	ALL SIZES		C6–20	C6–21	C6–22	C6–23
	V1	V3	V2	V2	V2	V2
80	83	97				
90	93	108				
100	103	120				
110	112	131				
120	122	142				
130	132	153	142	143		
140	141	164	152	153	155	156
150	151	175	162	164	165	167
160	160	186	172	174	176	177
170	170	197	182	184	186	188
180	179	208	192	194	196	198
190	188	218	201	204	206	208
200	197	228	211	214	216	219
210	206	239	220	223	226	229
220	215	249	230	233	236	239
230	224	259	239	243	246	249
240	233	270	248	252	256	259
250	241	279	258	262	265	269
260	250	289	267	271	275	279
270	259	299	276	280	284	288
280	267	309	285	289	294	298
290	275	319	293	298	303	308
300	284	328	302	307	312	317
310	TYPES HS AND VIS ARE NOT USED ABOVE 300mm TRAVEL		311	316	322	327
320			319	325	331	336
330			328	334	340	346
340			336	343	349	355
350			345	352	358	364
360			353	360	367	373
370			361	369	376	382
380			369	377	384	392
390			378	386	393	401
400			386	394	402	410
410			394	402	410	418
420			401	410	419	427
430			409	419	427	436
440			417	427	436	445
450			425	435	444	453
460			432	443	452	462
470			440	451	461	471
480			447	459	469	479
490			455	466	477	488
500			462	474	485	496
510			470	482	493	505
520			477	489	501	513
530			484	497	509	521
540			491	505	517	529
550			498	512	525	538
560			505	519	532	546
570			512	527	540	554
580			519	534	548	562
590			526	541	555	570
600			533	549	563	578
610			540	556	571	586
620			547	563	578	593
630			553	570	585	601
640			560	577	593	609
650			566	584	600	617
660			573	591	607	624
670			579	598	615	632
680			586	604	622	639
690			592	611	629	647
700			599	618	636	655
710			605	625	643	662
720			611	631	650	669
730			617	638	657	677
740			624	644	664	684
750			630	651	671	691

INSTALLED HEIGHT DIMENSIONS **J4** AND **J7** ALLOW ±25mm ADJUSTMENT.

TAKE-OUT DIMENSIONS **A1**, **A2**, **A3**, **J5**, **J6** AND **J8** ALLOW ±75mm ADJUSTMENT AND ASSUME USE OF A STANDARD F228A EYEBOLT.

WHERE SEVERE HEADROOM LIMITATIONS EXIST, DIMENSIONS **A1**, **A2** AND **A3** CAN BE REDUCED AND DIMENSIONS **J5**, **J6** AND **J8** INCREASED AS FOLLOWS BY USE OF A SHORTENED EYEBOLT:

ØX	M16	M20	M24	M30	M36	M42	M48	M56
CHANGE mm	160	140	140	120	100	80	NIL	NIL

NOTE DIA. **X** IS THREADED ISO METRIC COARSE RIGHT HAND AS STANDARD.

NOTE THAT DIMENSIONS **A1**, **A2**, **A3**, **J4**, **J5**, **J6**, **J7** AND **J8** ARE GIVEN AT ZERO ROTATION, THAT IS WITH THE LEVER IN THE UPPERMOST POSITION.

N.B. DIMENSION **TA** IS THE MINIMUM FORWARD CLEARANCE REQUIRED.

C6: DIMENSIONS FOR SIZES C6–20 TO C6–23

MOVEMENT PROVIDED mm	ALL SIZES				C6–20								C6–21								C6–22								C6–23							
	ALL			HBMCS		HS HD	VS VD	VIS VID	VBM	VBMCS	HBMVBM		HS HD	VS VD	VIS VID	VBM	VBMCS	HBMVBM		HS HD	VS VD	VIS VID	VBM	VBMCS	HBMVBM		HS HD	VS VD	VIS VID	VBM	VBMCS	HBMVBM				
	C mm	D mm	E mm	J4 mm	ØX mm	A1 mm	A2 mm	A3 mm	J6 mm	J7 mm	J5/J8 mm	ØX mm	A1 mm	A2 mm	A3 mm	J6 mm	J7 mm	J5/J8 mm	ØX mm	A1 mm	A2 mm	A3 mm	J6 mm	J7 mm	J5/J8 mm	ØX mm	A1 mm	A2 mm	A3 mm	J6 mm	J7 mm	J5/J8 mm				
	AT 0° ROTATION				AT ZERO ROTATION							AT ZERO ROTATION							AT ZERO ROTATION							AT ZERO ROTATION									
80	107	88	61	820	M42	669		1321		1400	-109	M48	709		1434		1470	-149																		
90	120	99	69	823	M42	661		1313		1408	-101	M42	661		1386		1478	-101	M48	701		1473		1528	-141	M56	716		1554		1593	-156				
100	134	110	77	836	M36	653		1305		1416	-93	M42	653		1378		1486	-93	M48	693		1465		1536	-133	M56	708		1546		1601	-148				
110	147	121	84	843	M36	646		1298		1423	-86	M42	646		1371		1493	-86	M42	646		1418		1543	-86	M48	686		1524		1608	-126				
120	161	132	92	851	M36	638		1290		1431	-78	M42	638		1363		1501	-78	M42	638		1410		1551	-78	M48	678		1516		1616	-118				
130	174	143	100	859	M36	630	570	1282	580	1439	-70	M36	630	570	1355	650	1509	-70	M42	630		1402		1559	-70	M48	670		1508		1624	-110				
140	187	153	107	867	M36	623	563	1275	587	1426	-63	M36	623	563	1348	657	1496	-63	M42	623	563	1395	707	1546	-63	M42	623	563	1461	772	1611	-63				
150	201	164	115	854	M30	615	555	1267	595	1434	-55	M36	615	555	1340	665	1504	-55	M36	615	555	1387	715	1154	-55	M42	615	555	1453	780	1619	-55				
160	214	175	123	862	M30	607	547	1259	603	1442	-47	M36	607	547	1332	673	1012	-47	M36	607	547	1379	723	1562	-47	M42	607	547	1445	788	1627	-47				
170	228	186	130	869	M30	600	540	1252	610	1449	-40	M36	600	540	1325	680	1019	-40	M36	600	540	1372	730	1569	-40	M42	600	540	1438	795	1634	-40				
180	241	197	138	877	M30	592	532	1244	618	1457	-32	M30	592	532	1317	688	1527	-32	M36	592	532	1364	738	1577	-32	M42	592	532	1430	803	1642	-32				
190	254	208	146	885	M30	584	524	1236	626	1465	-24	M30	584	524	1309	696	1535	-24	M36	584	524	1356	746	1585	-24	M36	584	524	1422	811	1650	-24				
200	268	219	154	893	M30	576	516	1228	634	1473	-16	M30	576	516	1301	704	1543	-16	M36	576	516	1348	754	1593	-16	M36	576	516	1414	819	1658	-16				
210	281	230	161	900	M30	569	509	1221	641	1480	-9	M30	569	509	1294	711	1550	-9	M36	569	509	1341	761	1600	-9	M36	569	509	1407	826	1665	-9				
220	294	241	169	891	M30	561	561	1213	649	1471	-1	M30	561	561	1286	719	1541	-1	M30	561	561	1333	769	1591	-1	M36	561	561	1399	834	1656	-1				
230	308	252	177	899	M24	553	553	1205	657	1479	7	M30	553	553	1278	727	1549	7	M30	553	553	1325	777	1599	7	M36	553	553	1391	842	1664	7				
240	321	263	184	906	M24	546	546	1198	664	1486	14	M30	546	546	1271	734	1556	14	M30	546	546	1318	784	1606	14	M36	546	546	1384	849	1671	14				
250	335	274	192	914	M24	538	538	1190	672	1494	22	M30	538	538	1263	742	1564	22	M30	538	538	1310	792	1614	22	M36	538	538	1376	857	1679	22				
260	348	285	200	922	M24	530	530	1182	680	1502	30	M30	530	530	1255	750	1572	30	M30	530	530	1302	800	1622	30	M36	530	530	1368	865	1687	30				
270	361	296	207	929	M24	523	523	1175	687	1509	37	M30	523	523	1248	757	1579	37	M30	523	523	1295	807	1629	37	M36	523	523	1361	872	1694	37				
280	375	307	215	937	M24	515	515	1167	695	1517	45	M30	515	515	1240	765	1587	45	M30	515	515	1287	815	1637	45	M30	515	515	1353	880	1702	45				
290	388	318	223	945	M24	507	507	1159	703	1525	53	M24	507	507	1232	773	1595	53	M30	507	507	1279	823	1645	53	M30	507	507	1345	888	1710	53				
300	401	329	230	952	M24	500	500	1152	710	1532	60	M24	500	500	1225	780	1602	60	M30	500	500	1272	830	1652	60	M30	500	500	1338	895	1717	60				
310	415	340	238	971	M24	532	572	1144	718	1531	88	M24	532	572	1217	788	1601	88	M30	532	572	1264	838	1651	88	M30	532	572	1330	903	1716	88				
320	428	351	246	979	M24	524	564	1136	726	1539	96	M24	524	564	1209	796	1609	96	M30	524	564	1256	846	1659	96	M30	524	564	1322	911	1724	96				
330	442	362	253	986	M20	517	557	1129	733	1546	103	M24	517	557	1202	803	1616	103	M30	517	557	1249	853	1666	103	M30	517	557	1315	918	1731	103				
340	455	373	261	994	M20	509	549	1121	741	1554	111	M24	509	549	1194	811	1624	111	M30	509	549	1241	861	1674	111	M30	509	549	1307	926	1739	111				
350	468	384	269	1002	M20	501	541	1113	749	1562	119	M24	501	541	1186	819	1632	119	M30	501	541	1233	869	1682	119	M30	501	541	1299	934	1747	119				
360	482	395	276	1009	M20	494	534	1106	756	1569	126	M24	494	534	1179	826	1639	126	M24	494	534	1226	876	1689	126	M30	494	534	1292	941	1754	126				
370	495	406	284	1017	M20	486	526	1098	764	1577	134	M24	486	526	1171	834	1647	134	M24	486	526	1218	884	1697	134	M30	486	526	1284	949	1762	134				
380	509	417	292	1025	M20	478	518	1090	772	1585	142	M24	478	518	1163	842	1655	142	M24	478	518	1210	892	1705	142	M30	478	518	1276	957	1770	142				
390	522	428	299	1032	M20	471	511	1083	779	1592	149	M24	471	511	1156	849	1662	149	M24	471	511	1203	899	1712	149	M30	471	511	1269	964	1777	149				
400	535	439	307	1040	M20	463	503	1075	787	1600	157	M24	463	503	1148	857	1670	157	M24	463	503	1195	907	1720	157	M30	463	503	1261	972	1785	157				
410	549	449	315	1048	M20	455	495	1067	795	1608	165	M24	455	495	1140	865	1678	165	M24	455	495	1187	915	1728	165	M30	455	495	1253	980	1793	165				
420	562	460	322	1055	M20	513	553	1060	802	1615	172	M20	513	553	1133	872	1685	172	M24	513	553	1180	922	1735	172	M30	513	553	1246	987	1800	172				
430	575	471	330	1063	M20	505	545	1052	810	1623	180	M20	505	545	1125	880	1693	180	M24	505	545	1172	930	1743	180	M30	505	545	1238	995	1808	180				
440	589	482	338	1071	M20	497	537	1044	818	1631	188	M20	497	537	1117	888	1701	188	M24	497	537	1164	938	1751	188	M24	497	537	1230	1003	1816	188				
450	602	493	345	1078	M20	490	530	1037	825	1638	195	M20	490	530	1110	895	1708	195	M24	490	530	1157	945	1758	195	M24	490	530	1223	1010	1823	195				
460	616	504	353	1086	M20	482	522	1029	833	1646	203	M20	482	522	1102	903	1716	203	M24	482	522	1149	953	1766	203	M24	482	522	1215	1018	1831	203				
470	629	515	361	1094	M20	474	514	1021	841	1654	211	M20	474	514	1094	911	1724	211	M24	474	514	1141	961	1774	211	M24	474	514	1207	1026	1839	211				
480	642	526	368	1101	M20	467	507	1014	848	1661	218	M20	467	507	1087	918	1731	218	M24	467	507	1134	968	1781	218	M24	467	507	1200	1033	1846	218				
490	656	537	376	1109	M20	459	499	1006	856	1669	226	M20	459	499	1079	926	1739	226	M24	459	499	1126	976	1789	226	M24	459	499	1192	1041	1854	226				
500	669	548	384	1117	M20	451	491	998	864	1677	234	M20	451	491	1071	934	1747	234	M24	451	491	1118	984	1797	234	M24	451	491	1184	1049	1862	234				
510	683	559	391	1139	M20	519	559	991	871	1679	256	M20	519	559	1064	941	1749	256	M20	519	559	1111	991	1799	256	M24	519	559	1177	1056	1864	256				
520	696	570	399	1147	M16	511	551	983	879	1687	264	M20	511	551	1056	949	1757	264	M20	511	551	1103	999	1807	264	M24	511	551	1169	1064	1872	264				
530	709	581	407	1155	M16	503	543	975	887	1695	272	M20	503	543	1048	957	1765	272	M20	503	543	1095	1007	1815	272	M24	503	543	1161	1072	1880	272				
540	723	592	415	1163	M16	495	535	967	895	1703	280	M20	495	535	1040	965	1773	280	M20	495	535	1087	1015	1823	280	M24	495	535	1153	1080	1888	280				
550	736	603	422	1170	M16	488	528	960	902	1710	287	M20	488	528	1033	972	1780	287	M20	488	528	1080	1022	1830	287	M24	488	528	1146	1087	1895	287				
560	749	614	430	1178	M16	480	520	952	910	1718	295	M20	480	520	1025	980	1788	295	M20	480	520	1072	1030	1838	295	M24	480	520	1138	1095	1903	295				
570	763	625	438	1186	M16	472	512	944	918	1726	303	M20	472	512	1017	988	1796	303	M20	472	512	1064	1038	1846	303	M24	472	512	1130	1103	1911	303				
580	776	636	445	1193	M16	465	505	937	925	1733	310	M20	465	505	1010	995	1803	310	M20	465	505	1057	1045	1853	310	M24	465	505	1123	1110	1918	310				
590	790	647	453	1201	M16	457	497	929	933	1741	318	M20	457	497	1002	1003	1811	318	M20	457	497	1049	1053	1861	318	M24	457	497	1115	1118	1926	318				
600	803	658	461	1209	M16	449	489	921	941	1749	326	M20	449	489	994	1011	1819	326	M20	449	489	1041	1061	1869	326	M24	449	489	1107	1126	1934	326				
610	816	669	468	1236	M16	552	552	914	948	1756	358	M20	552	552	987	1018	1826	358	M20	552	552	1034	1068	1876	358	M24	552	552	1100	1133	1941	358				
620	830	680	476	1244	M16	544	544	906	956	1764	366	M20	544	544	979	1026	1834	366	M20	544	544	1026	1076	1884	366	M24	544	544	1092	1141	1949	366				
630	843	691	484	1252	M16	536	536	898	964	1772	374	M20	536	536	971	1034	1842	374	M20	536	536	1018	1084	1892	374	M24	536	536	1084	1149	1957	374				
640	857	702	491	1259	M16	529	529	891	971	1779	381	M20	529	529	964	1041	1849	381	M20	529	529	1011	1091	1899	381	M20	529	529	1077	1156	1964	381				
650	870	713	499	1267	M16	521	521	883	979	1787	389	M16	521	521	956	1049	1857	389	M20	521	521	1003	1099	1907	389	M20	521	521	1069	1164	1972	389				
660	883	724	507	1275	M16	513	513	875	987	1795	397	M16	513	513	948	1057	1865	397	M20	513	513	995	1107	1915	397	M20	513	513	1061	1172	1980	397				
670	897	734	514	1282	M16	506	506	868	994	1802	404	M16	506	506	941	1064	1872	404	M20	506	506	988	1114	1922	404	M20	506	506	1054	1179	1987	404				
680	910	745	522	1290	M16	498	498	860	1002	1810	412	M16	498	498	933	1072	1880	412	M20	498	498	980	1122	1930	412	M20	498	498	1046	1187	1995	412				
690	923	756	530	1298	M16	490	490	852	1010	1818	420	M16	490	490	925	1080	1888	420	M20	490	490	972	1130	1938	420	M20	490	490	1038	1195	2003	420				
700	937	767	537	1305	M16	483	483	845	1017	1825	427	M16	483	483	918	1087	1895	427	M20	483	483	965	1137	1945	427	M20	483	483	1031	1202	2010	427				
710	950	778	545	1313	M16	475	475	837	1025	1833	435	M16	475	475	910	1095	1903	435	M20	475	475	957	1145	1953	435	M20	475	475	1023	1210	2018	435				
720	964	789	553	1321	M16	467	467	829	1033	1841	443	M16	467	467	902	1103	1911	443	M20	467	467	949	1153	1961	443	M20	467	467	1015	1218	2026	443				
730	977	800	560	1328	M16	460	460	822	1040	1848	450	M16	460	460	895	1110	1918	450	M20	460	460	942	1160	1968	450	M20	460	460	1008	1225	2033	450				
740	990	811	568	1336	M16	452	452	814	1048	1856	458	M16	452	452	887	1118	1926	458	M20	452	452	934	1168	1976	458	M20	452	452	1000	1233	2041	458				
750	1004	822	576	1344	M16	444	444	806	1056	1864	466	M16	444	444	879	1126	1934	466	M20	444	444	926	1176	1984	466	M20	444	444	992	1241	2049	466				

C7: DIMENSIONS FOR SIZES C7–24 TO C7–27

MOVEMENT DEPENDENT DIMENSIONS

		MOVEMENT PROVIDED mm	90–180	190–340	350–440	450–540	550–640	650–750
TRAVEL RANGE DEPENDENT DIMENSIONS		U	355	355	385	385	525	525
		TA	445	630	745	860	975	1102
		TB	510	510	540	540	600	665
		TC	475	475	475	475	600	600
		TD	270	270	270	270	270	280
		TE	510	510	540	600	640	695
		TF	475	475	525	600	685	770
		TG	290	290	290	290	290	300
		TH	290	290	290	290	290	300
		TJ	460	460	460	460	460	460
TOP SUSPENSION DETAILS	C7–24	DD	60	46	40	40	40	40
		AA	120	90	80	80	80	80
		BB	100	75	55	55	55	55
		CC	180	130	110	110	110	110
		EE	20	15	15	15	15	15
		GG	75	60	45	45	45	45
		LL	M56	M42	M36	M36	M36	M36
	C7–25	DD	68	52	40	40	40	40
		AA	140	105	80	80	80	80
		BB	115	85	55	55	55	55
		CC	200	150	110	110	110	110
		EE	20	20	15	15	15	15
		GG	80	70	45	45	45	45
		LL	M64	M48	M36	M36	M36	M36
	C7–26	DD	68	60	46	46	40	40
		AA	140	120	90	90	80	80
		BB	115	100	75	75	55	55
		CC	200	180	130	130	110	110
		EE	20	20	15	15	15	15
		GG	80	75	60	60	45	45
		LL	M64	M56	M42	M42	M36	M36
	C7–27	DD	76	60	52	46	46	46
		AA	155	120	105	90	90	90
		BB	130	100	85	75	75	75
		CC	220	180	150	130	130	130
		EE	25	20	20	15	15	15
		GG	90	75	70	60	60	60
		LL	M72	M56	M48	M42	M42	M42

FIXED DIMENSIONS

FA	655	FQ	150	XE	40
FB	228	FR	480	XF	570
FC	240	FS	585	XG	355
FD	179	FT	355	XH	320
FE	526	FU	100	XJ	440
FF	25	FV	350	XK	805
FG	100	FW	40	XL	40
FH	40	FX	280	XM	400
FJ	65	FY	375	XN	50
FK	480	FZ	630	XP	500
FL	350	XA	1020	XQ	302
FM	30	XB	355	XR	460
FN	400	XC	535		
FP	230	XD	500		

SPRING SIZE DEPENDENT DIMENSIONS

	C7–24	C7–25	C7–26	C7–27
SA	868	868	868	868
SB	918	918	918	918
SC	1115	1115	1115	1115
SD	1150	1150	1150	1150
SE	1150	1150	1150	1150
SF	540	540	540	540

WEIGHTS (kgf)

	C7–24	C7–25	C7–26	C7–27
HS/HD	580	620	670	720
VS/VD	610	660	710	760
VIS/VID	630	680	730	780
HBMCS	630	670	720	770
HBM	560	610	650	710
VBM	590	640	690	740
VBMCS	670	720	770	820
VIBM	610	650	700	750

SINGLE POINT SUSPENSION DIMENSION 'V'

MOVEMENT PROVIDED mm	ALL SIZES		C7–24	C7–25	C7–26	C7–27
	V1	V3	V2	V2	V2	V2
90	91	110				
100	101	122				
110	111	133				
120	120	144				
130	130	156				
140	139	167	149			
150	149	178	158	162	165	166
160	157	189	168	172	175	177
170	167	200	178	182	185	187
180	176	211	187	192	196	198
190	185	222	197	202	206	208
200	194	232	206	212	216	218
210	203	243	216	222	226	229
220	212	254	225	232	236	239
230	220	264	234	241	246	249
240	229	275	243	251	256	259
250	238	285	252	260	266	269
260	246	295	261	270	275	279
270	255	305	270	279	285	289
280	263	315	279	288	295	299
290	272	325	287	297	304	308
300	280	335	296	307	314	318
310	288	345	304	316	323	328
320	297	355	313	325	331	337
330	305	364	321	334	342	347
340	313	374	330	342	351	356
350	TYPES HS AND VIS ARE NOT USED ABOVE 340mm TRAVEL		338	351	360	366
360			346	360	369	375
370			354	369	378	384
380			362	377	387	394
390			370	386	396	403
400			378	394	405	412
410			386	403	414	421
420			394	411	423	430
430			401	419	431	439
440			409	428	440	448
450			416	436	449	457
460			424	444	457	466
470			431	452	466	475
480			439	460	474	483
490			446	468	483	492
500			454	476	491	501
510			461	484	499	509
520			468	492	508	518
530			475	500	516	527
540			482	507	524	535
550			489	515	532	543
560			496	523	540	552
570			503	530	548	560
580			510	538	556	569
590			517	545	564	577
600			523	553	572	585
610			530	560	580	593
620			537	567	588	601
630			543	575	596	609
640			550	582	603	617
650			556	589	611	625
660			563	596	619	633
670			569	603	626	641
680			576	610	634	649
690			582	617	641	657
700			588	624	649	665
710			594	631	656	673
720			601	638	663	680
730			607	645	671	688
740			613	652	678	696
750			619	658	685	703

INSTALLED HEIGHT DIMENSIONS **J4** AND **J7** ALLOW ±25mm ADJUSTMENT.

TAKE-OUT DIMENSIONS **A1**, **A2**, **A3**, **J5**, **J6** AND **J8** ALLOW ±75mm ADJUSTMENT AND ASSUME USE OF A STANDARD F228A EYEBOLT.

WHERE SEVERE HEADROOM LIMITATIONS EXIST, DIMENSIONS **A1**, **A2** AND **A3** CAN BE REDUCED AND DIMENSIONS **J5**, **J6** AND **J8** INCREASED AS FOLLOWS BY USE OF A SHORTENED EYEBOLT:

ØX	M20	M24	M30	M36	M42	M48	M56	M64	M72
CHANGE mm	140	140	120	100	80	NIL	NIL	NIL	NIL

NOTE DIA. **X** IS THREADED ISO METRIC COARSE RIGHT HAND AS STANDARD.

NOTE THAT DIMENSIONS **A1**, **A2**, **A3**, **J4**, **J5**, **J6**, **J7** AND **J8** ARE GIVEN AT ZERO ROTATION, THAT IS WITH THE LEVER IN THE UPPERMOST POSITION.

N.B. DIMENSION **TA** IS THE MINIMUM FORWARD CLEARANCE REQUIRED.

C7: DIMENSIONS FOR SIZES C7–24 TO C7–27

MOTOR FRAME SIZE mm	ALL SIZES				C7–24								C7–25								C7–26								C7–27							
	ALL			HBMCS		HS HD	VS VD	VIS VID	VBM	VBMCS	HBMVVBM		HS HD	VS VD	VIS VID	VBM	VBMCS	HBMVVBM		HS HD	VS VD	VIS VID	VBM	VBMCS	HBMVVBM		HS HD	VS VD	VIS VID	VBM	VBMCS	HBMVVBM	
	C mm	D mm	E mm	J4 mm	ØX mm	A1 mm	A2 mm	A3 mm	J7 mm	J5/J8 mm		ØX mm	A1 mm	A2 mm	A3 mm	J6 mm	J7 mm	J5/J8 mm	ØX mm	A1 mm	A2 mm	A3 mm	J6 mm	J7 mm	J5/J8 mm	ØX mm	A1 mm	A2 mm	A3 mm	J6 mm	J7 mm	J5/J8 mm	
	AT 0° ROTATION				AT ZERO ROTATION							AT ZERO ROTATION							AT ZERO ROTATION							AT ZERO ROTATION							
90	120	99	69	1092	M56	871		1739		1847	-71	M64	886		1754		1847	-86															
100	134	110	77	1100	M56	863		1731		1855	-63	M64	878		1746		1855	-78															
110	147	121	84	1107	M56	856		1724		1862	-56	M64	871		1739		1862	-71	M64	871			1739	1862	-71								
120	161	132	92	1115	M48	833		1701		1870	-33	M56	848		1716		1870	-48	M64	863			1731	1870	-63	M72	913		1781		1870	-113
130	174	143	100	1123	M48	825		1693		1878	-25	M56	840		1708		1878	-40	M64	855			1723	1878	-55	M64	855		1723		1878	-55
140	187	153	107	1130	M48	818	818	1686	842	1885	-18	M56	833	833	1701		1885	-33	M64	848			1716	1885	-48	M64	848		1716		1885	-48
150	201	164	115	1138	M48	810	810	1678	850	1893	-10	M56	825	825	1693	835	1893	-25	M56	825	825	1693	835	1893	-25	M64	840	840	1708	820	1893	-40
160	214	175	123	1146	M42	762	762	1630	898	1901	38	M48	802	802	1670	858	1901	-2	M56	817	817	1685	843	1901	-17	M64	832	832	1700	828	1901	-32
170	228	186	130	1153	M42	755	755	1623	905	1908	45	M48	795	795	1663	865	1908	5	M56	810	810	1678	850	1908	-10	M56	810	810	1678	850	1908	-10
180	241	197	138	1161	M42	747	747	1615	913	1916	53	M48	787	787	1655	873	1916	13	M56	802	802	1670	858	1916	-2	M56	802	802	1670	858	1916	-2
190	254	208	146	1145	M42	739	739	1607	921	1900	61	M48	779	779	1647	881	1900	21	M56	794	794	1662	866	1900	6	M56	794	794	1662	866	1900	6
200	268	219	154	1153	M42	731	731	1599	929	1908	69	M48	771	771	1639	889	1908	29	M48	771	771	1639	889	1908	29	M56	786	786	1654	874	1908	14
210	281	230	161	1160	M42	724	724	1592	936	1915	76	M42	724	724	1592	936	1915	76	M48	764	764	1632	896	1915	36	M56	779	779	1647	881	1915	21
220	294	241	169	1168	M36	716	716	1584	944	1923	84	M42	716	716	1584	944	1923	84	M48	756	756	1624	904	1923	44	M56	771	771	1639	889	1923	29
230	308	252	177	1176	M36	708	708	1576	952	1931	92	M42	708	708	1576	952	1931	92	M48	748	748	1616	912	1931	52	M56	763	763	1631	897	1931	37
240	321	263	184	1183	M36	701	701	1569	959	1938	99	M42	701	701	1569	959	1938	99	M48	741	741	1609	919	1938	59	M48	741	741	1609	919	1938	59
250	335	274	192	1191	M36	693	693	1561	967	1946	107	M42	693	693	1561	967	1946	107	M48	733	733	1601	927	1946	67	M48	733	733	1601	927	1946	67
260	348	285	200	1199	M36	685	685	1553	975	1954	115	M42	685	685	1553	975	1954	115	M42	685	685	1553	975	1954	115	M48	725	725	1593	935	1954	75
270	361	296	207	1206	M36	678	678	1546	982	1961	122	M42	678	678	1546	982	1961	122	M42	678	678	1546	982	1961	122	M48	718	718	1586	942	1961	82
280	375	307	215	1214	M36	670	670	1538	990	1969	130	M42	670	670	1538	990	1969	130	M42	670	670	1538	990	1969	130	M48	710	710	1578	950	1969	90
290	388	318	223	1222	M36	662	662	1530	998	1977	138	M36	662	662	1530	998	1977	138	M42	662	662	1530	998	1977	138	M48	702	702	1570	958	1977	98
300	401	329	230	1229	M36	655	655	1523	1005	1984	145	M36	655	655	1523	1005	1984	145	M42	655	655	1523	1005	1984	145	M48	695	695	1563	965	1984	105
310	415	340	238	1237	M30	647	647	1515	1013	1992	153	M36	647	647	1515	1013	1992	153	M42	647	647	1515	1013	1992	153	M42	647	647	1515	1013	1992	153
320	428	351	246	1245	M30	639	639	1507	1021	2000	161	M36	639	639	1507	1021	2000	161	M42	639	639	1507	1021	2000	161	M42	639	639	1507	1021	2000	161
330	442	362	253	1252	M30	632	632	1500	1028	2007	168	M36	632	632	1500	1028	2007	168	M42	632	632	1500	1028	2007	168	M42	632	632	1500	1028	2007	168
340	455	373	261	1260	M30	624	624	1492	1036	2015	176	M36	624	624	1492	1036	2015	176	M42	624	624	1492	1036	2015	176	M42	624	624	1492	1036	2015	176
350	468	384	269	1250	M30	646	646	1484	1044	2005	184	M36	646	646	1484	1044	2005	184	M42	646	646	1484	1044	2005	184	M42	646	646	1484	1044	2005	184
360	482	395	276	1257	M30	639	639	1477	1051	2012	191	M36	639	639	1477	1051	2012	191	M36	639	639	1477	1051	2012	191	M42	639	639	1477	1051	2012	191
370	495	406	284	1265	M30	631	631	1469	1059	2020	199	M36	631	631	1469	1059	2020	199	M36	631	631	1469	1059	2020	199	M42	631	631	1469	1059	2020	199
380	509	417	292	1273	M30	623	623	1461	1067	2028	207	M36	623	623	1461	1067	2028	207	M36	623	623	1461	1067	2028	207	M42	623	623	1461	1067	2028	207
390	522	428	299	1280	M30	616	616	1454	1074	2035	214	M36	616	616	1454	1074	2035	214	M36	616	616	1454	1074	2035	214	M42	616	616	1454	1074	2035	214
400	535	439	307	1288	M30	608	608	1446	1082	2043	222	M36	608	608	1446	1082	2043	222	M36	608	608	1446	1082	2043	222	M42	608	608	1446	1082	2043	222
410	549	449	315	1296	M30	600	600	1438	1090	2051	230	M36	600	600	1438	1090	2051	230	M36	600	600	1438	1090	2051	230	M42	600	600	1438	1090	2051	230
420	562	460	322	1303	M30	593	593	1431	1097	2058	237	M30	593	593	1431	1097	2058	237	M36	593	593	1431	1097	2058	237	M42	593	593	1431	1097	2058	237
430	575	471	330	1311	M30	585	585	1423	1105	2066	245	M30	585	585	1423	1105	2066	245	M36	585	585	1423	1105	2066	245	M36	585	585	1423	1105	2066	245
440	589	482	338	1319	M30	577	577	1415	1113	2074	253	M30	577	577	1415	1113	2074	253	M36	577	577	1415	1113	2074	253	M36	577	577	1415	1113	2074	253
450	602	493	345	1324	M30	570	630	1408	1120	2079	260	M30	570	630	1408	1120	2079	260	M36	570	630	1408	1120	2079	260	M36	570	630	1408	1120	2079	260
460	616	504	353	1332	M30	562	622	1400	1128	2087	268	M30	562	622	1400	1128	2087	268	M36	562	622	1400	1128	2087	268	M36	562	622	1400	1128	2087	268
470	629	515	361	1340	M30	554	614	1392	1136	2095	276	M30	554	614	1392	1136	2095	276	M36	554	614	1392	1136	2095	276	M36	554	614	1392	1136	2095	276
480	642	526	368	1347	M30	547	607	1385	1143	2102	283	M30	547	607	1385	1143	2102	283	M36	547	607	1385	1143	2102	283	M36	547	607	1385	1143	2102	283
490	656	537	376	1355	M30	539	599	1377	1151	2110	291	M30	539	599	1377	1151	2110	291	M36	539	599	1377	1151	2110	291	M36	539	599	1377	1151	2110	291
500	669	548	384	1363	M24	531	591	1369	1159	2118	299	M30	531	591	1369	1159	2118	299	M36	531	591	1369	1159	2118	299	M36	531	591	1369	1159	2118	299
510	683	559	391	1370	M24	524	584	1362	1166	2125	306	M30	524	584	1362	1166	2125	306	M36	524	584	1362	1166	2125	306	M36	524	584	1362	1166	2125	306
520	696	570	399	1378	M24	516	576	1354	1174	2133	314	M30	516	576	1354	1174	2133	314	M30	516	576	1354	1174	2133	314	M36	516	576	1354	1174	2133	314
530	709	581	407	1386	M24	508	568	1346	1182	2141	322	M30	508	568	1346	1182	2141	322	M30	508	568	1346	1182	2141	322	M36	508	568	1346	1182	2141	322
540	723	592	415	1394	M24	500	560	1338	1190	2149	330	M30	500	560	1338	1190	2149	330	M30	500	560	1338	1190	2149	330	M36	500	560	1338	1190	2149	330
550	736	603	422	1401	M24	553	593	1331	1197	2156	337	M30	553	593	1331	1197	2156	337	M30	553	593	1331	1197	2156	337	M36	553	593	1331	1197	2156	337
560	749	614	430	1409	M24	545	585	1323	1205	2164	345	M30	545	585	1323	1205	2164	345	M30	545	585	1323	1205	2164	345	M36	545	585	1323	1205	2164	345
570	763	625	438	1417	M24	537	577	1315	1213	2172	353	M30	537	577	1315	1213	2172	353	M30	537	577	1315	1213	2172	353	M36	537	577	1315	1213	2172	353
580	776	636	445	1424	M24	530	570	1308	1220	2179	360	M30	530	570	1308	1220	2179	360	M30	530	570	1308	1220	2179	360	M36	530	570	1308	1220	2179	360
590	790	647	453	1432	M24	522	562	1300	1228	2187	368	M30	522	562	1300	1228	2187	368	M30	522	562	1300	1228	2187	368	M36	522	562	1300	1228	2187	368
600	803	658	461	1440	M24	514	554	1292	1236	2195	376	M30	514	554	1292	1236	2195	376	M30	514	554	1292	1236	2195	376	M36	514	554	1292	1236	2195	376
610	816	669	468	1447	M24	507	547	1285	1243	2202	383	M30	507	547	1285	1243	2202	383	M30	507	547	1285	1243	2202	383	M36	507	547	1285	1243	2202	383
620	830	680	476	1455	M24	499	539	1277	1251	2210	391	M30	499	539	1277	1251	2210	391	M30	499	539	1277	1251	2210	391	M30	499	539	1277	1251	2210	391
630	843	691	484	1463	M24	491	531	1269	1259	2218	399	M30	491	531	1269	1259	2218	399	M30	491	531	1269	1259	2218	399	M30	491	531	1269	1259	2218	399
640	857	702	491	1470	M24	484	524	1262	1266	2225	406	M30	484	524	1262	1266	2225	406	M30	484	524	1262	1266	2225	406	M30	484	524	1262	1266	2225	406
650	870	713	499	1483	M24	541	571	1254	1274	2228	424	M30	541	571	1254	1274	2228	424	M30	541	571	1254	1274	2228	424	M30	541	571	1254	1274	2228	424
660	883	724	507	1491	M24	533	563	1246	1282	2236	432	M24	533	563	1246	1282	2236	432	M30	533	563	1246	1282	2236	432	M30	533	563	1246	1282	2236	432
670	897	734	514	1498	M24	526	556	1239	1289	2243	439	M24	526	556	1239	1289	2243	439	M30	526	556	1239	1289	2243	439	M30	526	556	1239	1289	2243	439
680	910	745	522	1506	M24	518	548	1231	1297	2251	447	M24	518	548	1231	1297	2251	447	M30	518	548	1231	1297	2251	447	M30	518	548	1231	1297	2251	447
690	923	756	530	1514	M24	510	540	1223	1305	2259	455	M24	510	540	1223	1305	2259	455	M30	510	540	1223	1305	2259	455	M30	510	540	1223	1305	2259	455
700	937	767	537	1521	M24	503	533	1216	1312	2266	462	M24	503	533	1216	1312	2266	462	M30	503	533	1216	1312	2266	462	M30	503	533	1216	1312	2266	462
710	950	778	545	1529	M24	495	525	1208	1320	2274	470	M24	495	525	1208	1320	2274	470	M30	495	525	1208	1320	2274	470	M30	495	525	1208	1320	2274	470
720	964	789	553	1537	M20	487	517	1200	1328	2282	478	M24	487	517	1200	1328	2282	478	M30	487	517	1200	1328	2282	478	M30	487	517	1200	1328	2282	478
730	977	800	560	1544	M20	480	510	1193	1335	2289	485	M24	480	510	1193	1335	2289	485	M30	480	510	1193	1335	2289	485	M30	480	510	1193	1335	2289	485
740	990	811	568	1552	M20	472	502	1185	1343	2297	493	M24	472	502	1185	1343	2297	493	M30	472	502	1185	1343	2297	493	M30	472	502	1185	1343	2297	493
750	1004	822	576	1560	M20	464	494	1177	1351	2305	501	M24	464	494	1177	1351	2305	501	M30	464	494	1177	1351	2305	501	M30	464	494	1177	1351	2305	501

C7: DIMENSIONS FOR SIZES C7–28 AND C7–29

MOVEMENT DEPENDENT DIMENSIONS

		MOVEMENT PROVIDED mm	90–180	190–340	350–440	450–540	550–640	650–750
TRAVEL RANGE DEPENDENT DIMENSIONS		U	355	355	385	385	525	525
		TA	445	630	745	860	975	1102
		TB	510	510	540	540	600	665
		TC	475	475	475	475	600	600
		TD	270	270	270	270	270	280
		TE	510	510	570	600	655	700
		TF	475	475	545	630	700	790
		TG	290	290	290	290	290	300
		TH	290	290	290	290	290	300
		TJ	460	460	460	460	460	460
TOP SUSPENSION DETAILS	C7–28	DD	76	68	52	52	46	46
		AA	155	140	105	105	90	90
		BB	130	115	85	85	75	75
		CC	220	200	150	150	130	130
		EE	25	20	20	20	15	15
		GG	90	80	70	70	60	60
		LL	M72	M64	M48	M48	M42	M42
	C7–29	DD	85	68	60	60	52	52
		AA	175	140	120	120	105	105
		BB	150	115	100	100	85	85
		CC	240	200	180	180	150	150
		EE	25	20	20	20	20	20
		GG	100	80	75	75	70	70
		LL	M80	M64	M56	M56	M48	M48

FIXED DIMENSIONS

FA	710	FQ	150	XE	46
FB	228	FR	480	XF	570
FC	240	FS	585	XG	355
FD	179	FT	355	XH	320
FE	572	FU	100	XJ	440
FF	25	FV	350	XK	805
FG	100	FW	46	XL	40
FH	46	FX	280	XM	415
FJ	65	FY	375	XN	60
FK	480	FZ	680	XP	500
FL	350	XA	1060	XQ	302
FM	30	XB	355	XR	460
FN	415	XC	575		
FP	230	XD	550		

SPRING SIZE DEPENDENT DIMENSIONS

	C7–28	C7–29
SA	999	999
SB	1059	1059
SC	1245	1245
SD	1280	1280
SE	1280	1280
SF	575	575

WEIGHTS (kgf)

	C7–28	C7–29
HS/HD	930	1000
VS/VD	970	1040
VIS/VID	990	1060
HBMCS	1000	1070
HBM	910	980
VBM	960	1030
VBMCS	1050	1120
VIBM	960	1030

SINGLE POINT SUSPENSION DIMENSION 'V'

MOVEMENT PROVIDED mm	ALL SIZES		C7–28	C7–29
	V1	V3	V2	V2
120	123	145		
130	132	157		
140	142	168		
150	152	180		
160	162	191		
170	171	203		
180	181	214	196	
190	190	225	207	209
200	199	236	217	219
210	209	247	227	229
220	218	258	237	240
230	227	269	247	250
240	237	279	256	260
250	246	290	267	270
260	255	301	277	280
270	263	311	286	290
280	272	322	296	300
290	281	332	306	310
300	290	343	315	320
310	299	353	323	329
320	308	364	334	339
330	317	374	344	349
340	325	384	353	358
350	TYPES HS AND VIS ARE NOT USED ABOVE 340mm TRAVEL		362	368
360			371	377
370			381	387
380			390	396
390			399	405
400			408	415
410			417	424
420			426	433
430			435	442
440			443	451
450			452	460
460			461	469
470			469	478
480			478	487
490			487	496
500			495	505
510			504	514
520			512	522
530			520	531
540			529	540
550			537	548
560			545	557
570			553	567
580			562	574
590			570	582
600			578	590
610			586	599
620			594	607
630			602	615
640			609	623
650			617	632
660			625	640
670			633	648
680			640	656
690			648	664
700			656	672
710			663	680
720			671	688
730			678	695
740			686	703
750			693	711

INSTALLED HEIGHT DIMENSIONS **J4** AND **J7** ALLOW ±25mm ADJUSTMENT.

TAKE-OUT DIMENSIONS **A1**, **A2**, **A3**, **J5**, **J6** AND **J8** ALLOW ±75mm ADJUSTMENT AND ASSUME USE OF A STANDARD F228A EYEBOLT.

WHERE SEVERE HEADROOM LIMITATIONS EXIST, DIMENSIONS **A1**, **A2** AND **A3** CAN BE REDUCED AND DIMENSIONS **J5**, **J6** AND **J8** INCREASED AS FOLLOWS BY USE OF A SHORTENED EYEBOLT:

ØX	M36	M42	M48	M56	M64	M72	M80
CHANGE mm	100	80	NIL	NIL	NIL	NIL	NIL

NOTE DIA. **X** IS THREADED ISO METRIC COARSE RIGHT HAND AS STANDARD.

NOTE THAT DIMENSIONS **A1**, **A2**, **A3**, **J4**, **J5**, **J6**, **J7** AND **J8** ARE GIVEN AT ZERO ROTATION, THAT IS WITH THE LEVER IN THE UPPERMOST POSITION.

N.B. DIMENSION **TA** IS THE MINIMUM FORWARD CLEARANCE REQUIRED.

C7: DIMENSIONS FOR SIZES C7–28 AND C7–29

MOVEMENT PROVIDED mm	ALL SIZES				C7–28								C7–29							
	ALL			HBMCS		HS HD	VS VD	VIS VID	HBM	VIBM	VBMCS	VBM		HS HD	VS VD	VIS VID	HBM	VIBM	VBMCS	VBM
	C mm	D mm	E mm	J4 mm	ØX mm	A1 mm	A2 mm	A3 mm	J5 mm	J6 mm	J7 mm	J8 mm	ØX mm	A1 mm	A2 mm	A3 mm	J5 mm	J6 mm	J7 mm	J8 mm
	AT ZERO ROTATION				AT ZERO ROTATION								AT ZERO ROTATION							
120	161	132	92	1131	M72	913		1922	-113		2016	-113								
130	174	143	100	1139	M72	905		1914	-105		2024	-105	M80	985		1994	-185		2024	-185
140	187	153	107	1146	M72	898		1907	-98		2031	-98	M80	978		1987	-178		2031	-178
150	201	164	115	1154	M72	890		1899	-90		2039	-90	M72	890		1899	-90		2039	-90
160	214	175	123	1162	M64	832		1841	-32		2047	-32	M72	882		1891	-82		2047	-82
170	228	186	130	1169	M64	825		1834	-25		2054	-25	M72	875		1884	-75		2054	-75
180	241	197	138	1177	M64	817	817	1826	-17	973	2062	-17	M72	867		1876	-67		2062	-67
190	254	208	146	1171	M64	809	809	1818	-9	981	2056	-9	M64	809	809	1818	-9	981	2056	-9
200	268	219	154	1179	M64	801	801	1810	-1	989	2064	-1	M64	801	801	1810	-1	989	2064	-1
210	281	230	161	1186	M56	779	779	1788	21	1011	2071	21	M64	794	794	1803	6	996	2071	6
220	294	241	169	1194	M56	771	771	1780	29	1019	2079	29	M64	786	786	1795	14	1004	2079	14
230	308	252	177	1202	M56	763	763	1772	37	1027	2087	37	M64	778	778	1787	22	1012	2087	22
240	321	263	184	1209	M56	756	756	1765	44	1034	2094	44	M64	771	771	1780	29	1019	2094	29
250	335	274	192	1217	M56	748	748	1757	52	1042	2102	52	M56	748	748	1757	52	1042	2102	52
260	348	285	200	1225	M56	740	740	1749	60	1050	2110	60	M56	740	740	1749	60	1050	2110	60
270	361	296	207	1232	M56	733	733	1742	67	1057	2117	67	M56	733	733	1742	67	1057	2117	67
280	375	307	215	1240	M56	725	725	1734	75	1065	2125	75	M56	725	725	1734	75	1065	2125	75
290	388	318	223	1248	M48	702	702	1711	98	1088	2133	98	M56	717	717	1726	83	1073	2133	83
300	401	329	230	1255	M48	695	695	1704	105	1095	2140	105	M56	710	710	1719	90	1080	2140	90
310	415	340	238	1263	M48	687	687	1696	113	1103	2148	113	M56	702	702	1711	98	1088	2148	98
320	428	351	246	1271	M48	679	679	1688	121	1111	2156	121	M56	694	694	1703	106	1096	2156	106
330	442	362	253	1278	M48	672	672	1681	128	1118	2163	128	M56	687	687	1696	113	1103	2163	113
340	455	373	261	1286	M48	664	664	1673	136	1126	2171	136	M56	679	679	1688	121	1111	2171	121
350	468	384	269	1270	M48	686	716	1665	144	1134	2155	144	M48	686	716	1665	144	1134	2155	144
360	482	395	276	1277	M48	679	709	1658	151	1141	2162	151	M48	679	709	1658	151	1141	2162	151
370	495	406	284	1285	M48	671	701	1650	159	1149	2170	159	M48	671	701	1650	159	1149	2170	159
380	509	417	292	1293	M42	623	653	1602	207	1197	2178	207	M48	663	693	1642	167	1157	2178	167
390	522	428	299	1300	M42	616	646	1595	214	1204	2185	214	M48	656	686	1635	174	1164	2185	174
400	535	439	307	1308	M42	608	638	1587	222	1212	2193	222	M48	648	678	1627	182	1172	2193	182
410	549	449	315	1316	M42	600	630	1579	230	1220	2201	230	M48	640	670	1619	190	1180	2201	190
420	562	460	322	1323	M42	593	623	1572	237	1227	2208	237	M48	633	663	1612	197	1187	2208	197
430	575	471	330	1331	M42	585	615	1564	245	1235	2216	245	M48	625	655	1604	205	1195	2216	205
440	589	482	338	1339	M42	577	607	1556	253	1243	2224	253	M48	617	647	1596	213	1203	2224	213
450	602	493	345	1331	M42	570	630	1549	260	1250	2216	260	M42	570	630	1549	260	1250	2216	260
460	616	504	353	1339	M42	562	622	1541	268	1258	2224	268	M42	562	622	1541	268	1258	2224	268
470	629	515	361	1347	M42	554	614	1533	276	1266	2232	276	M42	554	614	1533	276	1266	2232	276
480	642	526	368	1354	M42	547	607	1526	283	1273	2239	283	M42	547	607	1526	283	1273	2239	283
490	656	537	376	1362	M42	539	599	1518	291	1281	2247	291	M42	539	599	1518	291	1281	2247	291
500	669	548	384	1370	M42	531	591	1510	299	1289	2255	299	M42	531	591	1510	299	1289	2255	299
510	683	559	391	1377	M42	524	584	1503	306	1296	2262	306	M42	524	584	1503	306	1296	2262	306
520	696	570	399	1385	M36	516	576	1495	314	1304	2270	314	M42	516	576	1495	314	1304	2270	314
530	709	581	407	1393	M36	508	568	1487	322	1312	2278	322	M42	508	568	1487	322	1312	2278	322
540	723	592	415	1401	M36	500	560	1479	330	1320	2286	330	M42	500	560	1479	330	1320	2286	330
550	736	603	422	1400	M36	553	608	1472	337	1327	2285	337	M42	553	608	1472	337	1327	2285	337
560	749	614	430	1408	M36	545	600	1464	345	1335	2293	345	M42	545	600	1464	345	1335	2293	345
570	763	625	438	1416	M36	537	592	1456	353	1343	2301	353	M42	537	592	1456	353	1343	2301	353
580	776	636	445	1423	M36	530	585	1449	360	1350	2308	360	M42	530	585	1449	360	1350	2308	360
590	790	647	453	1431	M36	522	577	1441	368	1358	2316	368	M42	522	577	1441	368	1358	2316	368
600	803	658	461	1439	M36	514	569	1433	376	1366	2324	376	M42	514	569	1433	376	1366	2324	376
610	816	669	468	1446	M36	507	562	1426	383	1373	2331	383	M42	507	562	1426	383	1373	2331	383
620	830	680	476	1454	M36	499	554	1418	391	1381	2339	391	M36	499	554	1418	391	1381	2339	391
630	843	691	484	1462	M36	491	546	1410	399	1389	2347	399	M36	491	546	1410	399	1389	2347	399
640	857	702	491	1469	M36	484	539	1403	406	1396	2354	406	M36	484	539	1403	406	1396	2354	406
650	870	713	499	1487	M36	541	576	1395	424	1404	2362	424	M36	541	576	1395	424	1404	2362	424
660	883	724	507	1495	M36	533	568	1387	432	1412	2370	432	M36	533	568	1387	432	1412	2370	432
670	897	734	514	1502	M36	526	561	1380	439	1419	2377	439	M36	526	561	1380	439	1419	2377	439
680	910	745	522	1510	M36	518	553	1372	447	1427	2385	447	M36	518	553	1372	447	1427	2385	447
690	923	756	530	1518	M36	510	545	1364	455	1435	2393	455	M36	510	545	1364	455	1435	2393	455
700	937	767	537	1525	M36	503	538	1357	462	1442	2400	462	M36	503	538	1357	462	1442	2400	462
710	950	778	545	1533	M36	495	530	1349	470	1450	2408	470	M36	495	530	1349	470	1450	2408	470
720	964	789	553	1541	M36	487	522	1341	478	1458	2416	478	M36	487	522	1341	478	1458	2416	478
730	977	800	560	1548	M36	480	515	1334	485	1465	2423	485	M36	480	515	1334	485	1465	2423	485
740	990	811	568	1556	M36	472	507	1326	493	1473	2431	493	M36	472	507	1326	493	1473	2431	493
750	1004	822	576	1564	M36	464	499	1318	501	1481	2439	501	M36	464	499	1318	501	1481	2439	501

C8: DIMENSIONS FOR SIZE C8–30

MOVEMENT DEPENDENT DIMENSIONS

	MOVEMENT PROVIDED mm	150–190	200–340	350–440	450–540	550–640	650–750
TRAVEL RANGE DEPENDENT DIMENSIONS	U	300	400	400	500	500	600
	TA	470	600	720	850	970	1110
	TB	650	650	650	650	650	705
	TC	440	520	520	615	615	690
	TE	—	650	650	650	675	705
	TF	—	540	540	620	700	775
	TG	320	320	320	320	320	320
TOP SUSPENSION DETAILS	DD	95	76	68	60	60	52
	AA	200	155	140	120	120	105
	BB	170	130	115	100	100	85
	CC	260	220	200	180	180	150
	EE	30	25	20	20	20	20
	GG	120	90	80	75	75	70

FIXED DIMENSIONS

FA	812	FR	565
FB	332	FS	660
FC	330	FT	400
FD	179	FU	150
FE	657	FV	455
FF	25	FW	40
FG	150	SA	1200
FP	280	SC	1540

WEIGHTS (kgf)

	C8–30
HS/HD	1570
VS/VD	1660
HBM	1540

MOVEMENT PROVIDED mm	ØX mm	ALL			HS HD	HS	VS VD	VS	HBM
		C mm	D mm	E mm	A1 mm	V1 mm	A2 mm	V2 mm	J5 mm
		AT ZERO ROTATION							
150	M90	201	164	115	1210	141			-240
160	M80	214	175	123	1102	150			-132
170	M80	228	186	130	1095	159			-125
180	M80	241	197	138	1087	168			-117
190	M80	254	208	146	1079	177			-109
200	M72	268	219	154	991	186	991	215	-21
210	M72	281	230	161	984	194	984	224	-14
220	M72	294	241	169	976	203	976	234	-6
230	M72	308	252	177	968	211	968	244	2
240	M72	321	263	184	961	220	961	254	9
250	M72	335	274	192	953	228	953	264	17
260	M64	348	285	200	895	237	895	273	75
270	M64	361	296	207	888	245	888	283	82
280	M64	375	307	215	880	253	880	293	90
290	M64	388	318	223	872	261	872	302	98
300	M64	401	329	230	865	270	865	312	105
310	M64	415	340	238	857	278	857	321	113
320	M64	428	351	246	849	286	849	330	121
330	M64	442	362	253	842	294	842	339	128
340	M56	455	373	261	819	302	819	349	151
350	M56	468	384	269	811	310	811	358	159
360	M56	482	395	276	804	318	804	367	166
370	M56	495	406	284	796	325	796	376	174
380	M56	509	417	292	788	333	788	385	182
390	M56	522	428	299	781	341	781	394	189
400	M56	535	439	307	773	348	773	403	197
410	M56	549	449	315	765	356	765	411	205
420	M56	562	460	322	758	364	758	420	212
430	M56	575	471	330	750	371	750	429	220
440	M56	589	482	338	742	379	742	437	228
450	M56	602	493	345	735	386	735	446	235
460	M56	616	504	353	727	394	727	455	243
470	M48	629	515	361	704	401	704	463	266
480	M48	642	526	368	697	408	697	471	273
490	M48	656	537	376	689	415	689	480	281
500	M48	669	548	384	681	423	681	488	289
510	M48	683	559	391	674	430	674	496	296
520	M48	696	570	399	666	437	666	505	304
530	M48	709	581	407	658	444	658	513	312
540	M48	723	592	415	650	451	650	521	320
550	M48	736	603	422	643	458	668	529	327
560	M48	749	614	430	635	465	660	537	335
570	M48	763	625	438	627	472	652	545	343
580	M48	776	636	445	620	479	645	553	350
590	M48	790	647	453	612	486	637	561	358
600	M48	803	658	461	604	493	629	569	366
610	M42	816	669	468	557	499	582	577	413
620	M42	830	680	476	549	506	574	584	421
630	M42	843	691	484	541	513	566	592	429
640	M42	857	702	491	534	520	559	600	436
650	M42	870	713	499	581	526	581	608	444
660	M42	883	724	507	573	533	573	615	452
670	M42	897	734	514	566	539	566	623	459
680	M42	910	745	522	558	546	558	630	467
690	M42	923	756	530	550	552	550	638	475
700	M42	937	767	537	543	559	543	645	482
710	M42	950	778	545	535	565	535	653	490
720	M42	964	789	553	527	571	527	660	498
730	M42	977	800	560	520	578	520	667	505
740	M42	990	811	568	512	584	512	674	513
750	M42	1004	822	576	504	590	504	682	521

C8–30 SUPPORTS ARE AVAILABLE IN THE FOLLOWING TYPES

TYPE HBM
TYPE HS, STYLE TS2 AND TS3
TYPE HD, STYLE TS2, TS3 AND TS4
TYPE VS, STYLE TS2 AND TS3
TYPE VD, STYLE TS2, TS3 AND TS4

TAKE-OUT DIMENSIONS **A1**, **A2** AND **J5** ALLOW ±75mm ADJUSTMENT

NOTE DIA. **X** IS THREADED ISO METRIC COARSE RIGHT HAND AS STANDARD.

NOTE THAT DIMENSIONS **A1**, **A2** AND **J5** ARE GIVEN AT ZERO ROTATION, THAT IS WITH THE LEVER IN THE UPPERMOST POSITION.

C8: DIMENSIONS FOR SIZE C8–31

MOVEMENT DEPENDENT DIMENSIONS

	MOVEMENT PROVIDED mm	160–190	200–340	350–440	450–540	550–640	650–750
TRAVEL RANGE DEPENDENT DIMENSIONS	U	300	400	400	500	500	600
	TA	470	600	720	850	970	1110
	TB	650	650	650	650	650	705
	TC	440	520	520	615	615	690
	TE	—	650	650	650	675	705
	TF	—	540	540	620	700	775
	TG	320	320	320	320	320	320
TOP SUSPENSION DETAILS	DD	95	85	68	68	68	60
	AA	200	175	140	140	140	120
	BB	170	150	115	115	115	100
	CC	260	240	200	200	200	180
	EE	30	25	20	20	20	20
	GG	120	100	80	80	80	75

FIXED DIMENSIONS

FA	876	FR	565
FB	332	FS	660
FC	330	FT	400
FD	179	FU	150
FE	733	FV	455
FF	25	FW	40
FG	150	SA	1250
FP	280	SC	1590

WEIGHTS (kgf)

	C8–31
HS/HD	1950
VS/VD	2040
HBM	1920

C8–31 SUPPORTS ARE AVAILABLE IN THE FOLLOWING TYPES

TYPE HBM
TYPE HS, STYLE TS2 AND TS3
TYPE HD, STYLE TS2, TS3 AND TS4
TYPE VS, STYLE TS2 AND TS3
TYPE VD, STYLE TS2, TS3 AND TS4

TAKE-OUT DIMENSIONS **A1**, **A2** AND **J5** ALLOW ±75mm ADJUSTMENT

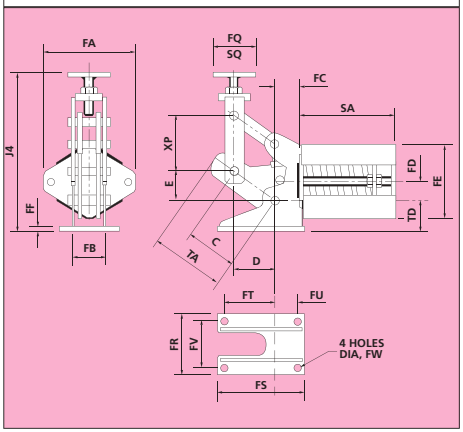
NOTE DIA. **X** IS THREADED ISO METRIC COARSE RIGHT HAND AS STANDARD.

NOTE THAT DIMENSIONS **A1**, **A2** AND **J5** ARE GIVEN AT ZERO ROTATION, THAT IS WITH THE LEVER IN THE UPPERMOST POSITION.

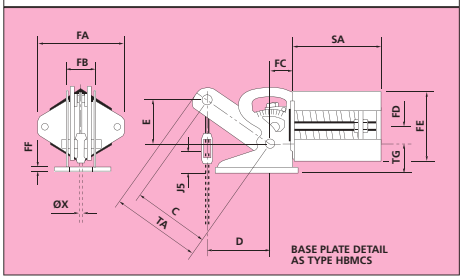
MOVEMENT PROVIDED mm	ØX mm	ALL			HS HD	HS	VS VD	VS	HBM
		C mm	D mm	E mm	A1 mm	V1 mm	A2 mm	V2 mm	J5 mm
		AT ZERO ROTATION							
160	M90	214	175	123	1202	148			-232
170	M90	228	186	130	1195	157			-225
180	M90	241	197	138	1187	166			-217
190	M90	254	208	146	1179	174			-209
200	M80	268	219	154	1071	183			-101
210	M80	281	230	161	1064	191			-94
220	M80	294	241	169	1056	200			-86
230	M80	308	252	177	1048	208			-78
240	M80	321	263	184	1041	216	1041	254	-71
250	M72	335	274	192	953	225	953	263	17
260	M72	348	285	200	945	233	945	273	25
270	M72	361	296	207	938	241	938	283	32
280	M72	375	307	215	930	249	930	292	40
290	M72	388	318	223	922	257	922	302	48
300	M72	401	329	230	915	266	915	311	55
310	M72	415	340	238	907	274	907	320	63
320	M64	428	351	246	849	281	849	330	121
330	M64	442	362	253	842	289	842	339	128
340	M64	455	373	261	834	297	834	348	136
350	M64	468	384	269	826	305	826	357	144
360	M64	482	395	276	819	313	819	366	151
370	M64	495	406	284	811	320	811	375	159
380	M64	509	417	292	803	328	803	384	167
390	M64	522	428	299	796	336	796	393	174
400	M64	535	439	307	788	343	788	402	182
410	M64	549	449	315	780	351	780	411	190
420	M64	562	460	322	773	358	773	419	197
430	M56	575	471	330	750	366	750	428	220
440	M56	589	482	338	742	373	742	437	228
450	M56	602	493	345	735	380	735	445	235
460	M56	616	504	353	727	388	727	454	243
470	M56	629	515	361	719	395	719	462	251
480	M56	642	526	368	712	402	712	471	258
490	M56	656	537	376	704	409	704	479	266
500	M56	669	548	384	696	416	696	488	274
510	M56	683	559	391	689	424	689	496	281
520	M56	696	570	399	681	431	681	504	289
530	M56	709	581	407	673	438	673	512	297
540	M56	723	592	415	665	445	665	520	305
550	M56	736	603	422	658	451	683	529	312
560	M56	749	614	430	650	458	675	537	320
570	M56	763	625	438	642	465	667	545	328
580	M56	776	636	445	635	472	660	553	335
590	M48	790	647	453	612	479	637	560	358
600	M48	803	658	461	604	485	629	568	366
610	M48	816	669	468	597	492	622	576	373
620	M48	830	680	476	589	499	614	584	381
630	M48	843	691	484	581	505	606	592	389
640	M48	857	702	491	574	512	599	599	396
650	M48	870	713	499	621	519	621	607	404
660	M48	883	724	507	613	525	613	615	412
670	M48	897	734	514	606	531	606	622	419
680	M48	910	745	522	598	538	598	630	427
690	M48	923	756	530	590	544	590	637	435
700	M48	937	767	537	583	551	583	645	442
710	M48	950	778	545	575	557	575	652	450
720	M48	964	789	553	567	563	567	659	458
730	M48	977	800	560	560	569	560	667	465
740	M48	990	811	568	552	576	552	674	473
750	M48	1004	822	576	544	582	544	681	481

CONSTANT EFFORT SUPPORTS: BASE MOUNTED TYPES

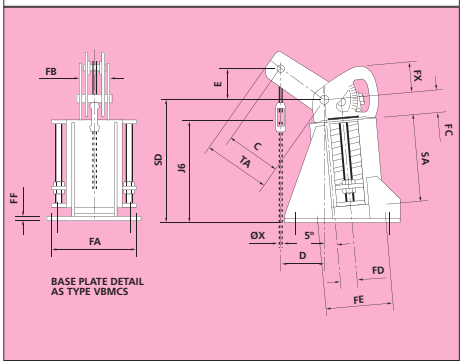
TYPE HBMCS



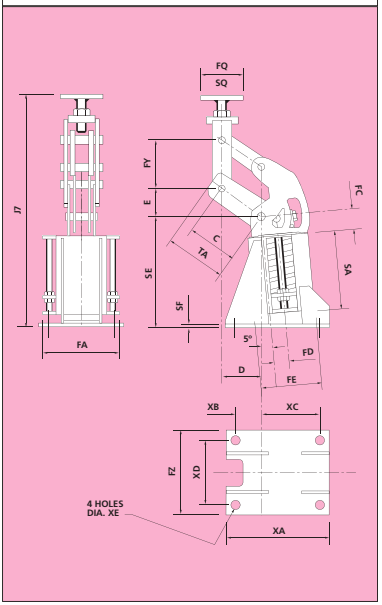
TYPE HBM



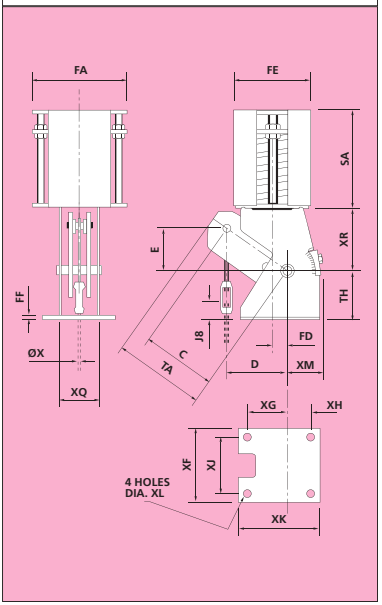
TYPE VBM

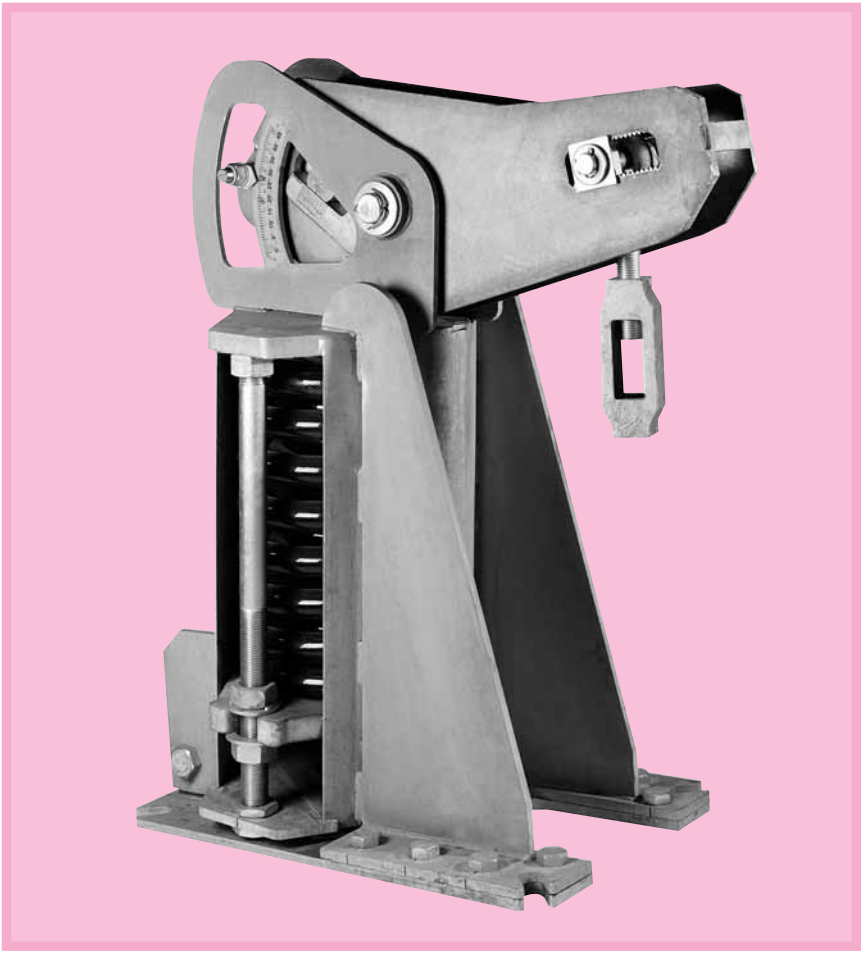


TYPE VBMCS



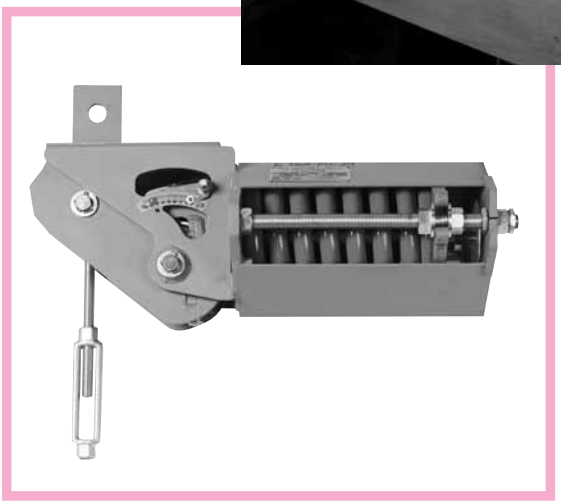
TYPE VIBM





TURN OUT THIS PAGE FOR DETAILS OF SUPPORT SIZE C8–31 AND FOR DIAGRAMS OF CONSTANT EFFORT SUPPORTS: BASE MOUNTED TYPES

Constant Effort Support —
During Load Test



Constant Effort Support —
Type HS

VARIABLE EFFORT SUPPORTS

The latest range of Variable Effort Supports has been designed to cater for the ever increasing space limitations on Offshore Rigs and other process plants and also to enable the units to be finished in either a galvanised or protective paint finish at minimum cost, allowing full assembly without damaging such finishes.

APPLICATION

Variable Effort Supports are used to support the weight of pipework or equipment whilst allowing a degree of movement relative to the supporting structure. Where pipes transport hot (or cold) liquids or gases they expand (or contract) due to the difference between operating and ambient temperatures. It is necessary to support the pipe in operating and ambient conditions, whilst permitting movement between the two. Variable Effort Supports may also be needed to cater for ambient temperature variation local to items of plant or long vertical pipe runs, or where pipes pass between buildings that may be subject to relative movement due to subsidence or earthquake.

LOAD RANGE

We offer a wide range of variable effort supports catering for loads from 3.43kgf to 39120kgf.

Our standard range of variable supports offers 5 travel ranges over 29 spring sizes enabling the engineer to optimise his selection of spring stiffness giving the lowest possible variability.

Our ***High-load*** range of variable supports caters for situations where high load carrying capacity and compact design is required. We offer 3 travel ranges (V1 to V3) over 7 spring sizes catering for loads from 6445kgf to 39120kgf.

Most of these spring sizes are available in the following configurations.

WORKING RANGES

V1	35mm	**V4**	210mm
V2	70mm	**V5**	280mm
V3	140mm		

These figures represent the total working travel available from each range however it should be noted that the allowable deviation will restrict the amount of the full travel range that can be used. The lower the allowable variability the less available travel will be useable.

SPRING STIFFNESS

The stiffness of the spring is a function of the load range and travel range with the shorter travel ranges using the stiffer springs. Spring stiffness has a direct relationship to variability, also referred to as allowable deviation. Variability is the measure of the variance in supporting effort in either the 'cold' or the 'hot' condition when compared with the 'design' load.

The ideal pipe supporting system will exert no additional force on the pipe and will therefore be made up of entirely constant effort supports. This would be a very costly and inefficient solution.

The most cost effective solution is that which utilises 100% of the available 'stress capacity' of the pipe and combines rigid hangers, variable effort supports and constant effort supports to deliver this optimum solution.

Because we offer the engineer 166 possible spring sizes over a wide range of working loads it is possible to select the ideal spring rate and create the optimum pipe supporting solution that minimises the need for constant effort supports.

The critical factor in specifying variable effort supports is the allowable variability. The engineer should work towards maximising variability within the specified limit thereby making use of the maximum stress capacity of the pipe and achieving the most cost effective hanger solution.

SUPPORT TYPES

TS1, TS2, TS3	Top Suspended
TA	Top Adjustable
ES	Extended Support
DS	Double Support
BM1, BM2, BM3, BM4	Base Mounted

RELATED SPECIFICATIONS

Our Variable Effort Supports are designed and manufactured to meet the requirements of the following specifications:

EN13480	ANSI/ASME B31.1
ANSI/ASME B31.3	ANSI/MSS SP-58
ANSI/MSS SP-69	

INSTALLATION AND ERECTION

Types TS1, TS2, TS3, TA and ES
Lift the support carefully into position and secure to the hanger rod for type TS1, to the beam attachment with a suspension bolt or clevis pin for types TS2 and TS3 or to the support beams for types TA and ES. Make the connection to the pipework via the hanger rod and pipe clip. Apply tension to the spring unit by rotating the turnbuckle (or adjusting nut for type TA). When the preset load is attained, the locking nuts above the spring plate will become free to rotate. The locking nuts beneath the spring plate are then ready to carry any hydrostatic test load. On completion of hydrostatic testing, lagging, etc. the locking nuts must be fully withdrawn from the spring plate to the unlocked position (see diagram page 174).

Type DS
The procedure is similar to the above except that the spring canister is inverted and application of the load will release the locking nuts below the spring plate, with nuts above the spring plate carrying the hydrostatic test load, etc.

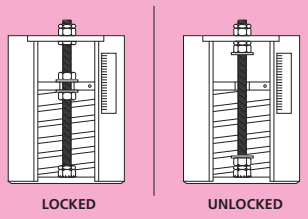
Types BM1, BM2, BM3, BM4
For these supports the load is transferred to the support by rotation of the height adjustment nut, which is situated below the load pad, rather than via a turnbuckle. Then proceed as for TS1, etc.

MAINTENANCE

Variable Effort Supports are designed to be maintenance free. On no account should any attempt be made to remove the spring coil from the canister, since it has been pre-compressed. Periodic inspection should be carried out at a frequency which suits the environment in which they are used. Check for visual damage, for any corrosion (especially of the spring coil and threaded rods) and to ensure that no debris has fallen into the support which could impede the movement of the spring.

A more detailed erection and maintenance procedure is available upon request.

STANDARD FEATURES

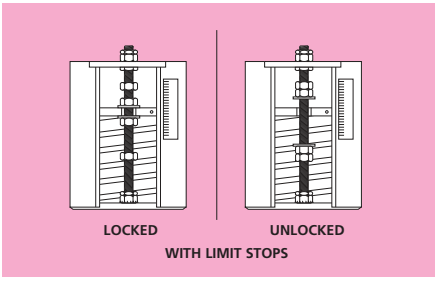


1. Compactness of units. Installed heights designed to minimum.
2. Preset and multi-locking device, allowing unit to be supplied locked at its installed load and ready to accept a test load of at least twice the rated load. The infinitely adjustable multi-lock is permanently fixed to the unit, allowing re-locking at any travel position. This is of particular benefit at times of plant outages or during pipework maintenance/inspection.
3. Overtravel is provided on either side of the working range.
4. Supports are fitted with stainless steel nameplates marked with the installed and operating load, support reference mark, type and unique serial number.
5. Variable effort supports are supplied as standard with plastic coated spring coils and hot-dipped galvanised casings and threaded items.

Type TS2

Type BM1

OPTIONAL FEATURES



1. Limit Stops. The preset/multilock facility may be enhanced to precisely limit spring travel. Additional nuts welded in position are used to limit movement to a specified amount.
2. The construction of our variable effort supports makes the application of special paint finishes a simple matter.
3. For low temperature applications suitable grades of carbon steel are used to suit the specified temperature range. Where necessary the material used for spring coils is also changed to an appropriate grade of steel.
4. For extreme corrosive condition extra-thick body section can be supplied.
5. For extended life in offshore or other situations subject to highly corrosive conditions, supports are available in various grades of stainless steel with the spring coil from 17/4 PH (precipitation hardened) stainless steel. Please check with our design department for dimensional information.
6. In Cryogenic applications supports are available manufactured entirely in austenitic stainless steel. Please check with our design department for dimensional information.
7. For type BM1 Supports, where lateral loading greater than 25% of the maximum operating load is envisaged, PTFE covered load pads should be specified.

VARIABLE EFFORT SUPPORTS

SELECTION

Selection of Variable Effort Supports can either be done manually from the catalogue as described below, or by using computer software that is available from our sales department.

SELECTION FROM THE CATALOGUE

Load charts are on page 177 and 188 and can be opened out and used at the same time as dimensional charts for the units being selected.

Range: The choice of range V1 to V5 will depend upon the movement at the support position and the allowable change in effort.

Change in effort = movement x Spring Rate

This often expressed as a percentage of operating load.

$$\text{Variation in effort} = \frac{\text{Movement x Spring Rate}}{\text{Operating Load}} \text{ x } 100\%$$

This variation is usually limited to 25% although greater variation is sometimes specified where a higher spring rate is justified in the pipework analysis, or lesser when supporting critical items.

For guidance only on selecting the travel range, movements of 15 mm, 30 mm, 60 mm, 90 mm and 120 mm will produce variations in effort of approximately 25% of 'mid table load' on ranges V1 to V5 respectively.

SUPPORT SIZE

Selection of support size is determined using the selection charts in N or kgf which are located on fold out page 177 and 188.

SELECTION PROCEDURE

1. Determine the required supporting effort and pipe movement (up or down) installed to operating. Weights of spreader beams, heavy pipe clamps, etc. should be added to the pipe load.
2. Estimate which travel range will be required. (See above).
3. Select the smallest spring size which has the operating load within the working travel.
4. Ensure the spring selected can accommodate the preset to operating travel within the working range. This is done by moving up and down the chart from the operating load by the amount of the travel. Down if the movement 'installed to operating' is up, and up if the movement 'installed to operating' is down.
5. If the spring selected can not accommodate the movement try a larger spring size or the next travel range. If the movement can not be accommodated by V5 range then a constant effort support is required.
6. Check the variation in supporting effort for the selected spring

$$\text{Variation} = \frac{\text{Movement x Spring Rate}}{\text{Operating Load}} \text{ x } 100\%$$

If this exceeds the allowable variation then choose the next travel range and go back to 3 above. If the variation is less than half of the allowable then a smaller travel range may be acceptable. Choose a smaller travel range and go back to Step 4. If the variation exceeds the allowable for a V5 selection then a constant effort support is required.

TYPE

Determine the type of unit required, i.e. TS1, TS2, TS3, TA, ES, DS, BM1, BM2, BM3 or BM4. Selection will depend upon the location of steelwork/concrete and available space.

Once the travel range, spring size and type have been selected the descriptions can be written, i.e. V1-18BMI.

CALCULATION OF INSTALLED DIMENSIONS

The "RTO" or rod take out dimension for TS1, TS2, TS3 and DS units and "J" dimension for TA, ES and BM supports tabulated are dimensions at minimum load, i.e. at the start of the working range. In order to determine installed dimensions carry out the calculations below:

a) Installed Load =
Operating Load + (Movement x Spring Rate)
for 'installed to operating' movement up.

b) Installed Load =
Operating Load - (Movement x Spring Rate)
for 'installed to operating' movement down.

Spring Displacement at Installed Load =

$$\frac{\text{Installed Load - Minimum Load (mm)}}{\text{Spring Rate}}$$

Installed Dimension =
R.T.O. + Spring Displacement at Installed Load
(TS1, TS2, TS3 and DS units).

Installed Dimension =
J - Spring Displacement at Installed Load
(TA, ES and BM units).

ORDERING

Either:

a) Advise
- i) Number off.
- ii) Support Description, i.e.

V2 —	12 —	TS3
Travel Range	Spring Size	Type

- iii) Operating Load.
- iv) Installed to operating movement and direction.
- v) Finish required.
- vi) Support Mark No.
- vii) Thread Form.

N.B. If exact load and movement are not known supports will be supplied set at mid-travel.

or b)
- i) Number off.
- ii) Support Type.
- iii) Operating Load.
- iv) Installed to operating movement.
- v) Allowable variation. This will be taken as 25% of operating load unless otherwise stated.
- vi) Finish.
- vii) Support Mark No.
- viii) Thread Form.

In this case we will determine support size to be supplied.

