Support Catalogue 147E

Edition 7, year 2018

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PRESENTATION

It is our pleasure to offer you the 7th edition of our technical catalogue on standard supports for piping, which has now become a reference in the sector. This catalogue describes the experience built up by the PIHASA team since 1972, and is mainly designed as a practical work tool for engineers, assemblers and users of the power generation industries, petrochemicals, paper industry, shipbuilding, food, steel, LNG and other heavy industries involving heavy loads and high or cold temperatures.

Following the previous long-lived version of our catalogue, apart from showing the corporate image of the company, this update introduces a new, more rational organization in sections or families of products, incorporating new components in line with the technical development in our discipline, besides suggestions and requirements expressed by our customers, to whom we are grateful for this contribution and collaboration. But however, generally speaking, there is a continuity of designs, backed by decades of satisfactory service and a well-earned reputation of sturdiness and durability.

As has been the case to date, our designs are based on criterion established in the ASME code following MSS standards, while also complying with the EN European standards and materials.

In short, this catalogue is the result of know-how built up over more than four decades of service to the market, condensing all our know-how and our intention to meet the needs of an extremely wide range of customers and projects distributed worldwide.

Nonetheless, as you can see in numerous indications found in the catalogue, here at PIHASA we specialize in offering a highly flexible solution adapted to the requirements of each individual customer, so that we are at your entire disposal for any variation in the design or specific modification that you may put forward.

Since the world of supports for piping is a discipline constantly developing, alongside the increasing level of innovation in engineering and processes, we reserve the right to introduce revisions in the catalogue designs, as shown below. Furthermore, we shall regularly be showing these revisions on our website and in the course of direct consultation.

Lastly, we would like to thank you for your kind attention and for allowing us to be your collaborators. We remain at your disposal to hear your comments and needs, which we will gladly make every effort to meet.

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HANGER COMPONENTS

STRUCTURAL ATTACHMENT ELEMENTS

CLAMPS

THREADED ACCESSORIES

ANCHOR BOLTS

TRAPEZES

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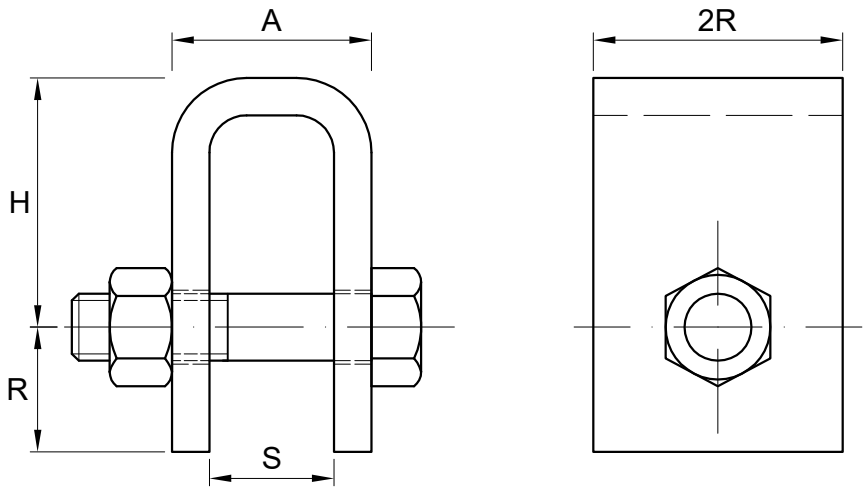
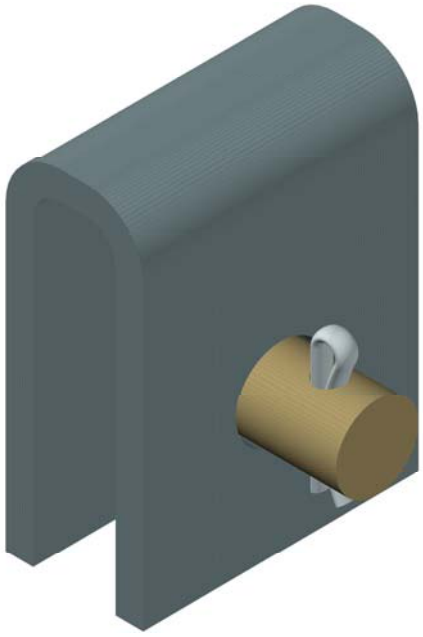
BEAM ATTACHMENT

FIG.: 2100

SECTION A
1





APPLICATION: Upper connection welded to structure; connects with forged eyenut fig. 2333 or with B type variable springs or equivalent upper-connection constant springs.

ORDER FORM:
- Name.
- Figure.
- Number or associated Metric.

MATERIAL: Carbon steel.

No.	Assoaciated ROD	A (mm)	H (mm)	R (mm)	S (mm)	BOLT OR PIN	WEIGHT (Kg)	MAX. REC. LOAD (Kg)
1	M12	32	40	20	20	M12	0,4	575
2	M16	32	55	25	20	M16	0,5	1200
3	M20	46	60	30	30	M20	1	1800
4	M24	55	60	35	35	M24	1,5	2500
5	M30	69	80	40	45	Ø30	3	4100
6	M36	74	95	50	50	Ø35	4,5	6500

N.B.: For sizes greater than M36, refer to Fig. 2101.

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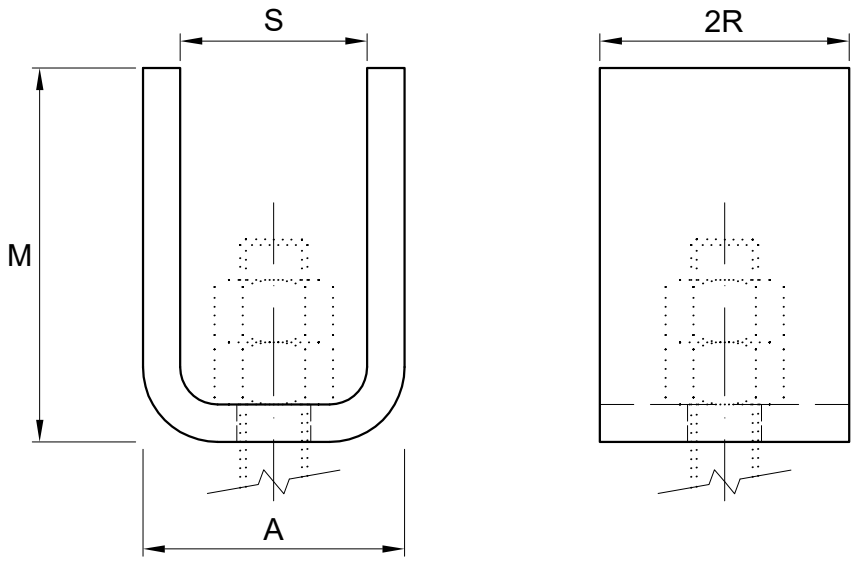
INVERTED BEAM ATTACHMENT

FIG.: 2100 INV

SECTION A 2



APPLICATION: Upper connection welded to structure; connects directly with the hanging rod.

ORDER FORM:
- Name.
- Figure.
- Number or associated Metric.

MATERIAL: Carbon steel.

No.	Associated ROD	A (mm)	2R (mm)	M (mm)	S (mm)	WEIGHT (Kg)	MAX. REC. LOAD (Kg)
1	M12	42	40	60	30	0,3	575
2	M16	52	50	80	40	0,4	1200
3	M20	66	60	90	50	0,8	1800
4	M24	70	70	100	50	1,3	2500
5	M30	89	80	130	65	2,6	4100
6	M36	104	100	150	80	4	6500

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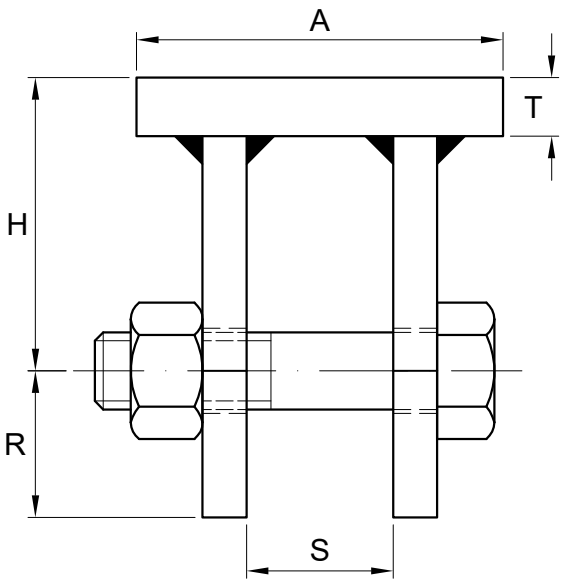
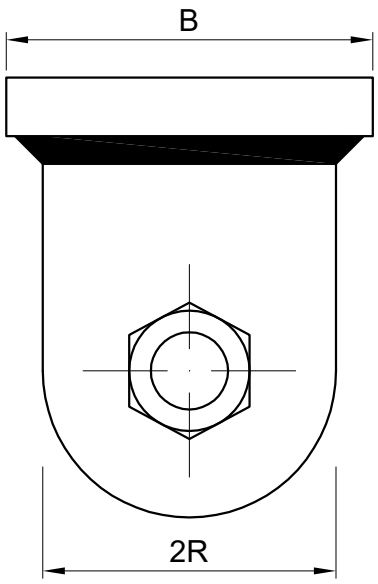
BEAM ATTACHMENT

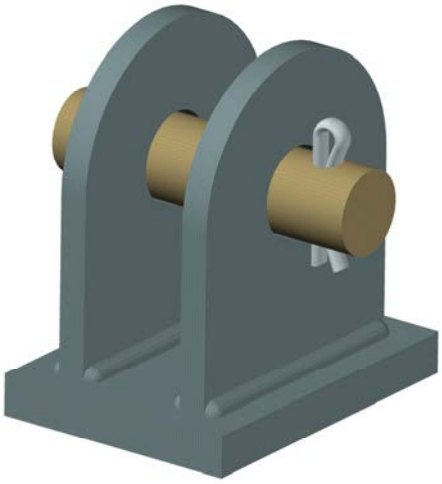
FIG.: 2101

SECTION A 3





APPLICATION: Upper connection welded to structure; connects with the hanging rod by means of a forged eye nut fig. 2333. It can be connected with B type variable springs or equivalent upper-connection constant springs, or alternatively with special connections to the pipe or equipment.



ORDER FORM:

- Name.
- Figure.
- Number or associated Metric.

MATERIAL: Carbon steel. Can be manufactured in other qualities, on request.

N.B.: For sizes No. 1 to No. 6 (M12 to M36), we recommend referring to fig. 2100 (more economical).

No.	Associated ROD	A (mm)	B (mm)	H (mm)	R (mm)	S (mm)	T (mm)	BOLT OR PIN	WEIGHT (Kg)	MAX. REC. LOAD (Kg)
1	M12	50	50	40	20	20	8	M12	0,4	575
2	M16	50	65	55	25	20	10	M16	0,7	1200
3	M20	65	80	60	30	30	10	M20	1,4	1800
4	M24	80	90	60	35	35	12	M24	2	2500
5	M30	90	100	80	40	40	15	Ø30	3,5	4100
6	M36	90	120	95	50	40	15	Ø35	5,5	6500
7	M42	110	140	110	60	50	20	Ø40	7,6	8500
8	M48	125	150	115	65	50	25	Ø45	11	11000
9	M56	125	180	135	75	50	25	Ø50	14	15000
10	M64	140	200	155	85	50	30	Ø55	22	20000

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LUG

FIG.: 2105

SECTION A
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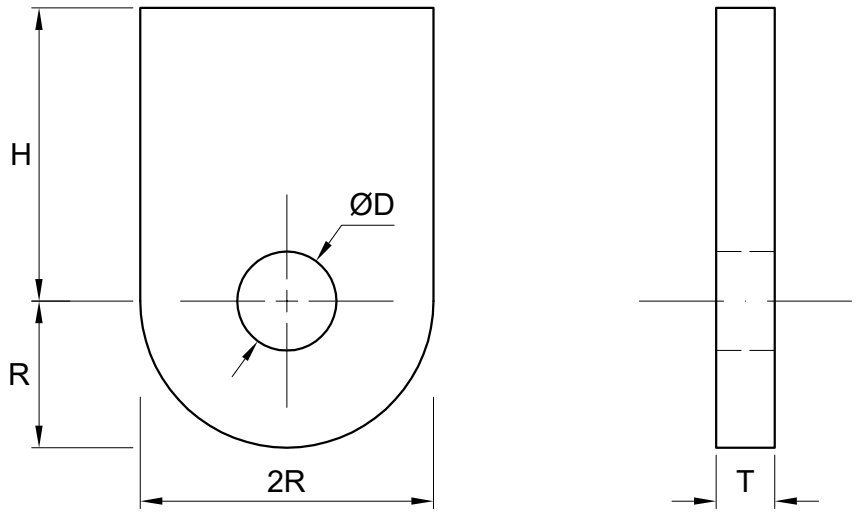
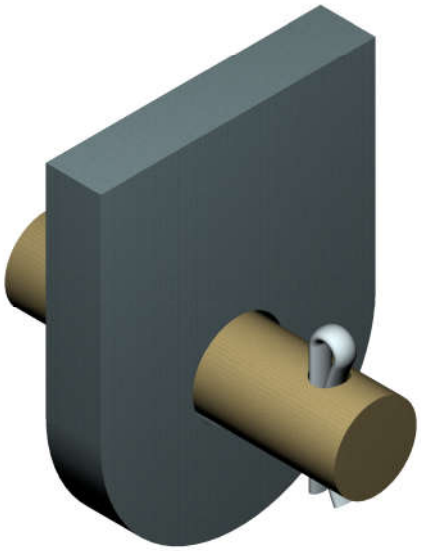


APPLICATION: Upper connection welded to structure; connects with the hanging rod by means of a forged clevis. Can also connect with C type springs. It can be used as lower connection, directly welded to the uninsulated pipe.



ORDER FORM:

- Name.
- Figure.
- Number or associated Metric.

MATERIAL: Carbon steel. Can be manufactured in other qualities, on request.

No.	Associated ROD	H (mm)	R (mm)	ØD (mm)	T (mm)	WEIGHT (Kg)	MAX. REC. LOAD (Kg)
1	M12	40	20	13,5	8	0,2	575
2	M16	55	25	17,5	10	0,3	1200
3	M20	60	30	21,5	12	0,5	1800
4	M24	60	35	26	15	0,8	2500
5	M30	80	40	33	20	1,7	4100
6	M36	95	50	38	25	2,8	6500
7	M42	110	60	43	25	3,5	8500
8	M48	115	65	48	30	4,8	11000
9	M56	135	75	53	35	8	15000
10	M64	155	85	58	40	11,5	20000

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SQUARE SUPPORT PLATE

FIG.: 2110

SECTION A
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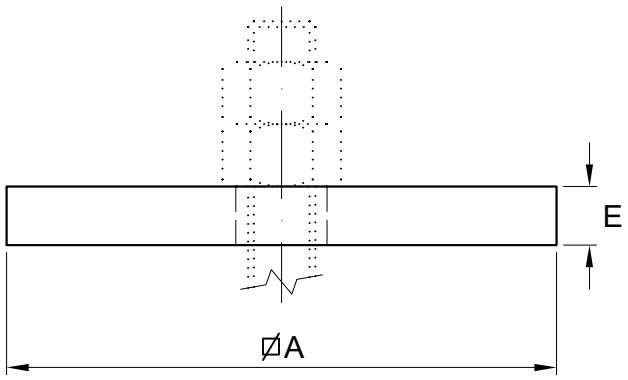

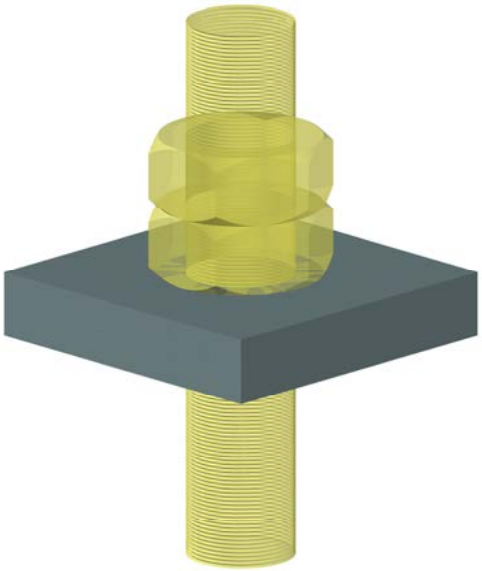

APPLICATION: As a support on hanging rods, both upper and lower. Can be produced in different dimensions, on request.

ORDER FORM:
- Name.
- Figure.
- Number or associated Metric.

MATERIAL: Carbon steel. Can be manufactured in other qualities, on request.

No.	Associated ROD	⌀ A (mm)	E (mm)	WEIGHT (Kg)	MAX. REC. LOAD (Kg)
1	M12	75	8	0,35	575
2	M16	75	10	0,45	1200
3	M20	100	10	0,75	1800
4	M24	100	12	0,9	2500
5	M30	120	15	1,65	4100
6	M36	120	15	1,6	6500
7	M42	130	20	2,5	8500
8	M48	140	20	2,9	11000
9	M56	150	25	4	15000
10	M64	150	25	3,8	20000

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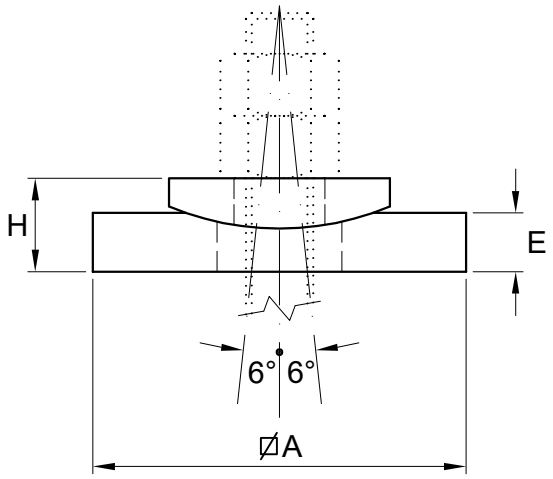
SPHERICAL SUPPORT PLATE

FIG.: 2111

SECTION A 6

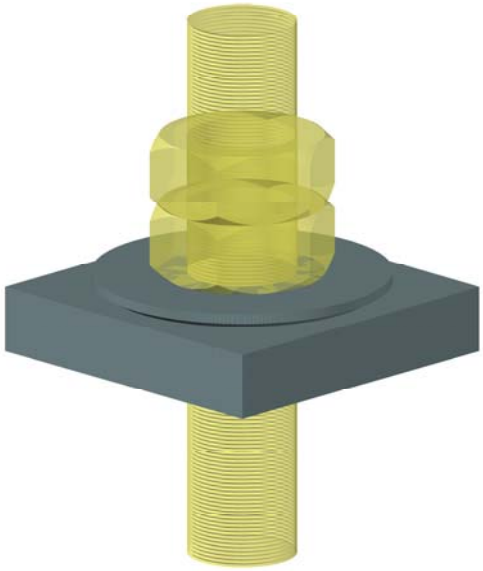


APPLICATION: Support on piping hangers where horizontal movements are significant (6º maximun). The base can be produced with different dimensions, on request.

ORDER FORM:

- Name.
- Figure.
- Number or associated Metric.

MATERIAL: Carbon steel. Can be manufactured in other qualities, on request.



No.	Associated ROD	⌀ A (mm)	E (mm)	H (mm)	WEIGHT (Kg)	MAX. REC. LOAD (Kg)
1	M12	50	8	12	0,2	575
2	M16	60	10	15	0,35	1200
3	M20	70	12	17	0,6	1800
4	M24	80	15	21	0,9	2500
5	M30	100	20	26	1,8	4100
6	M36	100	20	27	1,8	6500
7	M42	120	25	33	3,1	8500
8	M48	120	25	34	3,1	11000
9	M56	160	30	42	6,4	15000
10	M64	200	30	42	10	20000

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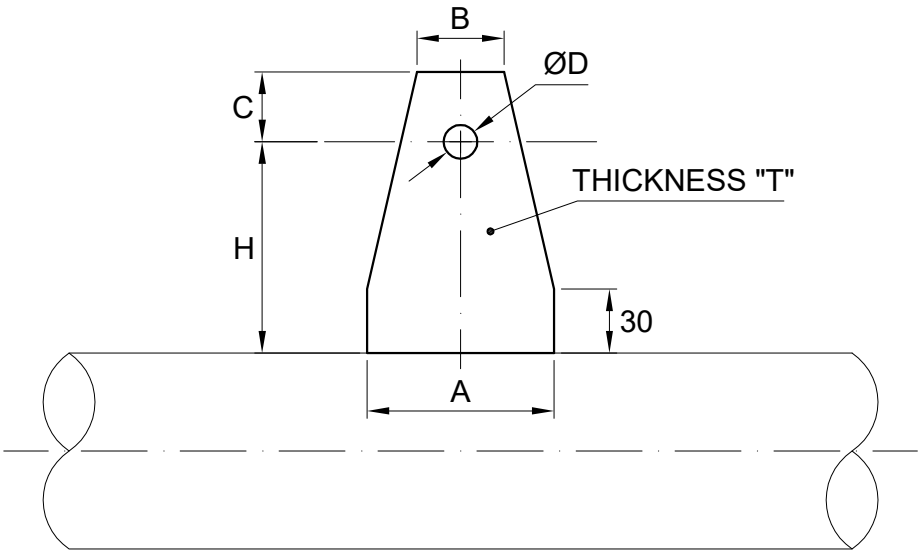
LUG FOR HORIZONTAL PIPE

FIG.: 2200

SECTION A 7



No.	Associated ROD	A (mm)	B (mm)	C (mm)	ØD (mm)	H (mm)	T (mm)	WEIGHT (Kg)	MAX. REC. LOAD (Kg)
1	M12	60	35	20	13,5	110	8	0,4	575
2	M16	70	45	25	17,5	120	10	0,65	1200
3	M20	90	55	35	21,5	120	12	1,05	1800
4	M24	120	70	40	26	130	15	1,9	2500
5	M30	140	80	50	32	130	20	3,1	4100
6	M36	150	90	55	37	140	25	4,6	6500
7	M42	165	110	65	42	150	25	5,8	8500
8	M48	170	115	70	48	160	25	7,2	11000

APPLICATION: For welding to horizontal pipes with or without insulation. In the case of piping without insulation, fig. 2105 lug can be used. This can also be connected to type C springs.

ASSEMBLY: Hanged by forged clevis and rod.

ORDER FORM:

- Name.
- Figure.
- Number or associated Metric.
- Insulation Thickness.

MATERIAL: Compatible with the quality of the piping. Load limitations due to high temperature are the same as those indicated on sheet A-20.

N.B.: They can be manufactured with other "H" dimensions to adapt them to any insulation size.

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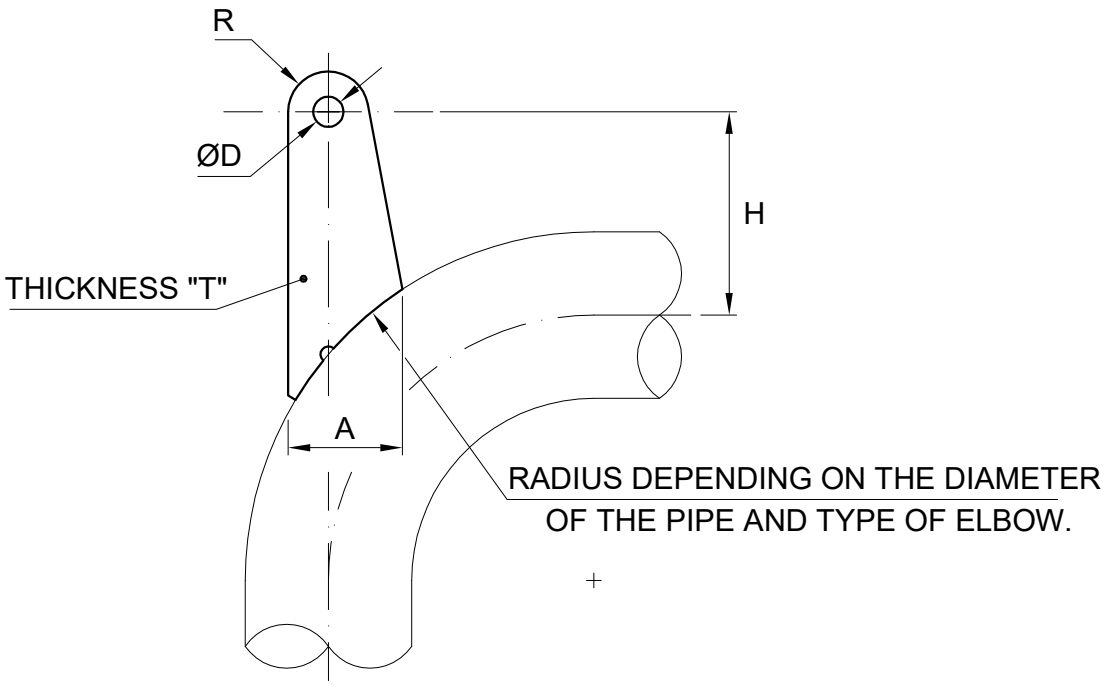
LUG FOR ELBOW

FIG.: 2201

SECTION A 8



No.	Associated ROD	A (mm)	ØD (mm)	H (mm)	R (mm)	T (mm)	MAX. REC. LOAD (Kg)
1	M12	55	13,5	150	20	8	575
2	M16	65	17,5	150	25	10	1200
3	M20	90	21,5	160	35	12	1800
4	M24	105	26	160	40	15	2500
5	M30	130	32	175	50	20	4100
6	M36	145	37	175	55	25	6500
7	M42	160	42	200	65	25	8500
8	M48	200	47	200	80	25	11000

APLICATION: For welding to any type of elbow or piping bend, with or without insulation. Can be coupled to any diameter or type of elbow.

ASSEMBLY: Hanged by forged clevis and rod.

ORDER FORM:

- Name.
- Figure.
- Number or associated Metric.
- Diameter.
- Type of elbow.
- Insulation Thickness.
- Temperature or pipe quality.

MATERIAL: Compatible with the quality of the piping. Load limitations due to high temperature are the same as those indicated on sheet A-20.

N.B.: Level "H" is meant for a maximum insulation of 100 mm. For greater insulation thicknesses, this value should be increased accordingly.

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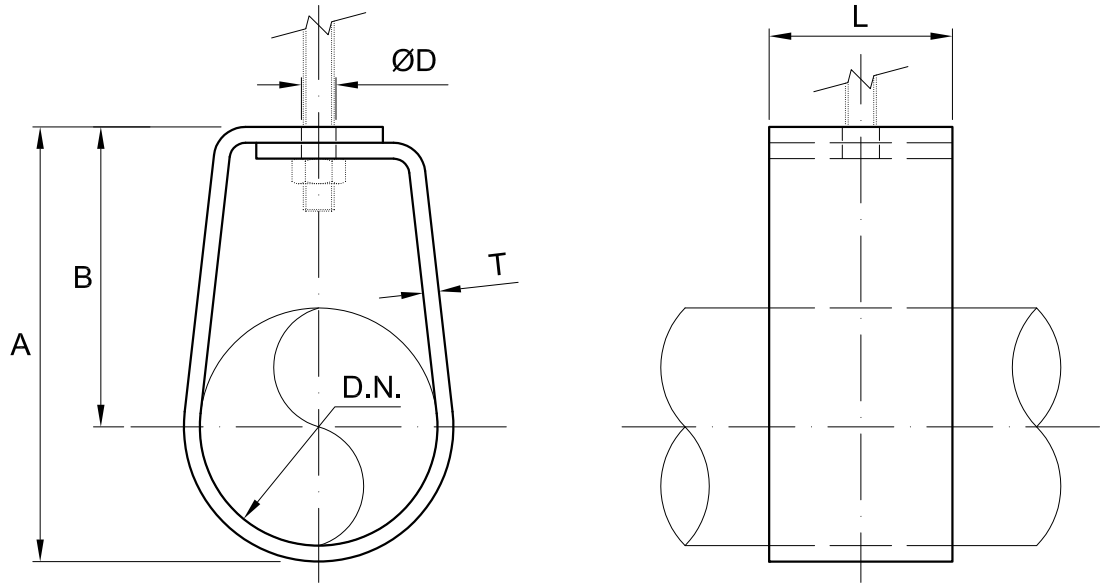
RING CLAMP

FIG.: 2220

SECTION A 9



No.	D.N.	A (mm)	B (mm)	ØD (mm)	FLAT BAR		WEIGHT (Kg)	MAX. REC. LOAD (Kg)
					L (mm)	T (mm)		
1	1/2"	59	46	11,5	25	3	0,11	275
2	3/4"	68	52	11,5	25	3	0,12	275
3	1"	75	55	11,5	30	4	0,22	275
3 a	1 1/4"	90	65,5	11,5	30	4	0,25	275
4	1 1/2"	98	70	11,5	30	4	0,27	275
5	2"	110	76	11,5	30	4	0,30	275
6	2 1/2"	139	98	13,5	35	4	0,43	450
7	3"	156	108	13,5	35	4	0,48	450
8	4"	185	124	17,5	35	4	0,60	550
8 a	5"	216	142	17,5	35	4	0,70	550
9	6"	251	162	21,5	40	4	0,90	750
10	8"	306	192	21,5	50	4	1,35	850

APLICATION: To support uninsulated pipes. Makes it possible to adjust rod length.

ORDER FORM:

- Name.
- Figure.
- Pipe diameter.

MATERIAL: Carbon steel.

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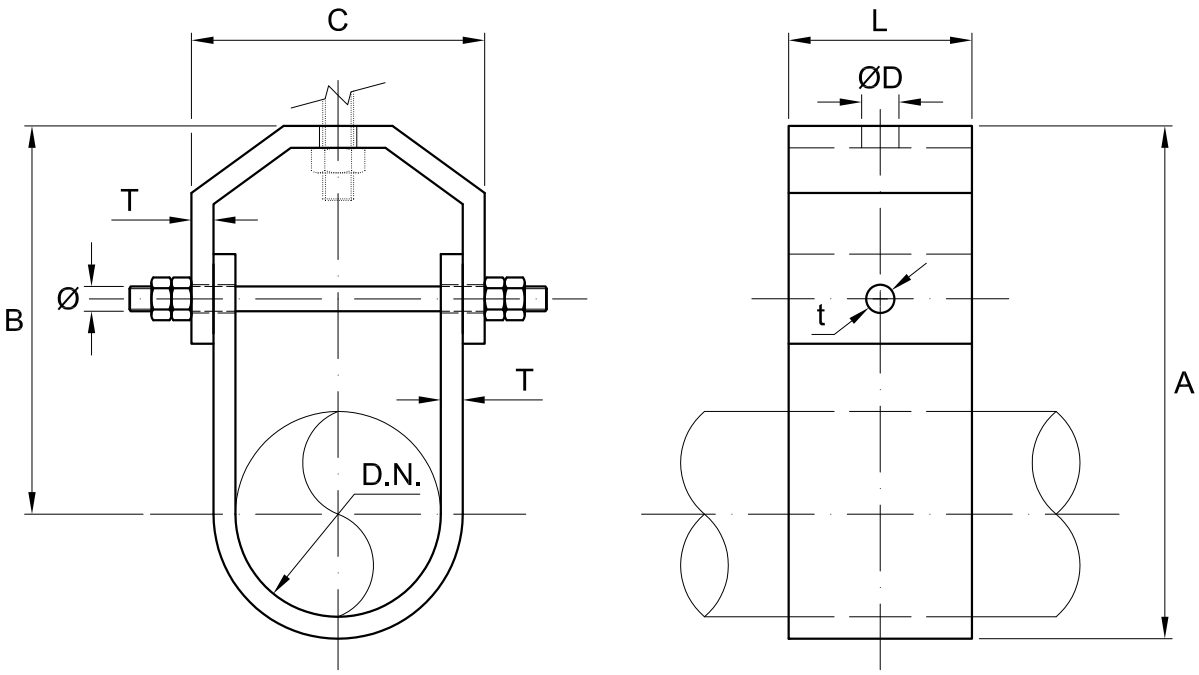
CLEVIS CLAMP

FIG.: 2221

SECTION A 10



No.	D.N.	A (mm)	B (mm)	C (mm)	ØD (mm)	FLAT BAR L (mm)	FLAT BAR T (mm)	Ø (mm)	t (mm)	WEIGHT (Kg)	MAX. REC. LOAD (Kg)
1	1/2"	75	61	34	11,5	25	3	M8	9,5	0,15	275
2	3/4"	92	75	39	11,5	25	3	M8	9,5	0,18	275
3	1"	99	79	46	11,5	25	3	M8	9,5	0,19	275
3 a	1 1/4"	109	84	55	11,5	25	3	M8	9,5	0,21	275
4	1 1/2"	118	90	61	11,5	25	3	M8	9,5	0,23	275
5	2"	128	95	73	11,5	25	3	M8	9,5	0,25	275
6	2 1/2"	155	112	95	13,5	35	5	M10	11,5	0,7	500
7	3"	170	120	110	13,5	35	5	M10	11,5	0,8	500
8	4"	202	139	135	17,5	35	5	M10	11,5	1	650
8 a	5"	233	157	162	17,5	35	5	M12	13,5	1,1	650
9	6"	263	173	189	21,5	40	5	M12	13,5	1,5	900
10	8"	326	211	240	25,5	45	5	M16	17,5	2,1	900

APPLICATION: To support uninsulated pipes. Makes it possible to adjust rod length.

ORDER FORM:

- Name.
- Figure.
- Pipe diameter.

MATERIAL: Carbon steel.

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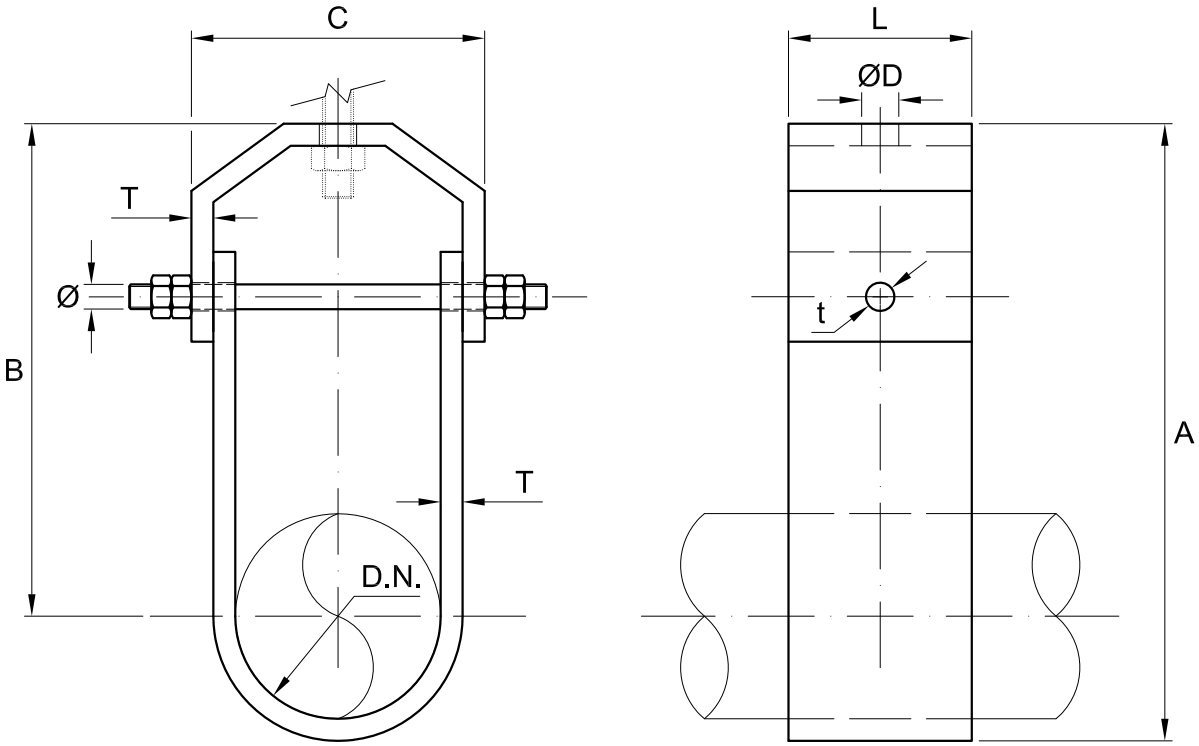
LONG CLEVIS CLAMP

FIG.: 2222

SECTION A 11



No.	D.N.	A (mm)	B (mm)	C (mm)	ØD (mm)	FLAT BAR L (mm)	FLAT BAR T (mm)	Ø (mm)	t (mm)	WEIGHT (Kg)	MAX. REC. LOAD (Kg)
1	1/2"	125	111	34	11,5	25	3	M8	9,5	0,21	275
2	3/4"	142	125	39	11,5	25	3	M8	9,5	0,23	275
3	1"	149	129	46	11,5	25	3	M8	9,5	0,25	275
3 a	1 1/4"	159	134	55	11,5	25	3	M8	9,5	0,27	275
4	1 1/2"	168	140	61	11,5	25	3	M8	9,5	0,29	275
5	2"	228	195	73	11,5	25	3	M8	9,5	0,4	275
6	2 1/2"	255	212	95	13,5	35	5	M10	11,5	1	500
7	3"	270	220	110	13,5	35	5	M10	11,5	1,1	500
8	4"	302	239	135	17,5	35	5	M10	11,5	1,25	650
8 a	5"	333	257	162	17,5	35	5	M12	13,5	1,4	650
9	6"	363	273	189	21,5	40	5	M12	13,5	1,75	900
10	8"	426	311	240	25,5	45	5	M16	17,5	2,4	900

APPLICATION: To support insulated pipes. Makes it possible to adjust rod length.

ORDER FORM:

- Name.
- Figure.
- Pipe diameter.

MATERIAL: Carbon steel.

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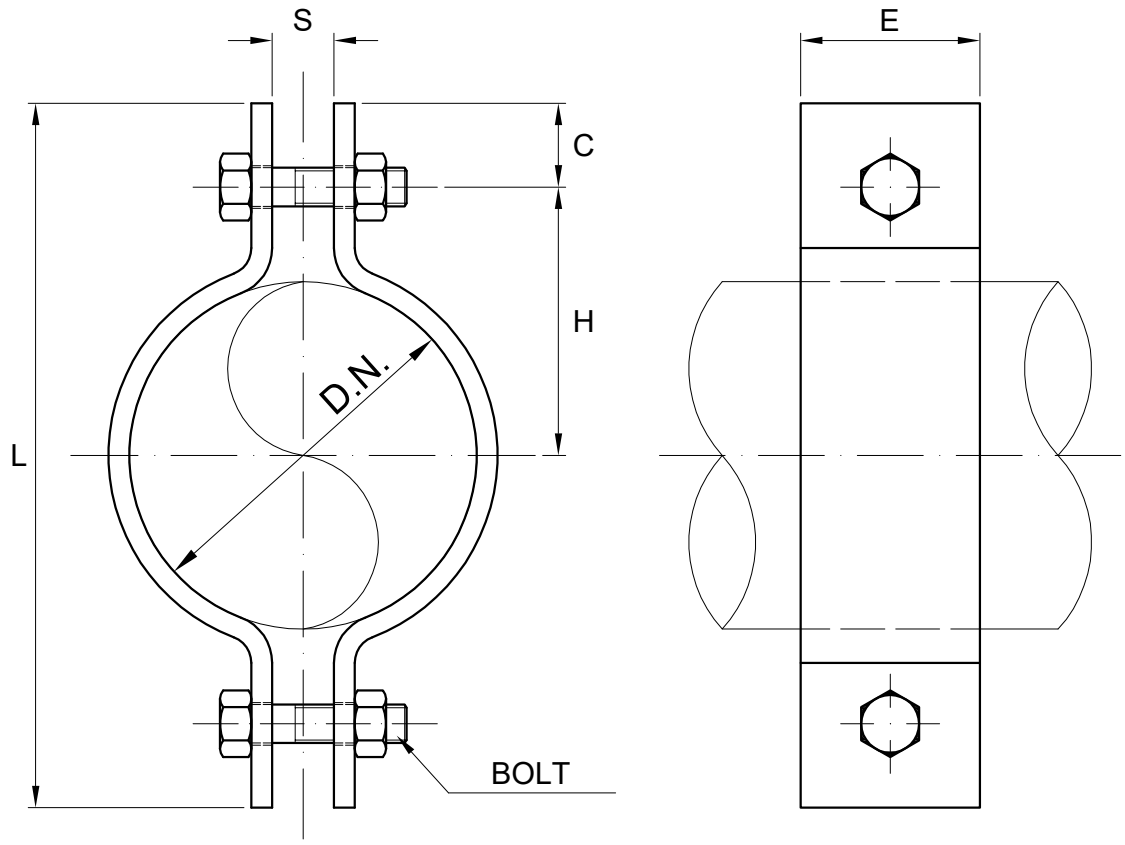
TWO-BOLT CLAMP

FIG.: 2224

SECTION A 12



APPLICATION: For supporting uninsulated piping. Also use on support pipe shoes.

ASSEMBLY: Hanged by forged eye nut and rod.

MANUFACTURE: Light series, normal series and heavy series. For loads above those considered, special series will be manufactured.

MATERIAL: Carbon steel, up to 380°C pipe temperature.
Alloy steel type 0.5Mo, for pipe temperature up to 500°C.
Alloy steel type 1Cr-0.5Mo, for pipe temperature up to 540°C.
Alloy steel type 2.25Cr-1Mo, for pipe temperature up to 575-600°C.
Can also be manufactured in stainless steel.

ORDER FORM:

- Name.
- Figure.
- Series.
- Pipe diameter.
- Temperature or pipe quality.

N.B.: Can be manufactured in other diameters, special or larger, than those indicated.

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TWO-BOLT CLAMP

FIG.: 2224 L

SECTION A 13

LIGHT SERIES

No.	D.N.	C (mm)	H (mm)	L (mm)	E (mm)	S (mm)	BOLT	WEIGHT (Kg)	MAX. REC. LOAD (Kg)
1	1/2"	13	30	86	25	15	M8	0,12	200
2	3/4"	13	33	92	25	15	M8	0,18	200
3	1"	13	36	98	30	15	M8	0,22	200
3 a	1 1/4"	13	40	106	30	15	M8	0,28	200
4	1 1/2"	16	45	122	30	15	M10	0,4	300
5	2"	16	51	134	30	15	M10	0,45	300
6	2 1/2"	19	62	162	40	20	M12	0,9	425
7	3"	19	70	178	40	20	M12	1,1	425
8	4"	25	85	220	50	25	M16	1,6	500
8 a	5"	25	100	250	50	25	M16	2	500
9	6"	25	118	286	50	25	M16	2,7	600
10	8"	25	144	338	50	25	M16	3,1	600
11	10"	32	182	428	60	25	M20	5,5	900
12	12"	32	208	480	60	25	M20	6,3	900
13	14"	32	232	528	70	25	M20	9,5	1200
14	16"	32	258	580	70	25	M20	10,5	1200
15	18"	32	284	632	80	25	M20	14	1300
16	20"	32	322	708	80	25	M20	19	1500
17	24"	38	375	826	100	30	M24	27	1650
18	26"	38	405	886	100	30	M24	30	1650
19	28"	38	430	936	100	30	M24	31	1650
20	30"	38	470	1016	100	30	M24	44	1800
21	32"	38	500	1076	100	30	M24	47	1800
22	34"	38	520	1116	100	30	M24	55	1800
23	36"	38	550	1176	100	30	M24	61	1800

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TWO-BOLT CLAMP

FIG.: 2224 N

SECTION A 14

NORMAL SERIES

No.	D.N.	C (mm)	H (mm)	L (mm)	E (mm)	S (mm)	BOLT	WEIGHT (Kg)	MAX. REC. LOAD (Kg)
1	1/2"	13	34	94	30	15	M8	0,2	250
2	3/4"	13	36	98	30	15	M8	0,3	250
3	1"	16	39	110	30	15	M10	0,5	350
3 a	1 1/4"	16	43	118	30	15	M10	0,6	350
4	1 1/2"	19	47	132	60	20	M12	1	550
5	2"	19	53	144	60	20	M12	1,1	550
6	2 1/2"	25	63	176	60	25	M16	1,5	800
7	3"	25	71	192	60	25	M16	1,7	800
8	4"	32	90	244	60	25	M20	3	1000
8 a	5"	32	103	270	60	25	M20	3,5	1000
9	6"	32	130	324	80	25	M20	5,5	1200
10	8"	32	160	384	80	25	M20	6,7	1450
11	10"	32	190	444	80	30	M20	9,5	1450
12	12"	32	215	494	80	30	M20	10,5	1650
13	14"	32	245	554	100	30	M20	17,5	1650
14	16"	32	270	604	100	30	M20	19	1650
15	18"	38	298	672	100	30	M24	22	1875
16	20"	38	325	726	100	30	M24	24	1875
17	24"	38	395	866	100	30	M24	38	2300
18	26"	38	425	926	100	30	M24	41	2300
19	28"	38	450	976	100	30	M24	43	2300
20	30"	47	485	1064	150	30	M30	70	2750
21	32"	47	510	1114	150	30	M30	74	2750
22	34"	47	535	1164	150	30	M30	95	3500
23	36"	47	560	1214	150	30	M30	100	3500

REV.	DATE	EDITED FOR :	DRAW.	REV.
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TWO-BOLT CLAMP

FIG.: 2224 H

SECTION A 15

HEAVY SERIES

No.	D.N.	C (mm)	H (mm)	L (mm)	E (mm)	S (mm)	BOLT	WEIGHT (Kg)	MAX. REC. LOAD (Kg)
1	3"	32	81	226	60	30	M20	3	1350
2	4"	38	105	286	80	30	M24	5,5	2000
2 a	5"	38	120	316	80	30	M24	6	2000
3	6"	38	135	346	80	30	M24	7,5	2500
4	8"	38	180	436	100	30	M24	13,5	2800
5	10"	38	205	486	100	30	M24	15,5	2800
6	12"	47	260	614	100	30	M30	26	3300
7	14"	47	275	644	100	30	M30	28	3300
8	16"	47	300	694	100	30	M30	30	3300
9	18"	47	330	754	150	30	M30	48	3750
10	20"	47	355	804	150	30	M30	51	3750
11	24"	47	435	964	150	30	M30	71	4400
12	26"	47	470	1034	150	30	M30	78	4400
13	28"	47	485	1064	150	30	M30	82	4400
14	30"	47	510	1114	150	30	M30	89	4400
15	32"	47	535	1164	150	30	M30	93	4400
16	34"	47	545	1184	180	30	M30	115	6250
17	36"	47	560	1214	180	30	M30	142	6250

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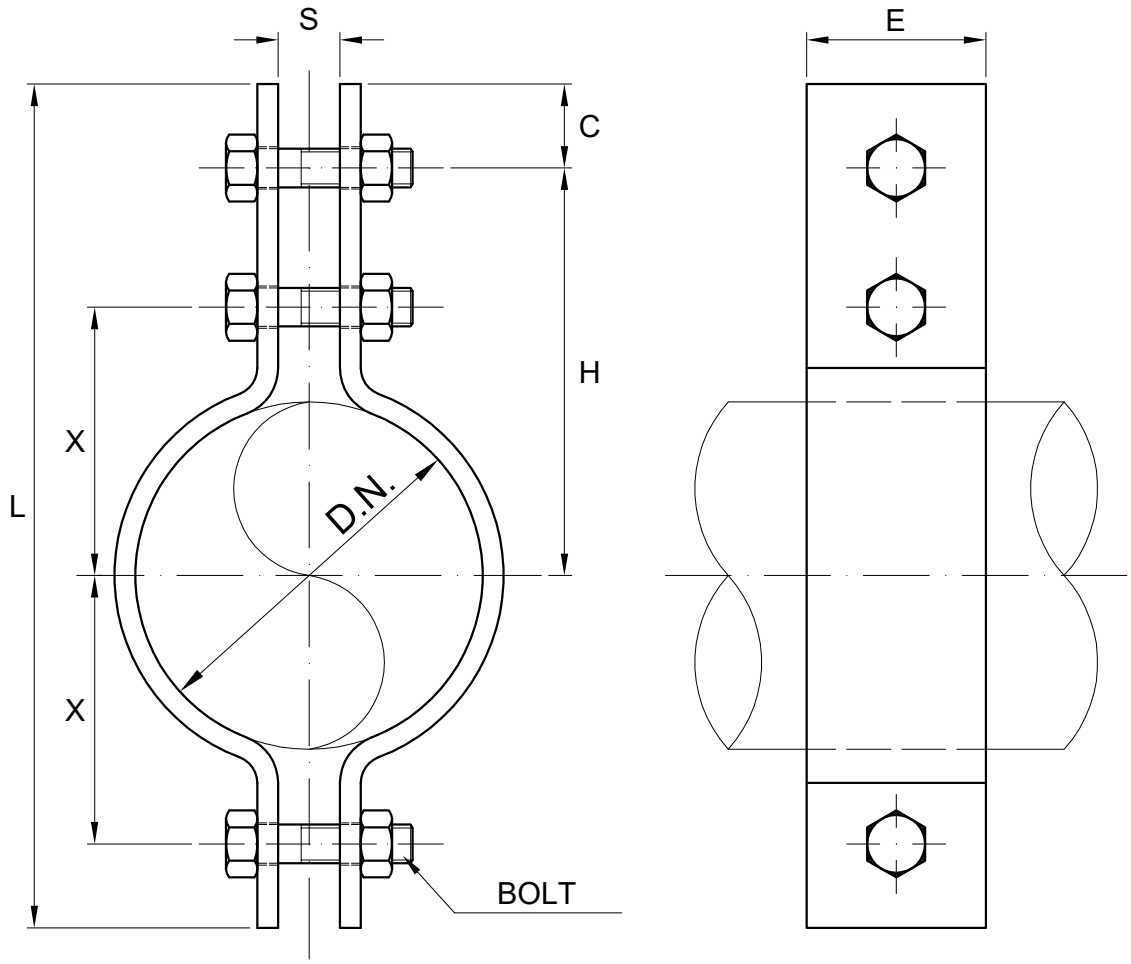
THREE-BOLT CLAMP

FIG.: 2229

SECTION A 16



APPLICATION: For hanging insulated piping.

ASSEMBLY: Hang by forged eye nut and rod.

MANUFACTURE: Light series, normal series and heavy series. For loads above those considered, special series will be manufactured.

MATERIAL: Carbon Steel, up to 380°C pipe temperature.
Alloy steel type 0.5Mo, for pipe temperature up to 500°C.
Alloy steel type 1Cr-0.5Mo, for pipe temperature up to 540°C.
Alloy steel type 2.25Cr-1Mo, for pipe temperature up to 575-600°C.
Can also be manufactured in stainless steel.

ORDER FORM:

- Name.
- Figure.
- Series.
- Pipe diameter.
- Insulation thickness or "H" dimension, if required larger.
- Temperature or pipe quality.

N.B.: Can be manufactured in other diameters, special or larger, than those indicated. In the case of higher operating loads than those appearing in the standard clamps on the following sheets, the following should be indicated: pipe diameter, operating temperature, insulation thickness (if applicable) and operating load.

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THREE-BOLT CLAMP

FIG.: 2229 L

SECTION A 17

LIGHT SERIES

No.	D.N.	C (mm)	H (mm)	L (mm)	E (mm)	S (mm)	X (mm)	BOLT	WEIGHT (Kg)	MAX. REC. LOAD (Kg)
1	1/2"	13	59	114	25	15	29	M8	0,25	300
2	3/4"	13	62	120	25	15	32	M8	0,3	300
3	1"	16	69	137	30	15	36	M10	0,4	350
3 a	1 1/4"	16	73	145	30	15	40	M10	0,5	350
4	1 1/2"	19	90	178	30	20	50	M12	0,8	500
5	2"	19	96	190	30	20	56	M12	0,9	500
6	2 1/2"	25	108	223	50	25	65	M16	1,8	650
7	3"	25	117	241	50	25	74	M16	2,1	650
8	4"	25	128	263	50	25	85	M16	2,3	650
8 a	5"	25	143	293	50	25	100	M16	2,5	650
9	6"	25	161	329	60	25	118	M16	4,2	800
10	8"	32	207	426	60	25	155	M20	5,8	1000
11	10"	32	242	496	70	25	190	M20	9,5	1200
12	12"	32	265	542	70	25	213	M20	10,5	1200
13	14"	38	304	624	80	30	244	M24	16,5	1650
14	16"	38	332	680	80	30	272	M24	18	1650
15	18"	38	357	730	100	30	297	M24	24	2000
16	20"	38	385	786	100	30	325	M24	26	2000
17	24"	38	450	911	100	30	385	M24	39	2000
18	26"	38	470	951	120	30	405	M24	48	2250
19	28"	38	510	1036	120	30	450	M24	53	2250
20	30"	38	560	1111	120	30	475	M24	57	2250
21	32"	38	590	1171	120	30	505	M24	61	2250
22	34"	38	615	1221	150	30	530	M24	80	2250
23	36"	38	650	1276	150	30	550	M24	83	2250

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THREE-BOLT CLAMP

FIG.: 2229 N

SECTION A 18

NORMAL SERIES

No.	D.N.	C (mm)	H (mm)	L (mm)	E (mm)	S (mm)	X (mm)	BOLT	WEIGHT (Kg)	MAX. REC. LOAD (Kg)
1	1/2"	16	67	133	30	15	34	M10	0,5	400
2	3/4"	16	71	141	30	15	38	M10	0,6	400
3	1"	16	74	147	30	15	41	M10	0,7	400
3 a	1 1/4"	16	76	151	30	15	43	M10	0,8	400
4	1 1/2"	25	89	189	60	25	50	M16	1,7	800
5	2"	25	105	211	60	25	56	M16	2	800
6	2 1/2"	32	126	265	60	25	75	M20	3,2	1250
7	3"	32	135	282	60	25	83	M20	3,5	1250
8	4"	32	146	305	60	25	95	M20	3,7	1250
8 a	5"	32	160	332	60	25	108	M20	4,2	1250
9	6"	32	195	406	80	25	135	M20	8,5	1750
10	8"	32	220	456	80	25	160	M20	9,5	1750
11	10"	38	265	546	100	30	205	M24	17	2500
12	12"	38	290	596	100	30	230	M24	19	2500
13	14"	38	330	676	100	30	270	M24	28	2850
14	16"	38	355	726	100	30	295	M24	30	2850
15	18"	38	380	776	100	30	320	M24	33	2850
16	20"	47	435	884	150	30	355	M30	56	3250
17	24"	47	485	984	150	30	405	M30	63	3250
18	26"	47	505	1024	150	30	425	M30	66	3250
19	28"	47	535	1084	150	30	455	M30	71	3250
20	30"	47	588	1192	150	30	510	M30	95	4250
21	32"	47	613	1242	150	30	535	M30	99	4250
21	34"	47	655	1294	150	30	545	M30	102	4250
21	36"	47	670	1324	150	30	560	M30	107	4250

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THREE-BOLT CLAMP

FIG.: 2229 H

SECTION A 19

HEAVY SERIES

No.	D.N.	C (mm)	H (mm)	L (mm)	E (mm)	S (mm)	X (mm)	BOLT	WEIGHT (Kg)	MAX. REC. LOAD (Kg)
1	3"	38	155	326	80	30	95	M24	7,3	2500
2	4"	38	168	352	80	30	108	M24	7,8	2500
2 a	5"	38	185	386	80	30	125	M24	8,5	2500
3	6"	47	233	482	100	30	155	M30	15	3500
4	8"	47	263	542	100	30	185	M30	17	3500
5	10"	47	313	642	100	42	235	M30	26	5000
6	12"	47	338	692	100	42	260	M30	28	5000
7	14"	56	370	762	150	42	280	M36	52	5700
8	16"	56	395	812	150	42	305	M36	56	5700
9	18"	56	450	922	150	42	360	M36	75	5700
10	20"	56	480	982	150	42	390	M36	80	6000
11	24"	56	530	1082	180	42	440	M36	105	6500
12	26"	56	550	1122	180	42	460	M36	108	6500
13	28"	56	580	1182	180	42	490	M36	115	6500
14	30"	67	635	1294	180	48	525	M42	149	8500
15	32"	67	660	1344	180	48	550	M42	155	8500
16	34"	67	685	1394	180	48	575	M42	158	8500
17	36"	67	710	1444	180	48	600	M42	163	8500

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PIPE INSULATION THICKNESS FOR THREE BOLT CLAMPS. LOADS CORRECTOR FACTOR

1.- MAXIMUM RECOMMENDED INSULATION THICKNESSES FOR THREE BOLT CLAMPS, ACCORDING TO "H" DIMENSION INDICATED IN PREVIOUS SHEETS.

INSULATION IN mm.

D.N.	FIG. 2229-L	FIG. 2229-N	FIG. 2229-H
1/2" - 3/4"	40	40	-
1" - 1 1/4"	45	45	-
1 1/2" - 2"	50	50	-
2 1/2"	55	65	-
3" - 4"	55	65	75
5"	55	65	80
6"	60	80	110
8"	70	80	110
10"	75	100	125
12"	80	100	125
14" - 16"	100	120	140
18" - 20"	100	120	170
24" - 28"	120	120	170
30" - 32"	150	150	170

FOR LARGER INSULATION THICKNESSES, "H" DIMENSION MUST BE INCREASED IN THE SAME PROPORTION.

THE ORDER SHALL ADVISE SPECIAL "H" DIMENSION AS FOLLOWS:

EXAMPLE: FIG.2229, NORMAL SERIES, Ø6": H=220mm.
(FOR INSULATION UP TO 105mm.)

2.- LOAD CORRECTION FACTORS FOR CLAMPS, TEMPERATURE-DEPENDENT.

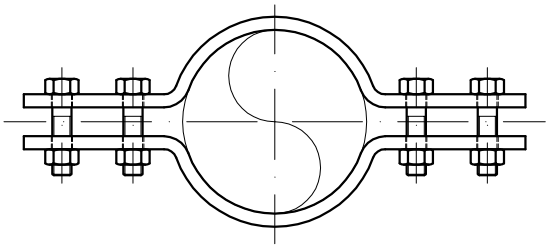
TEMP. / MATERIAL	<300°C	350°C	390°C	450°C	500°C	540°C	575°C	600°C
CARBON STEEL	1	0,85	0,70	-	-	-	-	-
ALLOY STEEL (0.5Mo)	-	-	1	0,80	0,60	-	-	-
ALLOY STEEL (1Cr-0.5Mo)	-	-	1	0,90	0,80	0,60	-	-
ALLOY STEEL (2.25Cr-1Mo)	-	-	-	-	-	-	0,55	-
STAINLESS STEEL (TP-304)	1	1	1	0,90	0,85	0,80	0,70	0,55
STAINLESS STEEL (TP-316)	1	1	1	1	0,95	0,90	0,85	0,70

RISER CLAMP

FIG.: 2240

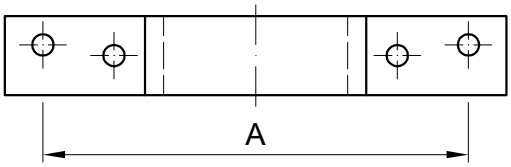
SECTION A 21

APPLICATION: To support stretches of vertical piping, doing away with the use of lugs.