TURN OUT THIS PAGE FOR VARIABLE EFFORT SUPPORT SELECTION CHART (Newtons)

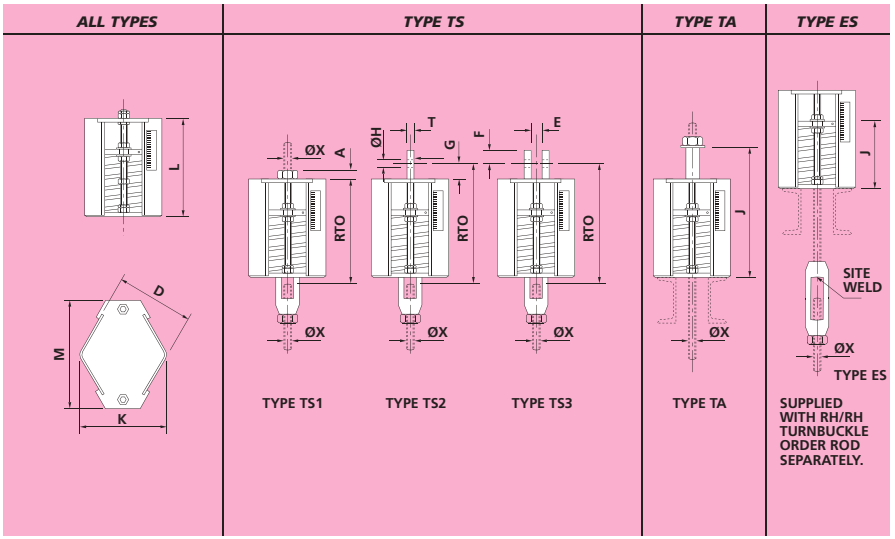
VARIABLE EFFORT SUPPORT SELECTION CHART — Newtons

MOVEMENT mm	V1	V2	V3	V4	V5	SPRING SIZE 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
OVERTRAVEL						26.7	46.7	75.5	107	125	160	178	289	353	461	608	775	1079	1412	1981	2471	3501	4511	5972	7963	10611	14328	20006	26782	35333	47023	62272	83102	111139
						28.1	48.4	77.6	110	129	165	183	296	363	473	625	798	1108	1453	2034	2544	3591	4631	6132	8176	10894	14711	20532	27483	36281	48270	63934	85360	114064
						29.5	50.2	79.7	112	133	170	189	303	373	486	642	821	1138	1493	2088	2617	3682	4752	6291	8389	11177	15095	21059	28183	37228	49517	65595	87619	116989
						30.9	51.9	81.8	115	137	175	194	310	382	499	659	844	1167	1534	2141	2690	3772	4872	6451	8602	11460	15479	21586	28884	38175	50764	67257	89878	119915
						32.3	53.7	83.9	118	141	179	200	317	392	511	676	867	1196	1575	2194	2763	3863	4992	6610	8815	11743	15863	22112	29584	39122	52010	68919	92137	122840
MIN	0	0	0	0	0	33.7	55.5	86.0	121	146	184	206	324	402	524	693	890	1226	1615	2248	2836	3953	5113	6770	9029	12026	16247	22639	30285	40069	53257	70580	94396	125765
WORKING RANGE						35.1	57.2	88.1	124	150	189	211	331	412	536	710	912	1255	1656	2301	2909	4043	5233	6929	9242	12309	16631	23166	30985	41016	54504	72242	96655	128690
						36.5	59.0	90.2	126	154	194	217	338	422	549	727	935	1285	1697	2354	2982	4134	5353	7089	9455	12591	17015	23692	31686	41964	55751	73904	98914	131616
						37.9	60.7	92.3	129	158	199	222	345	431	562	744	958	1314	1737	2408	3055	4224	5474	7249	9668	12874	17399	24219	32387	42911	56998	75565	101173	134541
						39.3	62.5	94.5	132	162	204	228	352	441	574	761	981	1344	1778	2461	3128	4315	5594	7408	9881	13157	17783	24746	33087	43858	58245	77227	103431	137466
	5	10	20	30	40	40.7	64.2	96.6	135	167	209	234	359	451	587	778	1004	1373	1819	2514	3201	4405	5714	7568	10094	13440	18166	25272	33788	44805	59492	78889	105690	140391
						42.1	66.0	98.7	138	171	214	239	366	461	599	795	1027	1402	1859	2568	3274	4496	5834	7727	10307	13723	18550	25799	34488	45752	60739	80550	107949	143317
						43.5	67.7	101	140	175	219	245	373	471	612	812	1050	1432	1900	2621	3347	4586	5955	7887	10520	14006	18934	26326	35189	46700	61985	82212	110208	146242
						44.9	69.5	103	143	179	224	251	380	481	624	829	1073	1461	1941	2674	3420	4676	6075	8046	10733	14289	19318	26853	35889	47647	63232	83873	112467	149167
						46.3	71.3	105	146	183	228	256	387	490	637	846	1096	1491	1981	2728	3493	4767	6195	8206	10947	14572	19702	27379	36590	48594	64479	85535	114726	152092
	10	20	40	60	80	47.7	73.0	107	149	188	233	262	394	500	650	863	1119	1520	2022	2781	3566	4857	6316	8365	11160	14855	20086	27906	37291	49541	65726	87197	116985	155018
						49.1	74.8	109	152	192	238	267	401	510	662	880	1142	1549	2063	2834	3639	4948	6436	8525	11373	15138	20470	28433	37991	50488	66973	88858	119244	157943
						50.5	76.5	111	154	196	243	273	408	520	675	897	1165	1579	2103	2888	3711	5038	6556	8684	11586	15421	20854	28959	38692	51435	68220	90520	121502	160868
						51.9	78.3	113	157	200	248	279	415	530	687	914	1188	1608	2144	2941	3784	5128	6677	8844	11799	15704	21238	29486	39392	52383	69467	92182	123761	163793
						53.3	80.0	116	160	205	253	284	422	539	700	931	1211	1638	2185	2994	3857	5219	6797	9003	12012	15987	21622	30013	40093	53330	70714	93843	126020	166719
	15	30	60	90	120	54.7	81.8	118	163	209	258	290	429	549	713	948	1234	1667	2225	3048	3930	5309	6917	9163	12225	16270	22005	30539	40794	54277	71960	95505	128279	169644
						56.1	83.5	120	166	213	263	296	436	559	725	965	1257	1697	2266	3101	4003	5400	7038	9323	12438	16553	22389	31066	41494	55224	73207	97166	130538	172569
						57.5	85.3	122	168	217	268	301	443	569	738	982	1280	1726	2307	3154	4076	5490	7158	9482	12652	16836	22773	31593	42195	56171	74454	98828	132797	175494
						58.9	87.1	124	171	221	273	307	450	579	750	999	1303	1755	2347	3208	4149	5580	7278	9642	12865	17119	23157	32119	42895	57118	75701	100490	135056	178420
						60.3	88.8	126	174	226	278	312	457	588	763	1016	1326	1785	2388	3261	4222	5671	7399	9801	13078	17402	23541	32646	43596	58066	76948	102151	137315	181345
	20	40	80	120	160	61.7	90.6	128	177	230	282	318	465	598	775	1033	1349	1814	2429	3314	4295	5761	7519	9961	13291	17685	23925	33173	44296	59013	78195	103813	139574	184270
						63.1	92.3	130	180	234	287	324	472	608	788	1050	1372	1844	2469	3368	4368	5852	7639	10120	13504	17968	24309	33699	44997	59960	79442	105475	141832	187195
						64.5	94.1	132	182	238	292	329	479	618	801	1067	1395	1873	2510	3421	4441	5942	7759	10280	13717	18251	24693	34226	45698	60907	80689	107136	144091	190121
						65.9	95.8	134	185	242	297	335	486	628	813	1084	1418	1902	2551	3474	4514	6033	7880	10439	13930	18534	25077	34753	46398	61854	81936	108798	146350	193046
						67.3	97.6	137	188	247	302	341	493	637	826	1100	1441	1932	2591	3528	4587	6123	8000	10599	14143	18817	25460	35280	47099	62802	83182	110459	148609	195971
	25	50	100	150	200	68.7	99.3	139	191	251	307	346	500	647	838	1117	1464	1961	2632	3581	4660	6213	8120	10758	14356	19100	25844	35806	47799	63749	84429	112121	150868	198896
						70.1	101	141	194	255	312	352	507	657	851	1134	1487	1991	2673	3634	4733	6304	8241	10918	14570	19382	26228	36333	48500	64696	85676	113783	153127	201822
						71.5	103	143	196	259	317	357	514	667	864	1151	1510	2020	2713	3688	4806	6394	8361	11077	14783	19665	26612	36860	49200	65643	86923	115444	155386	204747
						72.9	105	145	199	263	322	363	521	677	876	1168	1532	2050	2754	3741	4879	6485	8481	11237	14996	19948	26996	37386	49901	66590	88170	117108	157645	207672
						74.3	106	147	202	268	327	369	528	686	889	1185	1555	2079	2795	3794	4952	6575	8602	11397	15209	20231	27380	37913	50602	67537	89417	118768	159903	210597
	30	60	120	180	240	75.7	108	149	205	272	331	374	535	696	901	1202	1578	2108	2835	3848	5025	6665	8722	11556	15422	20514	27764	38440	51302	68485	90664	120429	162162	213523
						77.1	110	151	208	276	336	380	542	706	914	1219	1601	2138	2876	3901	5098	6756	8842	11716	15635	20797	28148	38966	52003	69432	91911	122091	164421	216448
						78.5	112	153	210	280	341	385	549	716	926	1236	1624	2167	2917	3954	5170	6846	8963	11875	15848	21080	28532	39493	52703	70379	93157	123753	166680	219373
						79.9	113	155	213	285	346	391	556	726	939	1253	1647	2197	2957	4008	5243	6937	9083	12035	16061	21363	28916	40020	53404	71326	94404	125414	168939	222298
						81.3	115	158	216	289	351	397	563	735	952	1270	1670	2226	2998	4061	5316	7027	9203	12194	16274	21646	29299	40546	54104	72273	95651	127076	171198	225224
MAX	35	70	140	210	280	82.7	117	160	219	293	356	402	570	745	964	1287	1693	2256	3039	4114	5389	7117	9323	12354	16488	21929	29683	41073	54805	73221	96898	128737	173457	228149
OVERTRAVEL						84.1	119	162	222	297	361	408	577	755	977	1304	1716	2285	3079	4168	5462	7208	9444	12513	16701	22212	30067	41600	55506	74168	98145	130399	175716	231074
						85.5	120	164	224	301	366	414	584	765	989	1321	1739	2314	3120	4221	5535	7298	9564	12673	16914	22495	30451	42126	56206	75115	99392	132061	177974	233999
						86.9	122	166	227	306	371	419	591	775	1002	1338	1762	2344	3161	4275	5608	7389	9684	12832	17127	22778	30835	42653	56907	76062	100639	133722	180233	236925
						88.3	124	168	230	310	376	425	598	785	1014	1355	1785	2373	3201	4328	5681	7479	9805	12992	17340	23061	31219	43180	57607	77009	101886	135384	182492	239850
	40	80	160	240	320	89.7	126	170	233	314	380	430	605	794	1027	1372	1808	2403	3242	4381	5754	7570	9925	13151	17553	23344	31603	43707	58308	77956	103132	137046	184751	242775

SPRING RATE N/mm	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
V1	1.40	1.76	2.10	2.80	4.21	4.90	5.62	7.01	9.81	12.6	17.0	23.0	29.4	40.7	53.3	73.0	90.4	120	160	213	283	384	527	701	947	1247	1662	2259	2925
V2	0.701	0.878	1.05	1.40	2.10	2.45	2.81	3.50	4.90	6.29	8.49	11.5	14.7	20.3	26.7	36.5	45.2	60.2	79.8	107	141	192	263	350	474	623	831	1129	1463
V3	0.350	0.439	0.526	0.700	1.05	1.23	1.41	1.75	2.45	3.15	4.25	5.74	7.35	10.2	13.3	18.2	22.6	30.1	39.9	53.3	70.7	96.0	132	175	237	312	415	565	731
V4	0.234	0.293	0.351	0.466	0.702	0.817	0.937	1.17	1.63	2.10	2.83	3.83	4.90	6.78	8.89	12.16	15.07	20.05	26.59	35.52	47.16	63.98	87.78	116.8	157.9	207.8	276.9	376.5	487.5
V5	0.175	0.219	0.263	0.350	0.526	0.613	0.703	0.876	1.23	1.57	2.12	2.87	3.68	5.08	6.67	9.12	11.30	15.04	19.94	26.64	35.37	47.99	65.84	87.57	118.4	155.9	207.7	282.4	365.7

SELECTION CHART IN KILOGRAMS IS SHOWN ON PAGE 188

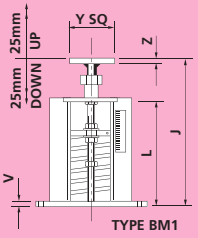
RANGE V1



SUPPORT SIZE	ROD DIA	BODY DIMENSIONS				RTO AT MIN LOAD (mm)			DEPTH OF THR'D	LUG DIMENSIONS TYPES TS2 & TS3					WEIGHTS kgf			J AT MIN LOAD	WEIGHT	J AT MIN LOAD	WEIGHT
	X mm	D mm	K mm	M mm	L mm (not BM)	TS1	TS2	TS3	A mm	E mm	F mm	G mm	H mm	T mm	TS1	TS2	TS3	mm	kgf	mm	kgf
V1-1	M12	108	122	155	133	150	182	182	12	20	20	30	14	6	4.0	4.1	4.2	153	3.2	84	3.4
V1-2	M12	108	122	155	117	150	182	182	12	20	20	30	14	6	4.1	4.2	4.3	157	3.2	88	3.5
V1-3	M12	108	122	155	123	150	182	182	12	20	20	30	14	6	4.1	4.2	4.3	163	3.3	93	3.5
V1-4	M12	108	122	155	124	150	182	182	12	20	20	30	14	6	4.2	4.3	4.4	164	3.3	94	3.6
V1-5	M12	108	122	155	123	150	182	182	12	20	20	30	14	6	4.2	4.3	4.4	163	3.3	93	3.6
V1-6	M12	108	122	155	126	150	182	182	12	20	20	30	14	6	4.2	4.3	4.4	166	3.3	96	3.6
V1-7	M12	108	122	155	127	150	182	182	12	20	20	30	14	6	4.3	4.4	4.5	167	3.4	97	3.7
V1-8	M12	108	122	155	133	150	182	182	12	20	20	30	14	6	4.4	4.5	4.6	173	3.5	103	3.8
V1-9	M12	108	122	155	136	150	182	182	12	20	20	30	14	6	4.4	4.5	4.6	176	3.6	106	3.8
V1-10	M12	108	122	155	134	150	182	182	12	20	20	30	14	6	4.5	4.6	4.7	174	3.6	105	3.9
V1-11	M12	108	122	155	139	150	182	182	12	20	20	30	14	6	4.6	4.7	4.8	179	3.7	109	4.0
V1-12	M12	108	122	155	139	150	182	182	12	20	20	30	14	6	4.7	4.8	4.9	179	3.8	110	4.1
V1-13	M12	108	122	155	160	158	196	196	12	25	30	36	18	6	5.0	5.1	5.3	200	4.1	130	4.4
V1-14	M12	108	122	155	173	171	209	209	12	25	30	36	18	6	5.4	5.6	5.7	213	4.6	143	4.8
V1-15	M12	108	122	155	194	192	230	230	12	25	30	36	18	6	6.0	6.2	6.3	234	5.1	165	5.4
V1-16	M16	145	164	200	210	207	260	260	16	30	35	50	22	10	12.3	12.6	13.0	250	10.4	172	10.8
V1-17	M16	145	164	200	184	181	234	234	16	30	35	50	22	10	11.5	11.9	12.2	224	9.6	146	10.1
V1-18	M16	145	164	200	197	194	247	247	16	30	35	50	22	10	12.2	12.5	12.9	237	10.3	159	10.7
V1-19	M20	175	198	250	209	205	269	269	20	35	45	60	26	10	20.8	21.4	22.0	249	16.7	163	17.3
V1-20	M24	175	198	250	231	226	301	301	24	40	55	70	33	12	23.0	24.0	25.1	271	18.3	181	19.3
V1-21	M30	175	198	250	259	253	339	339	30	45	55	80	40	15	26.4	27.8	29.4	299	20.5	204	22.2
V1-22	M30	220	250	330	268	262	348	348	30	45	55	80	40	15	45.3	46.6	48.2	308	35.8	208	37.5
V1-23	M36	220	250	330	313	306	403	403	36	60	75	90	46	15	57.2	59.2	61.5	353	44.6	242	46.6
V1-24	M42	220	250	330	360	352	465	465	42	70	85	105	52	20	72.1	75.6	79.8	400	55.4	277	58.3
V1-25	M48	330	376	500	366	356	486	486	48	75	100	120	60	20	137	142	148	406	112	283	116
V1-26	M56	330	376	500	398	387	538	538	56	80	115	140	68	20	161	167	175	438	132	307	139
V1-27	M64	330	376	520	425	412	580	580	64	90	130	155	76	25	184	194	205	465	148	328	158
V1-28	M72	330	376	530	488	474	643	643	72	90	130	155	76	25	233	241	253	528	185	378	198
V1-29	M80	330	376	540	571	555	746	746	80	100	150	175	85	25	293	304	318	611	228	448	247

RANGE V1

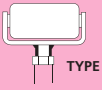
TYPE BM



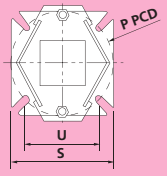
TYPE BM1

TYPE BM2

TYPE BM3



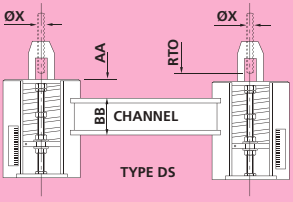
TYPE BM4



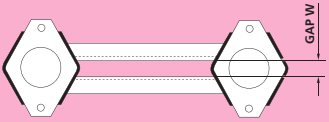
NB. INSTALLED HEIGHT 'J' DIMENSIONS FOR TYPES BM2 BM3 AND BM4 VARY WITH PIPE SIZE. PLEASE CONTACT PIPE SUPPORTS LIMITED'S DESIGN DEPARTMENT FOR DETAILS.

NOTE THAT WHERE DIMENSION 'M' EXCEEDS THE BASE PLATE SQUARE DIMENSION 'S', 'M' WILL BE THE MAX. WIDTH OF THE BASE PLATE.

TYPE DS



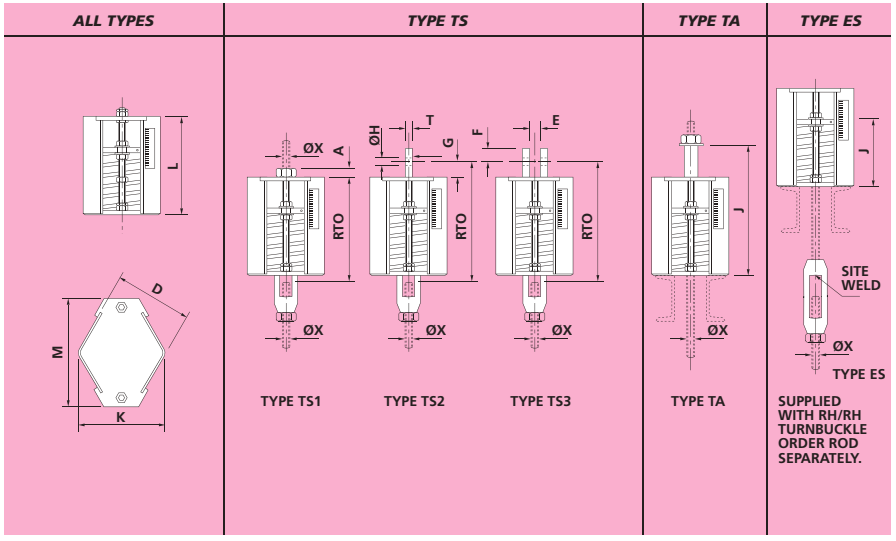
TYPE DS



SUPPORTING EFFORT = TABULATED VALUE 5 2
SPRING RATE = TABULATED VALUE 5 2
ADD WEIGHT OF UNIT TO LOAD FROM PIPE.

SUPPORT SIZE	J AT MIN. LOAD TYPE BM1 mm	BODY L'TH L mm	BASE PLATE SQ. S mm	BASE PLATE PCD P mm	BASE BOLT CRS. SQ. U mm	BASE BOLT SIZE	BASE PLATE THK V mm	LOAD PAD SQ. Y mm	LOAD PAD THK Z mm	WEIGHT kgf BM1	RTO AT MIN LOAD mm	DIM. AA mm	GAP W mm	BEAM DEPTH BB (mm) 800 MAX CENTRES	BEAM DEPTH BB (mm) 1200 MAX CENTRES	BEAM DEPTH BB (mm) 1600 MAX CENTRES	WEIGHT kgf @ 800 CRS	WEIGHT kgf @ 1200 CRS	WEIGHT kgf @ 1600 CRS
V1-1	184	104	150	160	113	M16	6	75	6	3.5	63	25	18	50	50	50	14	18	21
V1-2	188	108	150	160	113	M16	6	75	6	3.5	59	25	18	50	50	50	14	18	21
V1-3	193	113	150	160	113	M16	6	75	6	3.5	54	25	18	50	50	50	14	18	21
V1-4	194	114	150	160	113	M16	6	75	6	3.6	53	25	18	50	50	50	15	18	22
V1-5	193	113	150	160	113	M16	6	75	6	3.6	54	25	18	50	50	50	15	18	22
V1-6	196	116	150	160	113	M16	6	75	6	3.6	51	25	18	50	50	50	15	18	22
V1-7	197	117	150	160	113	M16	6	75	6	3.6	50	25	18	50	50	50	15	18	22
V1-8	203	123	150	160	113	M16	6	75	6	3.7	44	25	18	50	50	50	15	18	22
V1-9	206	126	150	160	113	M16	6	75	6	3.8	41	25	18	50	50	50	15	18	22
V1-10	210	127	185	177	125	M20	8	75	6	5.4	42	25	22	75	75	75	19	24	30
V1-11	214	131	185	177	125	M20	8	75	6	5.5	38	25	22	75	75	75	19	25	30
V1-12	215	132	185	177	125	M20	8	75	6	5.6	37	25	22	75	75	75	19	25	31
V1-13	241	152	200	197	139	M20	8	75	10	6.8	25	25	26	75	75	75	20	25	31
V1-14	254	165	200	197	139	M20	8	75	10	7.2	25	25	26	75	75	75	21	26	32
V1-15	276	187	200	197	139	M20	8	75	10	7.6	25	25	26	75	75	75	22	27	33
V1-16	292	204	270	240	170	M20	10	100	12	15.1	25	25	33	100	100	125	38	46	64
V1-17	266	178	270	240	170	M20	10	100	12	14.7	25	25	33	100	100	125	36	44	63
V1-18	279	191	270	240	170	M20	10	100	12	15.2	25	25	33	100	100	125	37	45	64
V1-19	289	199	270	240	170	M20	12	120	12	22.5	25	25	40	125	150	150	59	82	97
V1-20	307	217	270	240	170	M20	12	120	12	23.6	25	25	40	125	150	150	63	86	102
V1-21	330	240	270	240	170	M20	12	120	12	25.4	25	25	40	125	150	150	70	93	109
V1-22	337	246	270	268	190	M20	12	150	15	38.6	25	25	52	200	200	250	119	138	158
V1-23	361	270	270	268	190	M20	12	150	15	44	25	25	52	200	200	250	143	162	182
V1-24	401	308	270	268	190	M20	20	150	15	57	25	25	52	200	200	250	172	192	212
V1-25	422	320	400	400	283	M24	20	200	20	117	25	25	60	250	300	390	296	342	411
V1-26	446	339	400	400	283	M24	20	200	20	132	25	25	70	250	300	390	345	391	459
V1-27	473	363	400	400	283	M24	20	200	20	150	25	25	80	250	300	390	391	437	506
V1-28	536	416	400	400	283	M24	25	200	25	189	25	25	80	390	390	430	517	560	629
V1-29	626	495	400	400	283	M24	30	200	30	237	25	25	90	390	390	430	637	681	750

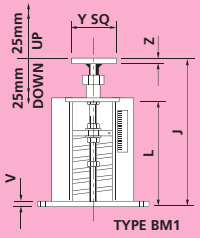
RANGE V2



SUPPORT SIZE	ROD DIA	BODY DIMENSIONS				RTO AT MIN LOAD (mm)			DEPTH OF THR'D	LUG DIMENSIONS TYPES TS2 & TS3					WEIGHTS kgf			J AT MIN LOAD	WEIGHT	J AT MIN LOAD	WEIGHT
	X mm	D mm	K mm	M mm	L mm (not BM)	TS1	TS2	TS3	A mm	E mm	F mm	G mm	H mm	T mm	TS1	TS2	TS3	mm	kgf	mm	kgf
V2-1	M12	108	122	155	169	167	199	199	12	20	20	30	14	6	4.4	4.5	4.6	249	3.6	133	3.8
V2-2	M12	108	122	155	176	174	206	206	12	20	20	30	14	6	4.5	4.6	4.7	256	3.7	140	3.9
V2-3	M12	108	122	155	185	183	215	215	12	20	20	30	14	6	4.7	4.8	4.9	265	3.8	148	4.1
V2-4	M12	108	122	155	191	189	221	221	12	20	20	30	14	6	4.8	4.9	5.0	271	3.9	155	4.2
V2-5	M12	108	122	155	187	185	217	217	12	20	20	30	14	6	4.7	4.8	4.9	267	3.9	151	4.1
V2-6	M12	108	122	155	197	195	227	227	12	20	20	30	14	6	4.8	4.9	5.0	277	4.0	161	4.2
V2-7	M12	108	122	155	190	188	220	220	12	20	20	30	14	6	4.8	4.9	5.0	270	4.0	154	4.2
V2-8	M12	108	122	155	206	204	236	236	12	20	20	30	14	6	5.1	5.1	5.3	286	4.2	170	4.4
V2-9	M12	108	122	155	208	206	238	238	12	20	20	30	14	6	5.0	5.1	5.2	288	4.2	171	4.4
V2-10	M12	145	164	200	206	204	236	236	12	20	20	30	14	6	9.5	9.6	9.7	286	8.4	167	8.6
V2-11	M12	145	164	200	209	207	239	239	12	20	20	30	14	6	9.7	9.8	9.9	289	8.6	171	8.8
V2-12	M12	145	164	200	213	211	243	243	12	20	20	30	14	6	9.9	10.0	10.1	293	8.8	175	9.0
V2-13	M12	145	164	200	222	220	258	258	12	25	30	36	18	6	10.2	10.3	10.5	302	9.1	183	9.3
V2-14	M12	145	164	200	235	233	271	271	12	25	30	36	18	6	10.9	11.0	11.1	315	9.7	197	9.9
V2-15	M12	145	164	200	261	259	297	297	12	25	30	36	18	6	12.2	12.4	12.5	341	11.1	223	11.3
V2-16	M16	175	198	250	244	241	294	294	16	30	35	50	22	10	17.7	18.0	18.4	324	15.2	199	15.5
V2-17	M16	175	198	250	264	261	314	314	16	30	35	50	22	10	18.8	19.2	19.6	344	16.3	219	16.7
V2-18	M16	175	198	250	284	281	334	334	16	30	35	50	22	10	20.4	20.8	21.1	364	17.9	239	18.2
V2-19	M20	220	250	320	285	281	345	345	20	35	45	60	26	10	34.0	34.6	35.2	365	28.5	232	29.0
V2-20	M24	220	250	320	311	306	381	381	24	40	55	70	33	12	37.7	38.7	39.8	391	31.7	254	32.4
V2-21	M30	220	250	320	348	342	428	428	30	45	55	80	40	15	45.5	46.9	48.5	428	36.1	281	37.5
V2-22	M30	220	250	330	389	383	469	469	30	45	55	80	40	15	55.2	56.5	58.2	469	45.4	322	46.9
V2-23	M36	220	250	330	454	447	544	544	36	60	75	90	46	15	71.2	73.1	75.5	534	58.3	376	59.6
V2-24	M42	220	250	330	526	518	631	631	42	70	85	105	52	20	89.9	93.4	97.6	606	72.4	436	74.6
V2-25	M48	330	376	500	467	457	587	587	48	75	100	120	60	20	165	170	176	547	139	377	143
V2-26	M56	330	376	500	541	530	681	681	56	80	115	140	68	20	193	199	206	621	162	443	168
V2-27	M64	330	376	520	611	598	766	766	64	90	130	155	76	25	234	243	255	691	195	507	204
V2-28	M72	330	376	530	728	714	883	883	72	90	130	155	76	25	303	312	323	808	250	611	262
V2-29	M80	330	376	540	845	829	1020	1020	80	100	150	175	85	25	382	393	407	925	309	715	328

RANGE V2

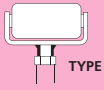
TYPE BM



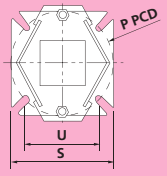
TYPE BM1

TYPE BM2

TYPE BM3



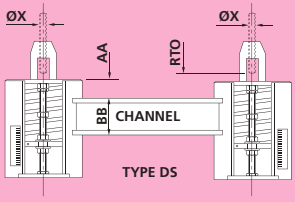
TYPE BM4



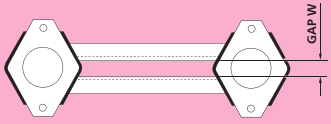
NB. INSTALLED HEIGHT 'J' DIMENSIONS FOR TYPES BM2 BM3 AND BM4 VARY WITH PIPE SIZE. PLEASE CONTACT PIPE SUPPORTS LIMITED'S DESIGN DEPARTMENT FOR DETAILS.

NOTE THAT WHERE DIMENSION 'M' EXCEEDS THE BASE PLATE SQUARE DIMENSION 'S', 'M' WILL BE THE MAX. WIDTH OF THE BASE PLATE.

TYPE DS



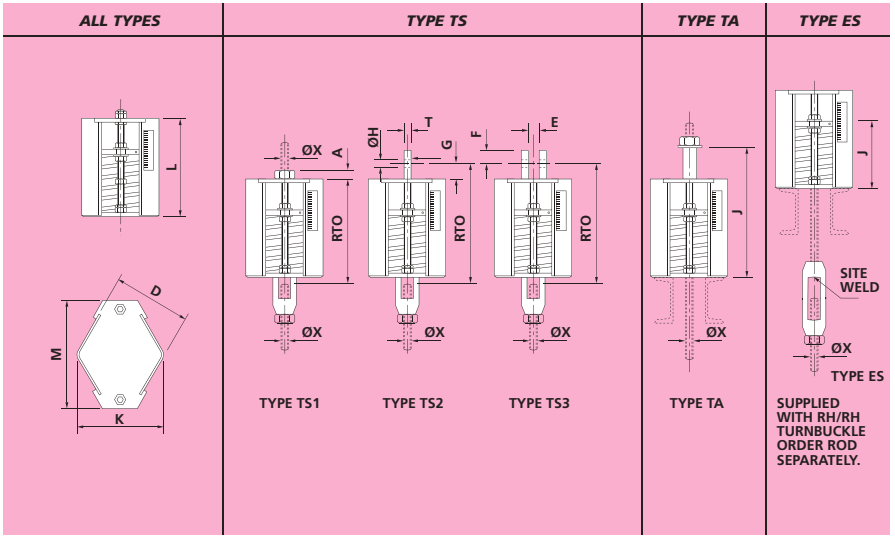
TYPE DS



SUPPORTING EFFORT = TABULATED VALUE 5 2
SPRING RATE = TABULATED VALUE 5 2
ADD WEIGHT OF UNIT TO LOAD FROM PIPE.

SUPPORT SIZE	J AT MIN. LOAD TYPE BM1 mm	BODY L'TH L mm	BASE PLATE SQ. S mm	BASE PLATE PCD P mm	BASE BOLT CRS. SQ. U mm	BASE BOLT SIZE	BASE PLATE THK V mm	LOAD PAD SQ. Y mm	LOAD PAD THK Z mm	WEIGHT kgf BM1	RTO AT MIN LOAD mm	DIM. AA mm	GAP W mm	BEAM DEPTH BB (mm) 800 MAX CENTRES	BEAM DEPTH BB (mm) 1200 MAX CENTRES	BEAM DEPTH BB (mm) 1600 MAX CENTRES	WEIGHT kgf @ 800 CRS	WEIGHT kgf @ 1200 CRS	WEIGHT kgf @ 1600 CRS
V2-1	280	159	150	160	113	M16	6	75	6	3.7	25	25	18	50	50	50	15	18	22
V2-2	287	166	150	160	113	M16	6	75	6	3.7	25	25	18	50	50	50	15	19	22
V2-3	295	174	150	160	113	M16	6	75	6	3.8	25	25	18	50	50	50	16	19	23
V2-4	302	181	150	160	113	M16	6	75	6	3.9	25	25	18	50	50	50	16	19	23
V2-5	298	177	150	160	113	M16	6	75	6	3.8	25	25	18	50	50	50	16	19	23
V2-6	308	187	150	160	113	M16	6	75	6	3.9	25	25	18	50	50	50	16	19	23
V2-7	301	180	150	160	113	M16	6	75	6	3.9	25	25	18	50	50	50	16	19	23
V2-8	317	196	150	160	113	M16	6	75	6	4.1	25	25	18	50	50	50	16	20	23
V2-9	318	197	150	160	113	M16	6	75	6	4.0	25	25	18	50	50	50	16	20	23
V2-10	325	205	200	197	139	M20	10	75	6	9.6	25	25	22	75	75	75	28	34	40
V2-11	329	209	200	197	139	M20	10	75	6	9.7	25	25	22	75	75	75	29	34	40
V2-12	333	213	200	197	139	M20	10	75	6	9.9	25	25	22	75	75	75	29	35	40
V2-13	347	221	200	197	139	M20	10	75	10	10.8	25	25	26	75	75	75	30	35	41
V2-14	361	235	200	197	139	M20	10	75	10	11.3	25	25	26	75	75	75	31	37	42
V2-15	387	261	200	197	139	M20	10	75	10	12.4	25	25	26	75	75	75	34	39	45
V2-16	368	239	270	240	170	M20	12	100	12	20.0	25	25	33	100	100	125	48	56	74
V2-17	388	259	270	240	170	M20	12	100	12	20.9	25	25	33	100	100	125	50	58	76
V2-18	408	279	270	240	170	M20	12	100	12	22.2	25	25	33	100	100	125	53	61	80
V2-19	405	276	270	268	190	M20	12	120	12	31.7	25	25	40	125	150	150	84	106	122
V2-20	427	298	270	268	190	M20	12	120	12	34.2	25	25	40	125	150	150	91	113	129
V2-21	454	325	270	268	190	M20	12	120	12	37.8	25	25	40	125	150	150	107	129	145
V2-22	498	366	270	268	190	M20	12	150	15	46.8	25	25	52	200	200	250	139	158	178
V2-23	542	410	270	268	190	M20	12	150	15	55.5	25	25	52	200	200	250	171	190	210
V2-24	607	473	270	268	190	M20	20	150	15	71.4	25	25	52	200	200	250	208	228	247
V2-25	563	420	400	400	283	M24	20	200	20	141	25	25	60	250	300	390	352	398	467
V2-26	629	481	400	400	283	M24	20	200	20	158	25	25	70	250	300	390	409	455	523
V2-27	699	548	400	400	283	M24	20	200	20	192	25	25	80	250	300	390	491	537	606
V2-28	816	655	400	400	283	M24	25	200	25	248	25	25	80	390	390	430	657	700	769
V2-29	940	768	400	400	283	M24	30	200	30	312	25	25	90	390	390	430	815	859	928

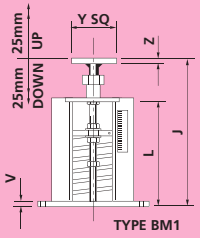
RANGE V3

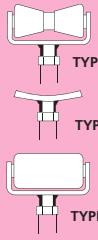


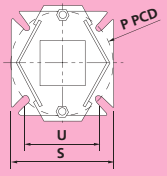
SUPPORT SIZE	ROD DIA X mm	BODY DIMENSIONS D mm	K mm	M mm	L mm (not BM)	RTO AT MIN LOAD (mm) TS1	TS2	TS3	DEPTH OF THR'D A mm	LUG DIMENSIONS TYPES TS2 & TS3 E mm	F mm	G mm	H mm	T mm	WEIGHTS kgf TS1	TS2	TS3	J AT MIN LOAD mm	WEIGHT kgf	J AT MIN LOAD mm	WEIGHT kgf
V3-1	M12	108	122	155	294	292	324	324	12	20	20	30	14	6	5.4	5.5	5.6	454	4.7	243	4.8
V3-2	M12	108	122	155	315	313	345	345	12	20	20	30	14	6	5.8	5.8	6.0	475	5.0	264	5.1
V3-3	M12	108	122	155	329	327	359	359	12	20	20	30	14	6	5.9	6.0	6.1	489	5.1	278	5.2
V3-4	M12	108	122	155	330	328	360	360	12	20	20	30	14	6	6.0	6.1	6.2	490	5.2	279	5.3
V3-5	M12	108	122	155	323	321	353	353	12	20	20	30	14	6	6.0	6.1	6.2	483	5.2	272	5.3
V3-6	M12	108	122	155	328	326	358	358	12	20	20	30	14	6	6.0	6.1	6.2	488	5.2	277	5.3
V3-7	M12	108	122	155	336	334	366	366	12	20	20	30	14	6	6.2	6.3	6.4	496	5.4	286	5.5
V3-8	M12	108	122	155	356	354	386	386	12	20	20	30	14	6	6.6	6.7	6.8	516	5.7	306	5.9
V3-9	M12	108	122	155	370	368	400	400	12	20	20	30	14	6	7.0	7.1	7.2	530	6.1	319	6.2
V3-10	M12	145	164	200	351	349	381	381	12	20	20	30	14	6	12.0	12.0	12.2	511	10.9	299	11.0
V3-11	M12	145	164	200	357	355	387	387	12	20	20	30	14	6	12.3	12.4	12.5	517	11.2	305	11.4
V3-12	M12	145	164	200	364	362	394	394	12	20	20	30	14	6	12.7	12.8	12.9	524	11.6	312	11.7
V3-13	M12	145	164	200	380	378	416	416	12	25	30	36	18	6	13.2	13.3	13.5	540	12.1	328	12.2
V3-14	M12	145	164	200	406	404	442	442	12	25	30	36	18	6	14.4	14.5	14.7	566	13.3	353	13.4
V3-15	M12	145	164	200	455	453	491	491	12	25	30	36	18	6	16.9	17.1	17.2	615	15.8	403	15.9
V3-16	M16	220	250	320	374	371	424	424	16	30	35	50	22	10	30.0	30.3	30.7	534	27.0	315	27.2
V3-17	M16	220	250	320	409	406	459	459	16	30	35	50	22	10	33.6	33.9	34.3	569	30.5	350	30.7
V3-18	M16	220	250	320	430	427	480	480	16	30	35	50	22	10	36.0	36.4	36.7	590	32.9	371	33.1
V3-19	M20	220	250	320	473	469	533	533	20	35	45	60	26	10	43.8	44.4	45.0	633	38.2	406	38.4
V3-20	M24	220	250	320	519	514	589	589	24	40	55	70	33	12	50.0	51.0	52.1	679	43.8	448	44.2
V3-21	M30	220	250	320	578	572	658	658	30	45	55	80	40	15	61.6	63.0	64.6	738	51.6	497	52.6
V3-22	M30	220	250	330	649	643	729	729	30	45	55	80	40	15	76.1	77.5	79.1	809	65.7	568	66.7
V3-23	M36	220	250	330	759	752	849	849	36	60	75	90	46	15	101	103	105	919	87.0	667	87.2
V3-24	M42	220	250	330	929	921	1034	1034	42	70	85	105	52	20	136	140	144	1089	117	825	117
V3-25	M48	330	376	500	806	796	926	926	48	75	100	120	60	20	235	240	246	966	207	702	209
V3-26	M56	330	376	500	942	931	1082	1082	56	80	115	140	68	20	283	289	297	1102	248	830	251
V3-27	M64	330	376	520	1074	1061	1229	1229	64	90	130	155	76	25	358	367	379	1234	311	956	318
V3-28	M72	330	376	530	1285	1271	1440	1440	72	90	130	155	76	25	474	483	494	1445	408	1154	417
V3-29	M80	330	376	540	1503	1487	1678	1678	80	100	150	175	85	25	609	620	635	1663	517	1359	532

RANGE V3

TYPE BM



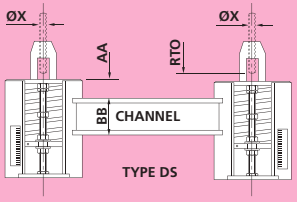


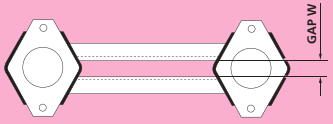


NB. INSTALLED HEIGHT 'J' DIMENSIONS FOR TYPES BM2 BM3 AND BM4 VARY WITH PIPE SIZE. PLEASE CONTACT PIPE SUPPORTS LIMITED'S DESIGN DEPARTMENT FOR DETAILS.

NOTE THAT WHERE DIMENSION 'M' EXCEEDS THE BASE PLATE SQUARE DIMENSION 'S', 'M' WILL BE THE MAX. WIDTH OF THE BASE PLATE.

TYPE DS

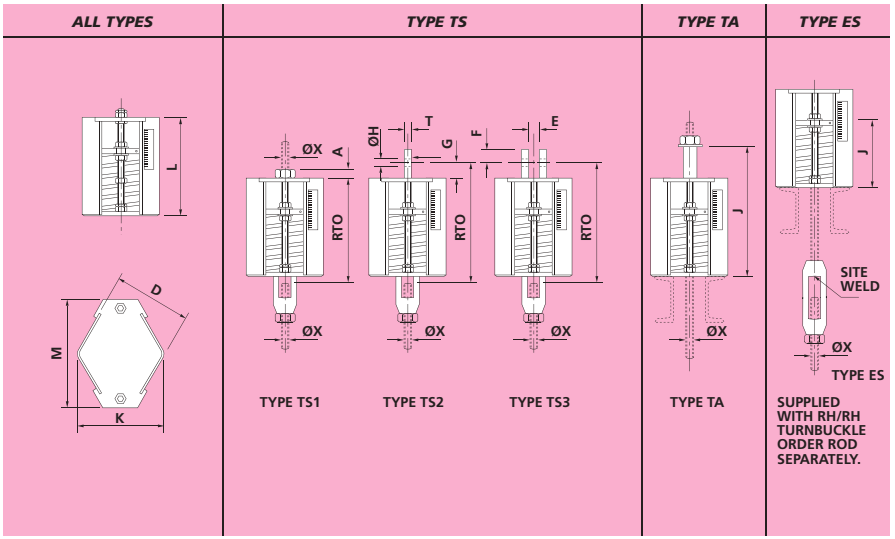




SUPPORTING EFFORT = TABULATED VALUE 5 2
SPRING RATE = TABULATED VALUE 5 2
ADD WEIGHT OF UNIT TO LOAD FROM PIPE.

SUPPORT SIZE	J AT MIN. LOAD TYPE BM1 mm	BODY L'TH L mm	BASE PLATE SQ. S mm	BASE PLATE PCD P mm	BASE BOLT CRS. SQ. U mm	BASE BOLT SIZE	BASE PLATE THK V mm	LOAD PAD SQ. Y mm	LOAD PAD THK Z mm	WEIGHT kgf BM1	RTO AT MIN LOAD mm	DIM. AA mm	GAP W mm	BEAM DEPTH BB (mm) 800 MAX CENTRES	BEAM DEPTH BB (mm) 1200 MAX CENTRES	BEAM DEPTH BB (mm) 1600 MAX CENTRES	WEIGHT kgf @ 800 CRS	WEIGHT kgf @ 1200 CRS	WEIGHT kgf @ 1600 CRS
V3-1	484	281	150	160	113	M16	6	75	6	4.1	25	25	18	50	50	50	17	20	24
V3-2	505	302	150	160	113	M16	6	75	6	4.3	25	25	18	50	50	50	18	21	25
V3-3	519	316	150	160	113	M16	6	75	6	4.4	25	25	18	50	50	50	18	21	25
V3-4	520	317	150	160	113	M16	6	75	6	4.4	25	25	18	50	50	50	18	22	25
V3-5	513	310	150	160	113	M16	6	75	6	4.5	25	25	18	50	50	50	18	22	25
V3-6	518	315	150	160	113	M16	6	75	6	4.5	25	25	18	50	50	50	18	22	25
V3-7	527	324	150	160	113	M16	6	75	6	4.7	25	25	18	50	50	50	19	22	26
V3-8	547	344	150	160	113	M16	6	75	6	4.9	25	25	18	50	50	50	19	23	26
V3-9	560	357	150	160	113	M16	6	75	6	5.2	25	25	18	50	50	50	20	24	27
V3-10	551	349	200	197	139	M20	10	75	6	10.9	25	25	22	75	75	75	33	39	45
V3-11	557	355	200	197	139	M20	10	75	6	11.2	25	25	22	75	75	75	34	39	45
V3-12	564	362	200	197	139	M20	10	75	6	11.5	25	25	22	75	75	75	35	40	46
V3-13	586	378	200	197	139	M20	10	75	10	12.6	25	25	26	75	75	75	36	41	47
V3-14	611	403	200	197	139	M20	10	75	10	13.6	25	25	26	75	75	75	38	44	49
V3-15	661	453	200	197	139	M20	10	75	10	15.6	25	25	26	75	75	75	43	49	54
V3-16	580	371	270	268	190	M20	12	100	12	28.4	25	25	33	100	100	125	71	79	97
V3-17	615	406	270	268	190	M20	12	100	12	31.4	25	25	33	100	100	125	79	87	105
V3-18	636	427	270	268	190	M20	12	100	12	33.5	25	25	33	100	100	125	83	91	109
V3-19	673	462	270	268	190	M20	12	120	12	39.5	25	25	40	125	150	150	103	126	141
V3-20	715	504	270	268	190	M20	12	120	12	43.9	25	25	40	125	150	150	116	138	154
V3-21	764	553	270	268	190	M20	12	120	12	50.6	25	25	40	125	150	150	139	161	177
V3-22	838	624	270	268	190	M20	12	150	15	63.7	25	25	52	200	200	250	180	200	220
V3-23	927	713	270	268	190	M20	12	150	15	79.5	25	25	52	200	200	250	230	250	269
V3-24	1090	874	270	268	190	M20	20	150	15	109	25	25	52	200	200	250	300	320	339
V3-25	982	757	400	400	283	M24	20	200	20	200	25	25	60	250	300	390	492	538	607
V3-26	1109	880	400	400	283	M24	20	200	20	232	25	25	70	250	300	390	589	635	703
V3-27	1242	1009	400	400	283	M24	20	200	20	295	25	25	80	250	300	390	739	785	854
V3-28	1453	1210	400	400	283	M24	25	200	25	390	25	25	80	390	390	430	999	1042	1111
V3-29	1678	1424	400	400	283	M24	30	200	30	501	25	25	90	390	390	430	1269	1313	1382

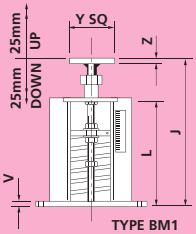
RANGE V4



SUPPORT SIZE	ROD DIA	BODY DIMENSIONS				RTO AT MIN LOAD (mm)			DEPTH OF THR'D	LUG DIMENSIONS TYPES TS2 & TS3					WEIGHTS kgf			J AT MIN LOAD mm	WEIGHT kgf	J AT MIN LOAD mm	WEIGHT kgf
	X mm	D mm	K mm	M mm	L mm (not BM)	TS1	TS2	TS3	A mm	E mm	F mm	G mm	H mm	T mm	TS1	TS2	TS3				
V4-1	M12	149.2	156.2	155	429	427	459	459	12	20	20	30	14	6	7.6	7.7	7.8	669	6.6	378	6.7
V4-2	M12	149.2	156.2	155	457	455	487	487	12	20	20	30	14	6	8.1	8.1	8.4	697	7.0	406	7.1
V4-3	M12	149.2	156.2	155	480	478	510	510	12	20	20	30	14	6	8.3	8.4	8.5	720	7.1	429	7.3
V4-4	M12	149.2	156.2	155	487	485	517	517	12	20	20	30	14	6	8.4	8.5	8.7	727	7.3	436	7.4
V4-5	M12	149.2	156.2	155	476	474	506	506	12	20	20	30	14	6	8.4	8.5	8.7	716	7.3	425	7.4
V4-6	M12	149.2	156.2	155	486	484	516	516	12	20	20	30	14	6	8.4	8.5	8.7	726	7.3	435	7.4
V4-7	M12	149.2	156.2	155	492	490	522	522	12	20	20	30	14	6	8.7	8.8	9.0	732	7.6	442	7.7
V4-8	M12	149.2	156.2	155	528	526	558	558	12	20	20	30	14	6	9.2	9.4	9.5	768	8.0	478	8.3
V4-9	M12	149.2	156.2	155	544	542	574	574	12	20	20	30	14	6	9.8	9.9	10.1	784	8.5	493	8.7
V4-10	M12	177.6	188.9	200	523	521	553	553	12	20	20	30	14	6	16.8	16.8	17.1	763	15.3	471	15.4
V4-11	M12	177.6	188.9	200	532	530	562	562	12	20	20	30	14	6	17.2	17.4	17.5	772	15.7	480	16.0
V4-12	M12	177.6	188.9	200	543	541	573	573	12	20	20	30	14	6	17.8	17.9	18.1	783	16.2	491	16.4
V4-13	M12	177.6	188.9	200	568	566	604	604	12	25	30	36	18	6	18.5	18.6	18.9	808	16.9	516	17.1
V4-14	M12	177.6	188.9	200	607	605	643	643	12	25	30	36	18	6	20.2	20.3	20.6	847	18.6	554	18.8
V4-15	M12	177.6	188.9	200	682	680	718	718	12	25	30	36	18	6	23.7	23.9	24.1	922	22.1	630	22.3
V4-16	M16	246.2	263.5	320	578	575	628	628	16	30	35	50	22	10	42.0	42.4	43.0	818	37.8	517	38.1
V4-17	M16	246.2	263.5	320	633	630	683	683	16	30	35	50	22	10	47.0	47.5	48.0	873	42.7	572	43.0
V4-18	M16	246.2	263.5	320	675	672	725	725	16	30	35	50	22	10	50.4	51.0	51.4	915	46.1	614	46.3
V4-19	M20	246.2	263.5	320	709	705	769	769	20	35	45	60	26	10	61.3	62.2	63.0	949	53.5	639	53.8
V4-20	M24	246.2	263.5	320	778	773	848	848	24	40	55	70	33	12	70.0	71.4	72.9	1018	61.3	704	61.9
V4-21	M30	246.2	263.5	320	863	857	943	943	30	45	55	80	40	15	86.2	88.2	90.4	1103	72.2	779	73.6
V4-22	M30	248.2	263.5	330	970	964	1050	1050	30	45	55	80	40	15	107	109	111	1210	92.0	884	93.4
V4-23	M36	248.2	263.5	330	1129	1122	1219	1219	36	60	75	90	46	15	141	144	147	1369	122	1032	122
V4-24	M42	248.2	263.5	330	1343	1335	1448	1448	42	70	85	105	52	20	190	196	202	1583	164	1239	164
V4-25	M48	375.8	408.5	500	1165	1155	1285	1285	48	75	100	120	60	20	329	336	344	1405	290	1056	293
V4-26	M56	375.8	408.5	500	1367	1356	1507	1507	56	80	115	140	68	20	396	405	416	1607	347	1245	351
V4-27	M64	379.2	412.5	520	1572	1559	1727	1727	64	90	130	155	76	25	501	514	531	1812	435	1434	445
V4-28	M72	379.2	412.5	530	1882	1868	2037	2037	72	90	130	155	76	25	664	676	692	2122	571	1726	584
V4-29	M80	379.2	412.5	540	2200	2184	2375	2375	80	100	150	175	85	25	853	868	889	2440	724	2031	745

RANGE V4

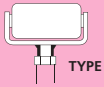
TYPE BM



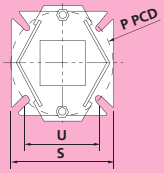
TYPE BM1

TYPE BM2

TYPE BM3



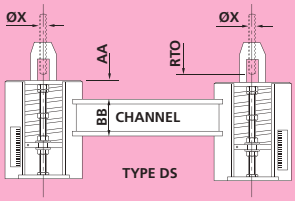
TYPE BM4



NB. INSTALLED HEIGHT 'J' DIMENSIONS FOR TYPES BM2 BM3 AND BM4 VARY WITH PIPE SIZE. PLEASE CONTACT PIPE SUPPORTS LIMITED'S DESIGN DEPARTMENT FOR DETAILS.

NOTE THAT WHERE DIMENSION 'M' EXCEEDS THE BASE PLATE SQUARE DIMENSION 'S', 'M' WILL BE THE MAX. WIDTH OF THE BASE PLATE.

TYPE DS



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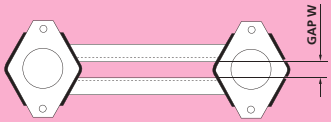
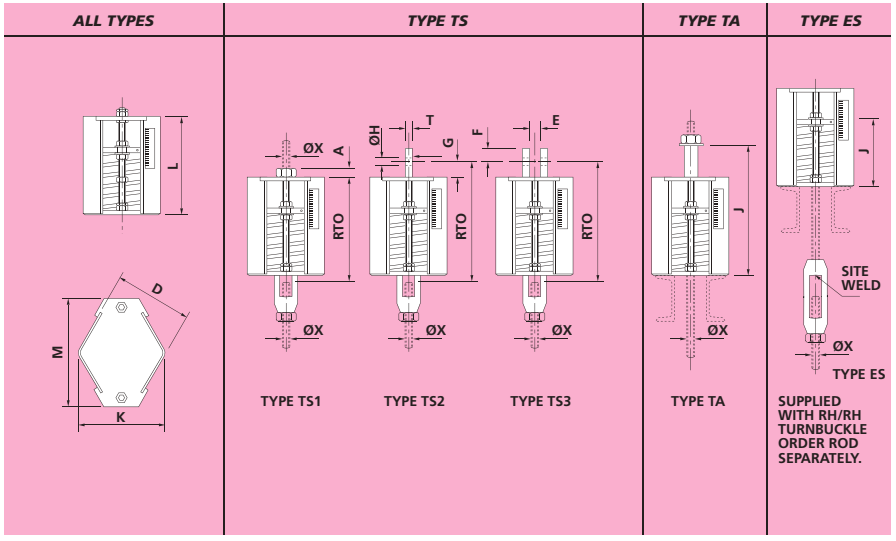


SUPPORTING EFFORT = TABULATED VALUE 5 2
SPRING RATE = TABULATED VALUE 5 2
ADD WEIGHT OF UNIT TO LOAD FROM PIPE.

SUPPORT SIZE	J AT MIN. LOAD TYPE BM1 mm	BODY L'TH L mm	BASE PLATE E SQ. S mm	BASE PLATE E PCD P mm	BASE BOLT CRS. SQ. U mm	BASE BOLT SIZE	BASE PLATE E V mm	LOAD PAD SQ. Y mm	LOAD PAD THK Z mm	WEIGHT TYPE BM1 kgf	RTO AT MIN LOAD mm	DIM. M mm	GAP W mm	RSC SIZE 900 MAX CENTRES	RSC SIZE 1300 MAX CENTRES	RSC SIZE 1800 MAX CENTRES	WEIGHT kgf @ 900 CRS	WEIGHT kgf @ 1300 CRS	WEIGHT kgf @ 1800 CRS
V4-1	701	416	156	170	120	M16	6	75	6	5.7	25	25	18	51 x 25	51 x 25	51 x 25	20.6	23.3	26.7
V4-2	729	444	156	170	120	M16	6	75	6	6.0	25	25	18	51 x 25	51 x 25	51 x 25	21.5	24.2	27.7
V4-3	752	467	156	170	120	M16	6	75	6	6.2	25	25	18	51 x 25	51 x 25	51 x 25	21.9	24.7	28.1
V4-4	759	474	156	170	120	M16	6	75	6	6.2	25	25	18	51 x 25	51 x 25	51 x 25	22.1	24.9	28.3
V4-5	748	463	156	170	120	M16	6	75	6	6.3	25	25	18	51 x 25	51 x 25	51 x 25	22.1	24.8	28.3
V4-6	758	473	156	170	120	M16	6	75	6	6.3	25	25	18	51 x 25	51 x 25	51 x 25	22.3	25.0	28.4
V4-7	765	480	156	170	120	M16	6	75	6	6.6	25	25	18	51 x 25	51 x 25	51 x 25	22.8	25.6	29.0
V4-8	801	516	156	170	120	M16	6	75	6	6.9	25	25	18	51 x 25	51 x 25	51 x 25	23.8	26.6	30.0
V4-9	816	531	156	170	120	M16	6	75	6	7.3	25	25	18	51 x 25	51 x 25	51 x 25	24.9	27.7	31.1
V4-10	805	521	200	205	145	M20	10	75	6	15.3	25	25	22	76 x 38	76 x 38	76 x 38	43.4	48.8	55.5
V4-11	814	530	200	205	145	M20	10	75	6	15.7	25	25	22	76 x 38	76 x 38	76 x 38	44.4	49.8	56.5
V4-12	825	541	200	205	145	M20	10	75	6	16.1	25	25	22	76 x 38	76 x 38	76 x 38	45.5	50.9	57.6
V4-13	856	566	200	205	145	M20	10	75	10	17.6	25	25	26	76 x 38	76 x 38	76 x 38	47.0	52.3	59.0
V4-14	894	604	200	205	145	M20	10	75	10	19.0	25	25	26	76 x 38	76 x 38	76 x 38	50.3	55.6	62.3
V4-15	970	680	200	205	145	M20	10	75	10	21.8	25	25	26	76 x 38	76 x 38	76 x 38	57.4	62.7	69.4
V4-16	864	573	270	280	198	M20	12	100	12	39.8	25	25	33	76 x 38	102 x 51	102 x 51	92.8	106	117
V4-17	919	628	270	280	198	M20	12	100	12	44.0	25	25	33	76 x 38	102 x 51	102 x 51	103	116	127
V4-18	961	670	270	280	198	M20	12	100	12	46.9	25	25	33	76 x 38	102 x 51	102 x 51	110	123	134
V4-19	988	695	270	287	203	M20	12	120	12	55.3	25	25	40	102 x 51	127 x 64	127 x 64	136	154	169
V4-20	1053	760	270	287	203	M20	12	120	12	61.5	25	25	40	102 x 51	127 x 64	127 x 64	154	172	187
V4-21	1128	835	270	287	203	M20	12	120	12	70.8	25	25	40	102 x 51	127 x 64	127 x 64	186	204	218
V4-22	1236	940	276	294	208	M20	12	150	15	89.2	25	25	52	152 x 76	203 x 76	203 x 76	237	264	288
V4-23	1377	1081	300	308	218	M20	12	150	15	111.3	25	25	52	152 x 76	203 x 76	203 x 76	306	333	357
V4-24	1586	1288	300	308	218	M20	20	150	15	152.6	25	25	52	152 x 76	203 x 76	203 x 76	405	431	455
V4-25	1418	1111	430	453	320	M24	20	200	20	280.0	25	25	60	203 x 89	254 x 89	305 x 89	689	724	777
V4-26	1606	1295	430	453	320	M24	20	200	20	324.8	25	25	70	203 x 89	254 x 89	305 x 89	823	858	911
V4-27	1802	1487	440	467	330	M24	20	200	20	413.0	25	25	80	203 x 89	254 x 89	305 x 89	1031	1067	1120
V4-28	2107	1782	460	481	340	M24	25	200	25	546.0	25	25	80	305 x 89	305 x 102	381 x 102	1369	1411	1483
V4-29	2432	2096	480	495	350	M24	30	200	30	701.4	25	25	90	305 x 89	305 x 102	381 x 102	1746	1788	1861

RANGE V5



SUPPORT SIZE	ROD DIA	BODY DIMENSIONS				RTO AT MIN LOAD (mm)			DEPTH OF THR'D	LUG DIMENSIONS TYPES TS2 & TS3					WEIGHTS kgf			J AT MIN LOAD mm	WEIGHT kgf	J AT MIN LOAD mm	WEIGHT kgf
	X mm	D mm	K mm	M mm	L mm (not BM)	TS1	TS2	TS3	A mm	E mm	F mm	G mm	H mm	T mm	TS1	TS2	TS3				
V5-1	M12	149.2	156.2	155	556	554	586	586	12	20	20	30	14	6	9.2	9.4	9.5	876	8.0	505	8.2
V5-2	M12	149.2	156.2	155	598	596	628	628	12	20	20	30	14	6	9.9	9.9	10.2	918	8.5	547	8.7
V5-3	M12	149.2	156.2	155	626	624	656	656	12	20	20	30	14	6	10.0	10.2	10.4	946	8.7	575	8.8
V5-4	M12	149.2	156.2	155	628	626	658	658	12	20	20	30	14	6	10.2	10.4	10.5	948	8.8	577	9.0
V5-5	M12	149.2	156.2	155	614	612	644	644	12	20	20	30	14	6	10.2	10.4	10.5	934	8.8	563	9.0
V5-6	M12	149.2	156.2	155	624	622	654	654	12	20	20	30	14	6	10.2	10.4	10.5	944	8.8	573	9.0
V5-7	M12	149.2	156.2	155	640	638	670	670	12	20	20	30	14	6	10.5	10.7	10.9	960	9.2	590	9.4
V5-8	M12	149.2	156.2	155	680	678	710	710	12	20	20	30	14	6	11.2	11.4	11.6	1000	9.7	630	10.0
V5-9	M12	149.2	156.2	155	708	706	738	738	12	20	20	30	14	6	11.9	12.1	12.2	1028	10.4	657	10.5
V5-10	M12	177.6	188.9	200	670	668	700	700	12	20	20	30	14	6	20.4	20.4	20.7	990	18.5	618	18.7
V5-11	M12	177.6	188.9	200	682	680	712	712	12	20	20	30	14	6	20.9	21.1	21.3	1002	19.0	630	19.4
V5-12	M12	177.6	188.9	200	696	694	726	726	12	20	20	30	14	6	21.6	21.8	21.9	1016	19.7	644	19.9
V5-13	M12	177.6	188.9	200	728	726	764	764	12	25	30	36	18	6	22.4	22.6	23.0	1048	20.6	676	20.7
V5-14	M12	177.6	188.9	200	780	778	816	816	12	25	30	36	18	6	24.5	24.7	25.0	1100	22.6	727	22.8
V5-15	M12	177.6	188.9	200	878	876	914	914	12	25	30	36	18	6	28.7	29.1	29.2	1198	26.9	826	27.0
V5-16	M16	246.2	263.5	320	714	711	764	764	16	30	35	50	22	10	51.0	51.5	52.2	1034	45.9	653	46.2
V5-17	M16	246.2	263.5	320	781	778	831	831	16	30	35	50	22	10	57.1	57.6	58.3	1101	51.9	720	52.2
V5-18	M16	246.2	263.5	320	822	819	872	872	16	30	35	50	22	10	61.2	61.9	62.4	1142	55.9	761	56.3
V5-19	M20	246.2	263.5	320	899	895	959	959	20	35	45	60	26	10	74.5	75.5	76.5	1219	64.9	829	65.3
V5-20	M24	246.2	263.5	320	987	982	1057	1057	24	40	55	70	33	12	85.0	86.7	88.6	1307	74.5	913	75.1
V5-21	M30	246.2	263.5	320	1095	1089	1175	1175	30	45	55	80	40	15	105	107	110	1415	87.7	1011	89.4
V5-22	M30	248.2	263.5	330	1231	1225	1311	1311	30	45	55	80	40	15	129	132	134	1551	111.7	1145	113.4
V5-23	M36	248.2	263.5	330	1436	1429	1526	1526	36	60	75	90	46	15	172	175	179	1756	147.9	1339	148.2
V5-24	M42	248.2	263.5	330	1704	1696	1809	1809	42	70	85	105	52	20	231	238	245	2024	198.9	1600	198.9
V5-25	M48	375.8	408.5	500	1449	1439	1569	1569	48	75	100	120	60	20	400	408	418	1769	351.9	1340	355.3
V5-26	M56	375.8	408.5	500	1708	1697	1848	1848	56	80	115	140	68	20	481	491	505	2028	421.6	1586	426.7
V5-27	M64	379.2	412.5	520	1970	1957	2125	2125	64	90	130	155	76	25	609	624	644	2290	528.7	1832	540.6
V5-28	M72	379.2	412.5	530	2367	2353	2522	2522	72	90	130	155	76	25	806	821	840	2687	693.6	2211	708.9
V5-29	M80	379.2	412.5	540	2778	2762	2953	2953	80	100	150	175	85	25	1035	1054	1080	3098	879	2609	904

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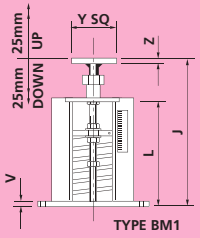
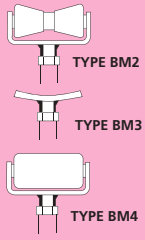
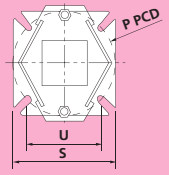
RANGE V5

TYPE BM



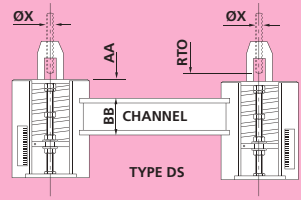


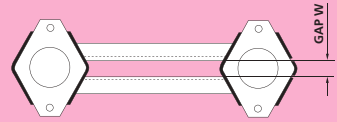


NB. INSTALLED HEIGHT 'J' DIMENSIONS FOR TYPES BM2 BM3 AND BM4 VARY WITH PIPE SIZE. PLEASE CONTACT PIPE SUPPORTS LIMITED'S DESIGN DEPARTMENT FOR DETAILS.

NOTE THAT WHERE DIMENSION 'M' EXCEEDS THE BASE PLATE SQUARE DIMENSION 'S', 'M' WILL BE THE MAX. WIDTH OF THE BASE PLATE.

TYPE DS





SUPPORTING EFFORT = TABULATED VALUE 5 2
SPRING RATE = TABULATED VALUE 5 2
ADD WEIGHT OF UNIT TO LOAD FROM PIPE.

SUPPORT SIZE	J AT MIN. LOAD TYPE BM1 mm	BODY L'TH L mm	BASE PLATE SQ. S mm	BASE PLATE PCD P mm	BASE BOLT CRS. SQ. U mm	BASE BOLT SIZE	BASE PLATE THK V mm	LOAD PAD SQ. Y mm	LOAD PAD THK Z mm	WEIGHT TYPE BM1 kgf	RTO AT MIN LOAD mm	DIM. M mm	GAP W mm	RSC SIZE 900 MAX CENTRES	RSC SIZE 1300 MAX CENTRES	RSC SIZE 1800 MAX CENTRES	WEIGHT kgf @ 900 CRS	WEIGHT kgf @ 1300 CRS	WEIGHT kgf @ 1800 CRS
V5-1	910	543	156	169.7	120	M16	6	75	6	7.0	25	25	18	51 x 25	51 x 25	51 x 25	23.9	26.7	30.2
V5-2	952	585	156	169.7	120	M16	6	75	6	7.3	25	25	18	51 x 25	51 x 25	51 x 25	25.0	27.7	31.5
V5-3	980	613	156	169.7	120	M16	6	75	6	7.5	25	25	18	51 x 25	51 x 25	51 x 25	25.5	28.4	31.9
V5-4	982	615	156	169.7	120	M16	6	75	6	7.5	25	25	18	51 x 25	51 x 25	51 x 25	25.7	28.6	32.2
V5-5	968	601	156	169.7	120	M16	6	75	6	7.7	25	25	18	51 x 25	51 x 25	51 x 25	25.7	28.5	32.2
V5-6	978	611	156	169.7	120	M16	6	75	6	7.7	25	25	18	51 x 25	51 x 25	51 x 25	25.9	28.7	32.3
V5-7	995	628	156	169.7	120	M16	6	75	6	8.0	25	25	18	51 x 25	51 x 25	51 x 25	26.5	29.4	33.0
V5-8	1035	668	156	169.7	120	M16	6	75	6	8.3	25	25	18	51 x 25	51 x 25	51 x 25	27.7	30.7	34.2
V5-9	1062	695	156	169.7	120	M16	6	75	6	8.8	25	25	18	51 x 25	51 x 25	51 x 25	29.1	32.0	35.6
V5-10	1034	668	200	205.1	145	M20	10	75	6	18.5	25	25	22	76 x 38	76 x 38	76 x 38	50.6	56.0	63.0
V5-11	1046	680	200	205.1	145	M20	10	75	6	19.0	25	25	22	76 x 38	76 x 38	76 x 38	51.8	57.4	64.2
V5-12	1060	694	200	205.1	145	M20	10	75	6	19.6	25	25	22	76 x 38	76 x 38	76 x 38	53.1	58.6	65.5
V5-13	1098	726	200	205.1	145	M20	10	75	10	21.4	25	25	26	76 x 38	76 x 38	76 x 38	54.9	60.3	67.3
V5-14	1149	777	200	205.1	145	M20	10	75	10	23.1	25	25	26	76 x 38	76 x 38	76 x 38	59.0	64.4	71.4
V5-15	1248	876	200	205.1	145	M20	10	75	10	26.5	25	25	26	76 x 38	76 x 38	76 x 38	67.6	73.1	80.0
V5-16	1082	709	270	280	198	M20	12	100	12	48.3	25	25	33	76 x 38	102 x 51	102 x 51	110.8	124.5	135.5
V5-17	1149	776	270	280	198	M20	12	100	12	53.4	25	25	33	76 x 38	102 x 51	102 x 51	122.9	136.7	147.7
V5-18	1190	817	270	280	198	M20	12	100	12	57.0	25	25	33	76 x 38	102 x 51	102 x 51	131.3	145.2	156.4
V5-19	1260	885	270	287.1	203	M20	12	120	12	67.2	25	25	40	102 x 51	127 x 64	127 x 64	162.3	181.2	197.0
V5-20	1344	969	270	287.1	203	M20	12	120	12	74.6	25	25	40	102 x 51	127 x 64	127 x 64	184.0	203.4	219.9
V5-21	1442	1067	270	287.1	203	M20	12	120	12	86.0	25	25	40	102 x 51	127 x 64	127 x 64	223.2	243.2	259.4
V5-22	1579	1201	276	294.2	208	M20	12	150	15	108.3	25	25	52	152 x 76	203 x 76	203 x 76	282.5	311.5	337.7
V5-23	1766	1388	300	308.3	218	M20	12	150	15	135.2	25	25	52	152 x 76	203 x 76	203 x 76	366.4	396.2	423.0
V5-24	2029	1649	300	308.3	218	M20	20	150	15	185.3	25	25	52	152 x 76	203 x 76	203 x 76	486.4	518.0	547.6
V5-25	1784	1395	430	452.5	320	M24	20	200	20	340.0	25	25	60	203 x 89	254 x 89	305 x 89	830	872	933
V5-26	2029	1636	430	452.5	320	M24	20	200	20	394.4	25	25	70	203 x 89	254 x 89	305 x 89	993	1037	1101
V5-27	2282	1885	440	466.7	330	M24	20	200	20	501.5	25	25	80	203 x 89	254 x 89	305 x 89	1246	1295	1365
V5-28	2674	2267	460	480.8	340	M24	25	200	25	663.0	25	25	80	305 x 89	305 x 102	381 x 102	1654	1708	1796
V5-29	3092	2674	480	495	350	M24	30	200	30	851.7	25	25	90	305 x 89	305 x 102	381 x 102	2112	2169	2263

VAREFFORT SUPPORT LOAD SELECTION CHART lbs

MOVEMENT in						SPRING SIZE																										
	V1	V2	V3	V4	V5	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
OVERTRAVEL						6	10.5	17	24	28	35.9	39.9	65	79.4	103.6	136.7	174.2	242.5	317.5	445.3	555.6	787.1	1014.1	1342.6	1790.2	2385.4	3221	4497.4	6020.8	7943.3	10571.2	13999.4	18682	24985
						6.3	10.9	17.4	24.7	28.9	37	41.2	66.6	81.6	106.5	140.4	179.2	249.1	326.3	456.4	571	806.9	1040.6	1377.9	1838.7	2449.3	3306.9	4616.5	6177.4	8157.1	10851.2	14371.9	19189	25642
						6.6	11.3	17.9	25.4	30	38.1	42.3	68.1	83.8	109.3	144.4	184.5	255.7	335.1	469.6	588.6	826.7	1069.2	1415.4	1885	2513.3	3392.9	4733.3	6336.1	8368.7	11131.1	14746.7	19698.3	26301.1
						6.9	11.7	18.4	26	30.9	39.2	43.7	69.7	86	112	148.2	189.6	262.4	343.9	480.6	604.1	848.8	1095.7	1450.6	1933.5	2577.2	3478.9	4852.4	6492.6	8582.6	11411.1	15119.3	20205.4	26958.1
						7.3	12.1	18.9	26.5	31.7	40.3	45	71.4	88.2	114.9	151.9	194.9	269	354.9	493.8	621.7	868.6	1122.2	1485.9	1982	2638.9	3567.1	4971.4	6651.3	8794.2	11693.3	15494.1	20712.4	27615.1
MIN	0	0	0	0	0	7.6	12.5	19.3	27.1	32.6	41.4	46.3	73	90.4	117.7	155.9	200	275.6	363.8	504.9	637.1	888.5	1148.6	1521.2	2030.5	2702.9	3653.1	5090.5	6807.9	9008.1	11973.3	15866.1	21221.7	28272.1
						7.9	12.9	19.8	27.8	33.7	42.5	47.4	74.5	92.6	120.6	159.6	205	282.2	372.6	518.1	654.8	908.3	1177.3	1558.7	2076.8	2766.8	3739	5207.3	6966.6	9221.9	12253.3	16241.5	21728.8	28931.3
						8.2	13.2	20.3	28.4	34.6	43.7	48.7	76.1	94.8	123.5	163.4	210.3	288.8	381.4	529.1	670.2	930.4	1203.7	1593.9	2125.3	2830.7	3825	5326.4	7123.1	9433.6	12533.3	16614	22235.8	29588.2
						8.5	13.6	20.8	29.1	35.5	44.8	50	77.6	97	126.3	167.3	215.4	295.4	390.2	542.3	687.8	950.2	1230.2	1629.2	2173.8	2894.7	3911	5445.4	7281.9	9647.4	12813.3	16988.8	22745.1	30245.2
W						8.8	14	21.2	29.8	36.6	45.9	51.4	79.1	99.2	129	171.1	220.5	302	399	553.4	703.3	970	1256.6	1664.5	2222.3	2958.6	3997	5562.3	7438.4	9859.1	13093.3	17361.4	23252.2	30904.4
	0.2	0.4	0.8	1.2	1.6	9.1	14.4	21.7	30.4	37.5	47	52.5	80.7	101.4	131.8	174.8	224.9	308.6	407.9	564.4	718.7	989.9	1285.3	1702	2268.6	3022.5	4083	5681.3	7594.9	10072.9	13373.2	17734	23759.2	31561.4
O						9.5	14.8	22.3	30.9	38.4	48.1	53.8	82.5	103.6	134.7	178.6	231.5	315.3	418.9	577.6	736.3	1009.7	1311.8	1737.2	2317.1	3084.3	4171.1	5800.4	7753.7	10284.6	13655.4	18108.8	24268.5	32218.4
						9.8	15.2	22.7	31.5	39.5	49.2	55.1	84	105.8	137.6	182.5	235.9	321.9	427.7	588.6	751.8	1031.8	1338.2	1772.5	2365.6	3148.2	4257.1	5917.2	7910.2	10498.4	13935.4	18481.4	24775.5	32877.5
R						10.1	15.6	23.1	32.2	40.3	50.3	56.4	85.5	108	140.4	186.3	240.3	328.5	436.5	601.9	769.4	1051.6	1364.7	1807.8	2414.1	3212.1	4343.1	6036.3	8068.9	10712.3	14215.4	18856.1	25282.6	33534.5
						10.4	16	23.6	32.8	41.2	51.4	57.5	87.1	110.2	143.3	190	246.9	335.1	445.3	612.9	784.8	1071.4	1393.3	1845.3	2460.4	3276.1	4429.1	6155.3	8225.4	10923.9	14495.4	19228.7	25791.9	34191.5
	0.4	0.8	1.6	2.4	3.1	10.7	16.4	24	33.5	42.1	52.5	58.9	88.6	112.4	145.9	194	251.3	341.7	454.2	626.1	802.5	1091.3	1419.8	1880.5	2508.9	3340	4515.1	6274.4	8384.2	11137.8	14775.4	19603.5	26298.9	34848.5
K						11	16.8	24.5	34.2	43.2	53.6	60.2	90.2	114.6	148.8	197.8	255.7	348.3	463	637.1	817.9	1113.3	1446.2	1915.8	2557.4	3403.9	4601	6391.2	8540.7	11349.4	15055.4	19976.1	26806	35507.7
						11.4	17.2	24.9	34.8	44.1	54.7	61.3	91.7	116.8	151.7	201.5	262.4	354.9	471.8	648.2	833.3	1133.2	1474.9	1953.3	2603.7	3467.9	4687	6510.3	8697.2	11563.2	15335.4	20348.7	27315.3	36164.6
I						11.7	17.6	25.6	35.3	45	55.8	62.6	93.5	119	154.5	205.5	266.8	361.6	482.8	661.4	851	1153	1501.3	1988.6	2652.2	3529.6	4775.2	6629.3	8856	11777.1	15617.5	20723.5	27822.3	36821.6
						12	18	26	35.9	46.1	56.9	63.9	95	121.3	157.4	209.2	271.2	368.2	491.6	672.4	866.4	1172.9	1527.8	2023.8	2700.7	3593.5	4861.2	6746.1	9012.5	11988.7	15897.5	21096	28329.4	37480.8
N	0.6	1.2	2.4	3.5	4.7	12.3	18.4	26.5	36.6	47	58	65.3	96.6	123.5	160.3	213	277.8	374.8	500.4	685.6	884.1	1192.7	1554.3	2059.1	2749.2	3657.5	4947.2	6865.2	9171.2	12202.6	16177.5	21470.8	28838.7	38137.8
						12.6	18.8	26.9	37.3	47.8	59.1	66.4	98.1	125.7	162.9	216.9	282.2	381.4	509.3	696.7	899.5	1214.7	1582.9	2096.6	2795.5	3721.4	5033.2	6984.2	9327.8	12414.2	16457.5	21843.4	29345.7	38794.7
G						12.9	19.2	27.3	37.9	48.7	60.2	67.7	99.6	127.9	165.8	220.5	288.8	388	518.1	709.9	917.1	1234.6	1609.4	2131.9	2844	3785.3	5119.1	7103.3	9486.5	12628.1	16737.5	22218.2	29855	39451.7
						13.2	19.6	27.8	38.6	49.8	61.3	69	101.2	130.1	168.7	224.9	293.2	394.6	526.9	720.9	932.6	1254.4	1635.8	2167.1	2892.5	3849.3	5205.1	7220.1	9643	12839.7	17017.5	22590.8	30362.1	40110.9
						13.6	20	28.4	39	50.7	62.4	70.3	103	132.3	171.5	229.3	297.6	401.2	537.9	734.1	950.2	1274.3	1662.3	2202.4	2941	3911	5293.3	7339.2	9801.8	13053.6	17299.7	22965.6	30869.1	40767.9
	0.8	1.6	3.1	4.7	6.3	13.9	20.4	28.9	39.7	51.6	63.5	71.4	104.5	134.5	174.4	231.5	304.2	407.9	546.7	745.2	965.6	1294.1	1690.9	2239.9	2987.3	3974.9	5379.3	7458.2	9958.3	13267.4	17579.7	23338.1	31378.4	41424.9
						14.2	20.7	29.3	40.3	52.7	64.6	72.8	106	136.7	177.3	235.9	308.6	414.5	555.6	756.2	981.1	1316.2	1717.4	2275.2	3035.8	4038.9	5465.3	7575.1	10114.8	13479.1	17859.6	23710.7	31885.5	42084
R						14.5	21.1	29.8	41	53.6	65.7	74.1	107.6	138.9	179.9	240.3	313.1	421.1	564.4	769.4	998.7	1336	1743.9	2310.4	3084.3	4102.8	5551.2	7694.1	10273.5	13692.9	18139.6	24085.5	32392.5	42741
						14.8	21.5	30.2	41.7	54.5	66.8	75.2	109.1	141.1	182.8	242.5	319.7	427.7	573.2	780.4	1014.1	1355.8	1772.5	2347.9	3130.6	4166.7	5637.2	7813.2	10430.1	13904.6	18419.6	24458.1	32901.8	43398
A						15.1	21.9	30.6	42.3	55.3	67.9	76.5	110.7	143.3	185.6	246.9	324.1	434.3	582	793.7	1031.8	1375.7	1799	2383.2	3179.1	4230.7	5723.2	7932.2	10588.8	14118.4	18699.6	24832.9	33408.9	44055
	1	2	3.9	5.9	7.9	15.5	22.3	31.1	43	56.4	69	77.8	112.2	145.5	188.5	251.3	328.5	440.9	590.8	804.7	1047.2	1397.7	1825.4	2418.5	3227.6	4294.6	5809.2	8049.1	10745.3	14332.3	18979.6	25205.5	33915.9	44714.2
						15.8	22.7	31.7	43.4	57.3	70.1	79.1	114	147.7	191.4	255.7	335.1	447.5	601.9	817.9	1064.8	1417.6	1851.9	2453.7	3276.1	4356.3	5897.4	8168.1	10904.1	14543.9	19261.8	25580.2	34425.2	45371.1
N						16.1	23.1	32.2	44.1	58.2	71.2	80.2	115.5	149.9	194.2	257.9	339.5	454.2	610.7	828.9	1080.3	1437.4	1880.5	2491.2	3322.4	4420.3	5983.3	8287.2	11060.6	14757.7	19541.8	25952.8	34932.2	46028.1
						16.4	23.6	32.6	44.8	59.3	72.3	81.6	117.1	152.1	196.9	262.4	343.9	460.8	619.5	840	1095.7	1457.3	1907	2526.5	3370.9	4484.2	6069.3	8404	11217.1	14969.4	19821.8	26325.4	35439.3	46687.3
G						16.7	23.8	33.1	45.4	60.2	73.4	82.9	118.6	154.3	199.7	266.8	350.5	467.4	628.3	853.2	1113.3	1477.1	1933.5	2561.8	3419.4	4548.1	6155.3	8523.1	11375.9	15183.2	20101.7	26700.2	35948.6	47344.3
	1.2	2.4	4.7	7.1	9.4	17	24.3	33.5	46.1	61.1	74.5	84.2	120.2	156.5	202.6	271.2	354.9	474	637.1	864.2	1128.8	1499.1	1959.9	2597	3467.9	4612.1	6241.3	8642.1	11532.4	15394.9	20381.7	27072.8	36455.6	48001.2
E						17.4	24.7	34	46.7	62.2	75.6	85.3	121.7	158.7	205.5	273.4	359.4	480.6	646	877.4	1146.4	1519	1988.6	2634.5	3514.2	4676	6327.3	8759	11691.1	15608.7	20661.7	27447.6	36962.7	48660.4
						17.7	25.1	34.4	47.4	63.1	76.7	86.6	123.2	160.9	208.3	277.8	366	487.2	654.8	888.5	1161.8	1538.8	2015	2669.8	3562.7	4739.9	6413.2	8878	11847.6	15822.6	20941.7	27820.1	37472	49317.4
						18	25.6	35.1	47.8	63.9	77.8	88	125	163.1	211.2	282.2	370.4	493.8	665.8	901.7	1179.5	1558.7	2041.5	2705.1	3611.2	4801.7	6501.4	8997.1	12006.4	16034.2	21223.9	28194.9	37979	49974.4
						18.3	25.8	35.5	48.5	64.8	78.9	89.3	126.5	165.3	213.8	286.6	374.8	500.4	674.6	912.7	1194.9	1580.7	2067.9	2740.3	3659.7	4865.6	6587.4	9116.1	12162.9	16248.1	21503.9	28567.5	38486.1	50631.4
MAX	1.4	2.8	5.5	8.3	11	18.6	26.2	35.9	49.2	65.9	80	90.4	128.1	167.6	216.7	288.8	381.4	507.1	683.4	925.9	1212.5	1600.6	2096.6	2777.8	3706	4929.5	6673.4	9233	12321.6	16459.7	21783.9	28942.3	38995.4	51290.5
OVERTRAVEL						18.9	26.7	36.4	49.8	66.8	81.1	91.7	129.6	169.8	219.6	293.2	385.8	513.7	692.3	937	1228	1620.4	2123.1	2813.1	3754.5	4993.5	6759.4	9352	12478.2	16673.6	22063.9	29314.9	39502.4	51947.5
						19.2	27.1	36.8	50.5	67.7	82.2	93	131.2	172	222.7	297.6	390.2	520.3	701.1	948	1243.4	1640.2	2149.5	2848.4	3803	5057.4	6845.4	9471.1	12634.7	16887.4	22343.9	29687.4	40009.5	52604.5
						19.6	27.6	37.3	51.1	68.8	83.3	94.1	132.7	174.2	224.9	299.8	396.8	526.9	709.9	961.2	1261	1660.1	2178.2	2885.9	3849.3	5121.3	6931.3	9587.9	12793.4	17099.1	22623.8	30062.2	40518.8	53263.7
						19.9	27.8	37.7	51.8	69.7	84.4	95.5	134.3	176.4	227.1	304.2	401.2	533.5	718.7	972.2	1276.5	1682.1	2204.6	2921.1	3897.8	5185.3	7017.3	9707	12950	17312.9	22903.8	30434.8	41025.8	53920.7
	1.6	3.1	6.3	9.4	12.6	20.2	28.2	38.4	52.2	70.5	85.5	96.8	136	178.6	231.5	308.6	405.7	540.1	729.7	985.5	1294.1	1702	2231.1	2956.4	3946.3	5247	7105.5	9826	13108.7	17524.5	23186	30809.6	41532.9	54577.6

SPRING RATE lbs/in	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
V1	8	10.02	12.01	15.97	24.03	27.99	32.09	40.01	55.99	71.84	96.97	131.11	167.99	232.18	304.57	416.56	516.26	686.99	910.98	1216.91	1615.72	2192.09	3007.46	4000.39	5408.52	7119.85	9488.13	12898.51	16703.59
V2	4	5.01	6	7.98	12.01	13.99	16.04	20	27.99	35.92	48.48	65.55	83.99	116.09	152.28	208.28	258.13	343.49	455.49	608.45	807.86	1096.04	1503.73	2000.19	2704.26	3559.92	4744.06	6449.25	8351.79
V3	2	2.5	3	3.99	6	6.99	8.02	10	13.99	17.96	24.24	32.77	41.99	58.04	76.14	104.14	129.06	171.74	227.74	304.22	403.93	548.02	751.86	1000.09	1352.13	1779.96	2372.03	3224.62	4175.89
V4	1.33	1.67	2	2.66	4	4.66	5.34	6.66	9.33	11.97	16.16	21.85	27.99	38.69	50.76	69.42	86.04	114.49	151.83	202.81	269.28	365.34	501.24	666.73	901.42	1186.64	1581.35	2149.75	2783.93
V5	1	1.25	1.5	1.99	3	3.49	4.01	5	6.99	8.98	12.12	16.38	20.99	29.02	38.07	52.07	64.53	85.87	113.87	152.11	201.96	274.01	375.93	500.04	676.06	889.98	1186.01	1612.31	2087.94

SELECTION CHART IN KIPS IS SHOWN ON PAGE 177

SELECTION CHART FOR HIGH LOAD VARIABLE EFFORT SUPPORTS LOADS IN N

MOVEMENT mm				SPRING SIZE						
	V1	V2	V3	H1	H2	H3	H4	H5	H6	H7
OVERTRAVEL				55741	74276	100293	120033	140039	160592	187474
				57233	76256	102980	123194	143726	164895	192378
				58725	78237	105667	126354	147413	169534	197282
				60216	80218	108354	129514	151099	173302	202186
				61708	82198	111042	132674	154786	177506	207090
MIN	0	0	0	63200	84179	113729	135834	158473	181709	211994
				64692	86160	116416	138994	162160	185913	216898
				66184	88140	119103	142154	165847	190116	221802
				67675	90121	121791	145314	169534	194319	226706
				69167	92102	124478	148475	173220	198523	231610
WORKING RANGE	5	10	20	70659	94083	127165	151635	176907	202726	236514
				72151	96063	129852	154795	180594	206930	241418
				73643	98044	132540	157955	184281	211133	246322
				75134	100025	135227	161115	187968	215337	251226
				76626	102005	137914	164275	191654	219540	256130
	10	20	40	78118	103986	140602	167435	195341	223744	261034
				79610	105967	143289	170596	199028	227947	265938
				81102	107948	145976	173756	202715	232151	270842
				82594	109928	148663	176916	206402	236354	275746
				84085	111909	151351	180076	210089	240558	280651
	15	30	60	85577	113890	154038	183236	213775	244761	285555
				87069	115870	156725	186396	217462	248965	290459
				88561	117851	159412	189556	221149	253168	295363
				90053	119832	162100	192716	224836	257371	300267
				91544	121812	164787	195877	228523	261575	305171
	20	40	80	93036	123793	167474	199037	232210	265778	310075
				94528	125774	170161	202197	235896	269982	314979
				96020	127755	172849	205357	239583	274185	319883
				97512	129735	175536	208517	243270	278389	324787
				99003	131716	178223	211677	246957	282592	329691
	25	50	100	100495	133697	180910	214837	250644	286796	334595
				101987	135677	183598	217998	254330	290999	339499
				103479	137658	186285	221158	258017	295203	344403
				104971	139639	188972	224318	261704	299406	349307
				106462	141620	191659	227478	265391	303610	354211
	30	60	120	107954	143600	194347	230638	269078	307813	359115
				109446	145581	197034	233798	272765	312017	364019
				110938	147562	199721	236958	276451	316220	368923
				112430	149542	202409	240118	280138	320423	373827
				113921	151523	205096	243279	283825	324627	378731
MAX	35	70	140	115413	153504	207783	246439	287512	328830	383635
OVERTRAVEL				116905	155484	210470	249599	291199	333034	388539
				118397	157465	213158	252759	294885	337237	393444
				119889	159446	215845	255919	298572	341441	398348
				121380	161427	218532	259079	302259	345644	403252
	40	80	160	122872	163407	221219	262239	305946	349848	408156

		H1	H2	H3	H4	H5	H6	H7
SPRING	V1	1492	1981	2687	3160	3687	4203	4904
RATE	V2	745.9	990	1344	1580	1843	2102	2452
N/mm	V3	373	495.2	672	790	922	1051	1226

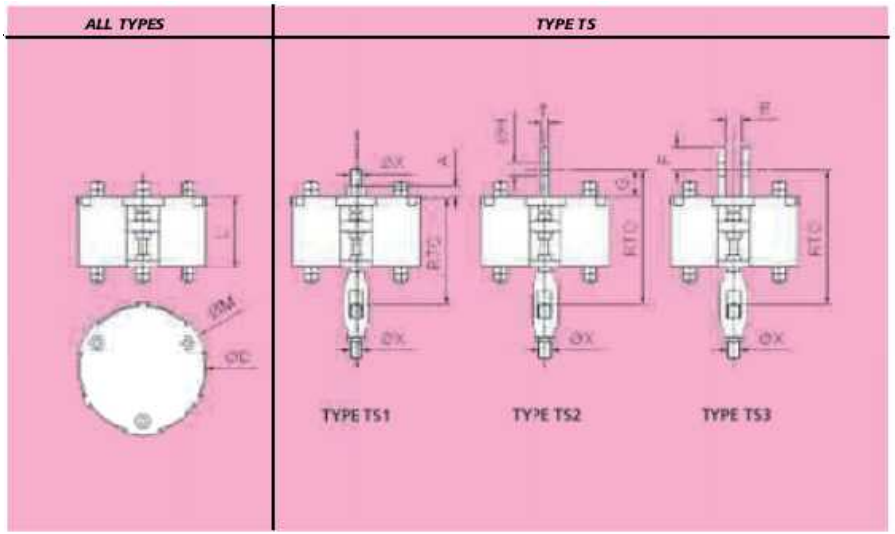
SELECTION CHART FOR HIGH LOAD VARIABLE EFFORT SUPPORTS LOADS IN kgf

MOVEMENT mm				SPRING SIZE						
	V1	V2	V3	H1	H2	H3	H4	H5	H6	H7
OVERTRAVEL				5684	7574	10227	12240	14280	16386	19117
				5836	7776	10501	12562	14656	16815	19617
				5988	7978	10775	12884	15032	17243	20117
				6140	8180	11049	13207	15408	17672	20617
				6292	8382	11323	13529	15784	18101	21117
MIN	0	0	0	6445	8584	11597	13851	16160	18529	21617
				6597	8786	11871	14173	16536	18958	22117
				6749	8988	12145	14496	16912	19386	22618
				6901	9190	12419	14818	17288	19815	23118
				7053	9392	12693	15140	17664	20244	23618
WORKING RANGE	5	10	20	7205	9594	12967	15462	18040	20672	24118
				7357	9796	13241	15785	18415	21101	24618
				7509	9998	13515	16107	18791	21530	25118
				7662	10200	13789	16429	19167	21958	25618
				7814	10402	14063	16751	19543	22387	26118
	10	20	40	7966	10604	14337	17074	19919	22816	26618
				8118	10806	14611	17396	20295	23244	27118
				8270	11008	14885	17718	20671	23673	27618
				8422	11210	15159	18040	21047	24101	28118
				8574	11412	15433	18363	21423	24530	28618
	15	30	60	8726	11614	15707	18685	21799	24959	29118
				8879	11815	15982	19007	22175	25387	29619
				9031	12017	16256	19329	22551	25816	30119
				9183	12219	16530	19652	22927	26245	30619
				9335	12421	16804	19974	23303	26673	31119
	20	40	80	9487	12623	17078	20296	23679	27102	31619
				9639	12825	17352	20618	24055	27530	32119
				9791	13027	17626	20941	24431	27959	32619
				9943	13229	17900	21263	24807	28388	33119
				10096	13431	18174	21585	25183	28816	33619
	25	50	100	10248	13633	18448	21907	25559	29245	34119
				10400	13835	18722	22230	25934	29674	34619
				10552	14037	18996	22552	26310	30102	35119
				10704	14239	19270	22874	26686	30531	35619
				10856	14441	19544	23196	27062	30960	36119
	30	60	120	11008	14643	19818	23519	27438	31388	36620
				11160	14845	20092	23841	27814	31817	37120
				11313	15047	20366	24163	28190	32245	37620
				11465	15249	20640	24485	28566	32674	38120
				11617	15451	20914	24808	28942	33103	38620
MAX	35	70	140	11769	15653	21188	25130	29318	33531	39120
OVERTRAVEL				11921	15855	21462	25452	29694	33960	39620
				12073	16057	21736	25774	30070	34389	40120
				12225	16259	22010	26096	30446	34817	40620
				12377	16461	22284	26419	30822	35246	41120
	40	80	160	12529	16663	22558	26741	31198	35675	41620

		H1	H2	H3	H4	H5	H6	H7
SPRING	V1	152	202	274	322	376	429	500
RATE	V2	76.1	101	137	161	188	214	250
KGF/MM	V3	38.0	50.5	68.5	80.6	94	107	125

TURN OUT THIS PAGE FOR EASE OF USE

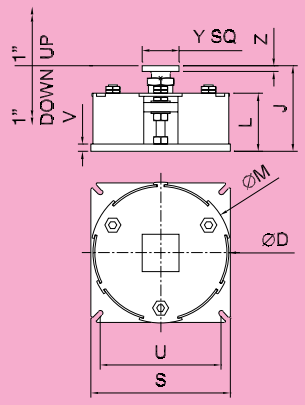
HIGH LOAD VARIABLES



SUPPORT SIZE	ROD DIA	BODY DIMENSIONS			RTO AT MIN LOAD (mm)			DEPTH OF THR'D	LUG DIMENSIONS TYPES TS2 & TS3					WEIGHTS kgf		
	X mm	⌀D mm	⌀M mm	L mm (not BM)	TS1	TS2	TS3	A mm	E mm	F mm	G mm	H mm	T mm	TS1	TS2	TS3
V1-H1	M56	630	657	353	539	690	690	56	80	115	140	68	20	386	393	400
V1-H2	M64	630	657	400	584	752	752	64	90	130	155	76	25	472	482	493
V1-H3	M72	730	757	406	577	766	766	72	100	150	175	85	25	633	645	659
V1-H4	M80	730	757	469	638	854	854	80	100	160	200	95	40	732	755	781
V1-H5	M90	730	757	479	666	884	884	90	100	160	200	95	40	814	834	860
V1-H6	M90	730	757	514	701	919	919	90	100	160	200	95	40	872	892	918
V1-H7	M100	780	807	537	722	957	957	100	110	170	215	105	40	1044	1066	1096
V2-H1	M56	730	757	431	622	773	773	56	80	115	140	68	20	532	538	546
V2-H2	M64	730	757	485	674	842	842	64	90	130	155	76	25	654	664	675
V2-H3	M72	730	757	528	704	893	893	72	100	150	175	85	25	702	714	728
V2-H4	M80	730	757	611	785	1001	1001	80	100	160	200	95	40	816	839	865
V2-H5	M90	730	757	621	813	1031	1031	90	100	160	200	95	40	909	929	955
V2-H6	M90	730	757	681	873	1091	1091	90	100	160	200	95	40	978	998	1024
V2-H7	M100	780	807	704	894	1129	1129	100	110	170	215	105	40	1167	1189	1219
V3-H1	M56	730	757	634	835	986	986	56	80	115	140	68	20	619	625	633
V3-H2	M64	730	757	717	916	1084	1084	64	90	130	155	76	25	767	777	788
V3-H3	M72	730	757	790	976	1165	1165	72	100	150	175	85	25	848	860	875
V3-H4	M80	730	757	918	1102	1318	1318	80	100	160	200	95	40	994	1018	1044
V3-H5	M90	730	757	928	1130	1348	1348	90	100	160	200	95	40	1111	1131	1157
V3-H6	M90	730	757	1041	1243	1461	1461	90	100	160	200	95	40	1215	1235	1261
V3-H7	M100	780	807	1064	1264	1499	1499	100	110	170	215	105	40	1441	1463	1493

HIGH LOAD VARIABLES

TYPE BM1



ALL SIZES			TYPE BM2								
SUPPORT SIZES	BODY DIMENSIONS		J AT MIN. LOAD TYPE BM2	BODY L'TH	BASE PLATE SQ.	BASE BOLT CRS. SQ.	BASE BOLT SIZE	BASE PLATE THK	LOAD PAD SQ.	LOAD PAD THK	WEIGHT
	Ø D in	Ø M in	in	L in	S in	U in		V in	Y in	Z in	TYPE BM2 lbs
V1-H1	24.81	25.87	16.07	10.87	25.6	21.66	1	1.38	7.88	0.99	718.7
V1-H2	24.81	25.87	17.68	12.33	25.6	21.66	1	1.58	7.88	0.99	845
V1-H3	28.75	29.81	18.12	12.33	29.53	25.6	1	1.58	7.88	1.19	1144.1
V1-H4	28.75	29.81	20	14.22	29.53	25.6	1 1/4	1.97	7.88	1.19	1324.5
V1-H5	28.75	29.81	21.97	14.61	29.53	25.6	1 1/4	1.97	7.88	1.19	1425.9
V1-H6	28.75	29.81	23.43	15.6	29.53	25.6	1 1/4	1.97	7.88	1.58	1481.5
V1-H7	30.71	31.78	23.94	16.11	31.5	27.56	1 1/4	2.37	7.88	1.58	1803.5
V2-H1	28.75	29.81	20.71	13.94	29.53	25.6	1	1.38	7.88	0.99	1011.7
V2-H2	28.75	29.81	22.6	15.67	29.53	25.6	1	1.58	7.88	0.99	1203.2
V2-H3	28.75	29.81	24.49	17.13	29.53	25.6	1	1.58	7.88	1.19	1293.8
V2-H4	28.75	29.81	27.17	19.81	29.53	25.6	1 1/4	1.97	7.88	1.19	1503.3
V2-H5	28.75	29.81	29.14	20.2	29.53	25.6	1 1/4	1.97	7.88	1.19	1625.9
V2-H6	28.75	29.81	31.58	22.17	29.53	25.6	1 1/4	1.97	7.88	1.58	1703.9
V2-H7	30.71	31.78	32.09	22.68	31.5	27.56	1 1/4	2.37	7.88	1.58	2058.2
V3-H1	28.75	29.81	31.86	21.93	29.53	25.6	1	1.38	7.88	0.99	1198.4
V3-H2	28.75	29.81	34.89	24.81	29.53	25.6	1	1.58	7.88	0.99	1450.8
V3-H3	28.75	29.81	37.96	27.45	29.53	25.6	1	1.58	7.88	1.19	1609.1
V3-H4	28.75	29.81	42.41	31.89	29.53	25.6	1 1/4	1.97	7.88	1.19	1881.4
V3-H5	28.75	29.81	44.38	32.29	29.53	25.6	1 1/4	1.97	7.88	1.19	2048
V3-H6	28.75	29.81	48.9	36.34	29.53	25.6	1 1/4	1.97	7.88	1.58	2197.3
V3-H7	30.71	31.78	49.41	36.86	31.5	27.56	1 1/4	2.37	7.88	1.58	2623.9

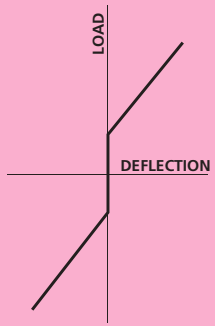


Fig. 1

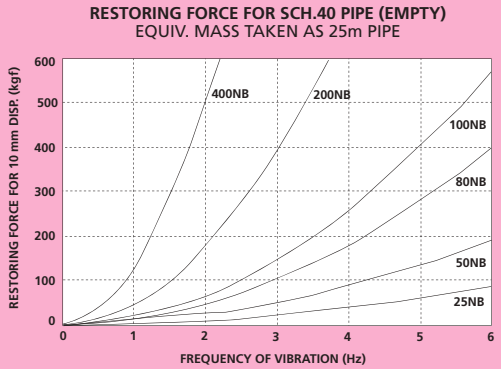


Fig. 2

DESCRIPTION

Sway Braces are essentially a double-acting spring, housed in a canister. Unlike variable effort supports, Sway Braces are not intended to carry the weight of pipework; their purpose is to limit undesirable movement.

Sway Braces act like a rigid strut until a small preload is reached, whereafter the restraining force increases in proportion to the applied deflection. Fig. 1

Undesirable movement can occur due to many phenomena, such as wind loading, sympathetic vibration, rapid valve closure, relief valves opening, two phase flow or earthquake. It may be necessary to limit this type of deflection to prevent the generation of unacceptable stresses and equipment loadings.

The Sway Brace is a cost-effective means of limiting pipework deflection. It should be noted however that it does provide some resistance to the thermal movement of the pipework and care should be taken when specifying to ensure that this is acceptable. Installation of Sway Braces will have the effect of raising the fundamental frequency of vibration of a pipework system; this is likely to reduce undesirable deflections.

Sway Braces are often used to solve unforeseen problems of resonant vibration.

For situations where the resistance to thermal movement provided by Sway Braces is unacceptable, you are referred to Pipe Supports Group's range of hydraulic snubbers and dampers.

THE PIPE SUPPORTS RANGE OF SWAY BRACES

Pipe Supports Group offer a range of eight Sway Braces, all of which limit movement to a maximum of 70mm in either direction. Preloads range from 14 kgf to 1040 kgf and corresponding maximum loads from 85 to 6170 kgf.

SELECTION

Care should be taken when selecting to ensure the Sway Brace provides sufficient force to limit the deflection caused by the dynamic occurrence, but not so much as to unduly restrain the thermal movement of the piping. Ideally selections should be checked by analysis.

The following notes are intended only as a guide:

1. Calculate the load imposed upon the pipework by the Sway Brace if the pipework expands in its normal (unrestrained) manner.

   P = Lp + K x

   Where **Lp** is the preload (kgf)
   K is the spring rate (kgf/mm)
   x is the deflection at the attachment position (mm) in the axis of the brace
2. Check whether this is acceptable; as a guide, consider what change in effort would be acceptable at a spring support location on the pipework: this may be 25% of the load at a support location.
3. Estimate the force required to restrain the pipework. If the pipework is vibrating with frequency **f** Hz at a maximum displacement (half amplitude) of **x** mm then, in simple harmonic motion, the **restoring force** exerted by the pipework at maximum displacement (kgf)

   $$= \frac{4\pi^2 f^2 m x}{1000\, g}$$

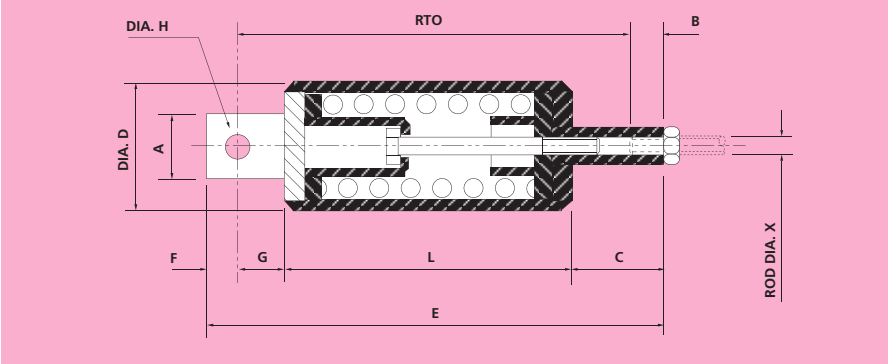
   Where **m** is the equivalent mass of the pipework in kg.

   It is likely that a Sway Brace having a preload greater than this value willfully restrain the pipe at the support location, while a Sway Brace for which this value is greater than the preload, but less than the max. load will have a significant effect.

Given a pipe which is vibrating at a known frequency with a known maximum displacement, the restoring force can be estimated if an assessment of the equivalent mass of the pipe can be made. Unfortunately, it is not very easy to do this with such accuracy without performing a dynamic analysis of the pipework. The equivalent mass will depend upon the length of pipework between anchors, the route of the pipework and the mode of vibration. Obviously any additional masses such as valves or flanged connections will also have an effect.

Figure 2 shows restoring forces for a 10mm deflection of empty unlagged schedule 40 pipe, for which the equivalent mass is arbitrarily taken as 25m of pipe.

SWAY BRACES



SIZE	SB1	SB2	SB3	SB4	SB5	SB6	SB7	SB8
PRELOAD kgf	14	45	140	300	400	535	770	1040
MAX LOAD kgf	85	260	800	1860	2470	3340	4620	6170
RATE kgf/mm	1.0	3.1	9.5	22.3	29.6	40.1	55.1	73.2
PRELOAD N	137	441	1370	2940	3920	5250	7550	10200
MAX. LOAD N	834	2550	7850	18240	24220	32750	45310	60510
RATE N/mm	9.8	30.4	93.2	219	290	393	540	718
RTO mm	308	305	311	359	395	406	447	495
ROD SIZE X	M20	M24	M24	M30	M36	M36	M42	M48
A mm	80	80	80	100	100	100	110	130
B mm	25	30	30	38	45	45	53	60
C mm	80	80	78	75	95	90	100	105
DIA. D mm	102	102	152	168	168	219	219	219
E mm	378	380	386	462	505	516	575	640
F mm	45	45	45	65	65	65	75	85
G mm	60	60	60	80	80	80	90	105
DIA. H mm	26	26	26	39	39	39	45	52
L mm	193	195	203	242	265	281	310	345
WEIGHT kgf	6.8	7.6	16	27	31	51	60	73

STANDARD DESIGN FEATURES

1. Rugged construction.
2. Compact design.
3. Spring preloaded.
4. 70 mm of travel in both directions.
5. Supplied with plastic coated spring coils, galvanised threaded items and painted casings.

NON STANDARD DESIGN FEATURES

1. Sway Braces are available in all the corrosion-resistant materials and finishes which are applicable to our range of variable effort supports.
2. Special units to suit particular preload and spring rate requirements are available. Please contact our design department for details.

ORDERING INFORMATION

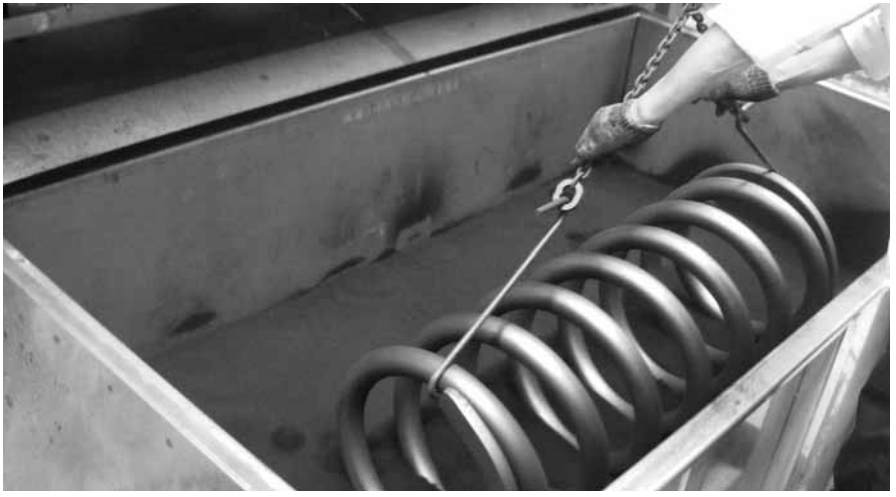
1. Size
2. Finish if other than Pipe Supports Group standard.
3. Thread form if other than isometric coarse.
4. Mark No. (if known).

INSTALLATION AND ERECTION

1. It is recommended that Sway Braces are installed in conjunction with a tubular strut, since they work both in tension and compression.
2. The unit should be installed so that it does not apply undue force in the installed (hot condition). The imposed loads will then apply in the cold condition.

MAINTENANCE

Periodic inspection should be made at intervals to suit the operating environment. Check for visual damage, corrosion and wear.



Rigid Struts

Hydraulic Snubbers

Pipework systems which are subject to purely static loading are generally supported on single acting vertical supports such as a hanger rod and pipe clamp or sliding base and, if the pipework is subject to change in temperature, some or all of these vertical supports may be spring supports, either variable or constant effort type. A supporting arrangement such as this is generally not suitable for pipework subject to dynamic loading.

Dynamic loading may occur for a number of reasons. Unsteady flow, such as that caused by valve closure, produces dynamic forces and is referred to as water hammer. In an earthquake, a piping system is also subject to dynamic forces.

Where the pipework system is subject to dynamic forces, vibration of the pipework will occur. This may be injurious to the pipework and connected equipment and plant. Pipework systems which are supported on single acting vertical restraints and springs with no lateral restraint will have low natural frequencies of vibration and will experience large dynamic deflections when subject to vibration; this will generally be unacceptable. Pipework stress analysis either by response spectrum or time history analysis can be used to show the need for dynamic restraints.

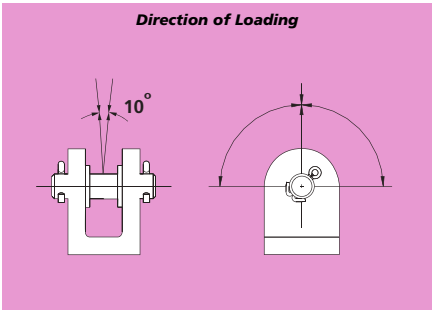
In pipework systems which are subject to dynamic loading, it may be necessary to use rigid struts, which act in both directions, rather than hanger rods, which only support downward acting loads. Rigid struts are also used to provide lateral restraint where this is required. Snubbers are used where dynamic restraint is required, but the pipe has to be allowed to move thermally.

RIGID STRUT — FIG. 511

Pipe Supports Group manufacture a comprehensive range of rigid struts covering loading up to more than 90 tonnes with lengths up to 6 metres (12'8"). The struts are designed for ease of use and to provide a cost-effective dynamic restraint. Rigid struts use spherical bearings to permit angulation and they provide length adjustment of +/- 100mm (4") by means of right and left hand threaded rod ends so that the adjustment can be made without disconnection. Maximum loadings are tabulated in kilograms, Newtons and pounds and weights and axial stiffnesses are also given. Having selected the size of strut that you need, the numbering system used makes the selection of the associated welding clevis and clamp a simple matter.

WELDING CLEVIS — FIG. 512

The welding clevis provides means of attachment of rigid struts and snubbers to steelwork. The welding clevis is designed to provide +/- 5 degrees and +/- 90 degrees of angulation as shown below.



SNUBBER — FIG. 516 AND FIG. 517

Pipe Supports Group's range of hydraulic snubbers cover loadings up to more than 85 tonnes with cylinder stroke up to 20" (508mm). The snubbers are to a well proven design; the numbering system and sizes of end fittings are compatible with the other dynamic restraint components. The Fig. 517 Adjustable Strut Snubber incorporates a tubular extension with a length adjustment of +/- 50 mm. The Fig. 516 Short Snubber is for use where available space is limited; there is no adjustment of length other than by moving the piston.

The hydraulic snubber is a standard 3000 psi hydraulic cylinder with a built-in fluid reservoir. The fluid is ported via the end blocks to the external valve block. The valve block contains two regulating valves with bleed grooves. The connection of the manifold to the reservoir and the valve block to the manifold is by use of "O" ring seals.

In operation, normal thermal expansion of the pipework causes the piston rod to extend or retract at a velocity less than the lock-up velocity. In this situation the snubber is inactive and the device has minimal effect on the behaviour of the pipework. In a dynamic situation, shock or vibration forces which cause the rate of displacement of the piston to exceed the lock-up velocity will cause the regulating valves to close and the snubber limits the velocity. The resistive capacity of the unit transfers the force to the structure and reduces the possibility of over-stressing the pipe or associated equipment connections.

The function of the bleed grooves is to control the velocity after lock-up. For prolonged thrust, the bleed grooves are eliminated and the unit becomes a rigid strut during lock-up.

CLAMPS FOR RIGID STRUTS AND SNUBBERS FIG. 513, FIG. 514 AND FIG. 515

Pipe Supports Group offer a very comprehensive range of clamps for rigid struts and Snubbers. The Fig. 513 clamp is a single plate stiff clamp incorporating a sheathed U-bolt. The Fig. 514 clamp is a double plate stiff clamp, again incorporating a single sheathed U-bolt and having the axis of the connecting pin parallel to

the axis of the pipe. The Fig. 515 clamp is a conventional type pipe clamp. It should be noted that when using type 515 clamps, because of the tolerance on pipe outside diameter, it may be necessary to use shim stock between the pipe and clamp to grip the pipe tightly and provide good dynamic restraint.

All three types of clamps use close tolerance load pins and are designed to operate within a 10 degree cone of load application.

The clamps are designed in four temperature ranges to suit maximum design temperatures of 400 °C (752 °F), 490 °C (914 °F), 530 °C (986 °F), and 570 °C (1058 °F). Maximum loadings and pin sizes are compatible with those for the struts and snubbers.

SELECTION — RIGID STRUTS

Rigid struts are selected on the basis of maximum applied load and length between pin centres. The loading shown at 1 metre (39.4") pin centres is the maximum applicable for the size of strut in question. Loadings at longer lengths are also shown at 1 metre intervals. For intermediate lengths, maximum loadings can be derived by interpolation. Do not specify strut sizes where no loading is shown for the required length. If a minimum stiffness of rigid strut is required, make reference to the tabulation of stiffnesses. The lengths of rigid struts should be such that the maximum angulation is not exceeded, the attachment can be offset on installation if necessary to help achieve this.

SELECTION — SNUBBERS

Determine the minimum required stroke by taking the anticipated design movement and adding an allowance for excess travel. This allowance should normally be at least 20% of the anticipated design movement. Then select a snubber where the cylinder stroke is greater than or equal to the minimum required stroke and the applied loadings in tension and compression are less than the allowable maximum loadings in tension and compression for the size and length of snubber as shown in the catalogue. For intermediate lengths, allowable compressive loadings may be determined by interpolation. The length of the snubber must be such that the maximum angulation is not exceeded. To calculate the required closed centres for the snubber, use the following formulae:

Closed Centres = Installed Centres — X

where

X = (Stroke - Design Movement in Extension) / 2

or

X = (Stroke + Design Movement in Compression) / 2

This method will result in the spare travel being distributed evenly on either side of the design movement.

SELECTION — WELDING CLEVIS

Welding clevises are selected to suit the size of strut or snubber: e.g. for rigid strut Fig. 511-4 or snubber Fig. 517-4-10, use welding clevis Fig. 512-4.

SELECTION — PIPE CLAMP FOR RIGID STRUT AND SNUBBER

1) Find the page relating to the appropriate pipe size.
2) Find the section relating to clamp maximum temperature just greater than or equal to the pipework temperature.
3) Look at the clamp part numbers; the number after the pipe size is the clamp load designation which corresponds to the strut or snubber size; e.g. for 150 NB pipe at 500 °C and using rigid strut size 3, choice of clamps is:

   Fig. 513-150-3-530

   Fig. 514-150-3-530

   Fig. 515-150-3-530

You may select any of the above 3 clamps.

In most circumstances, Fig. 515 clamps will be the least expensive and Fig. 514 clamps the most expensive.

STANDARD FEATURES — RIGID STRUT

1) A choice of eleven standard sizes.
2) Length adjustment of +/- 100mm without disconnection.
3) Sight holes to check thread engagement.
4) Painted finish — one coat of high-build acrylic primer with threaded parts electro-zinc plated.
5) +/- 5 degrees permissible angulation.

OPTIONAL FEATURES — RIGID STRUT

1) Painted in accordance with customer's own specification. Threaded parts electro-zinc plated.'

STANDARD FEATURES — WELDING CLEVIS

1) +/- 5 degrees and +/- 90 degrees permissible angulation as shown.
2) Painted finish — one coat of zinc phosphate primer.
3) Designed to suit maximum strut and snubber loadings.

STANDARD FEATURES — HYDRAULIC SNUBBER

1) Offers little resistance to normal thermal movement.
2) Compact — furnished as a complete functional unit.
3) Can be used in compression or in tension.
4) Has a built-in reservoir with a transparent window for viewing fluid level.
5) No external piping — unit is completely manifolded.
6) Units have special fluid and seals suitable for installation in radiation areas.
7) Assessment of travel position by measuring the length of exposed piston rod.
8) Painted finish – 1 coat of two-pack surface tolerant epoxy mastic primer to 125 microns DFT and 1 coat of polyurethane finish paint to 50 microns DFT, colour Purple/Red with threaded items electro-zinc plated.
9) Chromium plated piston rod.

OPTIONAL FEATURES — HYDRAULIC SNUBBER

1) Boot or gaiter covering the exposed piston rod.
2) Direct reading travel scale.
3) Painted finish — 2 coats of two-pack surface tolerant epoxy mastic primer to 250 microns DFT and 1 coat of polyurethane finish paint to 50 microns DFT, colour Purple/Red with threaded items electro-zinc plated.

STANDARD FEATURES — CLAMPS

1) Cost-effective designs to suit the standard strut and snubber sizes.
2) Choice of three styles of clamp.
3) Loading within a 10 degree cone of application of force.
4) Standard finish — self colour.

OPTIONAL FEATURES — CLAMPS

1) Hot dipped galvanized finish.
2) Corrosion resistant paint finish.
3) High temperature paint finish.

ORDERING INFORMATION:

RIGID STRUT

Specify part number and pin to pin dimension. If applicable, specify any optional features.

WELDING CLEVIS

Specify part number. If applicable, specify any optional features.

HYDRAULIC SNUBBER

Specify part number, installed pin to pin dimension and design movement in tension or compression. Specify whether the loading is dynamic bi-directional, e.g. seismic or water hammer, or sustained unidirectional, e.g. relief valve discharge. If applicable, specify any optional features.

PIPE CLAMP FOR RIGID STRUT AND SNUBBER

Specify part number. If applicable, specify any optional features.

SPECIAL ITEMS

In addition to the range of standard items shown in this catalogue, we design and manufacture dynamic restraints for applications not covered by the standard designs shown. Examples of special items are:

1) Stainless steel clamps.
2) Riser clamps for rigid struts.
3) Clamps for rigid struts with inclined loading.
4) Double clamps.

MATERIAL SPECIFICATIONS* — CLAMPS FOR RIGID STRUTS AND SNUBBERS

Clamps for use up to 400 °C

Item	*UK Material*	*US Material*
Clamp Body	BS EN10025 Grade S275JR	ASTM A36
Clamp Bolts	BS 4190 Grade 4.6	ASTM A307 Grade B
U-Bolt	BS EN10025 Grade S275JR	ASTM A36
Nuts	BS 4190 Grade 4	ASTM A563 Grade A
Pin	BS 970 Grade 709M40"T"	ASTM A193 Grade B7
Spacers (Clamp)	BS 1387	ASTM A106 Grade B
Spacers (Pin)	BS 970 Grade 230M07	AISI 1213

Clamps for use in the Range 400 °C to 530 °C

Item	*UK Material*	*US Material*
Clamp Body	BS EN10028-2 Grade 13CrMo4-5	ASTM A387 Grade 12 Class 2
Clamp Bolts	BS 4882 Grade B16	ASTM A193 Grade B16
U-Bolt	BS EN10028-2 Grade 13CrMo4-5	ASTM A182 Grade F12 Class 2
Nuts	BS 4882 Grade 4	ASTM A194 Grade 4
Pin	BS 970 Grade 709M40"T"	ASTM A193 Grade B7
Spacers (Clamp)	BS 3604 Grade 620–440	ASTM A335 Grade P12
Spacers (Pin)	BS 970 Grade 230M07	AISI 1213

Clamps for use in the Range 530 °C to 570 °C

Item	*UK Material*	*US Material*
Clamp Body	BS EN10028-2 Grade 10CrMo9-10	ASTM A387 Grade 22 Class 2
Clamp Bolts	BS 4882 Grade B16	ASTM A193 Grade B16
U-Bolt	BS EN10028-2 Grade 13 CrMo4-5	ASTM A182 Grade F12 Class 2
Nuts	BS 4882 Grade 4	ASTM A194 Grade 4
Pin	BS 970 Grade 709M40"T"	ASTM A193 Grade B7
Spacers (Clamp)	BS 3604 Grade 620-440	ASTM A335 Grade P12
Spacers (Pin)	BS 970 Grade 230M07	AISI 1213

* Equivalent Indian, Japanese and Chinese specifications are shown on page 5. Detailed erection and maintenance procedures for rigid struts and hydraulic snubbers are available on request.

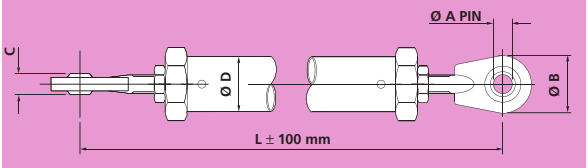


Fig. 511 Rigid Strut

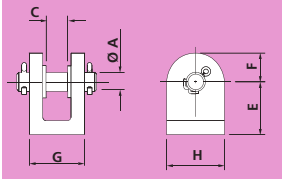


Fig. 512 Welding Clevis

LOAD CARRYING CAPACITIES OF RIGID STRUTS

Fig. 511 Rigid Struts

SIZE	Max. Load @ L= 1m	Max. Load @ L= 2m	Max. Load @ L= 3m	Max. Load @ L= 4m	Max. Load @ L= 5m	Max. Load @ L= 6m
	kgf	kgf	kgf	kgf	kgf	kgf
511-1	423	171				
511-2	985	356	158			
511-3	2125	2125	1034	567		
511-4	4293	3708	1664	948	552	
511-5	6324	6324	3632	2069	1288	809
511-6	12754	12414	7867	4448	2811	1913
511-7	18132	18132	15042	8860	5672	3875
511-8	25524	25524	25524	20643	13911	9812
511-9	55135	55135	50963	39364	27952	20225
511-10	70330	70330	70330	64670	50450	38065
511-11	90785	90785	90785	90785	90785	84373

DIMENSIONS OF RIGID STRUTS

Fig. 511 Rigid Struts

SIZE	PIN DIA. A	DIA. B	C	DIA. D	L (Min.)*	L (Max.)
	mm	mm	mm	mm	mm	mm
511-1	10	38	9	21	442	2000
511-2	10	38	9	27	456	3000
511-3	15	50	12	42	510	4000
511-4	20	70	16	48	552	5000
511-5	25	82	20	60	604	6000
511-6	35	110	25	73	670	6000
511-7	40	130	28	89	722	6000
511-8	50	150	35	114	826	6000
511-9	70	220	49	141	980	6000
511-10	80	250	55	168	1054	6000
511-11	90	280	60	219	1136	6000

*For reduced adjustment of +/- 50mm, L(Min.) can be reduced by 150mm

WEIGHTS OF RIGID STRUTS

Fig. 511 Rigid Struts

SIZE	WEIGHT @ L= Min.	WEIGHT @ L= 1m	WEIGHT @ L= 2m	WEIGHT @ L= 3m	WEIGHT @ L= 4m	WEIGHT @ L= 5m	WEIGHT @ L= 6m
	kgf	kgf	kgf	kgf	kgf	kgf	kgf
511-1	0.8	1.6	2.8				
511-2	1.1	2.0	3.7	5.4			
511-3	2.8	5.0	9.5	13.9	18.4		
511-4	4.5	6.9	12.3	17.8	23.2	28.6	
511-5	7.1	10.1	17.6	25.0	32.5	40.0	47.5
511-6	12.8	16.6	28.0	39.4	50.9	62.3	73.7
511-7	20.0	24.2	39.5	54.8	70.1	85.4	100.7
511-8	34.6	38.5	60.8	83.2	105.5	127.9	150.2
511-9	78.3	78.9	109.9	140.9	171.8	202.8	233.8
511-10	112.6	110.3	153.0	195.6	238.2	280.8	323.4
511-11	175.3	166.5	231.2	295.9	360.7	425.4	490.1

AXIAL STIFFNESSES

Fig. 511 Rigid Struts in Tension

SIZE	Stiffness @ L= Min.	Stiffness @ L= 1m	Stiffness @ L= 2m	Stiffness @ L= 3m	Stiffness @ L= 4m	Stiffness @ L= 5m	Stiffness @ L= 6m
	kgf/mm × 1000	kgf/mm × 1000	kgf/mm × 1000	kgf/mm × 1000	kgf/mm × 1000	kgf/mm × 1000	kgf/mm × 1000
511-1	6.6	3.1	1.6				
511-2	9.5	4.4	2.2	1.5			
511-3	16.8	9.9	5.4	3.7	2.8		
511-4	22.2	13.1	6.9	4.7	3.5	2.8	
511-5	30.5	19.0	9.7	6.5	4.9	3.9	3.3
511-6	43.8	29.7	15.0	10.0	7.6	6.0	5.0
511-7	57.7	41.4	20.5	13.6	10.2	8.2	6.8
511-8	79.6	64.6	31.0	20.4	15.2	12.1	10.0
511-9	117.3	114.0	47.8	30.3	22.1	17.4	14.4
511-10	143.9	154.4	65.4	41.5	30.4	23.9	19.8
511-11	183.7	214.9	95.6	61.5	45.3	35.9	29.7

LOAD CARRYING CAPACITIES OF WELDING CLEVISES

Fig. 512 Welding Clevis

SIZE	Max. Load
	kgf
512-1	423
512-2	985
512-3	2125
512-4	4293
512-5	6324
512-6	12754
512-7	18132
512-8	25524
512-9	55135
512-10	70330
512-11	90785

DIMENSIONS OF WELDING CLEVISES

Fig. 512 Welding Clevis

SIZE	PIN DIA. A	C	E	F	G	H
	mm	mm	mm	mm	mm	mm
512-1	10	9	30	12.5	30	25
512-2	10	9	30	12.5	30	25
512-3	15	12	38	20	35	40
512-4	20	16	52	25	45	50
512-5	25	20	62	35	55	70
512-6	35	25	80	50	70	100
512-7	40	28	98	50	90	100
512-8	50	35	115	65	110	130
512-9	70	49	160	90	145	180
512-10	80	55	190	90	180	180
512-11	90	60	210	105	195	210

WEIGHTS OF WELDING CLEVISES

Fig. 512 Welding Clevis

SIZE	WEIGHT
	kgf
512-1	0.17
512-2	0.17
512-3	0.41
512-4	0.89
512-5	1.9
512-6	4.3
512-7	6.8
512-8	13.2
512-9	32.4
512-10	48.5
512-11	67.4

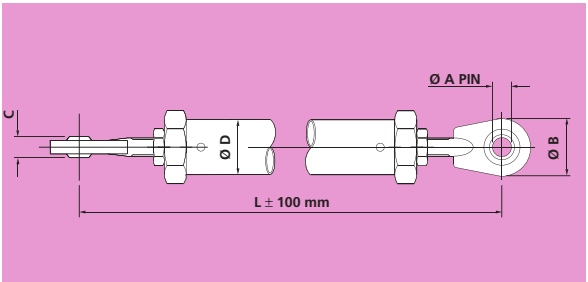


Fig. 511 Rigid Strut

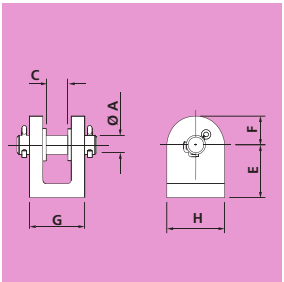


Fig. 512 Welding Clevis

LOAD CARRYING CAPACITIES OF RIGID STRUTS

Fig. 511 Rigid Struts

SIZE	Max. Load @ L= 1m	Max. Load @ L= 2m	Max. Load @ L= 3m	Max. Load @ L= 4m	Max. Load @ L= 5m	Max. Load @ L= 6m
	kN	kN	kN	kN	kN	kN
511-1	4.15	1.67				
511-2	9.7	3.49	1.55			
511-3	20.8	20.8	10.1	5.56		
511-4	42.1	36.4	16.3	9.30	5.41	
511-5	62.0	62.0	35.6	20.3	12.6	7.94
511-6	125	122	77.1	43.6	27.6	18.8
511-7	178	178	148	86.9	55.6	38.0
511-8	250	250	250	202	136	96.2
511-9	541	541	500	386	274	198
511-10	690	690	690	634	495	373
511-11	890	890	890	890	890	827

DIMENSIONS OF RIGID STRUTS

Fig. 511 Rigid Struts

SIZE	PIN DIA. A	DIA. B	C	DIA. D	L (Min.)*	L (Max.)
	mm	mm	mm	mm	mm	mm
511-1	10	38	9	21	442	2000
511-2	10	38	9	27	456	3000
511-3	15	50	12	42	510	4000
511-4	20	70	16	48	552	5000
511-5	25	82	20	60	604	6000
511-6	35	110	25	73	670	6000
511-7	40	130	28	89	722	6000
511-8	50	150	35	114	826	6000
511-9	70	220	49	141	980	6000
511-10	80	250	55	168	1054	6000
511-11	90	280	60	219	1136	6000

*For reduced adjustment of +/- 50mm, L(Min.) can be reduced by 150mm

WEIGHTS OF RIGID STRUTS

Fig. 511 Rigid Struts

SIZE	WEIGHT @ L = Min.	WEIGHT @ L = 1m	WEIGHT @ L = 2m	WEIGHT @ L = 3m	WEIGHT @ L = 4m	WEIGHT @ L = 5m	WEIGHT @ L = 6m
	N	N	N	N	N	N	N
511-1	8	15	28				
511-2	11	20	36	53			
511-3	27	49	93	137	181		
511-4	44	68	121	174	227	280	
511-5	70	99	172	246	319	393	466
511-6	126	163	275	387	499	611	723
511-7	196	237	387	537	687	837	987
511-8	339	377	596	816	1035	1254	1473
511-9	768	774	1078	1381	1685	1989	2293
511-10	1105	1082	1500	1918	2336	2754	3172
511-11	1719	1633	2267	2902	3537	4172	4806

AXIAL STIFFNESSES

Fig. 511 Rigid Struts in Tension

SIZE	Stiffness @ L = Min.	Stiffness @ L = 1m	Stiffness @ L = 2m	Stiffness @ L = 3m	Stiffness @ L = 4m	Stiffness @ L = 5m	Stiffness @ L = 6m
	kN/mm	kN/mm	kN/mm	kN/mm	kN/mm	kN/mm	kN/mm
511-1	64	31	16				
511-2	93	43	22	15			
511-3	165	98	53	37	28		
511-4	218	129	67	46	35	28	
511-5	299	186	95	64	48	39	32
511-6	430	291	147	99	74	59	49
511-7	566	406	201	134	100	80	67
511-8	781	633	304	200	149	118	98
511-9	1150	1118	469	297	217	171	141
511-10	1411	1515	641	407	298	235	194
511-11	1802	2108	937	603	444	352	291

LOAD CARRYING CAPACITIES OF WELDING CLEVISES

Fig. 512 Welding Clevis

SIZE	Max. Load
	kN
512-1	4.15
512-2	9.66
512-3	20.8
512-4	42.1
512-5	62.0
512-6	125
512-7	178
512-8	250
512-9	541
512-10	690
512-11	890

DIMENSIONS OF WELDING CLEVISES

Fig. 512 Welding Clevis

SIZE	PIN DIA. A	C	E	F	G	H
	mm	mm	mm	mm	mm	mm
512-1	10	9	30	12.5	30	25
512-2	10	9	30	12.5	30	25
512-3	15	12	38	20	35	40
512-4	20	16	52	25	45	50
512-5	25	20	62	35	55	70
512-6	35	25	80	50	70	100
512-7	40	28	98	50	90	100
512-8	50	35	115	65	110	130
512-9	70	49	160	90	145	180
512-10	80	55	190	90	180	180
512-11	90	60	210	105	195	210

WEIGHTS OF WELDING CLEVISES

Fig. 512 Welding Clevis

SIZE	WEIGHT
	N
512-1	1.7
512-2	1.7
512-3	4.1
512-4	8.8
512-5	19
512-6	43
512-7	66
512-8	130
512-9	317
512-10	476
512-11	661

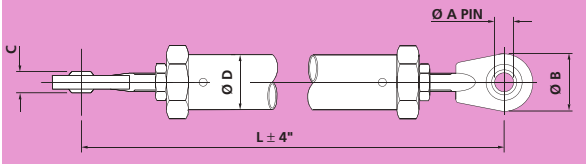


Fig. 511 Rigid Strut

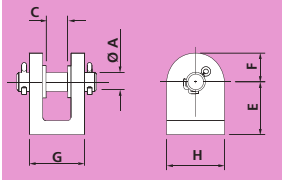


Fig. 512 Welding Clevis

LOAD CARRYING CAPACITIES OF RIGID STRUTS

Fig. 511 Rigid Struts

SIZE	Max. Load @ L= 39in	Max. Load @ L= 79in	Max. Load @ L= 118in	Max. Load @ L= 157in	Max. Load @ L= 197in	Max. Load @ L= 236in
	lbs	lbs	lbs	lbs	lbs	lbs
511-1	933	376				
511-2	2173	786	349			
511-3	4685	4865	2279	1251		
511-4	9465	8174	3669	2091	1217	
511-5	13942	13942	8006	4561	2840	1784
511-6	28117	27368	17343	9807	6197	4217
511-7	39974	39974	33162	19534	12504	8544
511-8	56269	56269	56269	45509	30668	21632
511-9	121552	121552	112352	86781	61623	44589
511-10	155050	155050	155050	142572	111223	83919
511-11	200144	200144	200144	200144	200144	186010

DIMENSIONS OF RIGID STRUTS

Fig. 511 Rigid Struts

SIZE	PIN DIA. A	DIA. B	C	DIA. D	L (Min.)*	L (Max.)
	in	in	in	in	in	in
511-1	0.39	1.50	0.35	0.83	17.4	78.7
511-2	0.39	1.50	0.35	1.06	18.0	118.1
511-3	0.59	1.97	0.47	1.65	20.1	157.5
511-4	0.79	2.76	0.63	1.89	21.7	196.9
511-5	0.98	3.23	0.79	2.36	23.8	236.2
511-6	1.38	4.33	0.98	2.87	26.4	236.2
511-7	1.57	5.12	1.10	3.50	28.4	236.2
511-8	1.97	5.91	1.38	4.49	32.5	236.2
511-9	2.76	8.66	1.93	5.55	38.6	236.2
511-10	3.15	9.84	2.17	6.61	41.5	236.2
511-11	3.54	11.02	2.36	8.62	44.7	236.2

*For reduced adjustment of +/- 2in, L(Min.) can be reduced by 6in

WEIGHTS OF RIGID STRUTS

Fig. 511 Rigid Struts

SIZE	WEIGHT @ L = Min.	WEIGHT @ L = 39in	WEIGHT @ L = 79in	WEIGHT @ L = 118in	WEIGHT @ L = 157in	WEIGHT @ L = 197in	WEIGHT @ L = 236in
	lbs	lbs	lbs	lbs	lbs	lbs	lbs
511-1	1.9	3.4	6.2				
511-2	2.4	4.5	8.2	11.9			
511-3	6.2	11.0	20.9	30.7	40.6		
511-4	9.9	15.2	27.2	39.1	51.1	63.0	
511-5	15.6	22.2	38.7	55.2	71.7	88.2	104.8
511-6	28.3	36.6	61.8	87.0	112.1	137.3	162.5
511-7	44.0	53.4	87.1	120.8	154.5	188.2	222.0
511-8	76.2	84.8	134.1	183.4	232.6	281.9	331.2
511-9	172.6	173.9	242.2	310.5	378.8	447.1	515.4
511-10	248.3	243.2	337.2	431.2	525.1	619.1	713.0
511-11	386.4	367.0	509.7	652.4	795.1	937.8	108.5

AXIAL STIFFNESSES

Fig. 511 Rigid Struts in Tension

SIZE	Stiffness @ L = Min.	Stiffness @ L = 39in	Stiffness @ L = 79in	Stiffness @ L = 118in	Stiffness @ L = 157in	Stiffness @ L = 197in	Stiffness @ L = 236in
	kips/in	kips/in	kips/in	kips/in	kips/in	kips/in	kips/in
511-1	368	176	91				
511-2	534	248	125	83			
511-3	943	557	303	208	159		
511-4	1245	736	385	261	197	158	
511-5	1710	1064	545	366	276	221	184
511-6	2453	1662	841	563	423	339	282
511-7	3231	2317	1149	764	572	457	381
511-8	4460	3616	1733	1140	849	676	562
511-9	6566	6384	2678	1694	1239	977	806
511-10	8056	8649	3661	2322	1700	1341	1107
511-11	10288	12035	5352	3442	2536	2008	1662

LOAD CARRYING CAPACITIES OF WELDING CLEVISES

Fig. 512 Welding Clevis

SIZE	Max. Load
	lbs
512-1	933
512-2	2173
512-3	4685
512-4	9465
512-5	13942
512-6	28117
512-7	39974
512-8	56269
512-9	121552
512-10	155050
512-11	200144

DIMENSIONS OF WELDING CLEVISES

Fig. 512 Welding Clevis

SIZE	PIN DIA. A	C	E	F	G	H
	in	in	in	in	in	in
512-1	0.39	0.35	1.18	0.49	1.18	0.98
512-2	0.39	0.35	1.18	0.49	1.18	0.98
512-3	0.59	0.47	1.50	0.79	1.38	1.57
512-4	0.79	0.63	2.05	0.98	1.77	1.97
512-5	0.98	0.79	2.44	1.38	2.17	2.76
512-6	1.38	0.98	3.15	1.97	2.76	3.94
512-7	1.57	1.10	3.86	1.97	3.54	3.94
512-8	1.97	1.38	4.53	2.56	4.33	5.12
512-9	2.76	1.93	6.30	3.54	5.71	7.09
512-10	3.15	2.17	7.48	3.54	7.09	7.09
512-11	3.54	2.36	8.27	4.13	7.68	8.27

WEIGHTS OF WELDING CLEVISES

Fig. 512 Welding Clevis

SIZE	WEIGHT
	lbs
512-1	0.38
512-2	0.38
512-3	0.91
512-4	2.0
512-5	4.2
512-6	9.6
512-7	14.9
512-8	29.2
512-9	71.3
512-10	107.0
512-11	148.5

Fig. 516 Snubber (Short Type)

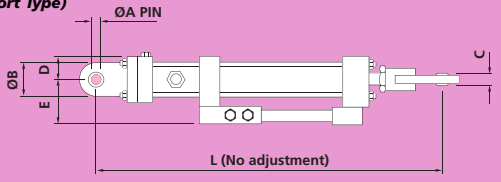
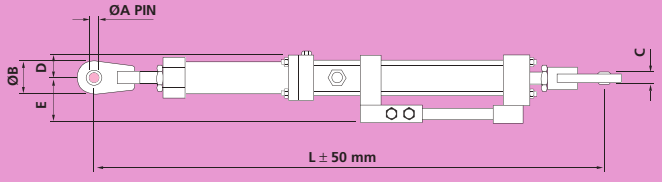


Fig. 517 Snubber (Adjustable Strut Type)



Snubber Size Fig.516- or Fig.517-	Cylinder Bore Size mm	Cylinder Stroke mm	Dia. A mm	Dia. B mm	C mm	D mm	E mm	Fig. 516 Short Snubber L (mm) Fully Closed	Mid Stroke	Fully Ext.	Weight kgf	Fig. 517 Adjustable Strut Snubber L (mm) Min. Fully Closed	Min. Fully Ext.	Max. Fully Closed	Weight @ L = Min. kgf	Weight @ L = Max kgf
1-5	20	127	10	38	9	29	73	442	506	569	6	628	755	2000	6	8
1-10	20	254	10	38	9	29	73	633	760	887	7	819	1073	2000	7	9
2-5	25	127	10	38	9	35	79	463	526	590	8	655	782	2500	8	11
2-10	25	254	10	38	9	35	79	653	780	907	9	845	1099	2500	10	12
3-5	40	127	15	50	12	32	76	518	582	645	10	723	850	4500	11	28
3-10	40	254	15	50	12	32	76	709	836	963	12	914	1168	4000	13	27
3-15	40	381	15	50	12	32	76	899	1090	1280	15	1104	1485	4000	15	28
4-5	50	127	20	70	16	38	83	572	636	699	14	783	910	5000	15	38
4-10	50	254	20	70	16	38	83	763	890	1017	17	974	1228	5000	19	40
4-15	50	381	20	70	16	38	83	953	1144	1334	20	1164	1545	5000	22	43
4-20	50	508	20	70	16	38	83	1144	1398	1652	24	1355	1863	4500	25	42
5-5	65	127	25	82	20	44	89	618	681	745	20	844	971	6000	22	60
5-10	65	254	25	82	20	44	89	808	935	1062	24	1034	1288	6000	26	63
5-15	65	381	25	82	20	44	89	999	1189	1380	29	1225	1606	6000	31	67
5-20	65	508	25	82	20	44	89	1189	1443	1697	33	1415	1923	6000	35	70
6-5	80	127	35	110	25	57	102	741	805	868	38	976	1103	6000	41	98
6-10	80	254	35	110	25	57	102	941	1068	1195	45	1176	1430	6000	49	104
6-15	80	381	35	110	25	57	102	1141	1332	1522	53	1376	1757	6000	56	109
6-20	80	508	35	110	25	57	102	1341	1595	1849	61	1576	2084	6000	64	115
7-5	100	127	40	130	28	64	108	771	835	898	48	1030	1157	6000	53	129
7-10	100	254	40	130	28	64	108	962	1089	1216	56	1221	1475	6000	61	134
7-15	100	381	40	130	28	64	108	1152	1343	1533	65	1411	1792	6000	69	140
7-20	100	508	40	130	28	64	108	1343	1597	1851	73	1602	2110	6000	78	145
8-5	125	127	50	150	35	83	127	866	930	993	88	1144	1271	6000	97	206
8-10	125	254	50	150	35	83	127	1057	1184	1311	105	1335	1589	6000	113	218
8-15	125	381	50	150	35	83	127	1247	1438	1628	121	1525	1906	6000	130	230
8-20	125	508	50	150	35	83	127	1438	1692	1946	138	1716	2224	6000	146	243
9-5	150	127	70	220	49	95	140	1025	1088	1152	142	1343	1470	6000	158	304
9-10	150	254	70	220	49	95	140	1215	1342	1469	163	1533	1787	6000	180	319
9-15	150	381	70	220	49	95	140	1406	1596	1787	184	1724	2105	6000	201	335
9-20	150	508	70	220	49	95	140	1596	1850	2104	205	1914	2422	6000	222	350
10-5	200	127	80	250	55	121	165	1192	1255	1319	277	1528	1655	6000	301	494
10-10	200	254	80	250	55	121	165	1382	1509	1636	312	1718	1972	6000	337	521
10-15	200	381	80	250	55	121	165	1573	1763	1954	348	1909	2290	6000	372	549
10-20	200	508	80	250	55	121	165	1763	2017	2271	383	2099	2607	6000	408	576
11-5	250	127	90	280	60	160	205	1346	1410	1473	501	1699	1826	6000	544	826
11-10	250	254	90	280	60	160	205	1524	1651	1778	551	1877	2131	6000	595	865
11-15	250	381	90	280	60	160	205	1702	1892	2083	602	2055	2436	6000	645	904
11-20	250	508	90	280	60	160	205	1880	2134	2388	653	2233	2741	6000	696	943

LOAD CAPACITIES OF HYDRAULIC SNUBBERS IN TENSION AND COMPRESSION

				Fig. 516 Short Snubber		Fig. 517 Adjustable Strut Snubber															
Snubber Size Fig. 516 – or Fig. 517 –	Cylinder Bore Size mm	Cylinder Stroke mm	Max. Rated Tensile Load kgf	Closed Centres (L) mm	Max. Rated Comp. Load kgf	Min. Closed Centres (L) mm	Max. Closed Centres (L) mm	Max. Closed Centres for Max. Comp. Load = Full Rated Tensile Load mm	Max. Comp. Load at Closed Crs. = Min. kgf	Max. Comp. Load at Closed Crs. = 1000 mm kgf	Max. Comp. Load at Closed Crs. = 1500 mm kgf	Max. Comp. Load at Closed Crs. = 2000 mm kgf	Max. Comp. Load at Closed Crs. = 2500 mm kgf	Max. Comp. Load at Closed Crs. = 3000 mm kgf	Max. Comp. Load at Closed Crs. = 3500 mm kgf	Max. Comp. Load at Closed Crs. = 4000 mm kgf	Max. Comp. Load at Closed Crs. = 4500 mm kgf	Max. Comp. Load at Closed Crs. = 5000 mm kgf	Max. Comp. Load at Closed Crs. = 5500 mm kgf	Max. Comp. Load at Closed Crs. = 6000 mm kgf
1-5	20	127	335	442	335	628	2000	1100	335	335	211	123								
1-10	20	254	335	633	211	819	2000	n/a	211	202	181	101								
2-5	25	127	650	463	650	655	2500	1200	650	650	468	285	180							
2-10	25	254	650	653	529	845	2500	n/a	529	514	392	244	152							
3-5	40	127	1769	518	1769	723	4500	2000	1769	1769	1769	1769	1300	902	685	490	388			
3-10	40	254	1769	709	1119	914	4000	n/a	1119	1103	1037	985	939	830	625	454				
3-15	40	381	1769	899	568	1104	4000	n/a	568		526	483	445	412	380	350				
4-5	50	127	3175	572	3175	783	5000	1900	3175	3175	3175	3078	2046	1426	1079	850	661	502		
4-10	50	254	3175	763	2851	974	5000	n/a	2851	2838	2735	2656	1807	1331	992	782	574	466		
4-15	50	381	3175	953	1632	1164	5000	n/a	1632		1579	1508	1449	1171	903	713	535	438		
4-20	50	508	3175	1144	989	1355	4500	n/a	989		974	911	859	813	771	638	493			
5-5	65	127	4990	618	4990	844	6000	2300	4990	4990	4990	4990	4436	3191	2422	1848	1463	1193	961	755
5-10	65	254	4990	808	4990	1034	6000	2100	4990		4990	4990	3997	2957	2203	1728	1351	1121	886	715
5-15	65	381	4990	999	3602	1225	6000	n/a	3602		3518	3404	3309	2631	1982	1605	1237	1039	856	671
5-20	65	508	4990	1189	2338	1415	6000	n/a	2338		2314	2209	2122	2045	1848	1478	1195	964	744	625
6-5	80	127	7983	741	7983	976	6000	2700	7983	7983	7983	7983	7983	6841	5236	4069	3197	2610	2167	1802
6-10	80	254	7983	941	7983	1176	6000	2600	7983		7983	7983	7983	6308	4736	3729	3007	2431	1999	1705
6-15	80	381	7983	1141	7983	1376	6000	2400	7983		7983	7983	7809	5786	4367	3515	2810	2249	1828	1593
6-20	80	508	7983	1341	7859	1576	6000	n/a	7859			7662	7196	5299	4144	3169	2608	2064	1775	1489
7-5	100	127	12791	771	12791	1030	6000	3000	12791		12791	12791	12791	12791	10303	8141	6384	5204	4406	3626
7-10	100	254	12791	962	12791	1221	6000	2900	12791		12791	12791	12791	12350	9627	7494	6124	4960	4172	3405
7-15	100	381	12791	1152	12791	1411	6000	2800	12791		12791	12791	12791	11461	8944	7028	5681	4712	3937	3183
7-20	100	508	12791	1343	12565	1602	6000	n/a	12565			12308	12037	10618	8284	6736	5411	4459	3699	3125
8-5	125	127	19958	866	19958	1144	6000	3800	19958		19958	19958	19958	19958	19958	18871	15425	12567	10552	9095
8-10	125	254	19958	1057	19958	1355	6000	3700	19958		19958	19958	19958	19958	19958	17815	14421	12135	10147	8455
8-15	125	381	19958	1247	19958	1525	6000	3500	19958			19958	19958	19958	19958	16463	13661	11417	9467	8060
8-20	125	508	19958	1438	19958	1716	6000	3300	19958			19958	19958	19958	19060	15664	12882	10684	9029	7652
9-5	150	127	28849	1025	28849	1343	6000	4700	28849		28849	28849	28849	28849	28849	28849	28849	26263	22275	18714
9-10	150	254	28849	1215	28849	1533	6000	4500	28849			28849	28849	28849	28849	28849	28849	24855	20920	18133
9-15	150	381	28849	1406	28849	1724	6000	4400	28849			28849	28849	28849	28849	28849	27713	23425	20277	17171
9-20	150	508	28849	1596	28849	1914	6000	4200	28849			28849	28849	28849	28849	28849	26223	22338	19245	16195
10-5	200	127	51256	1192	51256	1528	6000	4600	51256			51256	51256	51256	51256	51256	51256	46950	40927	35472
10-10	200	254	51256	1382	51256	1718	6000	4400	51256			51256	51256	51256	51256	51256	51240	44258	38844	33479
10-15	200	381	51256	1573	51256	1909	6000	4300	51256			51256	51256	51256	51256	51256	48961	42527	36710	31943
10-20	200	508	51256	1763	51256	2099	6000	4100	51256				51256	51256	51256	51256	46790	40357	35056	30359
11-5	250	127	85231	1346	85231	1699	6000	5600	85231			85231	85231	85231	85231	85231	85231	85231	85231	79430
11-10	250	254	85231	1524	85231	1877	6000	5400	85231			85231	85231	85231	85231	85231	85231	85231	84344	76868
11-15	250	381	85231	1702	85231	2055	6000	5200	85231				85231	85231	85231	85231	85231	85231	81579	74198
11-20	250	508	85231	1880	85231	2233	6000	5000	85231				85231	85231	85231	85231	85231	85231	78913	70777

Fig. 516 Snubber (Short Type)

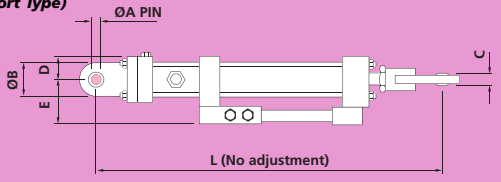
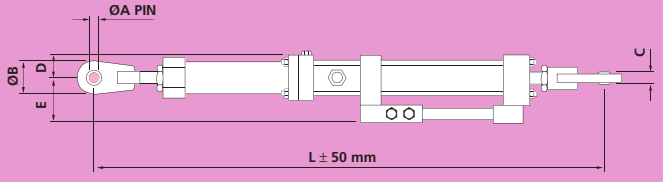


Fig. 517 Snubber (Adjustable Strut Type)



Snubber Size Fig.516- or Fig.517-	Cylinder Bore Size mm	Cylinder Stroke mm	Dia. A mm	Dia. B mm	C mm	D mm	E mm	Fig. 516 Short Snubber L (mm) Fully Closed	Mid Stroke	Fully Ext.	Weight N	Fig. 517 Adjustable Strut Snubber L (mm) Min. Fully Closed	Min. Fully Ext.	Max. Fully Closed	Weight @ L = Min. N	Weight @ L = Max N
1-5	20	127	10	38	9	29	73	442	506	569	58	628	755	2000	61	78
1-10	20	254	10	38	9	29	73	633	760	887	67	819	1073	2000	70	84
2-5	25	127	10	38	9	35	79	463	526	590	78	655	782	2500	81	111
2-10	25	254	10	38	9	35	79	653	780	907	91	845	1099	2500	94	121
3-5	40	127	15	50	12	32	76	518	582	645	98	723	850	4500	108	273
3-10	40	254	15	50	12	32	76	709	836	963	120	914	1168	4000	130	264
3-15	40	381	15	50	12	32	76	899	1090	1280	142	1104	1485	4000	152	278
4-5	50	127	20	70	16	38	83	572	636	699	137	783	910	5000	151	374
4-10	50	254	20	70	16	38	83	763	890	1017	169	974	1228	5000	183	396
4-15	50	381	20	70	16	38	83	953	1144	1334	201	1164	1545	5000	215	418
4-20	50	508	20	70	16	38	83	1144	1398	1652	233	1355	1863	4500	246	413
5-5	65	127	25	82	20	44	89	618	681	745	192	844	971	6000	213	591
5-10	65	254	25	82	20	44	89	808	935	1062	237	1034	1288	6000	258	622
5-15	65	381	25	82	20	44	89	999	1189	1380	282	1225	1606	6000	303	653
5-20	65	508	25	82	20	44	89	1189	1443	1697	327	1415	1923	6000	348	684
6-5	80	127	35	110	25	57	102	741	805	868	369	976	1103	6000	402	965
6-10	80	254	35	110	25	57	102	941	1068	1195	445	1176	1430	6000	478	1018
6-15	80	381	35	110	25	57	102	1141	1332	1522	521	1376	1757	6000	553	1071
6-20	80	508	35	110	25	57	102	1341	1595	1849	596	1576	2084	6000	629	1124
7-5	100	127	40	130	28	64	108	771	835	898	470	1030	1157	6000	518	1264
7-10	100	254	40	130	28	64	108	962	1089	1216	552	1221	1475	6000	600	1317
7-15	100	381	40	130	28	64	108	1152	1343	1533	633	1411	1792	6000	681	1369
7-20	100	508	40	130	28	64	108	1343	1597	1851	714	1602	2110	6000	762	1422
8-5	125	127	50	150	35	83	127	866	930	993	865	1144	1271	6000	948	2018
8-10	125	254	50	150	35	83	127	1057	1184	1311	1027	1335	1589	6000	1110	2138
8-15	125	381	50	150	35	83	127	1247	1438	1628	1189	1525	1906	6000	1272	2258
8-20	125	508	50	150	35	83	127	1438	1692	1946	1351	1716	2224	6000	1434	2378
9-5	150	127	70	220	49	95	140	1025	1088	1152	1390	1343	1470	6000	1553	2982
9-10	150	254	70	220	49	95	140	1215	1342	1469	1597	1533	1787	6000	1761	3132
9-15	150	381	70	220	49	95	140	1406	1596	1787	1805	1724	2105	6000	1968	3282
9-20	150	508	70	220	49	95	140	1596	1850	2104	2013	1914	2422	6000	2176	3432
10-5	200	127	80	250	55	121	165	1192	1255	1319	2716	1528	1655	6000	2954	4845
10-10	200	254	80	250	55	121	165	1382	1509	1636	3064	1718	1972	6000	3302	5113
10-15	200	381	80	250	55	121	165	1573	1763	1954	3412	1909	2290	6000	3650	5381
10-20	200	508	80	250	55	121	165	1763	2017	2271	3759	2099	2607	6000	3998	5649
11-5	250	127	90	280	60	160	205	1346	1410	1473	4909	1699	1826	6000	5334	8097
11-10	250	254	90	280	60	160	205	1524	1651	1778	5406	1877	2131	6000	5830	8481
11-15	250	381	90	280	60	160	205	1702	1892	2083	5903	2055	2436	6000	6327	8865
11-20	250	508	90	280	60	160	205	1880	2134	2388	6399	2233	2741	6000	6824	9249

LOAD CAPACITIES OF HYDRAULIC SNUBBERS IN TENSION AND COMPRESSION

				Fig. 516 Short Snubber		Fig. 517 Adjustable Strut Snubber															
Snubber Size Fig. 516 – or Fig. 517 –	Cylinder Bore Size mm	Cylinder Stroke mm	Max. Rated Tensile Load kN	Closed Centres (L) mm	Max. Rated Comp. Load kN	Min. Closed Centres (L) mm	Max. Closed Centres (L) mm	Max. Closed Centres for Max. Comp. Load = Full Rated Tensile Load mm	Max. Comp. Load at Closed Crs. = Min. kN	Max. Comp. Load at Closed Crs. = 1000 mm kN	Max. Comp. Load at Closed Crs. = 1500 mm kN	Max. Comp. Load at Closed Crs. = 2000 mm kN	Max. Comp. Load at Closed Crs. = 2500 mm kN	Max. Comp. Load at Closed Crs. = 3000 mm kN	Max. Comp. Load at Closed Crs. = 3500 mm kN	Max. Comp. Load at Closed Crs. = 4000 mm kN	Max. Comp. Load at Closed Crs. = 4500 mm kN	Max. Comp. Load at Closed Crs. = 5000 mm kN	Max. Comp. Load at Closed Crs. = 5500 mm kN	Max. Comp. Load at Closed Crs. = 6000 mm kN
1-5	20	127	3.28	442	3.28	628	2000	1100	3.28	3.28	2.07	1.21								
1-10	20	254	3.28	633	2.07	819	2000	n/a	2.07	1.98	1.77	0.99								
2-5	25	127	6.38	463	6.38	655	2500	1200	6.38	6.38	4.59	2.80	1.76							
2-10	25	254	6.38	653	5.18	845	2500	n/a	5.18	5.04	3.85	2.39	1.49							
3-5	40	127	17.35	518	17.35	723	4500	2000	17.35	17.35	17.35	17.35	12.75	8.84	6.72	4.80	3.80			
3-10	40	254	17.35	709	10.98	914	4000	n/a	10.98	10.82	10.17	9.66	9.21	8.14	6.13	4.45				
3-15	40	381	17.35	899	5.57	1104	4000	n/a	5.57		5.15	4.73	4.37	4.04	3.73	3.43				
4-5	50	127	31.14	572	31.14	783	5000	1900	31.14	31.14	31.14	30.18	20.06	13.99	10.58	8.33	6.48	4.92		
4-10	50	254	31.14	763	27.96	974	5000	n/a	27.96	27.83	26.82	26.05	17.72	13.05	9.73	7.67	5.63	4.57		
4-15	50	381	31.14	953	16.00	1164	5000	n/a	16.00		15.49	14.79	14.21	11.48	8.86	7.00	5.24	4.29		
4-20	50	508	31.14	1144	9.70	1355	4500	n/a	9.70		9.55	8.94	8.42	7.97	7.56	6.25	4.84			
5-5	65	127	48.93	618	48.93	844	6000	2300	48.93	48.93	48.93	48.93	43.50	31.30	23.75	18.12	14.35	11.70	9.42	7.40
5-10	65	254	48.93	808	48.93	1034	6000	2100	48.93		48.93	48.93	39.20	29.00	21.61	16.95	13.25	11.00	8.69	7.02
5-15	65	381	48.93	999	35.32	1225	6000	n/a	35.32		34.50	33.38	32.45	25.80	19.44	15.74	12.13	10.19	8.39	6.58
5-20	65	508	48.93	1189	22.93	1415	6000	n/a	22.93		22.69	21.66	20.81	20.06	18.12	14.50	11.71	9.45	7.29	6.13
6-5	80	127	78.29	741	78.29	976	6000	2700	78.29	78.29	78.29	78.29	78.29	67.09	51.34	39.90	31.35	25.59	21.25	17.67
6-10	80	254	78.29	941	78.29	1176	6000	2600	78.29		78.29	78.29	78.29	61.86	46.45	36.57	29.48	23.84	19.60	16.72
6-15	80	381	78.29	1141	78.29	1376	6000	2400	78.29		78.29	78.29	76.58	56.74	42.82	34.47	27.56	22.06	17.93	15.62
6-20	80	508	78.29	1341	77.07	1576	6000	n/a	77.07			75.14	70.57	51.97	40.64	31.08	25.57	20.24	17.41	14.60
7-5	100	127	125.44	771	125.44	1030	6000	3000	125.44		125.44	125.44	125.44	125.44	101.04	79.83	62.60	51.04	43.20	35.56
7-10	100	254	125.44	962	125.44	1221	6000	2900	125.44		125.44	125.44	125.44	121.11	94.40	73.50	60.06	48.64	40.92	33.39
7-15	100	381	125.44	1152	125.44	1411	6000	2800	125.44		125.44	125.44	125.44	112.39	87.71	68.92	55.71	46.20	38.61	31.21
7-20	100	508	125.44	1343	123.22	1602	6000	n/a	123.22			120.70	118.04	104.13	81.23	66.06	53.06	43.73	36.28	30.64
8-5	125	127	195.72	866	195.72	1144	6000	3800	195.72		195.72	195.72	195.72	195.72	195.72	185.06	151.27	123.24	103.48	89.19
8-10	125	254	195.72	1057	195.72	1335	6000	3700	195.72		195.72	195.72	195.72	195.72	195.72	174.71	141.42	119.00	99.51	82.91
8-15	125	381	195.72	1247	195.72	1525	6000	3500	195.72			195.72	195.72	195.72	195.72	161.45	133.97	111.97	92.84	79.04
8-20	125	508	195.72	1438	195.72	1716	6000	3300	195.72			195.72	195.72	195.72	186.92	153.61	126.33	104.77	88.54	75.04
9-5	150	127	282.91	1025	282.91	1343	6000	4700	282.91		282.91	282.91	282.91	282.91	282.91	282.91	282.91	257.55	218.45	183.52
9-10	150	254	282.91	1215	282.91	1533	6000	4500	282.91			282.91	282.91	282.91	282.91	282.91	282.91	243.75	205.16	177.83
9-15	150	381	282.91	1406	282.91	1724	6000	4400	282.91			282.91	282.91	282.91	282.91	282.91	271.77	229.72	198.85	168.39
9-20	150	508	282.91	1596	282.91	1914	6000	4200	282.91			282.91	282.91	282.91	282.91	282.91	257.16	219.06	188.73	158.82
10-5	200	127	502.65	1192	502.65	1528	6000	4600	502.65			502.65	502.65	502.65	502.65	502.65	502.65	460.43	401.35	347.86
10-10	200	254	502.65	1382	502.65	1718	6000	4400	502.65			502.65	502.65	502.65	502.65	502.65	502.49	434.03	380.93	328.32
10-15	200	381	502.65	1573	502.65	1909	6000	4300	502.65			502.65	502.65	502.65	502.65	502.65	480.14	417.05	360.00	313.26
10-20	200	508	502.65	1763	502.65	2099	6000	4100	502.65				502.65	502.65	502.65	502.65	458.85	395.76	343.78	297.72
11-5	250	127	835.83	1346	835.83	1699	6000	5600	835.83			835.83	835.83	835.83	835.83	835.83	835.83	835.83	835.83	778.95
11-10	250	254	835.83	1524	835.83	1877	6000	5400	835.83			835.83	835.83	835.83	835.83	835.83	835.83	835.83	827.13	753.82
11-15	250	381	835.83	1702	835.83	2055	6000	5200	835.83				835.83	835.83	835.83	835.83	835.83	835.83	800.02	727.64
11-20	250	508	835.83	1880	835.83	2233	6000	5000	835.83				835.83	835.83	835.83	835.83	835.83	835.83	773.88	694.09

Fig. 516 Snubber (Short Type)

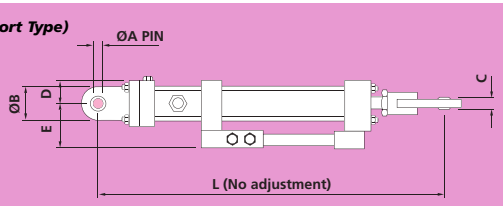


Fig. 517 Snubber (Adjustable Strut Type)

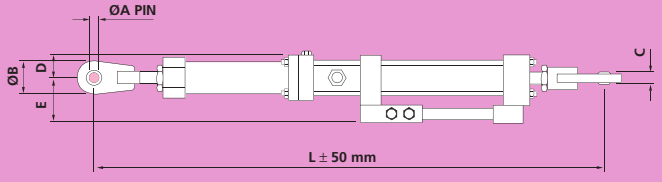
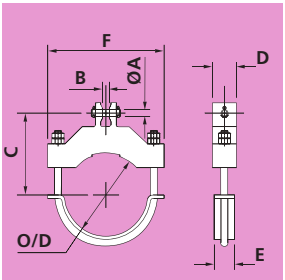


								Fig. 516 Short Snubber				Fig. 517 Adjustable Strut Snubber				
Snubber Size Fig.516- or Fig.517-	Cylinder Bore Size in	Cylinder Stroke in	Dia. A in	Dia. B in	C in	D in	E in	L (in) Fully Closed	L (in) Mid Stroke	L (in) Fully Ext.	Weight lbs	L (in) Min. Fully Closed	L (in) Min. Fully Ext.	L (in) Max. Fully Closed	Weight @ L = Min. lbs	Weight @ L = Max lbs
1-5	3/4	5	0.39	1.50	0.35	1.125	2.875	17.41	19.91	22.41	13	24.7	29.7	79	14	17
1-10	3/4	10	0.39	1.50	0.35	1.125	2.875	24.91	29.91	34.91	15	32.2	42.2	79	16	19
2-5	1	5	0.39	1.50	0.35	1.375	3.125	18.22	20.72	23.22	17	25.8	30.8	98	18	25
2-10	1	10	0.39	1.50	0.35	1.375	3.125	25.72	30.72	35.72	20	33.3	43.3	98	21	27
3-5	1.1/2	5	0.59	1.97	0.47	1.25	3.000	20.41	22.91	25.41	22	28.5	33.5	177	24	61
3-10	1.1/2	10	0.59	1.97	0.47	1.25	3.000	27.91	32.91	37.91	27	36.0	46.0	157	29	59
3-15	1.1/2	15	0.59	1.97	0.47	1.25	3.000	35.41	42.91	50.41	32	43.5	58.5	157	34	62
4-5	2	5	0.79	2.76	0.63	1.5	3.250	22.54	25.04	27.54	31	30.8	35.8	197	34	84
4-10	2	10	0.79	2.76	0.63	1.5	3.250	30.04	35.04	40.04	38	38.3	48.3	197	41	89
4-15	2	15	0.79	2.76	0.63	1.5	3.250	37.54	45.04	52.54	45	45.8	60.8	197	48	94
4-20	2	20	0.79	2.76	0.63	1.5	3.250	45.04	55.04	65.04	52	53.3	73.3	177	55	93
5-5	2.1/2	5	0.98	3.23	0.79	1.75	3.500	24.31	26.81	29.31	43	33.2	38.2	236	48	133
5-10	2.1/2	10	0.98	3.23	0.79	1.75	3.500	31.81	36.81	41.81	53	40.7	50.7	236	58	140
5-15	2.1/2	15	0.98	3.23	0.79	1.75	3.500	39.31	46.81	54.31	63	48.2	63.2	236	68	147
5-20	2.1/2	20	0.98	3.23	0.79	1.75	3.500	46.81	56.81	66.81	74	55.7	75.7	236	78	154
6-5	3.1/4	5	1.38	4.33	0.98	2.25	4.000	29.17	31.67	34.17	83	38.4	43.4	236	90	217
6-10	3.1/4	10	1.38	4.33	0.98	2.25	4.000	37.05	42.05	47.05	100	46.3	56.3	236	107	229
6-15	3.1/4	15	1.38	4.33	0.98	2.25	4.000	44.92	52.42	59.92	117	54.2	69.2	236	124	241
6-20	3.1/4	20	1.38	4.33	0.98	2.25	4.000	52.80	62.80	72.80	134	62.1	82.1	236	141	253
7-5	4	5	1.57	5.12	1.10	2.5	4.250	30.37	32.87	35.37	106	40.6	45.6	236	117	284
7-10	4	10	1.57	5.12	1.10	2.5	4.250	37.87	42.87	47.87	124	48.1	58.1	236	135	296
7-15	4	15	1.57	5.12	1.10	2.5	4.250	45.37	52.87	60.37	142	55.6	70.6	236	153	308
7-20	4	20	1.57	5.12	1.10	2.5	4.250	52.87	62.87	72.87	161	63.1	83.1	236	171	320
8-5	5	5	1.97	5.91	1.38	3.25	5.000	34.11	36.61	39.11	195	45.1	50.1	236	213	454
8-10	5	10	1.97	5.91	1.38	3.25	5.000	41.61	46.61	51.61	231	52.6	62.6	236	250	481
8-15	5	15	1.97	5.91	1.38	3.25	5.000	49.11	56.61	64.11	267	60.1	75.1	236	286	508
8-20	5	20	1.97	5.91	1.38	3.25	5.000	56.61	66.61	76.61	304	67.6	87.6	236	322	535
9-5	6	5	2.76	8.66	1.93	3.75	5.500	40.35	42.85	45.35	312	52.9	57.9	236	349	670
9-10	6	10	2.76	8.66	1.93	3.75	5.500	47.85	52.85	57.85	359	60.4	70.4	236	396	704
9-15	6	15	2.76	8.66	1.93	3.75	5.500	55.35	62.85	70.35	406	67.9	82.9	236	442	738
9-20	6	20	2.76	8.66	1.93	3.75	5.500	62.85	72.85	82.85	452	75.4	95.4	236	489	771
10-5	8	5	3.15	9.84	2.17	4.75	6.500	46.93	49.43	51.93	611	60.2	65.2	236	664	1089
10-10	8	10	3.15	9.84	2.17	4.75	6.500	54.43	59.43	64.43	689	67.7	77.7	236	742	1149
10-15	8	15	3.15	9.84	2.17	4.75	6.500	61.93	69.43	76.93	767	75.2	90.2	236	820	1210
10-20	8	20	3.15	9.84	2.17	4.75	6.500	69.43	79.43	89.43	845	82.7	102.7	236	899	1270
11-5	10	5	3.54	11.02	2.36	6.312	8.062	53.01	55.51	58.01	1104	66.9	71.9	236	1199	1820
11-10	10	10	3.54	11.02	2.36	6.312	8.062	60.01	65.01	70.01	1215	73.9	83.9	236	1311	1907
11-15	10	15	3.54	11.02	2.36	6.312	8.062	67.01	74.51	82.01	1327	80.9	95.9	236	1422	1993
11-20	10	20	3.54	11.02	2.36	6.312	8.062	74.01	84.01	94.01	1439	87.9	107.9	236	1534	2079