TYPES:
"TYPE 1".- Manufactured with four equal bolts, two external and two internal.
"TYPE 2".- Manufactured with six bolts, two external and four internal.
"TYPE 3".- The same manufacture as with Type 2, but reinforced with gussets.

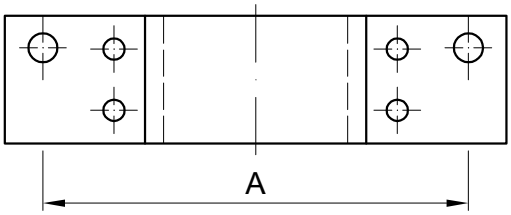
TYPE 1



SELECTION METHOD: According to the illustration on the following page.

1º.- Once the diameter of the piping and the distance between axes on the external bolts (dimension A) is known, determine its point of insertion, using the lower part of the illustration.

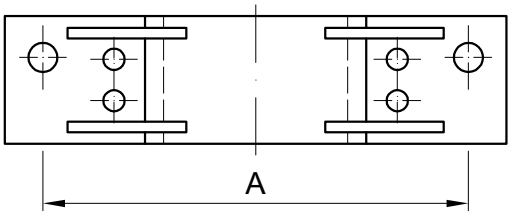
TYPE 2



2º.- Having determined this point of intersection, trace a vertical line upwards until making it meet a horizontal line traced by required load. The point of intersection of both lines will give us the appropriate dimension of the bar. If this bar falls between two bar values, the higher of the two is chosen.

3º.- Going off this last point and once having determined the bar, a horizontal line will be traced until finding the scale of dimensions for the bolts, the appropriate bolt diameter being the intersection with said scale. In the event of this point of intersection falling between two measurements, the higher of the two is chosen.

TYPE 3



ORDER FORM:
- Name.
- Figure.
- Pipe diameter.
- Distance between axes on the external bolts (Level A).
- Load.
- Temperature or pipe quality.

N.B.:
STANDARDIZATION:
On sheets A-23 and A-24, we have included a standardization of these clamps for different diameters, loads and assembly distances. In the case of alloy steel clamps, the same load correction factors, indicated on sheet A-20, for high temperatures, are to be used.

LUGS TO BE WELDED TO THE PIPE FOR ASSEMBLY:
4 lugs will be welded to the pipe to support on the clamp and avoid the pipe hanging loose.

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1	17/01/85	INFORMATION	JRS	EAR
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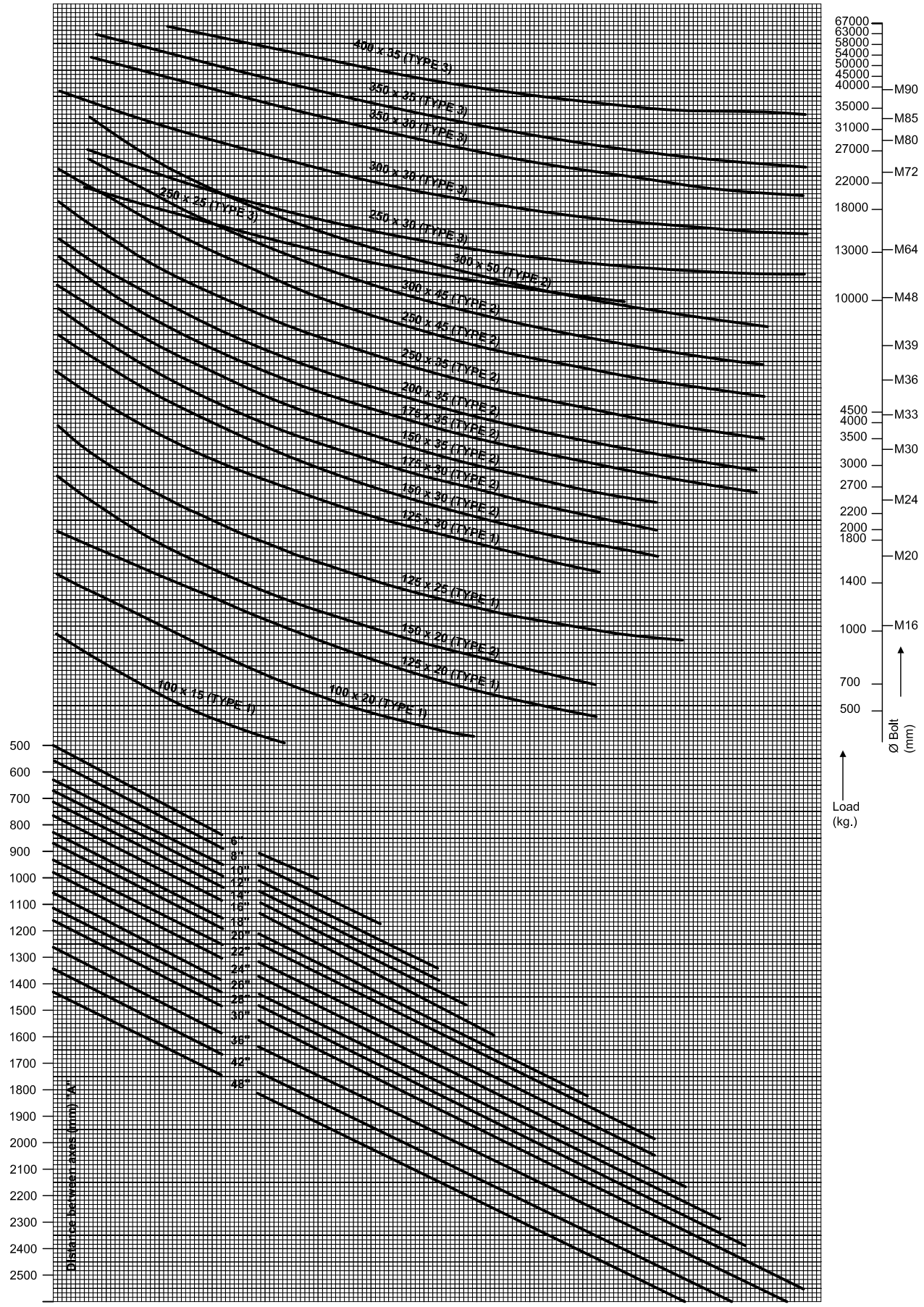
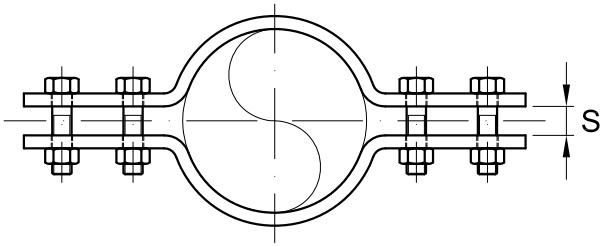
FIG. 2240 GRAPH I Rev.2



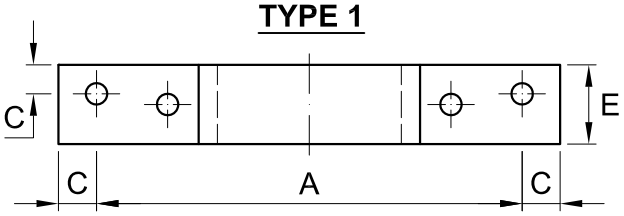
RISER CLAMP

FIG.: 2240

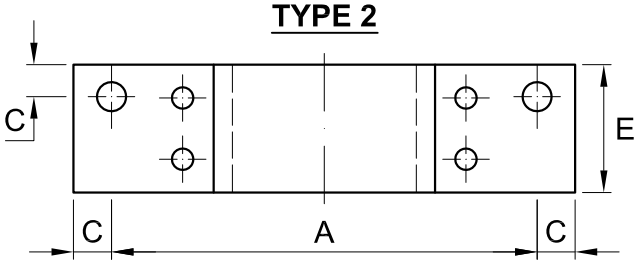
SECTION A 23



TYPE 1



TYPE 2



MATERIAL:

- Carbon steel for temperatures up to 380ºC.
- Alloy steels for temperatures up to 575ºC-600ºC.
- Can be manufactured in stainless steel.

SIZE	TYPE	C (mm)	E (mm)	S (mm)	BOLT	WEIGHT MIN. "A" (Kg)	MAX. REC. LOAD FOR "A" (Kg)				
							300	450	600	750	900
3" - 01	1	19	80	20	M12	5,1	550	400	300	225	-
3" - 02	1	25	100	25	M16	7,5	1050	775	525	350	-
3" - 03	1	32	100	25	M20	18,5	-	1450	1000	800	-
3" - 04	2	32	150	30	M20	27	-	2700	1775	1400	1150
4" - 05	1	19	80	20	M12	6,2	670	485	375	275	-
4" - 06	1	25	100	25	M16	13,5	-	1050	725	475	-
4" - 07	1	32	125	30	M20	23	-	2100	1550	1250	900
4" - 08	2	32	150	30	M20	27,5	-	2950	2000	1550	1200

SIZE	TYPE	C (mm)	E (mm)	S (mm)	BOLT	WEIGHT MIN. "A" (Kg)	MAX. REC. LOAD FOR "A" (Kg)				
							450	600	750	900	1050
6" - 09	1	19	100	20	M12	11	975	650	425	300	-
6" - 10	1	25	100	25	M16	14	1250	825	550	400	-
6" - 11	1	32	125	30	M20	30	-	1700	1300	1000	750
6" - 12	2	38	150	30	M24	45	-	3750	2950	2400	2025
8" - 13	1	25	100	25	M16	14,5	1400	900	650	425	-
8" - 14	1	32	100	30	M20	25	-	1400	1000	800	600
8" - 15	2	38	150	30	M24	38	-	2500	1750	1400	1100
8" - 16	2	38	150	30	M24	47	-	4550	3250	2550	2150

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RISER CLAMP

FIG.: 2240

SECTION A 24

SIZE	TYPE	C (mm)	E (mm)	S (mm)	BOLT	WEIGHT MIN. "A" (Kg)	MAX. REC. LOAD FOR "A" (Kg)				
							600	750	900	1050	1200
10" - 17	1	25	100	25	M16	19	1000	725	500	-	-
10" - 18	1	32	125	30	M20	32	2050	1550	1300	950	-
10" - 19	2	38	150	30	M24	49	5000	3250	2550	2100	-
10" - 20	2	47	200	40	M30	78	-	6100	5000	3750	3000
12" - 21	1	25	100	25	M16	20	1200	825	550	450	-
12" - 22	2	32	150	30	M20	47	-	2150	1700	1300	1000
12" - 23	2	38	150	30	M24	60	-	3750	3000	2500	2000
12" - 24	2	47	200	40	M30	81	-	7250	5300	3900	3200

SIZE	TYPE	C (mm)	E (mm)	S (mm)	BOLT	WEIGHT MIN. "A" (Kg)	MAX. REC. LOAD FOR "A" (Kg)				
							750	900	1050	1200	1350
14" - 25	1	32	100	30	M20	32	1300	1000	775	575	-
14" - 26	2	38	150	30	M24	61	4000	3300	2650	2150	1800
14" - 27	2	47	200	40	M30	113	-	6000	5100	4000	3300
16" - 28	1	32	125	30	M20	41	1900	1600	1250	925	-
16" - 29	2	38	150	30	M24	71	-	3900	3000	2300	2000
16" - 30	2	56	200	42	M36	133	-	10000	8100	6450	5000

SIZE	TYPE	C (mm)	E (mm)	S (mm)	BOLT	WEIGHT MIN. "A" (Kg)	MAX. REC. LOAD FOR "A" (Kg)				
							900	1050	1200	1350	1500
18" - 31	2	38	150	30	M24	59	2200	1600	1300	1050	-
18" - 32	2	47	200	40	M30	98	7100	5150	3750	3000	2600
18" - 33	2	56	200	42	M36	138	-	8700	6650	5500	4450
20" - 34	2	38	150	30	M24	61	2400	1700	1350	1100	900
20" - 35	2	47	200	40	M30	113	-	6100	4600	3850	3300
20" - 36	2	56	250	42	M36	193	-	11000	8900	7350	6000
24" - 37	2	38	175	30	M24	82	-	2750	2150	1700	1350
24" - 38	2	47	200	40	M30	118	-	7350	5500	4300	3750
24" - 39	2	56	250	42	M36	222	-	-	10750	8400	6850

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THREADED RODS

FIG.: 2321 2322 Y 2323

SECTION A 25

FIG. 2321
Total right threaded

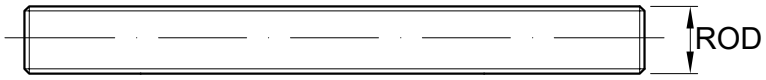


FIG. 2322
Right right threaded

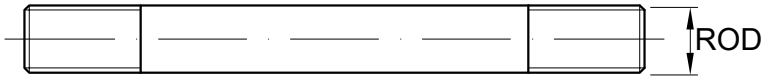
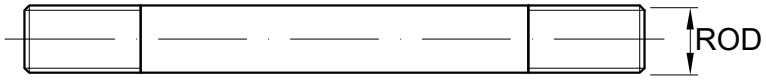


FIG. 2323
Right left threaded



No.	ROD	WEIGHT (Kg/m)	MAX. REC. LOAD (Kg)
1	M12	0,75	575
2	M16	1,35	1200
3	M20	2,1	1800
4	M24	3	2500
5	M30	4,75	4100
6	M36	8,15	6500
7	M42	11	8500
8	M48	14,4	11000
9	M56	19,7	15000
10	M64	25,75	20000
11	M72	34,5	26000
12	M80	40	30000
13	M90	51	35000
14	M100	62	45000

APPLICATION: To hang the piping, coupled to the forged eye nut, to a forged clevis, turnbuckles, couplings or alternatively against drilled plates. When the assembly height of the hanger requires the use of a rod longer than 2000 mm, this is normally replaced by two rods connected by a coupling or turnbuckle.

STANDARD SUPPLY:

- FOR FIG. 2321 y 2322:
We recommend rod lengths from 200 mm to 2000 mm, with 50 mm extensions.

- FOR FIG. 2323:
We recommend rod lengths from 250 mm to 2000 mm, with standard measurements of 250-500-1000-1500-2000 mm.

THREADED LENGTH (Fig. 2322 and 2323):

- ROD ≤ 500 mm:
The length of the thread will be 200 mm (or as long as possible) in each end.

- 500 mm < ROD ≤ 2000 mm:
Depending on the metric, there are two possibilities:
* M12 to M48: threaded length of 250 mm in each end.
* M56 to M100: threaded length of 300 mm in each end.

N.B.: For Fig. 2321 and with a metric the same as or larger than M42, the rod manufactured shall have a maximum length of 1000 mm. Note that several threaded rods can be connected directly with rod couplings until reaching the required length.

MANUFACTURE: On request, can be supplied with any rod length and threaded length (within the limitations of materials) and likewise with special threads and pitches.

ORDER FORM:
- Name.
- Figure.
- Metric.
- Length.

MATERIAL: Carbon steel. Can be manufactured in other qualities, on request.

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ROD COUPLING

FIG.: 2330

SECTION A
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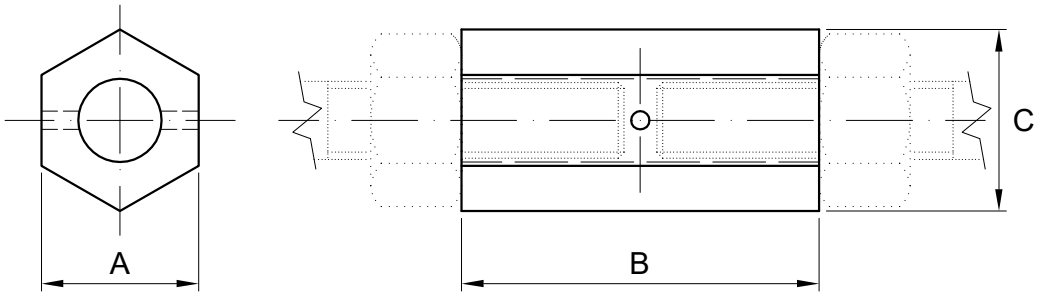

No.	Associated ROD	A (mm)	B (mm)	C (mm)	WEIGHT (Kg)	MAX. REC. LOAD (Kg)
1	M12	19	35	22	0,07	575
2	M16	24	45	28	0,15	1200
3	M20	30	60	35	0,3	1800
4	M24	36	75	42	0,5	2500
5	M30	46	90	53	1	4100
6	M36	55	110	61	1,7	6500
7	M42	65	120	75	2,5	8500
8	M48	75	125	87	3,5	11000
9	M56	85	150	98	6	15000
10	M64	95	170	110	8,5	20000

APPLICATION: To join and connect hanging rods. Used on long, rigid hangers not requiring adjustment. Always used on hangers with springs (if the installation length makes it necessary).

MANUFACTURE: Right threaded on both ends. They can be manufactured on request with special threads or pitches.

ORDER FORM:
- Name.
- Figure.
- Metric.

MATERIAL: Carbon steel. Can be manufactured in other qualities, on request.

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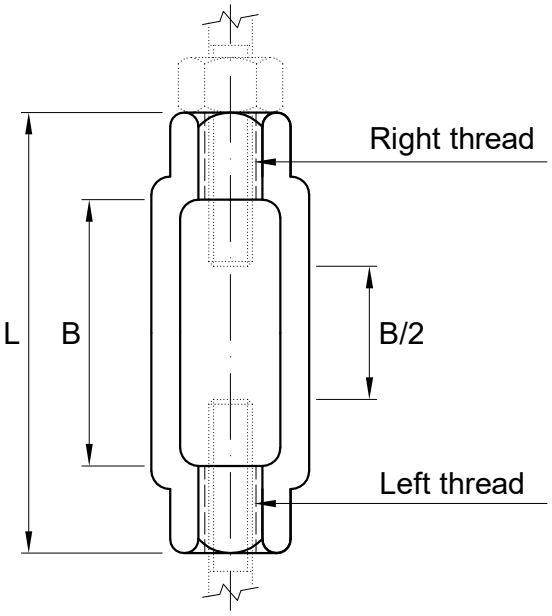
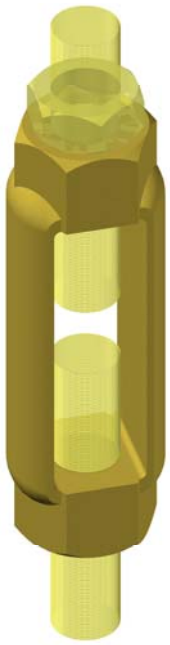
FORGED TURNBUCKLE

FIG.: 2331

SECTION A 27





No.	Associated ROD	B (mm)	L (mm)	WEIGHT (Kg)	MAX. REC. LOAD (Kg)
1	M12	110	150	0,5	575
2	M16				1200
3	M20	110	170	1,5	1800
4	M24				2500
5	M30	150	230	3,5	4100
6	M36				6500
7	M42	150	250	7	8500
8	M48				11000
9	M56	150	280	11	15000
10	M64				20000
11	M72	165	360	30	26000
12	M80				30000
13	M90				35000
14	M100				45000

APPLICATION: To connect hanging rods and adjust the length of the assembly. Used on long, rigid hangers requiring adjustment. Two turnbuckles should not be assembled under any circumstance on the same rigid hanger, nor one turnbuckle on one spring hanger since the spring unit includes one (use coupling instead).

MANUFACTURE: Right threaded at one end and left threaded at the other. They can be manufactured on request with special threads or pitches.

ORDER FORM:

- Name.
- Figure.
- Metric.

MATERIAL: Carbon steel. In exceptional circumstances, it can be manufactured in other qualities, on request (subject to a minimum order quantity).

N.B.: The forged turnbuckle can withstand operating loads of up to 75% higher than indicated here, without taking into account the influence of the rod or any other hanging element.

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FORGED CLEVIS

FIG.: 2332

SECTION A
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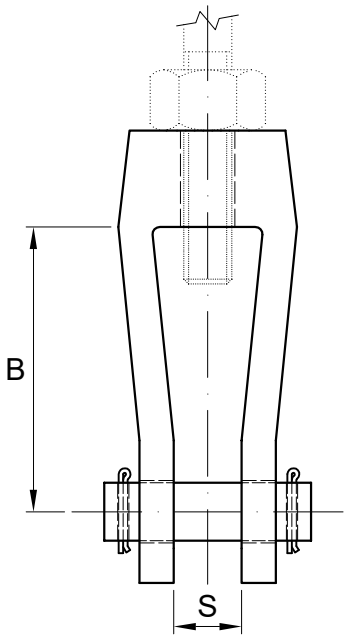

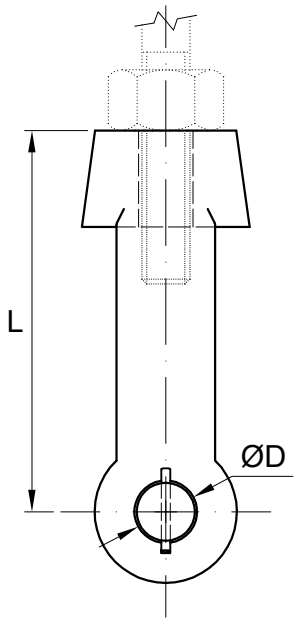

No.	Associated ROD	B (mm)	L (mm)	S (mm)	ØD (mm)	WEIGHT (Kg)	MAX. REC. LOAD (Kg)
1	M12	93	113	15	12	0,8	575
2	M16				15		1200
3	M20	120	146	22	20	1,6	1800
4	M24				25		2500
5	M30	125	161	28	30	3,5	4100
6	M36	150	195	31	35	5	6500
7	M42	175	230	48	40	12	8500
8	M48				45		11000
9	M56	200	275	60	50	18	15000
10	M64				55		20000
11	M72				65		26000
12	M80	250	350	70	70	45	30000
13	M90				80		35000
14	M100				90		45000

APPLICATION: Connection between rod and lug.

MANUFACTURE: Right threaded on metric sizes as a standard. Can be manufactured on request with left thread or special pitches.

ORDER FORM:

- Name.
- Figure.
- Mtric.
- Thread Direction.

MATERIAL: Carbon steel. In exceptional circumstances, it can be manufactured in other qualities, on request (subject to minimum order quantities).

N.B.: The forged clevis can withstand operating loads of up to 50% higher than the load above-mentioned, without taking into account the influence of the rod or any other hanging element.

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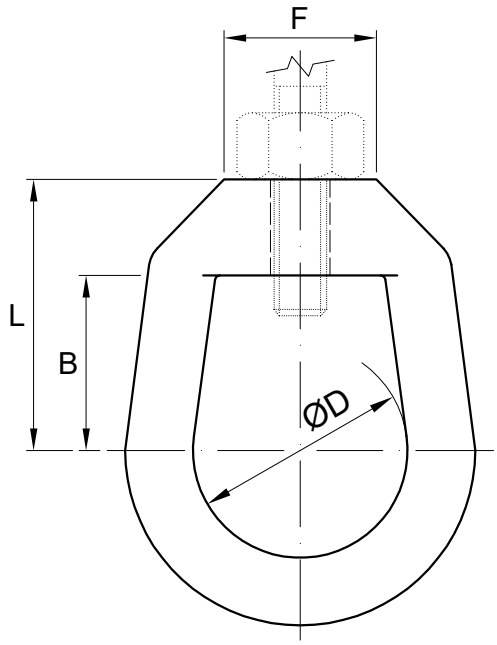
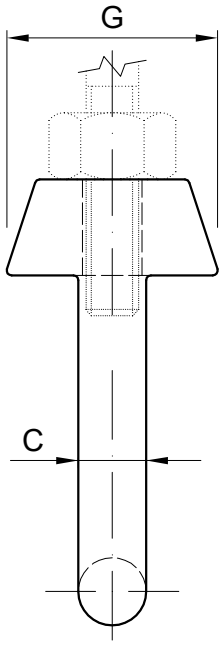
FORGED EYE NUT

FIG.: 2333

SECTION A 29





No.	Associated ROD	B (mm)	C (mm)	ØD (mm)	F (mm)	G (mm)	L (mm)	WEIGHT (Kg)	MAX. REC. LOAD (Kg)
1	M12	31	12	38	27	38	48	0,3	575
2	M16								1200
3	M20	41	20	50	45	50	66	1	1800
4	M24								2500
5	M30	54	25	62	55	62	85	2	4100
6	M36								6500
7	M42	95	32	80	75	80	140	5	8500
8	M48								11000
9	M56	108	38	100	95	100	165	8	15000
10	M64								20000

APPLICATION: Connection between rod and clamp or beam attachment.

MANUFACTURE: Right threaded on metric sizes as a standard supply. Left threaded as a common option for short rigid hangers where the eye nut connects to a right-left threaded rod in order to achieve adjustment. They can be manufactured on request with special pitches.

ORDER FORM:

- Name.
- Figure.
- Metric.
- (Left threaded if required as an option).

MATERIAL: Carbon steel. In exceptional circumstances, it can be manufactured in other qualities, on request (subject to minimum order quantities).

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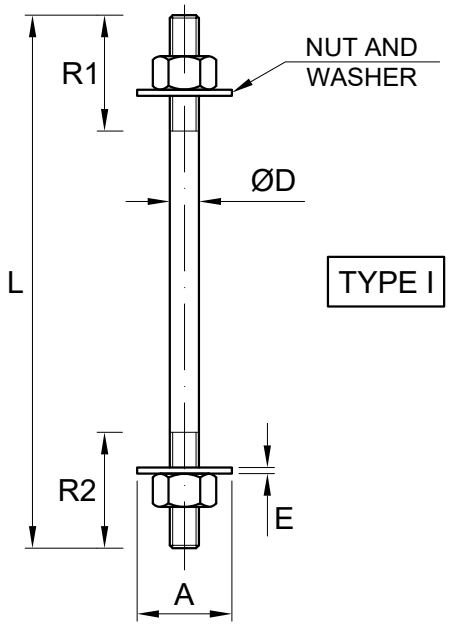
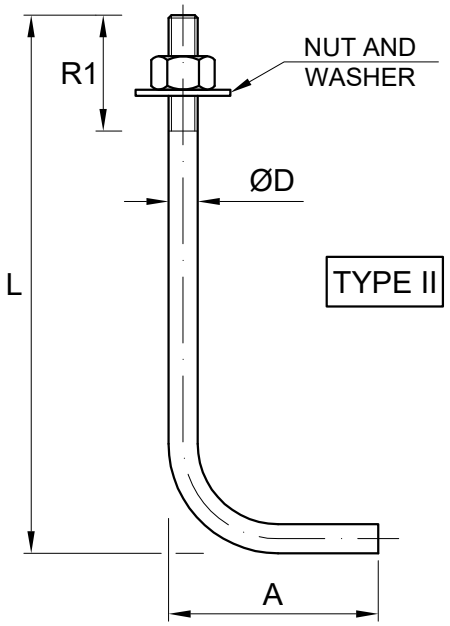
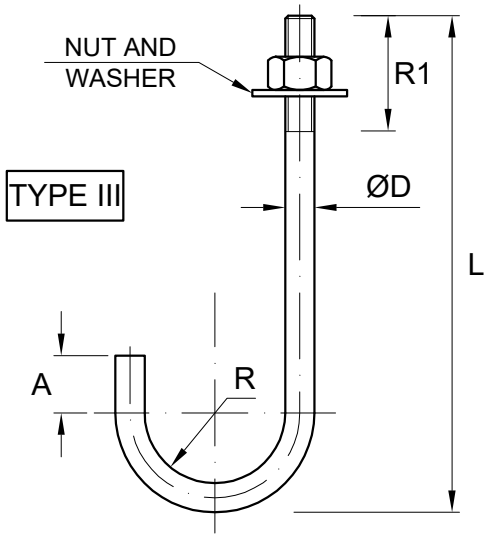
ANCHOR BOLTS

FIG.: 2340

SECTION A 30







APPLICATION: To anchor plates or equipment to concrete (wall, floor or ceilling).

MANUFACTURE: Can be manufactured in any size and type of threaded, according to client drawings. Any other variation or type of anchor bolt can be manufactured on request.

ORDER FORM:

- Name.
- Figure.
- Type.
- Dimensions as per drawings.
- Quality of the material.

MATERIAL: Carbon steel. Can be manufactured in other qualities, on request.