LOAD CAPACITIES OF HYDRAULIC SNUBBERS IN TENSION AND COMPRESSION

				Fig. 516 Short Snubber		Fig. 517 Adjustable Strut Snubber															
Snubber Size Fig. 516 – or Fig. 517 –	Cylinder Bore Size in	Cylinder Stroke in	Max. Rated Tensile Load lbs	Closed Centres (L) in	Max. Rated Comp. Load lbs	Min. Closed Centres (L) in	Max. Closed Centres (L) in	Max. Closed Centres for Max. Comp. Load = Full Rated Tensile Load in	Max. Comp. Load at Closed Crs. = Min. lbs	Max. Comp. Load at Closed Crs. = 39 in lbs	Max. Comp. Load at Closed Crs. = 59 in lbs	Max. Comp. Load at Closed Crs. = 79 in lbs	Max. Comp. Load at Closed Crs. = 98 in lbs	Max. Comp. Load at Closed Crs. = 118 in lbs	Max. Comp. Load at Closed Crs. = 138 in lbs	Max. Comp. Load at Closed Crs. = 157 in lbs	Max. Comp. Load at Closed Crs. = 177 in lbs	Max. Comp. Load at Closed Crs. = 197 in lbs	Max. Comp. Load at Closed Crs. = 217 in lbs	Max. Comp. Load at Closed Crs. = 236 in lbs
1-5	3/4	5	738	17.41	738	24.7	79	43.3	738	738	466	272								
1-10	3/4	10	738	24.91	465	32.2	79	n/a	465	446	398	222								
2-5	1	5	1434	18.22	1434	25.8	98	47.2	1434	1434	1031	629	396							
2-10	1	10	1434	25.72	1165	33.3	98	n/a	1165	1133	865	538	335							
3-5	1 1/2	5	3900	20.41	3900	28.5	177	78.7	3900	3900	3900	3900	2866	1988	1510	1079	855			
3-10	1 1/2	10	3900	27.91	2468	36.0	157	n/a	2468	2432	2287	2172	2071	1830	1378	1001				
3-15	1 1/2	15	3900	35.41	1253	43.5	157	n/a	1253		1159	1064	982	908	838	772				
4-5	2	5	7000	22.54	7000	30.8	197	74.8	7000	7000	7000	6785	4510	3145	2379	1873	1457	1106		
4-10	2	10	7000	30.04	6285	38.3	197	n/a	6285	6257	6030	5856	3983	2935	2187	1725	1266	1028		
4-15	2	15	7000	37.54	3597	45.8	197	n/a	3597		3482	3325	3194	2581	1991	1573	1178	965		
4-20	2	20	7000	45.04	2180	53.3	177	n/a	2180		2147	2009	1894	1793	1700	1406	1087			
5-5	2 1/2	5	11000	24.31	11000	33.2	236	90.6	11000	11000	11000	11000	9780	7036	5340	4074	3226	2631	2118	1664
5-10	2 1/2	10	11000	31.81	11000	40.7	236	82.7	11000		11000	11000	8812	6519	4857	3809	2978	2472	1953	1577
5-15	2 1/2	15	11000	39.31	7941	48.2	236	n/a	7941		7756	7505	7294	5801	4370	3537	2727	2291	1887	1478
5-20	2 1/2	20	11000	46.81	5155	55.7	236	n/a	5155		5102	4870	4678	4509	4074	3259	2633	2124	1639	1377
6-5	3 1/4	5	17600	29.17	17600	38.4	236	106.3	17600	17600	17600	17600	17600	15082	11542	8971	7048	5753	4778	3973
6-10	3 1/4	10	17600	37.05	17600	46.3	236	102.4	17600		17600	17600	17600	13906	10441	8221	6628	5360	4406	3759
6-15	3 1/4	15	17600	44.92	17600	54.2	236	94.5	17600		17600	17600	17216	12755	9627	7748	6195	4959	4031	3511
6-20	3 1/4	20	17600	52.80	17325	62.1	236	n/a	17325			16892	15865	11682	9136	6986	5749	4551	3914	3283
7-5	4	5	28200	30.37	28200	40.6	236	118.1	28200		28200	28200	28200	28200	22714	17947	14074	11474	9712	7994
7-10	4	10	28200	37.87	28200	48.1	236	114.2	28200		28200	28200	28200	27226	21223	16522	13502	10935	9199	7507
7-15	4	15	28200	45.37	28200	55.6	236	110.2	28200		28200	28200	28200	25266	19719	15493	12523	10387	8679	7017
7-20	4	20	28200	52.87	27701	63.1	236	n/a	27701			27135	26537	23410	18262	14851	11929	9831	8155	6888
8-5	5	5	44000	34.11	44000	45.1	236	149.6	44000		44000	44000	44000	44000	44000	41603	34006	27704	23262	20051
8-10	5	10	44000	41.61	44000	52.6	236	145.7	44000		44000	44000	44000	44000	44000	39275	31792	26752	22370	18640
8-15	5	15	44000	49.11	44000	60.1	236	137.8	44000			44000	44000	44000	44000	36294	30117	25171	20872	17770
8-20	5	20	44000	56.61	44000	67.6	236	129.9	44000			44000	44000	44000	42021	34533	28401	23554	19905	16869
9-5	6	5	63600	40.35	63600	52.9	236	185.0	63600		63600	63600	63600	63600	63600	63600	63600	57900	49108	41257
9-10	6	10	63600	47.85	63600	60.4	236	177.2	63600			63600	63600	63600	63600	63600	63600	54796	46121	39977
9-15	6	15	63600	55.35	63600	67.9	236	173.2	63600			63600	63600	63600	63600	63600	61095	51643	44702	37854
9-20	6	20	63600	62.85	63600	75.4	236	165.4	63600			63600	63600	63600	63600	63600	57811	49246	42428	35703
10-5	8	5	113000	46.93	113000	60.2	236	181.1	113000			113000	113000	113000	113000	113000	113000	103507	90227	78202
10-10	8	10	113000	54.43	113000	67.7	236	173.2	113000			113000	113000	113000	113000	113000	112964	97572	85636	73808
10-15	8	15	113000	61.93	113000	75.2	236	169.3	113000			113000	113000	113000	113000	113000	107939	93755	80931	70422
10-20	8	20	113000	69.43	113000	82.7	236	161.4	113000				113000	113000	113000	113000	103152	88970	77285	66929
11-5	10	5	187900	53.01	187900	66.9	236	220.5	187900			187900	187900	187900	187900	187900	187900	187900	187900	175112
11-10	10	10	187900	60.01	187900	73.9	236	212.6	187900			187900	187900	187900	187900	187900	187900	187900	185944	169464
11-15	10	15	187900	67.01	187900	80.9	236	204.7	187900				187900	187900	187900	187900	187900	187900	179849	163578
11-20	10	20	187900	74.01	187900	87.9	236	196.9	187900				187900	187900	187900	187900	187900	187900	173973	156036

CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 0.5" / 15mm



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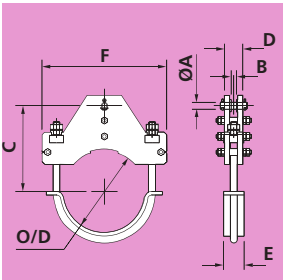

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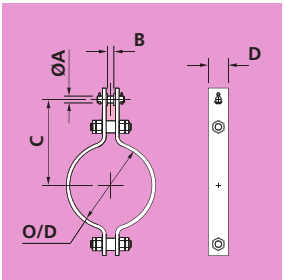


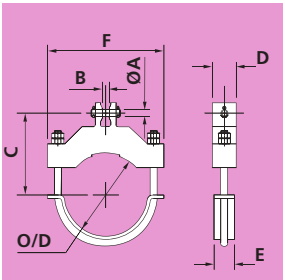
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-15-1-400	21.3	400	423	4.15	933	10	9	85	3.35	20	20	65	0.6	6	1.3
515-15-1-400	21.3	400	423	4.15	933	10	9	85	3.35	40			0.7	6	1.4
515-15-2-400	21.3	400	985	9.66	2172	10	9	85	3.35	40			0.7	6	1.4
513-15-1-490	21.3	490	423	4.15	933	10	9	85	3.35	20	20	65	0.6	6	1.3
515-15-1-490	21.3	490	423	4.15	933	10	9	85	3.35	40			0.6	6	1.4
515-15-2-490	21.3	490	985	9.66	2172	10	9	85	3.35	40			0.6	6	1.4
513-15-1-530	21.3	530	423	4.15	933	10	9	85	3.35	20	30	72	0.7	7	1.5
515-15-1-530	21.3	530	423	4.15	933	10	9	85	3.35	40			0.6	6	1.4
515-15-2-530	21.3	530	985	9.66	2172	10	9	85	3.35	40			0.6	6	1.4
513-15-1-570	21.3	570	423	4.15	933	10	9	85	3.35	25	30	83	1.0	10	2.2
515-15-1-570	21.3	570	423	4.15	933	10	9	85	3.35	40			0.6	6	1.4
515-15-2-570	21.3	570	985	9.66	2172	10	9	85	3.35	40			0.6	6	1.4

CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 0.75" / 20mm

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-20-1-400	26.7	400	423	4.15	933	10	9	87	3.43	20	20	70	0.6	6	1.3
515-20-1-400	26.7	400	423	4.15	933	10	9	85	3.35	40			0.7	7	1.5
513-20-2-400	26.7	400	985	9.66	2172	10	9	87	3.43	20	30	77	0.7	7	1.6
515-20-2-400	26.7	400	985	9.66	2172	10	9	85	3.35	40			0.7	7	1.5
513-20-1-490	26.7	490	423	4.15	933	10	9	87	3.43	20	20	70	0.6	6	1.3
515-20-1-490	26.7	490	423	4.15	933	10	9	85	3.35	40			0.7	7	1.5
513-20-2-490	26.7	490	985	9.66	2172	10	9	87	3.43	20	30	77	0.7	7	1.6
515-20-2-490	26.7	490	985	9.66	2172	10	9	85	3.35	40			0.7	7	1.5
513-20-1-530	26.7	530	423	4.15	933	10	9	87	3.43	20	30	77	0.7	7	1.5
515-20-1-530	26.7	530	423	4.15	933	10	9	85	3.35	40			0.7	7	1.5
513-20-2-530	26.7	530	985	9.66	2172	10	9	87	3.43	25	30	88	1.0	10	2.3
515-20-2-530	26.7	530	985	9.66	2172	10	9	85	3.35	40			0.7	7	1.5
513-20-1-570	26.7	570	423	4.15	933	10	9	87	3.43	25	30	88	1.0	10	2.2
515-20-1-570	26.7	570	423	4.15	933	10	9	85	3.35	40			0.7	7	1.5
513-20-2-570	26.7	570	985	9.66	2172	10	9	87	3.43	30	40	102	1.5	15	3.4
515-20-2-570	26.7	570	985	9.66	2172	10	9	85	3.35	50			1.3	13	3.0

CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 1" / 25mm



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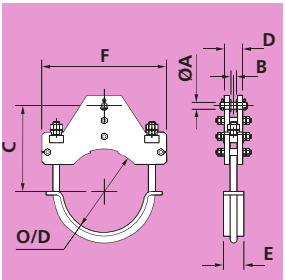

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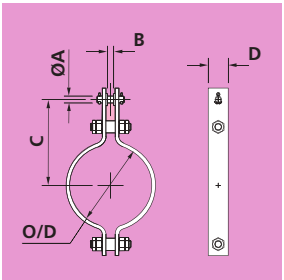
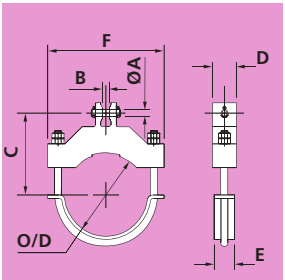


Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-25-1-400	33.4	400	423	4.15	933	10	9	106	4.17	20	20	78	0.7	7	1.6
515-25-1-400	33.4	400	423	4.15	933	10	9	105	4.13	40			0.8	8	1.7
513-25-2-400	33.4	400	985	9.66	2172	10	9	106	4.17	20	30	85	0.9	9	2.0
515-25-2-400	33.4	400	985	9.66	2172	10	9	105	4.13	40			0.8	8	1.7
513-25-1-490	33.4	490	423	4.15	933	10	9	106	4.17	20	20	78	0.7	7	1.6
515-25-1-490	33.4	490	423	4.15	933	10	9	105	4.13	40			0.8	8	1.7
513-25-2-490	33.4	490	985	9.66	2172	10	9	106	4.17	20	30	85	0.9	9	2.0
515-25-2-490	33.4	490	985	9.66	2172	10	9	105	4.13	40			0.8	8	1.7
513-25-1-530	33.4	530	423	4.15	933	10	9	106	4.17	20	30	85	0.9	8	1.9
515-25-1-530	33.4	530	423	4.15	933	10	9	105	4.13	40			0.8	8	1.7
513-25-2-530	33.4	530	985	9.66	2172	10	9	106	4.17	25	30	96	1.3	12	2.8
515-25-2-530	33.4	530	985	9.66	2172	10	9	105	4.13	50			1.6	15	3.4
513-25-1-570	33.4	570	423	4.15	933	10	9	106	4.17	25	30	96	1.2	12	2.7
515-25-1-570	33.4	570	423	4.15	933	10	9	105	4.13	40			0.8	8	1.7
513-25-2-570	33.4	570	985	9.66	2172	10	9	106	4.17	30	40	110	1.8	18	4.0
515-25-2-570	33.4	570	985	9.66	2172	10	9	105	4.13	50			1.6	15	3.4

CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 1.25" / 32mm



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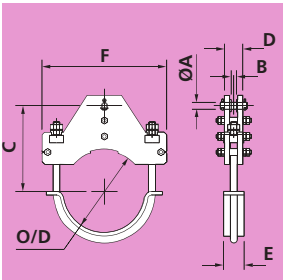

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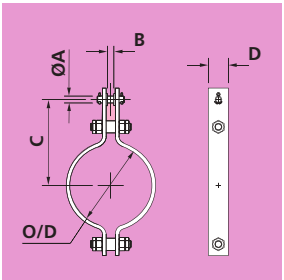
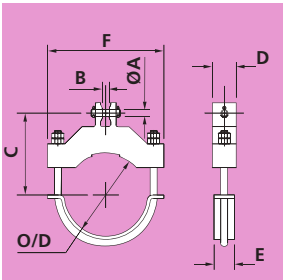


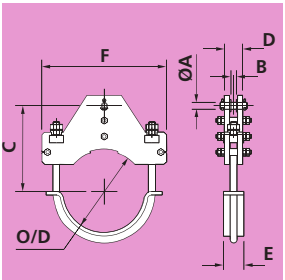
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-32-1-400	42.2	400	423	4.15	933	10	9	110	4.33	20	20	86	0.8	8	1.8
515-32-1-400	42.2	400	423	4.15	933	10	9	110	4.33	40			0.8	8	1.8
513-32-2-400	42.2	400	985	9.66	2172	10	9	110	4.33	20	30	93	1.0	10	2.2
515-32-2-400	42.2	400	985	9.66	2172	10	9	110	4.33	50			1.7	16	3.6
513-32-3-400	42.2	400	2125	20.8	4684	15	12	117	4.61	30	40	118	2.2	21	4.8
515-32-3-400	42.2	400	2125	20.8	4684	15	12	115	4.53	50			1.8	18	4.0
513-32-1-490	42.2	490	423	4.15	933	10	9	110	4.33	20	20	86	0.8	8	1.8
515-32-1-490	42.2	490	423	4.15	933	10	9	110	4.33	40			0.8	8	1.8
513-32-2-490	42.2	490	985	9.66	2172	10	9	110	4.33	20	30	93	1.0	10	2.2
515-32-2-490	42.2	490	985	9.66	2172	10	9	110	4.33	50			1.7	16	3.6
513-32-3-490	42.2	490	2125	20.8	4684	15	12	117	4.61	30	40	118	2.2	21	4.8
515-32-3-490	42.2	490	2125	20.8	4684	15	12	115	4.53	50			1.8	18	4.0
513-32-1-530	42.2	530	423	4.15	933	10	9	110	4.33	20	30	93	1.0	9	2.1
515-32-1-530	42.2	530	423	4.15	933	10	9	110	4.33	40			0.8	8	1.8
513-32-2-530	42.2	530	985	9.66	2172	10	9	110	4.33	25	30	104	1.4	14	3.1
515-32-2-530	42.2	530	985	9.66	2172	10	9	110	4.33	50			1.7	16	3.6
513-32-3-530	42.2	530	2125	20.8	4684	15	12	117	4.61	40	50	132	3.2	31	7.0
515-32-3-530	42.2	530	2125	20.8	4684	15	12	115	4.53	50			1.8	18	4.0
513-32-1-570	42.2	570	423	4.15	933	10	9	110	4.33	25	30	104	1.3	13	3.0
515-32-1-570	42.2	570	423	4.15	933	10	9	110	4.33	40			0.8	8	1.8
513-32-2-570	42.2	570	985	9.66	2172	10	9	110	4.33	30	40	118	2.0	20	4.4
515-32-2-570	42.2	570	985	9.66	2172	10	9	110	4.33	50			1.7	16	3.6
513-32-3-570	42.2	570	2125	20.8	4684	15	12	117	4.61	50	50	150	4.6	45	10.1
515-32-3-570	42.2	570	2125	20.8	4684	15	12	115	4.53	70			2.9	29	6.4

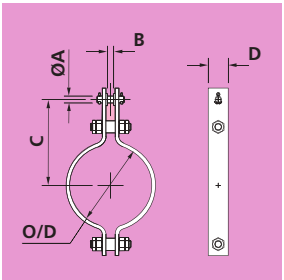
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 1.5" / 40mm



Type 513 Clamp

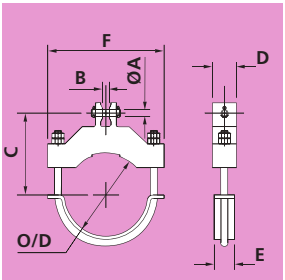


Type 514 Clamp

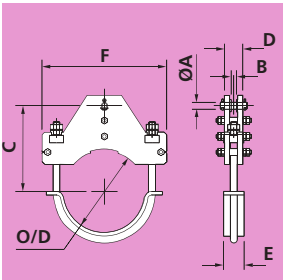


Type 515 Clamp

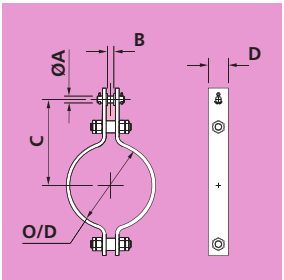
Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-40-1-400	48.3	400	423	4.15	933	10	9	113	4.45	20	20	92	0.9	9	2.0
515-40-1-400	48.3	400	423	4.15	933	10	9	115	4.53	40			0.9	9	1.9
513-40-2-400	48.3	400	985	9.66	2172	10	9	113	4.45	20	30	99	1.1	11	2.4
515-40-2-400	48.3	400	985	9.66	2172	10	9	115	4.53	50			1.8	17	3.9
513-40-3-400	48.3	400	2125	20.8	4684	15	12	120	4.72	30	40	124	2.3	22	5.1
515-40-3-400	48.3	400	2125	20.8	4684	15	12	120	4.72	50			1.9	19	4.2
513-40-1-490	48.3	490	423	4.15	933	10	9	113	4.45	20	20	92	0.9	9	2.0
515-40-1-490	48.3	490	423	4.15	933	10	9	115	4.53	40			0.9	9	1.9
513-40-2-490	48.3	490	985	9.66	2172	10	9	113	4.45	20	30	99	1.1	11	2.4
515-40-2-490	48.3	490	985	9.66	2172	10	9	115	4.53	50			1.8	17	3.9
513-40-3-490	48.3	490	2125	20.8	4684	15	12	120	4.72	30	40	124	2.3	22	5.1
515-40-3-490	48.3	490	2125	20.8	4684	15	12	120	4.72	50			1.9	19	4.2
513-40-1-530	48.3	530	423	4.15	933	10	9	113	4.45	20	30	99	1.0	10	2.3
515-40-1-530	48.3	530	423	4.15	933	10	9	115	4.53	40			0.9	9	1.9
513-40-2-530	48.3	530	985	9.66	2172	10	9	113	4.45	25	30	110	1.5	15	3.3
515-40-2-530	48.3	530	985	9.66	2172	10	9	115	4.53	50			1.8	17	3.9
513-40-3-530	48.3	530	2125	20.8	4684	15	12	120	4.72	40	50	138	3.3	33	7.4
515-40-3-530	48.3	530	2125	20.8	4684	15	12	120	4.72	50			1.9	19	4.2
513-40-1-570	48.3	570	423	4.15	933	10	9	113	4.45	25	30	110	1.5	14	3.2
515-40-1-570	48.3	570	423	4.15	933	10	9	115	4.53	50			1.8	17	3.9
513-40-2-570	48.3	570	985	9.66	2172	10	9	113	4.45	30	40	124	2.1	21	4.7
515-40-2-570	48.3	570	985	9.66	2172	10	9	115	4.53	50			1.8	17	3.9
513-40-3-570	48.3	570	2125	20.8	4684	15	12	120	4.72	50	50	156	4.8	47	10.7
515-40-3-570	48.3	570	2125	20.8	4684	15	12	120	4.72	70			3.1	30	6.8



Type 513 Clamp



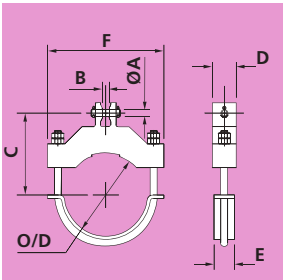
Type 514 Clamp



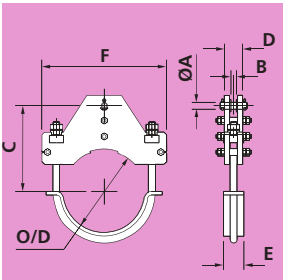
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-50-1-400	60.3	400	423	4.15	933	10	9	119	4.69	20	20	104	1.1	10	2.3
514-50-1-400	60.3	400	423	4.15	933	10	9	119	4.69	36	20	150	1.9	18	4.1
515-50-1-400	60.3	400	423	4.15	933	10	9	120	4.72	40			0.9	9	2.0
513-50-2-400	60.3	400	985	9.66	2172	10	9	119	4.69	20	30	111	1.3	12	2.8
515-50-2-400	60.3	400	985	9.66	2172	10	9	120	4.72	50			1.9	18	4.1
513-50-3-400	60.3	400	2125	20.8	4684	15	12	126	4.96	30	40	136	2.6	26	5.7
515-50-3-400	60.3	400	2125	20.8	4684	15	12	125	4.92	50			2.2	21	4.8
513-50-4-400	60.3	400	4293	42.1	9465	20	16	137	5.39	40	50	150	4.2	41	9.3
515-50-4-400	60.3	400	4293	42.1	9465	20	16	135	5.31	70			4.0	40	8.9
513-50-1-490	60.3	490	423	4.15	933	10	9	119	4.69	20	20	104	1.1	10	2.3
514-50-1-490	60.3	490	423	4.15	933	10	9	119	4.69	36	20	150	1.9	19	4.2
515-50-1-490	60.3	490	423	4.15	933	10	9	120	4.72	40			0.9	9	2.0
513-50-2-490	60.3	490	985	9.66	2172	10	9	119	4.69	20	30	111	1.3	12	2.8
515-50-2-490	60.3	490	985	9.66	2172	10	9	120	4.72	50			1.9	18	4.1
513-50-3-490	60.3	490	2125	20.8	4684	15	12	126	4.96	30	40	136	2.6	26	5.7
515-50-3-490	60.3	490	2125	20.8	4684	15	12	125	4.92	50			2.0	20	4.4
513-50-4-490	60.3	490	4293	42.1	9465	20	16	137	5.39	40	50	150	4.2	41	9.3
515-50-4-490	60.3	490	4293	42.1	9465	20	16	135	5.31	70			3.8	37	8.3
513-50-1-530	60.3	530	423	4.15	933	10	9	119	4.69	20	30	111	1.2	12	2.7
514-50-1-530	60.3	530	423	4.15	933	10	9	119	4.69	36	30	152	2.0	20	4.5
515-50-1-530	60.3	530	423	4.15	933	10	9	120	4.72	40			0.9	9	2.0
513-50-2-530	60.3	530	985	9.66	2172	10	9	119	4.69	25	30	122	1.7	17	3.8
514-50-2-530	60.3	530	985	9.66	2172	10	9	119	4.69	39	30	166	2.4	24	5.3
515-50-2-530	60.3	530	985	9.66	2172	10	9	120	4.72	50			1.9	18	4.1
513-50-3-530	60.3	530	2125	20.8	4684	15	12	126	4.96	40	50	150	3.7	37	8.2
515-50-3-530	60.3	530	2125	20.8	4684	15	12	125	4.92	60			2.4	23	5.3
513-50-4-530	60.3	530	4293	42.1	9465	20	16	137	5.39	50	50	168	5.9	58	13.1
515-50-4-530	60.3	530	4293	42.1	9465	20	16	135	5.31	80			4.3	42	9.4
513-50-1-570	60.3	570	423	4.15	933	10	9	119	4.69	25	30	122	1.7	16	3.7
514-50-1-570	60.3	570	423	4.15	933	10	9	119	4.69	36	30	158	2.4	24	5.3
515-50-1-570	60.3	570	423	4.15	933	10	9	120	4.72	50			1.9	18	4.1
513-50-2-570	60.3	570	985	9.66	2172	10	9	119	4.69	30	40	136	2.4	24	5.4
514-50-2-570	60.3	570	985	9.66	2172	10	9	119	4.69	39	40	170	3.4	33	7.4
515-50-2-570	60.3	570	985	9.66	2172	10	9	120	4.72	50			1.9	18	4.1
513-50-3-570	60.3	570	2125	20.8	4684	15	12	126	4.96	50	50	168	5.4	53	11.9
515-50-3-570	60.3	570	2125	20.8	4684	15	12	125	4.92	70			3.3	33	7.4
513-50-4-570	60.3	570	4293	42.1	9465	20	16	137	5.39	60	70	189	8.7	85	19.1
515-50-4-570	60.3	570	4293	42.1	9465	20	16	135	5.31	80			5.4	53	11.8

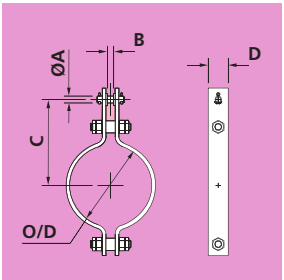
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 2.5" / 65mm



Type 513 Clamp



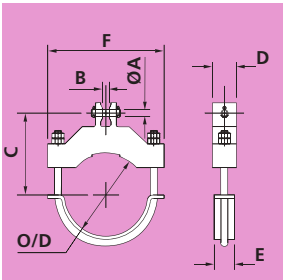
Type 514 Clamp



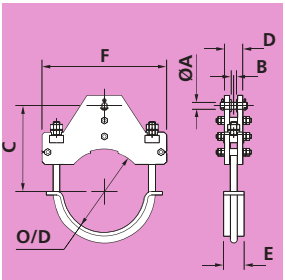
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-65-1-400	73	400	423	4.15	933	10	9	128	5.04	20	20	122	1.3	13	2.9
514-65-1-400	73	400	423	4.15	933	10	9	128	5.04	36	20	168	2.3	23	5.1
515-65-1-400	73	400	423	4.15	933	10	9	125	4.92	40			1.0	10	2.2
513-65-2-400	73	400	985	9.66	2172	10	9	128	5.04	20	30	129	1.5	15	3.4
514-65-2-400	73	400	985	9.66	2172	10	9	128	5.04	39	30	178	2.7	26	5.9
515-65-2-400	73	400	985	9.66	2172	10	9	125	4.92	50			2.1	20	4.5
513-65-3-400	73	400	2125	20.8	4684	15	12	135	5.31	30	40	154	3.1	30	6.8
515-65-3-400	73	400	2125	20.8	4684	15	12	130	5.12	60			2.8	27	6.1
513-65-4-400	73	400	4293	42.1	9465	20	16	146	5.75	40	50	168	4.9	48	10.9
515-65-4-400	73	400	4293	42.1	9465	20	16	140	5.51	80			4.9	48	10.8
513-65-5-400	73	400	6324	62	13942	25	20	153	6.02	50	50	186	7.4	73	16.4
513-65-1-490	73	490	423	4.15	933	10	9	128	5.04	20	20	122	1.3	13	2.9
514-65-1-490	73	490	423	4.15	933	10	9	128	5.04	36	20	168	2.3	23	5.2
515-65-1-490	73	490	423	4.15	933	10	9	125	4.92	40			1.0	10	2.2
513-65-2-490	73	490	985	9.66	2172	10	9	128	5.04	20	30	129	1.5	15	3.4
514-65-2-490	73	490	985	9.66	2172	10	9	128	5.04	39	30	178	2.7	26	5.9
515-65-2-490	73	490	985	9.66	2172	10	9	125	4.92	50			2.1	20	4.5
513-65-3-490	73	490	2125	20.8	4684	15	12	135	5.31	30	40	154	3.1	30	6.8
515-65-3-490	73	490	2125	20.8	4684	15	12	130	5.12	60			2.6	25	5.7
513-65-4-490	73	490	4293	42.1	9465	20	16	146	5.75	40	50	168	4.9	48	10.9
515-65-4-490	73	490	4293	42.1	9465	20	16	140	5.51	80			4.6	45	10.2
513-65-5-490	73	490	6324	62	13942	25	20	153	6.02	50	50	186	7.4	73	16.4
513-65-1-530	73	530	423	4.15	933	10	9	128	5.04	20	30	129	1.5	15	3.3
514-65-1-530	73	530	423	4.15	933	10	9	128	5.04	36	30	170	2.5	24	5.5
515-65-1-530	73	530	423	4.15	933	10	9	125	4.92	40			1.0	10	2.2
513-65-2-530	73	530	985	9.66	2172	10	9	128	5.04	25	30	140	2.1	21	4.6
514-65-2-530	73	530	985	9.66	2172	10	9	128	5.04	39	30	184	2.7	27	6.0
515-65-2-530	73	530	985	9.66	2172	10	9	125	4.92	50			2.1	20	4.5
513-65-3-530	73	530	2125	20.8	4684	15	12	135	5.31	40	50	168	4.4	43	9.7
515-65-3-530	73	530	2125	20.8	4684	15	12	130	5.12	70			3.6	36	8.0
513-65-4-530	73	530	4293	42.1	9465	20	16	146	5.75	50	50	186	6.8	67	15.1
515-65-4-530	73	530	4293	42.1	9465	20	16	140	5.51	80			5.8	57	12.7
513-65-5-530	73	530	6324	62	13942	25	20	153	6.02	60	70	207	10.5	102	23.0
513-65-1-570	73	570	423	4.15	933	10	9	128	5.04	25	30	140	2.0	20	4.5
514-65-1-570	73	570	423	4.15	933	10	9	128	5.04	36	30	176	2.5	24	5.5
515-65-1-570	73	570	423	4.15	933	10	9	125	4.92	50			2.1	20	4.5
513-65-2-570	73	570	985	9.66	2172	10	9	128	5.04	30	40	154	2.9	28	6.4
514-65-2-570	73	570	985	9.66	2172	10	9	128	5.04	39	40	188	3.6	36	8.0
515-65-2-570	73	570	985	9.66	2172	10	9	125	4.92	50			2.1	20	4.5
513-65-3-570	73	570	2125	20.8	4684	15	12	135	5.31	50	50	186	6.2	61	13.7
515-65-3-570	73	570	2125	20.8	4684	15	12	130	5.12	80			4.4	43	9.7
513-65-4-570	73	570	4293	42.1	9465	20	16	146	5.75	60	70	207	9.8	96	21.6
515-65-4-570	73	570	4293	42.1	9465	20	16	140	5.51	100			7.2	70	15.8
513-65-5-570	73	570	6324	62	13942	25	20	153	6.02	70	80	232	14.8	145	32.6

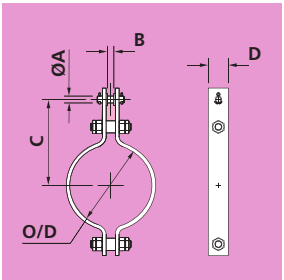
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 3" / 80mm



Type 513 Clamp



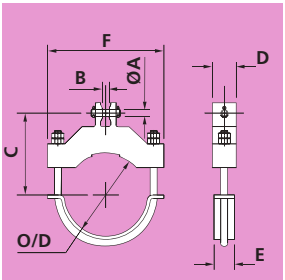
Type 514 Clamp



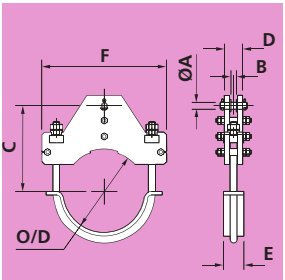
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-80-1-400	88.9	400	423	4.15	933	10	9	134	5.28	20	20	134	1.5	15	3.3
514-80-1-400	88.9	400	423	4.15	933	10	9	134	5.28	36	20	180	2.0	20	4.5
515-80-1-400	88.9	400	423	4.15	933	10	9	135	5.31	40			1.1	11	2.4
513-80-2-400	88.9	400	985	9.66	2172	10	9	134	5.28	20	30	141	1.7	17	3.8
514-80-2-400	88.9	400	985	9.66	2172	10	9	134	5.28	39	30	190	2.4	23	5.3
515-80-2-400	88.9	400	985	9.66	2172	10	9	135	5.31	50			2.3	22	5.0
513-80-3-400	88.9	400	2125	20.8	4684	15	12	141	5.55	30	40	166	3.4	34	7.6
514-80-3-400	88.9	400	2125	20.8	4684	15	12	140	5.51	47	40	238	5.2	51	11.4
515-80-3-400	88.9	400	2125	20.8	4684	15	12	140	5.51	70			4.1	40	9.1
513-80-4-400	88.9	400	4293	42.1	9465	20	16	152	5.98	40	50	180	5.4	53	11.9
515-80-4-400	88.9	400	4293	42.1	9465	20	16	150	5.91	80			6.6	64	14.5
513-80-5-400	88.9	400	6324	62	13942	25	20	159	6.26	50	50	198	8.1	79	17.8
515-80-5-400	88.9	400	6324	62	13942	25	20	165	6.50	100			9.1	89	20.0
513-80-1-490	88.9	490	423	4.15	933	10	9	134	5.28	20	20	134	1.5	15	3.3
514-80-1-490	88.9	490	423	4.15	933	10	9	134	5.28	36	20	180	2.1	20	4.5
515-80-1-490	88.9	490	423	4.15	933	10	9	135	5.31	40			1.1	11	2.4
513-80-2-490	88.9	490	985	9.66	2172	10	9	134	5.28	20	30	141	1.7	17	3.8
514-80-2-490	88.9	490	985	9.66	2172	10	9	134	5.28	39	30	190	2.4	24	5.3
515-80-2-490	88.9	490	985	9.66	2172	10	9	135	5.31	50			2.3	22	5.0
513-80-3-490	88.9	490	2125	20.8	4684	15	12	141	5.55	30	40	166	3.4	34	7.6
514-80-3-490	88.9	490	2125	20.8	4684	15	12	140	5.51	47	40	238	5.2	51	11.5
515-80-3-490	88.9	490	2125	20.8	4684	15	12	140	5.51	70			3.9	38	8.6
513-80-4-490	88.9	490	4293	42.1	9465	20	16	152	5.98	40	50	180	5.4	53	11.9
515-80-4-490	88.9	490	4293	42.1	9465	20	16	150	5.91	80			6.3	61	13.8
513-80-5-490	88.9	490	6324	62	13942	25	20	159	6.26	50	50	198	8.1	79	17.8
515-80-5-490	88.9	490	6324	62	13942	25	20	155	6.10	100			8.4	82	18.5
513-80-1-530	88.9	530	423	4.15	933	10	9	134	5.28	20	30	141	1.7	17	3.7
514-80-1-530	88.9	530	423	4.15	933	10	9	134	5.28	36	30	182	2.3	22	5.1
515-80-1-530	88.9	530	423	4.15	933	10	9	135	5.31	50			2.3	22	5.0
513-80-2-530	88.9	530	985	9.66	2172	10	9	134	5.28	25	30	152	2.4	23	5.2
514-80-2-530	88.9	530	985	9.66	2172	10	9	134	5.28	39	30	196	2.8	28	6.3
515-80-2-530	88.9	530	985	9.66	2172	10	9	135	5.31	50			2.3	22	5.0
513-80-3-530	88.9	530	2125	20.8	4684	15	12	141	5.55	40	50	180	4.8	47	10.6
514-80-3-530	88.9	530	2125	20.8	4684	15	12	141	5.55	47	50	242	6.9	67	15.1
515-80-3-530	88.9	530	2125	20.8	4684	15	12	140	5.51	70			4.1	40	9.1
513-80-4-530	88.9	530	4293	42.1	9465	20	16	152	5.98	50	50	198	7.4	73	16.4
515-80-4-530	88.9	530	4293	42.1	9465	20	16	150	5.91	80			6.3	61	13.8
513-80-5-530	88.9	530	6324	62	13942	25	20	159	6.26	60	70	219	11.2	110	24.6
515-80-5-530	88.9	530	6324	62	13942	25	20	165	6.50	100			11.6	114	25.5
513-80-1-570	88.9	570	423	4.15	933	10	9	134	5.28	25	30	152	2.3	22	5.0
514-80-1-570	88.9	570	423	4.15	933	10	9	134	5.28	36	30	188	2.9	29	6.4
515-80-1-570	88.9	570	423	4.15	933	10	9	135	5.31	50			2.3	22	5.0
513-80-2-570	88.9	570	985	9.66	2172	10	9	134	5.28	30	40	166	3.3	32	7.2
514-80-2-570	88.9	570	985	9.66	2172	10	9	134	5.28	39	40	200	3.8	38	8.5
515-80-2-570	88.9	570	985	9.66	2172	10	9	135	5.31	60			2.7	26	5.9
513-80-3-570	88.9	570	2125	20.8	4684	15	12	141	5.55	50	50	198	6.8	67	15.0
514-80-3-570	88.9	570	2125	20.8	4684	15	12	153	6.02	51	50	250	9.5	93	21.0
515-80-3-570	88.9	570	2125	20.8	4684	15	12	140	5.51	80			5.9	58	13.0
513-80-4-570	88.9	570	4293	42.1	9465	20	16	152	5.98	60	70	219	10.6	104	23.5
515-80-4-570	88.9	570	4293	42.1	9465	20	16	150	5.91	100			10.4	102	22.8
513-80-5-570	88.9	570	6324	62	13942	25	20	159	6.26	70	80	244	15.8	155	34.8
515-80-5-570	88.9	570	6324	62	13942	25	20	165	6.50	100			11.6	114	25.5

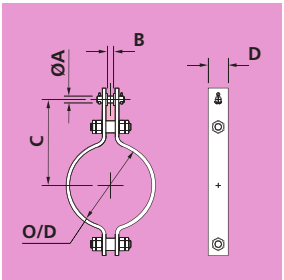
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 3.5" / 90mm



Type 513 Clamp



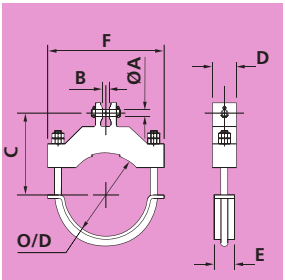
Type 514 Clamp



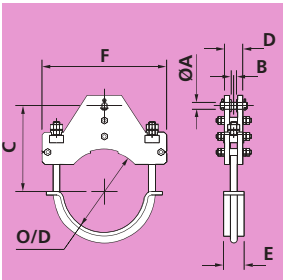
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-90-1-400	101.6	400	423	4.15	933	10	9	140	5.51	20	20	146	1.7	16	3.7
514-90-1-400	101.6	400	423	4.15	933	10	9	140	5.51	36	20	192	2.6	25	5.6
515-90-1-400	101.6	400	423	4.15	933	10	9	140	5.51	40			1.2	12	2.6
513-90-2-400	101.6	400	985	9.66	2172	10	9	140	5.51	20	30	153	2.0	19	4.3
514-90-2-400	101.6	400	985	9.66	2172	10	9	140	5.51	39	30	202	2.8	28	6.3
515-90-2-400	101.6	400	985	9.66	2172	10	9	140	5.51	50			2.4	23	5.3
513-90-3-400	101.6	400	2125	20.8	4684	15	12	147	5.79	30	40	178	3.8	37	8.4
514-90-3-400	101.6	400	2125	20.8	4684	15	12	146	5.75	47	40	250	5.9	58	13.1
515-90-3-400	101.6	400	2125	20.8	4684	15	12	145	5.71	70			4.3	42	9.6
513-90-4-400	101.6	400	4293	42.1	9465	20	16	158	6.22	40	50	192	5.9	58	13.1
515-90-4-400	101.6	400	4293	42.1	9465	20	16	155	6.10	80			6.9	67	15.1
513-90-5-400	101.6	400	6324	62	13942	25	20	165	6.50	50	50	210	8.8	86	19.3
515-90-5-400	101.6	400	6324	62	13942	25	20	175	6.89	100			9.6	95	21.3
513-90-1-490	101.6	490	423	4.15	933	10	9	140	5.51	20	20	146	1.7	16	3.7
514-90-1-490	101.6	490	423	4.15	933	10	9	140	5.51	36	20	192	2.6	25	5.7
515-90-1-490	101.6	490	423	4.15	933	10	9	140	5.51	40			1.2	12	2.6
513-90-2-490	101.6	490	985	9.66	2172	10	9	140	5.51	20	30	153	2.0	19	4.3
514-90-2-490	101.6	490	985	9.66	2172	10	9	140	5.51	39	30	202	2.9	28	6.3
515-90-2-490	101.6	490	985	9.66	2172	10	9	140	5.51	50			2.4	23	5.3
513-90-3-490	101.6	490	2125	20.8	4684	15	12	147	5.79	30	40	178	3.8	37	8.4
514-90-3-490	101.6	490	2125	20.8	4684	15	12	146	5.75	47	40	250	5.9	58	13.1
515-90-3-490	101.6	490	2125	20.8	4684	15	12	145	5.71	70			4.2	41	9.2
513-90-4-490	101.6	490	4293	42.1	9465	20	16	158	6.22	40	50	192	5.9	58	13.1
515-90-4-490	101.6	490	4293	42.1	9465	20	16	155	6.10	80			6.6	64	14.4
513-90-5-490	101.6	490	6324	62	13942	25	20	165	6.50	50	50	210	8.7	85	19.2
515-90-5-490	101.6	490	6324	62	13942	25	20	165	6.50	100			9.0	88	19.8
513-90-1-530	101.6	530	423	4.15	933	10	9	140	5.51	20	30	153	1.9	19	4.2
514-90-1-530	101.6	530	423	4.15	933	10	9	140	5.51	36	30	194	2.9	29	6.5
515-90-1-530	101.6	530	423	4.15	933	10	9	140	5.51	50			2.4	23	5.3
513-90-2-530	101.6	530	985	9.66	2172	10	9	140	5.51	25	30	164	2.6	26	5.8
514-90-2-530	101.6	530	985	9.66	2172	10	9	140	5.51	39	30	208	3.4	34	7.5
515-90-2-530	101.6	530	985	9.66	2172	10	9	140	5.51	50			2.4	23	5.3
513-90-3-530	101.6	530	2125	20.8	4684	15	12	147	5.79	40	50	192	5.3	52	11.7
514-90-3-530	101.6	530	2125	20.8	4684	15	12	147	5.79	47	50	254	6.6	65	14.6
515-90-3-530	101.6	530	2125	20.8	4684	15	12	145	5.71	70			4.3	42	9.6
513-90-4-530	101.6	530	4293	42.1	9465	20	16	158	6.22	50	50	210	8.1	79	17.9
515-90-4-530	101.6	530	4293	42.1	9465	20	16	155	6.10	80			6.6	64	14.4
513-90-5-530	101.6	530	6324	62	13942	25	20	165	6.50	60	70	231	12.1	118	26.6
515-90-5-530	101.6	530	6324	62	13942	25	20	170	6.69	100			12.1	118	26.6
513-90-1-570	101.6	570	423	4.15	933	10	9	140	5.51	25	30	164	2.5	25	5.6
514-90-1-570	101.6	570	423	4.15	933	10	9	140	5.51	36	30	200	3.2	31	7.1
515-90-1-570	101.6	570	423	4.15	933	10	9	140	5.51	50			2.4	23	5.3
513-90-2-570	101.6	570	985	9.66	2172	10	9	140	5.51	30	40	178	3.6	35	7.9
514-90-2-570	101.6	570	985	9.66	2172	10	9	140	5.51	39	40	212	3.6	36	8.0
515-90-2-570	101.6	570	985	9.66	2172	10	9	140	5.51	70			4.0	39	8.8
513-90-3-570	101.6	570	2125	20.8	4684	15	12	147	5.79	50	50	210	7.4	73	16.4
514-90-3-570	101.6	570	2125	20.8	4684	15	12	159	6.26	51	50	262	10.1	99	22.2
515-90-3-570	101.6	570	2125	20.8	4684	15	12	145	5.71	80			6.2	60	13.6
513-90-4-570	101.6	570	4293	42.1	9465	20	16	158	6.22	60	70	231	11.4	112	25.2
515-90-4-570	101.6	570	4293	42.1	9465	20	16	160	6.30	100			11.1	109	24.6
513-90-5-570	101.6	570	6324	62	13942	25	20	165	6.50	70	80	256	16.8	165	37.0
515-90-5-570	101.6	570	6324	62	13942	25	20	170	6.69	100			12.1	118	26.6

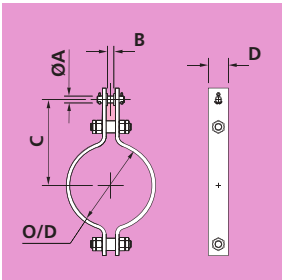
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 4" / 100mm



Type 513 Clamp

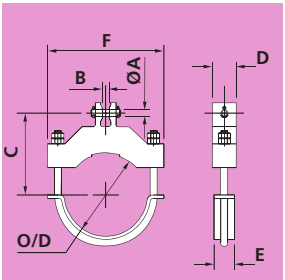


Type 514 Clamp

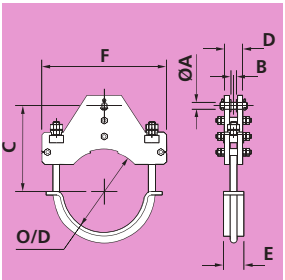


Type 515 Clamp

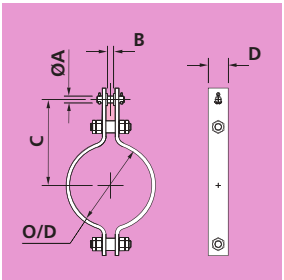
Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-100-1-400	114.3	400	423	4.15	933	10	9	147	5.79	20	20	160	1.9	18	4.2
514-100-1-400	114.3	400	423	4.15	933	10	9	146	5.75	36	20	206	2.7	27	6.0
515-100-1-400	114.3	400	423	4.15	933	10	9	145	5.71	50			2.6	25	5.6
513-100-2-400	114.3	400	985	9.66	2172	10	9	147	5.79	20	30	167	2.2	22	4.9
514-100-2-400	114.3	400	985	9.66	2172	10	9	146	5.75	39	30	216	3.1	31	6.9
515-100-2-400	114.3	400	985	9.66	2172	10	9	145	5.71	50			2.6	25	5.6
513-100-3-400	114.3	400	2125	20.8	4684	15	12	154	6.06	30	40	192	4.2	42	9.3
514-100-3-400	114.3	400	2125	20.8	4684	15	12	154	6.06	47	40	264	5.5	54	12.1
515-100-3-400	114.3	400	2125	20.8	4684	15	12	155	6.10	70			4.7	46	10.3
513-100-4-400	114.3	400	4293	42.1	9465	20	16	165	6.50	40	50	206	6.6	64	14.4
514-100-4-400	114.3	400	4293	42.1	9465	20	16	177	6.97	57	50	284	10.2	100	22.5
515-100-4-400	114.3	400	4293	42.1	9465	20	16	170	6.69	80			7.7	76	17.0
513-100-5-400	114.3	400	6324	62	13942	25	20	172	6.77	50	50	224	9.6	94	21.2
515-100-5-400	114.3	400	6324	62	13942	25	20	190	7.48	100			13.7	134	30.2
515-100-6-400	114.3	400	12754	125	28117	35	25	220	8.66	90			19.3	189	42.5
513-100-1-490	114.3	490	423	4.15	933	10	9	147	5.79	20	20	160	1.9	18	4.2
514-100-1-490	114.3	490	423	4.15	933	10	9	146	5.75	36	20	206	2.7	27	6.0
515-100-1-490	114.3	490	423	4.15	933	10	9	145	5.71	50			2.6	25	5.6
513-100-2-490	114.3	490	985	9.66	2172	10	9	147	5.79	20	30	167	2.2	22	4.9
514-100-2-490	114.3	490	985	9.66	2172	10	9	146	5.75	39	30	216	3.2	31	6.9
515-100-2-490	114.3	490	985	9.66	2172	10	9	145	5.71	50			2.6	25	5.6
513-100-3-490	114.3	490	2125	20.8	4684	15	12	154	6.06	30	40	192	4.2	42	9.3
514-100-3-490	114.3	490	2125	20.8	4684	15	12	154	6.06	47	40	264	5.5	54	12.1
515-100-3-490	114.3	490	2125	20.8	4684	15	12	155	6.10	70			4.7	46	10.3
513-100-4-490	114.3	490	4293	42.1	9465	20	16	165	6.50	40	50	206	6.6	64	14.4
514-100-4-490	114.3	490	4293	42.1	9465	20	16	175	6.89	57	50	284	10.2	100	22.5
515-100-4-490	114.3	490	4293	42.1	9465	20	16	165	6.50	80			7.4	72	16.2
513-100-5-490	114.3	490	6324	62	13942	25	20	172	6.77	50	50	224	9.5	93	21.0
515-100-5-490	114.3	490	6324	62	13942	25	20	170	6.69	100			9.4	92	20.6
515-100-6-490	114.3	490	12754	125	28117	35	25	215	8.46	90			18.1	177	39.8



Type 513 Clamp



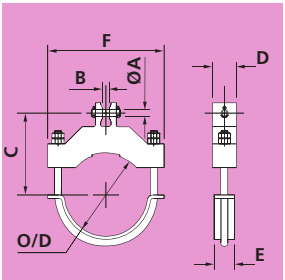
Type 514 Clamp



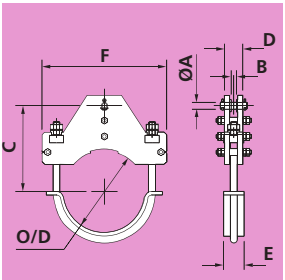
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-100-1-530	114.3	530	423	4.15	933	10	9	147	5.79	20	30	167	2.1	21	4.7
514-100-1-530	114.3	530	423	4.15	933	10	9	146	5.75	36	30	208	2.8	28	6.2
515-100-1-530	114.3	530	423	4.15	933	10	9	145	5.71	50			2.6	25	5.6
513-100-2-530	114.3	530	985	9.66	2172	10	9	147	5.79	25	30	178	3.0	29	6.5
514-100-2-530	114.3	530	985	9.66	2172	10	9	146	5.75	39	30	222	3.0	29	6.5
515-100-2-530	114.3	530	985	9.66	2172	10	9	145	5.71	50			2.6	25	5.6
513-100-3-530	114.3	530	2125	20.8	4684	15	12	154	6.06	40	50	206	5.9	58	13.0
514-100-3-530	114.3	530	2125	20.8	4684	15	12	154	6.06	47	50	268	7.5	74	16.6
515-100-3-530	114.3	530	2125	20.8	4684	15	12	155	6.10	80			5.3	52	11.8
513-100-4-530	114.3	530	4293	42.1	9465	20	16	165	6.50	50	50	224	8.9	87	19.6
514-100-4-530	114.3	530	4293	42.1	9465	20	16	169	6.65	63	50	292	13.3	130	29.3
515-100-4-530	114.3	530	4293	42.1	9465	20	16	165	6.50	100			9.1	89	20.1
513-100-5-530	114.3	530	6324	62	13942	25	20	172	6.77	60	70	245	13.0	128	28.7
515-100-5-530	114.3	530	6324	62	13942	25	20	180	7.09	100			12.9	126	28.4
515-100-6-530	114.3	530	12754	125	28117	35	25	205	8.07	90			16.7	163	36.7
513-100-1-570	114.3	570	423	4.15	933	10	9	147	5.79	25	30	178	2.9	28	6.3
514-100-1-570	114.3	570	423	4.15	933	10	9	146	5.75	36	30	214	2.8	27	6.1
515-100-1-570	114.3	570	423	4.15	933	10	9	145	5.71	50			2.6	25	5.6
513-100-2-570	114.3	570	985	9.66	2172	10	9	147	5.79	30	40	192	4.0	39	8.9
514-100-2-570	114.3	570	985	9.66	2172	10	9	146	5.75	39	40	226	4.2	41	9.3
515-100-2-570	114.3	570	985	9.66	2172	10	9	145	5.71	70			4.2	41	9.3
513-100-3-570	114.3	570	2125	20.8	4684	15	12	154	6.06	50	50	224	8.2	80	18.1
514-100-3-570	114.3	570	2125	20.8	4684	15	12	167	6.57	51	50	276	10.8	106	23.7
515-100-3-570	114.3	570	2125	20.8	4684	15	12	155	6.10	80			6.7	65	14.7
513-100-4-570	114.3	570	4293	42.1	9465	20	16	165	6.50	60	70	245	12.4	122	27.3
514-100-4-570	114.3	570	4293	42.1	9465	20	16	193	7.60	63	70	298	18.0	177	39.8
515-100-4-570	114.3	570	4293	42.1	9465	20	16	170	6.69	100			12.3	120	27.0
513-100-5-570	114.3	570	6324	62	13942	25	20	172	6.77	70	80	270	18.1	178	39.9
515-100-5-570	114.3	570	6324	62	13942	25	20	180	7.09	110			14.1	138	31.1
515-100-6-570	114.3	570	12754	125	28117	35	25	215	8.46	100			22.7	223	50.1

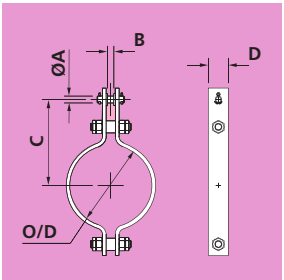
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 5" / 125mm



Type 513 Clamp



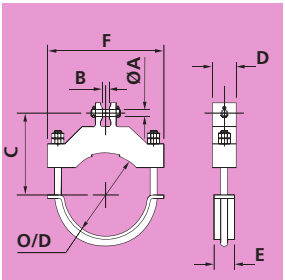
Type 514 Clamp



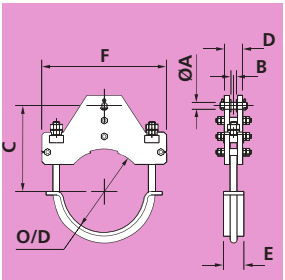
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-125-1-400	141.3	400	423	4.15	933	10	9	160	6.30	20	20	186	2.3	23	5.1
514-125-1-400	141.3	400	423	4.15	933	10	9	159	6.26	36	20	232	2.7	27	6.0
515-125-1-400	141.3	400	423	4.15	933	10	9	160	6.30	50			2.9	28	6.3
513-125-2-400	141.3	400	985	9.66	2172	10	9	160	6.30	20	30	193	2.7	27	6.0
514-125-2-400	141.3	400	985	9.66	2172	10	9	159	6.26	39	30	242	3.1	30	6.8
515-125-2-400	141.3	400	985	9.66	2172	10	9	160	6.30	50			3.0	30	6.6
513-125-3-400	141.3	400	2125	20.8	4684	15	12	167	6.57	30	40	218	5.1	50	11.2
514-125-3-400	141.3	400	2125	20.8	4684	15	12	167	6.57	47	40	290	6.5	64	14.4
515-125-3-400	141.3	400	2125	20.8	4684	15	12	165	6.50	70			5.4	53	12.0
513-125-4-400	141.3	400	4293	42.1	9465	20	16	178	7.01	40	50	232	7.7	76	17.1
514-125-4-400	141.3	400	4293	42.1	9465	20	16	185	7.28	57	50	310	11.0	108	24.2
515-125-4-400	141.3	400	4293	42.1	9465	20	16	185	7.28	100			10.5	103	23.2
513-125-5-400	141.3	400	6324	62	13942	25	20	185	7.28	50	50	250	11.2	109	24.6
514-125-5-400	141.3	400	6324	62	13942	25	20	210	8.27	69	50	344	18.2	179	40.2
515-125-5-400	141.3	400	6324	62	13942	25	20	210	8.27	100			16.0	157	35.2
515-125-6-400	141.3	400	12754	125	28117	35	25	235	9.25	100			22.8	224	50.3
513-125-1-490	141.3	490	423	4.15	933	10	9	160	6.30	20	20	186	2.3	23	5.1
514-125-1-490	141.3	490	423	4.15	933	10	9	159	6.26	36	20	232	2.8	27	6.1
515-125-1-490	141.3	490	423	4.15	933	10	9	160	6.30	50			2.9	28	6.3
513-125-2-490	141.3	490	985	9.66	2172	10	9	160	6.30	20	30	193	2.7	27	6.0
514-125-2-490	141.3	490	985	9.66	2172	10	9	159	6.26	39	30	242	3.1	31	6.9
515-125-2-490	141.3	490	985	9.66	2172	10	9	160	6.30	50			2.9	28	6.3
513-125-3-490	141.3	490	2125	20.8	4684	15	12	167	6.57	30	40	218	5.1	50	11.2
514-125-3-490	141.3	490	2125	20.8	4684	15	12	167	6.57	47	40	290	6.6	65	14.6
515-125-3-490	141.3	490	2125	20.8	4684	15	12	165	6.50	70			5.2	51	11.4
513-125-4-490	141.3	490	4293	42.1	9465	20	16	178	7.01	40	50	232	7.7	76	17.1
514-125-4-490	141.3	490	4293	42.1	9465	20	16	184	7.24	57	50	310	10.9	107	24.1
515-125-4-490	141.3	490	4293	42.1	9465	20	16	180	7.09	100			10.1	99	22.3
513-125-5-490	141.3	490	6324	62	13942	25	20	185	7.28	50	50	250	11.2	109	24.6
514-125-5-490	141.3	490	6324	62	13942	25	20	208	8.19	69	50	344	18.2	178	40.0
515-125-5-490	141.3	490	6324	62	13942	25	20	195	7.68	100			14.2	139	31.3
515-125-6-490	141.3	490	12754	125	28117	35	25	230	9.06	100			21.5	211	47.4

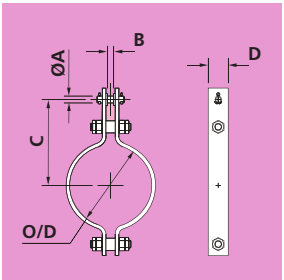
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 5" / 125mm



Type 513 Clamp



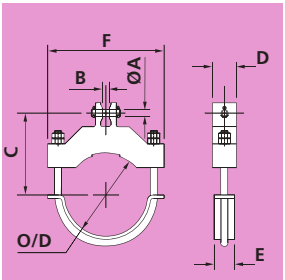
Type 514 Clamp



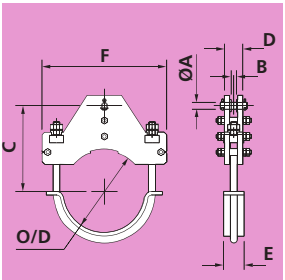
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-125-1-530	141.3	530	423	4.15	933	10	9	160	6.30	20	30	193	2.6	26	5.8
514-125-1-530	141.3	530	423	4.15	933	10	9	159	6.26	36	30	234	3.3	32	7.2
515-125-1-530	141.3	530	423	4.15	933	10	9	160	6.30	50			2.9	28	6.3
513-125-2-530	141.3	530	985	9.66	2172	10	9	160	6.30	25	30	204	3.6	36	8.0
514-125-2-530	141.3	530	985	9.66	2172	10	9	159	6.26	39	30	248	4.1	40	9.1
515-125-2-530	141.3	530	985	9.66	2172	10	9	160	6.30	60			3.4	33	7.5
513-125-3-530	141.3	530	2125	20.8	4684	15	12	167	6.57	40	50	232	7.0	69	15.5
514-125-3-530	141.3	530	2125	20.8	4684	15	12	167	6.57	47	50	294	7.2	71	15.9
515-125-3-530	141.3	530	2125	20.8	4684	15	12	165	6.50	80			7.4	72	16.3
513-125-4-530	141.3	530	4293	42.1	9465	20	16	178	7.01	50	50	250	10.4	102	23.0
514-125-4-530	141.3	530	4293	42.1	9465	20	16	194	7.64	57	50	318	14.1	138	31.1
515-125-4-530	141.3	530	4293	42.1	9465	20	16	185	7.28	100			13.6	133	30.0
513-125-5-530	141.3	530	6324	62	13942	25	20	185	7.28	60	70	271	15.1	148	33.4
514-125-5-530	141.3	530	6324	62	13942	25	20	218	8.58	69	70	350	24.0	236	53.0
515-125-5-530	141.3	530	6324	62	13942	25	20	195	7.68	100			14.2	139	31.3
515-125-6-530	141.3	530	12754	125	28117	35	25	230	9.06	120			25.5	250	56.2
513-125-1-570	141.3	570	423	4.15	933	10	9	160	6.30	25	30	204	3.5	35	7.8
514-125-1-570	141.3	570	423	4.15	933	10	9	159	6.26	36	30	240	4.1	40	9.1
515-125-1-570	141.3	570	423	4.15	933	10	9	160	6.30	50			2.9	28	6.3
513-125-2-570	141.3	570	985	9.66	2172	10	9	160	6.30	30	40	218	4.9	48	10.8
514-125-2-570	141.3	570	985	9.66	2172	10	9	159	6.26	39	40	252	4.6	45	10.2
515-125-2-570	141.3	570	985	9.66	2172	10	9	160	6.30	70			4.8	47	10.6
513-125-3-570	141.3	570	2125	20.8	4684	15	12	167	6.57	50	50	250	9.7	95	21.4
514-125-3-570	141.3	570	2125	20.8	4684	15	12	180	7.09	51	50	302	11.2	110	24.6
515-125-3-570	141.3	570	2125	20.8	4684	15	12	165	6.50	80			7.4	72	16.3
513-125-4-570	141.3	570	4293	42.1	9465	20	16	178	7.01	60	70	271	14.4	142	31.9
514-125-4-570	141.3	570	4293	42.1	9465	20	16	206	8.11	63	70	324	20.3	199	44.6
515-125-4-570	141.3	570	4293	42.1	9465	20	16	185	7.28	100			13.6	133	30.0
513-125-5-570	141.3	570	6324	62	13942	25	20	185	7.28	70	80	296	20.6	202	45.4
514-125-5-570	141.3	570	6324	62	13942	25	20	233	9.17	79	80	360	34.1	334	75.2
515-125-5-570	141.3	570	6324	62	13942	25	20	200	7.87	90			16.2	159	35.7
515-125-6-570	141.3	570	12754	125	28117	35	25	235	9.25	110			28.3	278	62.4

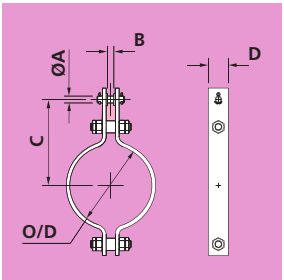
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 6" / 150mm



Type 513 Clamp

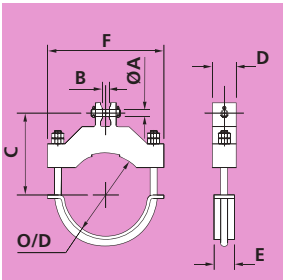


Type 514 Clamp

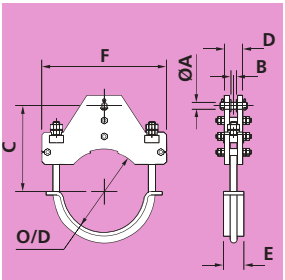


Type 515 Clamp

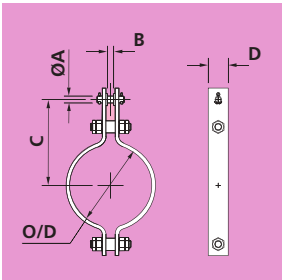
Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-150-1-400	168.3	400	423	4.15	933	10	9	184	7.24	20	20	214	3.0	29	6.6
514-150-1-400	168.3	400	423	4.15	933	10	9	184	7.24	36	20	260	4.0	40	8.9
515-150-1-400	168.3	400	423	4.15	933	10	9	185	7.28	50			3.3	32	7.3
513-150-2-400	168.3	400	985	9.66	2172	10	9	184	7.24	20	30	221	3.5	35	7.8
514-150-2-400	168.3	400	985	9.66	2172	10	9	184	7.24	39	30	270	4.5	44	9.8
515-150-2-400	168.3	400	985	9.66	2172	10	9	185	7.28	50			3.4	34	7.6
513-150-3-400	168.3	400	2125	20.8	4684	15	12	191	7.52	30	40	246	6.4	62	14.0
514-150-3-400	168.3	400	2125	20.8	4684	15	12	190	7.48	47	40	318	6.2	61	13.6
515-150-3-400	168.3	400	2125	20.8	4684	15	12	190	7.48	80			7.0	69	15.4
513-150-4-400	168.3	400	4293	42.1	9465	20	16	202	7.95	40	50	260	9.5	94	21.0
514-150-4-400	168.3	400	4293	42.1	9465	20	16	200	7.87	57	50	338	10.7	105	23.5
515-150-4-400	168.3	400	4293	42.1	9465	20	16	210	8.27	100			15.8	154	34.7
513-150-5-400	168.3	400	6324	62	13942	25	20	209	8.23	50	50	278	13.5	133	29.8
514-150-5-400	168.3	400	6324	62	13942	25	20	218	8.58	69	50	372	18.6	183	41.0
515-150-5-400	168.3	400	6324	62	13942	25	20	225	8.86	100			17.3	170	38.2
514-150-6-400	168.3	400	12754	125	28117	35	25	279	10.98	86	80	414	43.6	428	96.2
515-150-6-400	168.3	400	12754	125	28117	35	25	250	9.84	120			28.9	284	63.8
515-150-7-400	168.3	400	18132	178	39974	40	28	280	11.02	120			38.7	379	85.3
513-150-1-490	168.3	490	423	4.15	933	10	9	184	7.24	20	20	214	3.0	29	6.6
514-150-1-490	168.3	490	423	4.15	933	10	9	184	7.24	36	20	260	4.1	40	9.0
515-150-1-490	168.3	490	423	4.15	933	10	9	185	7.28	50			3.3	32	7.3
513-150-2-490	168.3	490	985	9.66	2172	10	9	184	7.24	20	30	221	3.5	35	7.8
514-150-2-490	168.3	490	985	9.66	2172	10	9	184	7.24	39	30	270	4.5	44	9.9
515-150-2-490	168.3	490	985	9.66	2172	10	9	185	7.28	50			3.3	32	7.3
513-150-3-490	168.3	490	2125	20.8	4684	15	12	191	7.52	30	40	246	6.4	62	14.0
514-150-3-490	168.3	490	2125	20.8	4684	15	12	190	7.48	47	40	318	6.2	61	13.6
515-150-3-490	168.3	490	2125	20.8	4684	15	12	190	7.48	80			6.7	66	14.9
513-150-4-490	168.3	490	4293	42.1	9465	20	16	202	7.95	40	50	260	9.5	93	20.9
514-150-4-490	168.3	490	4293	42.1	9465	20	16	200	7.87	57	50	338	10.7	105	23.6
515-150-4-490	168.3	490	4293	42.1	9465	20	16	200	7.87	100			14.9	146	32.9
513-150-5-490	168.3	490	6324	62	13942	25	20	209	8.23	50	50	278	13.5	132	29.7
514-150-5-490	168.3	490	6324	62	13942	25	20	217	8.54	69	50	372	18.6	182	41.0
515-150-5-490	168.3	490	6324	62	13942	25	20	220	8.66	100			16.4	161	36.1
514-150-6-490	168.3	490	12754	125	28117	35	25	277	10.91	86	70	404	39.9	392	88.0
515-150-6-490	168.3	490	12754	125	28117	35	25	245	9.65	110			25.3	248	55.8
515-150-7-490	168.3	490	18132	178	39974	40	28	265	10.43	110			33.2	326	73.2



Type 513 Clamp



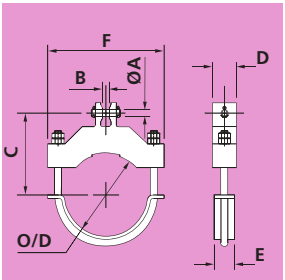
Type 514 Clamp



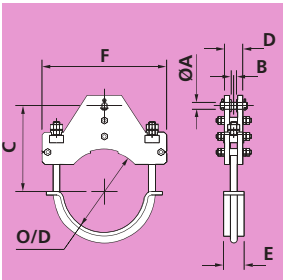
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-150-1-530	168.3	530	423	4.15	933	10	9	184	7.24	20	30	221	3.3	33	7.4
514-150-1-530	168.3	530	423	4.15	933	10	9	184	7.24	36	30	262	4.5	44	10.0
515-150-1-530	168.3	530	423	4.15	933	10	9	185	7.28	50			3.3	32	7.3
513-150-2-530	168.3	530	985	9.66	2172	10	9	184	7.24	25	30	232	4.7	46	10.3
514-150-2-530	168.3	530	985	9.66	2172	10	9	184	7.24	39	30	276	5.1	50	11.3
515-150-2-530	168.3	530	985	9.66	2172	10	9	185	7.28	60			3.9	39	8.7
513-150-3-530	168.3	530	2125	20.8	4684	15	12	191	7.52	40	50	260	8.7	86	19.3
514-150-3-530	168.3	530	2125	20.8	4684	15	12	191	7.52	51	50	322	8.1	79	17.9
515-150-3-530	168.3	530	2125	20.8	4684	15	12	190	7.48	80			8.4	82	18.5
513-150-4-530	168.3	530	4293	42.1	9465	20	16	202	7.95	50	50	278	12.7	124	27.9
514-150-4-530	168.3	530	4293	42.1	9465	20	16	203	7.99	57	50	346	13.7	134	30.2
515-150-4-530	168.3	530	4293	42.1	9465	20	16	200	7.87	100			14.9	146	32.9
513-150-5-530	168.3	530	6324	62	13942	25	20	209	8.23	60	70	299	18.0	177	39.7
514-150-5-530	168.3	530	6324	62	13942	25	20	227	8.94	69	70	378	25.4	249	55.9
515-150-5-530	168.3	530	6324	62	13942	25	20	220	8.66	110			17.9	176	39.6
514-150-6-530	168.3	530	12754	125	28117	35	25	288	11.34	86	80	414	45.2	443	99.7
515-150-6-530	168.3	530	12754	125	28117	35	25	255	10.04	100			28.3	278	62.5
515-150-7-530	168.3	530	18132	178	39974	40	28	260	10.24	120			34.3	337	75.7
513-150-1-570	168.3	570	423	4.15	933	10	9	184	7.24	25	30	232	4.4	43	9.8
514-150-1-570	168.3	570	423	4.15	933	10	9	184	7.24	36	30	268	4.9	48	10.9
515-150-1-570	168.3	570	423	4.15	933	10	9	185	7.28	50			3.3	32	7.3
513-150-2-570	168.3	570	985	9.66	2172	10	9	184	7.24	30	40	246	6.1	60	13.5
514-150-2-570	168.3	570	985	9.66	2172	10	9	184	7.24	39	40	280	5.0	49	10.9
515-150-2-570	168.3	570	985	9.66	2172	10	9	185	7.28	70			5.5	54	12.2
513-150-3-570	168.3	570	2125	20.8	4684	15	12	191	7.52	50	50	278	11.9	117	26.2
514-150-3-570	168.3	570	2125	20.8	4684	15	12	194	7.64	51	50	330	13.2	130	29.1
515-150-3-570	168.3	570	2125	20.8	4684	15	12	190	7.48	100			10.5	103	23.1
513-150-4-570	168.3	570	4293	42.1	9465	20	16	202	7.95	60	70	299	17.2	168	37.8
514-150-4-570	168.3	570	4293	42.1	9465	20	16	220	8.66	63	70	352	21.3	209	47.0
515-150-4-570	168.3	570	4293	42.1	9465	20	16	200	7.87	100			14.9	146	32.9
513-150-5-570	168.3	570	6324	62	13942	25	20	209	8.23	70	80	324	24.1	237	53.2
514-150-5-570	168.3	570	6324	62	13942	25	20	247	9.72	79	80	388	34.8	341	76.7
515-150-5-570	168.3	570	6324	62	13942	25	20	220	8.66	90			18.0	177	39.7
514-150-6-570	168.3	570	12754	125	28117	35	25	288	11.34	96	90	420	59.4	582	130.8
515-150-6-570	168.3	570	12754	125	28117	35	25	255	10.04	130			36.4	357	80.2
515-150-7-570	168.3	570	18132	178	39974	40	28	275	10.83	120			47.2	463	104.0

CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 7" / 175mm



Type 513 Clamp



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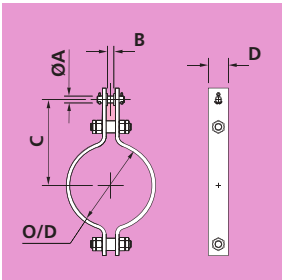
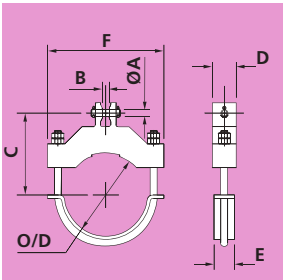
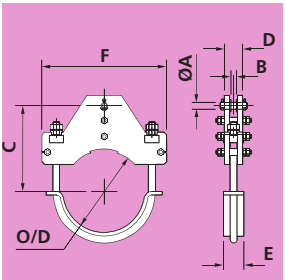


Type 515 Clamp

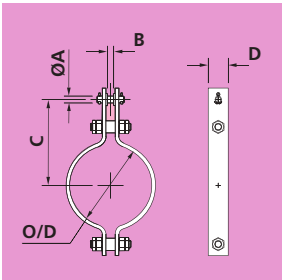
Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-175-1-400	193.7	400	423	4.15	933	10	9	197	7.76	20	20	240	3.5	35	7.8
514-175-1-400	193.7	400	423	4.15	933	10	9	197	7.76	36	20	286	4.1	40	9.0
515-175-1-400	193.7	400	423	4.15	933	10	9	195	7.68	50			3.6	35	7.9
513-175-2-400	193.7	400	985	9.66	2172	10	9	197	7.76	20	30	247	4.3	42	9.4
514-175-2-400	193.7	400	985	9.66	2172	10	9	197	7.76	39	30	296	4.6	45	10.0
515-175-2-400	193.7	400	985	9.66	2172	10	9	195	7.68	60			4.5	44	9.9
513-175-3-400	193.7	400	2125	20.8	4684	15	12	204	8.03	30	40	272	7.6	75	16.8
514-175-3-400	193.7	400	2125	20.8	4684	15	12	203	7.99	47	40	344	8.2	81	18.2
515-175-3-400	193.7	400	2125	20.8	4684	15	12	200	7.87	80			9.4	93	20.8
513-175-4-400	193.7	400	4293	42.1	9465	20	16	215	8.46	40	50	286	11.2	110	24.6
514-175-4-400	193.7	400	4293	42.1	9465	20	16	213	8.39	57	50	364	12.1	119	26.7
515-175-4-400	193.7	400	4293	42.1	9465	20	16	230	9.06	100			18.0	177	39.8
513-175-5-400	193.7	400	6324	62	13942	25	20	222	8.74	50	50	304	15.5	152	34.3
514-175-5-400	193.7	400	6324	62	13942	25	20	226	8.90	69	50	398	19.9	195	43.8
515-175-5-400	193.7	400	6324	62	13942	25	20	240	9.45	100			18.7	183	41.2
514-175-6-400	193.7	400	12754	125	28117	35	25	287	11.30	86	80	440	49.1	482	108.3
515-175-6-400	193.7	400	12754	125	28117	35	25	275	10.83	100			31.7	311	70.0
514-175-7-400	193.7	400	18132	178	39974	40	28	316	12.44	102	90	462	68.7	674	151.5
515-175-7-400	193.7	400	18132	178	39974	40	28	295	11.61	130			44.2	433	97.4
515-175-8-400	193.7	400	25524	250	56269	50	35	325	12.80	130			64.9	637	143.1
513-175-1-490	193.7	490	423	4.15	933	10	9	197	7.76	20	20	240	3.5	35	7.8
514-175-1-490	193.7	490	423	4.15	933	10	9	197	7.76	36	20	286	4.1	40	9.0
515-175-1-490	193.7	490	423	4.15	933	10	9	195	7.68	50			3.6	35	7.9
513-175-2-490	193.7	490	985	9.66	2172	10	9	197	7.76	20	30	247	4.3	42	9.4
514-175-2-490	193.7	490	985	9.66	2172	10	9	197	7.76	39	30	296	4.6	45	10.1
515-175-2-490	193.7	490	985	9.66	2172	10	9	195	7.68	60			4.3	42	9.5
513-175-3-490	193.7	490	2125	20.8	4684	15	12	204	8.03	30	40	272	7.6	74	16.7
514-175-3-490	193.7	490	2125	20.8	4684	15	12	203	7.99	47	40	344	8.1	79	17.8
515-175-3-490	193.7	490	2125	20.8	4684	15	12	200	7.87	80			9.1	90	20.1
513-175-4-490	193.7	490	4293	42.1	9465	20	16	215	8.46	40	50	286	11.2	110	24.6
514-175-4-490	193.7	490	4293	42.1	9465	20	16	213	8.39	57	50	364	12.5	123	27.6
515-175-4-490	193.7	490	4293	42.1	9465	20	16	215	8.46	100			16.3	160	35.9
513-175-5-490	193.7	490	6324	62	13942	25	20	222	8.74	50	50	304	15.5	152	34.3
514-175-5-490	193.7	490	6324	62	13942	25	20	226	8.90	69	50	398	20.1	197	44.3
515-175-5-490	193.7	490	6324	62	13942	25	20	235	9.25	100			17.7	174	39.1
514-175-6-490	193.7	490	12754	125	28117	35	25	287	11.30	86	70	430	40.0	392	88.1
515-175-6-490	193.7	490	12754	125	28117	35	25	260	10.24	120			29.5	289	65.0
514-175-7-490	193.7	490	18132	178	39974	40	28	313	12.32	102	80	456	56.8	557	125.1
515-175-7-490	193.7	490	18132	178	39974	40	28	285	11.22	130			42.0	412	92.5
515-175-8-490	193.7	490	25524	250	56269	50	35	305	12.01	130			59.2	580	130.5



Type 513 Clamp



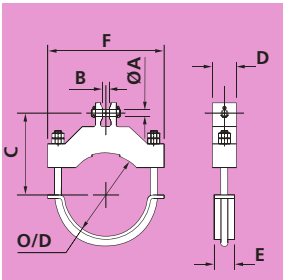
Type 514 Clamp



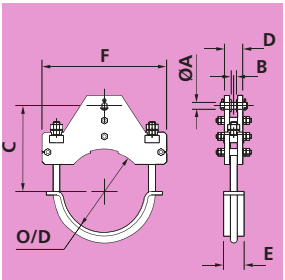
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-175-1-530	193.7	530	423	4.15	933	10	9	197	7.76	20	30	247	3.9	38	8.6
514-175-1-530	193.7	530	423	4.15	933	10	9	197	7.76	36	30	288	4.1	41	9.1
515-175-1-530	193.7	530	423	4.15	933	10	9	195	7.68	50			3.6	35	7.9
513-175-2-530	193.7	530	985	9.66	2172	10	9	197	7.76	25	30	258	5.6	55	12.4
514-175-2-530	193.7	530	985	9.66	2172	10	9	197	7.76	39	30	302	4.1	40	9.0
515-175-2-530	193.7	530	985	9.66	2172	10	9	195	7.68	70			6.0	59	13.3
513-175-3-530	193.7	530	2125	20.8	4684	15	12	204	8.03	40	50	286	10.3	101	22.7
514-175-3-530	193.7	530	2125	20.8	4684	15	12	204	8.03	51	50	348	10.7	105	23.5
515-175-3-530	193.7	530	2125	20.8	4684	15	12	200	7.87	80			9.1	90	20.1
513-175-4-530	193.7	530	4293	42.1	9465	20	16	215	8.46	50	50	304	14.7	144	32.5
514-175-4-530	193.7	530	4293	42.1	9465	20	16	213	8.39	57	50	372	14.3	140	31.4
515-175-4-530	193.7	530	4293	42.1	9465	20	16	215	8.46	100			16.3	160	35.9
513-175-5-530	193.7	530	6324	62	13942	25	20	222	8.74	60	70	325	20.5	201	45.1
514-175-5-530	193.7	530	6324	62	13942	25	20	236	9.29	69	70	404	24.1	236	53.1
515-175-5-530	193.7	530	6324	62	13942	25	20	245	9.65	90			20.5	201	45.1
514-175-6-530	193.7	530	12754	125	28117	35	25	297	11.69	86	80	440	50.9	499	112.1
515-175-6-530	193.7	530	12754	125	28117	35	25	270	10.63	100			30.3	297	66.8
514-175-7-530	193.7	530	18132	178	39974	40	28	324	12.76	102	90	462	70.7	694	155.9
515-175-7-530	193.7	530	18132	178	39974	40	28	285	11.22	150			48.0	471	105.9
515-175-8-530	193.7	530	25524	250	56269	50	35	305	12.01	130			59.2	580	130.5
513-175-1-570	193.7	570	423	4.15	933	10	9	197	7.76	25	30	258	5.2	51	11.5
514-175-1-570	193.7	570	423	4.15	933	10	9	197	7.76	36	30	294	3.7	37	8.2
515-175-1-570	193.7	570	423	4.15	933	10	9	195	7.68	50			3.6	35	7.9
513-175-2-570	193.7	570	985	9.66	2172	10	9	197	7.76	30	40	272	7.3	72	16.2
514-175-2-570	193.7	570	985	9.66	2172	10	9	197	7.76	39	40	306	5.6	55	12.3
515-175-2-570	193.7	570	985	9.66	2172	10	9	195	7.68	80			6.9	67	15.2
513-175-3-570	193.7	570	2125	20.8	4684	15	12	204	8.03	50	50	304	13.9	136	30.6
514-175-3-570	193.7	570	2125	20.8	4684	15	12	207	8.15	51	50	356	14.4	141	31.7
515-175-3-570	193.7	570	2125	20.8	4684	15	12	205	8.07	100			15.4	151	34.0
513-175-4-570	193.7	570	4293	42.1	9465	20	16	215	8.46	60	70	325	19.8	194	43.6
514-175-4-570	193.7	570	4293	42.1	9465	20	16	233	9.17	63	70	378	23.9	234	52.7
515-175-4-570	193.7	570	4293	42.1	9465	20	16	215	8.46	110			17.9	175	39.4
513-175-5-570	193.7	570	6324	62	13942	25	20	222	8.74	70	80	350	27.3	268	60.2
514-175-5-570	193.7	570	6324	62	13942	25	20	260	10.24	79	80	414	38.3	375	84.4
515-175-5-570	193.7	570	6324	62	13942	25	20	245	9.65	110			24.8	244	54.8
514-175-6-570	193.7	570	12754	125	28117	35	25	301	11.85	96	90	446	66.7	654	147.1
515-175-6-570	193.7	570	12754	125	28117	35	25	270	10.63	140			41.8	410	92.2
514-175-7-570	193.7	570	18132	178	39974	40	28	346	13.62	102	100	474	86.3	847	190.3
515-175-7-570	193.7	570	18132	178	39974	40	28	295	11.61	120			52.3	513	115.2
515-175-8-570	193.7	570	25524	250	56269	50	35	305	12.01	150			67.7	664	149.3

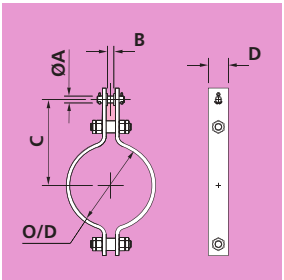
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 8" / 200mm



Type 513 Clamp



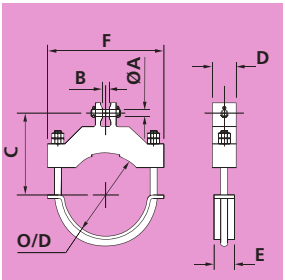
Type 514 Clamp



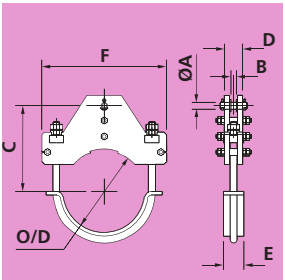
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-200-1-400	219.1	400	423	4.15	933	10	9	210	8.27	20	20	266	4.2	41	9.2
514-200-1-400	219.1	400	423	4.15	933	10	9	208	8.19	36	20	312	4.3	42	9.4
515-200-1-400	219.1	400	423	4.15	933	10	9	210	8.27	50			3.9	39	8.7
513-200-2-400	219.1	400	985	9.66	2172	10	9	210	8.27	20	30	273	5.1	50	11.2
514-200-2-400	219.1	400	985	9.66	2172	10	9	208	8.19	39	30	322	5.0	49	11.0
515-200-2-400	219.1	400	985	9.66	2172	10	9	210	8.27	70			6.8	66	14.9
513-200-3-400	219.1	400	2125	20.8	4684	15	12	217	8.54	30	40	298	9.0	88	19.8
514-200-3-400	219.1	400	2125	20.8	4684	15	12	217	8.54	47	40	370	9.2	90	20.2
515-200-3-400	219.1	400	2125	20.8	4684	15	12	215	8.46	80			10.2	100	22.4
513-200-4-400	219.1	400	4293	42.1	9465	20	16	228	8.98	40	50	312	13.0	128	28.7
514-200-4-400	219.1	400	4293	42.1	9465	20	16	226	8.90	57	50	390	12.2	120	27.0
515-200-4-400	219.1	400	4293	42.1	9465	20	16	240	9.45	100			18.5	181	40.7
513-200-5-400	219.1	400	6324	62	13942	25	20	235	9.25	50	50	330	17.9	175	39.4
514-200-5-400	219.1	400	6324	62	13942	25	20	235	9.25	69	50	424	19.5	191	42.9
515-200-5-400	219.1	400	6324	62	13942	25	20	255	10.04	110			21.9	215	48.3
514-200-6-400	219.1	400	12754	125	28117	35	25	297	11.69	86	80	466	46.7	458	103.0
515-200-6-400	219.1	400	12754	125	28117	35	25	300	11.81	110			38.9	381	85.7
514-200-7-400	219.1	400	18132	178	39974	40	28	324	12.76	102	90	488	69.8	684	153.8
515-200-7-400	219.1	400	18132	178	39974	40	28	310	12.20	150			53.4	524	117.7
515-200-8-400	219.1	400	25524	250	56269	50	35	340	13.39	130			68.3	670	150.5
513-200-1-490	219.1	490	423	4.15	933	10	9	210	8.27	20	20	266	4.2	41	9.2
514-200-1-490	219.1	490	423	4.15	933	10	9	208	8.19	36	20	312	4.3	42	9.4
515-200-1-490	219.1	490	423	4.15	933	10	9	210	8.27	50			3.9	39	8.7
513-200-2-490	219.1	490	985	9.66	2172	10	9	210	8.27	20	30	273	5.1	50	11.2
514-200-2-490	219.1	490	985	9.66	2172	10	9	208	8.19	39	30	322	5.0	49	11.0
515-200-2-490	219.1	490	985	9.66	2172	10	9	210	8.27	60			4.7	46	10.4
513-200-3-490	219.1	490	2125	20.8	4684	15	12	217	8.54	30	40	298	8.9	87	19.7
514-200-3-490	219.1	490	2125	20.8	4684	15	12	217	8.54	47	40	370	9.3	91	20.4
515-200-3-490	219.1	490	2125	20.8	4684	15	12	215	8.46	80			10.0	98	22.0
513-200-4-490	219.1	490	4293	42.1	9465	20	16	228	8.98	40	50	312	13.0	128	28.7
514-200-4-490	219.1	490	4293	42.1	9465	20	16	226	8.90	57	50	390	12.4	122	27.4
515-200-4-490	219.1	490	4293	42.1	9465	20	16	230	9.06	100			17.6	173	38.9
513-200-5-490	219.1	490	6324	62	13942	25	20	235	9.25	50	50	330	17.9	175	39.4
514-200-5-490	219.1	490	6324	62	13942	25	20	233	9.17	69	50	424	19.3	190	42.6
515-200-5-490	219.1	490	6324	62	13942	25	20	250	9.84	110			20.9	205	46.1
514-200-6-490	219.1	490	12754	125	28117	35	25	295	11.61	86	70	456	40.9	401	90.2
515-200-6-490	219.1	490	12754	125	28117	35	25	285	11.22	100			32.3	317	71.2
514-200-7-490	219.1	490	18132	178	39974	40	28	322	12.68	102	80	482	64.0	628	141.2
515-200-7-490	219.1	490	18132	178	39974	40	28	300	11.81	140			47.7	468	105.2
515-200-8-490	219.1	490	25524	250	56269	50	35	335	13.19	130			65.7	644	144.9

CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 8" / 200mm



Type 513 Clamp



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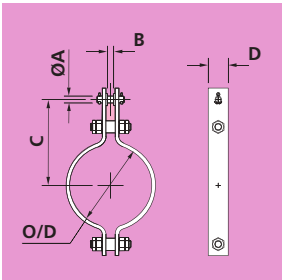
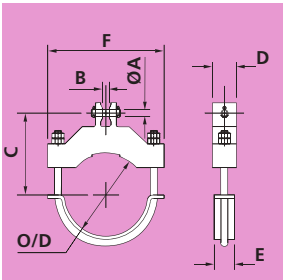


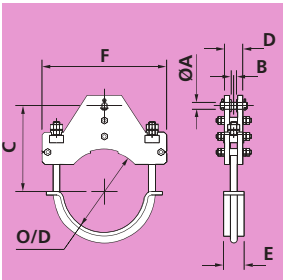
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-200-1-530	219.1	530	423	4.15	933	10	9	210	8.27	20	30	273	4.7	46	10.3
514-200-1-530	219.1	530	423	4.15	933	10	9	208	8.19	36	30	314	4.7	46	10.3
515-200-1-530	219.1	530	423	4.15	933	10	9	210	8.27	50			3.9	39	8.7
513-200-2-530	219.1	530	985	9.66	2172	10	9	210	8.27	25	30	284	6.6	64	14.5
514-200-2-530	219.1	530	985	9.66	2172	10	9	208	8.19	39	30	328	5.5	54	12.2
515-200-2-530	219.1	530	985	9.66	2172	10	9	210	8.27	70			6.6	65	14.6
513-200-3-530	219.1	530	2125	20.8	4684	15	12	217	8.54	40	50	312	12.1	119	26.7
514-200-3-530	219.1	530	2125	20.8	4684	15	12	217	8.54	47	50	374	11.4	112	25.2
515-200-3-530	219.1	530	2125	20.8	4684	15	12	215	8.46	80			10.0	98	22.0
513-200-4-530	219.1	530	4293	42.1	9465	20	16	228	8.98	50	50	330	17.0	167	37.6
514-200-4-530	219.1	530	4293	42.1	9465	20	16	226	8.90	57	50	398	15.7	154	34.5
515-200-4-530	219.1	530	4293	42.1	9465	20	16	230	9.06	100			17.6	173	38.9
513-200-5-530	219.1	530	6324	62	13942	25	20	235	9.25	60	70	351	23.3	229	51.4
514-200-5-530	219.1	530	6324	62	13942	25	20	250	9.84	69	70	430	26.1	256	57.6
515-200-5-530	219.1	530	6324	62	13942	25	20	255	10.04	90			21.6	212	47.7
514-200-6-530	219.1	530	12754	125	28117	35	25	306	12.05	86	80	466	48.4	475	106.7
515-200-6-530	219.1	530	12754	125	28117	35	25	285	11.22	110			35.4	347	78.0
514-200-7-530	219.1	530	18132	178	39974	40	28	333	13.11	102	90	488	72.3	709	159.4
515-200-7-530	219.1	530	18132	178	39974	40	28	300	11.81	160			54.2	531	119.4
515-200-8-530	219.1	530	25524	250	56269	50	35	320	12.60	130			62.5	613	137.9
513-200-1-570	219.1	570	423	4.15	933	10	9	210	8.27	25	30	284	6.2	61	13.7
514-200-1-570	219.1	570	423	4.15	933	10	9	208	8.19	36	30	320	5.2	51	11.6
515-200-1-570	219.1	570	423	4.15	933	10	9	210	8.27	50			3.9	39	8.7
513-200-2-570	219.1	570	985	9.66	2172	10	9	210	8.27	30	40	298	8.7	85	19.1
514-200-2-570	219.1	570	985	9.66	2172	10	9	208	8.19	39	40	332	7.9	77	17.4
515-200-2-570	219.1	570	985	9.66	2172	10	9	210	8.27	80			7.5	74	16.6
513-200-3-570	219.1	570	2125	20.8	4684	15	12	217	8.54	50	50	330	16.1	158	35.6
514-200-3-570	219.1	570	2125	20.8	4684	15	12	221	8.70	51	50	382	15.5	152	34.1
515-200-3-570	219.1	570	2125	20.8	4684	15	12	215	8.46	100			16.5	162	36.4
513-200-4-570	219.1	570	4293	42.1	9465	20	16	228	8.98	60	70	351	22.7	222	50.0
514-200-4-570	219.1	570	4293	42.1	9465	20	16	247	9.72	63	70	404	24.7	242	54.5
515-200-4-570	219.1	570	4293	42.1	9465	20	16	240	9.45	90			20.4	200	45.0
513-200-5-570	219.1	570	6324	62	13942	25	20	235	9.25	70	80	376	30.7	301	67.7
514-200-5-570	219.1	570	6324	62	13942	25	20	274	10.79	79	80	440	36.3	356	80.1
515-200-5-570	219.1	570	6324	62	13942	25	20	255	10.04	110			26.3	258	57.9
514-200-6-570	219.1	570	12754	125	28117	35	25	315	12.40	96	90	472	65.1	639	143.5
515-200-6-570	219.1	570	12754	125	28117	35	25	285	11.22	160			50.7	498	111.9
514-200-7-570	219.1	570	18132	178	39974	40	28	356	14.02	102	100	500	85.0	834	187.5
515-200-7-570	219.1	570	18132	178	39974	40	28	315	12.40	120			56.1	550	123.7
515-200-8-570	219.1	570	25524	250	56269	50	35	320	12.60	160			76.1	747	167.9

CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 9" / 225mm



Type 513 Clamp



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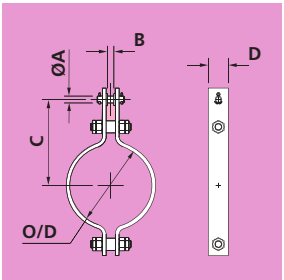
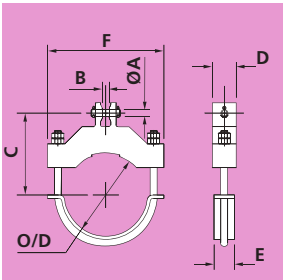
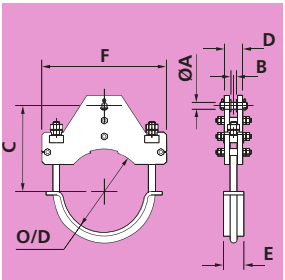


Type 515 Clamp

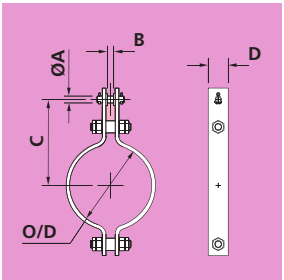
Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-225-1-400	244.5	400	423	4.15	933	10	9	222	8.74	20	20	290	4.8	47	10.6
514-225-1-400	244.5	400	423	4.15	933	10	9	220	8.66	36	20	336	5.7	56	12.6
515-225-1-400	244.5	400	423	4.15	933	10	9	220	8.66	50			4.2	41	9.3
513-225-2-400	244.5	400	985	9.66	2172	10	9	222	8.74	20	30	297	5.9	57	12.9
514-225-2-400	244.5	400	985	9.66	2172	10	9	220	8.66	39	30	346	6.6	65	14.6
515-225-2-400	244.5	400	985	9.66	2172	10	9	220	8.66	70			7.3	71	16.0
513-225-3-400	244.5	400	2125	20.8	4684	15	12	229	9.02	30	40	322	10.3	101	22.6
514-225-3-400	244.5	400	2125	20.8	4684	15	12	229	9.02	47	40	394	10.5	103	23.2
515-225-3-400	244.5	400	2125	20.8	4684	15	12	230	9.06	80			11.0	108	24.2
513-225-4-400	244.5	400	4293	42.1	9465	20	16	240	9.45	40	50	336	14.8	145	32.5
514-225-4-400	244.5	400	4293	42.1	9465	20	16	238	9.37	57	50	414	12.7	124	27.9
515-225-4-400	244.5	400	4293	42.1	9465	20	16	260	10.24	100			20.7	203	45.7
513-225-5-400	244.5	400	6324	62	13942	25	20	247	9.72	50	50	354	20.2	198	44.5
514-225-5-400	244.5	400	6324	62	13942	25	20	245	9.65	69	50	448	20.7	203	45.7
515-225-5-400	244.5	400	6324	62	13942	25	20	275	10.83	90			24.1	237	53.2
514-225-6-400	244.5	400	12754	125	28117	35	25	303	11.93	86	80	490	54.5	535	120.3
515-225-6-400	244.5	400	12754	125	28117	35	25	315	12.40	120			44.5	436	98.0
514-225-7-400	244.5	400	18132	178	39974	40	28	332	13.07	102	90	512	75.8	743	167.1
515-225-7-400	244.5	400	18132	178	39974	40	28	325	12.80	160			59.9	587	132.0
514-225-8-400	244.5	400	25524	250	56269	50	35	375	14.76	120	100	566	107.0	1049	235.9
515-225-8-400	244.5	400	25524	250	56269	50	35	370	14.57	140			81.6	800	179.9
513-225-1-490	244.5	490	423	4.15	933	10	9	222	8.74	20	20	290	4.8	47	10.6
514-225-1-490	244.5	490	423	4.15	933	10	9	220	8.66	36	20	336	5.7	56	12.6
515-225-1-490	244.5	490	423	4.15	933	10	9	220	8.66	50			4.2	41	9.3
513-225-2-490	244.5	490	985	9.66	2172	10	9	222	8.74	20	30	297	5.9	57	12.9
514-225-2-490	244.5	490	985	9.66	2172	10	9	220	8.66	39	30	346	6.7	65	14.7
515-225-2-490	244.5	490	985	9.66	2172	10	9	220	8.66	60			5.0	49	11.1
513-225-3-490	244.5	490	2125	20.8	4684	15	12	229	9.02	30	40	322	10.2	100	22.5
514-225-3-490	244.5	490	2125	20.8	4684	15	12	229	9.02	47	40	394	10.4	102	22.9
515-225-3-490	244.5	490	2125	20.8	4684	15	12	230	9.06	80			10.7	105	23.5
513-225-4-490	244.5	490	4293	42.1	9465	20	16	240	9.45	40	50	336	14.8	145	32.5
514-225-4-490	244.5	490	4293	42.1	9465	20	16	238	9.37	57	50	414	12.7	124	27.9
515-225-4-490	244.5	490	4293	42.1	9465	20	16	245	9.65	100			19.0	186	41.9
513-225-5-490	244.5	490	6324	62	13942	25	20	247	9.72	50	50	354	20.1	197	44.3
514-225-5-490	244.5	490	6324	62	13942	25	20	245	9.65	69	50	448	20.2	198	44.5
515-225-5-490	244.5	490	6324	62	13942	25	20	260	10.24	110			22.1	216	48.6
514-225-6-490	244.5	490	12754	125	28117	35	25	302	11.89	86	70	480	45.8	449	100.9
515-225-6-490	244.5	490	12754	125	28117	35	25	300	11.81	110			37.5	368	82.7
514-225-7-490	244.5	490	18132	178	39974	40	28	329	12.95	102	80	506	62.4	612	137.6
515-225-7-490	244.5	490	18132	178	39974	40	28	310	12.20	150			53.2	522	117.3
514-225-8-490	244.5	490	25524	250	56269	50	35	373	14.69	120	90	554	100.5	986	221.7
515-225-8-490	244.5	490	25524	250	56269	50	35	350	13.78	130			69.0	676	152.1



Type 513 Clamp



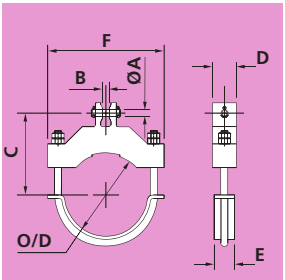
Type 514 Clamp



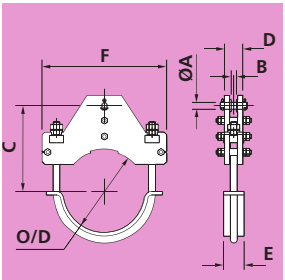
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-225-1-530	244.5	530	423	4.15	933	10	9	222	8.74	20	30	297	5.4	53	11.8
514-225-1-530	244.5	530	423	4.15	933	10	9	220	8.66	36	30	338	6.2	60	13.6
515-225-1-530	244.5	530	423	4.15	933	10	9	220	8.66	50			4.2	41	9.3
513-225-2-530	244.5	530	985	9.66	2172	10	9	222	8.74	25	30	308	7.5	74	16.6
514-225-2-530	244.5	530	985	9.66	2172	10	9	220	8.66	39	30	352	7.5	73	16.4
515-225-2-530	244.5	530	985	9.66	2172	10	9	220	8.66	70			7.0	69	15.5
513-225-3-530	244.5	530	2125	20.8	4684	15	12	229	9.02	40	50	336	13.9	136	30.5
514-225-3-530	244.5	530	2125	20.8	4684	15	12	229	9.02	47	50	398	12.3	121	27.1
515-225-3-530	244.5	530	2125	20.8	4684	15	12	230	9.06	80			10.7	105	23.5
513-225-4-530	244.5	530	4293	42.1	9465	20	16	240	9.45	50	50	354	19.2	189	42.4
514-225-4-530	244.5	530	4293	42.1	9465	20	16	238	9.37	57	50	422	16.4	161	36.1
515-225-4-530	244.5	530	4293	42.1	9465	20	16	245	9.65	100			19.0	186	41.9
513-225-5-530	244.5	530	6324	62	13942	25	20	247	9.72	60	70	375	26.1	256	57.5
514-225-5-530	244.5	530	6324	62	13942	25	20	262	10.31	69	70	454	26.8	263	59.0
515-225-5-530	244.5	530	6324	62	13942	25	20	270	10.63	90			23.1	227	50.9
514-225-6-530	244.5	530	12754	125	28117	35	25	312	12.28	86	80	490	56.2	551	124.0
515-225-6-530	244.5	530	12754	125	28117	35	25	300	11.81	120			40.8	400	89.9
514-225-7-530	244.5	530	18132	178	39974	40	28	341	13.43	102	90	512	77.7	762	171.4
515-225-7-530	244.5	530	18132	178	39974	40	28	325	12.80	120			58.5	573	128.9
514-225-8-530	244.5	530	25524	250	56269	50	35	380	14.96	120	100	566	108.4	1063	238.9
515-225-8-530	244.5	530	25524	250	56269	50	35	350	13.78	140			73.9	725	163.0
513-225-1-570	244.5	570	423	4.15	933	10	9	222	8.74	25	30	308	7.1	69	15.6
514-225-1-570	244.5	570	423	4.15	933	10	9	220	8.66	36	30	344	6.7	66	14.9
515-225-1-570	244.5	570	423	4.15	933	10	9	220	8.66	60			5.0	49	11.1
513-225-2-570	244.5	570	985	9.66	2172	10	9	222	8.74	30	40	322	10.0	98	22.0
514-225-2-570	244.5	570	985	9.66	2172	10	9	220	8.66	39	40	356	9.2	91	20.4
515-225-2-570	244.5	570	985	9.66	2172	10	9	220	8.66	80			10.1	99	22.2
513-225-3-570	244.5	570	2125	20.8	4684	15	12	229	9.02	50	50	354	18.4	180	40.5
514-225-3-570	244.5	570	2125	20.8	4684	15	12	233	9.17	51	50	406	16.1	157	35.4
515-225-3-570	244.5	570	2125	20.8	4684	15	12	230	9.06	100			17.8	175	39.3
513-225-4-570	244.5	570	4293	42.1	9465	20	16	240	9.45	60	70	375	25.5	250	56.2
514-225-4-570	244.5	570	4293	42.1	9465	20	16	259	10.20	63	70	428	25.3	249	55.9
515-225-4-570	244.5	570	4293	42.1	9465	20	16	250	9.84	90			21.5	211	47.5
513-225-5-570	244.5	570	6324	62	13942	25	20	247	9.72	70	80	400	34.1	334	75.2
514-225-5-570	244.5	570	6324	62	13942	25	20	286	11.26	79	80	464	42.3	414	93.2
515-225-5-570	244.5	570	6324	62	13942	25	20	280	11.02	100			31.3	307	69.1
514-225-6-570	244.5	570	12754	125	28117	35	25	327	12.87	96	90	496	75.4	739	166.1
515-225-6-570	244.5	570	12754	125	28117	35	25	315	12.40	120			55.7	546	122.9
514-225-7-570	244.5	570	18132	178	39974	40	28	363	14.29	102	100	524	95.3	935	210.2
515-225-7-570	244.5	570	18132	178	39974	40	28	325	12.80	130			63.1	619	139.1
514-225-8-570	244.5	570	25524	250	56269	50	35	402	15.83	120	120	574	137.9	1352	304.0
515-225-8-570	244.5	570	25524	250	56269	50	35	350	13.78	180			93.8	920	206.8

CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 10" / 250mm



Type 513 Clamp



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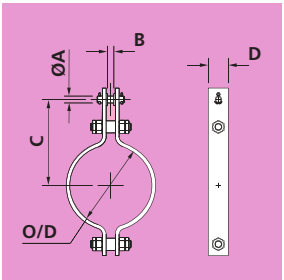
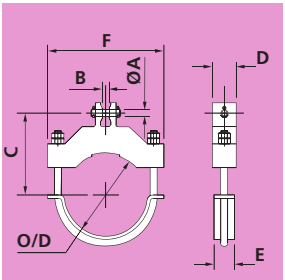


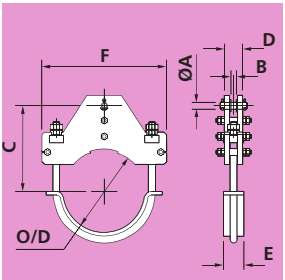
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-250-1-400	273	400	423	4.15	933	10	9	237	9.33	20	20	320	5.8	56	12.7
514-250-1-400	273	400	423	4.15	933	10	9	235	9.25	36	20	366	7.7	75	16.9
515-250-1-400	273	400	423	4.15	933	10	9	235	9.25	50			4.6	45	10.1
513-250-2-400	273	400	985	9.66	2172	10	9	237	9.33	20	30	327	6.9	67	15.1
514-250-2-400	273	400	985	9.66	2172	10	9	235	9.25	39	30	376	8.4	82	18.5
515-250-2-400	273	400	985	9.66	2172	10	9	235	9.25	70			7.9	77	17.4
513-250-3-400	273	400	2125	20.8	4684	15	12	244	9.61	30	40	352	12.0	118	26.4
514-250-3-400	273	400	2125	20.8	4684	15	12	244	9.61	47	40	424	11.9	116	26.1
515-250-3-400	273	400	2125	20.8	4684	15	12	240	9.45	80			11.8	115	25.9
513-250-4-400	273	400	4293	42.1	9465	20	16	255	10.04	40	50	366	17.2	168	37.8
514-250-4-400	273	400	4293	42.1	9465	20	16	253	9.96	57	50	444	13.1	128	28.8
515-250-4-400	273	400	4293	42.1	9465	20	16	275	10.83	100			22.2	217	48.8
513-250-5-400	273	400	6324	62	13942	25	20	263	10.35	50	50	384	23.2	228	51.2
514-250-5-400	273	400	6324	62	13942	25	20	260	10.24	69	50	478	21.8	214	48.2
515-250-5-400	273	400	6324	62	13942	25	20	295	11.61	90			26.1	256	57.5
514-250-6-400	273	400	12754	125	28117	35	25	313	12.32	86	80	520	49.2	483	108.5
515-250-6-400	273	400	12754	125	28117	35	25	330	12.99	120			47.0	461	103.6
514-250-7-400	273	400	18132	178	39974	40	28	344	13.54	102	90	542	77.4	759	170.7
515-250-7-400	273	400	18132	178	39974	40	28	360	14.17	120			67.4	661	148.6
514-250-8-400	273	400	25524	250	56269	50	35	386	15.20	120	100	596	122.7	1203	270.4
515-250-8-400	273	400	25524	250	56269	50	35	390	15.35	140			86.4	847	190.4
514-250-9-400	273	400	55135	541	121552	70	49	537	21.14	148	130	660	258.0	2530	568.7
513-250-1-490	273	490	423	4.15	933	10	9	237	9.33	20	20	320	5.8	56	12.7
514-250-1-490	273	490	423	4.15	933	10	9	235	9.25	36	20	366	7.7	75	16.9
515-250-1-490	273	490	423	4.15	933	10	9	235	9.25	50			4.6	45	10.1
513-250-2-490	273	490	985	9.66	2172	10	9	237	9.33	20	30	327	6.9	67	15.1
514-250-2-490	273	490	985	9.66	2172	10	9	235	9.25	39	30	376	8.4	83	18.6
515-250-2-490	273	490	985	9.66	2172	10	9	235	9.25	70			7.7	75	16.9
513-250-3-490	273	490	2125	20.8	4684	15	12	244	9.61	30	40	352	11.9	117	26.3
514-250-3-490	273	490	2125	20.8	4684	15	12	244	9.61	47	40	424	11.9	116	26.2
515-250-3-490	273	490	2125	20.8	4684	15	12	240	9.45	80			11.4	112	25.2
513-250-4-490	273	490	4293	42.1	9465	20	16	255	10.04	40	50	366	17.2	168	37.8
514-250-4-490	273	490	4293	42.1	9465	20	16	253	9.96	57	50	444	13.2	129	29.0
515-250-4-490	273	490	4293	42.1	9465	20	16	270	10.63	100			21.2	208	46.8
513-250-5-490	273	490	6324	62	13942	25	20	262	10.31	50	50	384	23.2	227	51.1
514-250-5-490	273	490	6324	62	13942	25	20	260	10.24	69	50	478	21.4	210	47.1
515-250-5-490	273	490	6324	62	13942	25	20	295	11.61	90			26.1	256	57.5
514-250-6-490	273	490	12754	125	28117	35	25	312	12.28	86	70	510	44.2	433	97.4
515-250-6-490	273	490	12754	125	28117	35	25	320	12.60	120			44.9	441	99.0
514-250-7-490	273	490	18132	178	39974	40	28	340	13.39	102	80	536	71.2	699	157.0
515-250-7-490	273	490	18132	178	39974	40	28	330	12.99	160			60.6	595	133.7
514-250-8-490	273	490	25524	250	56269	50	35	384	15.12	120	90	584	110.8	1087	244.3
515-250-8-490	273	490	25524	250	56269	50	35	370	14.57	130			73.4	720	161.8
514-250-9-490	273	490	55135	541	121552	70	49	528	20.79	148	130	660	254.4	2495	560.8

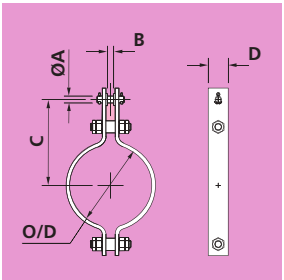
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 10" / 250mm



Type 513 Clamp



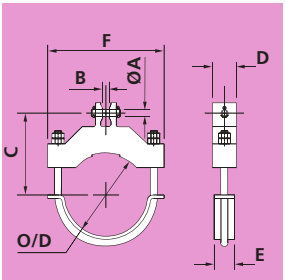
Type 514 Clamp



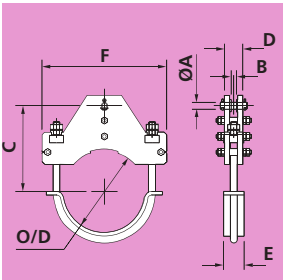
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-250-1-530	273	530	423	4.15	933	10	9	237	9.33	20	30	327	6.3	62	14.0
514-250-1-530	273	530	423	4.15	933	10	9	235	9.25	36	30	368	8.2	80	18.0
515-250-1-530	273	530	423	4.15	933	10	9	235	9.25	50			4.6	45	10.1
513-250-2-530	273	530	985	9.66	2172	10	9	237	9.33	25	30	338	8.8	86	19.4
514-250-2-530	273	530	985	9.66	2172	10	9	235	9.25	39	30	382	9.2	90	20.3
515-250-2-530	273	530	985	9.66	2172	10	9	235	9.25	70			7.7	75	16.9
513-250-3-530	273	530	2125	20.8	4684	15	12	244	9.61	40	50	366	16.1	158	35.6
514-250-3-530	273	530	2125	20.8	4684	15	12	244	9.61	47	50	428	12.8	126	28.3
515-250-3-530	273	530	2125	20.8	4684	15	12	240	9.45	100			14.3	140	31.4
513-250-4-530	273	530	4293	42.1	9465	20	16	255	10.04	50	50	384	22.2	218	49.0
514-250-4-530	273	530	4293	42.1	9465	20	16	253	9.96	57	50	452	17.7	173	39.0
515-250-4-530	273	530	4293	42.1	9465	20	16	270	10.63	110			23.3	228	51.4
513-250-5-530	273	530	6324	62	13942	25	20	262	10.31	60	70	405	29.8	292	65.6
514-250-5-530	273	530	6324	62	13942	25	20	277	10.91	69	70	484	27.9	273	61.4
515-250-5-530	273	530	6324	62	13942	25	20	285	11.22	90			24.7	242	54.5
514-250-6-530	273	530	12754	125	28117	35	25	322	12.68	86	80	520	51.3	503	113.2
515-250-6-530	273	530	12754	125	28117	35	25	320	12.60	140			52.1	511	114.8
514-250-7-530	273	530	18132	178	39974	40	28	351	13.82	102	90	542	79.2	776	174.5
515-250-7-530	273	530	18132	178	39974	40	28	345	13.58	120			62.5	612	137.7
514-250-8-530	273	530	25524	250	56269	50	35	390	15.35	120	100	596	124.4	1220	274.2
515-250-8-530	273	530	25524	250	56269	50	35	370	14.57	150			84.0	824	185.2
514-250-9-530	273	530	55135	541	121552	70	49	533	20.98	148	130	660	256.7	2518	566.0
513-250-1-570	273	570	423	4.15	933	10	9	237	9.33	25	30	338	8.3	82	18.4
514-250-1-570	273	570	423	4.15	933	10	9	235	9.25	36	30	374	8.8	86	19.4
515-250-1-570	273	570	423	4.15	933	10	9	235	9.25	60			5.5	54	12.1
513-250-2-570	273	570	985	9.66	2172	10	9	237	9.33	30	40	352	11.5	113	25.3
514-250-2-570	273	570	985	9.66	2172	10	9	235	9.25	39	40	386	10.0	98	22.0
515-250-2-570	273	570	985	9.66	2172	10	9	235	9.25	80			10.9	107	24.1
513-250-3-570	273	570	2125	20.8	4684	15	12	244	9.61	50	50	384	21.2	208	46.7
514-250-3-570	273	570	2125	20.8	4684	15	12	248	9.76	51	50	436	16.2	158	35.6
515-250-3-570	273	570	2125	20.8	4684	15	12	245	9.65	100			19.3	189	42.5
513-250-4-570	273	570	4293	42.1	9465	20	16	255	10.04	60	70	405	29.1	286	64.2
514-250-4-570	273	570	4293	42.1	9465	20	16	274	10.79	63	70	458	26.7	262	58.8
515-250-4-570	273	570	4293	42.1	9465	20	16	270	10.63	90			23.5	230	51.8
513-250-5-570	273	570	6324	62	13942	25	20	264	10.39	70	80	430	38.7	380	85.4
514-250-5-570	273	570	6324	62	13942	25	20	301	11.85	79	80	494	47.6	467	105.0
515-250-5-570	273	570	6324	62	13942	25	20	295	11.61	100			33.5	328	73.8
514-250-6-570	273	570	12754	125	28117	35	25	342	13.46	96	90	526	71.5	701	157.6
515-250-6-570	273	570	12754	125	28117	35	25	335	13.19	120			61.0	598	134.5
514-250-7-570	273	570	18132	178	39974	40	28	373	14.69	102	100	554	89.8	881	198.0
515-250-7-570	273	570	18132	178	39974	40	28	345	13.58	140			72.4	710	159.7
514-250-8-570	273	570	25524	250	56269	50	35	412	16.22	120	120	604	143.9	1411	317.2
515-250-8-570	273	570	25524	250	56269	50	35	370	14.57	200			110.5	1084	243.7
514-250-9-570	273	570	55135	541	121552	70	49	532	20.94	158	130	660	276.6	2713	609.9

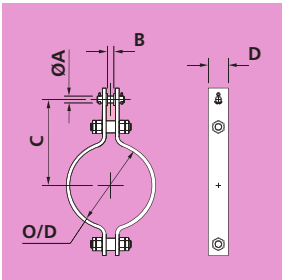
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 12" / 300mm



Type 513 Clamp



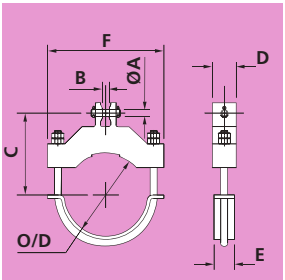
Type 514 Clamp



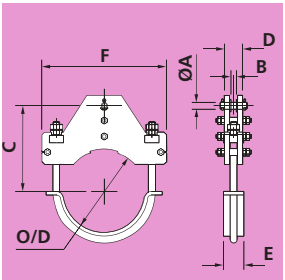
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-300-1-400	323.9	400	423	4.15	933	10	9	263	10.35	20	20	372	7.4	73	16.4
514-300-1-400	323.9	400	423	4.15	933	10	9	262	10.31	36	20	418	9.9	97	21.7
515-300-1-400	323.9	400	423	4.15	933	10	9	260	10.24	50			5.2	51	11.5
513-300-2-400	323.9	400	985	9.66	2172	10	9	263	10.35	20	30	379	8.7	86	19.3
514-300-2-400	323.9	400	985	9.66	2172	10	9	262	10.31	39	30	428	10.3	101	22.8
515-300-2-400	323.9	400	985	9.66	2172	10	9	260	10.24	70			8.9	87	19.6
513-300-3-400	323.9	400	2125	20.8	4684	15	12	270	10.63	30	40	404	15.1	148	33.3
514-300-3-400	323.9	400	2125	20.8	4684	15	12	269	10.59	47	40	476	11.9	116	26.2
515-300-3-400	323.9	400	2125	20.8	4684	15	12	275	10.83	100			17.1	168	37.7
513-300-4-400	323.9	400	4293	42.1	9465	20	16	284	11.18	40	50	418	21.8	213	48.0
514-300-4-400	323.9	400	4293	42.1	9465	20	16	279	10.98	57	50	496	13.9	137	30.7
515-300-4-400	323.9	400	4293	42.1	9465	20	16	300	11.81	100			24.6	241	54.2
513-300-5-400	323.9	400	6324	62	13942	25	20	296	11.65	50	50	436	29.4	288	64.8
514-300-5-400	323.9	400	6324	62	13942	25	20	287	11.30	63	50	530	28.7	282	63.3
515-300-5-400	323.9	400	6324	62	13942	25	20	325	12.80	100			33.1	325	73.0
514-300-6-400	323.9	400	12754	125	28117	35	25	333	13.11	86	80	572	53.6	525	118.1
515-300-6-400	323.9	400	12754	125	28117	35	25	360	14.17	140			60.0	589	132.4
514-300-7-400	323.9	400	18132	178	39974	40	28	371	14.61	102	90	594	86.6	850	191.0
515-300-7-400	323.9	400	18132	178	39974	40	28	390	15.35	120			73.8	724	162.8
514-300-8-400	323.9	400	25524	250	56269	50	35	402	15.83	120	100	648	133.0	1304	293.2
515-300-8-400	323.9	400	25524	250	56269	50	35	415	16.34	160			105.1	1031	231.8
514-300-9-400	323.9	400	55135	541	121552	70	49	555	21.85	148	130	712	287.2	2816	633.1
514-300-10-400	323.9	400	70330	690	155050	80	55	611	24.06	166	150	746	371.1	3639	818.1
513-300-1-490	323.9	490	423	4.15	933	10	9	263	10.35	20	20	372	7.4	73	16.4
514-300-1-490	323.9	490	423	4.15	933	10	9	262	10.31	36	20	418	9.9	97	21.8
515-300-1-490	323.9	490	423	4.15	933	10	9	260	10.24	50			5.2	51	11.5
513-300-2-490	323.9	490	985	9.66	2172	10	9	263	10.35	20	30	379	8.7	86	19.3
514-300-2-490	323.9	490	985	9.66	2172	10	9	262	10.31	39	30	428	10.4	102	22.8
515-300-2-490	323.9	490	985	9.66	2172	10	9	260	10.24	70			8.9	87	19.6
513-300-3-490	323.9	490	2125	20.8	4684	15	12	270	10.63	30	40	404	15.1	148	33.3
514-300-3-490	323.9	490	2125	20.8	4684	15	12	269	10.59	47	40	476	12.2	120	26.9
515-300-3-490	323.9	490	2125	20.8	4684	15	12	265	10.43	80			13.0	128	28.7
513-300-4-490	323.9	490	4293	42.1	9465	20	16	283	11.14	40	50	418	21.6	212	47.7
514-300-4-490	323.9	490	4293	42.1	9465	20	16	279	10.98	57	50	496	14.2	139	31.3
515-300-4-490	323.9	490	4293	42.1	9465	20	16	295	11.61	100			23.7	232	52.2
513-300-5-490	323.9	490	6324	62	13942	25	20	295	11.61	50	50	436	29.2	286	64.4
514-300-5-490	323.9	490	6324	62	13942	25	20	285	11.22	63	50	530	28.6	280	63.0
515-300-5-490	323.9	490	6324	62	13942	25	20	320	12.60	100			31.9	313	70.3
514-300-6-490	323.9	490	12754	125	28117	35	25	326	12.83	86	70	562	44.2	433	97.4
515-300-6-490	323.9	490	12754	125	28117	35	25	350	13.78	140			57.7	566	127.3
514-300-7-490	323.9	490	18132	178	39974	40	28	354	13.94	102	80	588	68.1	668	150.2
515-300-7-490	323.9	490	18132	178	39974	40	28	385	15.16	120			71.4	701	157.5
514-300-8-490	323.9	490	25524	250	56269	50	35	401	15.79	120	90	636	110.1	1080	242.8
515-300-8-490	323.9	490	25524	250	56269	50	35	400	15.75	150			91.9	902	202.7
514-300-9-490	323.9	490	55135	541	121552	70	49	546	21.50	148	130	712	283.7	2782	625.5
514-300-10-490	323.9	490	70330	690	155050	80	55	602	23.70	166	150	746	367.0	3599	809.0

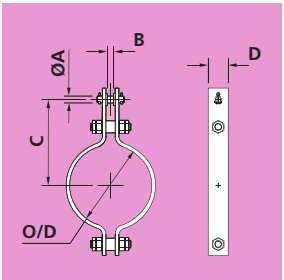
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 12" / 300mm



Type 513 Clamp



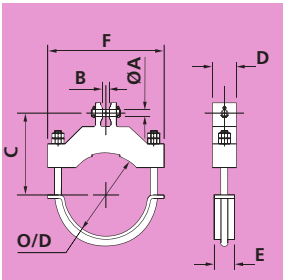
Type 514 Clamp



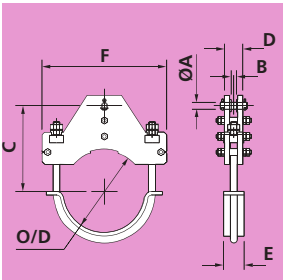
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-300-1-530	323.9	530	423	4.15	933	10	9	263	10.35	20	30	379	8.1	79	17.9
514-300-1-530	323.9	530	423	4.15	933	10	9	262	10.31	36	30	420	10.4	102	23.0
515-300-1-530	323.9	530	423	4.15	933	10	9	260	10.24	50			5.2	51	11.5
513-300-2-530	323.9	530	985	9.66	2172	10	9	263	10.35	25	30	390	11.2	110	24.7
514-300-2-530	323.9	530	985	9.66	2172	10	9	262	10.31	39	30	434	10.5	103	23.2
515-300-2-530	323.9	530	985	9.66	2172	10	9	260	10.24	70			8.9	87	19.6
513-300-3-530	323.9	530	2125	20.8	4684	15	12	270	10.63	40	50	418	20.3	199	44.7
514-300-3-530	323.9	530	2125	20.8	4684	15	12	269	10.59	47	50	480	12.6	124	27.8
515-300-3-530	323.9	530	2125	20.8	4684	15	12	265	10.43	100			16.2	159	35.8
513-300-4-530	323.9	530	4293	42.1	9465	20	16	281	11.06	50	50	436	27.8	272	61.2
514-300-4-530	323.9	530	4293	42.1	9465	20	16	280	11.02	57	50	504	18.0	177	39.8
515-300-4-530	323.9	530	4293	42.1	9465	20	16	305	12.01	90			27.1	266	59.7
513-300-5-530	323.9	530	6324	62	13942	25	20	293	11.54	60	70	457	37.1	363	81.7
514-300-5-530	323.9	530	6324	62	13942	25	20	304	11.97	69	70	536	30.1	295	66.3
515-300-5-530	323.9	530	6324	62	13942	25	20	320	12.60	110			35.0	343	77.1
514-300-6-530	323.9	530	12754	125	28117	35	25	336	13.23	86	80	572	54.0	530	119.1
515-300-6-530	323.9	530	12754	125	28117	35	25	350	13.78	160			65.7	644	144.8
514-300-7-530	323.9	530	18132	178	39974	40	28	371	14.61	102	90	594	86.2	845	190.0
515-300-7-530	323.9	530	18132	178	39974	40	28	375	14.76	120			68.9	675	151.8
514-300-8-530	323.9	530	25524	250	56269	50	35	406	15.98	120	100	648	134.8	1322	297.2
515-300-8-530	323.9	530	25524	250	56269	50	35	400	15.75	170			103.6	1016	228.4
514-300-9-530	323.9	530	55135	541	121552	70	49	552	21.73	148	130	712	286.2	2807	631.0
514-300-10-530	323.9	530	70330	690	155050	80	55	603	23.74	166	150	746	367.5	3604	810.2
513-300-1-570	323.9	570	423	4.15	933	10	9	263	10.35	25	30	390	10.6	104	23.3
514-300-1-570	323.9	570	423	4.15	933	10	9	262	10.31	36	30	426	11.1	109	24.5
515-300-1-570	323.9	570	423	4.15	933	10	9	260	10.24	70			8.7	85	19.2
513-300-2-570	323.9	570	985	9.66	2172	10	9	263	10.35	30	40	404	14.4	142	31.8
514-300-2-570	323.9	570	985	9.66	2172	10	9	262	10.31	39	40	438	9.6	94	21.2
515-300-2-570	323.9	570	985	9.66	2172	10	9	260	10.24	80			12.5	123	27.6
513-300-3-570	323.9	570	2125	20.8	4684	15	12	270	10.63	50	50	436	26.6	261	58.7
514-300-3-570	323.9	570	2125	20.8	4684	15	12	275	10.83	51	50	488	16.4	161	36.2
515-300-3-570	323.9	570	2125	20.8	4684	15	12	275	10.83	100			22.0	216	48.6
513-300-4-570	323.9	570	4293	42.1	9465	20	16	282	11.10	60	70	457	35.9	352	79.2
514-300-4-570	323.9	570	4293	42.1	9465	20	16	301	11.85	63	70	510	29.2	286	64.3
515-300-4-570	323.9	570	4293	42.1	9465	20	16	305	12.01	110			33.0	324	72.8
513-300-5-570	323.9	570	6324	62	13942	25	20	296	11.65	70	80	482	47.5	466	104.7
514-300-5-570	323.9	570	6324	62	13942	25	20	328	12.91	79	80	546	54.0	529	119.0
515-300-5-570	323.9	570	6324	62	13942	25	20	325	12.80	100			37.5	368	82.7
514-300-6-570	323.9	570	12754	125	28117	35	25	369	14.53	86	90	578	71.5	701	157.6
515-300-6-570	323.9	570	12754	125	28117	35	25	365	14.37	120			67.4	661	148.7
514-300-7-570	323.9	570	18132	178	39974	40	28	389	15.31	102	100	606	98.6	967	217.5
515-300-7-570	323.9	570	18132	178	39974	40	28	375	14.76	160			91.0	892	200.6
514-300-8-570	323.9	570	25524	250	56269	50	35	430	16.93	120	120	656	163.8	1607	361.2
515-300-8-570	323.9	570	25524	250	56269	50	35	400	15.75	220			132.8	1302	292.7
514-300-9-570	323.9	570	55135	541	121552	70	49	548	21.57	158	130	712	308.0	3020	679.0
514-300-10-570	323.9	570	70330	690	155050	80	55	600	23.62	176	150	746	390.4	3829	860.8

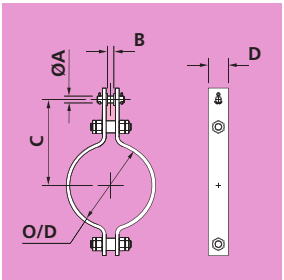
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 14" / 350mm



Type 513 Clamp



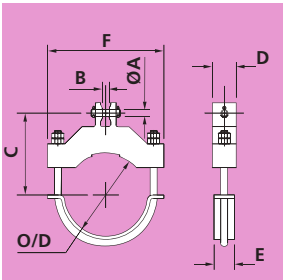
Type 514 Clamp



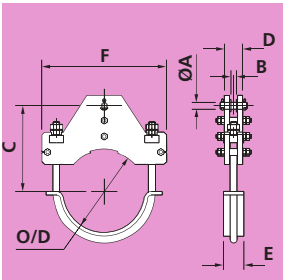
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-350-1-400	355.6	400	423	4.15	933	10	9	279	10.98	20	20	404	8.7	85	19.2
514-350-1-400	355.6	400	423	4.15	933	10	9	278	10.94	36	20	450	10.1	99	22.2
515-350-1-400	355.6	400	423	4.15	933	10	9	275	10.83	50			5.6	55	12.4
513-350-2-400	355.6	400	985	9.66	2172	10	9	279	10.98	20	30	411	10.1	99	22.2
514-350-2-400	355.6	400	985	9.66	2172	10	9	278	10.94	39	30	460	10.0	98	22.1
515-350-2-400	355.6	400	985	9.66	2172	10	9	275	10.83	70			9.6	94	21.2
513-350-3-400	355.6	400	2125	20.8	4684	15	12	286	11.26	30	40	436	17.2	169	37.9
514-350-3-400	355.6	400	2125	20.8	4684	15	12	285	11.22	47	40	508	10.8	106	23.9
515-350-3-400	355.6	400	2125	20.8	4684	15	12	290	11.42	100			18.2	179	40.2
513-350-4-400	355.6	400	4293	42.1	9465	20	16	303	11.93	40	50	450	25.0	245	55.1
514-350-4-400	355.6	400	4293	42.1	9465	20	16	295	11.61	57	50	528	14.5	142	31.9
515-350-4-400	355.6	400	4293	42.1	9465	20	16	320	12.60	110			29.0	284	63.8
513-350-5-400	355.6	400	6324	62	13942	25	20	316	12.44	50	50	468	33.5	329	73.9
514-350-5-400	355.6	400	6324	62	13942	25	20	301	11.85	63	50	562	30.2	296	66.6
515-350-5-400	355.6	400	6324	62	13942	25	20	345	13.58	110			38.7	380	85.4
514-350-6-400	355.6	400	12754	125	28117	35	25	349	13.74	86	80	604	54.7	537	120.7
515-350-6-400	355.6	400	12754	125	28117	35	25	375	14.76	150			67.5	662	148.7
514-350-7-400	355.6	400	18132	178	39974	40	28	387	15.24	102	90	626	91.9	901	202.6
515-350-7-400	355.6	400	18132	178	39974	40	28	410	16.14	120			78.1	765	172.1
514-350-8-400	355.6	400	25524	250	56269	50	35	413	16.26	120	100	680	126.3	1239	278.5
515-350-8-400	355.6	400	25524	250	56269	50	35	435	17.13	180			123.7	1213	272.8
514-350-9-400	355.6	400	55135	541	121552	70	49	566	22.28	148	130	744	277.5	2722	611.9
514-350-10-400	355.6	400	70330	690	155050	80	55	623	24.53	166	150	778	385.1	3776	848.9
514-350-11-400	355.6	400	90785	890	200144	90	60	641	25.24	214	190	856	563.3	5524	1241.8
513-350-1-490	355.6	490	423	4.15	933	10	9	279	10.98	20	20	404	8.7	85	19.2
514-350-1-490	355.6	490	423	4.15	933	10	9	278	10.94	36	20	450	10.1	99	22.2
515-350-1-490	355.6	490	423	4.15	933	10	9	275	10.83	50			5.6	55	12.4
513-350-2-490	355.6	490	985	9.66	2172	10	9	279	10.98	20	30	411	10.0	98	22.0
514-350-2-490	355.6	490	985	9.66	2172	10	9	278	10.94	39	30	460	10.1	99	22.2
515-350-2-490	355.6	490	985	9.66	2172	10	9	275	10.83	70			9.6	94	21.2
513-350-3-490	355.6	490	2125	20.8	4684	15	12	286	11.26	30	40	436	17.2	169	37.9
514-350-3-490	355.6	490	2125	20.8	4684	15	12	285	11.22	47	40	508	10.8	106	23.9
515-350-3-490	355.6	490	2125	20.8	4684	15	12	285	11.22	100			17.8	175	39.3
513-350-4-490	355.6	490	4293	42.1	9465	20	16	302	11.89	40	50	450	24.8	243	54.7
514-350-4-490	355.6	490	4293	42.1	9465	20	16	295	11.61	57	50	528	14.5	142	31.9
515-350-4-490	355.6	490	4293	42.1	9465	20	16	310	12.20	100			25.2	247	55.5
513-350-5-490	355.6	490	6324	62	13942	25	20	315	12.40	50	50	468	33.3	327	73.5
514-350-5-490	355.6	490	6324	62	13942	25	20	301	11.85	63	50	562	31.3	307	69.1
515-350-5-490	355.6	490	6324	62	13942	25	20	335	13.19	100			33.7	331	74.4
514-350-6-490	355.6	490	12754	125	28117	35	25	335	13.19	86	70	594	51.2	502	112.8
515-350-6-490	355.6	490	12754	125	28117	35	25	365	14.37	140			60.8	597	134.1
514-350-7-490	355.6	490	18132	178	39974	40	28	363	14.29	102	80	620	68.4	671	150.9
515-350-7-490	355.6	490	18132	178	39974	40	28	405	15.94	120			75.7	742	166.8
514-350-8-490	355.6	490	25524	250	56269	50	35	410	16.14	120	90	668	127.5	1251	281.2
515-350-8-490	355.6	490	25524	250	56269	50	35	415	16.34	160			102.4	1004	225.7
514-350-9-490	355.6	490	55135	541	121552	70	49	557	21.93	148	130	744	273.2	2679	602.2
514-350-10-490	355.6	490	70330	690	155050	80	55	613	24.13	166	150	778	379.8	3725	837.3
514-350-11-490	355.6	490	90785	890	200144	90	60	634	24.96	214	170	846	526.7	5165	1161.2

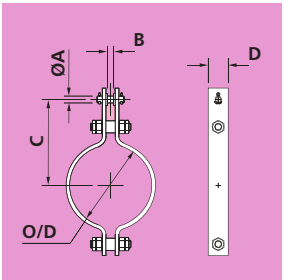
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 14" / 350mm



Type 513 Clamp



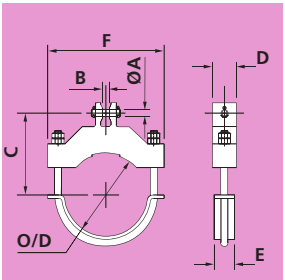
Type 514 Clamp



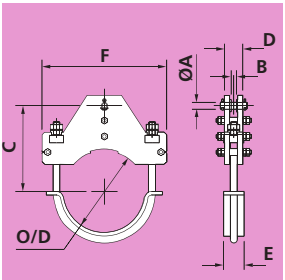
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-350-1-530	355.6	530	423	4.15	933	10	9	279	10.98	20	30	411	9.4	92	20.7
514-350-1-530	355.6	530	423	4.15	933	10	9	278	10.94	36	30	452	10.7	105	23.5
515-350-1-530	355.6	530	423	4.15	933	10	9	275	10.83	50			5.6	55	12.4
513-350-2-530	355.6	530	985	9.66	2172	10	9	279	10.98	25	30	422	12.8	125	28.2
514-350-2-530	355.6	530	985	9.66	2172	10	9	278	10.94	39	30	466	9.3	92	20.6
515-350-2-530	355.6	530	985	9.66	2172	10	9	275	10.83	80			11.0	107	24.2
513-350-3-530	355.6	530	2125	20.8	4684	15	12	286	11.26	40	50	450	23.1	226	50.9
514-350-3-530	355.6	530	2125	20.8	4684	15	12	285	11.22	47	50	512	11.9	116	26.2
515-350-3-530	355.6	530	2125	20.8	4684	15	12	295	11.61	100			24.1	237	53.2
513-350-4-530	355.6	530	4293	42.1	9465	20	16	299	11.77	50	50	468	31.7	311	69.8
514-350-4-530	355.6	530	4293	42.1	9465	20	16	296	11.65	57	50	536	20.4	200	45.0
515-350-4-530	355.6	530	4293	42.1	9465	20	16	320	12.60	90			28.8	282	63.4
513-350-5-530	355.6	530	6324	62	13942	25	20	312	12.28	60	70	489	42.1	413	92.8
514-350-5-530	355.6	530	6324	62	13942	25	20	320	12.60	69	70	568	30.8	302	67.8
515-350-5-530	355.6	530	6324	62	13942	25	20	335	13.19	120			40.3	395	88.8
514-350-6-530	355.6	530	12754	125	28117	35	25	349	13.74	86	80	604	58.6	575	129.2
515-350-6-530	355.6	530	12754	125	28117	35	25	385	15.16	120			71.7	703	158.0
514-350-7-530	355.6	530	18132	178	39974	40	28	387	15.24	102	90	626	86.7	850	191.0
515-350-7-530	355.6	530	18132	178	39974	40	28	405	15.94	130			81.7	801	180.1
514-350-8-530	355.6	530	25524	250	56269	50	35	417	16.42	120	100	680	128.2	1257	282.6
515-350-8-530	355.6	530	25524	250	56269	50	35	415	16.34	180			114.6	1124	252.7
514-350-9-530	355.6	530	55135	541	121552	70	49	562	22.13	148	130	744	275.8	2704	608.0
514-350-10-530	355.6	530	70330	690	155050	80	55	616	24.25	166	150	778	381.8	3744	841.8
514-350-11-530	355.6	530	90785	890	200144	90	60	634	24.96	214	170	846	526.7	5165	1161.2
513-350-1-570	355.6	570	423	4.15	933	10	9	279	10.98	25	30	422	12.2	120	27.0
514-350-1-570	355.6	570	423	4.15	933	10	9	278	10.94	36	30	458	11.4	112	25.2
515-350-1-570	355.6	570	423	4.15	933	10	9	275	10.83	70			9.4	92	20.7
513-350-2-570	355.6	570	985	9.66	2172	10	9	279	10.98	30	40	436	16.4	161	36.2
514-350-2-570	355.6	570	985	9.66	2172	10	9	278	10.94	39	40	470	8.6	85	19.0
515-350-2-570	355.6	570	985	9.66	2172	10	9	275	10.83	80			13.7	134	30.2
513-350-3-570	355.6	570	2125	20.8	4684	15	12	286	11.26	50	50	468	30.2	296	66.5
514-350-3-570	355.6	570	2125	20.8	4684	15	12	291	11.46	51	50	520	16.3	160	35.9
515-350-3-570	355.6	570	2125	20.8	4684	15	12	290	11.42	100			23.5	231	51.8
513-350-4-570	355.6	570	4293	42.1	9465	20	16	301	11.85	60	70	489	40.9	401	90.1
514-350-4-570	355.6	570	4293	42.1	9465	20	16	317	12.48	63	70	542	28.9	283	63.6
515-350-4-570	355.6	570	4293	42.1	9465	20	16	320	12.60	110			35.0	344	77.2
513-350-5-570	355.6	570	6324	62	13942	25	20	315	12.40	70	80	514	53.5	525	118.0
514-350-5-570	355.6	570	6324	62	13942	25	20	344	13.54	79	80	578	58.5	574	129.0
515-350-5-570	355.6	570	6324	62	13942	25	20	345	13.58	110			45.0	441	99.1
514-350-6-570	355.6	570	12754	125	28117	35	25	385	15.16	86	90	610	73.0	716	160.9
515-350-6-570	355.6	570	12754	125	28117	35	25	385	15.16	120			71.7	703	158.0
514-350-7-570	355.6	570	18132	178	39974	40	28	398	15.67	102	100	638	99.2	973	218.7
515-350-7-570	355.6	570	18132	178	39974	40	28	405	15.94	170			105.8	1038	233.3
514-350-8-570	355.6	570	25524	250	56269	50	35	440	17.32	120	120	688	149.8	1469	330.2
515-350-8-570	355.6	570	25524	250	56269	50	35	435	17.13	180			147.0	1442	324.1
514-350-9-570	355.6	570	55135	541	121552	70	49	587	23.11	148	130	744	289.0	2834	637.1
514-350-10-570	355.6	570	70330	690	155050	80	55	611	24.06	176	150	778	405.6	3978	894.2
514-350-11-570	355.6	570	90785	890	200144	90	60	649	25.55	214	170	846	539.8	5294	1190.1

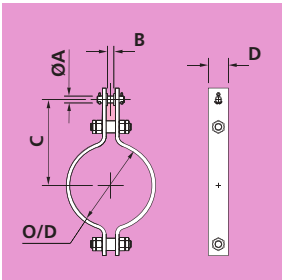
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 16" / 400mm



Type 513 Clamp



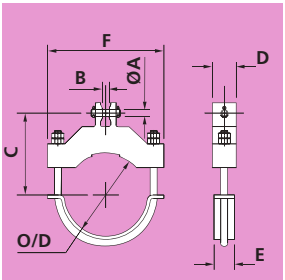
Type 514 Clamp



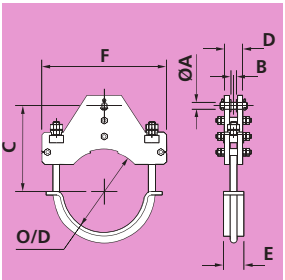
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-400-1-400	406.4	400	423	4.15	933	10	9	304	11.97	20	20	454	10.7	104	23.5
514-400-1-400	406.4	400	423	4.15	933	10	9	303	11.93	36	20	500	9.1	89	20.0
515-400-1-400	406.4	400	423	4.15	933	10	9	300	11.81	50			6.2	61	13.7
513-400-2-400	406.4	400	985	9.66	2172	10	9	304	11.97	20	30	461	12.2	119	26.8
514-400-2-400	406.4	400	985	9.66	2172	10	9	303	11.93	39	30	510	8.0	79	17.7
515-400-2-400	406.4	400	985	9.66	2172	10	9	300	11.81	70			10.6	104	23.5
513-400-3-400	406.4	400	2125	20.8	4684	15	12	311	12.24	30	40	486	20.6	202	45.5
514-400-3-400	406.4	400	2125	20.8	4684	15	12	310	12.20	47	40	558	10.1	99	22.4
515-400-3-400	406.4	400	2125	20.8	4684	15	12	315	12.40	100			20.1	197	44.3
513-400-4-400	406.4	400	4293	42.1	9465	20	16	333	13.11	40	50	500	30.3	297	66.9
514-400-4-400	406.4	400	4293	42.1	9465	20	16	320	12.60	57	50	578	16.3	160	35.9
515-400-4-400	406.4	400	4293	42.1	9465	20	16	355	13.98	90			32.8	322	72.4
513-400-5-400	406.4	400	6324	62	13942	25	20	347	13.66	50	50	518	40.5	397	89.3
514-400-5-400	406.4	400	6324	62	13942	25	20	326	12.83	63	50	612	35.6	349	78.4
515-400-5-400	406.4	400	6324	62	13942	25	20	370	14.57	120			45.7	448	100.8
514-400-6-400	406.4	400	12754	125	28117	35	25	374	14.72	86	80	654	57.9	567	127.5
515-400-6-400	406.4	400	12754	125	28117	35	25	430	16.93	120			82.9	813	182.9
514-400-7-400	406.4	400	18132	178	39974	40	28	412	16.22	102	90	676	96.0	941	211.6
515-400-7-400	406.4	400	18132	178	39974	40	28	435	17.13	140			97.0	951	213.8
514-400-8-400	406.4	400	25524	250	56269	50	35	427	16.81	120	100	730	127.9	1254	282.0
515-400-8-400	406.4	400	25524	250	56269	50	35	465	18.31	200			147.4	1445	324.9
514-400-9-400	406.4	400	55135	541	121552	70	49	582	22.91	148	130	794	318.3	3122	701.8
514-400-10-400	406.4	400	70330	690	155050	80	55	639	25.16	166	150	828	399.6	3919	881.0
514-400-11-400	406.4	400	90785	890	200144	90	60	659	25.94	214	190	906	646.4	6339	1425.1
513-400-1-490	406.4	490	423	4.15	933	10	9	304	11.97	20	20	454	10.7	104	23.5
514-400-1-490	406.4	490	423	4.15	933	10	9	303	11.93	36	20	500	9.1	89	20.1
515-400-1-490	406.4	490	423	4.15	933	10	9	300	11.81	50			6.2	61	13.7
513-400-2-490	406.4	490	985	9.66	2172	10	9	304	11.97	20	30	461	12.2	119	26.8
514-400-2-490	406.4	490	985	9.66	2172	10	9	303	11.93	39	30	510	8.0	79	17.7
515-400-2-490	406.4	490	985	9.66	2172	10	9	300	11.81	70			10.6	104	23.5
513-400-3-490	406.4	490	2125	20.8	4684	15	12	311	12.24	30	40	486	20.5	201	45.2
514-400-3-490	406.4	490	2125	20.8	4684	15	12	310	12.20	47	40	558	10.2	100	22.4
515-400-3-490	406.4	490	2125	20.8	4684	15	12	310	12.20	100			19.7	193	43.4
513-400-4-490	406.4	490	4293	42.1	9465	20	16	332	13.07	40	50	500	30.2	296	66.5
514-400-4-490	406.4	490	4293	42.1	9465	20	16	320	12.60	57	50	578	15.9	156	35.1
515-400-4-490	406.4	490	4293	42.1	9465	20	16	350	13.78	90			31.8	312	70.2
513-400-5-490	406.4	490	6324	62	13942	25	20	345	13.58	50	50	518	40.3	396	89.0
514-400-5-490	406.4	490	6324	62	13942	25	20	326	12.83	63	50	612	35.9	352	79.1
515-400-5-490	406.4	490	6324	62	13942	25	20	365	14.37	110			40.7	399	89.8
514-400-6-490	406.4	490	12754	125	28117	35	25	350	13.78	86	70	644	64.4	632	142.0
515-400-6-490	406.4	490	12754	125	28117	35	25	395	15.55	160			75.7	743	167.0
514-400-7-490	406.4	490	18132	178	39974	40	28	376	14.80	102	80	670	85.5	839	188.5
515-400-7-490	406.4	490	18132	178	39974	40	28	430	16.93	130			87.8	861	193.6
514-400-8-490	406.4	490	25524	250	56269	50	35	461	18.15	110	90	718	114.1	1119	251.6
515-400-8-490	406.4	490	25524	250	56269	50	35	450	17.72	180			127.4	1250	280.9
514-400-9-490	406.4	490	55135	541	121552	70	49	573	22.56	148	130	794	314.9	3088	694.3
514-400-10-490	406.4	490	70330	690	155050	80	55	630	24.80	166	150	828	395.0	3873	870.7
514-400-11-490	406.4	490	90785	890	200144	90	60	710	27.95	194	170	896	575.2	5641	1268.1

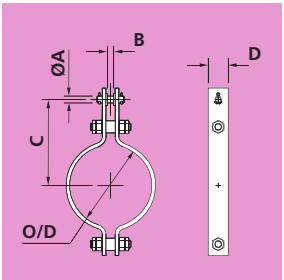
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 16" / 400mm



Type 513 Clamp



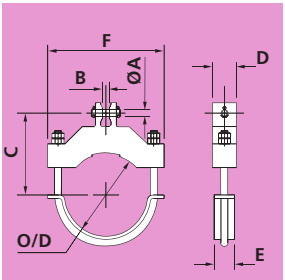
Type 514 Clamp



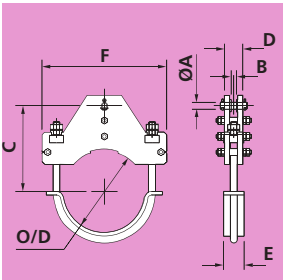
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-400-1-530	406.4	530	423	4.15	933	10	9	304	11.97	20	30	461	11.4	112	25.2
514-400-1-530	406.4	530	423	4.15	933	10	9	303	11.93	36	30	502	9.8	96	21.5
515-400-1-530	406.4	530	423	4.15	933	10	9	300	11.81	50			6.2	61	13.7
513-400-2-530	406.4	530	985	9.66	2172	10	9	304	11.97	25	30	472	15.5	152	34.2
514-400-2-530	406.4	530	985	9.66	2172	10	9	303	11.93	39	30	516	7.5	74	16.6
515-400-2-530	406.4	530	985	9.66	2172	10	9	300	11.81	80			15.2	149	33.4
513-400-3-530	406.4	530	2125	20.8	4684	15	12	311	12.24	40	50	500	27.5	270	60.6
514-400-3-530	406.4	530	2125	20.8	4684	15	12	310	12.20	47	50	562	15.8	154	34.7
515-400-3-530	406.4	530	2125	20.8	4684	15	12	320	12.60	100			26.5	260	58.5
513-400-4-530	406.4	530	4293	42.1	9465	20	16	328	12.91	50	50	518	38.3	376	84.4
514-400-4-530	406.4	530	4293	42.1	9465	20	16	321	12.64	57	50	586	24.8	244	54.8
515-400-4-530	406.4	530	4293	42.1	9465	20	16	350	13.78	90			31.8	312	70.2
513-400-5-530	406.4	530	6324	62	13942	25	20	342	13.46	60	70	539	50.4	494	111.2
514-400-5-530	406.4	530	6324	62	13942	25	20	345	13.58	69	70	618	32.5	319	71.7
515-400-5-530	406.4	530	6324	62	13942	25	20	375	14.76	100			45.0	442	99.3
514-400-6-530	406.4	530	12754	125	28117	35	25	374	14.72	86	80	654	63.2	620	139.3
515-400-6-530	406.4	530	12754	125	28117	35	25	410	16.14	120			77.3	758	170.4
514-400-7-530	406.4	530	18132	178	39974	40	28	412	16.22	102	90	676	90.1	884	198.7
515-400-7-530	406.4	530	18132	178	39974	40	28	430	16.93	150			100.8	989	222.3
514-400-8-530	406.4	530	25524	250	56269	50	35	431	16.97	120	100	730	129.8	1273	286.3
515-400-8-530	406.4	530	25524	250	56269	50	35	450	17.72	210			147.8	1449	325.8
514-400-9-530	406.4	530	55135	541	121552	70	49	579	22.80	148	130	794	317.2	3111	699.3
514-400-10-530	406.4	530	70330	690	155050	80	55	632	24.88	166	150	828	395.0	3873	870.8
514-400-11-530	406.4	530	90785	890	200144	90	60	710	27.95	194	170	896	575.2	5641	1268.1
513-400-1-570	406.4	570	423	4.15	933	10	9	304	11.97	25	30	472	14.8	145	32.7
514-400-1-570	406.4	570	423	4.15	933	10	9	303	11.93	36	30	508	10.6	104	23.3
515-400-1-570	406.4	570	423	4.15	933	10	9	300	11.81	70			10.4	102	23.0
513-400-2-570	406.4	570	985	9.66	2172	10	9	304	11.97	30	40	486	19.8	194	43.6
514-400-2-570	406.4	570	985	9.66	2172	10	9	303	11.93	39	40	520	8.7	86	19.3
515-400-2-570	406.4	570	985	9.66	2172	10	9	300	11.81	80			15.2	149	33.4
513-400-3-570	406.4	570	2125	20.8	4684	15	12	311	12.24	50	50	518	35.8	351	78.9
514-400-3-570	406.4	570	2125	20.8	4684	15	12	316	12.44	51	50	570	17.5	172	38.7
515-400-3-570	406.4	570	2125	20.8	4684	15	12	320	12.60	100			26.5	260	58.5
513-400-4-570	406.4	570	4293	42.1	9465	20	16	330	12.99	60	70	539	48.9	480	107.9
514-400-4-570	406.4	570	4293	42.1	9465	20	16	342	13.46	63	70	592	29.6	291	65.3
515-400-4-570	406.4	570	4293	42.1	9465	20	16	360	14.17	100			43.0	422	94.8
513-400-5-570	406.4	570	6324	62	13942	25	20	344	13.54	70	80	564	63.6	623	140.2
514-400-5-570	406.4	570	6324	62	13942	25	20	369	14.53	79	80	628	62.5	613	137.8
515-400-5-570	406.4	570	6324	62	13942	25	20	375	14.76	130			58.2	571	128.4
514-400-6-570	406.4	570	12754	125	28117	35	25	410	16.14	86	90	660	76.9	754	169.5
515-400-6-570	406.4	570	12754	125	28117	35	25	410	16.14	130			83.6	820	184.3
514-400-7-570	406.4	570	18132	178	39974	40	28	412	16.22	102	100	688	116.6	1144	257.1
515-400-7-570	406.4	570	18132	178	39974	40	28	430	16.93	190			126.8	1244	279.6
514-400-8-570	406.4	570	25524	250	56269	50	35	453	17.83	120	120	738	158.4	1554	349.3
515-400-8-570	406.4	570	25524	250	56269	50	35	465	18.31	180			161.2	1581	355.3
514-400-9-570	406.4	570	55135	541	121552	70	49	603	23.74	148	130	794	331.4	3250	730.6
514-400-10-570	406.4	570	70330	690	155050	80	55	655	25.79	166	150	828	411.2	4032	906.5
514-400-11-570	406.4	570	90785	890	200144	90	60	666	26.22	214	170	896	610.9	5991	1346.9

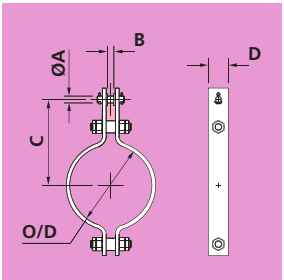
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 18" / 450mm



Type 513 Clamp



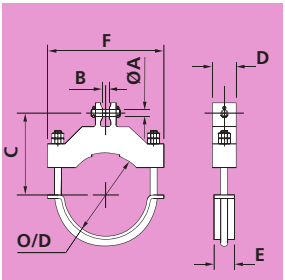
Type 514 Clamp



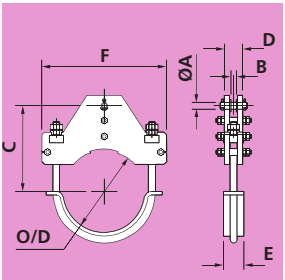
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-450-1-400	457.2	400	423	4.15	933	10	9	330	12.99	20	20	506	12.9	127	28.5
514-450-1-400	457.2	400	423	4.15	933	10	9	329	12.95	36	20	552	7.5	74	16.6
515-450-1-400	457.2	400	423	4.15	933	10	9	325	12.80	50			6.8	67	15.1
513-450-2-400	457.2	400	985	9.66	2172	10	9	330	12.99	20	30	513	14.7	144	32.3
514-450-2-400	457.2	400	985	9.66	2172	10	9	329	12.95	39	30	562	6.6	64	14.5
515-450-2-400	457.2	400	985	9.66	2172	10	9	325	12.80	80			13.6	133	30.0
513-450-3-400	457.2	400	2125	20.8	4684	15	12	337	13.27	30	40	538	24.4	240	53.9
514-450-3-400	457.2	400	2125	20.8	4684	15	12	336	13.23	47	40	610	12.4	121	27.3
515-450-3-400	457.2	400	2125	20.8	4684	15	12	355	13.98	100			29.8	293	65.8
513-450-4-400	457.2	400	4293	42.1	9465	20	16	364	14.33	40	50	552	36.4	357	80.3
514-450-4-400	457.2	400	4293	42.1	9465	20	16	346	13.62	57	50	630	20.2	198	44.5
515-450-4-400	457.2	400	4293	42.1	9465	20	16	380	14.96	90			35.6	349	78.5
513-450-5-400	457.2	400	6324	62	13942	25	20	378	14.88	50	50	570	48.6	477	107.1
514-450-5-400	457.2	400	6324	62	13942	25	20	352	13.86	63	50	664	40.4	397	89.2
515-450-5-400	457.2	400	6324	62	13942	25	20	405	15.94	100			50.1	491	110.4
514-450-6-400	457.2	400	12754	125	28117	35	25	400	15.75	86	80	706	60.6	595	133.7
515-450-6-400	457.2	400	12754	125	28117	35	25	455	17.91	120			88.8	870	195.7
514-450-7-400	457.2	400	18132	178	39974	40	28	438	17.24	92	90	728	109.0	1069	240.3
515-450-7-400	457.2	400	18132	178	39974	40	28	485	19.09	160			124.8	1224	275.2
514-450-8-400	457.2	400	25524	250	56269	50	35	478	18.82	110	100	782	133.2	1306	293.6
515-450-8-400	457.2	400	25524	250	56269	50	35	500	19.69	220			178.5	1751	393.6
514-450-9-400	457.2	400	55135	541	121552	70	49	598	23.54	148	130	846	301.0	2951	663.5
514-450-10-400	457.2	400	70330	690	155050	80	55	656	25.83	166	150	880	426.6	4183	940.4
514-450-11-400	457.2	400	90785	890	200144	90	60	736	28.98	194	190	958	601.2	5895	1325.3
513-450-1-490	457.2	490	423	4.15	933	10	9	330	12.99	20	20	506	12.9	127	28.5
514-450-1-490	457.2	490	423	4.15	933	10	9	329	12.95	36	20	552	7.5	74	16.6
515-450-1-490	457.2	490	423	4.15	933	10	9	325	12.80	50			6.8	67	15.1
513-450-2-490	457.2	490	985	9.66	2172	10	9	330	12.99	20	30	513	14.6	143	32.1
514-450-2-490	457.2	490	985	9.66	2172	10	9	329	12.95	39	30	562	6.6	65	14.5
515-450-2-490	457.2	490	985	9.66	2172	10	9	325	12.80	70			11.7	115	25.8
513-450-3-490	457.2	490	2125	20.8	4684	15	12	337	13.27	30	40	538	24.4	240	53.9
514-450-3-490	457.2	490	2125	20.8	4684	15	12	336	13.23	47	40	610	12.4	121	27.3
515-450-3-490	457.2	490	2125	20.8	4684	15	12	335	13.19	100			21.5	211	47.5
513-450-4-490	457.2	490	4293	42.1	9465	20	16	363	14.29	40	50	552	36.2	355	79.7
514-450-4-490	457.2	490	4293	42.1	9465	20	16	346	13.62	57	50	630	19.4	190	42.8
515-450-4-490	457.2	490	4293	42.1	9465	20	16	375	14.76	90			34.6	339	76.3
513-450-5-490	457.2	490	6324	62	13942	25	20	376	14.80	50	50	570	48.3	473	106.4
514-450-5-490	457.2	490	6324	62	13942	25	20	352	13.86	63	50	664	40.5	397	89.2
515-450-5-490	457.2	490	6324	62	13942	25	20	390	15.35	120			48.0	471	105.8
514-450-6-490	457.2	490	12754	125	28117	35	25	376	14.80	86	70	696	70.9	695	156.3
515-450-6-490	457.2	490	12754	125	28117	35	25	440	17.32	120			83.9	823	184.9
514-450-7-490	457.2	490	18132	178	39974	40	28	429	16.89	92	80	722	99.9	979	220.2
515-450-7-490	457.2	490	18132	178	39974	40	28	460	18.11	140			102.0	1000	224.8
514-450-8-490	457.2	490	25524	250	56269	50	35	475	18.70	110	90	770	119.6	1173	263.7
515-450-8-490	457.2	490	25524	250	56269	50	35	480	18.90	200			151.8	1489	334.7
514-450-9-490	457.2	490	55135	541	121552	70	49	590	23.23	148	130	846	297.1	2913	655.0
514-450-10-490	457.2	490	70330	690	155050	80	55	648	25.51	166	150	880	423.3	4151	933.3
514-450-11-490	457.2	490	90785	890	200144	90	60	728	28.66	194	170	948	553.5	5428	1220.2

CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 18" / 450mm



Type 513 Clamp



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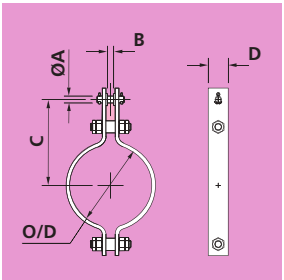
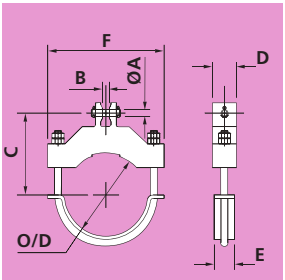