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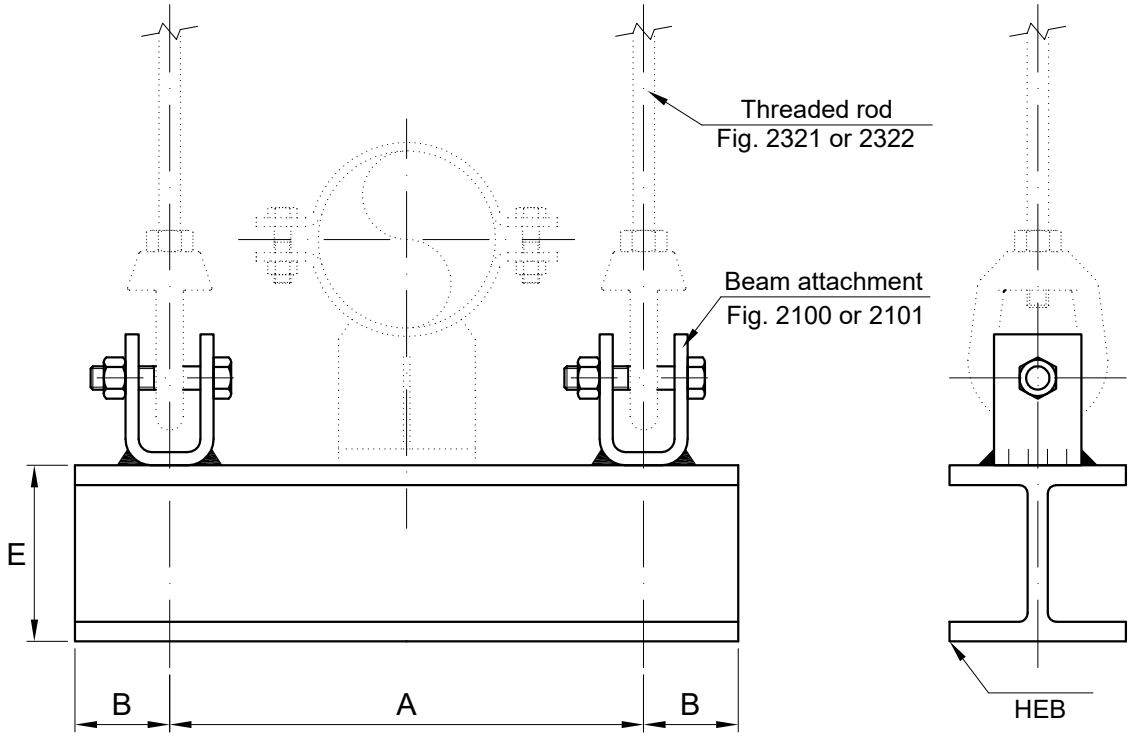
TRAPEZE

FIG.: 2350 OPTION 1

SECTION A 31



No.	E (mm)	MAX. REC. LOAD (Kg) DEPENDING ON "A"							
		300	500	750	1000	1250	1500	1750	2000
1	100	3500	3150	2300	1725	1450	1200	-	-
2	120	-	4500	3000	2450	2150	1850	1550	-
3	140	-	-	3500	3050	2400	2000	1650	-
4	160	-	-	4525	3900	3100	2650	2200	1850
5	200	-	-	-	7500	6600	5250	4500	4000
6	240	-	-	-	11750	10200	8750	7200	6550
7	300	-	-	-	21500	19500	16900	15250	14500

ASSOCIATED ROD	B
M12 / M16	40
M20 / M24	50
M30 / M36	60
M42 / M48	80
M56	100

APPLICATION: For double hangers. In general, they are used when it is not possible to hang above the pipe either due to the lack of space or due to interference.

MANUFACTURE: The size of the beam attachment will depend on the operating load and/or on the size of the spring, where this is the upper element.

ASSEMBLY: Connection to the rod by means of a forged eye nut.

ORDER FORM:

- Name.
- Figure.
- Size.
- "A" dimension.
- Hanging rod.

MATERIAL: Carbon steel.

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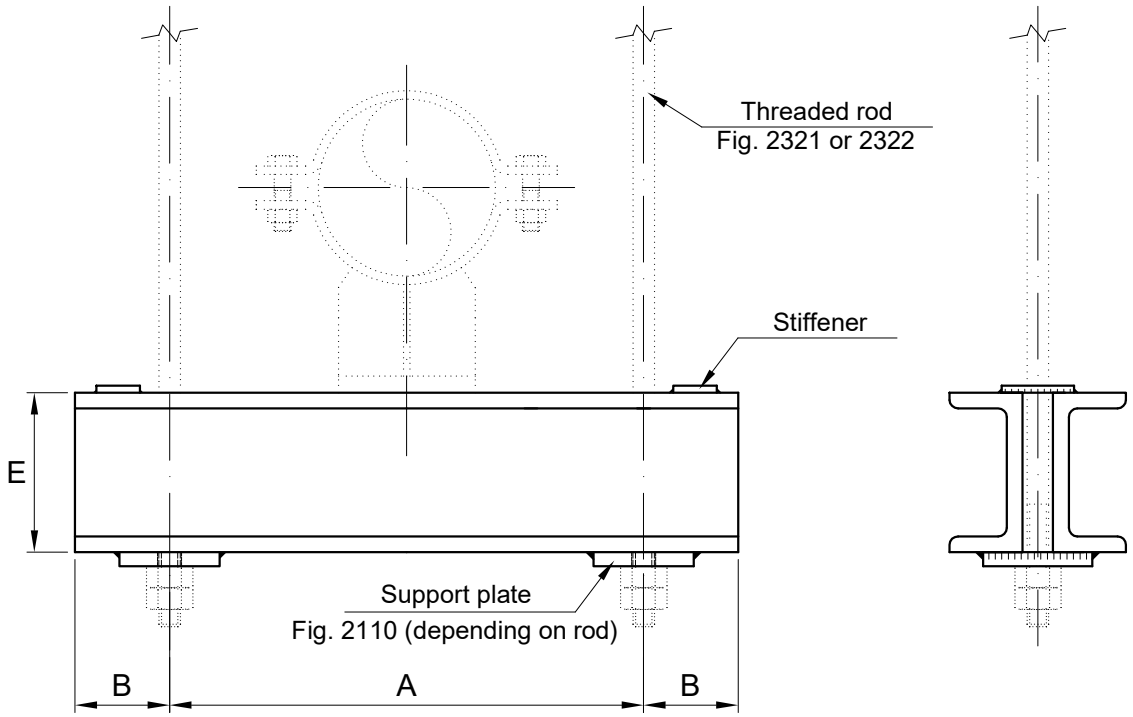
TRAPEZE

FIG.: 2350 OPTION 2

SECTION A 32



No.	E (mm)	MAX. REC. LOAD (Kg) DEPENDING ON "A"								WEIGHT FOR "A"=1000mm (Kg)	INCREASE IN WEIGHT FOR EACH "A"+100mm (Kg)
		300	500	750	1000	1250	1500	1750	2000		
1	80	2750	1950	1375	950	875	-	-	-	20	1,8
2	100	3750	3150	2150	1600	1350	1100	-	-	24,5	2,2
3	120	-	4250	2650	2275	2000	1750	-	-	31	2,7
4	160	-	-	3950	3400	2650	2250	1900	1600	45	3,8
5	200	-	-	-	5950	5150	4100	3500	3150	62	5,1
6	240	-	-	-	10500	9200	7850	6600	5900	84	6,7
7	300	-	-	-	16500	15250	12800	11500	10900	120	9,3

APPLICATION: For double hangers. In general, they are used when it is not possible to hang above the pipe, either due to the lack of space or due to interference. Can also be used as an intermediate beam on hangers.

ASSEMBLY: Connects with rod, support plate and nuts. The gap between the two UPN will be determined by the diameter of the rod.

ORDER FORM:

- Name.
- Figure.
- Size.
- "A" dimension.
- Hanging rod.

MATERIAL: Carbon steel.

ASSOCIATED ROD	B
M12 / M16	40
M20 / M24	50
M30 / M36	60
M42 / M48	80
M56	100

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SECTION B

PIPING SUPPORTS

CLAMP BASE

SLIDING PLATES

WELDED PIPE STRAP

U-BOLTS

ROLLERS

SADDLES

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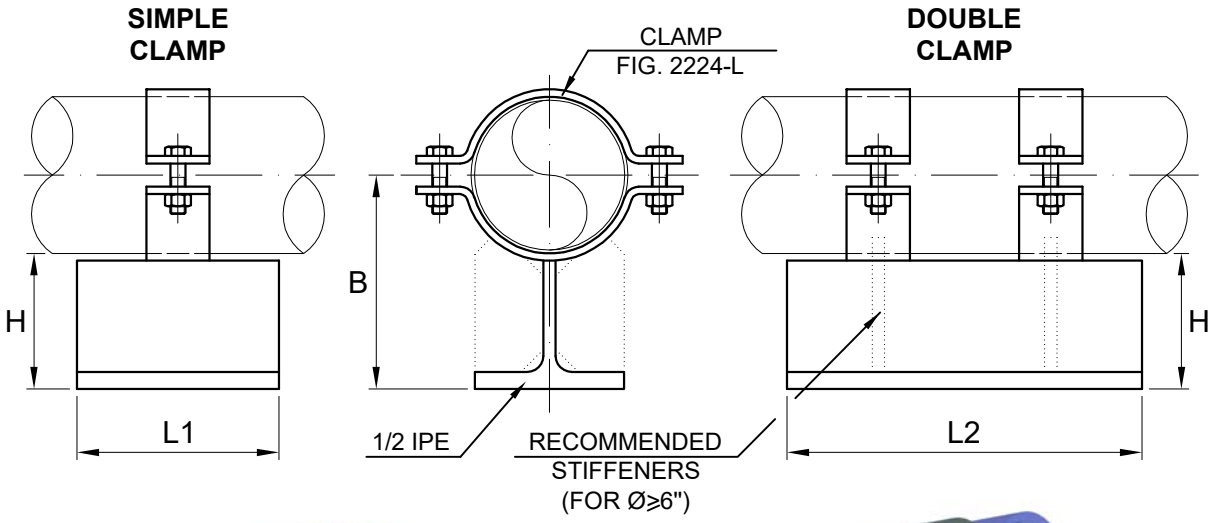
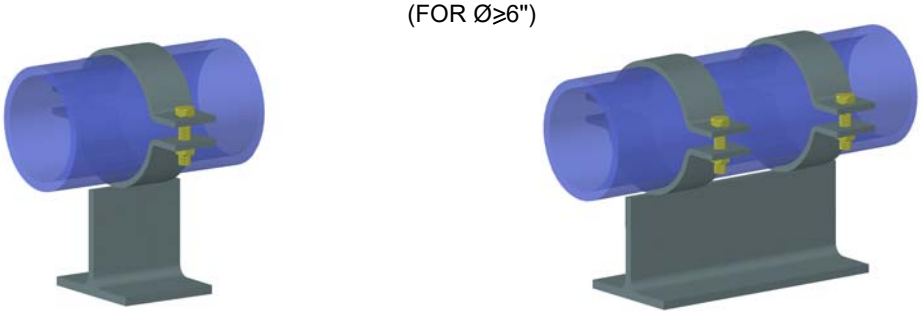
CONTENTS

CLAMP BASE

FIG.: 2134

SECTION B
1





PIPE D.N.	B (mm)				L_1 (mm)	L_2 (mm)	MAX. REC. OPERATING LOAD (Kg)
	IPE 160	IPE 200	IPE 240	IPE 270			
1/2"	93	113	-	-	100	200	250
3/4"	96	116	-	-	100	200	250
1"	99	119	-	-	100	200	250
1 1/4"	103	123	-	-	100	200	250
1 1/2"	108	128	-	-	100	200	350
2"	114	134	-	-	150	200	350
2 1/2"	121	141	-	-	150	250	400
3"	129	149	169	-	150	250	500
4"	141	161	181	-	150	250	500
5"	-	175	195	210	150	250	650
6"	-	190	210	225	150	300	1150
8"	-	216	236	251	150	300	1150
10"	-	245	265	280	150	300	1400
12"	-	270	290	305	-	350	1650
14"	-	288	308	323	-	350	1950
16"	-	313	333	348	-	400	1950
18"	-	339	359	374	-	400	2250
20"	-	367	387	402	-	400	2650

APPLICATION: Pipe shoes with clamps to act as sliding supports for medium-low operating loads. Valid for pipes with or without insulation. They can be used as guided pipe shoes, by means of lateral stops or by welding two, three or four bases to the clamps rotated through 45º.

ORDER FORM:

- Name.
- Figure and type of clamp (Simple/Double)
- Pipe diameter.
- Height "B" or "H".
- Length "L" if not standard.
- Option "G" if clamps are rotated or "SS" if the base is in stainless steel.
- Temperature or pipe quality.

MATERIAL: Carbon steel or alloy steel. In the case of alloy steel, "T" sections are to be manufactured with equivalent plates.

*** N.B.:** For stainless steel piping, clamps in stainless steel, in carbon steel/alloy steel with stainless lining, with elastomeric materials or any other type can be manufactured to avoid direct contact.

*** N.B.:** This can be manufactured with dimensions other than those indicated, as well as with the clamps rotated through 30º to 45º. In order to improve friction on the support base, they can be supplied with stainless steel sheet welded to the base (2 mm thick sheet and 2B finish).

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2	20/10/98	INFORMATION	JB	EAR
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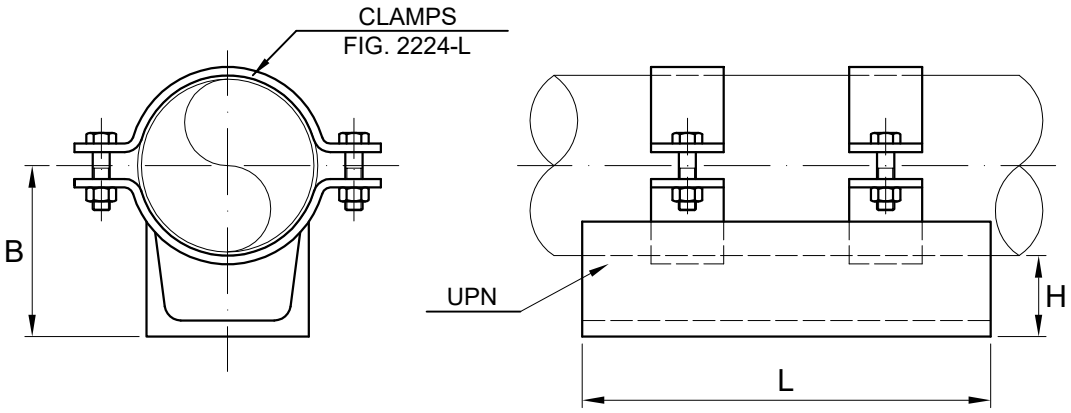
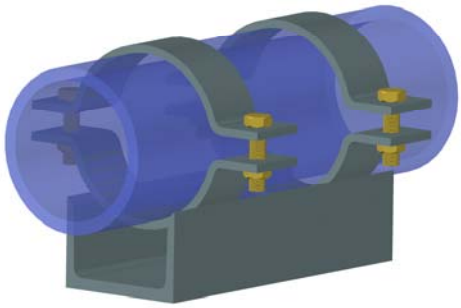
CLAMP BASE

FIG.: 2135

SECTION B 2



PIPE D.N.	UPN	B (mm)	L (mm)	MAX. REC. OPERATING LOAD (Kg)
2"	60	53	200	400
2 1/2"	80	60	250	550
3"	80	77	250	550
4"	100	89	250	750
5"	100	109	250	750
6"	120	125	300	1000
8"	140	155	300	1500
10"	140	189	300	1500
12"	160	217	350	2050
14"	160	237	350	2050
16"	200	265	400	3250
18"	200	282	400	3250
20"	240	326	400	4500



APPLICATION: Pipe shoes with clamps to act as sliding supports for medium-low operating loads. Valid for uninsulated pipe only. Can be used as guided pipe shoes by means of lateral stops.

ORDER FORM:

- Name.
- Figure.
- Pipe diameter.
- Height "B" or "H".
- Length "L" if not standard.
- Option "G" if clamps are rotated or "SS" if the base is in stainless steel.

MATERIAL: Carbon Steel.

N.B.: This can be manufactured with dimensions other than those indicated, as well as with clamps rotated 30º or 45º (when the UPN allows it). In order to improve the friction on the support base, they can be supplied with stainless steel sheet welded to the base (2 mm thick base with 2B finish).

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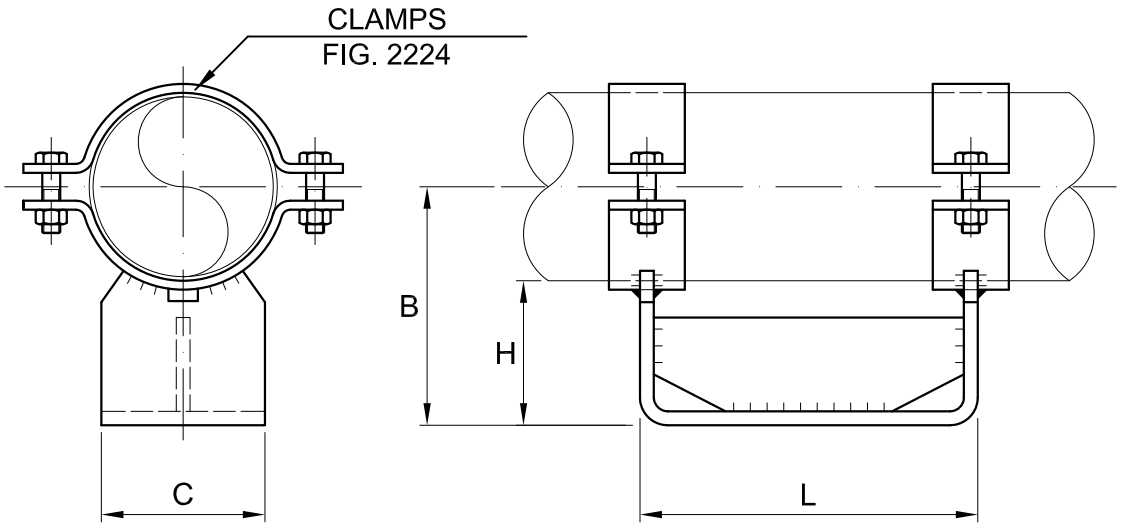
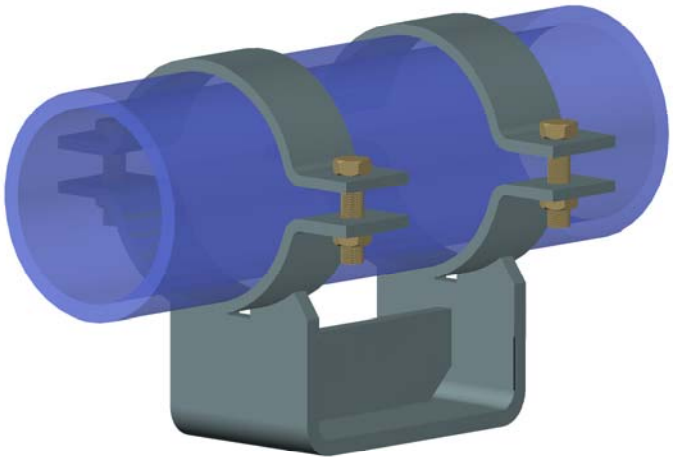
CLAMP BASE

FIG.: 2136

SECTION B
3





APPLICATION: Pipe shoes with clamps to act as sliding supports for any type of operating load. Valid for pipes with or without insulation, either in carbon steel, alloy steel or stainless steel. Can be used as guided pipe shoe by means of lateral stops or double, triple or quadruple bases.

ORDER FORM:

- Name.
- Figure.
- Pipe diameter.
- Height "B" o "H".
- Length "L" if not standard.
- Option "G" if clamps are rotated or "SS" if the base is stainless steel.
- Indicate configuration: double, triple or quadruple.
- Temperature or pipe quality.

MATERIAL:
Carbon steel or alloy steel.

DIMENSIONS TABLE ON SHEET B-4

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CLAMP BASE

FIG.: 2136

SECTION B 4

PIPE D.N.	B (mm)			C (mm)	L (mm)	MAX. REC. OPERATING LOAD (Kg)			
						SERIES 1	SERIES 2	SERIES 3	SERIES 4
2"	130	180	230	70	200	575	-	-	-
2 1/2"	137	187	237	80	250	650	-	-	-
3"	144	194	244	100	250	750	1100	-	-
4"	157	207	257	110	250	800	1250	-	-
5"	170	220	270	130	250	900	1350	-	-
6"	184	234	284	150	300	1250	1600	2350	-
8"	210	260	310	175	300	1500	2000	2750	-
10"	237	287	337	200	300	2000	3500	4500	-
12"	262	312	362	230	350	2500	3250	4750	6500
14"	278	328	428	250	350	2750	3900	5000	7150
16"	303	403	453	280	400	-	4150	5750	7250
18"	329	429	529	300	400	-	4500	6000	7500
20"	354	454	554	315	400	-	5100	6500	8800
22"	380	480	580	325	450	-	5400	7200	9450
24"	455	505	605	340	450	-	6250	7500	10150
26"	480	530	630	360	450	-	6500	7950	10500
28"	506	556	656	375	450	-	-	8500	11250
30"	531	581	681	400	450	-	-	9100	11800
32"	556	606	706	425	500	-	-	9500	12400
34"	582	632	732	440	500	-	-	10050	12950
36"	607	657	757	440	500	-	-	10050	12950

N.B.: This can be manufactured with dimensions other than those indicated. They can be manufactured with clamps rotated 30º or 45º. For pipe shoes in high temperature service, both in carbon steel and in alloy steel, loads must consider correction factors depending on the temperature and quality of the steel.

See the table shown on sheet A-20.

In order to improve the friction on the support base, they can be supplied with stainless steel sheet welded to the base (2 mm thick sheet and finish 2B).

For stainless steel piping, clamps can be manufactured in stainless steel, in carbon steel/alloy steel with stainless steel lining, with elastomeric materials or in any other type that avoids direct contact.

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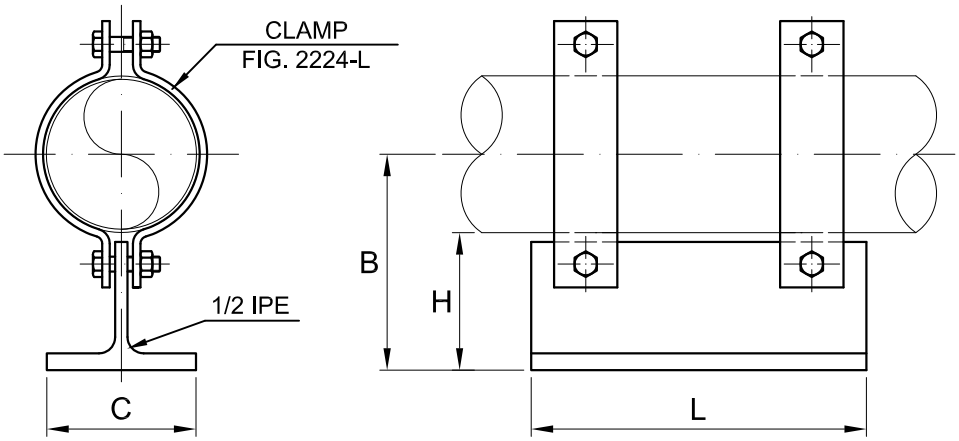
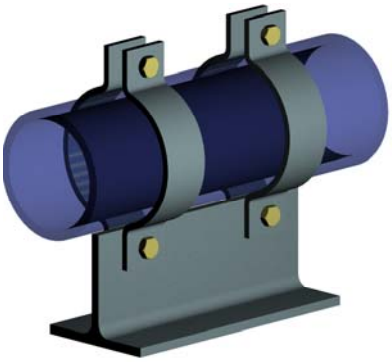
CLAMP BASE

FIG.: 2137

SECTION B
5



PIPE D.N.	B (mm)				L (mm)	MAX. REC. OPERATING LOAD (Kg)
	IPE-160	IPE-200	IPE-240	IPE-270		
1/2"	95	115	-	-	200	250
3/4"	98	118	-	-	200	250
1"	101	121	-	-	200	250
1 1/4"	105	125	-	-	200	250
1 1/2"	107	127	-	-	200	350
2"	113	133	153	-	200	450
2 1/2"	121	141	161	-	250	500
3"	129	149	169	-	250	500
4"	138	158	178	-	250	500
5"	-	173	193	208	250	650
6"	-	191	211	226	300	750
8"	-	217	237	252	300	750
10"	-	243	263	278	300	850
12"	-	269	289	304	350	950



APPLICATION: Pipe shoes with clamps to act as sliding supports for medium-low operating loads. Piping with or without insulation. Can be used as a guide by fitting double, triple or quadruple base pipe shoes.

ORDER FORM:

- Name.
- Figure.
- Pipe diameter.
- Height "B" or "H".
- Length "L" if not standard.

MATERIAL: Carbon steel.

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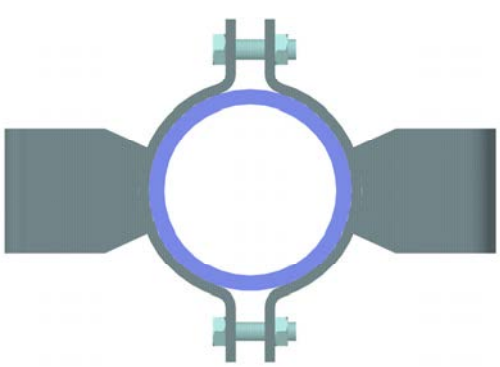
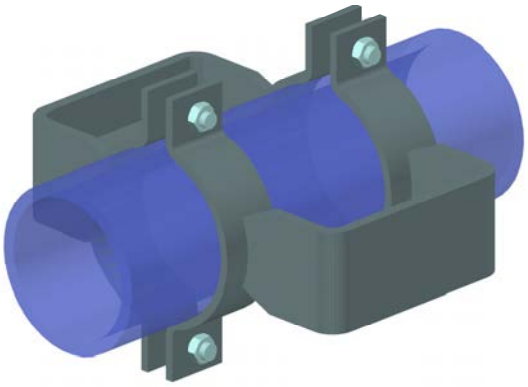
CLAMP BASE VARIATIONS

180º DOUBLE PIPE SHOES

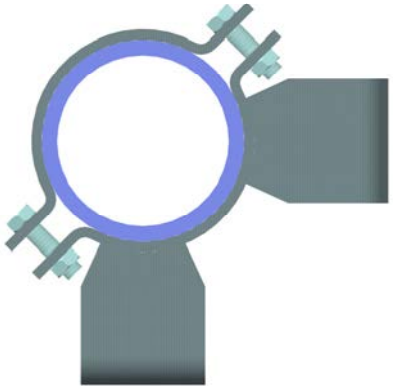


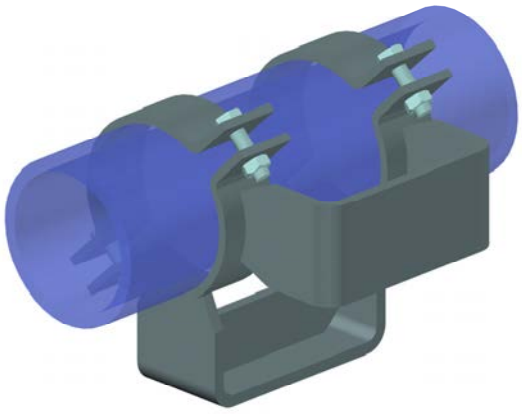


TO SUPPORT EITHER VERTICAL LOADS OR LATERAL LOADS IN BOTH DIRECTIONS.

e.g.: Fig. 2136 180º Double.

90º DOUBLE PIPE SHOES





TO SUPPORT VERTICAL LOADS AND LATERAL LOADS IN A SINGLE DIRECTION.
e.g.: Fig. 2136 90º Double.

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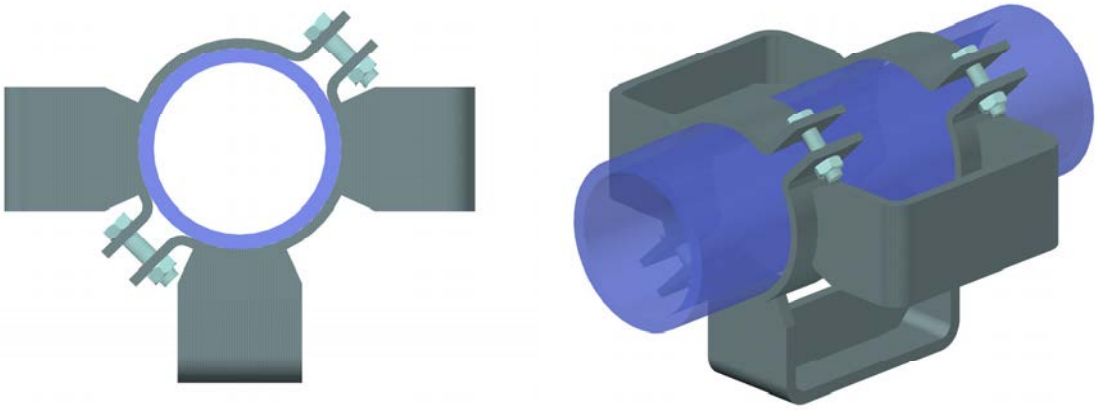
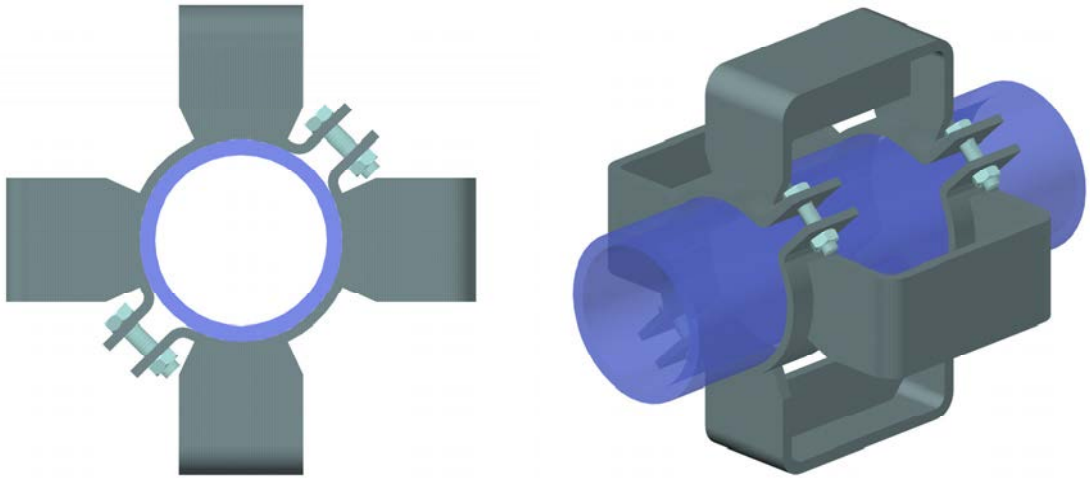
CLAMP BASE VARIATIONS

TRIPLE PIPE SHOES



TO SUPPORT VERTICAL LOADS IN A SINGLE DIRECTION AND LATERAL LOADS IN BOTH DIRECTIONS.
e.g.: Fig. 2136 Triple.