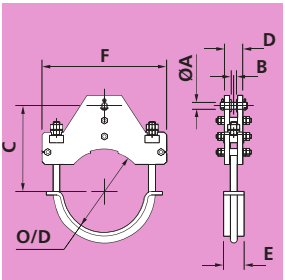
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-450-1-530	457.2	530	423	4.15	933	10	9	330	12.99	20	30	513	13.8	135	30.4
514-450-1-530	457.2	530	423	4.15	933	10	9	329	12.95	36	30	554	8.3	81	18.2
515-450-1-530	457.2	530	423	4.15	933	10	9	325	12.80	50			6.8	67	15.1
513-450-2-530	457.2	530	985	9.66	2172	10	9	330	12.99	25	30	524	18.5	182	40.9
514-450-2-530	457.2	530	985	9.66	2172	10	9	329	12.95	39	30	568	7.4	72	16.3
515-450-2-530	457.2	530	985	9.66	2172	10	9	325	12.80	80			16.6	163	36.7
513-450-3-530	457.2	530	2125	20.8	4684	15	12	337	13.27	40	50	552	32.6	320	71.9
514-450-3-530	457.2	530	2125	20.8	4684	15	12	336	13.23	47	50	614	20.5	201	45.2
515-450-3-530	457.2	530	2125	20.8	4684	15	12	345	13.58	100			29.0	285	64.0
513-450-4-530	457.2	530	4293	42.1	9465	20	16	358	14.09	50	50	570	45.3	445	99.9
514-450-4-530	457.2	530	4293	42.1	9465	20	16	347	13.66	57	50	638	30.9	303	68.1
515-450-4-530	457.2	530	4293	42.1	9465	20	16	375	14.76	90			34.6	339	76.3
513-450-5-530	457.2	530	6324	62	13942	25	20	372	14.65	60	70	591	60.0	588	132.3
514-450-5-530	457.2	530	6324	62	13942	25	20	371	14.61	69	70	670	36.0	353	79.4
515-450-5-530	457.2	530	6324	62	13942	25	20	400	15.75	100			48.7	478	107.4
514-450-6-530	457.2	530	12754	125	28117	35	25	400	15.75	86	80	706	68.4	671	150.8
515-450-6-530	457.2	530	12754	125	28117	35	25	440	17.32	120			83.9	823	184.9
514-450-7-530	457.2	530	18132	178	39974	40	28	438	17.24	92	90	728	113.9	1117	251.1
515-450-7-530	457.2	530	18132	178	39974	40	28	460	18.11	160			116.1	1138	255.9
514-450-8-530	457.2	530	25524	250	56269	50	35	479	18.86	110	100	782	133.9	1313	295.2
515-450-8-530	457.2	530	25524	250	56269	50	35	495	19.49	180			173.4	1700	382.2
514-450-9-530	457.2	530	55135	541	121552	70	49	594	23.39	148	130	846	298.8	2931	658.8
514-450-10-530	457.2	530	70330	690	155050	80	55	649	25.55	166	150	880	423.9	4157	934.6
514-450-11-530	457.2	530	90785	890	200144	90	60	728	28.66	194	170	948	553.5	5428	1220.2
513-450-1-570	457.2	570	423	4.15	933	10	9	330	12.99	25	30	524	17.7	173	39.0
514-450-1-570	457.2	570	423	4.15	933	10	9	329	12.95	36	30	560	8.0	79	17.7
515-450-1-570	457.2	570	423	4.15	933	10	9	325	12.80	70			11.5	112	25.3
513-450-2-570	457.2	570	985	9.66	2172	10	9	330	12.99	30	40	538	23.5	231	51.9
514-450-2-570	457.2	570	985	9.66	2172	10	9	329	12.95	39	40	572	12.2	120	27.0
515-450-2-570	457.2	570	985	9.66	2172	10	9	325	12.80	100			20.8	204	45.8
513-450-3-570	457.2	570	2125	20.8	4684	15	12	337	13.27	50	50	570	42.3	414	93.2
514-450-3-570	457.2	570	2125	20.8	4684	15	12	342	13.46	51	50	622	22.4	220	49.4
515-450-3-570	457.2	570	2125	20.8	4684	15	12	345	13.58	100			29.0	285	64.0
513-450-4-570	457.2	570	4293	42.1	9465	20	16	359	14.13	60	70	591	58.2	571	128.3
514-450-4-570	457.2	570	4293	42.1	9465	20	16	368	14.49	63	70	644	32.5	318	71.6
515-450-4-570	457.2	570	4293	42.1	9465	20	16	385	15.16	100			46.6	457	102.8
513-450-5-570	457.2	570	6324	62	13942	25	20	374	14.72	70	80	616	74.8	734	164.9
514-450-5-570	457.2	570	6324	62	13942	25	20	395	15.55	79	80	680	62.5	613	137.7
515-450-5-570	457.2	570	6324	62	13942	25	20	400	15.75	140			67.8	665	149.4
514-450-6-570	457.2	570	12754	125	28117	35	25	436	17.17	86	90	712	81.2	797	179.1
515-450-6-570	457.2	570	12754	125	28117	35	25	440	17.32	150			104.3	1023	230.0
514-450-7-570	457.2	570	18132	178	39974	40	28	438	17.24	102	100	740	128.0	1255	282.2
515-450-7-570	457.2	570	18132	178	39974	40	28	460	18.11	210			151.3	1484	333.6
514-450-8-570	457.2	570	25524	250	56269	50	35	479	18.86	120	120	790	164.7	1615	363.1
515-450-8-570	457.2	570	25524	250	56269	50	35	495	19.49	180			173.4	1700	382.2
514-450-9-570	457.2	570	55135	541	121552	70	49	620	24.41	148	130	846	313.9	3079	692.1
514-450-10-570	457.2	570	70330	690	155050	80	55	674	26.54	166	150	880	441.1	4326	972.4
514-450-11-570	457.2	570	90785	890	200144	90	60	682	26.85	214	170	948	578.7	5675	1275.7

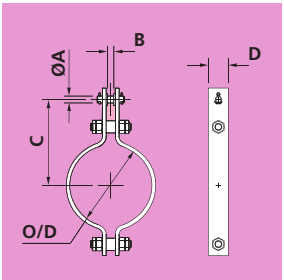
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 20" / 500mm



Type 513 Clamp



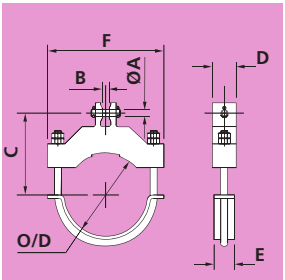
Type 514 Clamp



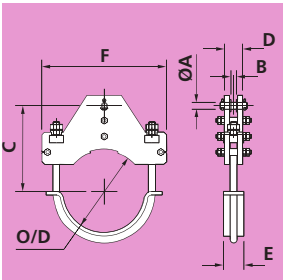
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-500-1-400	508	400	423	4.15	933	10	9	356	14.02	25	20	558	18.4	181	40.6
514-500-1-400	508	400	423	4.15	933	10	9	356	14.02	40	20	604	7.5	73	16.4
515-500-1-400	508	400	423	4.15	933	10	9	355	13.98	50			7.5	74	16.6
513-500-2-400	508	400	985	9.66	2172	10	9	356	14.02	25	30	565	20.6	202	45.5
514-500-2-400	508	400	985	9.66	2172	10	9	356	14.02	43	30	614	7.3	71	16.0
515-500-2-400	508	400	985	9.66	2172	10	9	355	13.98	80			14.9	146	32.8
513-500-3-400	508	400	2125	20.8	4684	15	12	369	14.53	30	40	590	28.9	284	63.8
514-500-3-400	508	400	2125	20.8	4684	15	12	362	14.25	51	40	662	15.5	152	34.2
515-500-3-400	508	400	2125	20.8	4684	15	12	380	14.96	100			32.3	317	71.2
513-500-4-400	508	400	4293	42.1	9465	20	16	397	15.63	40	50	604	42.8	420	94.4
514-500-4-400	508	400	4293	42.1	9465	20	16	373	14.69	57	50	682	28.5	280	62.9
515-500-4-400	508	400	4293	42.1	9465	20	16	410	16.14	90			38.7	380	85.4
513-500-5-400	508	400	6324	62	13942	25	20	411	16.18	50	50	622	57.3	562	126.4
514-500-5-400	508	400	6324	62	13942	25	20	378	14.88	63	50	716	39.4	386	86.8
515-500-5-400	508	400	6324	62	13942	25	20	435	17.13	100			54.2	532	119.6
514-500-6-400	508	400	12754	125	28117	35	25	428	16.85	86	80	758	64.1	629	141.4
515-500-6-400	508	400	12754	125	28117	35	25	485	19.09	120			95.3	935	210.1
514-500-7-400	508	400	18132	178	39974	40	28	466	18.35	92	90	780	115.0	1128	253.5
515-500-7-400	508	400	18132	178	39974	40	28	510	20.08	170			140.5	1378	309.7
514-500-8-400	508	400	25524	250	56269	50	35	494	19.45	110	100	834	156.7	1537	345.4
515-500-8-400	508	400	25524	250	56269	50	35	545	21.46	180			197.8	1940	436.1
514-500-9-400	508	400	55135	541	121552	70	49	613	24.13	148	130	898	348.1	3414	767.4
514-500-10-400	508	400	70330	690	155050	80	55	672	26.46	166	150	932	423.2	4151	933.1
514-500-11-400	508	400	90785	890	200144	90	60	752	29.61	194	190	1010	699.5	6860	1542.1
513-500-1-490	508	490	423	4.15	933	10	9	356	14.02	25	20	558	18.4	181	40.6
514-500-1-490	508	490	423	4.15	933	10	9	356	14.02	40	20	604	7.5	73	16.5
515-500-1-490	508	490	423	4.15	933	10	9	355	13.98	50			7.5	74	16.6
513-500-2-490	508	490	985	9.66	2172	10	9	356	14.02	25	30	565	20.6	202	45.5
514-500-2-490	508	490	985	9.66	2172	10	9	356	14.02	43	30	614	7.3	71	16.0
515-500-2-490	508	490	985	9.66	2172	10	9	355	13.98	80			14.6	143	32.2
513-500-3-490	508	490	2125	20.8	4684	15	12	368	14.49	30	40	590	28.9	283	63.7
514-500-3-490	508	490	2125	20.8	4684	15	12	362	14.25	51	40	662	15.5	152	34.3
515-500-3-490	508	490	2125	20.8	4684	15	12	370	14.57	100			31.5	309	69.5
513-500-4-490	508	490	4293	42.1	9465	20	16	395	15.55	40	50	604	42.5	417	93.6
514-500-4-490	508	490	4293	42.1	9465	20	16	373	14.69	57	50	682	28.5	280	62.9
515-500-4-490	508	490	4293	42.1	9465	20	16	400	15.75	90			37.4	366	82.4
513-500-5-490	508	490	6324	62	13942	25	20	409	16.10	50	50	622	56.9	558	125.4
514-500-5-490	508	490	6324	62	13942	25	20	378	14.88	63	50	716	38.3	375	84.4
515-500-5-490	508	490	6324	62	13942	25	20	430	16.93	100			52.9	518	116.5
514-500-6-490	508	490	12754	125	28117	35	25	404	15.91	86	70	748	71.5	701	157.5
515-500-6-490	508	490	12754	125	28117	35	25	480	18.90	120			93.0	912	205.0
514-500-7-490	508	490	18132	178	39974	40	28	444	17.48	92	80	774	104.5	1025	230.3
515-500-7-490	508	490	18132	178	39974	40	28	485	19.09	150			116.3	1140	256.4
514-500-8-490	508	490	25524	250	56269	50	35	490	19.29	110	90	822	144.5	1417	318.5
515-500-8-490	508	490	25524	250	56269	50	35	505	19.88	220			177.1	1737	390.4
514-500-9-490	508	490	55135	541	121552	70	49	605	23.82	148	130	898	341.9	3353	753.7
514-500-10-490	508	490	70330	690	155050	80	55	663	26.10	166	150	932	417.9	4098	921.3
514-500-11-490	508	490	90785	890	200144	90	60	745	29.33	194	170	1000	639.3	6269	1409.3

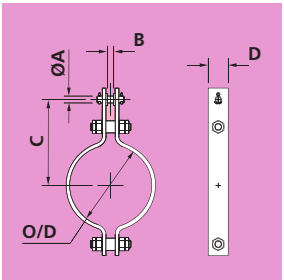
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 20" / 500mm



Type 513 Clamp



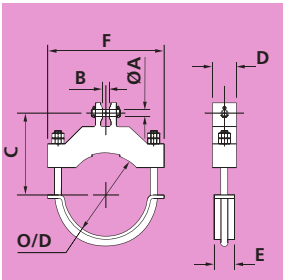
Type 514 Clamp



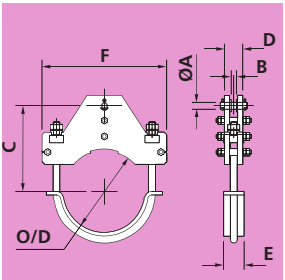
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-500-1-530	508	530	423	4.15	933	10	9	356	14.02	25	30	565	19.4	191	42.9
514-500-1-530	508	530	423	4.15	933	10	9	356	14.02	40	30	606	8.3	81	18.2
515-500-1-530	508	530	423	4.15	933	10	9	355	13.98	60			9.0	88	19.8
513-500-2-530	508	530	985	9.66	2172	10	9	356	14.02	25	30	576	21.7	213	47.9
514-500-2-530	508	530	985	9.66	2172	10	9	356	14.02	43	30	620	8.9	87	19.6
515-500-2-530	508	530	985	9.66	2172	10	9	355	13.98	80			18.3	180	40.4
513-500-3-530	508	530	2125	20.8	4684	15	12	363	14.29	40	50	604	38.1	374	84.1
514-500-3-530	508	530	2125	20.8	4684	15	12	362	14.25	51	50	666	25.1	246	55.2
515-500-3-530	508	530	2125	20.8	4684	15	12	370	14.57	100			31.5	309	69.5
513-500-4-530	508	530	4293	42.1	9465	20	16	390	15.35	50	50	622	53.2	522	117.3
514-500-4-530	508	530	4293	42.1	9465	20	16	372	14.65	57	50	690	36.2	355	79.8
515-500-4-530	508	530	4293	42.1	9465	20	16	400	15.75	100			41.4	406	91.4
513-500-5-530	508	530	6324	62	13942	25	20	405	15.94	60	70	643	70.6	692	155.5
514-500-5-530	508	530	6324	62	13942	25	20	399	15.71	69	70	722	38.9	381	85.7
515-500-5-530	508	530	6324	62	13942	25	20	430	16.93	110			58.0	569	128.0
514-500-6-530	508	530	12754	125	28117	35	25	428	16.85	86	80	758	69.3	680	152.8
515-500-6-530	508	530	12754	125	28117	35	25	465	18.31	120			89.7	880	197.7
514-500-7-530	508	530	18132	178	39974	40	28	466	18.35	92	90	780	121.7	1193	268.3
515-500-7-530	508	530	18132	178	39974	40	28	485	19.09	170			131.4	1288	289.6
514-500-8-530	508	530	25524	250	56269	50	35	494	19.45	110	100	834	157.1	1541	346.4
515-500-8-530	508	530	25524	250	56269	50	35	525	20.67	180			185.5	1819	409.0
514-500-9-530	508	530	55135	541	121552	70	49	610	24.02	148	130	898	345.0	3383	760.5
514-500-10-530	508	530	70330	690	155050	80	55	665	26.18	166	150	932	417.3	4092	919.9
514-500-11-530	508	530	90785	890	200144	90	60	745	29.33	194	170	1000	639.3	6269	1409.3
513-500-1-570	508	570	423	4.15	933	10	9	356	14.02	25	30	576	20.8	204	45.9
514-500-1-570	508	570	423	4.15	933	10	9	356	14.02	40	30	612	9.0	88	19.7
515-500-1-570	508	570	423	4.15	933	10	9	355	13.98	70			12.6	123	27.7
513-500-2-570	508	570	985	9.66	2172	10	9	356	14.02	30	40	590	27.5	270	60.6
514-500-2-570	508	570	985	9.66	2172	10	9	356	14.02	43	40	624	15.3	150	33.7
515-500-2-570	508	570	985	9.66	2172	10	9	355	13.98	100			22.9	224	50.4
513-500-3-570	508	570	2125	20.8	4684	15	12	364	14.33	50	50	622	49.1	481	108.2
514-500-3-570	508	570	2125	20.8	4684	15	12	370	14.57	51	50	674	35.6	350	78.6
515-500-3-570	508	570	2125	20.8	4684	15	12	370	14.57	110			34.6	340	76.4
513-500-4-570	508	570	4293	42.1	9465	20	16	390	15.35	60	70	643	67.5	662	148.9
514-500-4-570	508	570	4293	42.1	9465	20	16	396	15.59	63	70	696	35.6	349	78.5
515-500-4-570	508	570	4293	42.1	9465	20	16	410	16.14	100			50.3	494	111.0
513-500-5-570	508	570	6324	62	13942	25	20	406	15.98	70	80	668	87.2	855	192.2
514-500-5-570	508	570	6324	62	13942	25	20	423	16.65	79	80	732	64.9	636	143.0
515-500-5-570	508	570	6324	62	13942	25	20	430	16.93	150			78.8	773	173.7
514-500-6-570	508	570	12754	125	28117	35	25	464	18.27	86	90	764	85.0	833	187.4
515-500-6-570	508	570	12754	125	28117	35	25	465	18.31	150			111.6	1094	246.0
514-500-7-570	508	570	18132	178	39974	40	28	466	18.35	102	100	792	129.4	1268	285.2
515-500-7-570	508	570	18132	178	39974	40	28	485	19.09	220			169.0	1658	372.6
514-500-8-570	508	570	25524	250	56269	50	35	516	20.31	110	120	842	187.8	1842	414.1
515-500-8-570	508	570	25524	250	56269	50	35	525	20.67	190			195.5	1917	431.1
514-500-9-570	508	570	55135	541	121552	70	49	636	25.04	148	130	898	360.9	3539	795.6
514-500-10-570	508	570	70330	690	155050	80	55	688	27.09	166	150	932	436.0	4275	961.1
514-500-11-570	508	570	90785	890	200144	90	60	757	29.80	194	170	1000	651.1	6385	1435.3

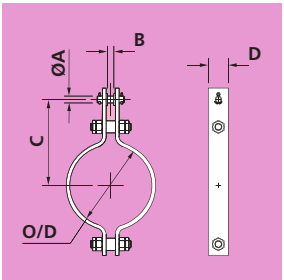
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 22" / 550mm



Type 513 Clamp



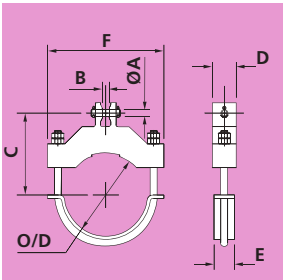
Type 514 Clamp



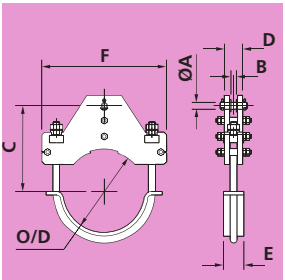
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-550-1-400	558.8	400	423	4.15	933	10	9	381	15.00	25	20	608	21.7	213	47.8
514-550-1-400	558.8	400	423	4.15	933	10	9	381	15.00	40	20	654	6.3	62	14.0
515-550-1-400	558.8	400	423	4.15	933	10	9	380	14.96	50			8.3	81	18.2
513-550-2-400	558.8	400	985	9.66	2172	10	9	381	15.00	25	30	615	24.0	236	53.0
514-550-2-400	558.8	400	985	9.66	2172	10	9	381	15.00	43	30	664	8.2	81	18.1
515-550-2-400	558.8	400	985	9.66	2172	10	9	380	14.96	80			20.0	196	44.1
513-550-3-400	558.8	400	2125	20.8	4684	15	12	398	15.67	30	40	640	33.7	331	74.4
514-550-3-400	558.8	400	2125	20.8	4684	15	12	387	15.24	51	40	712	22.1	216	48.6
515-550-3-400	558.8	400	2125	20.8	4684	15	12	405	15.94	100			34.7	341	76.6
513-550-4-400	558.8	400	4293	42.1	9465	20	16	426	16.77	40	50	654	49.6	486	109.2
514-550-4-400	558.8	400	4293	42.1	9465	20	16	398	15.67	57	50	732	34.8	341	76.7
515-550-4-400	558.8	400	4293	42.1	9465	20	16	435	17.13	100			46.0	451	101.4
513-550-5-400	558.8	400	6324	62	13942	25	20	441	17.36	50	50	672	66.2	649	145.8
514-550-5-400	558.8	400	6324	62	13942	25	20	403	15.87	63	50	766	42.4	416	93.6
515-550-5-400	558.8	400	6324	62	13942	25	20	460	18.11	100			57.9	568	127.6
514-550-6-400	558.8	400	12754	125	28117	35	25	453	17.83	86	80	808	69.6	682	153.3
515-550-6-400	558.8	400	12754	125	28117	35	25	510	20.08	120			101.1	992	222.9
514-550-7-400	558.8	400	18132	178	39974	40	28	491	19.33	92	90	830	124.3	1219	274.1
515-550-7-400	558.8	400	18132	178	39974	40	28	535	21.06	180			157.0	1540	346.1
514-550-8-400	558.8	400	25524	250	56269	50	35	508	20.00	110	100	884	185.5	1819	409.0
515-550-8-400	558.8	400	25524	250	56269	50	35	570	22.44	180			208.4	2044	459.5
514-550-9-400	558.8	400	55135	541	121552	70	49	628	24.72	148	130	948	352.6	3458	777.3
514-550-10-400	558.8	400	70330	690	155050	80	55	688	27.09	166	150	982	492.2	4827	1085.2
514-550-11-400	558.8	400	90785	890	200144	90	60	768	30.24	194	190	1060	654.0	6413	1441.8
513-550-1-490	558.8	490	423	4.15	933	10	9	381	15.00	25	20	608	21.7	213	47.8
514-550-1-490	558.8	490	423	4.15	933	10	9	381	15.00	40	20	654	6.3	62	14.0
515-550-1-490	558.8	490	423	4.15	933	10	9	380	14.96	50			8.1	80	17.9
513-550-2-490	558.8	490	985	9.66	2172	10	9	381	15.00	25	30	615	24.0	236	53.0
514-550-2-490	558.8	490	985	9.66	2172	10	9	381	15.00	43	30	664	8.2	81	18.1
515-550-2-490	558.8	490	985	9.66	2172	10	9	380	14.96	80			15.8	155	34.8
513-550-3-490	558.8	490	2125	20.8	4684	15	12	397	15.63	30	40	640	33.5	329	73.9
514-550-3-490	558.8	490	2125	20.8	4684	15	12	387	15.24	51	40	712	22.1	217	48.7
515-550-3-490	558.8	490	2125	20.8	4684	15	12	400	15.75	100			34.2	336	75.5
513-550-4-490	558.8	490	4293	42.1	9465	20	16	424	16.69	40	50	654	49.1	482	108.3
514-550-4-490	558.8	490	4293	42.1	9465	20	16	398	15.67	57	50	732	34.8	341	76.7
515-550-4-490	558.8	490	4293	42.1	9465	20	16	425	16.73	90			40.1	393	88.4
513-550-5-490	558.8	490	6324	62	13942	25	20	439	17.28	50	50	672	65.6	643	144.6
514-550-5-490	558.8	490	6324	62	13942	25	20	403	15.87	63	50	766	41.2	404	90.9
515-550-5-490	558.8	490	6324	62	13942	25	20	455	17.91	100			56.5	554	124.5
514-550-6-490	558.8	490	12754	125	28117	35	25	434	17.09	76	70	798	54.9	538	121.0
515-550-6-490	558.8	490	12754	125	28117	35	25	505	19.88	120			98.8	969	217.8
514-550-7-490	558.8	490	18132	178	39974	40	28	455	17.91	92	80	824	89.8	881	198.1
515-550-7-490	558.8	490	18132	178	39974	40	28	515	20.28	170			140.6	1378	309.9
514-550-8-490	558.8	490	25524	250	56269	50	35	505	19.88	110	90	872	170.7	1674	376.4
515-550-8-490	558.8	490	25524	250	56269	50	35	550	21.65	180			196.1	1923	432.4
514-550-9-490	558.8	490	55135	541	121552	70	49	619	24.37	148	130	948	345.3	3387	761.3
514-550-10-490	558.8	490	70330	690	155050	80	55	679	26.73	166	150	982	486.6	4772	1072.7
514-550-11-490	558.8	490	90785	890	200144	90	60	761	29.96	194	170	1050	628.4	6163	1385.4

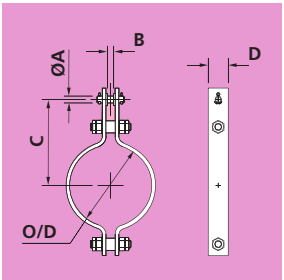
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 22" / 550mm



Type 513 Clamp



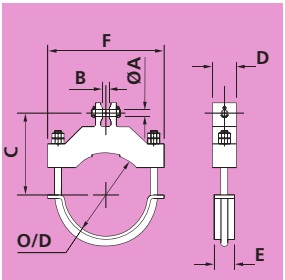
Type 514 Clamp



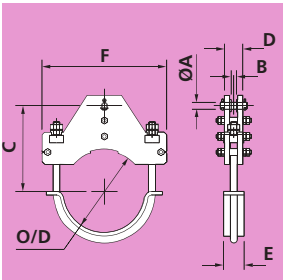
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-550-1-530	558.8	530	423	4.15	933	10	9	381	15.00	25	30	615	22.7	223	50.2
514-550-1-530	558.8	530	423	4.15	933	10	9	381	15.00	40	30	656	7.2	71	15.9
515-550-1-530	558.8	530	423	4.15	933	10	9	380	14.96	60			9.7	95	21.5
513-550-2-530	558.8	530	985	9.66	2172	10	9	381	15.00	25	30	626	25.2	247	55.6
514-550-2-530	558.8	530	985	9.66	2172	10	9	381	15.00	43	30	670	12.0	118	26.5
515-550-2-530	558.8	530	985	9.66	2172	10	9	380	14.96	80			19.8	194	43.6
513-550-3-530	558.8	530	2125	20.8	4684	15	12	390	15.35	40	50	654	44.1	432	97.1
514-550-3-530	558.8	530	2125	20.8	4684	15	12	387	15.24	51	50	716	33.4	328	73.7
515-550-3-530	558.8	530	2125	20.8	4684	15	12	400	15.75	100			34.2	336	75.5
513-550-4-530	558.8	530	4293	42.1	9465	20	16	418	16.46	50	50	672	61.2	600	134.8
514-550-4-530	558.8	530	4293	42.1	9465	20	16	397	15.63	57	50	740	39.2	384	86.4
515-550-4-530	558.8	530	4293	42.1	9465	20	16	425	16.73	110			48.9	480	107.8
513-550-5-530	558.8	530	6324	62	13942	25	20	433	17.05	60	70	693	80.6	790	177.6
514-550-5-530	558.8	530	6324	62	13942	25	20	424	16.69	69	70	772	45.6	447	100.5
515-550-5-530	558.8	530	6324	62	13942	25	20	455	17.91	120			67.6	663	149.0
514-550-6-530	558.8	530	12754	125	28117	35	25	453	17.83	86	80	808	79.7	782	175.7
515-550-6-530	558.8	530	12754	125	28117	35	25	495	19.49	130			104.1	1021	229.5
514-550-7-530	558.8	530	18132	178	39974	40	28	491	19.33	92	90	830	131.6	1291	290.1
515-550-7-530	558.8	530	18132	178	39974	40	28	515	20.28	190			156.7	1537	345.5
514-550-8-530	558.8	530	25524	250	56269	50	35	508	20.00	110	100	884	185.9	1823	409.9
515-550-8-530	558.8	530	25524	250	56269	50	35	550	21.65	180			196.1	1923	432.4
514-550-9-530	558.8	530	55135	541	121552	70	49	624	24.57	148	130	948	348.6	3418	768.5
514-550-10-530	558.8	530	70330	690	155050	80	55	679	26.73	166	150	982	484.8	4755	1068.9
514-550-11-530	558.8	530	90785	890	200144	90	60	761	29.96	194	170	1050	628.4	6163	1385.4
513-550-1-570	558.8	570	423	4.15	933	10	9	381	15.00	25	30	626	24.2	238	53.4
514-550-1-570	558.8	570	423	4.15	933	10	9	381	15.00	40	30	662	8.4	83	18.6
515-550-1-570	558.8	570	423	4.15	933	10	9	380	14.96	70			13.6	134	30.0
513-550-2-570	558.8	570	985	9.66	2172	10	9	381	15.00	30	40	640	31.7	311	70.0
514-550-2-570	558.8	570	985	9.66	2172	10	9	381	15.00	43	40	674	21.3	209	47.1
515-550-2-570	558.8	570	985	9.66	2172	10	9	380	14.96	100			24.7	242	54.5
513-550-3-570	558.8	570	2125	20.8	4684	15	12	391	15.39	50	50	672	56.6	555	124.8
514-550-3-570	558.8	570	2125	20.8	4684	15	12	395	15.55	51	50	724	43.7	428	96.2
515-550-3-570	558.8	570	2125	20.8	4684	15	12	410	16.14	90			39.0	382	85.9
513-550-4-570	558.8	570	4293	42.1	9465	20	16	418	16.46	60	70	693	77.3	758	170.5
514-550-4-570	558.8	570	4293	42.1	9465	20	16	421	16.57	63	70	746	41.2	404	90.9
515-550-4-570	558.8	570	4293	42.1	9465	20	16	440	17.32	100			54.4	534	120.0
513-550-5-570	558.8	570	6324	62	13942	25	20	434	17.09	70	80	718	99.8	979	220.0
514-550-5-570	558.8	570	6324	62	13942	25	20	448	17.64	79	80	782	62.2	610	137.0
515-550-5-570	558.8	570	6324	62	13942	25	20	455	17.91	160			89.8	880	197.9
514-550-6-570	558.8	570	12754	125	28117	35	25	489	19.25	86	90	814	88.8	870	195.7
515-550-6-570	558.8	570	12754	125	28117	35	25	495	19.49	170			135.5	1329	298.7
514-550-7-570	558.8	570	18132	178	39974	40	28	491	19.33	92	100	842	129.9	1274	286.4
515-550-7-570	558.8	570	18132	178	39974	40	28	530	20.87	180			187.9	1843	414.3
514-550-8-570	558.8	570	25524	250	56269	50	35	532	20.94	110	120	892	216.5	2123	477.3
515-550-8-570	558.8	570	25524	250	56269	50	35	550	21.65	200			217.3	2131	479.1
514-550-9-570	558.8	570	55135	541	121552	70	49	649	25.55	148	130	948	364.7	3577	804.1
514-550-10-570	558.8	570	70330	690	155050	80	55	703	27.68	166	150	982	503.1	4934	1109.1
514-550-11-570	558.8	570	90785	890	200144	90	60	772	30.39	194	170	1050	635.0	6228	1400.0

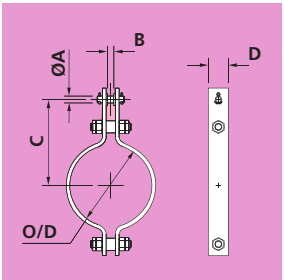
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 24" / 600mm



Type 513 Clamp



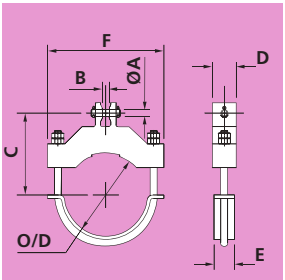
Type 514 Clamp



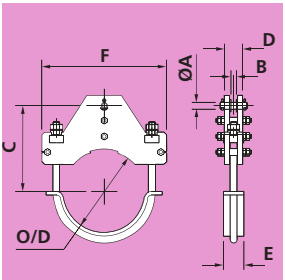
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-600-1-400	609.6	400	423	4.15	933	10	9	407	16.02	25	20	660	25.1	246	55.4
514-600-1-400	609.6	400	423	4.15	933	10	9	407	16.02	46	20	706	8.1	80	17.9
515-600-1-400	609.6	400	423	4.15	933	10	9	405	15.94	50			8.9	87	19.6
513-600-2-400	609.6	400	985	9.66	2172	10	9	407	16.02	25	30	667	27.6	271	60.9
514-600-2-400	609.6	400	985	9.66	2172	10	9	407	16.02	49	30	716	10.9	107	24.1
515-600-2-400	609.6	400	985	9.66	2172	10	9	410	16.14	80			21.7	213	47.8
513-600-3-400	609.6	400	2125	20.8	4684	15	12	427	16.81	30	40	692	38.6	379	85.1
514-600-3-400	609.6	400	2125	20.8	4684	15	12	413	16.26	57	40	764	28.0	275	61.7
515-600-3-400	609.6	400	2125	20.8	4684	15	12	435	17.13	100			37.5	368	82.8
513-600-4-400	609.6	400	4293	42.1	9465	20	16	456	17.95	40	50	706	56.7	556	125.0
514-600-4-400	609.6	400	4293	42.1	9465	20	16	424	16.69	63	50	784	42.6	418	94.0
515-600-4-400	609.6	400	4293	42.1	9465	20	16	470	18.50	110			55.4	544	122.2
513-600-5-400	609.6	400	6324	62	13942	25	20	471	18.54	50	50	724	75.3	739	166.1
514-600-5-400	609.6	400	6324	62	13942	25	20	429	16.89	69	50	818	64.3	630	141.7
515-600-5-400	609.6	400	6324	62	13942	25	20	485	19.09	110			67.6	663	149.1
514-600-6-400	609.6	400	12754	125	28117	35	25	479	18.86	86	80	860	77.3	758	170.4
515-600-6-400	609.6	400	12754	125	28117	35	25	535	21.06	130			115.5	1133	254.7
514-600-7-400	609.6	400	18132	178	39974	40	28	517	20.35	92	90	882	129.6	1271	285.7
515-600-7-400	609.6	400	18132	178	39974	40	28	565	22.24	190			175.9	1725	387.8
514-600-8-400	609.6	400	25524	250	56269	50	35	522	20.55	110	100	936	198.8	1950	438.4
515-600-8-400	609.6	400	25524	250	56269	50	35	600	23.62	180			220.7	2165	486.6
514-600-9-400	609.6	400	55135	541	121552	70	49	642	25.28	148	130	1000	336.7	3302	742.3
514-600-10-400	609.6	400	70330	690	155050	80	55	704	27.72	166	150	1034	481.9	4725	1062.3
514-600-11-400	609.6	400	90785	890	200144	90	60	785	30.91	194	190	1112	712.1	6983	1569.8
513-600-1-490	609.6	490	423	4.15	933	10	9	407	16.02	25	20	660	25.1	246	55.4
514-600-1-490	609.6	490	423	4.15	933	10	9	407	16.02	46	20	706	8.1	80	17.9
515-600-1-490	609.6	490	423	4.15	933	10	9	405	15.94	50			8.8	86	19.4
513-600-2-490	609.6	490	985	9.66	2172	10	9	407	16.02	25	30	667	27.6	271	60.9
514-600-2-490	609.6	490	985	9.66	2172	10	9	407	16.02	49	30	716	10.9	107	24.1
515-600-2-490	609.6	490	985	9.66	2172	10	9	405	15.94	80			17.0	167	37.4
513-600-3-490	609.6	490	2125	20.8	4684	15	12	426	16.77	30	40	692	38.6	378	85.0
514-600-3-490	609.6	490	2125	20.8	4684	15	12	413	16.26	57	40	764	29.6	290	65.2
515-600-3-490	609.6	490	2125	20.8	4684	15	12	425	16.73	100			36.7	360	81.0
513-600-4-490	609.6	490	4293	42.1	9465	20	16	455	17.91	40	50	706	56.4	553	124.3
514-600-4-490	609.6	490	4293	42.1	9465	20	16	424	16.69	63	50	784	42.7	418	94.1
515-600-4-490	609.6	490	4293	42.1	9465	20	16	460	18.11	100			49.1	481	108.2
513-600-5-490	609.6	490	6324	62	13942	25	20	470	18.50	50	50	724	74.9	734	165.1
514-600-5-490	609.6	490	6324	62	13942	25	20	429	16.89	69	50	818	64.3	631	141.8
515-600-5-490	609.6	490	6324	62	13942	25	20	480	18.90	100			60.2	591	132.8
514-600-6-490	609.6	490	12754	125	28117	35	25	455	17.91	86	70	850	96.3	944	212.2
515-600-6-490	609.6	490	12754	125	28117	35	25	530	20.87	120			104.6	1026	230.6
514-600-7-490	609.6	490	18132	178	39974	40	28	481	18.94	92	80	876	105.9	1039	233.5
515-600-7-490	609.6	490	18132	178	39974	40	28	545	21.46	180			160.6	1575	354.0
514-600-8-490	609.6	490	25524	250	56269	50	35	522	20.55	110	90	924	185.5	1819	408.8
515-600-8-490	609.6	490	25524	250	56269	50	35	590	23.23	180			214.0	2099	471.8
514-600-9-490	609.6	490	55135	541	121552	70	49	633	24.92	148	130	1000	331.2	3248	730.2
514-600-10-490	609.6	490	70330	690	155050	80	55	693	27.28	166	150	1034	471.6	4625	1039.8
514-600-11-490	609.6	490	90785	890	200144	90	60	777	30.59	194	170	1102	626.1	6140	1380.3

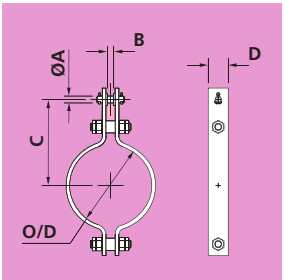
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 24" / 600mm



Type 513 Clamp



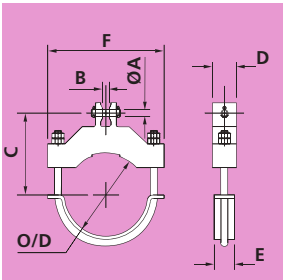
Type 514 Clamp



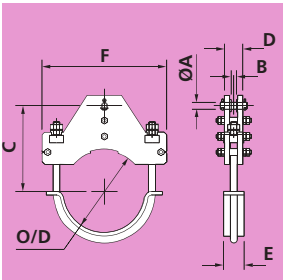
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-600-1-530	609.6	530	423	4.15	933	10	9	407	16.02	25	30	667	26.3	258	57.9
514-600-1-530	609.6	530	423	4.15	933	10	9	407	16.02	46	30	708	9.1	89	20.0
515-600-1-530	609.6	530	423	4.15	933	10	9	405	15.94	70			14.7	144	32.5
513-600-2-530	609.6	530	985	9.66	2172	10	9	407	16.02	25	30	678	28.9	283	63.7
514-600-2-530	609.6	530	985	9.66	2172	10	9	407	16.02	49	30	722	17.4	171	38.5
515-600-2-530	609.6	530	985	9.66	2172	10	9	405	15.94	80			21.3	209	46.9
513-600-3-530	609.6	530	2125	20.8	4684	15	12	419	16.50	40	50	706	50.5	495	111.3
514-600-3-530	609.6	530	2125	20.8	4684	15	12	413	16.26	57	50	768	42.7	419	94.1
515-600-3-530	609.6	530	2125	20.8	4684	15	12	425	16.73	100			36.7	360	81.0
513-600-4-530	609.6	530	4293	42.1	9465	20	16	448	17.64	50	50	724	70.0	687	154.4
514-600-4-530	609.6	530	4293	42.1	9465	20	16	423	16.65	63	50	792	61.4	602	135.3
515-600-4-530	609.6	530	4293	42.1	9465	20	16	460	18.11	120			58.7	576	129.5
513-600-5-530	609.6	530	6324	62	13942	25	20	463	18.23	60	70	745	91.7	899	202.1
514-600-5-530	609.6	530	6324	62	13942	25	20	450	17.72	69	70	824	76.2	747	167.9
515-600-5-530	609.6	530	6324	62	13942	25	20	480	18.90	120			72.1	707	158.9
514-600-6-530	609.6	530	12754	125	28117	35	25	479	18.86	86	80	860	91.0	892	200.6
515-600-6-530	609.6	530	12754	125	28117	35	25	530	20.87	140			121.6	1192	268.0
514-600-7-530	609.6	530	18132	178	39974	40	28	517	20.35	92	90	882	138.5	1358	305.3
515-600-7-530	609.6	530	18132	178	39974	40	28	545	21.46	200			177.9	1745	392.3
514-600-8-530	609.6	530	25524	250	56269	50	35	522	20.55	110	100	936	198.4	1945	437.3
515-600-8-530	609.6	530	25524	250	56269	50	35	590	23.23	180			214.0	2099	471.8
514-600-9-530	609.6	530	55135	541	121552	70	49	638	25.12	148	130	1000	334.6	3281	737.6
514-600-10-530	609.6	530	70330	690	155050	80	55	695	27.36	166	150	1034	475.9	4667	1049.1
514-600-11-530	609.6	530	90785	890	200144	90	60	777	30.59	194	170	1102	626.1	6140	1380.3
513-600-1-570	609.6	570	423	4.15	933	10	9	407	16.02	25	30	678	27.9	273	61.4
514-600-1-570	609.6	570	423	4.15	933	10	9	407	16.02	46	30	714	10.3	101	22.8
515-600-1-570	609.6	570	423	4	933	10	9	405	15.94	70			14.7	144.5	32.5
513-600-2-570	609.6	570	985	9.66	2172	10	9	407	16.02	30	40	692	36.3	356	79.9
514-600-2-570	609.6	570	985	9.66	2172	10	9	407	16.02	49	40	726	28.9	283	63.7
515-600-2-570	609.6	570	985	10	2172	10	9	405	15.94	100			26.6	260.6	58.6
513-600-3-570	609.6	570	2125	20.8	4684	15	12	420	16.54	50	50	724	64.7	635	142.7
514-600-3-570	609.6	570	2125	20.8	4684	15	12	421	16.57	57	50	776	54.4	534	120.0
515-600-3-570	609.6	570	2125	21	4684	15	12	435	17.13	90			41.7	409.4	92.0
513-600-4-570	609.6	570	4293	42.1	9465	20	16	448	17.64	60	70	745	87.8	861	193.6
514-600-4-570	609.6	570	4293	42.1	9465	20	16	447	17.60	63	70	798	69.1	678	152.4
515-600-4-570	609.6	570	4293	42	9465	20	16	465	18.31	110			63.9	626.4	140.8
513-600-5-570	609.6	570	6324	62	13942	25	20	464	18.27	70	80	770	112.6	1105	248.3
514-600-5-570	609.6	570	6324	62	13942	25	20	474	18.66	79	80	834	61.7	605	136.1
515-600-5-570	609.6	570	6324	62	13942	25	20	480	18.90	160			95.7	938.8	211.0
514-600-6-570	609.6	570	12754	125	28117	35	25	515	20.28	86	90	866	95.1	933	209.8
515-600-6-570	609.6	570	12754	125	28117	35	25	530	20.87	180			155.5	1525	342.8
514-600-7-570	609.6	570	18132	178	39974	40	28	517	20.35	92	100	894	146.4	1435	322.7
515-600-7-570	609.6	570	18132	178	39974	40	28	565	22.24	180			203.9	1999	449.5
514-600-8-570	609.6	570	25524	250	56269	50	35	558	21.97	110	120	944	229.3	2248	505.4
515-600-8-570	609.6	570	25524	250	56269	50	35	580	22.83	210			242.3	2376	534.1
514-600-9-570	609.6	570	55135	541	121552	70	49	664	26.14	148	130	1000	352.4	3456	777.0
514-600-10-570	609.6	570	70330	690	155050	80	55	720	28.35	166	150	1034	495.7	4861	1092.9
514-600-11-570	609.6	570	90785	890	200144	90	60	789	31.06	194	170	1102	640.3	6279	1411.5

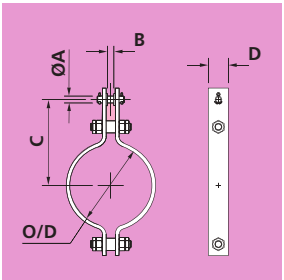
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 26" / 650mm



Type 513 Clamp



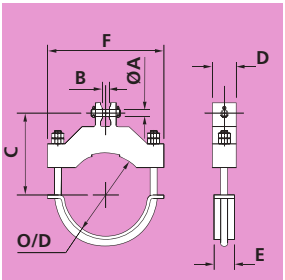
Type 514 Clamp



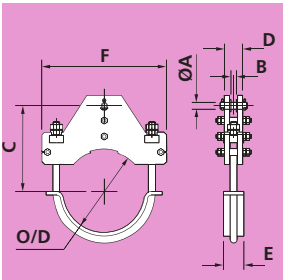
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-650-1-400	660.4	400	423	4.15	933	10	9	457	17.99	30	20	710	35.2	345	77.6
514-650-1-400	660.4	400	423	4.15	933	10	9	457	17.99	46	20	756	16.8	165	37.0
515-650-1-400	660.4	400	423	4.15	933	10	9	455	17.91	50			9.7	95	21.4
513-650-2-400	660.4	400	985	9.66	2172	10	9	457	17.99	30	30	717	38.3	376	84.5
514-650-2-400	660.4	400	985	9.66	2172	10	9	457	17.99	49	30	766	14.6	144	32.3
515-650-2-400	660.4	400	985	9.66	2172	10	9	455	17.91	80			23.5	231	51.9
513-650-3-400	660.4	400	2125	20.8	4684	15	12	464	18.27	30	40	742	44.7	439	98.6
514-650-3-400	660.4	400	2125	20.8	4684	15	12	463	18.23	57	40	814	18.9	185	41.7
515-650-3-400	660.4	400	2125	20.8	4684	15	12	460	18.11	100			40.0	392	88.2
513-650-4-400	660.4	400	4293	42.1	9465	20	16	485	19.09	40	50	756	64.4	631	141.9
514-650-4-400	660.4	400	4293	42.1	9465	20	16	474	18.66	63	50	834	28.6	280	63.0
515-650-4-400	660.4	400	4293	42.1	9465	20	16	495	19.49	110			58.8	576	129.5
513-650-5-400	660.4	400	6324	62	13942	25	20	500	19.69	50	50	774	85.2	835	187.8
514-650-5-400	660.4	400	6324	62	13942	25	20	479	18.86	69	50	868	47.5	466	104.7
515-650-5-400	660.4	400	6324	62	13942	25	20	510	20.08	110			71.6	702	157.9
514-650-6-400	660.4	400	12754	125	28117	35	25	504	19.84	86	80	910	89.0	873	196.3
515-650-6-400	660.4	400	12754	125	28117	35	25	565	22.24	140			131.8	1293	290.6
514-650-7-400	660.4	400	18132	178	39974	40	28	542	21.34	92	90	932	139.5	1368	307.5
515-650-7-400	660.4	400	18132	178	39974	40	28	590	23.23	200			194.4	1907	428.6
514-650-8-400	660.4	400	25524	250	56269	50	35	547	21.54	110	100	986	214.5	2104	472.9
515-650-8-400	660.4	400	25524	250	56269	50	35	625	24.61	190			243.8	2391	537.5
514-650-9-400	660.4	400	55135	541	121552	70	49	656	25.83	148	130	1050	344.6	3379	759.7
514-650-10-400	660.4	400	70330	690	155050	80	55	717	28.23	166	150	1084	462.0	4531	1018.5
514-650-11-400	660.4	400	90785	890	200144	90	60	800	31.50	194	190	1162	763.7	7489	1683.6
513-650-1-490	660.4	490	423	4.15	933	10	9	457	17.99	30	20	710	35.2	345	77.6
514-650-1-490	660.4	490	423	4.15	933	10	9	457	17.99	46	20	756	16.8	165	37.1
515-650-1-490	660.4	490	423	4.15	933	10	9	455	17.91	50			9.6	94	21.2
513-650-2-490	660.4	490	985	9.66	2172	10	9	457	17.99	30	30	717	38.3	376	84.5
514-650-2-490	660.4	490	985	9.66	2172	10	9	457	17.99	49	30	766	14.7	144	32.3
515-650-2-490	660.4	490	985	9.66	2172	10	9	455	17.91	80			23.2	228	51.2
513-650-3-490	660.4	490	2125	20.8	4684	15	12	464	18.27	30	40	742	44.5	437	98.2
514-650-3-490	660.4	490	2125	20.8	4684	15	12	463	18.23	57	40	814	18.9	186	41.7
515-650-3-490	660.4	490	2125	20.8	4684	15	12	460	18.11	100			39.5	387	87.1
513-650-4-490	660.4	490	4293	42.1	9465	20	16	484	19.06	40	50	756	64.0	628	141.1
514-650-4-490	660.4	490	4293	42.1	9465	20	16	474	18.66	63	50	834	28.6	280	63.0
515-650-4-490	660.4	490	4293	42.1	9465	20	16	485	19.09	110			57.2	561	126.2
513-650-5-490	660.4	490	6324	62	13942	25	20	499	19.65	50	50	774	84.7	831	186.8
514-650-5-490	660.4	490	6324	62	13942	25	20	479	18.86	69	50	868	47.6	466	104.9
515-650-5-490	660.4	490	6324	62	13942	25	20	505	19.88	110			70.1	688	154.6
514-650-6-490	660.4	490	12754	125	28117	35	25	494	19.45	86	70	900	87.7	860	193.3
515-650-6-490	660.4	490	12754	125	28117	35	25	555	21.85	130			119.4	1171	263.2
514-650-7-490	660.4	490	18132	178	39974	40	28	506	19.92	92	80	926	120.4	1180	265.3
515-650-7-490	660.4	490	18132	178	39974	40	28	570	22.44	190			178.3	1749	393.2
514-650-8-490	660.4	490	25524	250	56269	50	35	547	21.54	110	90	974	200.0	1962	441.0
515-650-8-490	660.4	490	25524	250	56269	50	35	620	24.41	180			226.2	2218	498.6
514-650-9-490	660.4	490	55135	541	121552	70	49	689	27.13	138	130	1050	338.8	3323	747.0
514-650-10-490	660.4	490	70330	690	155050	80	55	708	27.87	166	150	1084	455.5	4466	1004.1
514-650-11-490	660.4	490	90785	890	200144	90	60	793	31.22	194	170	1152	710.6	6968	1566.6

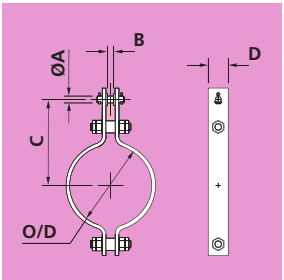
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 26" / 650mm



Type 513 Clamp



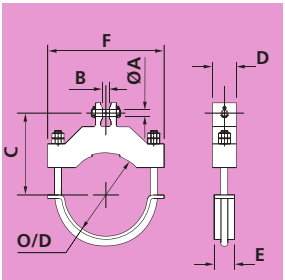
Type 514 Clamp



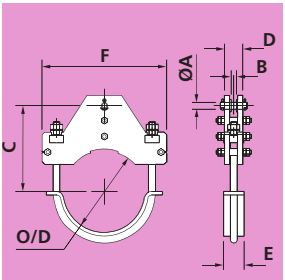
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-650-1-530	660.4	530	423	4.15	933	10	9	457	17.99	30	30	717	36.6	359	80.6
514-650-1-530	660.4	530	423	4.15	933	10	9	457	17.99	46	30	758	17.8	175	39.3
515-650-1-530	660.4	530	423	4.15	933	10	9	455	17.91	70			16.1	158	35.5
513-650-2-530	660.4	530	985	9.66	2172	10	9	457	17.99	30	30	728	39.8	390	87.7
514-650-2-530	660.4	530	985	9.66	2172	10	9	457	17.99	49	30	772	13.9	136	30.6
515-650-2-530	660.4	530	985	9.66	2172	10	9	455	17.91	80			23.2	228	51.2
513-650-3-530	660.4	530	2125	20.8	4684	15	12	464	18.27	40	50	756	59.0	579	130.1
514-650-3-530	660.4	530	2125	20.8	4684	15	12	462	18.19	57	50	818	27.3	268	60.3
515-650-3-530	660.4	530	2125	20.8	4684	15	12	460	18.11	100			39.5	387	87.1
513-650-4-530	660.4	530	4293	42.1	9465	20	16	476	18.74	50	50	774	79.1	775	174.3
514-650-4-530	660.4	530	4293	42.1	9465	20	16	473	18.62	63	50	842	49.0	481	108.1
515-650-4-530	660.4	530	4293	42.1	9465	20	16	495	19.49	100			63.0	618	138.9
513-650-5-530	660.4	530	6324	62	13942	25	20	492	19.37	60	70	795	103.1	1011	227.3
514-650-5-530	660.4	530	6324	62	13942	25	20	479	18.86	69	70	874	85.7	841	189.0
515-650-5-530	660.4	530	6324	62	13942	25	20	505	19.88	130			82.7	811	182.3
514-650-6-530	660.4	530	12754	125	28117	35	25	504	19.84	86	80	910	104.1	1021	229.4
515-650-6-530	660.4	530	12754	125	28117	35	25	555	21.85	150			137.3	1346	302.7
514-650-7-530	660.4	530	18132	178	39974	40	28	542	21.34	92	90	932	147.0	1442	324.1
515-650-7-530	660.4	530	18132	178	39974	40	28	570	22.44	210			196.7	1929	433.5
514-650-8-530	660.4	530	25524	250	56269	50	35	547	21.54	110	100	986	215.0	2108	473.9
515-650-8-530	660.4	530	25524	250	56269	50	35	620	24.41	190			238.3	2337	525.4
514-650-9-530	660.4	530	55135	541	121552	70	49	691	27.20	138	130	1050	340.0	3334	749.5
514-650-10-530	660.4	530	70330	690	155050	80	55	708	27.87	166	150	1084	455.7	4469	1004.6
514-650-11-530	660.4	530	90785	890	200144	90	60	793	31.22	194	170	1152	710.6	6968	1566.6
513-650-1-570	660.4	570	423	4.15	933	10	9	457	17.99	30	30	728	38.3	376	84.4
514-650-1-570	660.4	570	423	4.15	933	10	9	457	17.99	46	30	764	18.4	180	40.5
515-650-1-570	660.4	570	423	4	933	10	9	455	17.91	70			16.1	157.8	35.5
513-650-2-570	660.4	570	985	9.66	2172	10	9	457	17.99	30	40	742	42.9	420	94.5
514-650-2-570	660.4	570	985	9.66	2172	10	9	457	17.99	49	40	776	16.9	166	37.3
515-650-2-570	660.4	570	985	10	2172	10	9	455	17.91	100			38.7	379.4	85.3
513-650-3-570	660.4	570	2125	20.8	4684	15	12	464	18.27	50	50	774	75.4	739	166.2
514-650-3-570	660.4	570	2125	20.8	4684	15	12	463	18.23	57	50	826	47.5	466	104.8
515-650-3-570	660.4	570	2125	21	4684	15	12	460	18.11	90			44.5	436.4	98.1
513-650-4-570	660.4	570	4293	42.1	9465	20	16	476	18.74	60	70	795	99.3	974	219.0
514-650-4-570	660.4	570	4293	42.1	9465	20	16	472	18.58	63	70	848	74.4	729	163.9
515-650-4-570	660.4	570	4293	42	9465	20	16	490	19.29	110			67.9	666.1	149.7
513-650-5-570	660.4	570	6324	62	13942	25	20	492	19.37	70	80	820	126.2	1238	278.2
514-650-5-570	660.4	570	6324	62	13942	25	20	499	19.65	79	80	884	63.8	625	140.6
515-650-5-570	660.4	570	6324	62	13942	25	20	525	20.67	120			103.7	1016	228.5
514-650-6-570	660.4	570	12754	125	28117	35	25	540	21.26	86	90	916	105.1	1031	231.8
515-650-6-570	660.4	570	12754	125	28117	35	25	555	21.85	190			173.2	1698	381.8
514-650-7-570	660.4	570	18132	178	39974	40	28	542	21.34	92	100	944	161.8	1587	356.7
515-650-7-570	660.4	570	18132	178	39974	40	28	590	23.23	180			214.6	2105	473.2
514-650-8-570	660.4	570	25524	250	56269	50	35	583	22.95	110	120	994	244.4	2396	538.7
515-650-8-570	660.4	570	25524	250	56269	50	35	620	24.41	240			299.2	2934	659.5
514-650-9-570	660.4	570	55135	541	121552	70	49	679	26.73	148	130	1050	359.7	3527	792.9
514-650-10-570	660.4	570	70330	690	155050	80	55	734	28.90	166	150	1084	477.0	4677	1051.5
514-650-11-570	660.4	570	90785	890	200144	90	60	805	31.69	194	170	1152	719.6	7056	1586.3

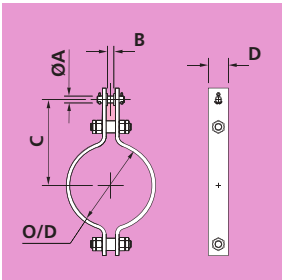
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 28" / 700mm



Type 513 Clamp



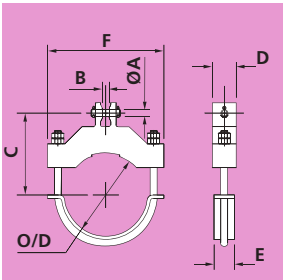
Type 514 Clamp



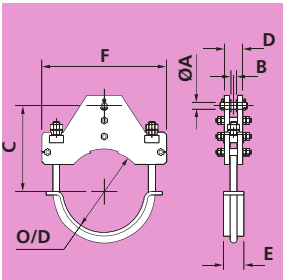
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-700-1-400	711.2	400	423	4.15	933	10	9	482	18.98	30	20	760	39.9	392	88.0
514-700-1-400	711.2	400	423	4.15	933	10	9	482	18.98	46	20	806	13.4	132	29.6
515-700-1-400	711.2	400	423	4.15	933	10	9	480	18.90	60			12.4	121	27.3
513-700-2-400	711.2	400	985	9.66	2172	10	9	482	18.98	30	30	767	43.2	423	95.1
514-700-2-400	711.2	400	985	9.66	2172	10	9	482	18.98	49	30	816	12.4	121	27.3
515-700-2-400	711.2	400	985	9.66	2172	10	9	480	18.90	80			25.0	245	55.1
513-700-3-400	711.2	400	2125	20.8	4684	15	12	489	19.25	30	40	792	49.9	490	110.1
514-700-3-400	711.2	400	2125	20.8	4684	15	12	488	19.21	57	40	864	22.0	215	48.4
515-700-3-400	711.2	400	2125	20.8	4684	15	12	485	19.09	100			42.4	416	93.6
513-700-4-400	711.2	400	4293	42.1	9465	20	16	514	20.24	40	50	806	72.0	706	158.8
514-700-4-400	711.2	400	4293	42.1	9465	20	16	499	19.65	63	50	884	35.7	350	78.8
515-700-4-400	711.2	400	4293	42.1	9465	20	16	520	20.47	120			67.7	663	149.1
513-700-5-400	711.2	400	6324	62	13942	25	20	530	20.87	50	50	824	95.5	937	210.6
514-700-5-400	711.2	400	6324	62	13942	25	20	504	19.84	69	50	918	60.5	593	133.3
515-700-5-400	711.2	400	6324	62	13942	25	20	550	21.65	130			91.9	901	202.6
514-700-6-400	711.2	400	12754	125	28117	35	25	529	20.83	86	80	960	126.0	1235	277.7
515-700-6-400	711.2	400	12754	125	28117	35	25	590	23.23	150			148.2	1453	326.8
514-700-7-400	711.2	400	18132	178	39974	40	28	567	22.32	92	90	982	170.9	1676	376.8
515-700-7-400	711.2	400	18132	178	39974	40	28	615	24.21	210			214.0	2099	471.8
514-700-8-400	711.2	400	25524	250	56269	50	35	572	22.52	110	100	1036	230.4	2260	508.0
515-700-8-400	711.2	400	25524	250	56269	50	35	655	25.79	200			269.8	2646	594.9
514-700-9-400	711.2	400	55135	541	121552	70	49	714	28.11	138	130	1100	377.8	3705	832.9
514-700-10-400	711.2	400	70330	690	155050	80	55	732	28.82	166	150	1134	473.1	4639	1043.0
514-700-11-400	711.2	400	90785	890	200144	90	60	816	32.13	194	190	1212	748.3	7338	1649.7
513-700-1-490	711.2	490	423	4.15	933	10	9	482	18.98	30	20	760	39.7	389	87.5
514-700-1-490	711.2	490	423	4.15	933	10	9	482	18.98	46	20	806	13.4	132	29.6
515-700-1-490	711.2	490	423	4.15	933	10	9	480	18.90	60			12.2	120	27.0
513-700-2-490	711.2	490	985	9.66	2172	10	9	482	18.98	30	30	767	43.2	423	95.1
514-700-2-490	711.2	490	985	9.66	2172	10	9	482	18.98	49	30	816	12.4	121	27.3
515-700-2-490	711.2	490	985	9.66	2172	10	9	480	18.90	80			24.7	242	54.5
513-700-3-490	711.2	490	2125	20.8	4684	15	12	489	19.25	30	40	792	49.7	488	109.6
514-700-3-490	711.2	490	2125	20.8	4684	15	12	488	19.21	57	40	864	22.0	215	48.4
515-700-3-490	711.2	490	2125	20.8	4684	15	12	485	19.09	100			41.9	411	92.5
513-700-4-490	711.2	490	4293	42.1	9465	20	16	512	20.16	40	50	806	71.8	704	158.3
514-700-4-490	711.2	490	4293	42.1	9465	20	16	499	19.65	63	50	884	35.8	351	78.8
515-700-4-490	711.2	490	4293	42.1	9465	20	16	510	20.08	110			60.6	594	133.6
513-700-5-490	711.2	490	6324	62	13942	25	20	528	20.79	50	50	824	94.9	930	209.1
514-700-5-490	711.2	490	6324	62	13942	25	20	504	19.84	69	50	918	60.5	594	133.5
515-700-5-490	711.2	490	6324	62	13942	25	20	530	20.87	110			74.2	727	163.5
514-700-6-490	711.2	490	12754	125	28117	35	25	519	20.43	86	70	950	101.2	992	223.0
515-700-6-490	711.2	490	12754	125	28117	35	25	585	23.03	140			136.0	1334	299.8
514-700-7-490	711.2	490	18132	178	39974	40	28	531	20.91	92	80	976	96.5	946	212.7
515-700-7-490	711.2	490	18132	178	39974	40	28	600	23.62	200			198.4	1946	437.5
514-700-8-490	711.2	490	25524	250	56269	50	35	572	22.52	110	90	1024	213.7	2096	471.1
515-700-8-490	711.2	490	25524	250	56269	50	35	645	25.39	190			249.8	2450	550.8
514-700-9-490	711.2	490	55135	541	121552	70	49	704	27.72	138	130	1100	371.9	3647	819.9
514-700-10-490	711.2	490	70330	690	155050	80	55	763	30.04	156	150	1134	465.1	4562	1025.5
514-700-11-490	711.2	490	90785	890	200144	90	60	806	31.73	194	170	1202	684.4	6712	1508.8

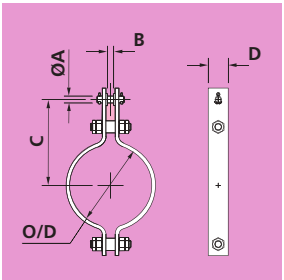
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 28" / 700mm



Type 513 Clamp



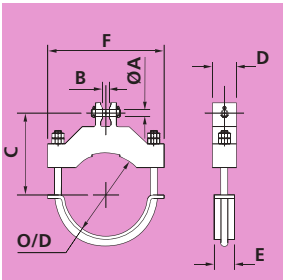
Type 514 Clamp



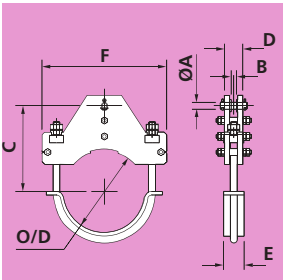
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-700-1-530	711.2	530	423	4.15	933	10	9	482	18.98	30	30	767	41.1	403	90.7
514-700-1-530	711.2	530	423	4.15	933	10	9	482	18.98	46	30	808	14.5	143	32.0
515-700-1-530	711.2	530	423	4.15	933	10	9	480	18.90	70			17.1	168	37.7
513-700-2-530	711.2	530	985	9.66	2172	10	9	482	18.98	30	30	778	44.7	439	98.6
514-700-2-530	711.2	530	985	9.66	2172	10	9	482	18.98	49	30	822	14.1	138	31.1
515-700-2-530	711.2	530	985	9.66	2172	10	9	480	18.90	80			24.7	242	54.5
513-700-3-530	711.2	530	2125	20.8	4684	15	12	489	19.25	40	50	806	65.9	646	145.3
514-700-3-530	711.2	530	2125	20.8	4684	15	12	487	19.17	57	50	868	36.7	360	80.8
515-700-3-530	711.2	530	2125	20.8	4684	15	12	485	19.09	100			41.9	411	92.5
513-700-4-530	711.2	530	4293	42.1	9465	20	16	504	19.84	50	50	824	88.7	870	195.6
514-700-4-530	711.2	530	4293	42.1	9465	20	16	498	19.61	63	50	892	62.6	614	137.9
515-700-4-530	711.2	530	4293	42.1	9465	20	16	520	20.47	100			66.7	654	147.0
513-700-5-530	711.2	530	6324	62	13942	25	20	520	20.47	60	70	845	115.2	1129	253.9
514-700-5-530	711.2	530	6324	62	13942	25	20	504	19.84	69	70	924	92.5	907	204.0
515-700-5-530	711.2	530	6324	62	13942	25	20	530	20.87	130			87.5	858	192.8
514-700-6-530	711.2	530	12754	125	28117	35	25	529	20.83	86	80	960	92.2	904	203.3
515-700-6-530	711.2	530	12754	125	28117	35	25	585	23.03	160			155.0	1520	341.8
514-700-7-530	711.2	530	18132	178	39974	40	28	567	22.32	102	90	982	121.0	1187	266.8
515-700-7-530	711.2	530	18132	178	39974	40	28	620	24.41	180			227.0	2226	500.3
514-700-8-530	711.2	530	25524	250	56269	50	35	572	22.52	110	100	1036	230.9	2264	509.0
515-700-8-530	711.2	530	25524	250	56269	50	35	645	25.39	200			262.6	2575	578.9
514-700-9-530	711.2	530	55135	541	121552	70	49	705	27.76	138	130	1100	372.8	3656	821.8
514-700-10-530	711.2	530	70330	690	155050	80	55	763	30.04	156	150	1134	465.1	4562	1025.5
514-700-11-530	711.2	530	90785	890	200144	90	60	806	31.73	194	170	1202	684.4	6712	1508.8
513-700-1-570	711.2	570	423	4.15	933	10	9	482	18.98	30	30	778	43.2	423	95.2
514-700-1-570	711.2	570	423	4.15	933	10	9	482	18.98	46	30	814	15.4	151	33.9
515-700-1-570	711.2	570	423	4	933	10	9	480	18.9	80			19.6	191.8	43.1
513-700-2-570	711.2	570	985	9.66	2172	10	9	482	18.98	30	40	792	48.0	471	105.8
514-700-2-570	711.2	570	985	9.66	2172	10	9	482	18.98	49	40	826	21.3	208	46.8
515-700-2-570	711.2	570	985	10	2172	10	9	480	18.9	100			41.2	403.7	90.8
513-700-3-570	711.2	570	2125	20.8	4684	15	12	489	19.25	50	50	824	84.1	825	185.4
514-700-3-570	711.2	570	2125	20.8	4684	15	12	488	19.21	57	50	876	59.1	580	130.3
515-700-3-570	711.2	570	2125	21	4684	15	12	485	19.09	90			47.3	463.5	104.2
513-700-4-570	711.2	570	4293	42.1	9465	20	16	503	19.80	60	70	845	110.6	1084	243.8
514-700-4-570	711.2	570	4293	42.1	9465	20	16	497	19.57	63	70	898	79.4	779	175.1
515-700-4-570	711.2	570	4293	42	9465	20	16	520	20.47	120			79.8	782.7	176.0
513-700-5-570	711.2	570	6324	62	13942	25	20	520	20.47	70	80	870	140.6	1378	309.9
514-700-5-570	711.2	570	6324	62	13942	25	20	524	20.63	79	80	934	134.9	1323	297.4
515-700-5-570	711.2	570	6324	62	13942	25	20	550	21.65	120			109.5	1073	241.3
514-700-6-570	711.2	570	12754	125	28117	35	25	565	22.24	96	90	966	110.4	1083	243.4
515-700-6-570	711.2	570	12754	125	28117	35	25	585	23.03	210			202.6	1987	446.6
514-700-7-570	711.2	570	18132	178	39974	40	28	567	22.32	102	100	994	187.5	1838	413.3
515-700-7-570	711.2	570	18132	178	39974	40	28	620	24.41	180			227.0	2226	500.3
514-700-8-570	711.2	570	25524	250	56269	50	35	608	23.94	110	120	1044	255.2	2503	562.7
515-700-8-570	711.2	570	25524	250	56269	50	35	645	25.39	250			326.5	3201	719.7
514-700-9-570	711.2	570	55135	541	121552	70	49	692	27.24	148	130	1100	401.6	3938	885.3
514-700-10-570	711.2	570	70330	690	155050	80	55	748	29.45	166	150	1134	488.8	4794	1077.7
514-700-11-570	711.2	570	90785	890	200144	90	60	820	32.28	194	170	1202	698.8	6853	1540.5

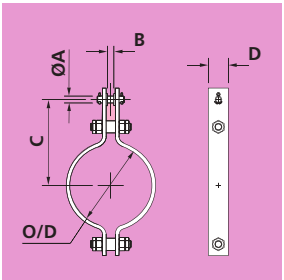
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 30" / 750mm



Type 513 Clamp



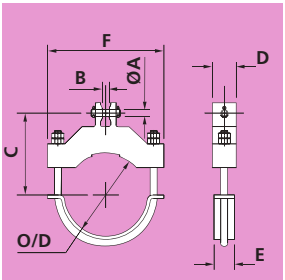
Type 514 Clamp



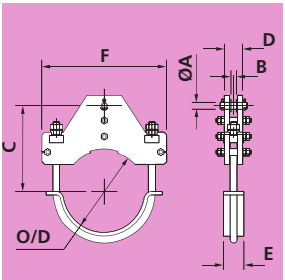
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-750-1-400	762	400	423	4.15	933	10	9	508	20.00	35	20	812	51.9	509	114.4
514-750-1-400	762	400	423	4.15	933	10	9	508	20.00	56	20	858	14.1	138	31.0
515-750-1-400	762	400	423	4.15	933	10	9	505	19.88	60			13.2	129	29.0
513-750-2-400	762	400	985	9.66	2172	10	9	508	20.00	35	30	819	55.7	546	122.8
514-750-2-400	762	400	985	9.66	2172	10	9	508	20.00	59	30	868	15.0	147	33.0
515-750-2-400	762	400	985	9.66	2172	10	9	505	19.88	80			26.5	260	58.5
513-750-3-400	762	400	2125	20.8	4684	15	12	515	20.28	35	40	844	63.3	620	139.5
514-750-3-400	762	400	2125	20.8	4684	15	12	514	20.24	67	40	916	27.9	274	61.5
515-750-3-400	762	400	2125	20.8	4684	15	12	515	20.28	100			45.9	450	101.1
513-750-4-400	762	400	4293	42.1	9465	20	16	544	21.42	40	50	858	80.9	793	178.3
514-750-4-400	762	400	4293	42.1	9465	20	16	525	20.67	73	50	936	42.0	412	92.7
515-750-4-400	762	400	4293	42.1	9465	20	16	560	22.05	100			72.5	711	159.7
513-750-5-400	762	400	6324	62	13942	25	20	560	22.05	50	50	876	106.5	1045	234.8
514-750-5-400	762	400	6324	62	13942	25	20	530	20.87	79	50	970	68.1	668	150.1
515-750-5-400	762	400	6324	62	13942	25	20	575	22.64	130			96.7	948	213.1
514-750-6-400	762	400	12754	125	28117	35	25	555	21.85	86	80	1012	142.7	1400	314.6
515-750-6-400	762	400	12754	125	28117	35	25	635	25.00	160			171.5	1682	378.1
514-750-7-400	762	400	18132	178	39974	40	28	593	23.35	92	90	1034	182.9	1794	403.3
515-750-7-400	762	400	18132	178	39974	40	28	665	26.18	180			245.6	2408	541.4
514-750-8-400	762	400	25524	250	56269	50	35	598	23.54	110	100	1088	246.4	2417	543.3
515-750-8-400	762	400	25524	250	56269	50	35	680	26.77	210			295.7	2900	652.0
514-750-9-400	762	400	55135	541	121552	70	49	728	28.66	138	130	1152	439.6	4311	969.2
514-750-10-400	762	400	70330	690	155050	80	55	789	31.06	156	150	1186	518.7	5087	1143.6
514-750-11-400	762	400	90785	890	200144	90	60	831	32.72	194	190	1264	732.1	7180	1614.1
513-750-1-490	762	490	423	4.15	933	10	9	508	20.00	35	20	812	51.6	506	113.8
514-750-1-490	762	490	423	4.15	933	10	9	508	20.00	56	20	858	14.1	138	31.0
515-750-1-490	762	490	423	4.15	933	10	9	505	19.88	60			13.0	127	28.6
513-750-2-490	762	490	985	9.66	2172	10	9	508	20.00	35	30	819	55.7	546	122.8
514-750-2-490	762	490	985	9.66	2172	10	9	508	20.00	59	30	868	15.0	147	33.0
515-750-2-490	762	490	985	9.66	2172	10	9	505	19.88	80			26.2	257	57.8
513-750-3-490	762	490	2125	20.8	4684	15	12	515	20.28	35	40	844	63.0	618	138.9
514-750-3-490	762	490	2125	20.8	4684	15	12	514	20.24	67	40	916	27.9	274	61.5
515-750-3-490	762	490	2125	20.8	4684	15	12	510	20.08	100			44.5	436	98.0
513-750-4-490	762	490	4293	42.1	9465	20	16	542	21.34	40	50	858	80.4	788	177.2
514-750-4-490	762	490	4293	42.1	9465	20	16	525	20.67	73	50	936	42.1	413	92.7
515-750-4-490	762	490	4293	42.1	9465	20	16	535	21.06	120			69.8	684	153.8
513-750-5-490	762	490	6324	62	13942	25	20	558	21.97	50	50	876	105.8	1038	233.3
514-750-5-490	762	490	6324	62	13942	25	20	530	20.87	79	50	970	68.1	668	150.2
515-750-5-490	762	490	6324	62	13942	25	20	560	22.05	120			85.8	841	189.2
514-750-6-490	762	490	12754	125	28117	35	25	545	21.46	86	70	1002	140.6	1379	309.9
515-750-6-490	762	490	12754	125	28117	35	25	610	24.02	150			152.9	1499	337.0
514-750-7-490	762	490	18132	178	39974	40	28	557	21.93	92	80	1028	97.9	960	215.9
515-750-7-490	762	490	18132	178	39974	40	28	625	24.61	210			218.6	2143	481.9
514-750-8-490	762	490	25524	250	56269	50	35	598	23.54	110	90	1076	228.8	2244	504.4
515-750-8-490	762	490	25524	250	56269	50	35	670	26.38	190			261.5	2564	576.4
514-750-9-490	762	490	55135	541	121552	70	49	717	28.23	138	130	1152	434.1	4257	956.9
514-750-10-490	762	490	70330	690	155050	80	55	778	30.63	156	150	1186	511.1	5012	1126.8
514-750-11-490	762	490	90785	890	200144	90	60	822	32.36	194	170	1254	670.7	6577	1478.5

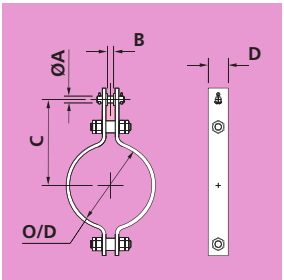
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 30" / 750mm



Type 513 Clamp



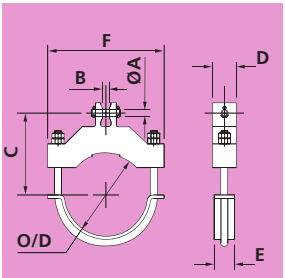
Type 514 Clamp



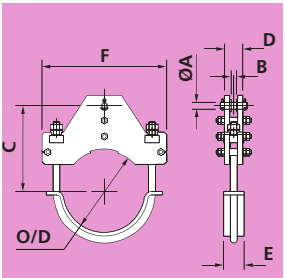
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-750-1-530	762	530	423	4.15	933	10	9	508	20.00	35	30	819	53.2	522	117.3
514-750-1-530	762	530	423	4.15	933	10	9	508	20.00	56	30	860	15.3	150	33.7
515-750-1-530	762	530	423	4.15	933	10	9	505	19.88	70			18.2	178	40.1
513-750-2-530	762	530	985	9.66	2172	10	9	508	20.00	35	30	830	57.5	564	126.7
514-750-2-530	762	530	985	9.66	2172	10	9	508	20.00	59	30	874	18.0	176	39.6
515-750-2-530	762	530	985	9.66	2172	10	9	505	19.88	80			26.2	257	57.8
513-750-3-530	762	530	2125	20.8	4684	15	12	515	20.28	40	50	858	73.6	722	162.4
514-750-3-530	762	530	2125	20.8	4684	15	12	513	20.20	67	50	920	43.4	426	95.8
515-750-3-530	762	530	2125	20.8	4684	15	12	510	20.08	100			44.5	436	98.0
513-750-4-530	762	530	4293	42.1	9465	20	16	533	20.98	50	50	876	99.1	972	218.6
514-750-4-530	762	530	4293	42.1	9465	20	16	524	20.63	73	50	944	74.0	726	163.2
515-750-4-530	762	530	4293	42.1	9465	20	16	550	21.65	100			70.9	695	156.2
513-750-5-530	762	530	6324	62	13942	25	20	550	21.65	60	70	897	128.3	1258	282.9
514-750-5-530	762	530	6324	62	13942	25	20	530	20.87	79	70	976	108.5	1064	239.1
515-750-5-530	762	530	6324	62	13942	25	20	560	22.05	140			99.9	980	220.3
514-750-6-530	762	530	12754	125	28117	35	25	555	21.85	86	80	1012	97.1	952	214.1
515-750-6-530	762	530	12754	125	28117	35	25	610	24.02	160			162.9	1597	359.1
514-750-7-530	762	530	18132	178	39974	40	28	593	23.35	102	90	1034	133.6	1310	294.4
515-750-7-530	762	530	18132	178	39974	40	28	645	25.39	180			238.0	2334	524.7
514-750-8-530	762	530	25524	250	56269	50	35	598	23.54	110	100	1088	246.9	2421	544.3
515-750-8-530	762	530	25524	250	56269	50	35	670	26.38	210			288.2	2827	635.5
514-750-9-530	762	530	55135	541	121552	70	49	718	28.27	138	130	1152	434.7	4263	958.3
514-750-10-530	762	530	70330	690	155050	80	55	778	30.63	156	150	1186	511.1	5012	1126.8
514-750-11-530	762	530	90785	890	200144	90	60	822	32.36	194	170	1254	670.7	6577	1478.5
513-750-1-570	762	570	423	4.15	933	10	9	508	20.00	35	30	830	55.5	545	122.5
514-750-1-570	762	570	423	4.15	933	10	9	508	20.00	56	30	866	16.9	166	37.3
515-750-1-570	762	570	423	4	933	10	9	505	19.88	80			20.8	203.6	45.8
513-750-2-570	762	570	985	9.66	2172	10	9	508	20.00	35	40	844	60.8	597	134.1
514-750-2-570	762	570	985	9.66	2172	10	9	508	20.00	59	40	878	27.4	268	60.3
515-750-2-570	762	570	985	10	2172	10	9	505	19.88	100			43.7	428.1	96.2
513-750-3-570	762	570	2125	20.8	4684	15	12	515	20.28	50	50	876	93.8	920	206.9
514-750-3-570	762	570	2125	20.8	4684	15	12	514	20.24	67	50	928	70.1	688	154.6
515-750-3-570	762	570	2125	21	4684	15	12	510	20.08	90			50.1	490.9	110.4
513-750-4-570	762	570	4293	42.1	9465	20	16	532	20.94	60	70	897	123.3	1209	271.8
514-750-4-570	762	570	4293	42.1	9465	20	16	523	20.59	73	70	950	117.5	1152	259.0
515-750-4-570	762	570	4293	42	9465	20	16	550	21.65	130			91.9	900.8	202.5
513-750-5-570	762	570	6324	62	13942	25	20	549	21.61	70	80	922	156.0	1530	344.0
514-750-5-570	762	570	6324	62	13942	25	20	550	21.65	79	80	986	147.3	1444	324.6
515-750-5-570	762	570	6324	62	13942	25	20	580	22.83	120			116.2	1139	256.1
514-750-6-570	762	570	12754	125	28117	35	25	591	23.27	96	90	1018	113.9	1117	251.2
515-750-6-570	762	570	12754	125	28117	35	25	610	24.02	210			212.9	2088	469.3
514-750-7-570	762	570	18132	178	39974	40	28	593	23.35	102	100	1046	207.8	2038	458.1
515-750-7-570	762	570	18132	178	39974	40	28	645	25.39	180			238.0	2334	524.7
514-750-8-570	762	570	25524	250	56269	50	35	634	24.96	110	120	1096	270.2	2650	595.8
515-750-8-570	762	570	25524	250	56269	50	35	670	26.38	260			355.2	3483	783.0
514-750-9-570	762	570	55135	541	121552	70	49	707	27.83	148	130	1152	467.2	4581	1029.9
514-750-10-570	762	570	70330	690	155050	80	55	762	30.00	166	150	1186	543.0	5325	1197.2
514-750-11-570	762	570	90785	890	200144	90	60	835	32.87	194	170	1254	683.9	6706	1507.7

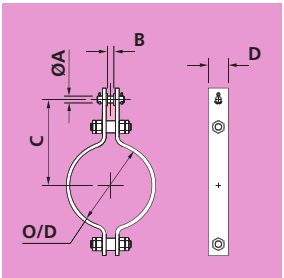
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 32" / 800mm