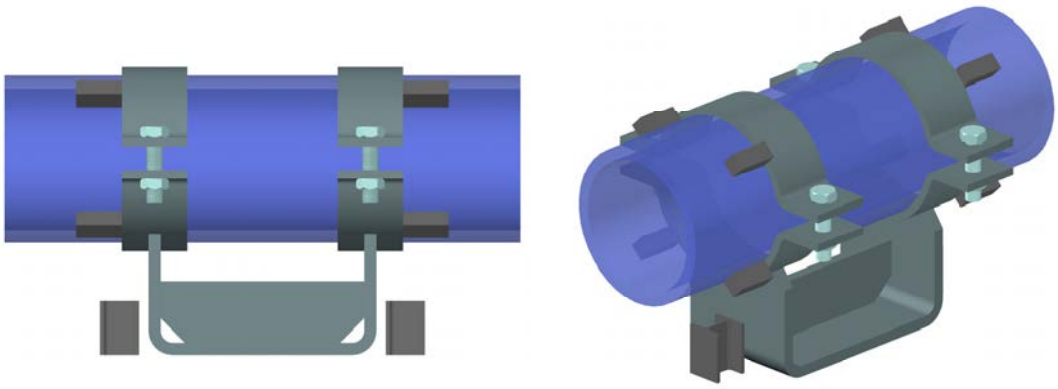
QUADRUPLE PIPE SHOES



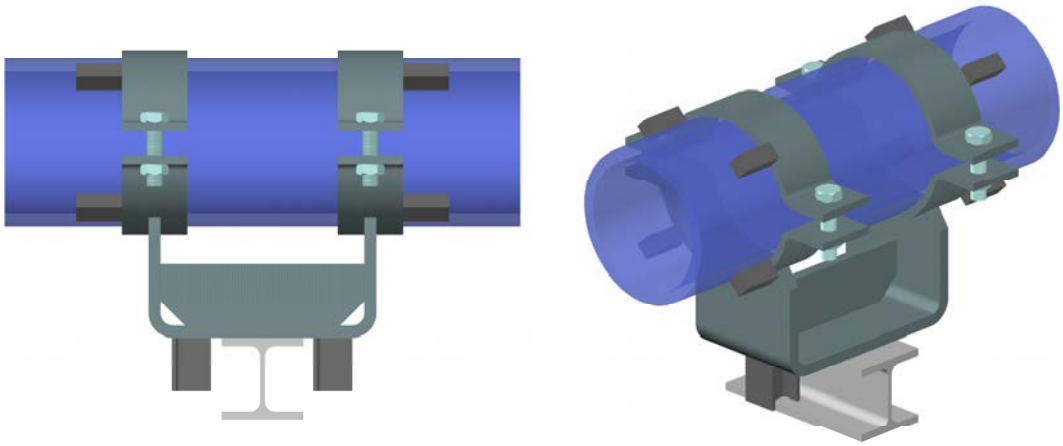
TO SUPPORT LATERAL AND VERTICAL LOADS IN BOTH DIRECTIONS.
e.g.: Fig. 2136 Quadruple.

PIPE SHOES FOR AXIAL LOADS

- WITH LUGS WELDED TO THE PIPE



e.g.: Fig. 2136 FOR AXIAL STOP WITH LUGS. OPTION 1.

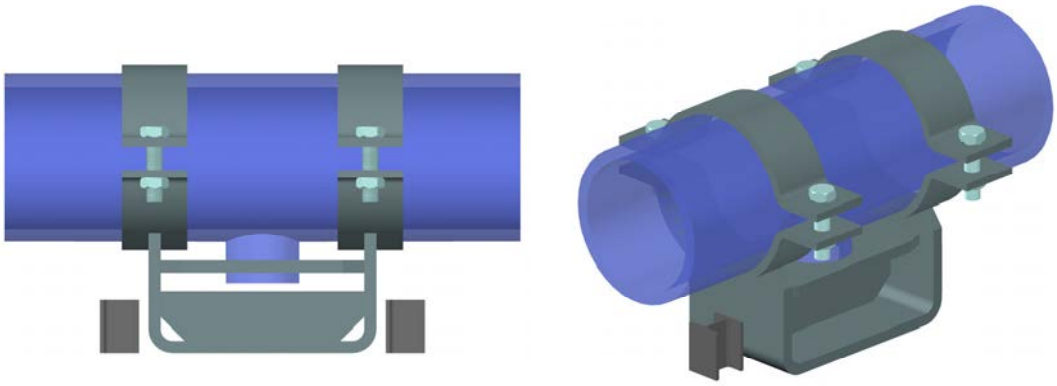


e.g.: Fig. 2136 FOR AXIAL STOP WITH LUGS. OPTION 2

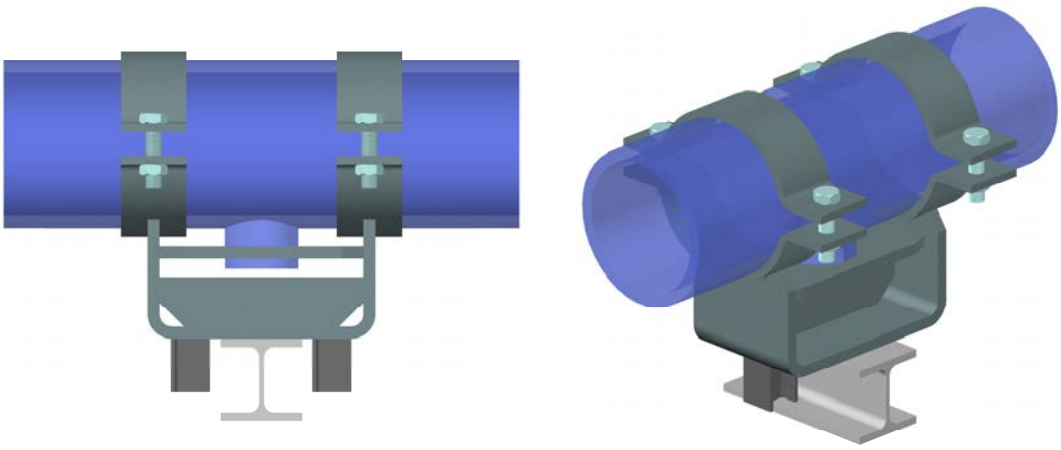
N.B.: The dimensions of the welded lugs and stop beams shall depend on the axial load.

PIPE SHOES FOR AXIAL LOADS

- WITH TRUNNION WELDED TO THE PIPE.



e.g.: Fig. 2136 FOR AXIAL STOP WITH TRUNNION. OPTION 1.

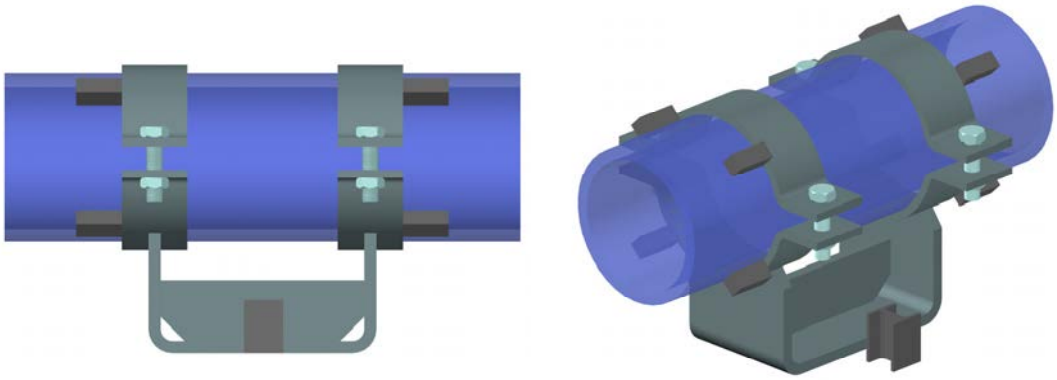


e.g.: Fig. 2136 FOR AXIAL STOP WITH TRUNNION. OPTION 2.

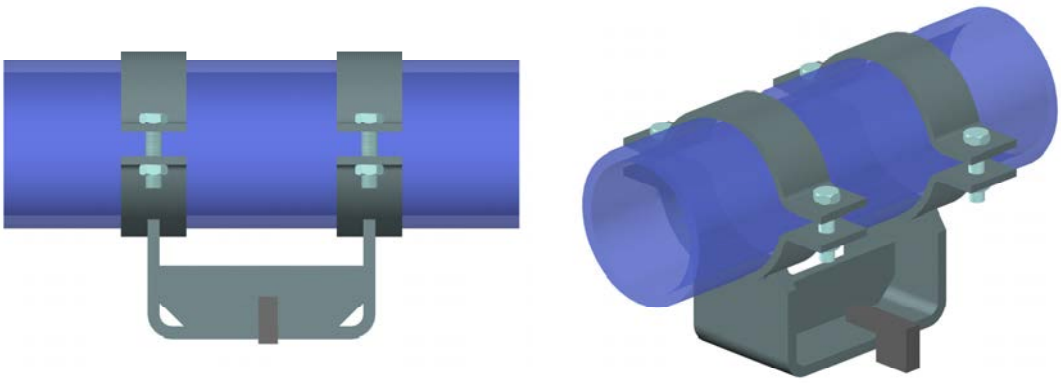
N.B.: The dimensions of the trunnions and the stop beams shall depend on the axial load.

GUIDED CLAMP BASES

- WITH LUGS WELDED TO THE CLAMPS AND TO THE PIPE.



e.g.: Fig. 2136 FOR GUIDED CLAMP BASE WITH ANTI-ROTATING LUGS.

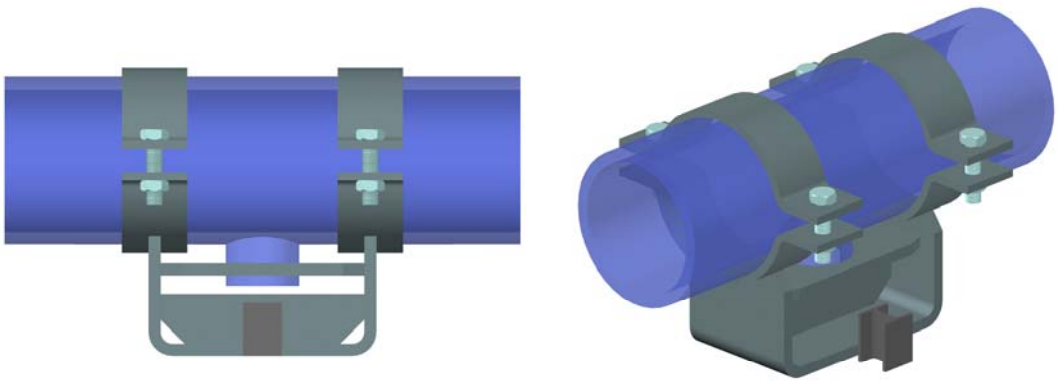


e.g.: Fig. 2136 WITH LIFT-OFF GUIDES.

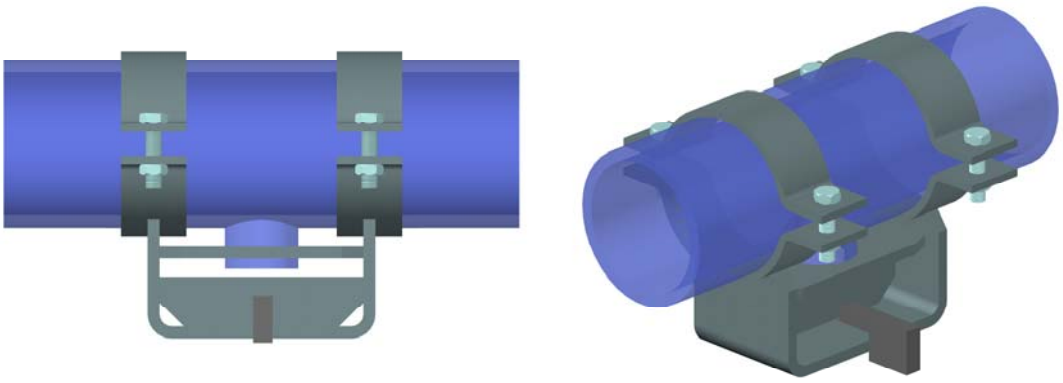
N.B.: The dimensions of the welded lugs, stop beams and lift-off guides will depend on the axial load.

GUIDED CLAMP BASES

- WITH TRUNNION WELDED TO THE PIPE.



e.g.: Fig. 2136 FOR GUIDED CLAMP BASE WITH ANTI-ROTATION LUGS.



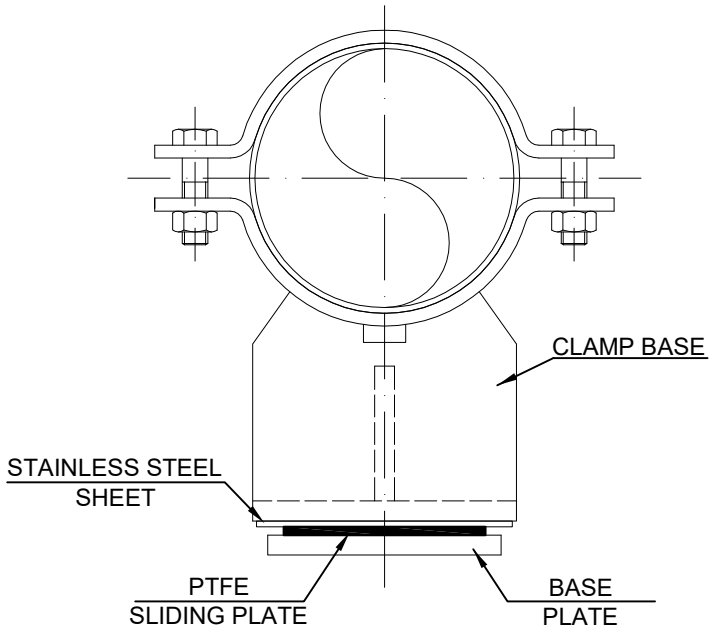
e.g.: Fig. 2136 WITH LIFT-OFF GUIDES

N.B.: The dimensions of the trunnions, anti-rotating lugs, stop beams and lift-off guides will depend on the lateral load.

PTFE SLIDING PLATES

FIG.: 2138

SECTION B 12



APPLICATION: Appropriate for coupling sliding supporting points. These are usually fitted under the pipe shoes, on plates according to Fig. 2138 (enclosed sheets) or also on the loading plate of the variable load springs type F. The maximum permanent contact temperature recommended is 120ºC.

ASSEMBLY: The PTFE can be fitted onto different sized seating plates. Between PTFE and the support, generally, a stainless steel upper plate is fitted, with a polished or semi-polished finish (minimum recommended: 2B finish).

CHARACTERISTICS:

- Low friction coefficient.
- Chemically inert.
- High non-stick properties.
- Chemical stability between -180ºC and +280ºC.
- Good resilience to fragility at high and low temperatures.
- Maximum recommended operating stress: 10Mpa.

ORDER FORM:

- Name.
- Figure.
- Dimensions or number.

N.B.: Depending on customer requirements, PIHASA will send more complete details and make the appropriate design. The design of the figure is only representative since the assembly of the PTFE plate can be made in different ways, depending on the particular design for each case.

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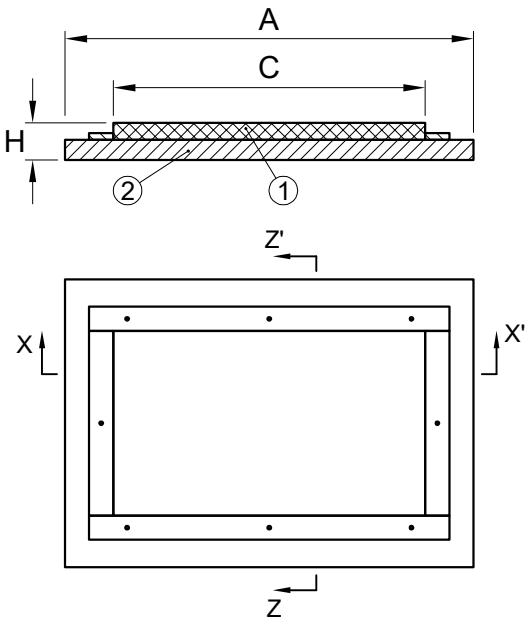
PTFE SLIDING PLATES

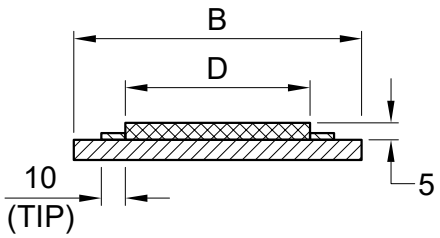
FIG.: 2138

SECTION B 13

VIEW X-X'



VIEW Z-Z'



① PTFE plate treated on the side for bonding

② Carbon steel seating plate with the frame for inserting the PTFE plate.

No.	A (mm)	B (mm)	C (mm)	D (mm)	H (mm)	CALCULATED LOAD FOR 5 Mpa. (Kg)
01	80	80	50	50	13	1250
02	105	80	75	50	13	1875
03	130	80	100	50	13	2500
04	155	80	125	50	13	3125
05	180	80	150	50	13	3750
06	105	105	75	75	13	2810
07	130	105	100	75	13	3750
08	180	105	150	75	13	5265
09	230	105	200	75	13	7500
10	130	130	100	100	13	5000
11	180	130	150	100	13	7500
12	230	130	200	100	13	10000
13	280	130	250	100	13	12500
14	330	130	300	100	13	15000
15	180	180	150	150	15	11250

No.	A (mm)	B (mm)	C (mm)	D (mm)	H (mm)	CALCULATED LOAD FOR 5 Mpa. (Kg)
16	230	180	200	150	15	15000
17	280	180	250	150	15	18750
18	330	180	300	150	15	22500
19	430	180	400	150	15	30000
20	230	230	200	200	15	20000
21	330	230	300	200	15	30000
22	430	230	400	200	15	40000
23	280	280	250	250	15	31250
24	330	280	300	250	15	37500
25	430	280	400	250	15	50000
26	530	280	500	250	15	62500
27	330	330	300	300	15	45000
28	430	330	400	300	15	60000
29	530	330	500	300	15	75000
30	430	430	400	400	15	80000

N.B.:

- The standard assembly is to support the PTFE plate against a polished or semi-polished stainless steel plate, obtaining a friction coefficient of less than 0.1.
  The dimensions of the stainless steel plate should be larger than the PTFE, depending on the expected movements.

- Support can also be made against another PTFE plate as upper sliding plate. With the oiled surface, the friction coefficient should not exceed a value of 0.05.

- The joint below the structure is made by applying alternate welding beads, with controlled thermal contribution, in order to avoid transmitting excessive heat to the PTFE plate.

- It may be manufactured in intermediate sizes and in any dimension, both the base plate and the PTFE, as well as in any thickness on the condition that it be greater than or equal to 8 mm.

- It is advisable not to exceed 120ºC as continuous operating temperature.

- Other options:
  - Plates incorporating restrictions on movement.
  - Plates that allow for swinging (by cylindrical or spherical supports).
  - Special plates according to the design supplied by the customer.

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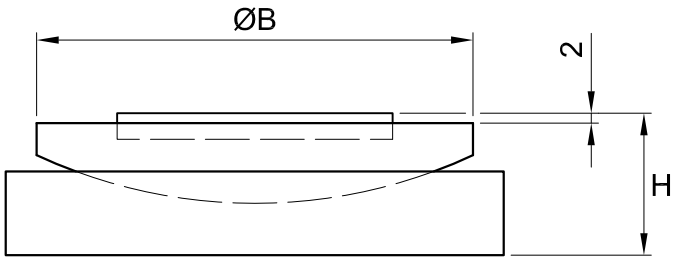
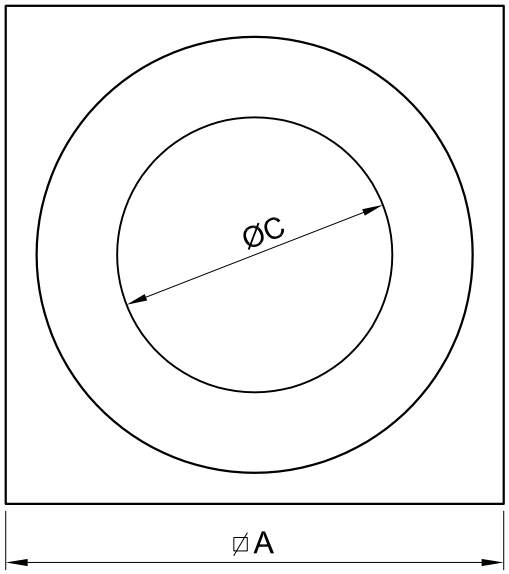
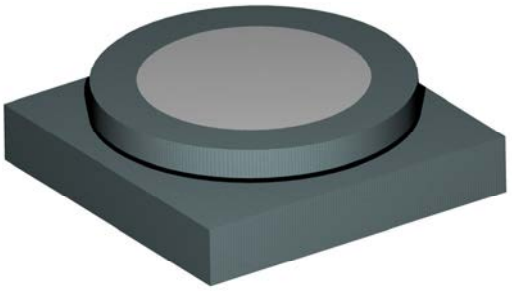
PTFE SPHERICAL SLIDING PLATES

FIG.: 2138 SPH

SECTION B 14







No.	⍁A (mm)	ØB (mm)	ØC (mm)	H (mm)	MAX. REC. LOAD (Kg)
1	90	80	50	32	975
2	115	105	75	35	2200
3	140	130	100	38	3900
4	160	150	120	37	5650
5	190	180	150	44	8825
6	220	210	200	44	15700

N.B.:

- Maximum angling ± 2º in all directions.
- On special request, this angling may be increased, but the dimensions may be affected.

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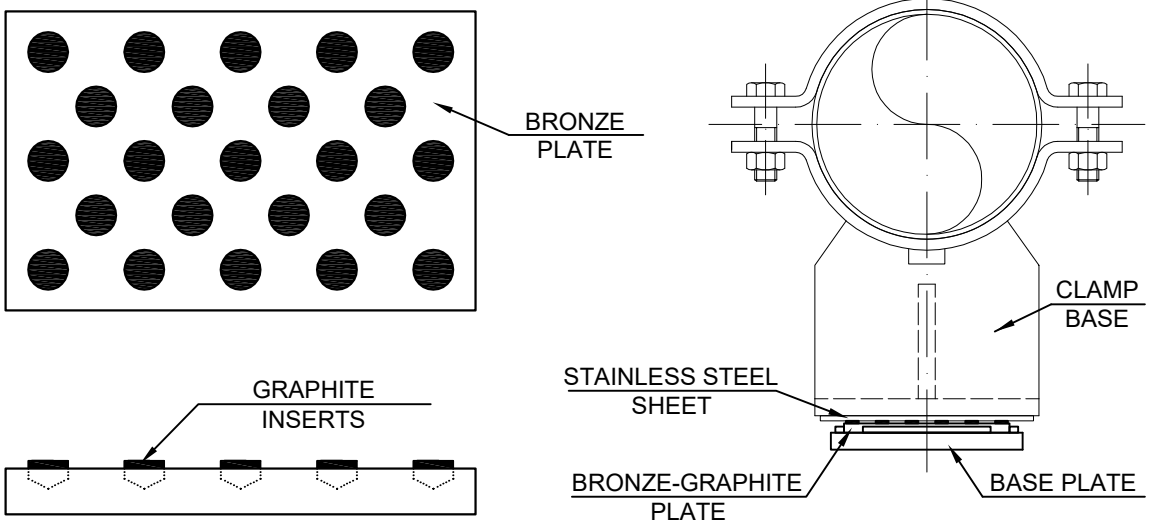
SELF-LUBRICATING GRAPHITE-BRONZE PLATES

FIG.: 2139

SECTION B 15



MATERIAL: The base element is a bronze alloy with small amounts of other materials (Pb, Zn, etc.). The lubricant element comprises graphite as the base element, with the addition of small amounts of metals, metal oxides and other lubricant elements.

APPLICATIONS: This material is specially appropriate for coupling to points where the support may need to be made sliding, due to it slow friction coefficient. This has a good response in adverse environmental conditions (sandy areas, etc.), a high resistance against abrasion and a high load capacity.

ASSEMBLY: The graphite-bronze strips can be fitted onto the support plates or profiles in different materials, depending on the design. A stainless steel plate should be fitted between the graphite-bronze strip and the support itself.

GEOMETRICAL FORMS: These supports can be supplied in the form of:
- Square or rectangular plate.
- Circular crown.
- Bushings.
- Rotating joints.

CHARACTERISTICS: The essential characteristic is its low friction coefficient:
- For high loads: 0.04 to 0.08.
- For low loads: 0.09 to 0.1.

The sliding speed between plates should be less than 150 metres per minute. It has a high resilience to use.
Working stress should not exceed 15 MPa.
The range of temperature use is very broad, with very high temperatures (600ºC).

ORDER FORM: In accordance with customer technical requirements, PIHASA will present full details, fitting the most adequate plate in each particular case.

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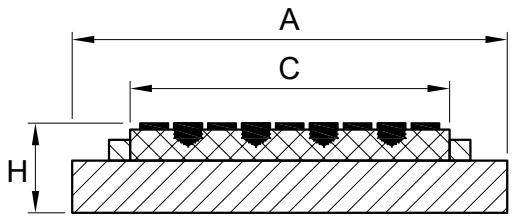
SELF-LUBRICATING GRAPHITE-BRONZE PLATES

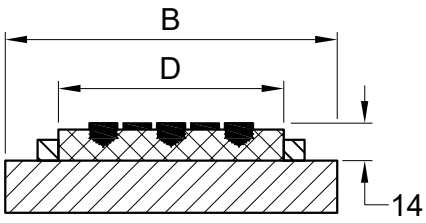
FIG.: 2139

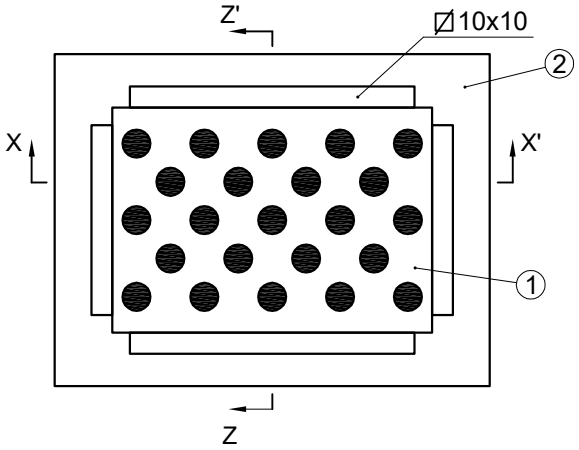
SECTION B 16

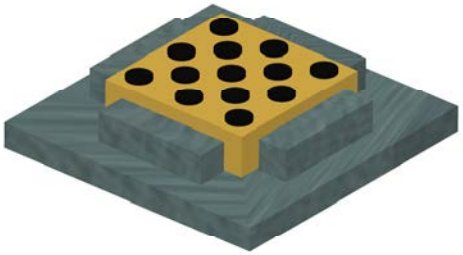
VIEW X-X'



VIEW Z-Z'







No.	A (mm)	B (mm)	C (mm)	D (mm)	H (mm)	NUMBER OF PLATES	MAX. REC. LOAD (Kg)
01	90	90	50	50	22	1	3750
02	115	90	75	50	22	1	5625
03	140	90	100	50	22	1	7500
04	190	90	150	50	22	1	11250
05	115	115	75	75	22	1	8435
06	140	115	100	75	22	1	11250
07	190	115	150	75	22	1	16875
08	240	115	200	75	22	1	22500
09	340	115	300	75	22	2	33750
10	140	140	100	100	24	1	15000
11	190	140	150	100	24	1	22500
12	240	140	200	100	24	1	30000
13	340	140	300	100	24	2	45000
14	190	190	150	150	24	1	33750
15	240	190	200	150	24	1	45000
16	340	190	300	150	24	2	67500
17	440	190	400	150	24	2	90000
18	240	240	200	200	26	1	60000
19	340	240	300	200	26	2	90000
20	440	240	400	200	26	2	120000
21	540	240	500	200	26	3	150000

① Self-lubricating bronze plate with graphite inserts.

② Carbon steel plate with 10x10 square frame for fitting graphite-bronze plate.

N.B.:

- The installation is made by welding to the supporting structure.
- This can be manufactured in intermediary sizes and in any dimension, both the base plate and the graphite-bronze, as well as any thickness, on the condition that it be greater than or equal to 15 mm.
- It allows for an operating temperature of up to 500ºC - 600ºC.

- Other options:
* Plates incorporating restrictions on movement.
* Plates that allow for swinging (by means of cylindrical or spherical supports).
* Special plates, following the design supplied by the customer.

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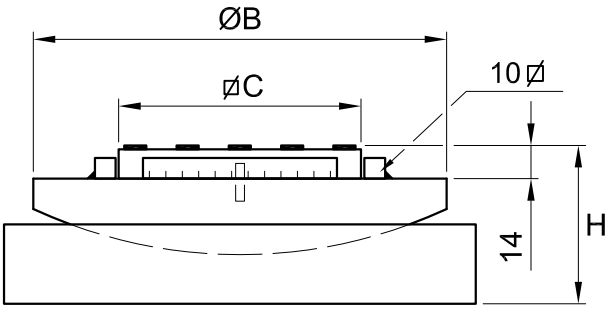
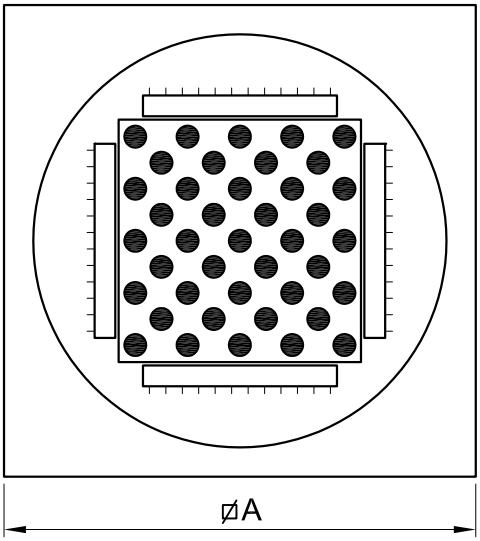
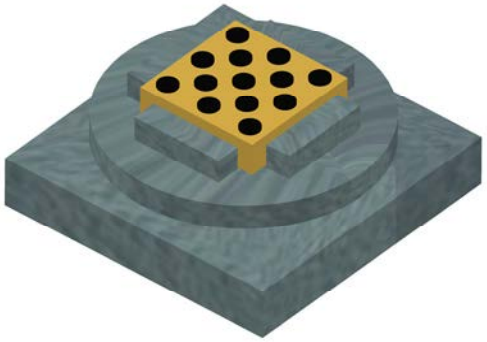
SELF-LUBRICATING SPHERICAL GRAPHITE-BRONZE PLATES

FIG.: 2139 SPH

SECTION B 17







No.	⌀A (mm)	ØB (mm)	⌀C (mm)	H (mm)	MAX. REC. LOAD (Kg)
1	100	90	50	39	2250
2	130	120	75	42	5050
3	170	160	100	50	9000
4	200	190	120	54	12750
5	240	230	150	61	20000

N.B.:

- Maximum angling ±2º in all directions.
- On special request, this angling may be increased, but the dimensions may be affected.

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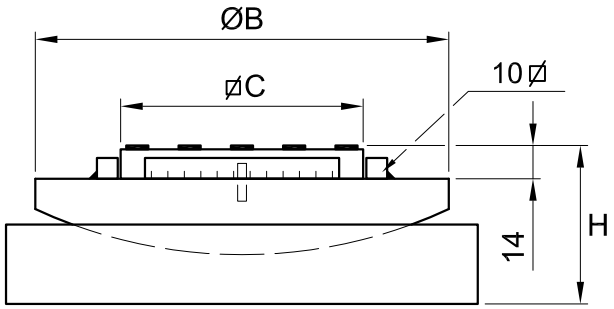
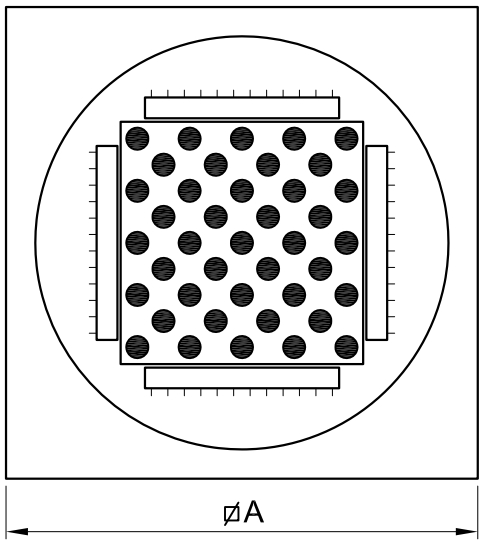
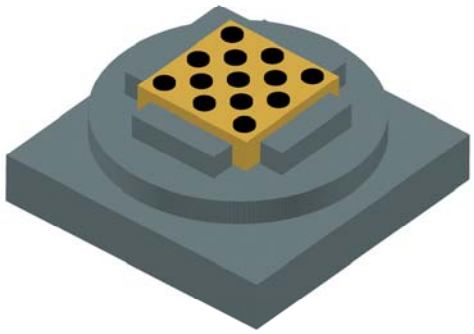
SELF-LUBRICATING SPHERICAL GRAPHITE-BRONZE PLATES

FIG.: 2139 SPH

SECTION B 17-BIS







No.	⌀A (mm)	ØB (mm)	⌀C (mm)	H (mm)	MAX. REC. LOAD (Kg)
1 E	120	110	50	42	2250
2 E	150	140	75	45	5050
3 E	200	190	100	48	9000
4 E	230	220	120	52	12750
5 E	260	250	150	58	20000

N.B.:

- Maximum angling ±4° in all directions.
- On special request, this angling may be increased, but the dimensions may be affected.

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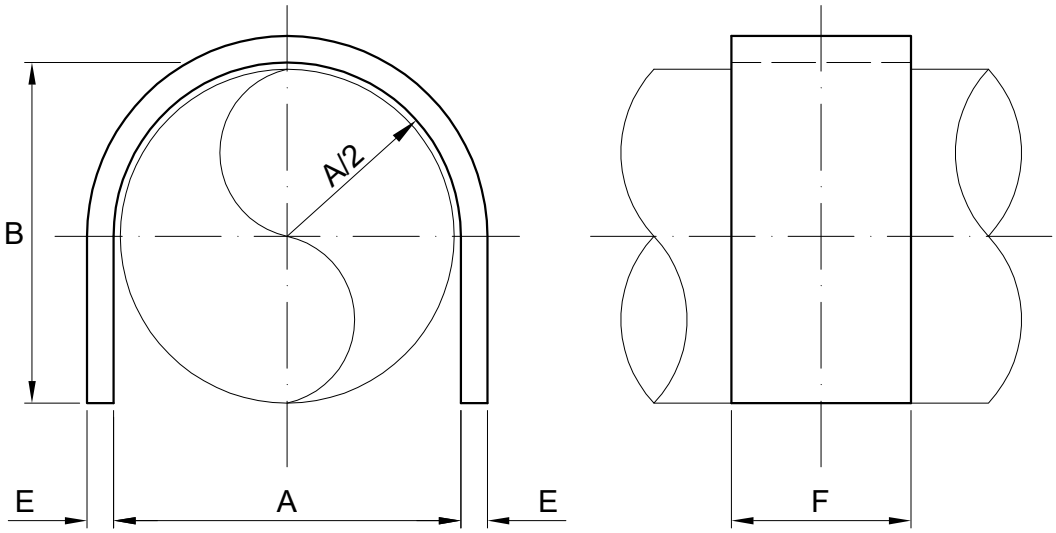
WELDED PIPE STRAP
DIAM. Ø ≤ 6"

FIG.: 2250

SECTION B
18



PIPE Ø	A (mm)	B (mm)	E (mm)	F (mm)	WEIGHT (Kg)	MAX. REC. LATERAL LOAD (Kg)
1/2"	23	23	6	30	0,1	150
3/4"	28	28	6	30	0,12	150
1"	35	35	6	40	0,2	200
1 1/4"	44	43	6	40	0,25	200
1 1/2"	50	49	8	50	0,45	250
2"	62	61	8	50	0,55	250
2 1/2"	75	74	8	50	0,7	250
3"	91	90	10	60	1,2	300
4"	117	116	10	60	1,5	300
5"	145	144	10	60	1,9	300
6"	172	171	12	70	3,1	375

APPLICATION: For guiding uninsulated pipes.

ORDER FORM:
- Name.
- Figure.
- Pipe diameter.

N.B.: - Can be manufactured in greater diameters (not recommended) by similar parts with side stiffeners.

- Vertical orientated loads are far greater than the lateral loads indicated (not less than 4 times that indicated).

- Tolerances at levels A and B $^{+1,5}_{-0}$

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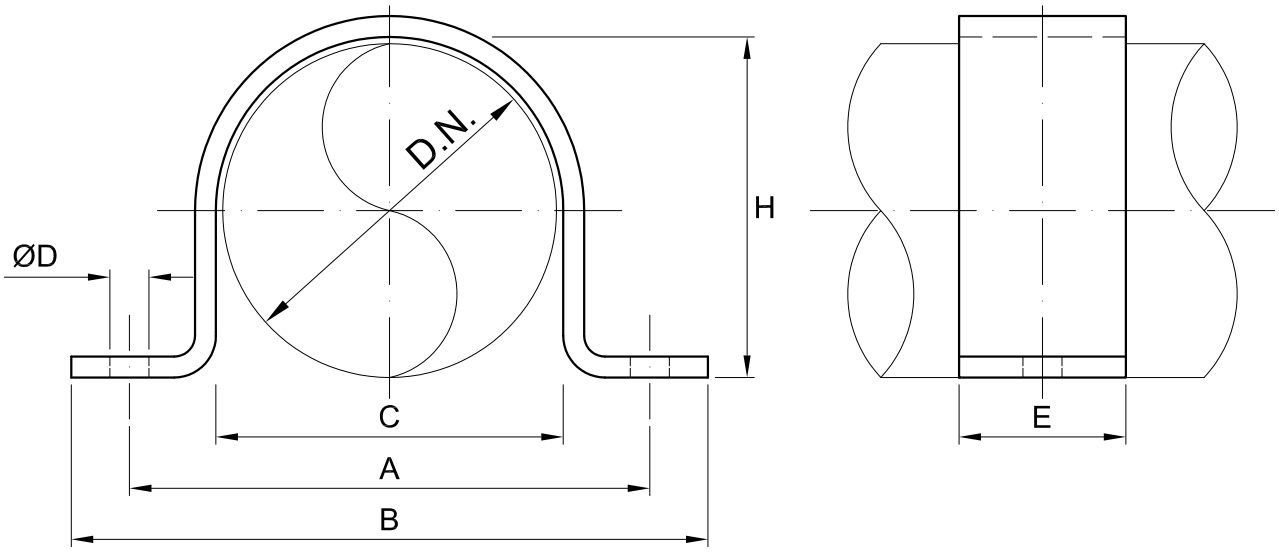
GUIDE CLAMP

FIG.: 2251

SECTION B 19



No.	D.N.	A (mm)	B (mm)	C (mm)	ØD (mm)	E (mm)	H (mm)	WEIGHT (Kg)
1	1/2"	70	110	25	11,5	30	23	0,18
2	3/4"	75	115	31	11,5	30	29	0,2
3	1"	85	135	38	11,5	35	35	0,28
3 a	1 1/4"	95	145	47	11,5	35	44	0,32
4	1 1/2"	110	170	53	13,5	60	50	0,65
5	2"	140	200	65	13,5	60	62	0,8
6	2 1/2"	155	215	77	13,5	60	75	0,9
7	3"	170	240	93	15,5	60	91	1
8	4"	196	266	118	15,5	60	116	1,6
8 a	5"	222	292	146	15,5	60	144	1,8
9	6"	250	320	174	15,5	60	171	2,1
10	8"	312	382	225	17,5	60	222	2,7
11	10"	375	445	279	17,5	80	276	5,3
12	12"	416	486	330	17,5	80	327	6,2
13	14"	460	530	362	19,5	80	359	8,5
14	16"	514	584	412	19,5	80	409	9,2
15	18"	565	635	463	19,5	80	460	10,5
16	20"	617	687	514	19,5	80	511	11,5

APPLICATION: For guiding the pipe in lines on the ground or on a structure.

MATERIAL: Carbon steel, alloy steel and stainless steel.

ORDER FORM:

- Name.
- Figure.
- Pipe diameter.

N.B.: Can be manufactured in other diameters, special or greater, than those indicated.

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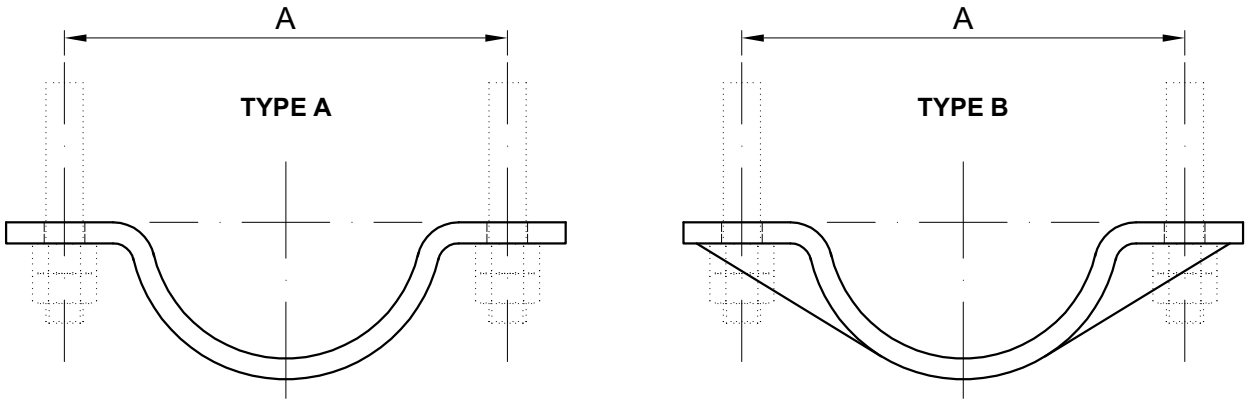
SEMI-CLAMP

FIG.: 2252

SECTION B
20



APPLICATION: hanging piping by hanger rods, coupled to the ends of the semi-clamp. Requires little space between the structure and the piping.

TYPES:
"TYPE A".- Semi-clamp with no stiffeners.
"TYPE B".- Semi-clamp with side stiffeners.

SELECTION METHOD: According to the illustration on the following page.
In this illustration, the required flatbar size is obtained in terms of the required load and the distance between the hanger rods (Level “A”). Selection is valid for carbon steel semi-clamps up to temperatures of 300ºC. The same coefficients and qualities as indicated on sheet A-20 will be used for high temperatures.

1º.- At the required load point, a horizontal is traced until it crosses with the vertical traced from the distance between axes (Level “A”) required. The intersection of these two straight lines will give the flatbar to be used.
In the event of this point falling between two flatbar values, the higher of the two is chosen.

2º.- A horizontal is traced through the previous intersection, until it crosses with the scale of hanger rods, at the intersection, giving the rod metric to use.

MATERIAL: Carbon steel, alloy steel and stainless steel.

ORDER FORM:
- Name.
- Figure.
- Pipe diameter.
- Distance between axes on the external bolts (level "A").
- Load.
- Operating temperature on the piping or pipe quality.

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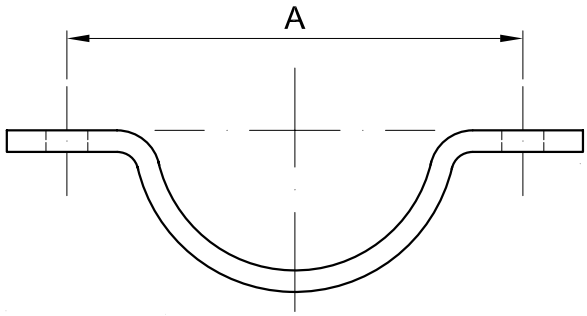
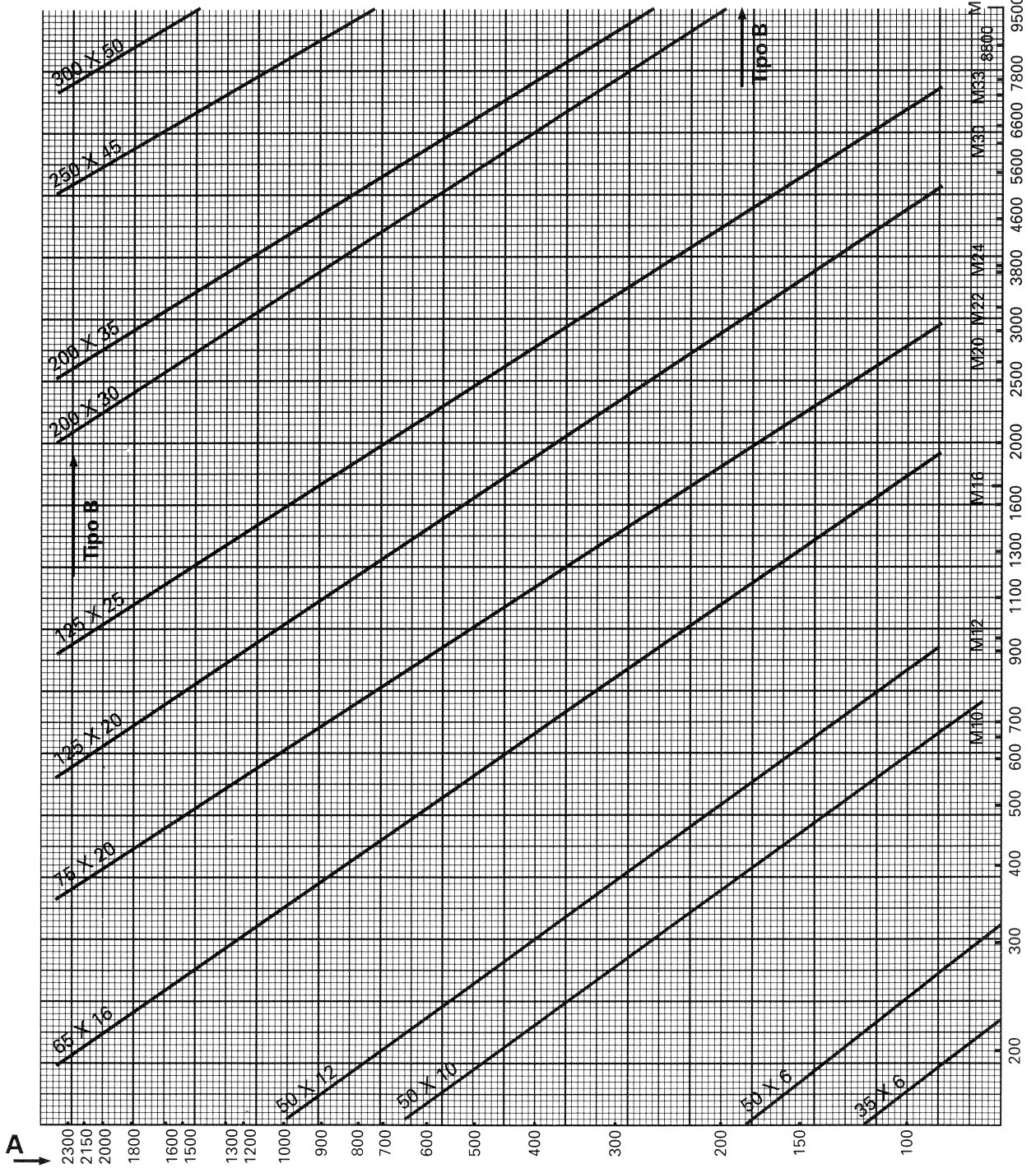
FIG. 2252 GRAPH II Rev.2

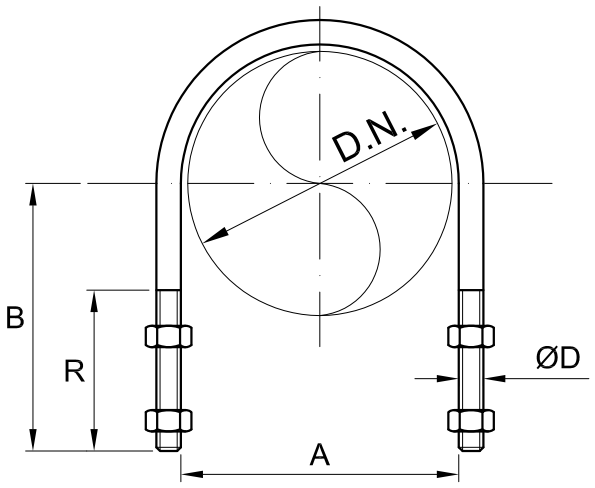




U-BOLT

FIG.: 2280

SECTION B 22



No.	D.N.	A (mm)	B (mm)	R (mm)	THREAD	WEIGHT (Kg)	MAX. REC. LOAD (Kg)
1	1/2"	24	40	35	M6	0,04	300
2	3/4"	29	45	40	M6	0,05	300
3	1"	36	50	40	M8	0,07	500
3 a	1 1/4"	45	50	40	M8	0,09	500
4	1 1/2"	51	55	45	M10	0,17	700
5	2"	64	70	55	M10	0,2	700
6	2 1/2"	76	80	65	M12	0,3	1000
7	3"	92	90	65	M12	0,4	1000
8	4"	118	115	75	M12	0,5	1000
8 a	5"	145	135	85	M12	0,7	1000
9	6"	172	155	95	M16	1,1	2200
10	8"	223	180	95	M16	1,5	2200
11	10"	277	215	100	M20	2,5	3500
12	12"	328	245	105	M24	4,2	5000
13	14"	360	260	105	M24	4,5	5000
14	16"	411	285	105	M24	5	5000
15	18"	462	320	120	M24	5,5	5000
16	20"	512	350	120	M24	6	5000
17	24"	614	400	120	M24	7	5000
18	30"	766	475	120	M24	8	5000

APPLICATION: securing piping to the structure by fitting four nuts. Valid for guiding uninsulated pipes, for low lateral loads (maximum 30% of the given vertical load).

MATERIAL: Carbon steel and stainless steel.

ORDER FORM:

- Name.
- Figure.
- Pipe diameter.

N.B.: Can be manufactured in dimensions other than those indicated.

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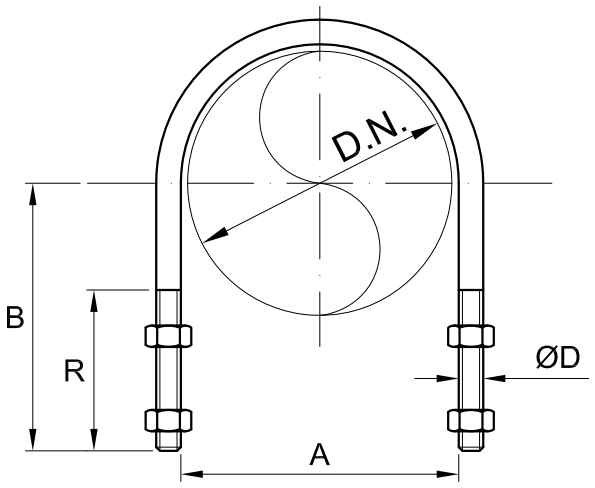
LIGHT U-BOLT

FIG.: 2281

SECTION B 23



No.	D.N.	A (mm)	B (mm)	R (mm)	THREAD	WEIGHT (Kg)	MAX. REC. LOAD (Kg)
1	1/2"	23	25	17	M6	0,03	250
2	3/4"	28	30	19	M6	0,03	250
3	1"	35	39	24	M6	0,04	250
3 a	1 1/4"	43	44	24	M6	0,05	250
4	1 1/2"	51	48	26	M8	0,08	350
5	2"	63	53	26	M8	0,09	350
6	2 1/2"	75	71	35	M10	0,18	550
7	3"	91	76	35	M10	0,20	550
8	4"	117	88	35	M10	0,24	550
8 a	5"	144	105	40	M10	0,28	550
9	6"	171	119	40	M10	0,31	550
10	8"	223	144	40	M10	0,38	550
11	10"	276	171	40	M10	0,45	550
12	12"	327	204	50	M12	0,75	1050
13	14"	360	219	50	M12	0,80	1050
14	16"	411	254	60	M12	0,90	1050
15	18"	460	286	70	M16	1,9	1150
16	20"	513	314	70	M16	2,1	1150

APPLICATION: Securing piping to the structure by fitting four nuts.

MATERIAL: Carbon steel and stainless steel

ORDER FORM:

- Name.
- Figure.
- Pipe diameter.

N.B.: Can be manufactured in dimensions other than those indicated.

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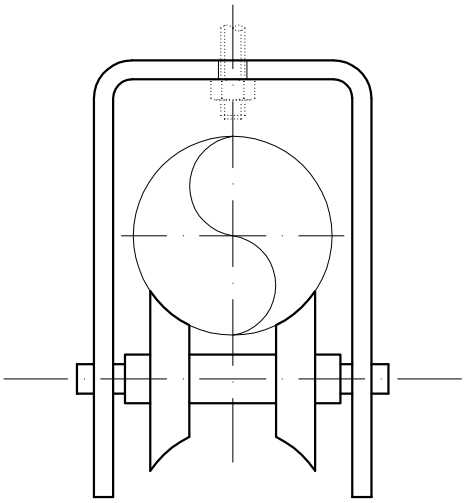
ROLLERS

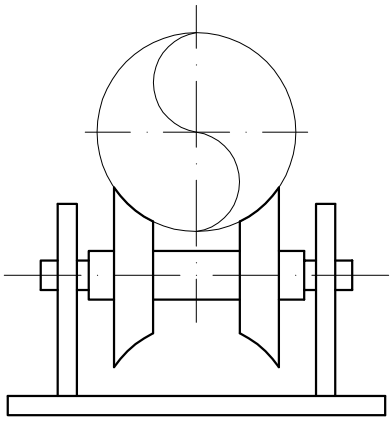
FIG.: 2297

SECTION B
24

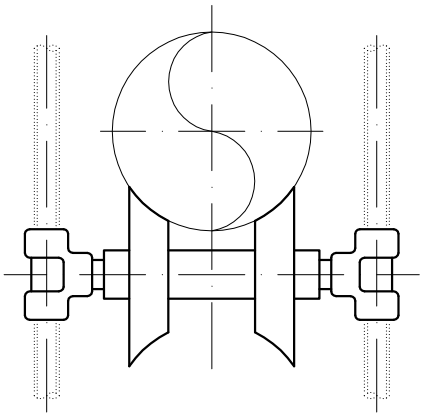
TYPE A
(For hanging with a single rod)



TYPE B
(For supporting on the floor)

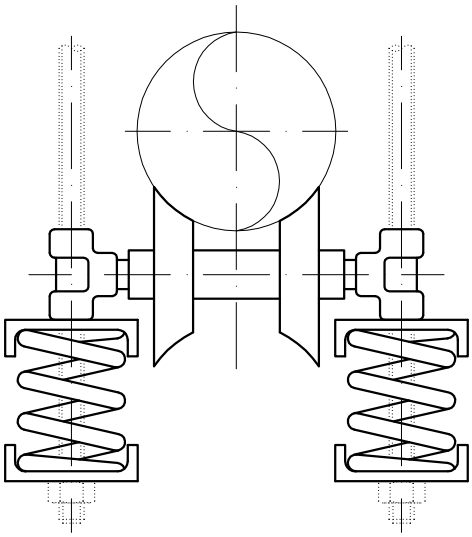


TYPE C
(For hanging with two rods)



TYPE D
(For hanging with springs)

No.	1	2	3
LOAD (Kg)	400	1300	3000



APPLICATION: To allow for axial movements due to thermal dilation of the pipe.

ORDER FORM:
- Name.
- Figure.
- Type.
- Load.
- Pipe diameter.

N.B.: Having received the data on the required roller, the most suitable will be manufactured for the dimensions and loads requested by the client.

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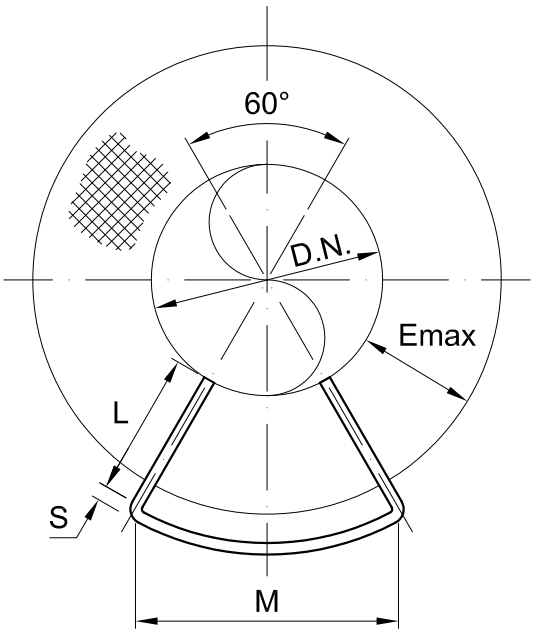
SADDLES

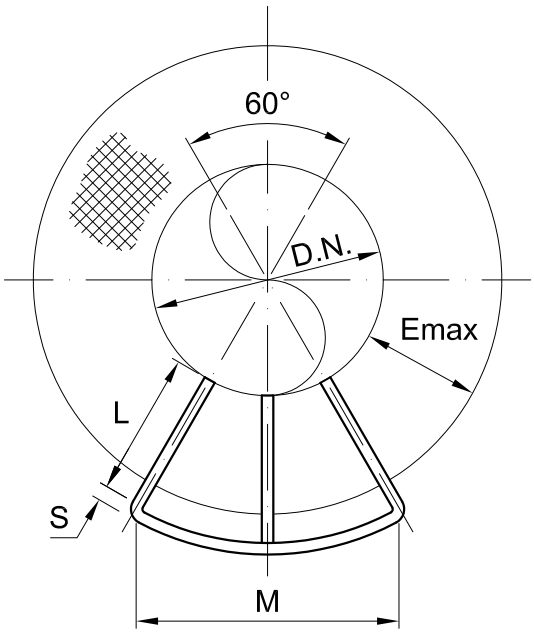
FIG.: 2300 TO 2310

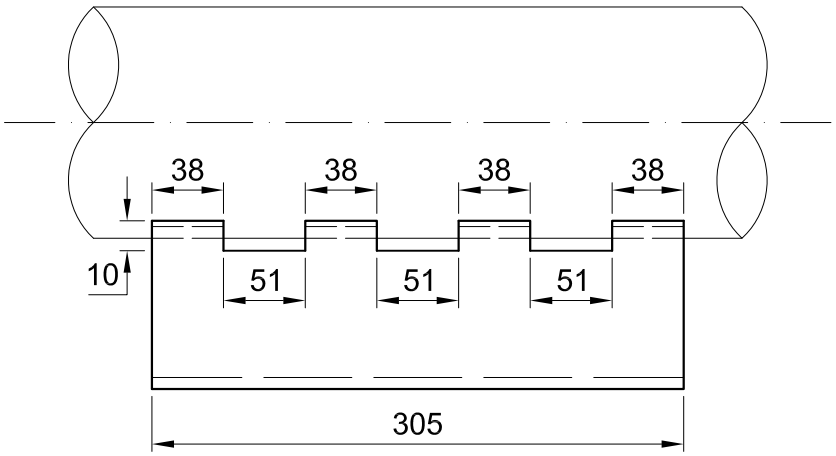
SECTION B 25

NORMAL SADDLE



WIDE SADDLE





APPLICATION: For supporting piping with insulation.