Type 513 Clamp



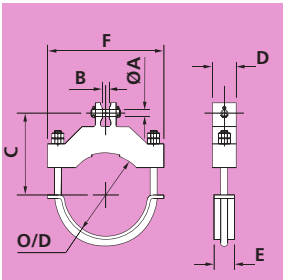
Type 514 Clamp



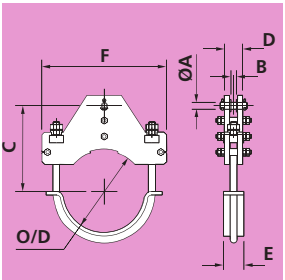
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-800-1-400	812.8	400	423	4.15	933	10	9	534	21.02	35	20	864	57.8	567	127.5
514-800-1-400	812.8	400	423	4.15	933	10	9	534	21.02	56	20	910	13.7	135	30.3
515-800-1-400	812.8	400	423	4.15	933	10	9	530	20.87	60			13.9	136	30.7
513-800-2-400	812.8	400	985	9.66	2172	10	9	534	21.02	35	30	871	62.2	610	137.1
514-800-2-400	812.8	400	985	9.66	2172	10	9	534	21.02	59	30	920	15.9	156	35.1
515-800-2-400	812.8	400	985	9.66	2172	10	9	530	20.87	80			28.0	275	61.7
513-800-3-400	812.8	400	2125	20.8	4684	15	12	541	21.30	35	40	896	70.1	688	154.6
514-800-3-400	812.8	400	2125	20.8	4684	15	12	541	21.30	67	40	968	34.5	339	76.1
515-800-3-400	812.8	400	2125	20.8	4684	15	12	540	21.26	100			48.4	474	106.6
513-800-4-400	812.8	400	4293	42.1	9465	20	16	575	22.64	40	50	910	90.1	883	198.6
514-800-4-400	812.8	400	4293	42.1	9465	20	16	551	21.69	73	50	988	53.9	529	118.9
515-800-4-400	812.8	400	4293	42.1	9465	20	16	585	23.03	100			76.2	747	168.0
513-800-5-400	812.8	400	6324	62	13942	25	20	592	23.31	50	50	928	118.5	1162	261.2
514-800-5-400	812.8	400	6324	62	13942	25	20	557	21.93	79	50	1022	83.8	821	184.6
515-800-5-400	812.8	400	6324	62	13942	25	20	600	23.62	140			109.1	1070	240.6
514-800-6-400	812.8	400	12754	125	28117	35	25	583	22.95	86	80	1064	153.7	1507	338.8
515-800-6-400	812.8	400	12754	125	28117	35	25	660	25.98	170			190.3	1866	419.6
514-800-7-400	812.8	400	18132	178	39974	40	28	621	24.45	92	90	1086	197.2	1934	434.7
515-800-7-400	812.8	400	18132	178	39974	40	28	700	27.56	180			263.1	2580	580.1
514-800-8-400	812.8	400	25524	250	56269	50	35	626	24.65	110	100	1140	263.9	2588	581.7
515-800-8-400	812.8	400	25524	250	56269	50	35	705	27.76	220			322.7	3165	711.4
514-800-9-400	812.8	400	55135	541	121552	70	49	740	29.13	138	130	1204	497.0	4874	1095.8
514-800-10-400	812.8	400	70330	690	155050	80	55	802	31.57	156	150	1238	593.5	5820	1308.4
514-800-11-400	812.8	400	90785	890	200144	90	60	845	33.27	194	190	1316	751.2	7367	1656.2
513-800-1-490	812.8	490	423	4.15	933	10	9	534	21.02	35	20	864	57.8	567	127.5
514-800-1-490	812.8	490	423	4.15	933	10	9	534	21.02	56	20	910	13.8	135	30.3
515-800-1-490	812.8	490	423	4.15	933	10	9	530	20.87	60			13.7	135	30.3
513-800-2-490	812.8	490	985	9.66	2172	10	9	534	21.02	35	30	871	61.9	607	136.5
514-800-2-490	812.8	490	985	9.66	2172	10	9	534	21.02	59	30	920	15.9	156	35.1
515-800-2-490	812.8	490	985	9.66	2172	10	9	530	20.87	80			27.7	272	61.1
513-800-3-490	812.8	490	2125	20.8	4684	15	12	541	21.30	35	40	896	69.9	685	154.0
514-800-3-490	812.8	490	2125	20.8	4684	15	12	541	21.30	67	40	968	34.5	339	76.2
515-800-3-490	812.8	490	2125	20.8	4684	15	12	535	21.06	100			46.9	460	103.5
513-800-4-490	812.8	490	4293	42.1	9465	20	16	574	22.60	40	50	910	89.7	879	197.7
514-800-4-490	812.8	490	4293	42.1	9465	20	16	551	21.69	73	50	988	53.9	529	118.9
515-800-4-490	812.8	490	4293	42.1	9465	20	16	565	22.24	120			74.0	725	163.1
513-800-5-490	812.8	490	6324	62	13942	25	20	590	23.23	50	50	928	117.7	1154	259.5
514-800-5-490	812.8	490	6324	62	13942	25	20	557	21.93	79	50	1022	83.8	822	184.8
515-800-5-490	812.8	490	6324	62	13942	25	20	585	23.03	120			90.3	885	199.0
514-800-6-490	812.8	490	12754	125	28117	35	25	571	22.48	86	70	1054	153.1	1501	337.4
515-800-6-490	812.8	490	12754	125	28117	35	25	635	25.00	150			160.3	1572	353.4
514-800-7-490	812.8	490	18132	178	39974	40	28	585	23.03	92	80	1080	102.1	1001	225.0
515-800-7-490	812.8	490	18132	178	39974	40	28	650	25.59	220			239.6	2349	528.2
514-800-8-490	812.8	490	25524	250	56269	50	35	626	24.65	110	90	1128	239.9	2353	528.9
515-800-8-490	812.8	490	25524	250	56269	50	35	700	27.56	200			288.5	2830	636.1
514-800-9-490	812.8	490	55135	541	121552	70	49	731	28.78	138	130	1204	487.8	4784	1075.4
514-800-10-490	812.8	490	70330	690	155050	80	55	792	31.18	156	150	1238	580.4	5692	1279.6
514-800-11-490	812.8	490	90785	890	200144	90	60	837	32.95	194	170	1306	689.0	6757	1519.0

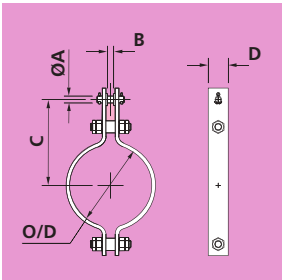
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 32" / 800mm



Type 513 Clamp



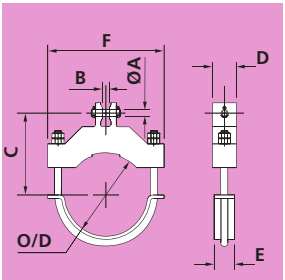
Type 514 Clamp



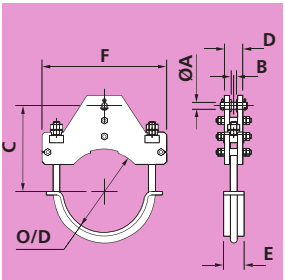
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-800-1-530	812.8	530	423	4.15	933	10	9	534	21.02	35	30	871	59.6	584	131.4
514-800-1-530	812.8	530	423	4.15	933	10	9	534	21.02	56	30	912	15.0	147	33.1
515-800-1-530	812.8	530	423	4.15	933	10	9	530	20.87	70			19.2	189	42.4
513-800-2-530	812.8	530	985	9.66	2172	10	9	534	21.02	35	30	882	64.0	628	141.2
514-800-2-530	812.8	530	985	9.66	2172	10	9	534	21.02	59	30	926	21.5	211	47.4
515-800-2-530	812.8	530	985	9.66	2172	10	9	530	20.87	80			27.7	272	61.1
513-800-3-530	812.8	530	2125	20.8	4684	15	12	541	21.30	40	50	910	81.9	803	180.5
514-800-3-530	812.8	530	2125	20.8	4684	15	12	541	21.30	67	50	972	51.8	508	114.3
515-800-3-530	812.8	530	2125	20.8	4684	15	12	535	21.06	100			46.9	460	103.5
513-800-4-530	812.8	530	4293	42.1	9465	20	16	564	22.20	50	50	928	110.1	1080	242.8
514-800-4-530	812.8	530	4293	42.1	9465	20	16	550	21.65	73	50	996	90.2	885	198.9
515-800-4-530	812.8	530	4293	42.1	9465	20	16	575	22.64	100			74.6	731	164.4
513-800-5-530	812.8	530	6324	62	13942	25	20	581	22.87	60	70	949	142.5	1397	314.1
514-800-5-530	812.8	530	6324	62	13942	25	20	557	21.93	79	70	1028	125.6	1232	276.9
515-800-5-530	812.8	530	6324	62	13942	25	20	585	23.03	140			105.2	1031	231.8
514-800-6-530	812.8	530	12754	125	28117	35	25	583	22.95	86	80	1064	112.0	1099	247.0
515-800-6-530	812.8	530	12754	125	28117	35	25	635	25.00	170			181.3	1778	399.7
514-800-7-530	812.8	530	18132	178	39974	40	28	621	24.45	102	90	1086	143.2	1404	315.6
515-800-7-530	812.8	530	18132	178	39974	40	28	675	26.57	180			250.3	2455	551.8
514-800-8-530	812.8	530	25524	250	56269	50	35	626	24.65	110	100	1140	264.3	2592	582.7
515-800-8-530	812.8	530	25524	250	56269	50	35	700	27.56	220			316.7	3105	698.1
514-800-9-530	812.8	530	55135	541	121552	70	49	731	28.78	138	130	1204	491.2	4817	1083.0
514-800-10-530	812.8	530	70330	690	155050	80	55	792	31.18	156	150	1238	580.4	5692	1279.6
514-800-11-530	812.8	530	90785	890	200144	90	60	837	32.95	194	170	1306	689.0	6757	1519.0
513-800-1-570	812.8	570	423	4.15	933	10	9	534	21.02	35	30	882	62.0	608	136.8
514-800-1-570	812.8	570	423	4.15	933	10	9	534	21.02	56	30	918	16.8	164	36.9
515-800-1-570	812.8	570	423	4	933	10	9	530	20.87	80			22.0	215.3	48.4
513-800-2-570	812.8	570	985	9.66	2172	10	9	534	21.02	35	40	896	67.6	663	149.0
514-800-2-570	812.8	570	985	9.66	2172	10	9	534	21.02	59	40	930	36.8	361	81.2
515-800-2-570	812.8	570	985	10	2172	10	9	530	20.87	100			46.3	454	102.1
513-800-3-570	812.8	570	2125	20.8	4684	15	12	541	21.30	50	50	928	103.8	1018	228.8
514-800-3-570	812.8	570	2125	20.8	4684	15	12	541	21.30	67	50	980	86.5	848	190.7
515-800-3-570	812.8	570	2125	21	4684	15	12	540	21.26	90			53.2	521.8	117.3
513-800-4-570	812.8	570	4293	42.1	9465	20	16	563	22.17	60	70	949	136.7	1341	301.4
514-800-4-570	812.8	570	4293	42.1	9465	20	16	551	21.69	73	70	1002	131.2	1287	289.3
515-800-4-570	812.8	570	4293	42	9465	20	16	575	22.64	130			96.7	948.2	213.2
513-800-5-570	812.8	570	6324	62	13942	25	20	580	22.83	70	80	974	172.3	1690	379.9
514-800-5-570	812.8	570	6324	62	13942	25	20	578	22.76	79	80	1038	159.9	1568	352.5
515-800-5-570	812.8	570	6324	62	13942	25	20	605	23.82	120			122.1	1197	269.1
514-800-6-570	812.8	570	12754	125	28117	35	25	619	24.37	96	90	1070	119.0	1167	262.3
515-800-6-570	812.8	570	12754	125	28117	35	25	635	25	210			223.3	2190	492.3
514-800-7-570	812.8	570	18132	178	39974	40	28	621	24.45	102	100	1098	222.5	2182	490.6
515-800-7-570	812.8	570	18132	178	39974	40	28	675	26.57	190			264.0	2589	581.9
514-800-8-570	812.8	570	25524	250	56269	50	35	662	26.06	110	120	1148	276.3	2710	609.2
515-800-8-570	812.8	570	25524	250	56269	50	35	700	27.56	270			387.0	3795	853.2
514-800-9-570	812.8	570	55135	541	121552	70	49	759	29.88	138	130	1204	507.6	4978	1119.0
514-800-10-570	812.8	570	70330	690	155050	80	55	813	32.01	156	150	1238	598.0	5865	1318.4
514-800-11-570	812.8	570	90785	890	200144	90	60	850	33.46	194	170	1306	703.5	6899	1551.0

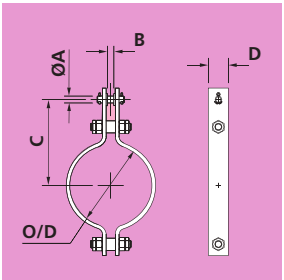
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 34" / 850mm



Type 513 Clamp



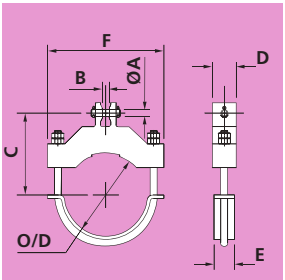
Type 514 Clamp



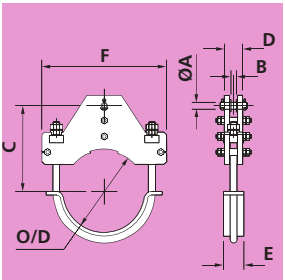
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-850-1-400	863.6	400	423	4.15	933	10	9	559	22.01	35	20	914	64.5	633	142.3
514-850-1-400	863.6	400	423	4.15	933	10	9	559	22.01	56	20	960	16.0	157	35.3
515-850-1-400	863.6	400	423	4.15	933	10	9	555	21.85	70			20.5	201	45.1
513-850-2-400	863.6	400	985	9.66	2172	10	9	559	22.01	35	30	921	68.8	674	151.6
514-850-2-400	863.6	400	985	9.66	2172	10	9	559	22.01	59	30	970	20.9	205	46.0
515-850-2-400	863.6	400	985	9.66	2172	10	9	555	21.85	80			29.5	289	65.0
513-850-3-400	863.6	400	2125	20.8	4684	15	12	566	22.28	35	40	946	77.4	759	170.5
514-850-3-400	863.6	400	2125	20.8	4684	15	12	566	22.28	67	40	1018	45.9	450	101.3
515-850-3-400	863.6	400	2125	20.8	4684	15	12	565	22.24	100			50.8	498	112.0
513-850-4-400	863.6	400	4293	42.1	9465	20	16	604	23.78	40	50	960	99.4	975	219.1
514-850-4-400	863.6	400	4293	42.1	9465	20	16	576	22.68	73	50	1038	71.0	697	156.6
515-850-4-400	863.6	400	4293	42.1	9465	20	16	610	24.02	100			79.9	783	176.1
513-850-5-400	863.6	400	6324	62	13942	25	20	620	24.41	50	50	978	130.6	1280	287.8
514-850-5-400	863.6	400	6324	62	13942	25	20	582	22.91	79	50	1072	104.6	1026	230.6
515-850-5-400	863.6	400	6324	62	13942	25	20	625	24.61	140			114.3	1121	252.0
514-850-6-400	863.6	400	12754	125	28117	35	25	608	23.94	86	80	1114	170.0	1668	374.9
515-850-6-400	863.6	400	12754	125	28117	35	25	685	26.97	170			198.6	1947	437.7
514-850-7-400	863.6	400	18132	178	39974	40	28	646	25.43	92	90	1136	209.6	2055	462.1
515-850-7-400	863.6	400	18132	178	39974	40	28	725	28.54	180			274.0	2687	604.1
514-850-8-400	863.6	400	25524	250	56269	50	35	651	25.63	110	100	1190	283.3	2779	624.6
515-850-8-400	863.6	400	25524	250	56269	50	35	745	29.33	230			360.3	3533	794.3
514-850-9-400	863.6	400	55135	541	121552	70	49	753	29.65	138	130	1254	535.0	5247	1179.6
514-850-10-400	863.6	400	70330	690	155050	80	55	817	32.17	156	150	1288	664.8	6520	1465.7
514-850-11-400	863.6	400	90785	890	200144	90	60	858	33.78	194	190	1366	825.5	8095	1819.8
513-850-1-490	863.6	490	423	4.15	933	10	9	559	22.01	35	20	914	64.5	633	142.3
514-850-1-490	863.6	490	423	4.15	933	10	9	559	22.01	56	20	960	16.0	157	35.3
515-850-1-490	863.6	490	423	4.15	933	10	9	555	21.85	60			14.5	142	31.9
513-850-2-490	863.6	490	985	9.66	2172	10	9	559	22.01	35	30	921	68.8	674	151.6
514-850-2-490	863.6	490	985	9.66	2172	10	9	559	22.01	59	30	970	20.9	205	46.1
515-850-2-490	863.6	490	985	9.66	2172	10	9	555	21.85	80			29.2	286	64.4
513-850-3-490	863.6	490	2125	20.8	4684	15	12	566	22.28	35	40	946	77.4	759	170.5
514-850-3-490	863.6	490	2125	20.8	4684	15	12	566	22.28	67	40	1018	45.9	451	101.3
515-850-3-490	863.6	490	2125	20.8	4684	15	12	560	22.05	100			49.9	489	110.0
513-850-4-490	863.6	490	4293	42.1	9465	20	16	602	23.70	40	50	960	98.8	969	217.8
514-850-4-490	863.6	490	4293	42.1	9465	20	16	576	22.68	73	50	1038	71.8	704	158.2
515-850-4-490	863.6	490	4293	42.1	9465	20	16	600	23.62	100			78.3	767	172.5
513-850-5-490	863.6	490	6324	62	13942	25	20	619	24.37	50	50	978	130.0	1275	286.6
514-850-5-490	863.6	490	6324	62	13942	25	20	582	22.91	79	50	1072	104.7	1026	230.7
515-850-5-490	863.6	490	6324	62	13942	25	20	615	24.21	130			104.2	1021	229.6
514-850-6-490	863.6	490	12754	125	28117	35	25	596	23.46	86	70	1104	165.8	1626	365.4
515-850-6-490	863.6	490	12754	125	28117	35	25	665	26.18	160			179.6	1761	395.9
514-850-7-490	863.6	490	18132	178	39974	40	28	610	24.02	92	80	1130	106.1	1041	234.0
515-850-7-490	863.6	490	18132	178	39974	40	28	700	27.56	180			261.2	2561	575.8
514-850-8-490	863.6	490	25524	250	56269	50	35	651	25.63	110	90	1178	261.3	2563	576.2
515-850-8-490	863.6	490	25524	250	56269	50	35	725	28.54	210			315.3	3092	695.1
514-850-9-490	863.6	490	55135	541	121552	70	49	743	29.25	138	130	1254	528.3	5181	1164.7
514-850-10-490	863.6	490	70330	690	155050	80	55	805	31.69	156	150	1288	655.4	6427	1444.9
514-850-11-490	863.6	490	90785	890	200144	90	60	893	35.16	184	170	1356	749.5	7350	1652.2

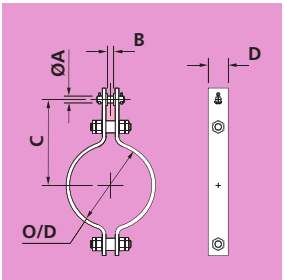
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 34" / 850mm



Type 513 Clamp



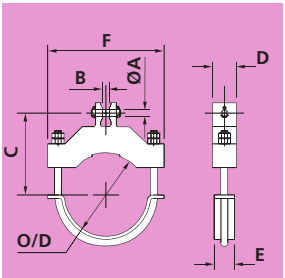
Type 514 Clamp



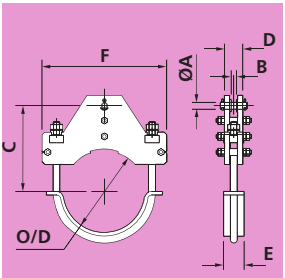
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-850-1-530	863.6	530	423	4.15	933	10	9	559	22.01	35	30	921	66.1	648	145.6
514-850-1-530	863.6	530	423	4.15	933	10	9	559	22.01	56	30	962	17.3	170	38.2
515-850-1-530	863.6	530	423	4.15	933	10	9	555	21.85	70			20.3	199	44.7
513-850-2-530	863.6	530	985	9.66	2172	10	9	559	22.01	35	30	932	70.7	693	155.9
514-850-2-530	863.6	530	985	9.66	2172	10	9	559	22.01	59	30	976	29.7	291	65.5
515-850-2-530	863.6	530	985	9.66	2172	10	9	555	21.85	80			29.2	286	64.4
513-850-3-530	863.6	530	2125	20.8	4684	15	12	566	22.28	40	50	960	90.2	885	198.9
514-850-3-530	863.6	530	2125	20.8	4684	15	12	566	22.28	67	50	1022	67.0	657	147.7
515-850-3-530	863.6	530	2125	20.8	4684	15	12	560	22.05	110			54.8	538	120.9
513-850-4-530	863.6	530	4293	42.1	9465	20	16	592	23.31	50	50	978	121.9	1195	268.6
514-850-4-530	863.6	530	4293	42.1	9465	20	16	575	22.64	73	50	1046	109.0	1069	240.2
515-850-4-530	863.6	530	4293	42.1	9465	20	16	600	23.62	100			78.3	767	172.5
513-850-5-530	863.6	530	6324	62	13942	25	20	609	23.98	60	70	999	156.6	1536	345.2
514-850-5-530	863.6	530	6324	62	13942	25	20	582	22.91	79	70	1078	144.7	1419	318.9
515-850-5-530	863.6	530	6324	62	13942	25	20	615	24.21	160			127.8	1254	281.8
514-850-6-530	863.6	530	12754	125	28117	35	25	608	23.94	86	80	1114	117.6	1153	259.2
515-850-6-530	863.6	530	12754	125	28117	35	25	665	26.18	180			201.7	1978	444.6
514-850-7-530	863.6	530	18132	178	39974	40	28	646	25.43	92	90	1136	217.0	2128	478.3
515-850-7-530	863.6	530	18132	178	39974	40	28	700	27.56	180			261.2	2561	575.8
514-850-8-530	863.6	530	25524	250	56269	50	35	651	25.63	110	100	1190	283.8	2783	625.6
515-850-8-530	863.6	530	25524	250	56269	50	35	725	28.54	230			344.7	3380	759.8
514-850-9-530	863.6	530	55135	541	121552	70	49	744	29.29	138	130	1254	529.2	5190	1166.8
514-850-10-530	863.6	530	70330	690	155050	80	55	805	31.69	156	150	1288	655.4	6427	1444.9
514-850-11-530	863.6	530	90785	890	200144	90	60	893	35.16	184	170	1356	749.5	7350	1652.2
513-850-1-570	863.6	570	423	4.15	933	10	9	559	22.01	35	30	932	68.6	673	151.3
514-850-1-570	863.6	570	423	4.15	933	10	9	559	22.01	56	30	968	19.2	188	42.2
515-850-1-570	863.6	570	423	4	933	10	9	555	21.85	80			23.2	227	51.0
513-850-2-570	863.6	570	985	9.66	2172	10	9	559	22.01	35	40	946	74.4	730	164.1
514-850-2-570	863.6	570	985	9.66	2172	10	9	559	22.01	59	40	980	50.0	490	110.2
515-850-2-570	863.6	570	985	10	2172	10	9	555	21.85	100			48.7	478	107.5
513-850-3-570	863.6	570	2125	20.8	4684	15	12	566	22.28	50	50	978	113.9	1117	251.1
514-850-3-570	863.6	570	2125	20.8	4684	15	12	566	22.28	67	50	1030	104.3	1023	230.0
515-850-3-570	863.6	570	2125	21	4684	15	12	565	22.24	100			62.1	609.5	137.0
513-850-4-570	863.6	570	4293	42.1	9465	20	16	590	23.23	60	70	999	150.3	1474	331.3
514-850-4-570	863.6	570	4293	42.1	9465	20	16	576	22.68	73	70	1052	146.1	1433	322.2
515-850-4-570	863.6	570	4293	42	9465	20	16	600	23.62	140			109.2	1071	240.8
513-850-5-570	863.6	570	6324	62	13942	25	20	608	23.94	70	80	1024	188.9	1852	416.5
514-850-5-570	863.6	570	6324	62	13942	25	20	603	23.74	79	80	1088	172.9	1696	381.2
515-850-5-570	863.6	570	6324	62	13942	25	20	630	24.8	120			127.9	1255	282.1
514-850-6-570	863.6	570	12754	125	28117	35	25	644	25.35	86	90	1120	227.2	2228	500.9
515-850-6-570	863.6	570	12754	125	28117	35	25	685	26.97	180			255.3	2504	562.9
514-850-7-570	863.6	570	18132	178	39974	40	28	646	25.43	102	100	1148	247.1	2423	544.8
515-850-7-570	863.6	570	18132	178	39974	40	28	700	27.56	200			289.7	2841	638.8
514-850-8-570	863.6	570	25524	250	56269	50	35	687	27.05	110	120	1198	300.5	2947	662.5
515-850-8-570	863.6	570	25524	250	56269	50	35	725	28.54	280			418.0	4100	921.6
514-850-9-570	863.6	570	55135	541	121552	70	49	771	30.35	138	130	1254	549.1	5385	1210.6
514-850-10-570	863.6	570	70330	690	155050	80	55	826	32.52	156	150	1288	678.5	6654	1495.9
514-850-11-570	863.6	570	90785	890	200144	90	60	863	33.98	194	170	1356	776.2	7612	1711.2

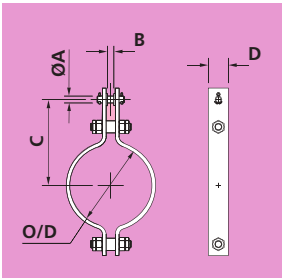
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 36" / 900mm



Type 513 Clamp



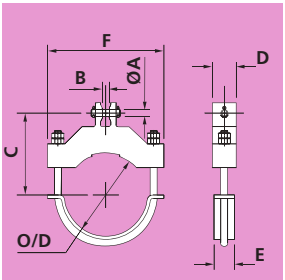
Type 514 Clamp



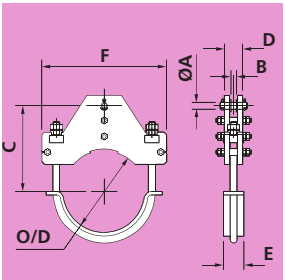
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-900-1-400	914.4	400	423	4.15	933	10	9	585	23.03	40	20	966	80.6	791	177.8
514-900-1-400	914.4	400	423	4.15	933	10	9	585	23.03	56	20	1012	20.5	201	45.2
515-900-1-400	914.4	400	423	4.15	933	10	9	580	22.83	70			21.5	211	47.4
513-900-2-400	914.4	400	985	9.66	2172	10	9	585	23.03	40	30	973	85.5	839	188.5
514-900-2-400	914.4	400	985	9.66	2172	10	9	585	23.03	59	30	1022	29.3	288	64.7
515-900-2-400	914.4	400	985	9.66	2172	10	9	580	22.83	80			31.0	304	68.3
513-900-3-400	914.4	400	2125	20.8	4684	15	12	592	23.31	40	40	998	95.0	931	209.3
514-900-3-400	914.4	400	2125	20.8	4684	15	12	592	23.31	67	40	1070	63.0	617	138.8
515-900-3-400	914.4	400	2125	20.8	4684	15	12	595	23.43	100			53.6	526	118.2
513-900-4-400	914.4	400	4293	42.1	9465	20	16	633	24.92	40	50	1012	109.3	1072	240.9
514-900-4-400	914.4	400	4293	42.1	9465	20	16	602	23.70	73	50	1090	88.8	871	195.8
515-900-4-400	914.4	400	4293	42.1	9465	20	16	635	25.00	100			83.6	820	184.3
513-900-5-400	914.4	400	6324	62	13942	25	20	650	25.59	50	50	1030	143.4	1406	316.2
514-900-5-400	914.4	400	6324	62	13942	25	20	608	23.94	79	50	1124	123.9	1215	273.1
515-900-5-400	914.4	400	6324	62	13942	25	20	655	25.79	150			128.6	1261	283.5
514-900-6-400	914.4	400	12754	125	28117	35	25	634	24.96	86	80	1166	186.4	1828	411.0
515-900-6-400	914.4	400	12754	125	28117	35	25	715	28.15	180			220.0	2157	485.0
514-900-7-400	914.4	400	18132	178	39974	40	28	672	26.46	92	90	1188	222.5	2182	490.5
515-900-7-400	914.4	400	18132	178	39974	40	28	750	29.53	180			285.2	2797	628.7
514-900-8-400	914.4	400	25524	250	56269	50	35	677	26.65	110	100	1242	302.6	2968	667.1
515-900-8-400	914.4	400	25524	250	56269	50	35	775	30.51	250			407.9	4000	899.2
514-900-9-400	914.4	400	55135	541	121552	70	49	768	30.24	138	130	1306	547.2	5366	1206.4
514-900-10-400	914.4	400	70330	690	155050	80	55	829	32.64	156	150	1340	719.8	7058	1586.8
514-900-11-400	914.4	400	90785	890	200144	90	60	916	36.06	184	190	1418	913.1	8955	2013.1
513-900-1-490	914.4	490	423	4.15	933	10	9	585	23.03	40	20	966	80.6	791	177.8
514-900-1-490	914.4	490	423	4.15	933	10	9	585	23.03	56	20	1012	20.5	201	45.3
515-900-1-490	914.4	490	423	4.15	933	10	9	580	22.83	60			15.2	149	33.6
513-900-2-490	914.4	490	985	9.66	2172	10	9	585	23.03	40	30	973	85.5	839	188.5
514-900-2-490	914.4	490	985	9.66	2172	10	9	585	23.03	59	30	1022	29.4	288	64.7
515-900-2-490	914.4	490	985	9.66	2172	10	9	580	22.83	80			30.8	302	67.8
513-900-3-490	914.4	490	2125	20.8	4684	15	12	592	23.31	40	40	998	95.0	931	209.3
514-900-3-490	914.4	490	2125	20.8	4684	15	12	592	23.31	67	40	1070	63.0	618	138.8
515-900-3-490	914.4	490	2125	20.8	4684	15	12	590	23.23	100			52.7	517	116.2
513-900-4-490	914.4	490	4293	42.1	9465	20	16	631	24.84	40	50	1012	108.7	1066	239.5
514-900-4-490	914.4	490	4293	42.1	9465	20	16	602	23.70	73	50	1090	88.8	871	195.8
515-900-4-490	914.4	490	4293	42.1	9465	20	16	625	24.61	100			82.0	804	180.7
513-900-5-490	914.4	490	6324	62	13942	25	20	648	25.51	50	50	1030	142.6	1399	314.4
514-900-5-490	914.4	490	6324	62	13942	25	20	608	23.94	79	50	1124	123.9	1215	273.2
515-900-5-490	914.4	490	6324	62	13942	25	20	640	25.20	140			117.3	1150	258.5
514-900-6-490	914.4	490	12754	125	28117	35	25	622	24.49	86	70	1156	178.6	1751	393.7
515-900-6-490	914.4	490	12754	125	28117	35	25	690	27.17	160			187.5	1839	413.4
514-900-7-490	914.4	490	18132	178	39974	40	28	636	25.04	92	80	1182	109.9	1078	242.3
515-900-7-490	914.4	490	18132	178	39974	40	28	725	28.54	180			272.4	2671	600.5
514-900-8-490	914.4	490	25524	250	56269	50	35	677	26.65	110	90	1230	281.3	2759	620.2
515-900-8-490	914.4	490	25524	250	56269	50	35	750	29.53	220			343.5	3368	757.2
514-900-9-490	914.4	490	55135	541	121552	70	49	756	29.76	138	130	1306	535.5	5252	1180.7
514-900-10-490	914.4	490	70330	690	155050	80	55	818	32.20	156	150	1340	711.1	6973	1567.7
514-900-11-490	914.4	490	90785	890	200144	90	60	907	35.71	184	170	1408	838.8	8226	1849.3

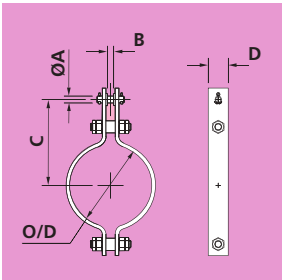
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 36" / 900mm



Type 513 Clamp



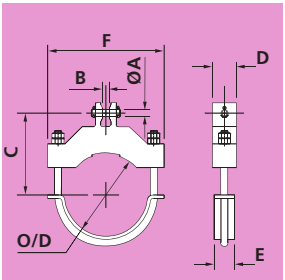
Type 514 Clamp



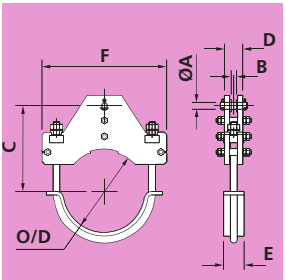
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-900-1-530	914.4	530	423	4.15	933	10	9	585	23.03	40	30	973	82.6	810	182.2
514-900-1-530	914.4	530	423	4.15	933	10	9	585	23.03	56	30	1014	21.9	215	48.4
515-900-1-530	914.4	530	423	4.15	933	10	9	580	22.83	70			21.3	209	47.0
513-900-2-530	914.4	530	985	9.66	2172	10	9	585	23.03	40	30	984	87.7	860	193.2
514-900-2-530	914.4	530	985	9.66	2172	10	9	585	23.03	59	30	1028	41.0	402	90.5
515-900-2-530	914.4	530	985	9.66	2172	10	9	580	22.83	100			38.4	377	84.7
513-900-3-530	914.4	530	2125	20.8	4684	15	12	592	23.31	40	50	1012	98.9	970	218.1
514-900-3-530	914.4	530	2125	20.8	4684	15	12	592	23.31	67	50	1074	87.0	853	191.8
515-900-3-530	914.4	530	2125	20.8	4684	15	12	600	23.62	90			59.6	585	131.5
513-900-4-530	914.4	530	4293	42.1	9465	20	16	621	24.45	50	50	1030	133.7	1311	294.7
514-900-4-530	914.4	530	4293	42.1	9465	20	16	601	23.66	73	50	1098	129.6	1271	285.7
515-900-4-530	914.4	530	4293	42.1	9465	20	16	625	24.61	110			90.1	884	198.6
513-900-5-530	914.4	530	6324	62	13942	25	20	638	25.12	60	70	1051	171.7	1684	378.6
514-900-5-530	914.4	530	6324	62	13942	25	20	608	23.94	79	70	1130	162.1	1590	357.4
515-900-5-530	914.4	530	6324	62	13942	25	20	640	25.20	160			133.8	1312	295.0
514-900-6-530	914.4	530	12754	125	28117	35	25	634	24.96	86	80	1166	122.0	1197	269.0
515-900-6-530	914.4	530	12754	125	28117	35	25	690	27.17	180			210.6	2065	464.3
514-900-7-530	914.4	530	18132	178	39974	40	28	672	26.46	92	90	1188	211.2	2071	465.6
515-900-7-530	914.4	530	18132	178	39974	40	28	725	28.54	180			272.4	2671	600.5
514-900-8-530	914.4	530	25524	250	56269	50	35	677	26.65	110	100	1242	303.1	2972	668.1
515-900-8-530	914.4	530	25524	250	56269	50	35	750	29.53	240			374.1	3668	824.6
514-900-9-530	914.4	530	55135	541	121552	70	49	758	29.84	138	130	1306	540.2	5297	1190.9
514-900-10-530	914.4	530	70330	690	155050	80	55	818	32.20	156	150	1340	711.1	6973	1567.7
514-900-11-530	914.4	530	90785	890	200144	90	60	907	35.71	184	170	1408	838.8	8226	1849.3
513-900-1-570	914.4	570	423	4.15	933	10	9	585	23.03	40	30	984	85.1	835	187.7
514-900-1-570	914.4	570	423	4.15	933	10	9	585	23.03	56	30	1020	25.4	249	56.1
515-900-1-570	914.4	570	423	4	933	10	9	580	22.83	80			24.3	238.7	53.7
513-900-2-570	914.4	570	985	9.66	2172	10	9	585	23.03	40	40	998	91.8	900	202.3
514-900-2-570	914.4	570	985	9.66	2172	10	9	585	23.03	59	40	1032	65.3	641	144.0
515-900-2-570	914.4	570	985	10	2172	10	9	580	22.83	100			51.3	502.7	113.0
513-900-3-570	914.4	570	2125	20.8	4684	15	12	592	23.31	50	50	1030	124.8	1224	275.2
514-900-3-570	914.4	570	2125	20.8	4684	15	12	592	23.31	67	50	1082	124.8	1223	275.0
515-900-3-570	914.4	570	2125	21	4684	15	12	590	23.23	100			65.3	639.9	143.9
513-900-4-570	914.4	570	4293	42.1	9465	20	16	619	24.37	60	70	1051	164.6	1614	362.9
514-900-4-570	914.4	570	4293	42.1	9465	20	16	602	23.70	73	70	1104	158.9	1559	350.4
515-900-4-570	914.4	570	4293	42	9465	20	16	625	24.61	140			114.4	1122	252.3
513-900-5-570	914.4	570	6324	62	13942	25	20	636	25.04	70	80	1076	206.1	2021	454.3
514-900-5-570	914.4	570	6324	62	13942	25	20	629	24.76	79	80	1140	186.2	1826	410.4
515-900-5-570	914.4	570	6324	62	13942	25	20	660	25.98	120			134.6	1320	296.7
514-900-6-570	914.4	570	12754	125	28117	35	25	670	26.38	86	90	1172	239.9	2353	529.0
515-900-6-570	914.4	570	12754	125	28117	35	25	710	27.95	180			266.5	2614	587.6
514-900-7-570	914.4	570	18132	178	39974	40	28	672	26.46	102	100	1200	269.5	2643	594.2
515-900-7-570	914.4	570	18132	178	39974	40	28	725	28.54	200			302.2	2963	666.1
514-900-8-570	914.4	570	25524	250	56269	50	35	713	28.07	110	120	1250	324.9	3187	716.4
515-900-8-570	914.4	570	25524	250	56269	50	35	750	29.53	290			450.5	4418	993.1
514-900-9-570	914.4	570	55135	541	121552	70	49	786	30.94	138	130	1306	561.8	5509	1238.5
514-900-10-570	914.4	570	70330	690	155050	80	55	841	33.11	156	150	1340	730.4	7163	1610.2
514-900-11-570	914.4	570	90785	890	200144	90	60	916	36.06	184	170	1408	856.0	8395	1887.2

CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 38" / 950mm



Type 513 Clamp



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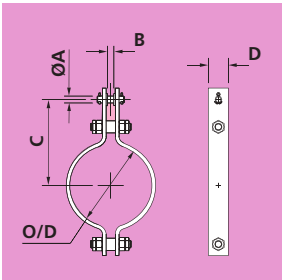
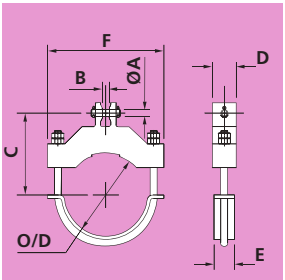


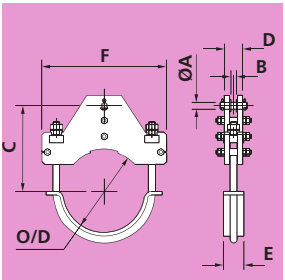
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-950-1-400	965	400	423	4.15	933	10	9	611	24.06	40	20	1018	88.9	871	195.9
514-950-1-400	965	400	423	4.15	933	10	9	611	24.06	56	20	1064	29.2	286	64.3
515-950-1-400	965	400	423	4.15	933	10	9	605	23.82	70			22.6	221	49.8
513-950-2-400	965	400	985	9.66	2172	10	9	611	24.06	40	30	1025	94.3	925	207.9
514-950-2-400	965	400	985	9.66	2172	10	9	611	24.06	59	30	1074	40.7	399	89.8
515-950-2-400	965	400	985	9.66	2172	10	9	605	23.82	80			32.6	320	71.8
513-950-3-400	965	400	2125	20.8	4684	15	12	618	24.33	40	40	1050	104.2	1022	229.7
514-950-3-400	965	400	2125	20.8	4684	15	12	618	24.33	67	40	1122	80.1	786	176.6
515-950-3-400	965	400	2125	20.8	4684	15	12	620	24.41	110			61.7	605	135.9
513-950-4-400	965	400	4293	42.1	9465	20	16	663	26.10	40	50	1064	120.1	1178	264.8
514-950-4-400	965	400	4293	42.1	9465	20	16	628	24.72	73	50	1142	111.1	1089	244.9
515-950-4-400	965	400	4293	42.1	9465	20	16	665	26.18	100			87.8	861	193.5
513-950-5-400	965	400	6324	62	13942	25	20	680	26.77	50	50	1082	156.8	1538	345.8
514-950-5-400	965	400	6324	62	13942	25	20	634	24.96	79	50	1176	148.0	1451	326.3
515-950-5-400	965	400	6324	62	13942	25	20	680	26.77	150			134.2	1316	295.8
514-950-6-400	965	400	12754	125	28117	35	25	660	25.98	86	80	1218	204.5	2006	450.9
515-950-6-400	965	400	12754	125	28117	35	25	740	29.13	190			241.4	2367	532.1
514-950-7-400	965	400	18132	178	39974	40	28	698	27.48	102	90	1240	229.3	2249	505.5
515-950-7-400	965	400	18132	178	39974	40	28	780	30.71	180			297.6	2919	656.2
514-950-8-400	965	400	25524	250	56269	50	35	703	27.68	110	100	1294	282.5	2770	622.8
515-950-8-400	965	400	25524	250	56269	50	35	800	31.50	250			423.4	4152	933.4
514-950-9-400	965	400	55135	541	121552	70	49	780	30.71	138	130	1358	524.7	5145	1156.7
514-950-10-400	965	400	70330	690	155050	80	55	844	33.23	156	150	1392	744.4	7300	1641.1
514-950-11-400	965	400	90785	890	200144	90	60	931	36.65	184	190	1470	1010.3	9907	2227.2
513-950-1-490	965	490	423	4.15	933	10	9	611	24.06	40	20	1018	88.9	871	195.9
514-950-1-490	965	490	423	4.15	933	10	9	611	24.06	56	20	1064	29.2	286	64.4
515-950-1-490	965	490	423	4.15	933	10	9	605	23.82	70			22.4	220	49.5
513-950-2-490	965	490	985	9.66	2172	10	9	611	24.06	40	30	1025	94.3	925	207.9
514-950-2-490	965	490	985	9.66	2172	10	9	611	24.06	59	30	1074	40.8	400	89.8
515-950-2-490	965	490	985	9.66	2172	10	9	605	23.82	80			32.3	317	71.2
513-950-3-490	965	490	2125	20.8	4684	15	12	618	24.33	40	40	1050	104.2	1022	229.7
514-950-3-490	965	490	2125	20.8	4684	15	12	618	24.33	67	40	1122	80.1	786	176.6
515-950-3-490	965	490	2125	20.8	4684	15	12	615	24.21	100			55.2	541	121.7
513-950-4-490	965	490	4293	42.1	9465	20	16	661	26.02	40	50	1064	119.5	1172	263.4
514-950-4-490	965	490	4293	42.1	9465	20	16	628	24.72	73	50	1142	111.1	1089	244.9
515-950-4-490	965	490	4293	42.1	9465	20	16	655	25.79	100			86.2	845	190.0
513-950-5-490	965	490	6324	62	13942	25	20	678	26.69	50	50	1082	156.0	1530	343.9
514-950-5-490	965	490	6324	62	13942	25	20	634	24.96	79	50	1176	148.1	1452	326.5
515-950-5-490	965	490	6324	62	13942	25	20	670	26.38	150			131.8	1293	290.6
514-950-6-490	965	490	12754	125	28117	35	25	648	25.51	86	70	1208	191.3	1876	421.8
515-950-6-490	965	490	12754	125	28117	35	25	715	28.15	170			207.5	2035	457.5
514-950-7-490	965	490	18132	178	39974	40	28	662	26.06	92	80	1234	114.5	1123	252.5
515-950-7-490	965	490	18132	178	39974	40	28	750	29.53	180			283.4	2779	624.8
514-950-8-490	965	490	25524	250	56269	50	35	703	27.68	110	90	1282	263.3	2582	580.5
515-950-8-490	965	490	25524	250	56269	50	35	780	30.71	230			374.9	3676	826.4
514-950-9-490	965	490	55135	541	121552	70	49	772	30.39	138	130	1358	518.8	5088	1143.8
514-950-10-490	965	490	70330	690	155050	80	55	832	32.76	156	150	1392	734.5	7203	1619.3
514-950-11-490	965	490	90785	890	200144	90	60	922	36.30	184	170	1460	935.6	9175	2062.7

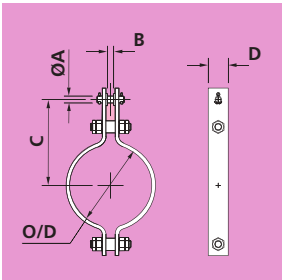
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 38" / 950mm



Type 513 Clamp



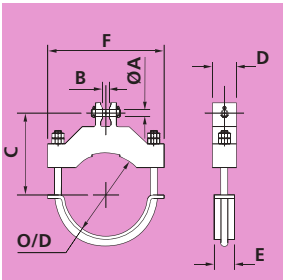
Type 514 Clamp



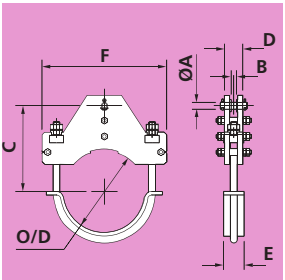
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-950-1-530	965	530	423	4.15	933	10	9	611	24.06	40	30	1025	90.9	892	200.5
514-950-1-530	965	530	423	4.15	933	10	9	611	24.06	56	30	1066	30.7	301	67.6
515-950-1-530	965	530	423	4.15	933	10	9	605	23.82	70			22.4	220	49.5
513-950-2-530	965	530	985	9.66	2172	10	9	611	24.06	40	30	1036	96.6	947	212.9
514-950-2-530	965	530	985	9.66	2172	10	9	611	24.06	59	30	1080	55.5	545	122.5
515-950-2-530	965	530	985	9.66	2172	10	9	605	23.82	100			40.3	395	88.9
513-950-3-530	965	530	2125	20.8	4684	15	12	618	24.33	40	50	1064	108.3	1062	238.8
514-950-3-530	965	530	2125	20.8	4684	15	12	618	24.33	67	50	1126	105.9	1038	233.4
515-950-3-530	965	530	2125	20.8	4684	15	12	625	24.61	90			62.5	613	137.7
513-950-4-530	965	530	4293	42.1	9465	20	16	650	25.59	50	50	1082	146.4	1436	322.7
514-950-4-530	965	530	4293	42.1	9465	20	16	627	24.69	73	50	1150	150.1	1472	331.0
515-950-4-530	965	530	4293	42.1	9465	20	16	655	25.79	110			94.7	929	208.8
513-950-5-530	965	530	6324	62	13942	25	20	668	26.30	60	70	1103	187.7	1841	413.9
514-950-5-530	965	530	6324	62	13942	25	20	634	24.96	79	70	1182	178.2	1747	392.8
515-950-5-530	965	530	6324	62	13942	25	20	690	27.17	120			142.5	1397	314.1
514-950-6-530	965	530	12754	125	28117	35	25	660	25.98	86	80	1218	128.7	1262	283.7
515-950-6-530	965	530	12754	125	28117	35	25	715	28.15	190			231.6	2271	510.6
514-950-7-530	965	530	18132	178	39974	40	28	698	27.48	102	90	1240	229.9	2255	506.9
515-950-7-530	965	530	18132	178	39974	40	28	750	29.53	180			283.4	2779	624.8
514-950-8-530	965	530	25524	250	56269	50	35	726	28.58	110	100	1294	319.0	3129	703.3
515-950-8-530	965	530	25524	250	56269	50	35	780	30.71	250			406.8	3990	896.9
514-950-9-530	965	530	55135	541	121552	70	49	772	30.39	138	130	1358	517.5	5075	1140.8
514-950-10-530	965	530	70330	690	155050	80	55	832	32.76	156	150	1392	734.5	7203	1619.3
514-950-11-530	965	530	90785	890	200144	90	60	922	36.30	184	170	1460	935.6	9175	2062.7
513-950-1-570	965	570	423	4.15	933	10	9	611	24.06	40	30	1036	93.9	921	207.1
514-950-1-570	965	570	423	4.15	933	10	9	611	24.06	56	30	1072	34.9	342	77.0
515-950-1-570	965	570	423	4	933	10	9	605	23.82	80			32.0	313.9	70.6
513-950-2-570	965	570	985	9.66	2172	10	9	611	24.06	40	40	1050	100.9	989	222.4
514-950-2-570	965	570	985	9.66	2172	10	9	611	24.06	59	40	1084	85.6	839	188.7
515-950-2-570	965	570	985	10	2172	10	9	605	23.82	100			53.7	527.1	118.5
513-950-3-570	965	570	2125	20.8	4684	15	12	618	24.33	50	50	1082	136.6	1340	301.2
514-950-3-570	965	570	2125	20.8	4684	15	12	618	24.33	67	50	1134	145.0	1422	319.7
515-950-3-570	965	570	2125	21	4684	15	12	615	24.21	100			68.4	670.7	150.8
513-950-4-570	965	570	4293	42.1	9465	20	16	647	25.47	60	70	1103	179.9	1764	396.7
514-950-4-570	965	570	4293	42.1	9465	20	16	628	24.72	73	70	1156	168.9	1656	372.4
515-950-4-570	965	570	4293	42	9465	20	16	655	25.79	150			128.8	1263	284.0
513-950-5-570	965	570	6324	62	13942	25	20	665	26.18	70	80	1128	225.4	2210	496.9
514-950-5-570	965	570	6324	62	13942	25	20	655	25.79	79	80	1192	199.2	1953	439.1
515-950-5-570	965	570	6324	62	13942	25	20	685	26.97	120			140.5	1378	309.9
514-950-6-570	965	570	12754	125	28117	35	25	696	27.40	96	90	1224	197.1	1933	434.4
515-950-6-570	965	570	12754	125	28117	35	25	735	28.94	180			277.6	2722	611.9
514-950-7-570	965	570	18132	178	39974	40	28	718	28.27	102	100	1252	326.6	3202	719.9
515-950-7-570	965	570	18132	178	39974	40	28	750	29.53	200			314.4	3083	693.2
514-950-8-570	965	570	25524	250	56269	50	35	739	29.09	120	120	1302	287.9	2824	634.8
515-950-8-570	965	570	25524	250	56269	50	35	780	30.71	300			486.8	4774	1073.1
514-950-9-570	965	570	55135	541	121552	70	49	799	31.46	138	130	1358	540.2	5298	1191.0
514-950-10-570	965	570	70330	690	155050	80	55	855	33.66	156	150	1392	755.9	7413	1666.5
514-950-11-570	965	570	90785	890	200144	90	60	931	36.65	184	170	1460	952.2	9338	2099.3

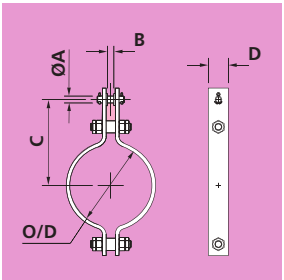
CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 40" / 1000mm



Type 513 Clamp



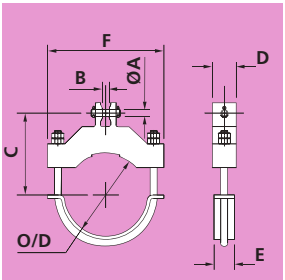
Type 514 Clamp



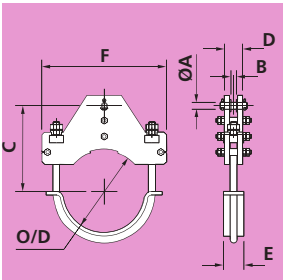
Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-1000-1-400	1016	400	423	4.15	933	10	9	636	25.04	45	20	1068	108.7	1066	239.7
514-1000-1-400	1016	400	423	4.15	933	10	9	636	25.04	66	20	1114	48.2	473	106.4
515-1000-1-400	1016	400	423	4.15	933	10	9	630	24.80	70			23.6	231	52.0
513-1000-2-400	1016	400	985	9.66	2172	10	9	636	25.04	45	30	1075	114.5	1123	252.5
514-1000-2-400	1016	400	985	9.66	2172	10	9	636	25.04	69	30	1124	57.4	563	126.6
515-1000-2-400	1016	400	985	9.66	2172	10	9	630	24.80	80			34.1	334	75.1
513-1000-3-400	1016	400	2125	20.8	4684	15	12	643	25.31	45	40	1100	125.5	1231	276.7
514-1000-3-400	1016	400	2125	20.8	4684	15	12	643	25.31	77	40	1172	103.2	1012	227.5
515-1000-3-400	1016	400	2125	20.8	4684	15	12	645	25.39	110			64.4	631	141.9
513-1000-4-400	1016	400	4293	42.1	9465	20	16	683	26.89	45	50	1114	142.1	1394	313.3
514-1000-4-400	1016	400	4293	42.1	9465	20	16	653	25.71	83	50	1192	137.1	1345	302.3
515-1000-4-400	1016	400	4293	42.1	9465	20	16	690	27.17	110			100.5	985	221.5
513-1000-5-400	1016	400	6324	62	13942	25	20	708	27.87	50	50	1132	170.3	1670	375.5
514-1000-5-400	1016	400	6324	62	13942	25	20	659	25.94	89	50	1226	178.4	1749	393.3
515-1000-5-400	1016	400	6324	62	13942	25	20	705	27.76	160			148.9	1460	328.2
514-1000-6-400	1016	400	12754	125	28117	35	25	685	26.97	96	80	1268	234.5	2300	517.0
515-1000-6-400	1016	400	12754	125	28117	35	25	765	30.12	190			250.6	2457	552.4
514-1000-7-400	1016	400	18132	178	39974	40	28	723	28.46	102	90	1290	253.6	2486	559.0
515-1000-7-400	1016	400	18132	178	39974	40	28	805	31.69	180			308.5	3026	680.2
514-1000-8-400	1016	400	25524	250	56269	50	35	728	28.66	110	100	1344	294.6	2889	649.4
515-1000-8-400	1016	400	25524	250	56269	50	35	825	32.48	260			455.6	4468	1004.4
514-1000-9-400	1016	400	55135	541	121552	70	49	797	31.38	138	130	1408	495.2	4857	1091.8
514-1000-10-400	1016	400	70330	690	155050	80	55	857	33.74	156	150	1442	732.4	7182	1614.7
514-1000-11-400	1016	400	90785	890	200144	90	60	944	37.17	184	190	1520	1086.5	10655	2395.4
513-1000-1-490	1016	490	423	4.15	933	10	9	636	25.04	45	20	1068	108.7	1066	239.7
514-1000-1-490	1016	490	423	4.15	933	10	9	636	25.04	66	20	1114	48.3	473	106.4
515-1000-1-490	1016	490	423	4.15	933	10	9	630	24.80	70			23.5	230	51.7
513-1000-2-490	1016	490	985	9.66	2172	10	9	636	25.04	45	30	1075	114.5	1123	252.5
514-1000-2-490	1016	490	985	9.66	2172	10	9	636	25.04	69	30	1124	57.4	563	126.6
515-1000-2-490	1016	490	985	9.66	2172	10	9	630	24.80	80			33.8	331	74.4
513-1000-3-490	1016	490	2125	20.8	4684	15	12	643	25.31	45	40	1100	125.1	1227	275.8
514-1000-3-490	1016	490	2125	20.8	4684	15	12	643	25.31	77	40	1172	103.2	1012	227.5
515-1000-3-490	1016	490	2125	20.8	4684	15	12	640	25.20	100			57.7	565	127.1
513-1000-4-490	1016	490	4293	42.1	9465	20	16	682	26.85	45	50	1114	141.6	1388	312.1
514-1000-4-490	1016	490	4293	42.1	9465	20	16	653	25.71	83	50	1192	137.1	1345	302.3
515-1000-4-490	1016	490	4293	42.1	9465	20	16	680	26.77	100			89.9	881	198.1
513-1000-5-490	1016	490	6324	62	13942	25	20	706	27.80	50	50	1132	169.5	1662	373.6
514-1000-5-490	1016	490	6324	62	13942	25	20	659	25.94	89	50	1226	178.5	1750	393.4
515-1000-5-490	1016	490	6324	62	13942	25	20	695	27.36	150			137.3	1347	302.8
514-1000-6-490	1016	490	12754	125	28117	35	25	673	26.50	96	70	1258	238.6	2339	525.9
515-1000-6-490	1016	490	12754	125	28117	35	25	740	29.13	170			215.7	2116	475.6
514-1000-7-490	1016	490	18132	178	39974	40	28	687	27.05	102	80	1284	260.5	2555	574.4
515-1000-7-490	1016	490	18132	178	39974	40	28	795	31.30	180			301.9	2960	665.5
514-1000-8-490	1016	490	25524	250	56269	50	35	728	28.66	110	90	1332	274.8	2695	605.9
515-1000-8-490	1016	490	25524	250	56269	50	35	805	31.69	240			405.4	3975	893.7
514-1000-9-490	1016	490	55135	541	121552	70	49	788	31.02	138	130	1408	481.5	4722	1061.5
514-1000-10-490	1016	490	70330	690	155050	80	55	845	33.27	156	150	1442	721.8	7079	1591.3
514-1000-11-490	1016	490	90785	890	200144	90	60	935	36.81	184	170	1510	1016.8	9971	2241.6

CLAMPS FOR RIGID STRUTS AND SNUBBERS N.B. 40" / 1000mm



Type 513 Clamp



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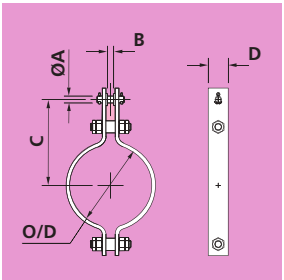


Type 515 Clamp

Fig. No.	Pipe O/D	Max. Pipe Temp	Max. Load			Dia. A	B	C		D	E	F	Clamp Weight		
	mm	°C	kgf	kN	lbs	mm	mm	mm	in	mm	mm	mm	kgf	N	lbs
513-1000-1-530	1016	530	423	4.15	933	10	9	636	25.04	45	30	1075	110.6	1084	243.8
514-1000-1-530	1016	530	423	4.15	933	10	9	636	25.04	66	30	1116	49.9	489	109.9
515-1000-1-530	1016	530	423	4.15	933	10	9	630	24.80	70			23.5	230	51.7
513-1000-2-530	1016	530	985	9.66	2172	10	9	636	25.04	45	30	1086	117.0	1147	257.9
514-1000-2-530	1016	530	985	9.66	2172	10	9	636	25.04	69	30	1130	76.1	747	167.9
515-1000-2-530	1016	530	985	9.66	2172	10	9	630	24.80	100			42.2	413	92.9
513-1000-3-530	1016	530	2125	20.8	4684	15	12	643	25.31	45	50	1114	129.5	1270	285.6
514-1000-3-530	1016	530	2125	20.8	4684	15	12	643	25.31	77	50	1176	131.6	1290	290.1
515-1000-3-530	1016	530	2125	20.8	4684	15	12	650	25.59	90			65.2	640	143.8
513-1000-4-530	1016	530	4293	42.1	9465	20	16	677	26.65	50	50	1132	159.3	1562	351.2
514-1000-4-530	1016	530	4293	42.1	9465	20	16	652	25.67	83	50	1200	186.4	1828	410.9
515-1000-4-530	1016	530	4293	42.1	9465	20	16	680	26.77	120			107.7	1056	237.3
513-1000-5-530	1016	530	6324	62	13942	25	20	695	27.36	60	70	1153	203.7	1997	449.0
514-1000-5-530	1016	530	6324	62	13942	25	20	659	25.94	89	70	1232	225.4	2211	497.0
515-1000-5-530	1016	530	6324	62	13942	25	20	715	28.15	120			148.4	1455	327.1
514-1000-6-530	1016	530	12754	125	28117	35	25	685	26.97	96	80	1268	269.4	2642	593.9
515-1000-6-530	1016	530	12754	125	28117	35	25	740	29.13	190			240.8	2361	530.8
514-1000-7-530	1016	530	18132	178	39974	40	28	723	28.46	102	90	1290	239.9	2352	528.8
515-1000-7-530	1016	530	18132	178	39974	40	28	795	31.30	190			318.3	3122	701.8
514-1000-8-530	1016	530	25524	250	56269	50	35	738	29.06	110	100	1344	364.0	3570	802.5
515-1000-8-530	1016	530	25524	250	56269	50	35	805	31.69	260			438.5	4301	966.8
514-1000-9-530	1016	530	55135	541	121552	70	49	790	31.10	138	130	1408	490.2	4807	1080.7
514-1000-10-530	1016	530	70330	690	155050	80	55	845	33.27	156	150	1442	721.8	7079	1591.3
514-1000-11-530	1016	530	90785	890	200144	90	60	935	36.81	184	170	1510	1016.8	9971	2241.6
513-1000-1-570	1016	570	423	4.15	933	10	9	636	25.04	45	30	1086	113.9	1117	251.1
514-1000-1-570	1016	570	423	4.15	933	10	9	636	25.04	66	30	1122	52.1	511	114.8
515-1000-1-570	1016	570	423	4	933	10	9	630	24.8	80			33.5	328.4	73.8
513-1000-2-570	1016	570	985	9.66	2172	10	9	636	25.04	45	40	1100	121.7	1193	268.2
514-1000-2-570	1016	570	985	9.66	2172	10	9	636	25.04	69	40	1134	107.3	1052	236.5
515-1000-2-570	1016	570	985	10	2172	10	9	630	24.8	100			56.2	551.1	123.9
513-1000-3-570	1016	570	2125	20.8	4684	15	12	643	25.31	50	50	1132	148.2	1453	326.6
514-1000-3-570	1016	570	2125	20.8	4684	15	12	643	25.31	77	50	1184	183.3	1798	404.2
515-1000-3-570	1016	570	2125	21	4684	15	12	650	25.59	110			79.6	780.9	175.6
513-1000-4-570	1016	570	4293	42.1	9465	20	16	674	26.54	60	70	1153	194.9	1911	429.7
514-1000-4-570	1016	570	4293	42.1	9465	20	16	653	25.71	83	70	1206	224.2	2198	494.2
515-1000-4-570	1016	570	4293	42	9465	20	16	680	26.77	160			143.3	1405	315.8
513-1000-5-570	1016	570	6324	62	13942	25	20	693	27.28	70	80	1178	243.9	2392	537.7
514-1000-5-570	1016	570	6324	62	13942	25	20	680	26.77	89	80	1242	252.0	2471	555.5
515-1000-5-570	1016	570	6324	62	13942	25	20	715	28.15	120			148.4	1455	327.1
514-1000-6-570	1016	570	12754	125	28117	35	25	721	28.39	96	90	1274	205.6	2016	453.2
515-1000-6-570	1016	570	12754	125	28117	35	25	765	30.12	180			289.9	2843	639.0
514-1000-7-570	1016	570	18132	178	39974	40	28	734	28.90	102	100	1302	313.9	3079	692.1
515-1000-7-570	1016	570	18132	178	39974	40	28	780	30.71	220			360.5	3535	794.7
514-1000-8-570	1016	570	25524	250	56269	50	35	764	30.08	120	120	1352	315.4	3093	695.3
515-1000-8-570	1016	570	25524	250	56269	50	35	805	31.69	310			521.5	5114	1149.7
514-1000-9-570	1016	570	55135	541	121552	70	49	811	31.93	138	130	1408	500.5	4909	1103.5
514-1000-10-570	1016	570	70330	690	155050	80	55	866	34.09	156	150	1442	736.1	7219	1622.8
514-1000-11-570	1016	570	90785	890	200144	90	60	946	37.24	184	170	1510	1025.6	10057	2260.9

INTRODUCTION

Pipe Supports Group has developed a range of cryogenic products to meet the varying requirements of both the Piping and the Pipe Supporting Engineers. Our solutions provide options that satisfy the need of both specialists; a means to transfer the forces generated within the pipe into the surrounding structure that will not compromise the integrity of the insulation system.

Pipe Supports Group has been designing and manufacturing pipe hangers, restraints and associated equipment since 1968. We became involved in the design and development of cryogenic pipe supports in 2001 and have been instrumental in the development of the corporate standards of several major EPC's.

We have worked closely with chemical specialists to develop a range of chemicals that enable us to produce rigid high density polyurethane in densities ranging from 100 to 600kg/m^3. The chemical is completely CFC and HCFC free and gives extremely low thermal conductivity combined with good compressive, flexural and tensile strength properties.

Our facility in Thailand is equipped with 4 modern high-pressure foam injection machines each equipped with an isocyanate tank and two polyol tanks enabling us to switch between densities very quickly ensuring maximum production flexibility.

Isolation vs Insulation: This discussion depends on your perspective; from the *Supporting* point of view these materials act as isolators because they separate the steel or concrete structure of the pipe support from the extreme temperatures of the pipe.

Low temperature causes normal carbon steel to become brittle and steels to withstand very low temperatures are expensive and sometimes difficult to process.

Freezing water expands and can cause serious damage to concrete structures if the concrete is not protected.

The use of a non-metallic material as a thermal break eliminates these problems and allows us to design the structure of the hanger for ambient temperature conditions thereby resulting in a more economic solution.

From the process engineer's perspective the need to insulate the pipe from the ambient temperature is often paramount to the viability of the process; localised breakdown of the insulation system can result in very high cost and disruption to the process.

The plant engineer however requires isolation from cold temperatures for personal protection, minimisation of condensation and the avoidance of structural damage.

The following extract from a spreadsheet compares the insulation and isolation performance of HD PUF with both glass reinforced composites and Densified Wood.

COMPARISON OF PROPERTIES:

Basic Data					GRE			HD PUF			Densified Wood		
Design Temp (°C)	Pipe O/D (do)	Insu'n Thickness	Insu'n O/D (dn)	Dn/do	Thermal Resistance (R)	Heat Transfer Rate (q)	Surface Temp. (T2)	Thermal Resistance (R)	Heat Transfer Rate (q)	Surface Temp. (T2)	Thermal Resistance (R)	Heat Transfer Rate (q)	Surface Temp. (T2)
-190.0	26.9	50	126.9	4.717	0.15	-1378.63	1.76	0.71	-294.09	14.54	0.08	-2557.63	-12.12
-190.0	33.7	50	133.7	3.967	0.17	-1232.16	0.75	0.79	-263.95	14.30	0.09	-2275.55	-13.86
-190.0	42.4	50	142.4	3.358	0.19	-1107.76	-0.32	0.87	-238.35	14.06	0.10	-2036.14	-15.68
-190.0	48.3	50	148.3	3.070	0.20	-1046.78	-0.94	0.92	-225.81	13.91	0.11	-1918.83	-16.72
-190.0	60.3	50	160.3	2.658	0.22	-956.68	-1.99	1.00	-207.27	13.67	0.12	-1745.57	-18.48
-190.0	76.1	50	176.1	2.314	0.24	-878.25	-3.08	1.09	-191.15	13.41	0.13	-1594.83	-20.29
-190.0	88.9	50	188.9	2.125	0.25	-833.69	-3.80	1.14	-182.00	13.24	0.14	-1509.22	-21.46
-190.0	101.6	50	201.6	1.984	0.26	-799.79	-4.39	1.19	-175.03	13.10	0.14	-1444.12	-22.43
-190.0	114.3	50	214.3	1.875	0.27	-772.92	-4.90	1.23	-169.52	12.98	0.15	-1392.51	-23.26
-190.0	139.7	50	239.7	1.716	0.28	-732.94	-5.73	1.29	-161.31	12.78	0.16	-1315.76	-24.60
-190.0	168.3	50	268.3	1.594	0.30	-701.58	-6.45	1.34	-154.88	12.60	0.17	-1255.57	-25.76
-190.0	193.7	50	293.7	1.516	0.31	-681.08	-6.95	1.38	-150.68	12.48	0.17	-1216.24	-26.56
-190.0	219.1	50	319.1	1.456	0.31	-665.10	-7.37	1.41	-147.40	12.38	0.18	-1185.59	-27.23
-190.0	244.5	50	344.5	1.409	0.32	-652.29	-7.72	1.44	-144.78	12.29	0.18	-1161.02	-27.78
-190.0	273.0	50	373	1.366	0.32	-640.63	-8.05	1.46	-142.39	12.21	0.18	-1138.67	-28.30
-190.0	323.9	50	423.9	1.309	0.33	-624.72	-8.52	1.49	-139.14	12.09	0.19	-1108.16	-29.04
-190.0	355.6	50	455.6	1.281	0.34	-617.03	-8.76	1.51	-137.56	12.04	0.19	-1093.42	-29.41
-190.0	406.4	50	506.4	1.246	0.34	-607.13	-9.07	1.53	-135.54	11.96	0.19	-1074.43	-29.90
-190.0	457.0	50	557	1.219	0.35	-599.39	-9.32	1.55	-133.95	11.89	0.20	-1059.59	-30.30
-190.0	508.0	50	608	1.197	0.35	-593.10	-9.53	1.57	-132.67	11.84	0.20	-1047.55	-30.63
-190.0	610.0	50	710	1.164	0.36	-583.61	-9.86	1.59	-130.73	11.76	0.20	-1029.36	-31.13
-190.0	762.0	50	862	1.131	0.36	-574.09	-10.19	1.62	-128.78	11.68	0.21	-1011.12	-31.66
-190.0	914.0	50	1014	1.109	0.37	-567.68	-10.43	1.63	-127.47	11.62	0.21	-998.84	-32.02
-190.0	1016.0	50	1116	1.098	0.37	-564.44	-10.55	1.64	-126.81	11.59	0.21	-992.63	-32.20

From a purely thermal perspective it can be seen that the HD PUF is considerably better at insulating the pipe than either GRE or Densified Wood however mechanically HD PUF is not as strong as the other two materials.

The property that is not shown in the above table is the load carrying capacity; comparing GRE to HD PUF the allowable compressive load for GRE is approximately 7N/mm^2 whereas for HD PUF it is one-tenth that value at approximately 0.7N/mm^2. Densified Wood by comparison is capable of sustaining compressive stresses up to 58N/mm^2. Therefore it is clear that where good insulation is required and high loading is anticipated there has to be a compromise.

In highly loaded anchors and line stops it is often beneficial to incorporate a combination of both HD PUF and Densified Wood which allows acceptable insulation properties to be achieved and yet sustain very high loading.

The following photograph is of a line stop where the support has been fully fitted to a spool of pipe. This unit will be positioned and welded straight in to the main line pipe. Axial forces are transferred from the pipe via the flanges positioned each side of the insulation mouldings. The compressive force is transmitted through the PUF and is taken by a central flange welded to the inside of the cradle. The integrity of the insulation is maintained.

HIGH DENSITY POLYURETHANE SUPPORTS

Our High Density Polyurethane Supports utilise CFC free blowing agents in producing a moulded product with a very low isocyanurate index resulting in a virtually chloride-free composition.

Component parts are moulded to precise dimensions in sheet steel moulds manufactured to accurate tolerances. Cylindrical components are monolithically moulded in 180º segments in layers to match the line insulation system.

Where conditions permit, we can also manufacture monolithically moulded components with machined steps to match up to the line insulation system. The benefit of this construction is found in the reduced installation requirements and the avoidance of having to apply expensive mastics and adhesives in the field. It should however be noted that for LNG services it is generally necessary to have a minimum of two layers of HD PUF.

THERMAL AND MECHANICAL PROPERTIES OF HD PUF MATERIALS

Testing has been carried out independently to determine the thermal conductivity, the density and the compressive strength of the HD PUF materials. Thermal conductivity was determined in accordance with ASTM C177 while density and compressive strength were determined in accordance with ASTM D1621.

The thermal conductivity at -165°C and compressive strength of the material, at 20°C were measured as follows

Density kg/m^3	Thermal Conductivity W/m.K	1% Compressive Modulus MPa	2% Compressive Modulus MPa	Ultimate Compressive Stress MPa	Recommended Design Stress MPa
160	0.0205	0.491	1.027	2.04	0.491
224	0.0267	0.8	1.8	4.44	0.8
320	0.0338	1.44	2.95	7.704	1.44
500	0.0372	3.15	6.69	15.54	3.15

DESIGN CONSIDERATIONS

Cryogenic pipe supports are required to perform three distinct functions -

- To support the pipe by restraining it against static and thermally generated forces.
- To isolate the pipe from the supporting structure.
- To maintain the thermal conditions within the pipe.

To carry out these functions effectively the support must combine strength with good thermal properties; high density polyurethane foam offers a good combination of both allowing for reasonably compact designs to be achieved.

Of primary importance is protection against the ingress of moisture, which if allowed to occur will cause a build up of ice around the pipe and a consequent break-down of the thermal insulation. Ultimately icing will lead to failure of the support.

Therefore consideration for providing a vapour seal, for layering of the insulation and for fit-up to line insulation must be given to ensure the thermal integrity of the support.

The table provides guidance for layering of the insulation material; it shall be confirmed with the insulation contractor in order to ensure compatibility between support and line insulation.

Where multi-layering is necessary, radial joints are staggered to avoid potential break-down of the vapour seal.

The vapour seal is provided by the correct selection and use of cryogenic adhesives, sealant mastics and the application of a proprietary vapour barrier of the following types —

Insulation Thickness (mm)	Layer Construction (mm)
25	25
30	30
40	40
50	50
60	30/30
70	30/40
80	40/40
90	50/40
100	50/50
110	50/60
120	30/40/50
130	30/50/50
140	40/50/50
150	50/50/50
160	50/60/50
170	50/70/50
180	50/80/50
190	50/90/50
200	50/100/50
210	50/50/60/50
220	50/50/70/50
230	50/50/80/50
240	50/50/90/50
250	50/50/100/50

Cryogenic Adhesive selected for the range of operating temperatures.

Sealant Mastic used to prevent ingress of moisture at joints and edges.

Foil vapour barrier, applied to the external surface of the insulation to provide primary resistance to moisture ingress.

All exposed surfaces of HD PUF where the high density skin has been removed are coated with sealant mastic to prevent damage by moisture ingress during the installation phase.

Protection of the vapour barrier is provided by the use of a suitable thin gauge steel or aluminium wrap.

Materials such as aluminium sheet 0.4-0.8mm thick, stainless steel sheet 0.6-0.8mm thick or various grades of coated carbon steel are suitable for this purpose and are usually dictated by the main insulation specification.

It is common practice for the layers of insulation in the lower half of the support to be factory bonded together. In order to ensure optimum 'fit-up' to pipe we use only a narrow strip of adhesive along the length of the PUF between each layer. This enables the multi-layered cradle to behave like a 'leaf-spring' and flex to accommodate any irregularities in both the pipe and cradle shape.

Please refer to the explanation of this further on in this text.

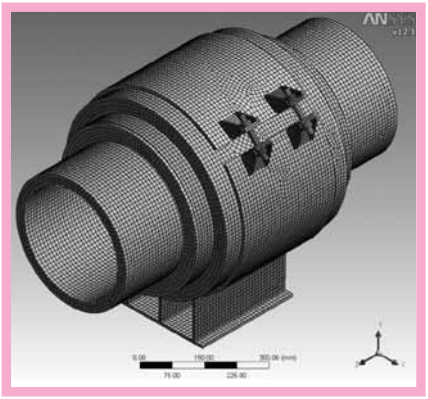
HD PUF is supplied in the following densities —

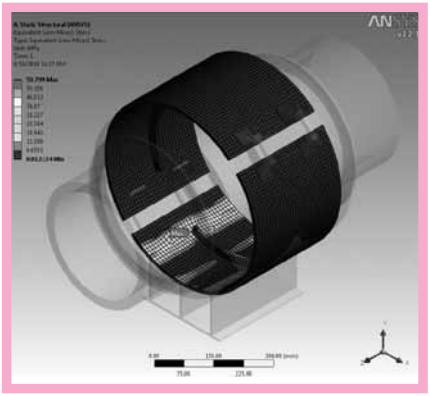
Pipe Size (NB)	Lower Cradle (kg/m^3)	Upper Cradle (kg/m^3) Resting type	Upper Cradle (kg/m^3) Line Stops and Anchors
Up to 150	160 (Natural)	160	160
200 to 600	224 (Red)	160	224
Over 600	320 (Green)	160	320
Special Needs	500 (Natural)	500	500

The different densities are coloured to allow easy identification at site. Layers are stepped in length by a minimum of 25mm (not more than 60mm) both circumferentially and longitudinally to allow fit-up to line insulation.

With regard to load capacities of foam components, consideration must be given to all forces being exerted on the pipe support and the respective bearing areas of either the pipe/foam interface or the foam/clamp interface. The allowable design stresses suggested in the previous text have been used to generate the load capacity and thermal tables that follow.

For special supports, line stops and anchors we utilize ANSYS finite element analysis to help us provide the optimum solution.





OUTSIDE DIAMETER OF INSULATION INSERTS

Insulation Thickness		25	30	40	50	60	70	80	90	100	110	120	130
Pipe O/D	No. Layers	1	1	1	1	2	2	2	2	2	2	3	3
21.3	15NB	71.3	81.3	101.3	121.3	141.3	161.3	181.3	201.3	221.3	241.3	261.3	281.3
26.9	20NB	76.9	86.9	106.9	126.9	146.9	166.9	186.9	206.9	226.9	246.9	266.9	286.9
33.7	25NB	83.7	93.7	113.7	133.7	153.7	173.7	193.7	213.7	233.7	253.7	273.7	293.7
42.4	32NB	92.4	102.4	122.4	142.4	162.4	182.4	202.4	222.4	242.4	262.4	282.4	302.4
48.3	40NB	98.3	108.3	128.3	148.3	168.3	188.3	208.3	228.3	248.3	268.3	288.3	308.3
60.3	50NB	110.3	120.3	140.3	160.3	180.3	200.3	220.3	240.3	260.3	280.3	300.3	320.3
76.1	65NB	126.1	136.1	156.1	176.1	196.1	216.1	236.1	256.1	276.1	296.1	316.1	336.1
88.9	80NB	138.9	148.9	168.9	188.9	208.9	228.9	248.9	268.9	288.9	308.9	328.9	348.9
114.3	100NB	164.3	174.3	194.3	214.3	234.3	254.3	274.3	294.3	314.3	334.3	354.3	374.3
139.7	125NB	189.7	199.7	219.7	239.7	259.7	279.7	299.7	319.7	339.7	359.7	379.7	399.7
168.3	150NB	218.3	228.3	248.3	268.3	288.3	308.3	328.3	348.3	368.3	388.3	408.3	428.3
193.7	175NB	243.7	253.7	273.7	293.7	313.7	333.7	353.7	373.7	393.7	413.7	433.7	453.7
219.1	200NB	269.1	279.1	299.1	319.1	339.1	359.1	379.1	399.1	419.1	439.1	459.1	479.1
244.5	225NB	294.5	304.5	324.5	344.5	364.5	384.5	404.5	424.5	444.5	464.5	484.5	504.5
273	250NB	323	333	353	373	393	413	433	453	473	493	513	533
323.9	300NB	373.9	383.9	403.9	423.9	443.9	463.9	483.9	503.9	523.9	543.9	563.9	583.9
355.6	350NB	405.6	415.6	435.6	455.6	475.6	495.6	515.6	535.6	555.6	575.6	595.6	615.6
406.4	400NB	456.4	466.4	486.4	506.4	526.4	546.4	566.4	586.4	606.4	626.4	646.4	666.4
457	450NB	507	517	537	557	577	597	617	637	657	677	697	717
508	500NB	558	568	588	608	628	648	668	688	708	728	748	768
559	550NB	609	619	639	659	679	699	719	739	759	779	799	819
610	600NB	660	670	690	710	730	750	770	790	810	830	850	870
660	650NB	710	720	740	760	780	800	820	840	860	880	900	920
711.2	700NB	761.2	771.2	791.2	811.2	831.2	851.2	871.2	891.2	911.2	931.2	951.2	971.2
762	750NB	812	822	842	862	882	902	922	942	962	982	1002	1022
813	800NB	863	873	893	913	933	953	973	993	1013	1033	1053	1073
864	850NB	914	924	944	964	984	1004	1024	1044	1064	1084	1104	1124
914	900NB	964	974	994	1014	1034	1054	1074	1094	1114	1134	1154	1174
965.2	950NB	1015	1025	1045	1065	1085	1105	1125	1145	1165	1185	1205	1225
1016	1000NB	1066	1076	1096	1116	1136	1156	1176	1196	1216	1236	1256	1276
1067	1050NB	1117	1127	1147	1167	1187	1207	1227	1247	1267	1287	1307	1327
1219	1200NB	1269	1279	1299	1319	1339	1359	1379	1399	1419	1439	1459	1479
1422	1400NB	1472	1482	1502	1522	1542	1562	1582	1602	1622	1642	1662	1682
1626	1600NB	1676	1686	1706	1726	1746	1766	1786	1806	1826	1846	1866	1886

NB. The inside diameter of the PUF insulation is moulded within the following limits –

(Pipe Outside Diameter x 101%) +3mm/-0mm

To compensate for gaps between pipe and PUF we provide a clearance at the longitudinal joint as follows —

Pipe O/D < 355.6mm	Clearance = 6mm
323.9 < Pipe O/D < 660mm	Clearance = 9mm
610 < Pipe O/D < 1016mm	Clearance = 12mm
Pipe O/D > 914mm	Clearance = 20mm

OUTSIDE DIAMETER OF INSULATION INSERTS:

Insulation Thickness		140	150	160	170	180	190	200	210	220	230	240	250
Pipe O/D	No. Layers	3	3	3	3	3	3	3	4	4	4	4	4
21.3	15NB	301.3	321.3	341.3	361.3	381.3	401.3	421.3	441.3	461.3	481.3	501.3	521.3
26.9	20NB	306.9	326.9	346.9	366.9	386.9	406.9	426.9	446.9	466.9	486.9	506.9	526.9
33.7	25NB	313.7	333.7	353.7	373.7	393.7	413.7	433.7	453.7	473.7	493.7	513.7	533.7
42.4	32NB	322.4	342.4	362.4	382.4	402.4	422.4	442.4	462.4	482.4	502.4	522.4	542.4
48.3	40NB	328.3	348.3	368.3	388.3	408.3	428.3	448.3	468.3	488.3	508.3	528.3	548.3
60.3	50NB	340.3	360.3	380.3	400.3	420.3	440.3	460.3	480.3	500.3	520.3	540.3	560.3
76.1	65NB	356.1	376.1	396.1	416.1	436.1	456.1	476.1	496.1	516.1	536.1	556.1	576.1
88.9	80NB	368.9	388.9	408.9	428.9	448.9	468.9	488.9	508.9	528.9	548.9	568.9	588.9
114.3	100NB	394.3	414.3	434.3	454.3	474.3	494.3	514.3	534.3	554.3	574.3	594.3	614.3
139.7	125NB	419.7	439.7	459.7	479.7	499.7	519.7	539.7	559.7	579.7	599.7	619.7	639.7
168.3	150NB	448.3	468.3	488.3	508.3	528.3	548.3	568.3	588.3	608.3	628.3	648.3	668.3
193.7	175NB	473.7	493.7	513.7	533.7	553.7	573.7	593.7	613.7	633.7	653.7	673.7	693.7
219.1	200NB	499.1	519.1	539.1	559.1	579.1	599.1	619.1	639.1	659.1	679.1	699.1	719.1
244.5	225NB	524.5	544.5	564.5	584.5	604.5	624.5	644.5	664.5	684.5	704.5	724.5	744.5
273	250NB	553	573	593	613	633	653	673	693	713	733	753	773
323.9	300NB	603.9	623.9	643.9	663.9	683.9	703.9	723.9	743.9	763.9	783.9	803.9	823.9
355.6	350NB	635.6	655.6	675.6	695.6	715.6	735.6	755.6	775.6	795.6	815.6	835.6	855.6
406.4	400NB	686.4	706.4	726.4	746.4	766.4	786.4	806.4	826.4	846.4	866.4	886.4	906.4
457	450NB	737	757	777	797	817	837	857	877	897	917	937	957
508	500NB	788	808	828	848	868	888	908	928	948	968	988	1008
559	550NB	839	859	879	899	919	939	959	979	999	1019	1039	1059
610	600NB	890	910	930	950	970	990	1010	1030	1050	1070	1090	1110
660	650NB	940	960	980	1000	1020	1040	1060	1080	1100	1120	1140	1160
711.2	700NB	991.2	1011	1031	1051	1071	1091	1111	1131	1151	1171	1191	1211
762	750NB	1042	1062	1082	1102	1122	1142	1162	1182	1202	1222	1242	1262
813	800NB	1093	1113	1133	1153	1173	1193	1213	1233	1253	1273	1293	1313
864	850NB	1144	1164	1184	1204	1224	1244	1264	1284	1304	1324	1344	1364
914	900NB	1194	1214	1234	1254	1274	1294	1314	1334	1354	1374	1394	1414
965.2	950NB	1245	1265	1285	1305	1325	1345	1365	1385	1405	1425	1465	1485
1016	1000NB	1296	1316	1336	1356	1376	1396	1416	1436	1456	1476	1496	1516
1067	1050NB	1347	1367	1387	1407	1427	1447	1467	1487	1507	1527	1547	1567
1219	1200NB	1499	1519	1539	1559	1579	1599	1619	1639	1659	1679	1699	1719
1422	1400NB	1702	1722	1742	1762	1782	1802	1822	1842	1862	1882	1902	1922
1626	1600NB	1906	1926	1946	1966	1986	2006	2026	2046	2066	2086	2106	2126

NB. The inside diameter of the PUF insulation is moulded within the following limits –

(Pipe Outside Diameter x 101%) +3mm/-0mm

To compensate for gaps between pipe and PUF we provide a clearance at the longitudinal joint as follows —

Pipe O/D < 355.6mm	Clearance = 6mm
323.9 < Pipe O/D < 660mm	Clearance = 9mm
610 < Pipe O/D < 1016mm	Clearance = 12mm
Pipe O/D > 914mm	Clearance = 20mm

INSULATION THICKNESS SELECTION CHARTS

Insul. Thick	25	30	40	50	60	70	80	90	100	110	120	130
Pipe O/D (do)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)
26.9	9.76	11.41	13.40	14.54	15.26	15.75	16.10	16.37	16.58	16.74	16.87	16.98
33.7	9.28	11.01	13.10	14.30	15.07	15.59	15.97	16.26	16.48	16.65	16.80	16.92
42.4	8.79	10.59	12.79	14.06	14.87	15.43	15.83	16.14	16.37	16.56	16.71	16.84
48.3	8.53	10.36	12.61	13.91	14.75	15.33	15.75	16.06	16.31	16.50	16.66	16.79
60.3	8.09	9.98	12.31	13.67	14.55	15.16	15.60	15.93	16.19	16.40	16.57	16.71
76.1	7.65	9.59	12.00	13.41	14.33	14.97	15.44	15.79	16.07	16.29	16.47	16.62
88.9	7.38	9.35	11.79	13.24	14.19	14.85	15.33	15.70	15.98	16.21	16.40	16.56
101.6	7.17	9.15	11.63	13.10	14.06	14.74	15.23	15.61	15.91	16.15	16.34	16.50
114.3	6.99	8.98	11.49	12.98	13.96	14.65	15.15	15.54	15.84	16.09	16.28	16.45
139.7	6.70	8.72	11.26	12.78	13.78	14.49	15.01	15.41	15.73	15.98	16.19	16.36
168.3	6.47	8.50	11.06	12.60	13.63	14.35	14.89	15.30	15.62	15.89	16.10	16.28
193.7	6.31	8.34	10.92	12.48	13.51	14.25	14.79	15.21	15.55	15.81	16.04	16.22
219.1	6.18	8.22	10.81	12.38	13.42	14.16	14.72	15.14	15.48	15.75	15.98	16.17
244.5	6.07	8.12	10.72	12.29	13.34	14.09	14.65	15.08	15.42	15.70	15.93	16.12
273.0	5.97	8.02	10.63	12.21	13.27	14.02	14.59	15.02	15.37	15.65	15.88	16.07
323.9	5.84	7.89	10.50	12.09	13.16	13.92	14.49	14.93	15.28	15.57	15.81	16.00
355.6	5.77	7.82	10.44	12.04	13.10	13.87	14.44	14.89	15.24	15.53	15.77	15.97
406.4	5.68	7.74	10.36	11.96	13.03	13.80	14.38	14.82	15.18	15.47	15.71	15.92
457.0	5.61	7.67	10.29	11.89	12.97	13.74	14.32	14.77	15.13	15.43	15.67	15.87
508.0	5.56	7.61	10.24	11.84	12.92	13.70	14.28	14.73	15.09	15.39	15.63	15.84
610.0	5.47	7.53	10.15	11.76	12.84	13.62	14.20	14.66	15.02	15.32	15.57	15.78
762.0	5.38	7.44	10.07	11.68	12.76	13.54	14.13	14.59	14.95	15.25	15.50	15.71
914.0	5.32	7.38	10.01	11.62	12.70	13.48	14.07	14.53	14.90	15.20	15.45	15.67
965.2	5.30	7.36	9.99	11.60	12.69	13.47	14.06	14.52	14.89	15.19	15.44	15.65
1016.0	5.29	7.34	9.98	11.59	12.67	13.46	14.05	14.51	14.87	15.18	15.43	15.64
1066.8	5.28	7.33	9.96	11.57	12.66	13.44	14.03	14.49	14.86	15.17	15.42	15.63
1219.2	5.24	7.30	9.93	11.54	12.63	13.41	14.00	14.46	14.83	15.14	15.39	15.60
1422.4	5.21	7.26	9.89	11.51	12.59	13.38	13.97	14.43	14.80	15.11	15.36	15.57
1625.6	5.18	7.24	9.87	11.48	12.57	13.35	13.94	14.41	14.78	15.08	15.34	15.55

Ambient Temperature T_m = 18°C, Fluid Temperature = -190°C, Medium Emissivity (f = 8W/m^{2}K)
Wind Velocity = 3m/second

The above data is applicable to cylindrical insulation and is based upon the following formulae

Thermal Resistance R(m^{2}K/W) $= d_o/(f.d_n)+\{(d_o/k).\ln(d_n/d_o)\times10^{-3}\}$

Rate of Heat Transfer q(W/m^2) $= (T_1-T_m).R$

Surface Temperature T_2(°C) $= T_m+\{q.d_o/(f.d_n)\}$

Where
- d_o = Pipe O/Dia.
- d_n = Insulation O/Dia.
- T_1 = Pipe Temperature.
- T_m = The ambient temperature of the air.
- T_2 = Surface temperature of the insulation.