ORDER FORM:

- Name.
- Figure.
- Pipe diameter.

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FIG. 2300 -NORMAL SADDLE - 25 mm. INSULATION

No.	D.N.	Emax. (mm)	L (mm)	M (mm)	S (mm)	MAX. REC. LOAD (Kg)
1	3/4"	25	26	40	4	525
2	1"	25	28	45	4	525
3	1 1/2"	25	28	53	4	525
4	2"	25	28	59	4	525
5	2 1/2"	25	28	66	5	525
6	3"	25	28	75	5	525
7	4"	25	28	86	6	800
8	6"	25	32	117	6	800

FIG. 2301 - NORMAL SADDLE - 40 mm. INSULATION

No.	D.N.	Emax. (mm)	L (mm)	M (mm)	S (mm)	MAX. REC. LOAD (Kg)
1	3/4"	40	41	55	4	525
2	1"	40	43	60	4	525
3	1 1/2"	40	43	68	4	525
4	2"	40	43	74	4	525
5	2 1/2"	40	43	81	6	525
6	3"	40	43	90	6	800
7	4"	40	43	101	6	800
8	6"	40	43	128	6	800
9	8"	40	44	154	6	800

FIG. 2302 - WIDE SADDLE - 40 mm. INSULATION

No.	D.N.	Emax. (mm)	L (mm)	M (mm)	S (mm)	MAX. REC. LOAD (Kg)
1	10"	40	45	182	10	800
2	12"	40	50	213	10	2250
3	14"	40	45	223	12	2250
4	16"	40	50	254	12	2250
5	18"	40	46	269	12	2250
6	20"	40	46	301	15	3250
7	24"	40	46	351	15	3250
8	30"	40	46	426	15	3250
9	36"	40	46	503	15	3250

FIG. 2303 - NORMAL SADDLE - 50 mm. INSULATION

No.	D.N.	Emax. (mm)	L (mm)	M (mm)	S (mm)	MAX. REC. LOAD (Kg)
1	3/4"	50	51	65	4	525
2	1"	50	53	70	4	525
3	1 1/2"	50	53	78	5	800
4	2"	50	53	84	6	800
5	2 1/2"	50	53	91	6	800
6	3"	50	55	100	6	800
7	4"	50	55	114	6	800
8	6"	50	57	142	6	800
9	8"	50	54	164	8	800

FIG. 2304 - WIDE SADDLE - 50 mm. INSULATION

No.	D.N.	Emax. (mm)	L (mm)	M (mm)	S (mm)	MAX. REC. LOAD (Kg)
1	10"	50	55	192	10	2250
2	12"	50	60	223	10	2250
3	14"	50	55	233	12	2250
4	16"	50	60	264	12	2250
5	18"	50	51	276	15	3250
6	20"	50	56	311	15	3250
7	24"	50	56	361	15	3250
8	30"	50	56	436	15	3250
9	36"	50	56	513	20	3250

SADDLES

FIG.: 2305 TO 2310

SECTION B 27

FIG. 2305 - NORMAL SADDLE - 65 mm. INSULATION

No.	D.N.	Emax. (mm)	L (mm)	M (mm)	S (mm)	MAX. REC. LOAD (Kg)
1	1 1/2"	65	68	93	5	800
2	2"	65	68	99	5	800
3	2 1/2"	65	68	106	6	800
4	3"	65	68	113	6	800
5	4"	65	68	126	6	800
6	6"	65	70	157	8	800
7	8"	65	70	179	8	800

FIG. 2306 - WIDE SADDLE - 65 mm. INSULATION

No.	D.N.	Emax. (mm)	L (mm)	M (mm)	S (mm)	MAX. REC. LOAD (Kg)
1	10"	65	70	207	12	2250
2	12"	65	76	239	12	2250
3	14"	65	71	250	12	2250
4	16"	65	71	276	15	3250
5	18"	65	66	291	15	3250
6	20"	65	71	326	15	3250
7	24"	65	71	376	15	3250
8	30"	65	71	451	20	3250
9	36"	65	71	528	20	3250

FIG. 2307 - NORMAL SADDLE - 75 mm. INSULATION

No.	D.N.	Emax. (mm)	L (mm)	M (mm)	S (mm)	MAX. REC. LOAD (Kg)
1	2"	75	78	109	5	800
2	2 1/2"	75	78	116	5	800
3	3"	75	80	125	5	800
4	4"	75	78	136	6	800
5	6"	75	82	167	8	800
6	8"	75	79	189	8	800

FIG. 2308 - WIDE SADDLE - 75 mm. INSULATION

No.	D.N.	Emax. (mm)	L (mm)	M (mm)	S (mm)	MAX. REC. LOAD (Kg)
1	10"	75	81	218	12	2250
2	12"	75	86	249	12	2250
3	14"	75	80	258	12	2250
4	16"	75	82	286	15	3250
5	18"	75	76	301	15	3250
6	20"	75	81	336	15	3250
7	24"	75	81	386	20	3250
8	30"	75	81	461	20	3250
9	36"	75	81	538	20	3250

FIG. 2309 - NORMAL SADDLE - 100 mm. INSULATION

No.	D.N.	Emax. (mm)	L (mm)	M (mm)	S (mm)	MAX. REC. LOAD (Kg)
1	4"	100	103	161	8	800
2	6"	100	108	193	8	800
3	8"	100	104	214	8	800

FIG. 2310 - WIDE SADDLE - 100 mm. INSULATION

No.	D.N.	Emax. (mm)	L (mm)	M (mm)	S (mm)	MAX. REC. LOAD (Kg)
1	10"	100	106	243	12	2250
2	12"	100	111	274	12	2250
3	14"	100	102	280	15	3250
4	16"	100	107	311	20	3250
5	18"	100	101	326	20	3250
6	20"	100	106	361	20	3250
7	24"	100	106	411	20	3250
8	30"	100	106	486	20	3250
9	36"	100	106	563	20	3250

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0	21/09/81	INFORMATION	JRS	EAR

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SECTION C

CRYOGENIC AND THERMAL SUPPORTS

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0	21/06/14	GENERAL REVISION	DDG	EAR	
REV.	DATE	EDITED FOR :	DRAW.	REV.	

CONTENTS

PREINSULATED SUPPORTS: THERMAL, COLD & CRYOGENIC SUPPORTS

Preinsulated supports use high density, mechanically capable, insulation materials between the pipe and the steel clamp or shoe in order to bear the load and movement of the pipe while ensuring the following additional benefits compared to conventional supports:

- Minimize thermal losses from the piping system to the outside environment through the pipe support
- Avoid the formation of ice blocks or condensation around the support in cryogenic or cold service
- Guarantee personal protection around hot or cold pipelines
- Make it technically and economically viable to support very high temperature pipelines which use very special steel grades

In order to be able to provide these solutions to our clients, at PIHASA we have established alliances with several partners that provide us with access to the most innovative and efficient materials that can be used for the fabrication and supply of preinsulated supports for hot and cold service:

- High density molded polyurethane foam (“PUF”), which is currently the most commonly used insulation material for pipe supports in cold and cryogenic pipelines, with a service temperature range from -196ºC up to +100ºC
- Cellular glass, very convenient for dual-operation pipelines due to its wide temperature range, from -260ºC to +430ºC
- Densified hardwood for cold and cryogenic service, which is commonly used as a high-density insulation material for stops and anchors
- Calcium silicate and other inorganic composite materials with a very wide range of densities and temperature ranges, up to +1000ºC

It must be taken into consideration that all these insulation materials display their best mechanical properties when working under compression, so the support designs must ensure that load is transferred to the insulation material in such manner. As a result, there are three main types of preinsulated supports:

a) Simple or guided supports, where the pipe is surrounded by insulation material, which is clamped by the steel support, which rests on the supporting structure or is hanged from it. When lateral loads are significant, double, triple or quadruple clamp bases are used, so that loads on insulation materials work under compression.

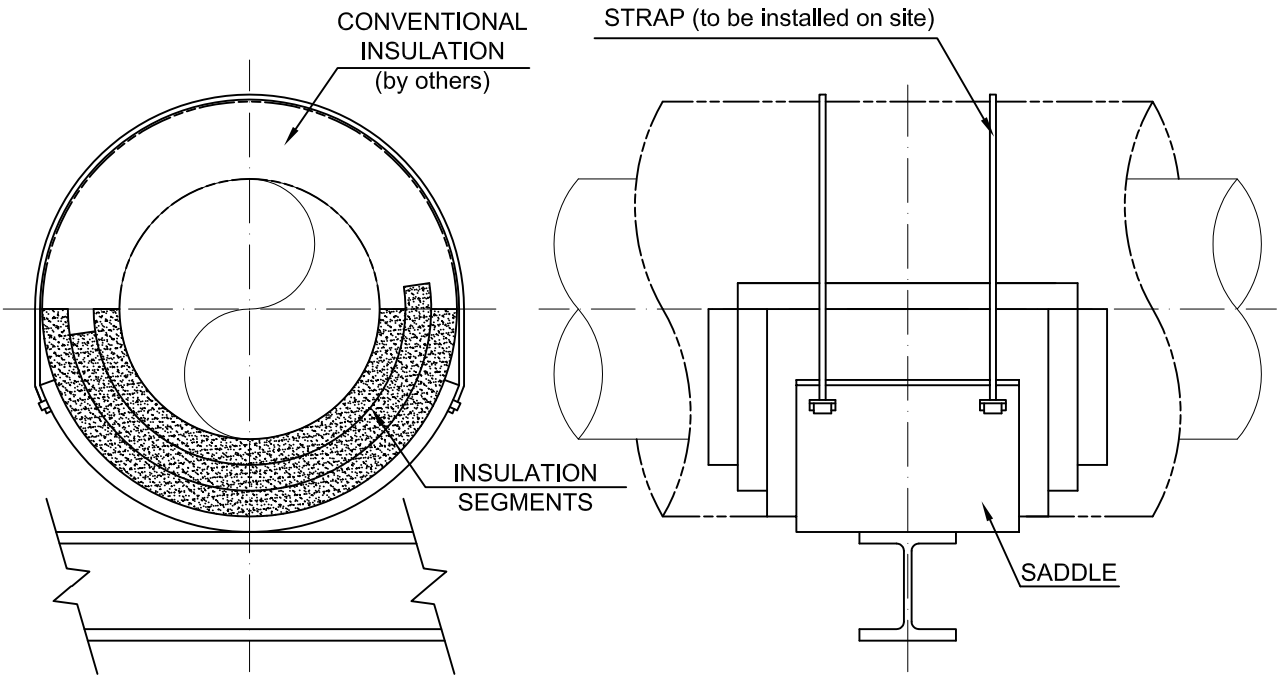
b) Axial stops, where the pipe is welded with a center thrust ring that becomes embedded into the insulation materials, and the clamps bear end thrust rings that ensure that the axial load becomes a compression load when transferred to the steel support.

c) “Sandwich” type supports, which are very typical for supporting trunnions, elbows, ladders or equipment, or even as lower insulation materials for clamp bases. These are square, rectangular or circular sized blocks with countersunk drills or insulation washers that ensure that there is no thermal bridge through the bolts that connect both ends of the sandwich .

PREINSULATED SADDLE

FIG.: 5000

SECTION C
2



FRONT VIEW

LATERAL VIEW

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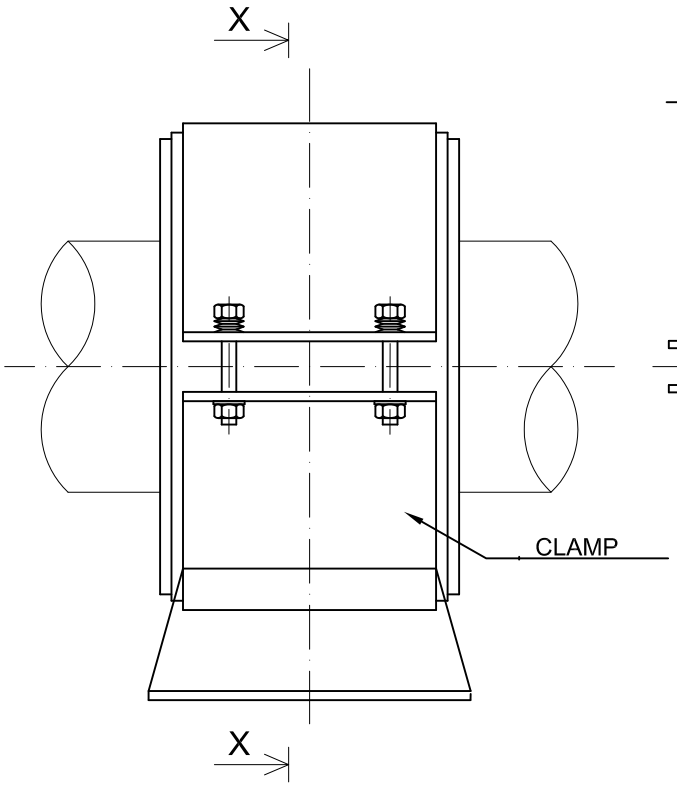
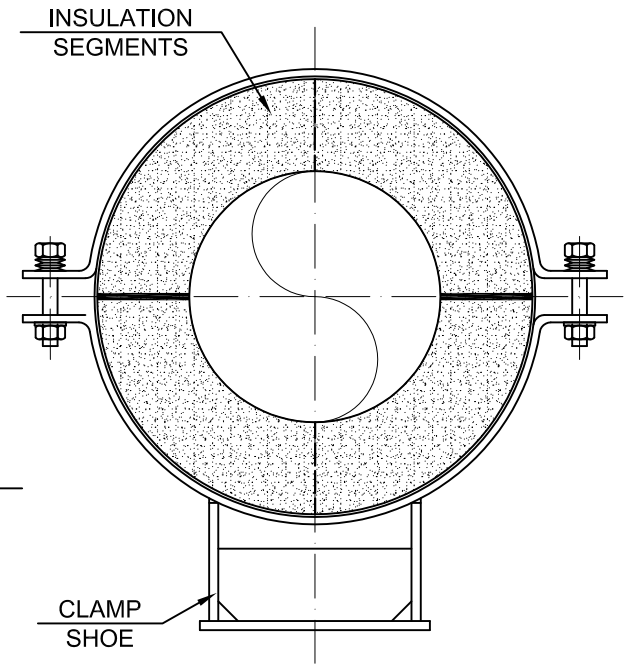
PREINSULATED CLAMP BASE	FIG.: 5100	SECTION C 3



LATERAL VIEW



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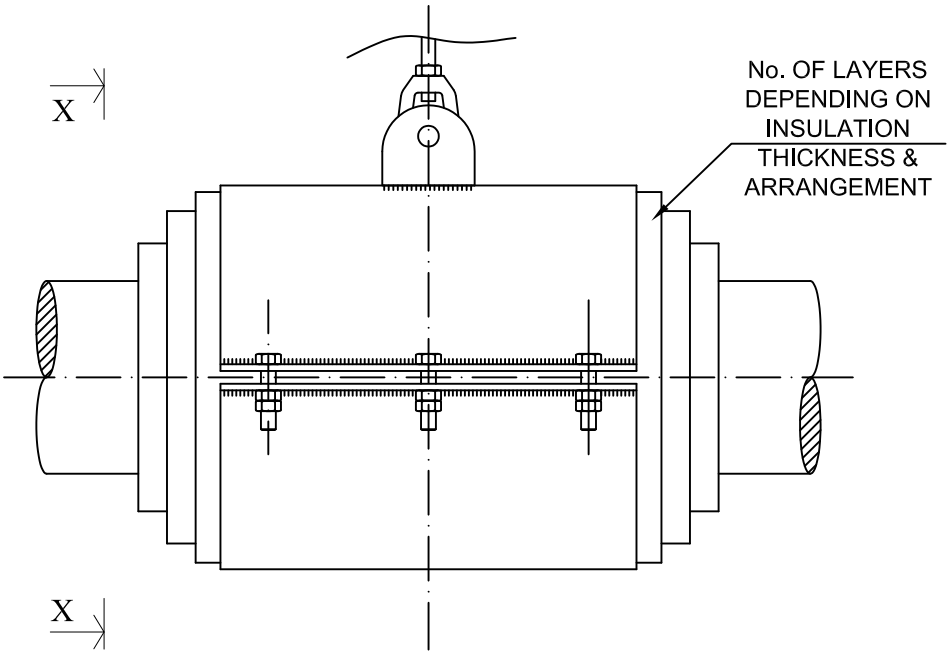
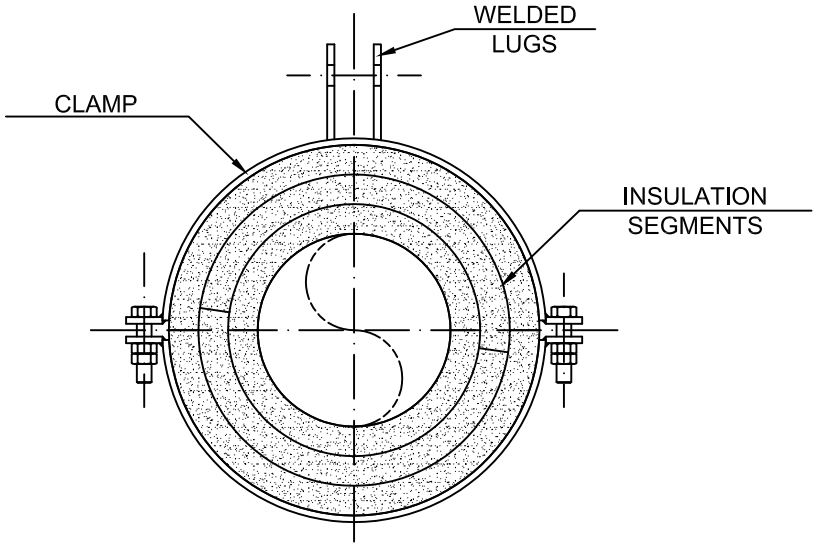
PREINSULATED CLAMP FOR HANGER

FIG.: 5200

SECTION C 4



LATERAL VIEW



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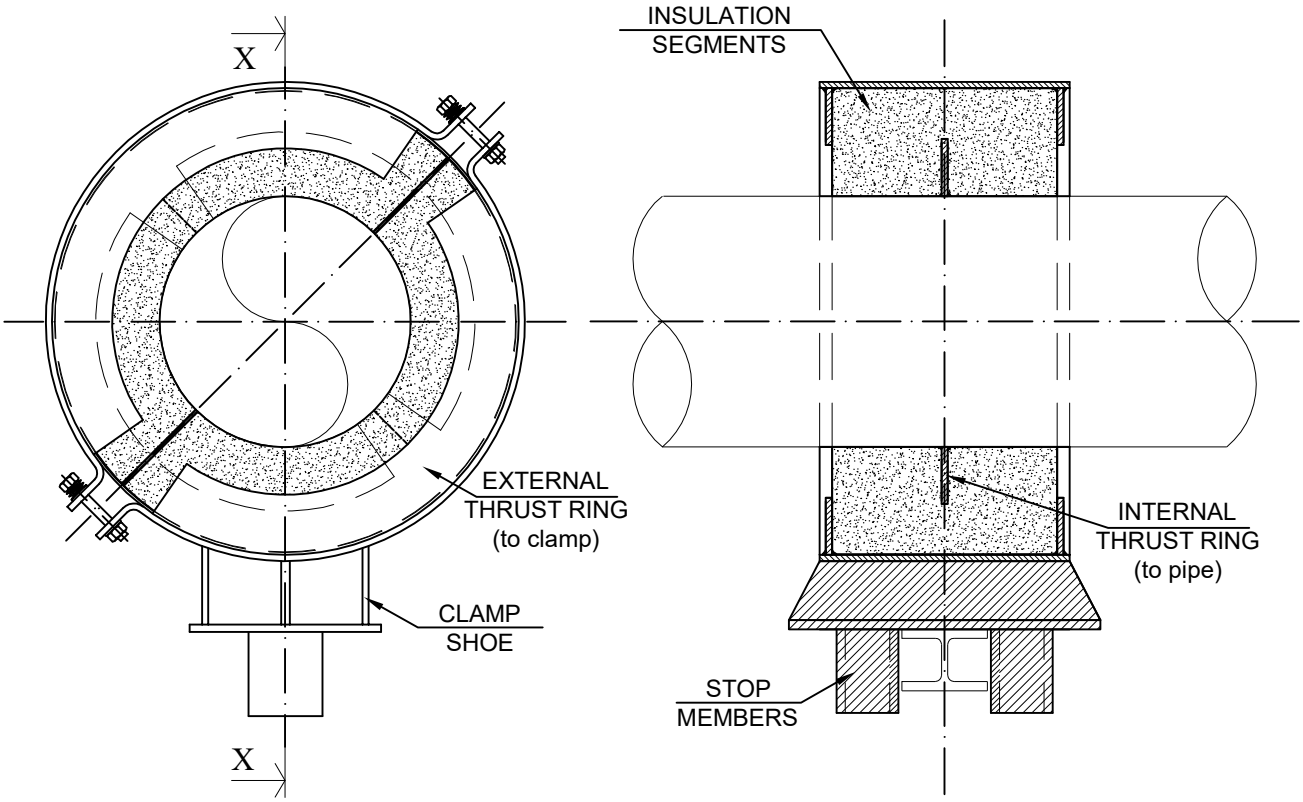
PREINSULATED AXIAL STOP

FIG.: 5300

SECTION C
5



FRONT VIEW

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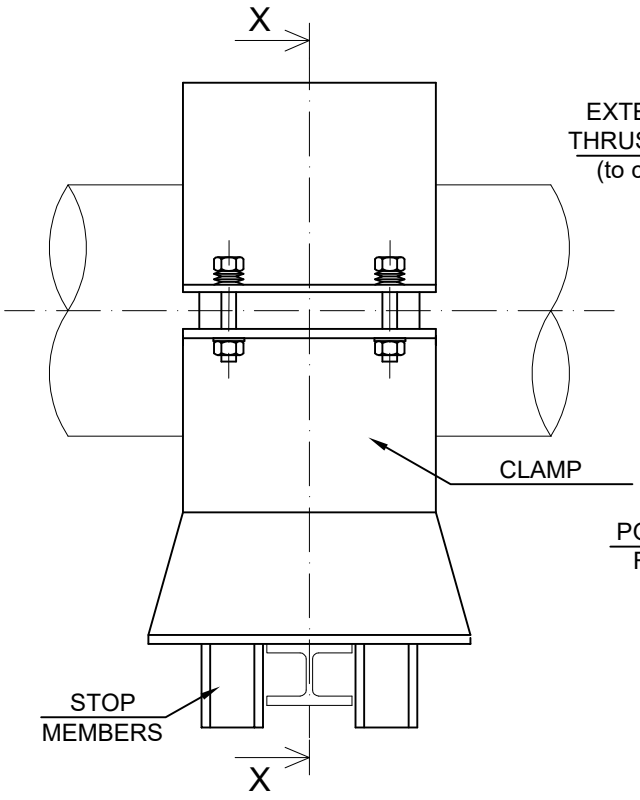
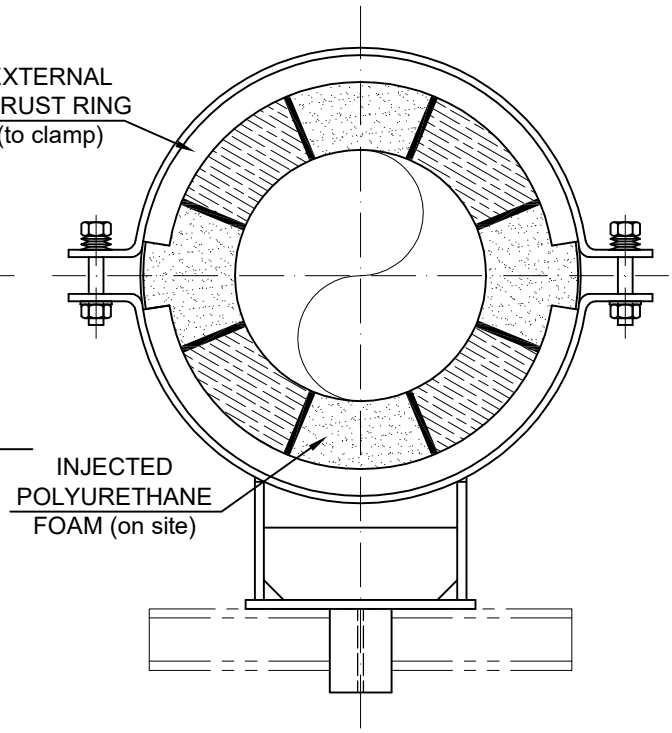
HIGH STRENGTH AXIAL STOP

FIG.: 5400

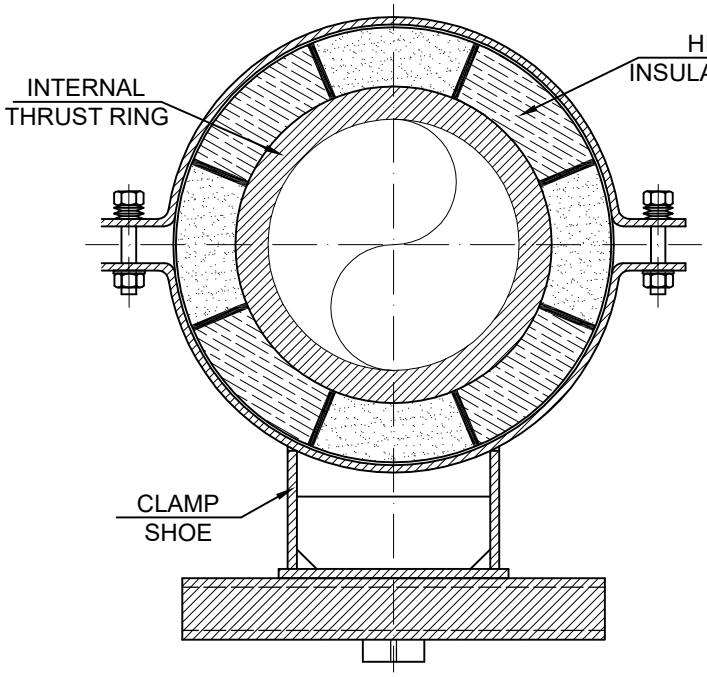
SECTION C
6



LATERAL VIEW



FRONT VIEW



* DENSIFIED WOOD OR INORGANIC COMPOSITE MATERIALS

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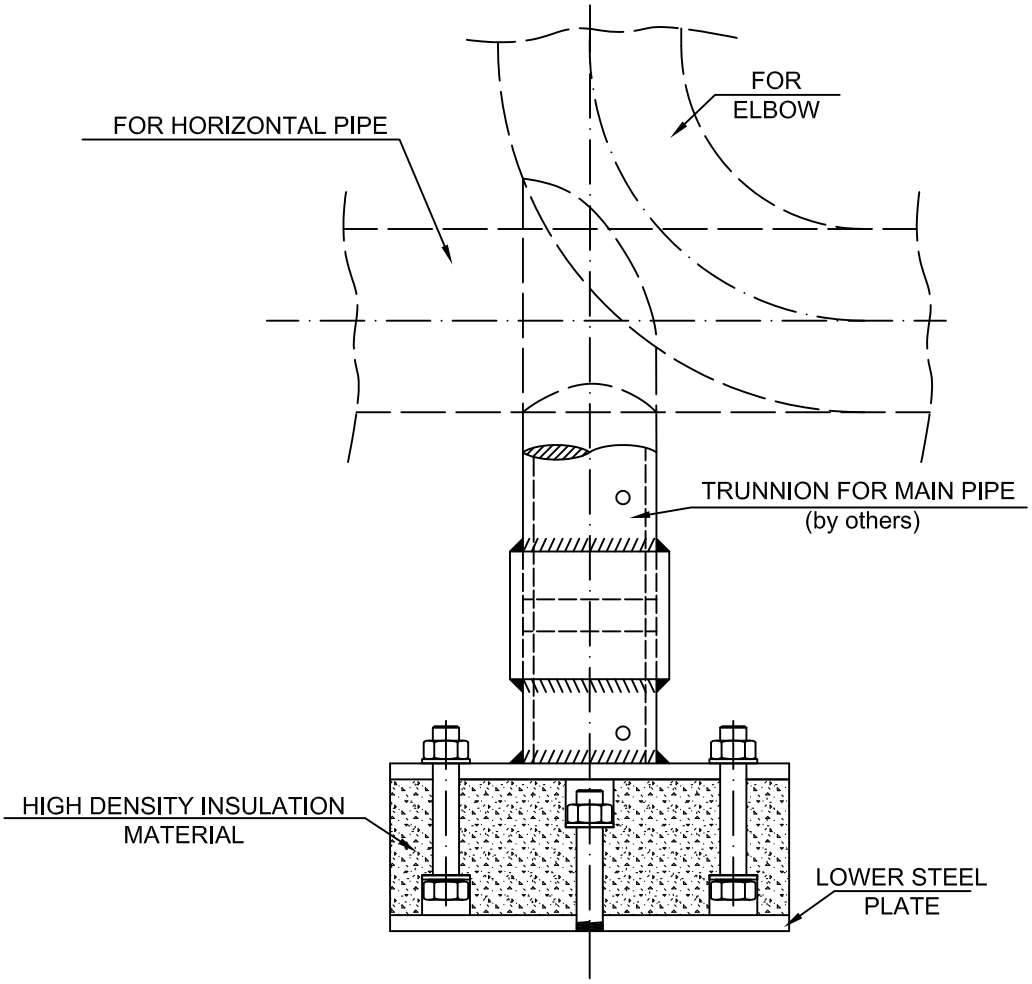
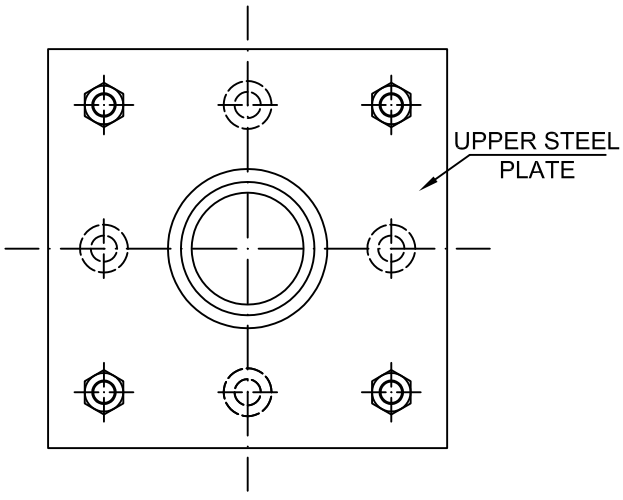
PREINSULATED "SANDWICH" FOR TRUNNION	FIG.: 5500	SECTION C 7