INSULATION THICKNESS SELECTION CHARTS

Insul. Thick	140	150	160	170	180	190	200	210	220	230	240	250
Pipe O/D (do)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)
26.9	17.08	17.15	17.22	17.28	17.33	17.37	17.41	17.45	17.48	17.51	17.54	17.56
33.7	17.01	17.10	17.17	17.23	17.29	17.33	17.38	17.41	17.45	17.48	17.51	17.53
42.4	16.95	17.04	17.11	17.18	17.24	17.29	17.33	17.37	17.41	17.44	17.47	17.50
48.3	16.90	17.00	17.08	17.15	17.21	17.26	17.31	17.35	17.39	17.42	17.45	17.48
60.3	16.83	16.93	17.01	17.09	17.15	17.21	17.26	17.31	17.35	17.38	17.42	17.45
76.1	16.75	16.85	16.94	17.02	17.09	17.15	17.21	17.26	17.30	17.34	17.38	17.41
88.9	16.69	16.80	16.89	16.98	17.05	17.11	17.17	17.22	17.27	17.31	17.35	17.38
101.6	16.64	16.75	16.85	16.94	17.01	17.08	17.14	17.19	17.24	17.28	17.32	17.35
114.3	16.59	16.71	16.81	16.90	16.98	17.05	17.11	17.16	17.21	17.25	17.29	17.33
139.7	16.51	16.63	16.74	16.83	16.92	16.99	17.05	17.11	17.16	17.21	17.25	17.29
168.3	16.43	16.56	16.68	16.77	16.86	16.93	17.00	17.06	17.12	17.17	17.21	17.25
193.7	16.38	16.51	16.63	16.73	16.81	16.89	16.96	17.02	17.08	17.13	17.18	17.22
219.1	16.33	16.46	16.58	16.68	16.78	16.86	16.93	16.99	17.05	17.10	17.15	17.19
244.5	16.28	16.42	16.54	16.65	16.74	16.82	16.90	16.96	17.02	17.07	17.12	17.17
273.0	16.24	16.38	16.50	16.61	16.71	16.79	16.86	16.93	16.99	17.05	17.10	17.14
323.9	16.17	16.32	16.44	16.55	16.65	16.74	16.82	16.89	16.95	17.00	17.06	17.10
355.6	16.14	16.29	16.41	16.53	16.62	16.71	16.79	16.86	16.92	16.98	17.03	17.08
406.4	16.09	16.24	16.37	16.48	16.58	16.67	16.75	16.82	16.89	16.95	17.00	17.05
457.0	16.05	16.20	16.33	16.45	16.55	16.64	16.72	16.79	16.86	16.92	16.97	17.02
508.0	16.01	16.17	16.30	16.42	16.52	16.61	16.69	16.77	16.83	16.90	16.95	17.00
610.0	15.96	16.11	16.25	16.37	16.47	16.56	16.65	16.72	16.79	16.85	16.91	16.96
762.0	15.90	16.05	16.19	16.31	16.42	16.51	16.60	16.67	16.74	16.81	16.86	16.92
914.0	15.85	16.01	16.14	16.27	16.37	16.47	16.56	16.63	16.71	16.77	16.83	16.88
965.2	15.84	15.99	16.13	16.25	16.36	16.46	16.55	16.62	16.69	16.76	16.82	16.87
1016.0	15.83	15.98	16.12	16.24	16.35	16.45	16.54	16.61	16.68	16.75	16.81	16.86
1066.8	15.81	15.97	16.11	16.23	16.34	16.44	16.53	16.60	16.68	16.74	16.80	16.86
1219.2	15.79	15.95	16.09	16.21	16.32	16.41	16.50	16.58	16.65	16.72	16.78	16.83
1422.4	15.76	15.92	16.06	16.18	16.29	16.39	16.48	16.56	16.63	16.69	16.75	16.81
1625.6	15.74	15.90	16.04	16.16	16.27	16.37	16.46	16.54	16.61	16.67	16.74	16.79

Ambient Temperature T_m = 18°C, Fluid Temperature = -190°C, Medium Emissivity (f = 8W/m^{2}K)
Wind Velocity = 3m/second

Surface Coefficient (f W/m^{2}K) is dependent upon the emissivity of the outer surface of the insulation and can be approximated as follows —

Wind Speed	Still Air	3m/sec	10m/sec
Low Emissivity — Bright metal, polished aluminium.	5.7	15.5	36
Medium Emissivity — Zinc / aluminium coated or galvanised steel.	8	18	38
High Emissivity — Matt black surfaces, plastic coated metals.	10	20	40

The above data is applicable to cylindrical insulation and is based upon the following formulae

Thermal Resistance R(m^{2}K/W) $= d_o/(f.d_n)+\{(d_o/k).\ln(d_n/d_o)\times10^{-3}\}$

Rate of Heat Transfer q(W/m^2) $= (T_1-T_m).R$

Surface Temperature T_2(°C) $= T_m+\{q.d_o/(f.d_n)\}$

Where
- d_o = Pipe O/Dia.
- d_n = Insulation O/Dia.
- T_1 = Pipe Temperature.
- T_m = The ambient temperature of the air.
- T_2 = Surface temperature of the insulation.

INSULATION THICKNESS SELECTION CHARTS

Insul. Thick	25	30	40	50	60	70	80	90	100	110	120	130
Pipe O/D (do)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)
26.9	15.76	17.22	19.27	20.44	21.18	21.68	22.05	22.32	22.54	22.70	22.84	22.95
33.7	15.28	16.81	18.96	20.20	20.98	21.52	21.91	22.21	22.44	22.62	22.76	22.88
42.4	14.79	16.38	18.64	19.94	20.78	21.35	21.77	22.08	22.33	22.52	22.68	22.81
48.3	14.53	16.14	18.46	19.80	20.66	21.25	21.68	22.01	22.26	22.46	22.62	22.76
60.3	14.09	15.75	18.14	19.54	20.45	21.07	21.53	21.87	22.14	22.36	22.53	22.67
76.1	13.65	15.35	17.82	19.28	20.22	20.88	21.36	21.73	22.01	22.24	22.43	22.58
88.9	13.38	15.10	17.62	19.10	20.08	20.75	21.25	21.63	21.93	22.16	22.35	22.52
101.6	13.17	14.89	17.44	18.96	19.95	20.64	21.16	21.54	21.85	22.09	22.29	22.46
114.3	12.99	14.72	17.30	18.83	19.84	20.55	21.07	21.47	21.78	22.03	22.24	22.41
139.7	12.70	14.45	17.06	18.63	19.66	20.39	20.93	21.34	21.66	21.92	22.14	22.32
168.3	12.47	14.22	16.86	18.45	19.50	20.24	20.80	21.22	21.56	21.82	22.05	22.23
193.7	12.31	14.06	16.72	18.32	19.39	20.14	20.70	21.13	21.48	21.75	21.98	22.17
219.1	12.18	13.94	16.60	18.21	19.29	20.05	20.62	21.06	21.41	21.69	21.92	22.11
244.5	12.07	13.83	16.51	18.13	19.21	19.98	20.55	21.00	21.35	21.63	21.87	22.07
273.0	11.97	13.73	16.42	18.04	19.13	19.91	20.49	20.94	21.29	21.58	21.82	22.02
323.9	11.84	13.60	16.29	17.92	19.02	19.80	20.39	20.84	21.21	21.50	21.74	21.95
355.6	11.77	13.53	16.22	17.86	18.96	19.75	20.34	20.80	21.16	21.46	21.70	21.91
406.4	11.68	13.44	16.14	17.78	18.89	19.68	20.27	20.73	21.10	21.40	21.65	21.86
457.0	11.61	13.37	16.07	17.72	18.83	19.62	20.22	20.68	21.05	21.35	21.60	21.81
508.0	11.56	13.31	16.01	17.66	18.77	19.57	20.17	20.64	21.01	21.31	21.56	21.78
610.0	11.47	13.22	15.93	17.58	18.69	19.49	20.10	20.56	20.94	21.25	21.50	21.72
762.0	11.38	13.13	15.84	17.49	18.61	19.41	20.02	20.49	20.87	21.17	21.43	21.65
914.0	11.32	13.07	15.78	17.43	18.55	19.35	19.96	20.43	20.81	21.12	21.38	21.60
965.2	11.30	13.05	15.76	17.42	18.53	19.34	19.95	20.42	20.80	21.11	21.37	21.59
1016.0	11.29	13.04	15.74	17.40	18.52	19.32	19.93	20.40	20.78	21.10	21.35	21.57
1066.8	11.28	13.02	15.73	17.39	18.51	19.31	19.92	20.39	20.77	21.08	21.34	21.56
1219.2	11.24	12.99	15.70	17.35	18.47	19.28	19.89	20.36	20.74	21.05	21.31	21.53
1422.4	11.21	12.95	15.66	17.32	18.44	19.24	19.85	20.33	20.71	21.02	21.28	21.50
1625.6	11.18	12.93	15.63	17.29	18.41	19.22	19.83	20.30	20.68	21.00	21.26	21.48

Ambient Temperature T_m = 24°C, Fluid Temperature = -190°C, Medium Emissivity (f = 8W/m^{2}K)
Wind Velocity = 3m/second

The above data is applicable to cylindrical insulation and is based upon the following formulae

Thermal Resistance R(m^{2}K/W) $= d_o/(f.d_n)+\{(d_o/k).\ln(d_n/d_o)\times10^{-3}\}$

Rate of Heat Transfer q(W/m^2) $= (T_1-T_m).R$

Surface Temperature T_2(°C) $= T_m+\{q.d_o/(f.d_n)\}$

Where
- d_o = Pipe O/Dia.
- d_n = Insulation O/Dia.
- T_1 = Pipe Temperature.
- T_m = The ambient temperature of the air.

INSULATION THICKNESS SELECTION CHARTS

Insul. Thick	140	150	160	170	180	190	200	210	220	230	240	250
Pipe O/D (do)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)
26.9	23.05	23.13	23.20	23.26	23.31	23.36	23.40	23.43	23.47	23.50	23.52	23.55
33.7	22.99	23.07	23.15	23.21	23.27	23.31	23.36	23.40	23.43	23.46	23.49	23.52
42.4	22.91	23.01	23.09	23.16	23.22	23.27	23.31	23.36	23.39	23.43	23.46	23.49
48.3	22.87	22.97	23.05	23.12	23.18	23.24	23.29	23.33	23.37	23.41	23.44	23.47
60.3	22.80	22.90	22.99	23.06	23.13	23.19	23.24	23.29	23.33	23.37	23.40	23.43
76.1	22.71	22.82	22.91	23.00	23.07	23.13	23.19	23.24	23.28	23.32	23.36	23.39
88.9	22.65	22.76	22.86	22.95	23.02	23.09	23.15	23.20	23.25	23.29	23.33	23.36
101.6	22.60	22.72	22.82	22.91	22.98	23.05	23.11	23.17	23.22	23.26	23.30	23.34
114.3	22.55	22.67	22.78	22.87	22.95	23.02	23.08	23.14	23.19	23.23	23.27	23.31
139.7	22.47	22.59	22.71	22.80	22.89	22.96	23.03	23.09	23.14	23.19	23.23	23.27
168.3	22.39	22.52	22.64	22.74	22.83	22.90	22.97	23.04	23.09	23.14	23.19	23.23
193.7	22.33	22.47	22.59	22.69	22.78	22.86	22.93	23.00	23.05	23.11	23.15	23.20
219.1	22.28	22.42	22.54	22.65	22.74	22.82	22.90	22.96	23.02	23.08	23.12	23.17
244.5	22.23	22.38	22.50	22.61	22.70	22.79	22.86	22.93	22.99	23.05	23.10	23.14
273.0	22.19	22.33	22.46	22.57	22.67	22.75	22.83	22.90	22.96	23.02	23.07	23.12
323.9	22.12	22.27	22.40	22.51	22.61	22.70	22.78	22.85	22.92	22.98	23.03	23.08
355.6	22.08	22.24	22.37	22.48	22.58	22.67	22.75	22.83	22.89	22.95	23.01	23.05
406.4	22.04	22.19	22.32	22.44	22.54	22.63	22.72	22.79	22.86	22.92	22.97	23.02
457.0	21.99	22.15	22.28	22.40	22.51	22.60	22.68	22.76	22.83	22.89	22.94	23.00
508.0	21.96	22.11	22.25	22.37	22.48	22.57	22.66	22.73	22.80	22.86	22.92	22.97
610.0	21.90	22.06	22.20	22.32	22.43	22.52	22.61	22.69	22.76	22.82	22.88	22.93
762.0	21.83	22.00	22.14	22.26	22.37	22.47	22.55	22.63	22.71	22.77	22.83	22.89
914.0	21.79	21.95	22.09	22.22	22.33	22.43	22.51	22.60	22.67	22.73	22.79	22.85
965.2	21.77	21.94	22.08	22.20	22.32	22.41	22.50	22.58	22.66	22.72	22.78	22.84
1016.0	21.76	21.93	22.07	22.19	22.30	22.40	22.49	22.57	22.65	22.71	22.77	22.83
1066.8	21.75	21.91	22.06	22.18	22.29	22.39	22.48	22.56	22.64	22.70	22.77	22.82
1219.2	21.72	21.89	22.03	22.16	22.27	22.37	22.46	22.54	22.61	22.68	22.74	22.80
1422.4	21.69	21.86	22.00	22.13	22.24	22.34	22.43	22.51	22.59	22.66	22.72	22.78
1625.6	21.67	21.83	21.98	22.11	22.22	22.32	22.41	22.49	22.57	22.64	22.70	22.76

Ambient Temperature T_m = 24°C, Fluid Temperature = -190°C, Medium Emissivity (f = 8W/m^{2}K)
Wind Velocity = 3m/second

The above data is applicable to cylindrical insulation and is based upon the following formulae

Thermal Resistance R(m^{2}K/W) $= d_o/(f.d_n)+\{(d_o/k).\ln(d_n/d_o)\times10^{-3}\}$

Rate of Heat Transfer q(W/m^2) $= (T_1-T_m).R$

Surface Temperature T_2(°C) $= T_m+\{q.d_o/(f.d_n)\}$

Where
- d_o = Pipe O/Dia.
- d_n = Insulation O/Dia.
- T_1 = Pipe Temperature.
- T_m = The ambient temperature of the air.
- T_2 = Surface temperature of the insulation.

INSULATION THICKNESS SELECTION CHARTS

Insul. Thick	25	30	40	50	60	70	80	90	100	110	120	130
Pipe O/D (do)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)
26.9	9.76	14.07	15.26	15.94	16.36	16.66	16.87	17.03	17.15	17.25	17.33	17.39
33.7	9.28	13.83	15.08	15.80	16.25	16.57	16.79	16.96	17.09	17.20	17.28	17.35
42.4	8.79	13.59	14.89	15.65	16.13	16.47	16.71	16.89	17.03	17.14	17.23	17.31
48.3	8.53	13.45	14.79	15.56	16.06	16.41	16.66	16.85	16.99	17.11	17.20	17.28
60.3	8.09	13.22	14.61	15.42	15.94	16.30	16.57	16.77	16.92	17.05	17.15	17.23
76.1	7.65	12.99	14.42	15.26	15.81	16.19	16.47	16.68	16.85	16.98	17.09	17.18
88.9	7.38	12.84	14.30	15.16	15.73	16.12	16.41	16.63	16.80	16.93	17.05	17.14
101.6	7.17	12.72	14.20	15.08	15.65	16.06	16.35	16.58	16.75	16.89	17.01	17.11
114.3	6.99	12.62	14.12	15.01	15.59	16.00	16.30	16.53	16.71	16.86	16.98	17.08
139.7	6.70	12.47	13.98	14.89	15.49	15.91	16.22	16.46	16.65	16.80	16.92	17.02
168.3	6.47	12.33	13.86	14.78	15.39	15.82	16.14	16.39	16.58	16.74	16.87	16.98
193.7	6.31	12.24	13.78	14.71	15.33	15.76	16.09	16.34	16.54	16.70	16.83	16.94
219.1	6.18	12.17	13.71	14.65	15.27	15.71	16.04	16.30	16.50	16.66	16.79	16.91
244.5	6.07	12.11	13.66	14.60	15.22	15.67	16.00	16.26	16.46	16.63	16.77	16.88
273.0	5.97	12.05	13.61	14.55	15.18	15.63	15.96	16.22	16.43	16.60	16.74	16.85
323.9	5.84	11.97	13.53	14.48	15.11	15.57	15.91	16.17	16.38	16.55	16.69	16.81
355.6	5.77	11.93	13.49	14.44	15.08	15.54	15.88	16.14	16.35	16.53	16.67	16.79
406.4	5.68	11.88	13.44	14.40	15.04	15.50	15.84	16.11	16.32	16.49	16.64	16.76
457.0	5.61	11.84	13.41	14.36	15.00	15.46	15.81	16.08	16.29	16.47	16.61	16.73
508.0	5.56	11.81	13.37	14.33	14.97	15.43	15.78	16.05	16.27	16.44	16.59	16.71
610.0	5.47	11.76	13.32	14.28	14.93	15.39	15.74	16.01	16.23	16.40	16.55	16.68
762.0	5.38	11.70	13.27	14.23	14.88	15.34	15.69	15.96	16.18	16.36	16.51	16.64
914.0	5.32	11.67	13.23	14.19	14.84	15.31	15.66	15.93	16.15	16.33	16.48	16.61
965.2	5.30	11.66	13.22	14.18	14.83	15.30	15.65	15.92	16.14	16.32	16.47	16.60
1016.0	5.29	11.65	13.22	14.18	14.82	15.29	15.64	15.92	16.14	16.32	16.47	16.59
1066.8	5.28	11.64	13.21	14.17	14.82	15.28	15.64	15.91	16.13	16.31	16.46	16.59
1219.2	5.24	11.62	13.19	14.15	14.80	15.26	15.62	15.89	16.11	16.29	16.44	16.57
1422.4	5.21	11.60	13.17	14.13	14.78	15.24	15.60	15.87	16.09	16.27	16.43	16.55
1625.6	5.18	11.58	13.15	14.11	14.76	15.23	15.58	15.86	16.08	16.26	16.41	16.54

Ambient Temperature T_m = 18°C, Fluid Temperature = -106°C, Medium Emissivity (f = 8W/m^{2}K)
Wind Velocity = 3m/second

The above data is applicable to cylindrical insulation and is based upon the following formulae

Thermal Resistance R(m^{2}K/W) $= d_o/(f.d_n)+\{(d_o/k).\ln(d_n/d_o)\times10^{-3}\}$

Rate of Heat Transfer q(W/m^2) $= (T_1-T_m).R$

Surface Temperature T_2(°C) $= T_m+\{q.d_o/(f.d_n)\}$

Where
- d_o = Pipe O/Dia.
- d_n = Insulation O/Dia.
- T_1 = Pipe Temperature.
- T_m = The ambient temperature of the air.
- T_2 = Surface temperature of the insulation.

INSULATION THICKNESS SELECTION CHARTS

Insul. Thick	140	150	160	170	180	190	200	210	220	230	240	250
Pipe O/D (do)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)
26.9	17.45	17.50	17.54	17.57	17.60	17.63	17.65	17.67	17.69	17.71	17.72	17.74
33.7	17.41	17.46	17.50	17.54	17.57	17.60	17.63	17.65	17.67	17.69	17.71	17.72
42.4	17.37	17.42	17.47	17.51	17.55	17.58	17.60	17.63	17.65	17.67	17.69	17.70
48.3	17.35	17.40	17.45	17.49	17.53	17.56	17.59	17.61	17.64	17.66	17.67	17.69
60.3	17.30	17.36	17.41	17.46	17.50	17.53	17.56	17.59	17.61	17.63	17.65	17.67
76.1	17.25	17.32	17.37	17.42	17.46	17.50	17.53	17.56	17.58	17.61	17.63	17.65
88.9	17.22	17.28	17.34	17.39	17.43	17.47	17.51	17.54	17.56	17.59	17.61	17.63
101.6	17.19	17.26	17.31	17.37	17.41	17.45	17.49	17.52	17.55	17.57	17.59	17.61
114.3	17.16	17.23	17.29	17.34	17.39	17.43	17.47	17.50	17.53	17.56	17.58	17.60
139.7	17.11	17.19	17.25	17.31	17.35	17.40	17.44	17.47	17.50	17.53	17.55	17.58
168.3	17.07	17.14	17.21	17.27	17.32	17.36	17.41	17.44	17.47	17.50	17.53	17.55
193.7	17.03	17.11	17.18	17.24	17.29	17.34	17.38	17.42	17.45	17.48	17.51	17.53
219.1	17.00	17.08	17.15	17.22	17.27	17.32	17.36	17.40	17.43	17.46	17.49	17.52
244.5	16.98	17.06	17.13	17.19	17.25	17.30	17.34	17.38	17.42	17.45	17.48	17.50
273.0	16.95	17.03	17.11	17.17	17.23	17.28	17.32	17.36	17.40	17.43	17.46	17.49
323.9	16.91	17.00	17.07	17.14	17.20	17.25	17.29	17.34	17.37	17.41	17.44	17.46
355.6	16.89	16.98	17.05	17.12	17.18	17.23	17.28	17.32	17.36	17.39	17.42	17.45
406.4	16.86	16.95	17.03	17.10	17.16	17.21	17.26	17.30	17.34	17.37	17.40	17.43
457.0	16.84	16.93	17.01	17.07	17.14	17.19	17.24	17.28	17.32	17.36	17.39	17.42
508.0	16.82	16.91	16.99	17.06	17.12	17.17	17.22	17.27	17.31	17.34	17.37	17.40
610.0	16.78	16.87	16.96	17.03	17.09	17.14	17.19	17.24	17.28	17.32	17.35	17.38
762.0	16.75	16.84	16.92	16.99	17.06	17.11	17.16	17.21	17.25	17.29	17.32	17.35
914.0	16.72	16.81	16.89	16.97	17.03	17.09	17.14	17.19	17.23	17.27	17.30	17.33
965.2	16.71	16.80	16.89	16.96	17.02	17.08	17.13	17.18	17.22	17.26	17.30	17.33
1016.0	16.70	16.80	16.88	16.95	17.02	17.08	17.13	17.17	17.22	17.25	17.29	17.32
1066.8	16.70	16.79	16.87	16.95	17.01	17.07	17.12	17.17	17.21	17.25	17.28	17.32
1219.2	16.68	16.78	16.86	16.93	17.00	17.05	17.11	17.15	17.20	17.24	17.27	17.30
1422.4	16.66	16.76	16.84	16.92	16.98	17.04	17.09	17.14	17.18	17.22	17.26	17.29
1625.6	16.65	16.75	16.83	16.90	16.97	17.03	17.08	17.13	17.17	17.21	17.25	17.28

Ambient Temperature T_m = 18°C, Fluid Temperature = -106°C, Medium Emissivity (f = 8W/m^{2}K)
Wind Velocity = 3m/second

The above data is applicable to cylindrical insulation and is based upon the following formulae

Thermal Resistance R(m^{2}K/W) $= d_o/(f.d_n)+\{(d_o/k).\ln(d_n/d_o)\times10^{-3}\}$

Rate of Heat Transfer q(W/m^2) $= (T_1-T_m).R$

Surface Temperature T_2(°C) $= T_m+\{q.d_o/(f.d_n)\}$

Where
- d_o = Pipe O/Dia.
- d_n = Insulation O/Dia.
- T_1 = Pipe Temperature.
- T_m = The ambient temperature of the air.
- T_2 = Surface temperature of the insulation.

INSULATION THICKNESS SELECTION CHARTS

Insul. Thick	25	30	40	50	60	70	80	90	100	110	120	130
Pipe O/D (do)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)
26.9	15.76	19.88	21.13	21.84	22.29	22.59	22.81	22.98	23.11	23.21	23.30	23.37
33.7	15.28	19.63	20.94	21.69	22.17	22.50	22.73	22.91	23.05	23.16	23.25	23.32
42.4	14.79	19.37	20.74	21.54	22.04	22.39	22.64	22.83	22.98	23.10	23.20	23.27
48.3	14.53	19.23	20.63	21.45	21.97	22.33	22.59	22.79	22.94	23.06	23.16	23.25
60.3	14.09	18.99	20.44	21.29	21.84	22.22	22.50	22.71	22.87	23.00	23.11	23.19
76.1	13.65	18.74	20.25	21.13	21.71	22.11	22.40	22.62	22.79	22.93	23.04	23.14
88.9	13.38	18.59	20.12	21.03	21.62	22.03	22.33	22.56	22.74	22.88	23.00	23.10
101.6	13.17	18.47	20.02	20.94	21.54	21.96	22.27	22.51	22.69	22.84	22.96	23.06
114.3	12.99	18.36	19.93	20.86	21.47	21.90	22.22	22.46	22.65	22.80	22.93	23.03
139.7	12.70	18.20	19.78	20.74	21.36	21.81	22.13	22.38	22.58	22.74	22.87	22.98
168.3	12.47	18.06	19.66	20.63	21.27	21.72	22.05	22.31	22.51	22.68	22.81	22.93
193.7	12.31	17.96	19.58	20.55	21.20	21.66	22.00	22.26	22.47	22.63	22.77	22.89
219.1	12.18	17.89	19.51	20.49	21.14	21.60	21.95	22.21	22.43	22.60	22.74	22.85
244.5	12.07	17.82	19.45	20.43	21.09	21.56	21.91	22.18	22.39	22.56	22.71	22.82
273.0	11.97	17.76	19.39	20.38	21.04	21.51	21.87	22.14	22.35	22.53	22.67	22.80
323.9	11.84	17.68	19.31	20.31	20.97	21.45	21.81	22.08	22.30	22.48	22.63	22.75
355.6	11.77	17.64	19.28	20.27	20.94	21.42	21.78	22.05	22.28	22.46	22.60	22.73
406.4	11.68	17.59	19.22	20.22	20.89	21.37	21.74	22.02	22.24	22.42	22.57	22.70
457.0	11.61	17.54	19.18	20.18	20.86	21.34	21.70	21.98	22.21	22.39	22.54	22.67
508.0	11.56	17.51	19.15	20.15	20.83	21.31	21.67	21.96	22.18	22.37	22.52	22.65
610.0	11.47	17.45	19.10	20.10	20.78	21.26	21.63	21.91	22.14	22.33	22.48	22.61
762.0	11.38	17.40	19.04	20.05	20.73	21.21	21.58	21.87	22.10	22.28	22.44	22.57
914.0	11.32	17.36	19.00	20.01	20.69	21.18	21.55	21.83	22.06	22.25	22.41	22.54
965.2	11.30	17.35	18.99	20.00	20.68	21.17	21.54	21.82	22.05	22.24	22.40	22.53
1016.0	11.29	17.34	18.98	19.99	20.67	21.16	21.53	21.82	22.05	22.24	22.39	22.53
1066.8	11.28	17.33	18.98	19.98	20.66	21.15	21.52	21.81	22.04	22.23	22.39	22.52
1219.2	11.24	17.31	18.96	19.96	20.64	21.13	21.50	21.79	22.02	22.21	22.37	22.50
1422.4	11.21	17.29	18.93	19.94	20.62	21.11	21.48	21.77	22.00	22.19	22.35	22.48
1625.6	11.18	17.27	18.92	19.93	20.61	21.10	21.47	21.75	21.99	22.18	22.33	22.47

Ambient Temperature T_m = 24°C, Fluid Temperature = -106°C, Medium Emissivity (f = 8W/m^{2}K)
Wind Velocity = 3m/second

The above data is applicable to cylindrical insulation and is based upon the following formulae

Thermal Resistance R(m^{2}K/W) $= d_o/(f.d_n)+\{(d_o/k).\ln(d_n/d_o)\times10^{-3}\}$

Rate of Heat Transfer q(W/m^2) $= (T_1-T_m).R$

Surface Temperature T_2(°C) $= T_m+\{q.d_o/(f.d_n)\}$

Where
- d_o = Pipe O/Dia.
- d_n = Insulation O/Dia.
- T_1 = Pipe Temperature.
- T_m = The ambient temperature of the air.
- T_2 = Surface temperature of the insulation.

INSULATION THICKNESS SELECTION CHARTS

Insul. Thick	140	150	160	170	180	190	200	210	220	230	240	250
Pipe O/D (do)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)	T_2 (°C)
26.9	23.42	23.47	23.51	23.55	23.58	23.61	23.63	23.66	23.68	23.69	23.71	23.72
33.7	23.38	23.44	23.48	23.52	23.55	23.58	23.61	23.63	23.65	23.67	23.69	23.71
42.4	23.34	23.40	23.45	23.49	23.52	23.56	23.58	23.61	23.63	23.65	23.67	23.69
48.3	23.31	23.37	23.42	23.47	23.50	23.54	23.57	23.59	23.62	23.64	23.66	23.68
60.3	23.27	23.33	23.38	23.43	23.47	23.51	23.54	23.57	23.59	23.61	23.64	23.65
76.1	23.22	23.28	23.34	23.39	23.43	23.47	23.51	23.54	23.56	23.59	23.61	23.63
88.9	23.18	23.25	23.31	23.36	23.41	23.45	23.48	23.51	23.54	23.57	23.59	23.61
101.6	23.15	23.22	23.28	23.34	23.38	23.42	23.46	23.49	23.52	23.55	23.57	23.60
114.3	23.12	23.19	23.26	23.31	23.36	23.40	23.44	23.48	23.51	23.53	23.56	23.58
139.7	23.07	23.15	23.21	23.27	23.32	23.37	23.41	23.44	23.48	23.51	23.53	23.56
168.3	23.02	23.10	23.17	23.23	23.29	23.33	23.38	23.41	23.45	23.48	23.51	23.53
193.7	22.99	23.07	23.14	23.20	23.26	23.31	23.35	23.39	23.43	23.46	23.49	23.51
219.1	22.95	23.04	23.11	23.18	23.23	23.28	23.33	23.37	23.41	23.44	23.47	23.49
244.5	22.93	23.01	23.09	23.15	23.21	23.26	23.31	23.35	23.39	23.42	23.45	23.48
273.0	22.90	22.99	23.06	23.13	23.19	23.24	23.29	23.33	23.37	23.40	23.44	23.46
323.9	22.86	22.95	23.03	23.10	23.16	23.21	23.26	23.30	23.34	23.38	23.41	23.44
355.6	22.84	22.93	23.01	23.08	23.14	23.19	23.24	23.29	23.33	23.36	23.40	23.43
406.4	22.81	22.90	22.98	23.05	23.11	23.17	23.22	23.27	23.31	23.34	23.38	23.41
457.0	22.78	22.88	22.96	23.03	23.09	23.15	23.20	23.25	23.29	23.32	23.36	23.39
508.0	22.76	22.85	22.94	23.01	23.07	23.13	23.18	23.23	23.27	23.31	23.34	23.38
610.0	22.72	22.82	22.90	22.98	23.04	23.10	23.15	23.20	23.24	23.28	23.32	23.35
762.0	22.68	22.78	22.87	22.94	23.01	23.07	23.12	23.17	23.21	23.25	23.29	23.32
914.0	22.66	22.75	22.84	22.92	22.98	23.04	23.10	23.15	23.19	23.23	23.27	23.30
965.2	22.65	22.75	22.83	22.91	22.98	23.04	23.09	23.14	23.18	23.22	23.26	23.30
1016.0	22.64	22.74	22.83	22.90	22.97	23.03	23.08	23.13	23.18	23.22	23.26	23.29
1066.8	22.63	22.73	22.82	22.90	22.96	23.02	23.08	23.13	23.17	23.21	23.25	23.28
1219.2	22.62	22.72	22.80	22.88	22.95	23.01	23.06	23.11	23.16	23.20	23.24	23.27
1422.4	22.60	22.70	22.79	22.86	22.93	22.99	23.05	23.10	23.14	23.18	23.22	23.26
1625.6	22.58	22.68	22.77	22.85	22.92	22.98	23.03	23.08	23.13	23.17	23.21	23.24

Ambient Temperature T_m = 24°C, Fluid Temperature = -106°C, Medium Emissivity (f = 8W/m^{2}K)
Wind Velocity = 3m/second

The above data is applicable to cylindrical insulation and is based upon the following formulae

Thermal Resistance R(m^{2}K/W) $= d_o/(f.d_n)+\{(d_o/k).\ln(d_n/d_o)\times 10^{-3}\}$

Rate of Heat Transfer q(W/m^2) $= (T_1-T_m).R$

Surface Temperature T_2(°C) $= T_m+\{q.d_o/(f.d_n)\}$

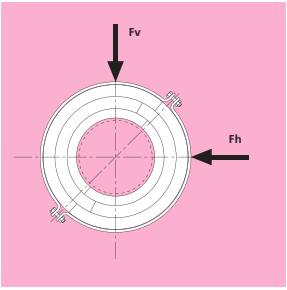
Where
- d_o = Pipe O/Dia.
- d_n = Insulation O/Dia.
- T_1 = Pipe Temperature.
- T_m = The ambient temperature of the air.
- T_2 = Surface temperature of the insulation.

MAXIMUM RADIAL APPLIED LOADING

Shoe Length	150				200				250			
No. Layers	1	2	3	4	1	2	3	4	1	2	3	4
Pipe O/D	Limiting Radial Load (kN)											
21.3	2.51	2.99	3.47	3.95	3.19	3.67	4.15	4.63	3.87	4.35	4.83	5.31
26.9	3.17	3.78	4.38	4.99	4.03	4.64	5.24	5.85	4.89	5.49	6.10	6.70
33.7	3.98	4.73	5.49	6.25	5.05	5.81	6.57	7.32	6.12	6.88	7.64	8.40
42.4	5.00	5.96	6.91	7.86	6.35	7.31	8.26	9.21	7.70	8.66	9.61	10.56
48.3	5.70	6.79	7.87	8.96	7.24	8.32	9.41	10.50	8.77	9.86	10.95	12.03
60.3	7.11	8.47	9.83	11.19	9.03	10.39	11.75	13.10	10.95	12.31	13.67	15.02
76.1	8.98	10.69	12.40	14.12	11.40	13.11	14.83	16.54	13.82	15.53	17.25	18.96
88.9	10.49	12.49	14.49	16.49	13.32	15.32	17.32	19.32	16.15	18.15	20.15	22.15
114.3	13.49	16.06	18.55	20.46	17.12	19.70	22.27	24.84	20.76	23.33	25.90	28.48
139.7	16.48	19.07	20.98	22.89	20.93	24.07	27.22	30.36	25.37	28.52	31.66	34.81
168.3	19.86	21.80	23.71	25.62	25.21	29.00	32.79	36.57	30.57	34.36	38.14	41.93
193.7	35.76	37.90	40.89	43.87	45.40	52.22	59.04	65.86	55.05	61.87	68.69	75.51
219.1	40.20	41.69	44.68	47.67	51.35	59.07	66.78	74.50	62.27	69.98	77.69	85.41
244.5	43.99	45.49	48.48	51.46	57.31	65.92	74.53	83.14	69.48	78.09	86.70	95.31
273	48.25	49.75	52.73	55.72	63.99	73.60	83.21	90.23	77.58	87.20	96.81	106.42
323.9	55.86	57.35	60.34	63.32	75.92	87.32	96.38	100.37	92.05	103.45	114.86	126.26
355.6	60.59	62.08	65.07	68.06	83.35	95.87	102.70	106.68	101.06	113.58	126.10	138.62
406.4	68.18	69.67	72.66	75.65	95.26	108.83	112.82	116.80	115.49	129.80	144.11	158.42
457	75.74	77.23	80.22	83.21	107.12	118.91	122.89	126.88	129.87	145.96	162.06	178.15
508	83.36	84.85	87.84	90.83	119.07	129.07	133.05	137.04	144.37	162.25	180.14	191.21
559	90.98	92.47	95.46	98.44	131.02	139.23	143.21	147.19	158.86	178.54	198.22	203.91
610	98.59	100.09	103.08	106.06	142.98	149.39	153.37	157.35	173.35	194.83	211.63	216.61
660	166.01	168.35	173.03	177.70	242.14	249.41	255.64	261.88	293.58	329.95	350.73	358.52
711.2	177.98	180.32	185.00	189.67	259.13	265.37	271.61	277.84	316.35	355.55	370.68	378.48
762	189.86	192.20	196.88	201.55	274.97	281.21	287.44	293.68	338.95	380.94	390.48	398.27
813	201.79	204.12	208.80	213.48	290.87	297.11	303.34	309.58	361.63	402.56	410.35	418.15
864	213.71	216.05	220.73	225.40	306.77	313.01	319.24	325.48	384.32	422.43	430.23	438.02
914	225.40	227.74	232.42	237.09	322.36	328.60	334.83	341.07	406.56	441.92	449.71	457.51
965.2	237.37	239.71	244.39	249.07	338.32	344.56	350.79	357.03	429.33	461.87	469.67	477.46
1016	249.25	251.59	256.27	260.94	354.16	360.39	366.63	372.86	451.93	481.67	489.46	497.26
1066.8	261.13	263.47	268.14	272.82	370.00	376.23	382.47	388.70	474.53	501.47	509.26	517.05
1219.2	296.76	299.10	303.78	308.46	417.51	423.74	429.98	436.21	542.31	560.86	568.65	576.44
1422.4	344.28	346.61	351.29	355.97	480.86	487.09	493.33	499.56	632.25	640.04	647.84	655.63
1625.6	391.79	394.13	398.80	403.48	544.21	550.44	556.68	562.91	711.44	719.23	727.02	734.82

NB. The maximum radial load is calculated as the resultant force due to all vertical and transverse loadings such that —

$$\text{Radial Force } Fr = \sqrt{(Fv^2 + Fh^2)}$$

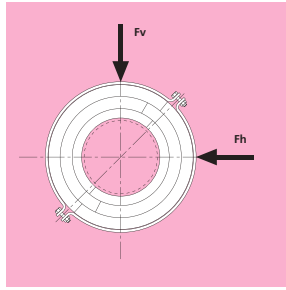


MAXIMUM RADIAL APPLIED LOADING

Shoe Length	300				450				600			
No. Layers	1	2	3	4	1	2	3	4	1	2	3	4
Pipe O/D	Limiting Radial Load (kN)											
21.3	4.55	5.03	5.51	5.98	6.58	7.06	7.54	8.02	8.61	9.09	9.57	10.05
26.9	5.74	6.35	6.95	7.56	8.31	8.92	9.52	10.13	10.88	11.48	12.09	12.69
33.7	7.19	7.95	8.71	9.47	10.41	11.17	11.93	12.69	13.63	14.39	15.15	15.90
42.4	9.05	10.00	10.96	11.91	13.10	14.05	15.01	15.96	17.15	18.10	19.06	20.01
48.3	10.31	11.40	12.48	13.57	14.92	16.01	17.10	18.18	19.53	20.62	21.71	22.79
60.3	12.87	14.23	15.59	16.94	18.63	19.99	21.34	22.70	24.39	25.74	27.10	28.46
76.1	16.24	17.96	19.67	21.38	23.51	25.22	26.93	28.65	30.78	32.49	34.20	35.91
88.9	18.98	20.98	22.98	24.98	27.46	29.46	31.47	33.47	35.95	37.95	39.95	41.95
114.3	24.40	26.97	29.54	32.11	35.31	37.88	40.46	43.03	46.22	48.80	51.37	53.94
139.7	29.82	32.96	36.11	39.25	43.16	46.30	49.45	52.59	56.50	59.64	62.78	65.93
168.3	35.92	39.71	43.50	47.29	51.99	55.78	59.57	63.36	68.06	71.85	75.64	79.42
193.7	64.69	71.51	78.33	85.15	93.63	100.45	107.27	114.09	122.56	129.38	136.20	143.02
219.1	73.18	80.89	88.60	96.32	105.91	113.62	121.33	129.05	138.64	146.35	154.06	161.78
244.5	81.66	90.27	98.88	107.49	118.18	126.79	135.40	144.01	154.71	163.32	171.93	180.53
273	91.18	100.79	110.40	120.01	131.96	141.57	151.18	160.80	172.74	182.35	191.97	201.58
323.9	108.18	119.58	130.99	142.39	156.56	167.97	179.37	190.78	204.95	216.35	227.76	239.16
355.6	118.76	131.28	143.81	156.33	171.88	184.41	196.93	209.45	225.01	237.53	250.05	262.57
406.4	135.73	150.04	164.35	178.66	196.44	210.75	225.06	239.37	257.15	271.46	285.77	300.08
457	152.63	168.72	184.81	200.90	220.90	236.99	253.08	269.17	289.17	305.26	321.35	337.44
508	169.66	187.55	205.44	223.32	245.55	263.44	281.32	299.21	321.44	339.32	357.21	375.10
559	186.70	206.38	226.06	245.74	270.20	289.88	309.57	329.25	353.71	373.39	393.07	412.76
610	203.73	225.21	246.68	268.16	294.85	316.33	337.81	359.29	385.98	407.46	428.93	450.41
660	345.02	381.39	417.76	454.14	499.34	535.71	572.09	608.46	653.66	690.03	726.41	762.78
711.2	371.78	410.98	450.17	489.37	538.07	577.27	616.47	655.66	704.37	743.56	782.76	821.95
762	398.34	440.33	482.33	515.34	576.51	618.50	660.50	702.49	754.68	796.67	838.67	880.66
813	425.00	469.80	514.61	539.19	615.09	659.90	704.70	749.51	805.19	849.99	894.80	939.61
864	451.66	499.27	546.89	563.04	653.68	701.29	748.91	796.53	855.70	903.32	950.93	998.55
914	477.80	528.17	577.07	586.42	691.51	741.88	792.25	842.62	905.22	955.59	1005.96	1056.34
965.2	504.56	557.75	601.01	610.36	730.24	783.44	836.63	889.83	955.93	1009.12	1062.31	1115.51
1016	531.12	587.11	624.77	634.12	768.68	824.67	880.66	936.66	1006.24	1062.23	1118.23	1174.22
1066.8	557.67	616.47	648.52	657.88	807.11	865.90	924.70	983.49	1056.55	1115.34	1174.14	1232.93
1219.2	637.34	704.53	719.79	729.14	922.41	989.60	1056.80	1123.99	1207.49	1274.68	1341.87	1409.06
1422.4	743.56	805.46	814.82	824.17	1076.15	1154.54	1232.93	1292.37	1408.73	1487.12	1565.52	1643.91
1625.6	849.79	900.49	909.84	919.19	1229.88	1319.47	1409.06	1434.91	1609.98	1699.57	1789.16	1878.75

NB. The maximum radial load is calculated as the resultant force due to all vertical and transverse loadings such that —

$$\text{Radial Force } Fr = \sqrt{\sqrt{(Fv^2 + Fh^2)}}$$



MAXIMUM AXIAL TORSION

Shoe Length		150				200				250				300				450				600			
Pipe O/D	No. of Layers	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	Clamp Bolt	4 Bolts				4 Bolts				4 Bolts				4 Bolts				6 Bolts				6 Bolts			
21.3	M10	3.25Nm				4.33Nm				5.42Nm				6.50Nm				9.75Nm				13.00Nm			
26.9	M10	5.18Nm				6.91Nm				8.63Nm				10.36Nm				15.54Nm				20.72Nm			
33.7	M10	8.13Nm				10.84Nm				13.55Nm				16.27Nm				24.40Nm				32.53Nm			
42.4	M10	12.87Nm				17.17Nm				21.46Nm				25.75Nm				38.62Nm				51.50Nm			
48.3	M10	16.71Nm				22.27Nm				27.84Nm				33.41Nm				50.12Nm				66.82Nm			
60.3	M10	26.04Nm				34.71Nm				43.40Nm				52.07Nm				78.11Nm				101.98Nm			
76.1	M12	41.46Nm				55.30Nm				69.12Nm				82.94Nm				124.41Nm				165.87Nm			
88.9	M12	56.60Nm				75.45Nm				94.32Nm				113.18Nm				169.77Nm				218.53Nm			
114.3	M12	93.55Nm				124.73Nm				155.92Nm				187.11Nm				280.66Nm				280.97Nm			
139.7	M12	139.75Nm				186.32Nm				228.94Nm				228.94Nm				343.41Nm				343.41Nm			
168.3	M12	202.82Nm				270.44Nm				275.81Nm				275.81Nm				413.71Nm				413.71Nm			
193.7	M12	268.66Nm				317.43Nm				317.43Nm				317.43Nm				476.15Nm				476.15Nm			
219.1	M12	343.74Nm				359.06Nm				359.06Nm				359.06Nm				538.59Nm				538.59Nm			
244.5	M12	400.68Nm				400.68Nm				400.68Nm				400.68Nm				601.03Nm				601.03Nm			
273	M12	447.39Nm				447.39Nm				447.39Nm				447.39Nm				671.09Nm				671.09Nm			
323.9	M16	751.25Nm				0.99kNm				0.99kNm				0.99kNm				1.48kNm				1.48kNm			
355.6	M16	0.91kNm				1.09kNm				1.09kNm				1.09kNm				1.63kNm				1.63kNm			
406.4	M16	1.18kNm				1.24kNm				1.24kNm				1.24kNm				1.86kNm				1.86kNm			
457	M16	1.39kNm				1.39kNm				1.39kNm				1.39kNm				2.09kNm				2.09kNm			
508	M16	1.55kNm				1.55kNm				1.55kNm				1.55kNm				2.33kNm				2.33kNm			
559	M16	1.71kNm				1.71kNm				1.71kNm				1.71kNm				2.56kNm				2.56kNm			
610	M16	1.86kNm				1.86kNm				1.86kNm				1.86kNm				2.79kNm				2.79kNm			
660	M20	3.12kNm				3.14kNm				3.14kNm				3.14kNm				4.72kNm				4.72kNm			
711.2	M20	3.39kNm				3.39kNm				3.39kNm				3.39kNm				5.08kNm				5.08kNm			
762	M20	3.63kNm				3.63kNm				3.63kNm				3.63kNm				5.44kNm				5.44kNm			
813	M20	3.87kNm				3.87kNm				3.87kNm				3.87kNm				5.81kNm				5.81kNm			
864	M20	4.12kNm				4.12kNm				4.12kNm				4.12kNm				6.17kNm				6.17kNm			
914	M20	4.35kNm				4.35kNm				4.35kNm				4.35kNm				6.53kNm				6.53kNm			
965.2	M20	4.60kNm				4.60kNm				4.60kNm				4.60kNm				6.90kNm				6.90kNm			
1016	M20	4.84kNm				4.84kNm				4.84kNm				4.84kNm				7.26kNm				7.26kNm			
1066.8	M24	7.32kNm				7.32kNm				7.32kNm				7.32kNm				10.98kNm				10.98kNm			
1219.2	M24	8.37kNm				8.37kNm				8.37kNm				8.37kNm				12.55kNm				12.55kNm			
1422.4	M24	9.76kNm				9.76kNm				9.76kNm				9.76kNm				14.64kNm				14.64kNm			
1625.6	M24	11.16kNm				11.16kNm				11.16kNm				11.16kNm				16.73kNm				16.73kNm			

NB. The above figures are calculated on the basis of the following torque settings within the clamp bolts —

M10	2.5Nm
M12	6.0Nm
M16	15.84Nm
M20	31.0Nm
M24	53.76Nm

These figures are offered for guidance only; the use of adhesives or thrust flanges may allow higher values to be achieved. The designer should assure himself that the proposed arrangement will function effectively.

MAXIMUM AXIAL THRUST

Shoe Length		150				200				250				300				450				600			
Pipe O/D	No. of Layers	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	Clamp Bolt	4 Bolts				4 Bolts				4 Bolts				4 Bolts				6 Bolts				6 Bolts			
21.3	M10	0.31kN				0.41kN				0.51kN				0.61kN				0.92kN				1.22kN			
26.9	M10	0.39kN				0.51kN				0.64kN				0.77kN				1.16kN				1.54kN			
33.7	M10	0.48kN				0.64kN				0.80kN				0.97kN				1.45kN				1.93kN			
42.4	M10	0.61kN				0.81kN				1.01kN				1.21kN				1.82kN				2.43kN			
48.3	M10	0.69kN				0.92kN				1.15kN				1.38kN				2.08kN				2.77kN			
60.3	M10	0.86kN				1.15kN				1.44kN				1.73kN				2.59kN				3.38kN			
76.1	M12	1.09kN				1.45kN				1.82kN				2.18kN				3.27kN				4.36kN			
88.9	M12	1.27kN				1.70kN				2.12kN				2.55kN				3.82kN				4.92kN			
114.3	M12	1.64kN				2.18kN				2.73kN				3.27kN				4.91kN				4.92kN			
139.7	M12	2.00kN				2.67kN				3.28kN				3.28kN				4.92kN				4.92kN			
168.3	M12	2.41kN				3.21kN				3.28kN				3.28kN				4.92kN				4.92kN			
193.7	M12	2.77kN				3.28kN				3.28kN				3.28kN				4.92kN				4.92kN			
219.1	M12	3.14kN				3.28kN				3.28kN				3.28kN				4.92kN				4.92kN			
244.5	M12	3.28kN				3.28kN				3.28kN				3.28kN				4.92kN				4.92kN			
273	M12	3.28kN				3.28kN				3.28kN				3.28kN				4.92kN				4.92kN			
323.9	M16	4.64kN				6.10kN				6.10kN				6.10kN				9.16kN				9.16kN			
355.6	M16	5.09kN				6.10kN				6.10kN				6.10kN				9.16kN				9.16kN			
406.4	M16	5.82kN				6.10kN				6.10kN				6.10kN				9.16kN				9.16kN			
457	M16	6.10kN				6.10kN				6.10kN				6.10kN				9.16kN				9.16kN			
508	M16	6.10kN				6.10kN				6.10kN				6.10kN				9.16kN				9.16kN			
559	M16	6.10kN				6.10kN				6.10kN				6.10kN				9.16kN				9.16kN			
610	M16	6.10kN				6.10kN				6.10kN				6.10kN				9.16kN				9.16kN			
660	M20	9.45kN				9.53kN				9.53kN				9.53kN				14.29kN				14.29kN			
711.2	M20	9.53kN				9.53kN				9.53kN				9.53kN				14.29kN				14.29kN			
762	M20	9.53kN				9.53kN				9.53kN				9.53kN				14.29kN				14.29kN			
813	M20	9.53kN				9.53kN				9.53kN				9.53kN				14.29kN				14.29kN			
864	M20	9.53kN				9.53kN				9.53kN				9.53kN				14.29kN				14.29kN			
914	M20	9.53kN				9.53kN				9.53kN				9.53kN				14.29kN				14.29kN			
965.2	M20	9.53kN				9.53kN				9.53kN				9.53kN				14.29kN				14.29kN			
1016	M20	9.53kN				9.53kN				9.53kN				9.53kN				14.29kN				14.29kN			
1066.8	M24	13.72kN				13.72kN				13.72kN				13.72kN				20.59kN				20.59kN			
1219.2	M24	13.72kN				13.72kN				13.72kN				13.72kN				20.59kN				20.59kN			
1422.4	M24	13.72kN				13.72kN				13.72kN				13.72kN				20.59kN				20.59kN			
1625.6	M24	13.72kN				13.72kN				13.72kN				13.72kN				20.59kN				20.59kN			

NB. The above figures are calculated on the basis of the following torque settings within the clamp bolts —

M10	2.5Nm
M12	6.0Nm
M16	15.84Nm
M20	31.0Nm
M24	53.76Nm

These figures are offered for guidance only; the use of adhesives or thrust flanges may allow higher values to be achieved. The designer should assure himself that the proposed arrangement will function effectively.

Combined Forces

Where deadweight is combined with lateral forces, axial torsion and thrust the following method should be used to determine the suitability of the support to sustain the combination of forces.

$$\sum \frac{Fr}{Pr} + \frac{Ft}{Pt} + \frac{Fa}{Pa} \leq 1$$

Where:

Fr = Applied Radial Force	Pr = Maximum Allowable Radial Force
Ft = Applied Axial Torsion	Pt = Maximum Allowable Axial Torsion
Fa = Applied Axial Thrust	Pa = Maximum Allowable Axial Thrust

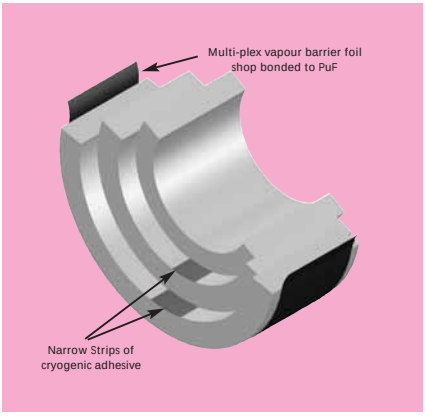
Construction Principles and Materials:

We have shown by full-scale testing at cryogenic temperatures that bonding between the layers of HD PUF can be kept to an absolute minimum and from these tests have concluded that in simple resting, hanging and guided supports the upper layers of HD PUF do not require any bonding.

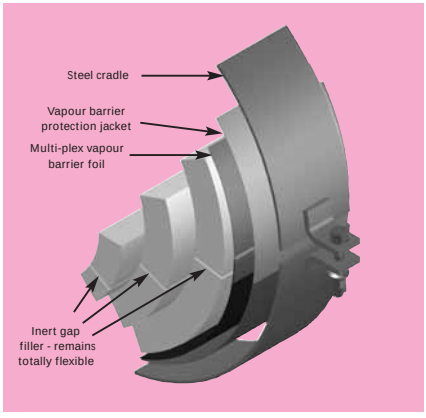
It can be shown that by fully bonding the multiple layers of HD PUF together the PUF cradle becomes more rigid than the steel cradle surrounding it and will not flex to suit any irregularity or tolerance in the shape and diameter of the pipe.

However by bonding the layers together with a narrow band of adhesive positioned along the quadrant of the moulding the multiple layers can flex and shear relative to one another thereby allowing the cradle to adjust its shape to suit geometric or dimensional anomalies.

The diagram shown on the right illustrates this principle —



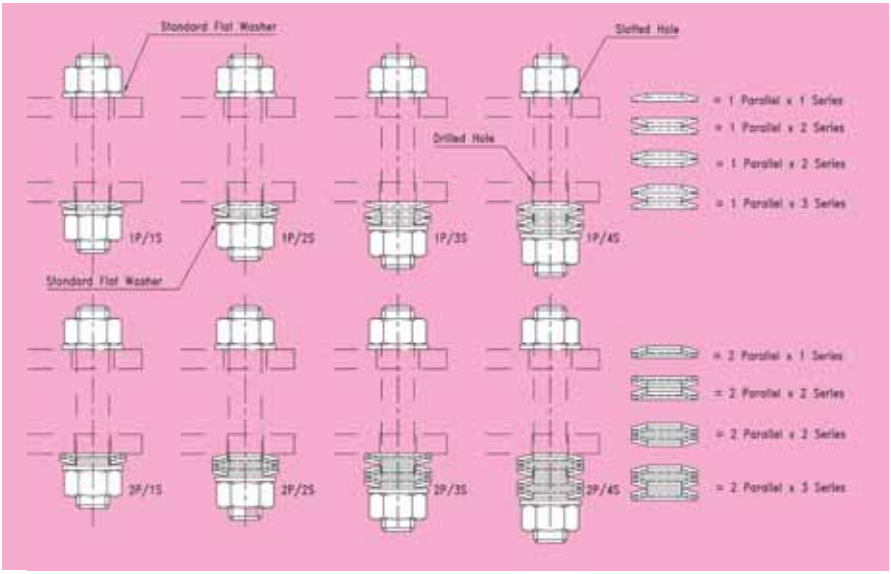
Strip bonding of lower insulation segments.



Mutli-layer construction.

Full scale test of 24"NB (600NB) cryogenic pipe shoe at –165°C for client approval.

DISC SPRING CONFIGURATION



The use of disc springs will maintain a nominal compressive force between the PUF ensuring that regardless of applied vertical loading there will always be positive force between the PUF and the Pipe thereby eliminating the possibility of the pipe 'floating' inside the insulation.

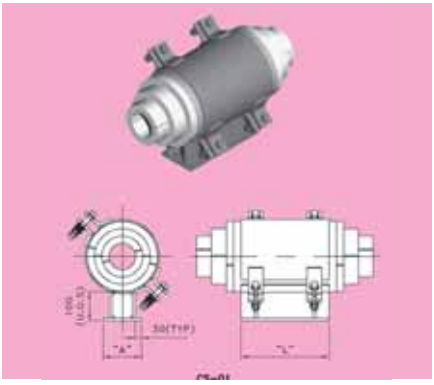
In practice the pipe cools to the same temperature of the fluid it carries. The inside face of the insulation will also cool to this temperature but the outer face of the PUF, exposed to the ambient conditions of the local environment will be held at a much higher temperature.

The PUF therefore has a large temperature gradient through its thickness causing the inside face to contract and effectively pulling it away from the shrinking pipe. Installed correctly, using appropriate mastics, adhesives and gap filling materials the PUF insulation will contract under the pressure exerted by the disc springs and remain in contact with the pipe.

The above diagram explains the terminology used and shows how disc springs should be installed. We will provide bolt torque values on a contract by contract basis since this must take in to account the thickness of the insulation.

TYPE CS01 CRYOGENIC PIPE SHOE

PIPE SIZE		PIPE OD	DIMENSIONS A	DIMENSIONS L	SWL (N) VERT	SWL (N) HOR
½”	15	21.3	100	150	1176	679
¾”	20	26.9	100	150	1485	857
1”	25	33.7	100	150	1861	1074
1½”	40	48.3	100	150	2667	1540
2”	50	60.3	100	300	6660	3845
2½”	65	76.1	100	300	8406	4853
3”	80	88.9	100	300	9820	5670
4”	100	114.3	150	300	12626	7290
6”	150	168.3	150	300	18591	10734
8”	200	219.1	200	450	59152	34153
10”	250	273	250	450	73705	42555
12”	300	323.9	300	450	87447	50489
14”	350	355.6	330	450	96005	55430
16”	400	406.4	350	450	109721	63349
18”	450	457	350	450	123382	71237
20”	500	508	400	450	137151	78187
22”	550	558.8	400	450	15866	87105
24”	600	610	500	750	274483	158478
26”	650	660.4	500	750	534891	308829
28”	700	711.2	500	750	675038	332585
30”	750	762	600	750	617183	356341
32”	800	812.8	600	750	658328	380097
34”	850	863.6	600	750	699474	403853
36”	900	914	650	750	740295	427422
38”	950	965.2	650	750	781765	451366
40”	1000	1016	650	750	822911	475122
42”	1050	1066.8	810	750	864056	498878
44”	1100	1117.6	840	750	905202	522634
46”	1150	1168.4	880	750	946348	546390
48”	1200	1219.2	880	750	987493	570146
50”	1250	1270	960	750	1028639	593902
52”	1300	1320.8	1000	750	1069784	617658
56”	1400	1422.4	1080	750	1152076	665171
58”	1450	1473.2	1080	750	1193221	688927
64”	1600	1625.6	1080	750	1416658	760195
66”	1650	1676.4	1200	750	1357803	783951
70”	1750	1778	1200	750	1440094	831463
72”	1800	1828.8	1200	750	1481241	855220

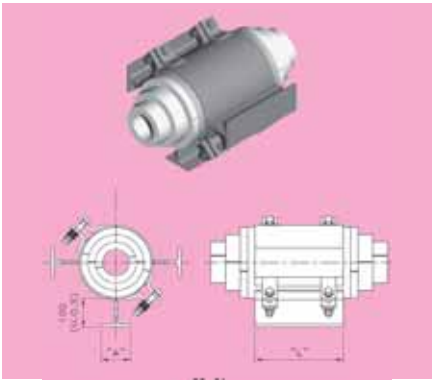


CS-01
For pipe sizes ½” to 3” NB.

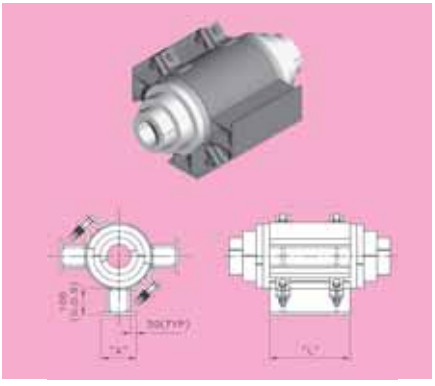
CS-01
For pipe sizes over 3” NB.

TYPE CG01, CG02 & CG03 SHOES

PIPE SIZE		SWL (N)		
		VERT	HOR	AXIAL
½”	15	1176	679	150
¾”	20	1485	857	150
1”	25	1861	1074	170
1½”	40	2667	1540	470
2”	50	6660	3845	610
2½”	65	8406	4853	770
3”	80	9820	5670	970
4”	100	12626	7290	1210
6”	150	18591	10734	1380
8”	200	59152	34153	2180
10”	250	73705	42555	2550
12”	300	87447	50489	3270
14”	350	96005	55430	3280
16”	400	109721	63349	3280
18”	450	123382	71237	3280
20”	500	137151	78187	3280
22”	550	150866	87105	3280
24”	600	274483	158478	4920
26”	650	534891	308829	4920
28”	700	568038	332585	9160
30”	750	617183	356341	9160
32”	800	658328	380097	9160
34”	850	699474	403853	9160
36”	900	740295	427422	9160
38”	950	781765	451366	9160
40”	1000	822911	475122	9160
42”	1050	864056	498878	14290
44”	1100	905202	522634	14290
46”	1150	946348	546390	14290
48”	1200	987493	570146	14290
50”	1250	1028639	593902	14290
52”	1300	1069784	617658	14290
56”	1400	1152076	665171	14290
58”	1450	1193221	688927	14290
64”	1600	1416658	760195	20590
66”	1650	1357803	783951	20590
70”	1750	1440094	831463	20590
72”	1800	1481241	855220	20590



CG-01
For pipe sizes ½” to 3” NB.

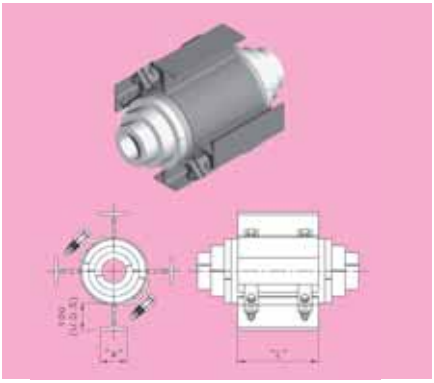


CG-01
For pipe sizes over 3” NB.

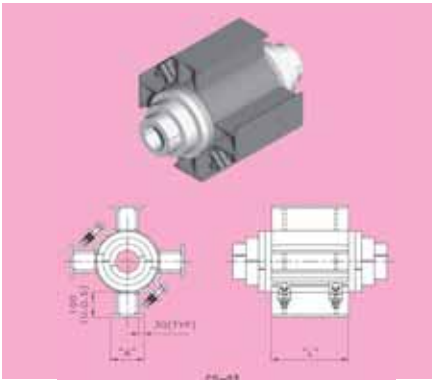
CG-02
For pipe sizes ½” to 3” NB.

CG-02
For pipe sizes over 3” NB.

TYPE CG01, CG02 & CG03 SHOES



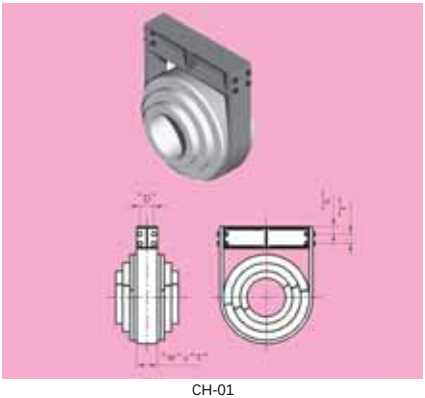
CG-03
For pipe sizes ½” to 3” NB.



CG-03
For pipe sizes over 3” NB.

TYPE CH01 HANGER

PIPE SIZE		D	E	F	W	T	SWL (kN)
6”	150	90	40	70	150	25	10.73
8”	200	90	40	70	150	25	22.76
10”	250	90	40	70	150	25	28.37
12”	300	90	40	70	150	25	33.65
14”	350	90	40	70	150	25	36.95
16”	400	90	40	70	150	25	42.23
18”	450	90	40	70	150	25	47.49
20”	500	90	40	70	150	25	52.79
22”	550	90	40	70	150	25	58.07
24”	600	90	40	70	150	25	63.39
26”	650	140	50	100	200	25	164.70
28”	700	140	50	100	200	25	177.37
30”	750	140	50	100	200	25	190.04
32”	800	140	50	100	200	25	202.71
34”	850	140	50	100	200	25	215.38
36”	900	140	50	100	200	25	227.95
38”	950	140	50	100	200	25	240.72
40”	1000	140	50	100	200	25	253.39

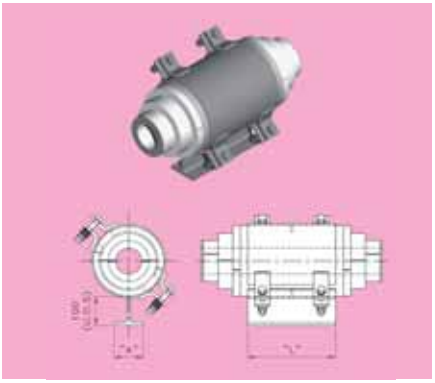


CH-01

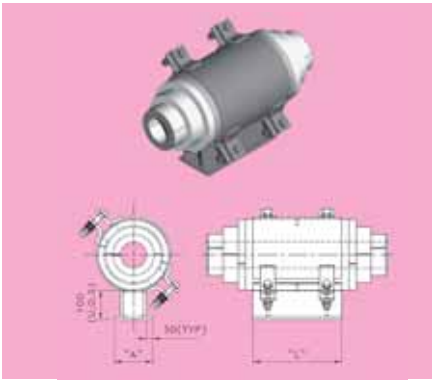
TYPE CL01 & CL03 SHOES

PIPE SIZE		SWL (N)		
		VERT	HOR	AXIAL
2"	50	6660	3845	1998
2½"	65	8406	4853	2521
3"	80	9820	5670	2946
4"	100	12626	7290	3787
6"	150	18591	10734	5577
8"	200	59152	34153	17745
10"	250	73705	42555	22111
12"	300	87447	50489	26234
14"	350	96005	55430	28801
16"	400	109721	63349	32916
18"	450	123382	71237	30714
20"	500	137151	78187	41145
22"	550	15866	87105	45259
24"	600	274483	158478	82344
26"	650	534891	308829	160467
28"	700	675038	332585	172811
30"	750	617183	356341	185154
32"	800	658328	380097	197498
34"	850	699474	403853	209842
36"	900	740295	427422	222088
38"	950	781765	451366	234529
40"	1000	822911	475122	246873
42"	1050	864056	498878	259216
44"	1100	905202	522634	271560
46"	1150	946348	546390	283904
48"	1200	987493	570146	296247
50"	1250	1028639	593902	308591
52"	1300	1069784	617658	320935
56"	1400	1152076	665171	345622
58"	1450	1193221	688927	357966
64"	1600	1416658	760195	394997
66"	1650	1357803	783951	407340
70"	1750	1440094	831463	432028
72"	1800	1481241	855220	444372

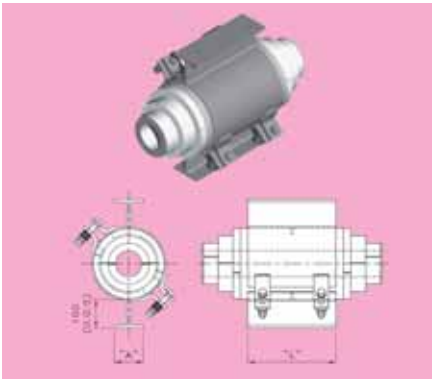
Please provide full piping specification & design conditions.



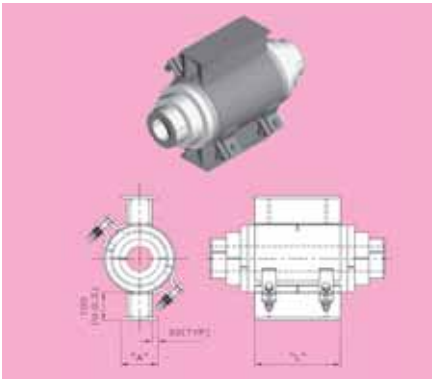
CL-01
For pipe sizes ½" to 3" NB.



CL-01
For pipe sizes over 3" NB.



CL-03
For pipe sizes ½" to 3" NB.



CL-03
For pipe sizes over 3" NB.

TYPE CL02 & CL04 SHOES

PIPE SIZE		SWL (N)		
		VERT	HOR	AXIAL
2"	50	6660	3845	1998
2½"	65	8406	4853	2521
3"	80	9820	5670	2946
4"	100	12626	7290	3787
6"	150	18591	10734	5577
8"	200	59152	34153	17745
10"	250	73705	42555	22111
12"	300	87447	50489	26234
14"	350	96005	55430	28801
16"	400	109721	63349	32916
18"	450	123382	71237	30714
20"	500	137151	78187	41145
22"	550	15866	87105	45259
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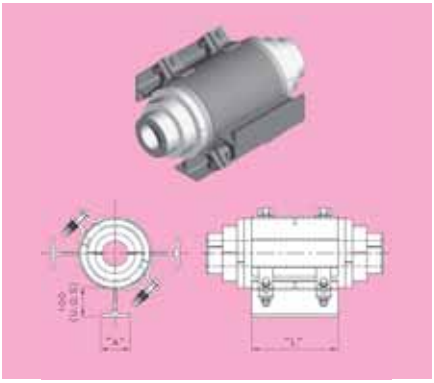
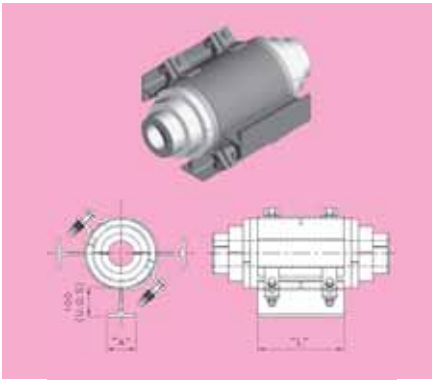
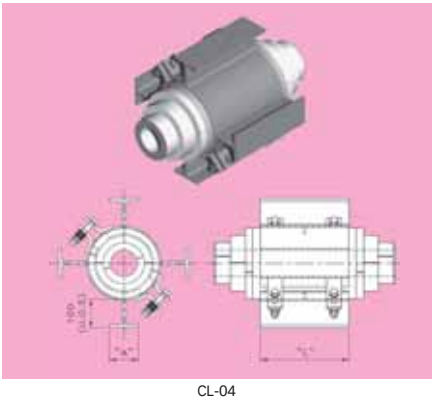
Please provide full piping specification & design conditions.



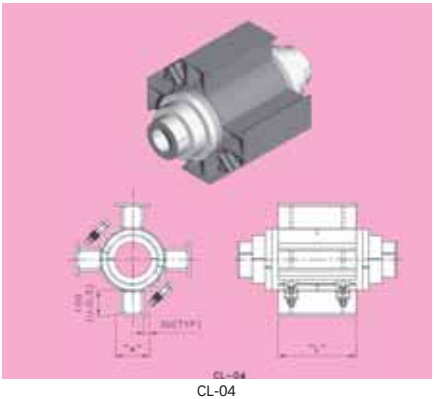
CL-02
For pipe sizes ½" to 3" NB.



CL-02
For pipe sizes over 3" NB.



CL-04
For pipe sizes ½" to 3" NB.



CL-04
For pipe sizes over 3" NB.

Densified Wood

Where insulation is not the primary concern and high load carrying capacity is required we recommend the use of Densified Wood as the thermal break.

A material that exhibits compressive strength approaching that of carbon steel, is totally resistant to corrosion and will not absorb moisture is ideally suited to the task of both supporting and anchoring cold pipework.

With extremely good screw holding capacity, pipe shoes and sliding plates can be safely fixed to our Densified Wood allowing a wide variety of support configurations to be used in conjunction with this material.

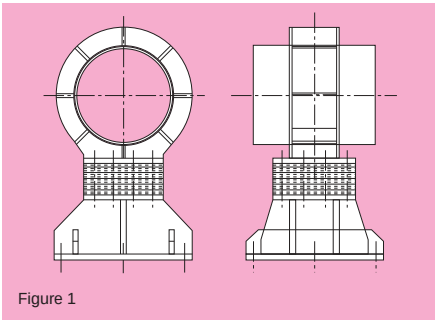
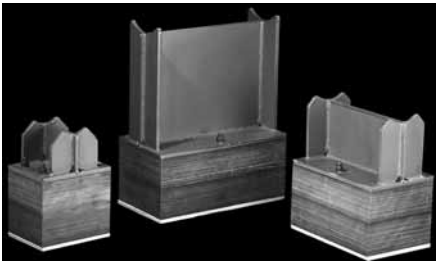


Figure 1



Simple weld-on shoes.

Figure 1 shows a typical cryogenic anchor where the pipe and upper part of the anchor would be insulated using Polyurethane Foam (PUF). The forces are transmitted through the Densified Wooden block into the base structure while the cold temperature is prevented from reaching it.

Such anchors and supports are designed to meet the customer's specific requirements and provide the best solution to a unique set of conditions.

Figure 2 shows a composite anchor using Densified Wood to transfer the forces and HD PUF to insulate the pipe.

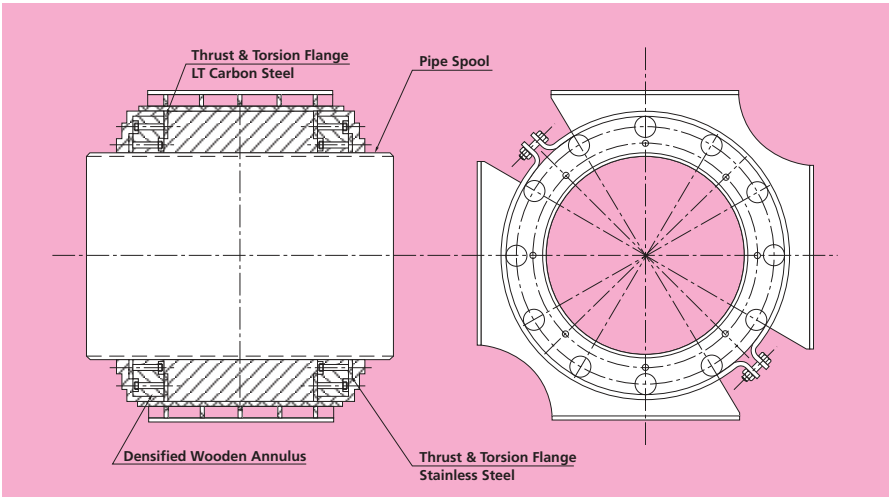


Figure 2

CRYOGENIC SUPPORTS

Due to the wide and varying range of support requirements we have not shown a 'standard' product for this material. Pipe Supports Group will be pleased to design supports that meet your specific requirements based upon the information provided in this catalogue.

Properties of Densified Wood

Specific Gravity		>1,35 g/cm³	DIN 53 479
Modulous Of Elasticity In Flexure		14000 N/mm²	DIN 53 452
Compressive Strength	⊥	250 N/mm²	DIN 53 454
Compressive Strength	‖	170 N/mm²	DIN 53 454
Flexural Strength	⊥ and ‖	120 N/mm²	DIN 53 452
Tensile Strength	‖	70 N/mm²	DIN 53 455
Impact Strength	⊥	25 kJ/m²	DIN 53 453
Impact Strength	‖	20 kJ/m²	DIN 53 453
Oil Absorption		Nil	DIN 7 707
Thermal Conductivity At Rt 20 °C		ca.0,30 [W/mK]	DIN 52 612
Operating Temperatures Continuous		90 °C	DIN 7 707
Electric Strength	‖ 20 °C	65 kV/25 mm	IEC 243-2/VDE 0303T.21
Electric Strength	‖ 90 °C	40 kV/25 mm	ICE 243-2/VDE 0303T.21
Dielectric Loss Factor At 50Hz	20 °C	0.02 tan ∂	DIN 53 483
Insulation Resistance		10^{8} Ω × cm	IEC 93/ VDE 0303T.30
Track Resistance		CT 100	IEC 112/ VDE 0303T.1

Note: The data mentioned in the table gives average values obtained by statistical examination of laboratory results. This data is provided purely for information and shall not be regarded as binding.