FRONT VIEW



PLANT VIEW



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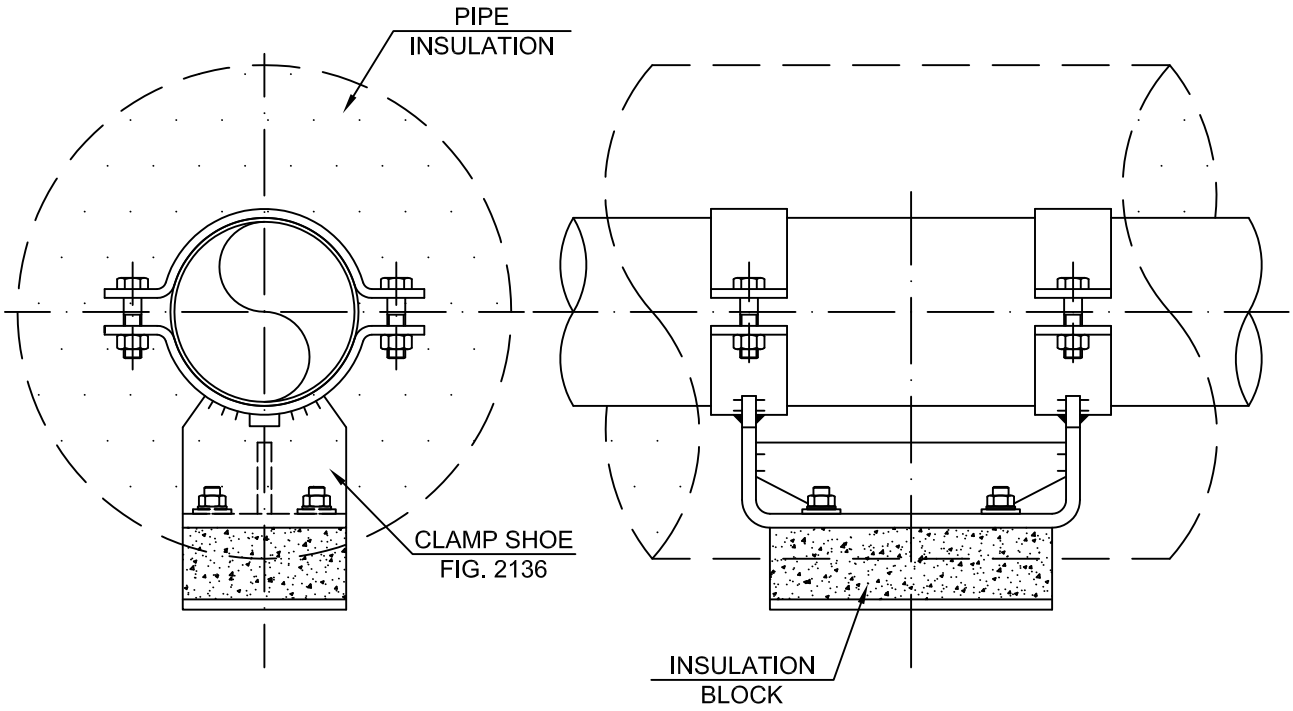
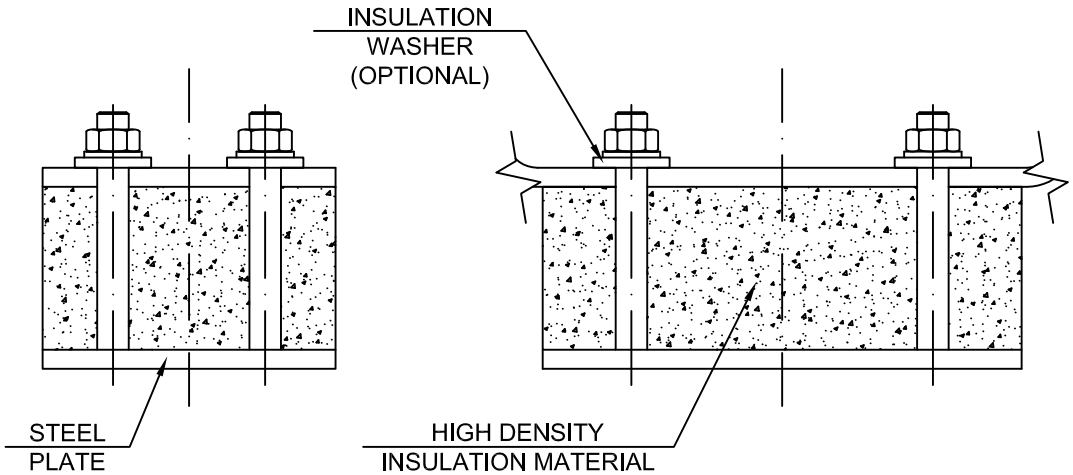
CLAMP BASE WITH INSULATION BLOCK

FIG.: 5600

SECTION C 8



INSULATION BLOCK DETAILS



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SECTION D

VARIABLE LOAD SPRING SUPPORTS

VARIABLE LOAD SPRINGS

SPRING SWAY BRACES (APV)

SMALL SPRINGS

SPRING ANTI-VIBRATING CLAMPS

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VARIABLE LOAD SPRING SUPPORTS

Variable load spring supports are installed in a piping system when relatively small (up to 80 mm) vertical movements need to be absorbed. They are generally related to thermal expansions or contractions. The springs always work under compression.

They are made up of a helical spring, inserted into a cylindrical housing with a welded or bolted down construction. Riveted to the support is a scaleplate indicating the model, type, size, loads and movement.

Springs are classified according to the MODEL-SIZE-TYPE combination.

MODEL

There are four models: CVC, CV, CVL and CVLL. They support the same loads, but they are differentiated by the vertical travels that they accept.

In order to select the suitable model, it should be taken into account that the variation in load from the cold position of the spring to the hot position must be equal to or less than 25%. This value is accepted by the majority of the national and international standards, but however, it is the project engineer who should set this variability or an even lower threshold, conducting an individualized study for each specific case.

According to this latter criterion, the result is approximately as follows:

- MODEL CVC → $\Delta y \leq 12$ mm.
- MODEL CV → 12 mm < $\Delta y \leq 25$ mm.
- MODEL CVL → 25 mm < $\Delta y \leq 50$ mm.
- MODEL CVLL → 50 mm < $\Delta y \leq 80$ mm.

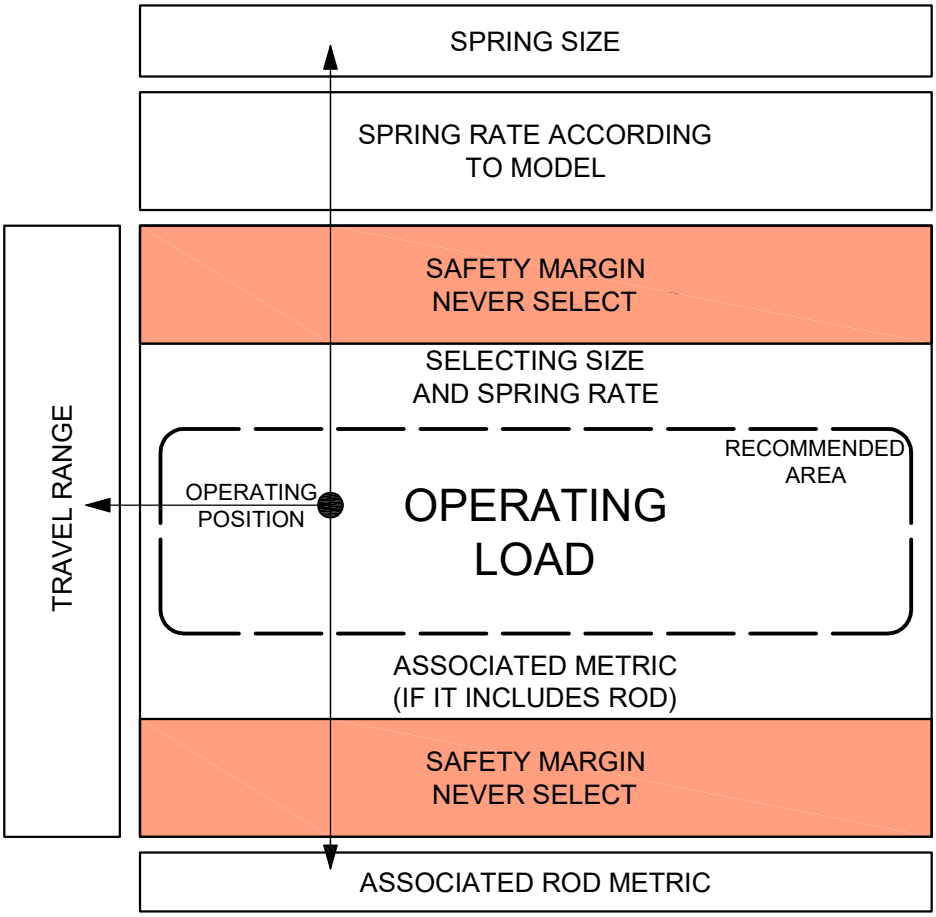
Where Δy is vertical movement.

$$(*)\ \text{Variability} = \frac{\text{ABS (CL - HL)}}{\text{HL}}$$

Where ABS (CL - HL) is the absolute value resulting from deducting the cold load (CL) from the hot load (HL).

SIZE

Spring size is indicated by a number, from 1 to 21, and determines the load range that the spring can support. This is selected using the loads table and in terms of the characteristics of the variable load supports (page 19). In this table, there are two zones (upper and lower) indicated as “safety margins”. These zones should never be considered as operating positions. The selection criterion is as follows: depending on the specified operating load (also known as “hot load”), a load is chosen from the table, either equal to or greater than the required load. It is recommended to select a load in the central zone of the table, so that the operating position of the spring is as centred as possible on the total travel of the spring (life span will be greater and there will be more margin for readjusting the load or for absorbing variations in the design). It can be noted that, depending on the model of the spring, the total travel varies, the CVLL model being the one that accepts a longer travel, as indicated in the section MODEL. This is related to the spring rate (kg/mm), a value indicated below the size of the spring. The greater the movements, the lower the value of the spring rate.



VARIABLE LOAD SPRING SUPPORTS

OPERATING LOAD TABLE AND CHARACTERISTICS OF THE VARIABLE LOAD SPRING SUPPORTS

MOD.	CORRESPONDING TYPE	CVC	CV	CVL	CVLL
	A	A	A	A	A
	B	B	B	B	B
	C	C	C	C	C
	D	D	D	D	D
	E	E	E	E	E
	F	F	F	F	F
	G*	G*	G*	G*	G*
	H	H	H	H	H

MODEL		SUPPORT SIZE																				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
		SPRING RATE IN Kg/mm																				
CVC	A	0,75	1	1,25	1,75	2,3	3	4	5,5	7,25	9,5	12,5	16,5	22	29	39	52	70	94	125	170	250
CV	B	0,375	0,5	0,625	0,875	1,15	1,5	2	2,75	3,625	4,75	6,25	8,25	11	14,5	19,5	26	35	47	62,5	85	125
CVL	C	0,188	0,25	0,313	0,438	0,575	0,75	1	1,375	1,813	2,375	3,125	4,125	5,5	7,25	9,75	13	17,5	23,5	31,25	42,5	62,5
CVLL	D	0,125	0,167	0,208	0,292	0,383	0,5	0,667	0,917	1,208	1,583	2,083	2,75	3,667	4,833	6,5	8,667	11,67	15,67	20,83	28,33	41,67
	E	15	20	25	35	46	60	80	110	145	190	250	330	440	580	780	1040	1400	1880	2500	3400	3750
	F	17	23	28	39	52	68	90	124	163	214	281	371	495	652	878	1170	1575	2115	2812	3825	4375
	G*	19	25	31	44	58	75	100	138	181	238	313	413	550	725	975	1300	1750	2350	3125	4250	5000
	H	21	28	34	48	63	83	110	151	200	261	344	454	605	797	1072	1430	1925	2585	3437	4675	5625
		23	30	38	53	69	90	120	165	218	285	375	495	660	870	1170	1560	2100	2820	3750	5100	6250
		24	33	41	57	75	98	130	179	236	309	406	536	715	942	1267	1690	2275	3055	4062	5525	6875
		26	35	44	61	81	105	140	193	254	333	438	578	770	1015	1365	1820	2450	3290	4375	5950	7500
		28	38	47	66	86	113	150	206	272	356	469	619	825	1087	1462	1950	2625	3525	4687	6375	8125
		30	40	50	70	92	120	160	220	290	380	500	660	880	1160	1560	2080	2800	3760	5000	6800	8750
		32	43	53	74	98	128	170	234	308	404	531	701	935	1232	1657	2210	2975	3995	5312	7225	9375
		34	45	56	79	103	135	180	248	326	428	562	742	990	1305	1755	2340	3150	4230	5625	7650	10000
		36	48	59	83	109	143	190	261	345	451	593	784	1045	1377	1852	2470	3325	4465	5937	8075	10625
		38	50	62	88	115	150	200	275	363	475	625	825	1100	1450	1950	2600	3500	4700	6250	8500	11250
		39	53	66	92	121	158	210	289	381	499	656	866	1155	1522	2047	2730	3675	4935	6562	8925	11875
		41	55	69	96	127	165	220	303	399	523	687	908	1210	1595	2145	2860	3850	5170	6875	9350	12500
		43	58	72	100	132	173	230	316	417	547	719	949	1265	1667	2242	2990	4025	5405	7187	9775	13125
		45	60	75	105	138	180	240	330	435	570	750	990	1320	1740	2340	3120	4200	5640	7500	10200	13750
		47	63	78	109	144	188	250	344	453	594	781	1030	1375	1812	2437	3250	4375	5875	7812	10620	14375
		49	65	81	114	150	195	260	358	471	618	813	1070	1430	1885	2535	3380	4550	6110	8125	11050	15000
		51	68	84	118	155	203	270	371	490	641	844	1113	1485	1957	2632	3510	4725	6345	8437	11470	15625
		53	70	88	123	161	210	280	385	508	665	875	1155	1540	2030	2730	3640	4900	6580	8750	11900	16250
		54	73	91	127	167	218	290	399	526	689	906	1196	1595	2102	2827	3770	5075	6815	9062	12325	16875
		56	75	94	131	173	225	300	413	544	713	938	1237	1650	2175	2925	3900	5250	7050	9375	12750	17500

* Please, Note that G-type is double and the information data shown below corresponds to each one. The maximun size for a G-type will be 20.

SAFETY MARGIN	TOTAL TRAVEL AND LOAD OF EACH SUPPORT				SAFETY MARGIN
	CVC	CV	CVL	CVLL	
0	0	0	0	0	
2,5	5	10	15		
5	10	20	30		
7,5	15	30	45		
10	20	40	60		
12,5	25	50	75		
15	30	60	90		
17,5	35	70	105		
20	40	80	120		
22,5	45	90	135		
25	50	100	150		
27,5	55	110	165		
30	60	120	180		
32,5	65	130	195		
35	70	140	210		
37,5	75	150	225		
40	80	160	240		
42,5	85	170	255		
45	90	180	270		

CVC	CV	CVL	CVLL	SUPPORT SIZE - LOADS IN Kg.																		
MODEL				M-12				M-16			M-20			M-24			M-30			M-36			M-42	M-48	M-56	M-64
ROD SIZE				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

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VARIABLE LOAD SPRING SUPPORTS

SECTION D
3-BIS

OPERATING LOAD TABLE AND CHARACTERISTICS OF THE VARIABLE LOAD SPRING SUPPORTS

MODEL	SUPPORT SIZE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
		SPRING RATE IN N/mm																				
CVC	A	7,36	9,81	12,26	17,16	22,56	29,42	39,23	53,94	71,10	93,17	122,6	161,8	215,8	284,4	382,5	510,0	686,5	921,9	1226	1667	2452
CV	B	3,68	4,90	6,13	8,58	11,28	14,71	19,61	26,97	35,55	46,58	61,29	80,91	107,9	142,2	191,2	255,0	343,3	461,0	613,0	833,6	1226
CVL	C	1,84	2,45	3,07	4,30	5,64	7,36	9,81	13,48	17,78	23,30	30,65	40,45	53,94	71,10	95,62	127,5	171,6	230,5	306,5	416,8	612,9
CVLL	D	1,23	1,64	2,04	2,86	3,76	4,90	6,54	8,99	11,85	15,52	20,43	26,97	35,96	47,40	63,75	85,01	114,5	153,7	204,3	277,8	408,7
	E	0,15	0,20	0,25	0,34	0,45	0,59	0,78	1,08	1,42	1,86	2,45	3,24	4,32	5,69	7,65	10,20	13,73	18,44	24,52	33,34	36,78
	F	0,17	0,23	0,27	0,38	0,51	0,67	0,88	1,22	1,60	2,10	2,76	3,64	4,85	6,39	8,61	11,47	15,45	20,74	27,58	37,51	42,91
	G*	0,19	0,25	0,30	0,43	0,57	0,74	0,98	1,35	1,78	2,33	3,07	4,05	5,39	7,11	9,56	12,75	17,16	23,05	30,65	41,68	49,04
	H	0,21	0,27	0,33	0,47	0,62	0,81	1,08	1,48	1,96	2,56	3,37	4,45	5,93	7,82	10,51	14,02	18,88	25,35	33,71	45,85	55,16
		0,23	0,29	0,37	0,52	0,68	0,88	1,18	1,62	2,14	2,79	3,68	4,85	6,47	8,53	11,47	15,30	20,59	27,66	36,78	50,02	61,29
		0,24	0,32	0,40	0,56	0,74	0,96	1,27	1,76	2,31	3,03	3,98	5,26	7,01	9,24	12,43	16,57	22,31	29,96	39,84	54,18	67,42
		0,25	0,34	0,43	0,60	0,79	1,03	1,37	1,89	2,49	3,27	4,30	5,67	7,55	9,95	13,39	17,85	24,03	32,27	42,91	58,35	73,55
		0,27	0,37	0,46	0,65	0,84	1,11	1,47	2,02	2,67	3,49	4,60	6,07	8,09	10,66	14,34	19,12	25,74	34,57	45,97	62,52	79,68
		0,29	0,39	0,49	0,69	0,90	1,18	1,57	2,16	2,84	3,73	4,90	6,47	8,63	11,38	15,30	20,40	27,46	36,87	49,04	66,69	85,81
		0,31	0,42	0,52	0,73	0,96	1,26	1,67	2,29	3,02	3,96	5,21	6,87	9,17	12,08	16,25	21,67	29,18	39,18	52,09	70,86	91,94
		0,33	0,44	0,55	0,77	1,01	1,32	1,77	2,43	3,20	4,20	5,51	7,28	9,71	12,80	17,21	22,95	30,89	41,48	55,16	75,02	98,07
		0,35	0,47	0,58	0,81	1,07	1,40	1,86	2,56	3,38	4,42	5,82	7,69	10,25	13,50	18,16	24,22	32,61	43,79	58,22	79,19	104,2
		0,37	0,49	0,61	0,86	1,13	1,47	1,96	2,70	3,56	4,66	6,13	8,09	10,79	14,22	19,12	25,50	34,32	46,09	61,29	83,36	110,3
		0,38	0,52	0,65	0,90	1,19	1,55	2,06	2,83	3,74	4,89	6,43	8,49	11,33	14,93	20,07	26,77	36,04	48,40	64,35	87,53	116,5
		0,40	0,54	0,68	0,94	1,25	1,62	2,16	2,97	3,91	5,13	6,74	8,90	11,87	15,64	21,04	28,05	37,76	50,70	67,42	91,70	122,6
		0,42	0,57	0,71	0,98	1,29	1,70	2,26	3,10	4,09	5,36	7,05	9,31	12,41	16,35	21,99	29,32	39,47	53,01	70,48	95,86	128,7
		0,44	0,59	0,74	1,03	1,36	1,77	2,35	3,24	4,27	5,59	7,36	9,71	12,95	17,06	22,95	30,60	41,19	55,31	73,55	100,0	134,9
		0,46	0,62	0,76	1,07	1,41	1,84	2,45	3,37	4,44	5,83	7,66	10,10	13,48	17,77	23,90	31,87	42,91	57,62	76,61	104,2	141,0
		0,48	0,64	0,79	1,12	1,47	1,91	2,55	3,51	4,62	6,06	7,97	10,49	14,02	18,49	24,86	33,15	44,62	59,92	79,68	108,4	147,1
		0,50	0,67	0,82	1,16	1,52	1,99	2,65	3,64	4,81	6,29	8,28	10,92	14,56	19,19	25,81	34,42	46,34	62,23	82,74	112,5	153,2
		0,52	0,69	0,86	1,21	1,58	2,06	2,75	3,78	4,98	6,52	8,58	11,33	15,10	19,91	26,77	35,70	48,05	64,53	85,81	116,7	159,4
		0,53	0,72	0,89	1,25	1,64	2,14	2,84	3,91	5,16	6,76	8,89	11,73	15,64	20,61	27,72	36,97	49,77	66,83	88,87	120,9	165,5
		0,55	0,74	0,92	1,28	1,70	2,21	2,94	4,05	5,34	6,99	9,20	12,13	16,18	21,33	28,69	38,25	51,49	69,14	91,94	125,0	171,6

* *Please note that the Type G is a double spring unit and the data shown below corresponds to each half. The maximun size for a Type G is 20.*

CORRESPONDING TYPE	MOD.	SAFETY MARGIN	TOTAL TRAVEL AND LOAD OF EACH SUPPORT	SAFETY MARGIN
A	CVC	0	0	
B		0	0	
C	CV	0	0	
D		2,5	5	
E		5	10	
F	CVL	7,5	15	
G*		10	20	
H		12,5	25	
A	CVLL	15	30	
B		17,5	35	
C		20	40	
D		22,5	45	
E		25	50	
F		27,5	55	
G*		30	60	
H		32,5	65	
		35	70	
		37,5	75	
		40	80	
		42,5	85	
		45	90	

CVC	CV	CVL	CVLL	MODEL / ROD SIZE	M-12				M-16			M-20			M-24			M-30			M-36			M-42	M-48	M-56	M-64
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21				
				SUPPORT SIZE - LOADS IN kN.																								

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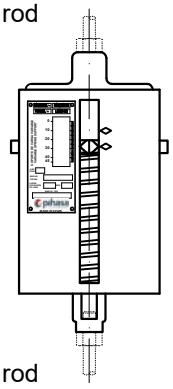
VARIABLE LOAD SPRING SUPPORTS

SECTION D
4

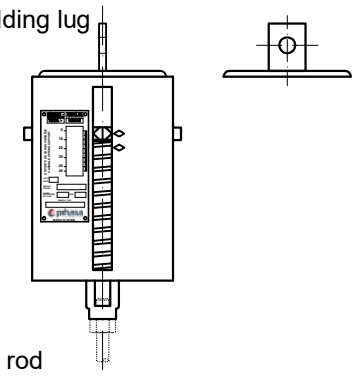
TYPE

The different types of support are classified by a letter - from A to H - and are differentiated by the assembly conditions regarding connection to the structure.

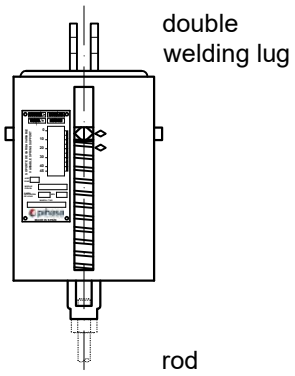
TYPE A



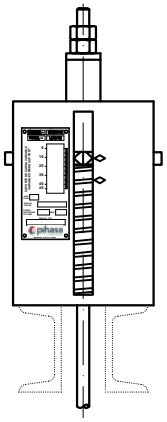
TYPE B



TYPE C

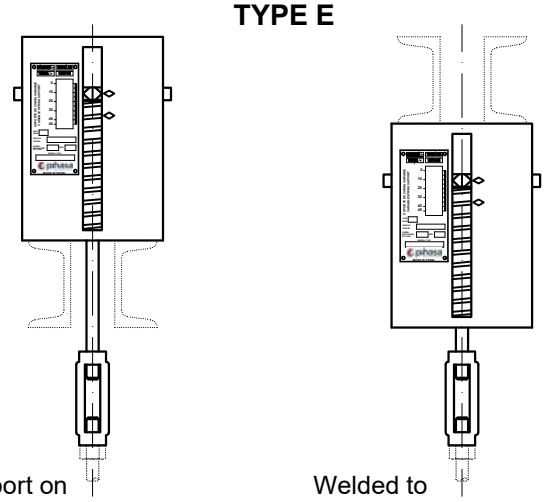


TYPE D



Support on
structure - hanging

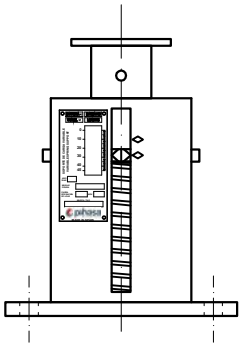
TYPE E



Support on
structure - hanging

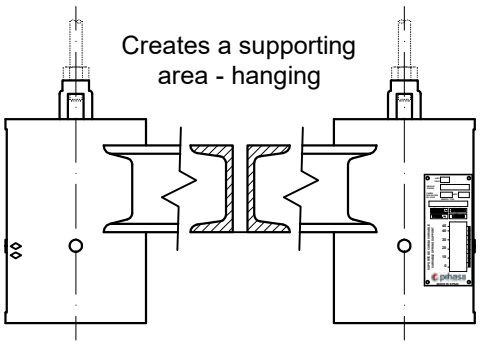
Welded to
structure - hanging

TYPE F

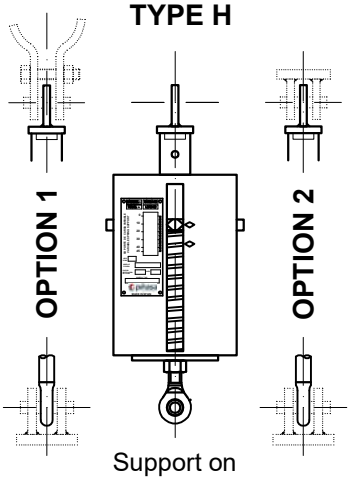


Support on
structure - support

TYPE G



TYPE H



Support on
structure - support

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ORDER

To place an order, the following details must be indicated:

- Model, size and type.
- Hot and/or cold load.
- Vertical movement (“travel”) of the pipe from the cold position to the hot position. If movement is upwards, indicate so with the positive sign (+), and with the sign (-) if movement is downwards.
- Identification mark (“tag number”).
- Options: corrosion resistant / continuous blocking.

Note that on a variable load spring, the following condition is always met:

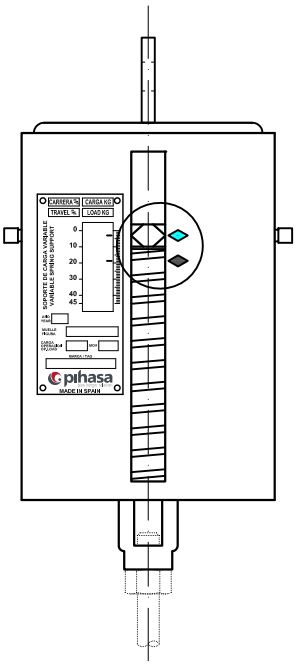
$$CL = HL + \Delta y \cdot k$$

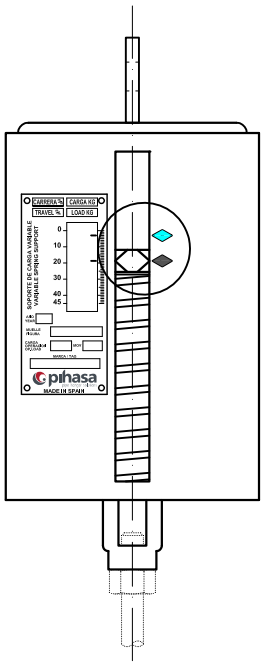
Where “k” is the spring rate (depending on the model selected). For this reason, different combinations of cold load, hot load and movement are given for each spring manufacturer.

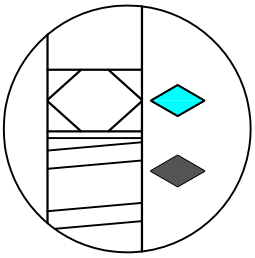
TRAVEL STOPS

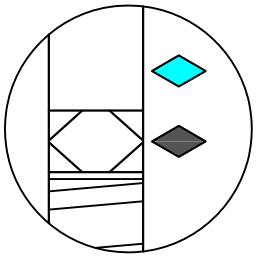
Unless required otherwise, the support will be preset on the cold or installation load, by two travel stops. These stops should not be removed until the installation stages and hydraulic testing are completed. Once removed (with the plant still “cold”), the indicator should coincide with the peak of the cold load / installation load indicator. When the plant starts up, the indicator will tend to shift until it coincides with the position of the hot load / operating load indicator.

The operating position for the spring is theoretical, i.e., it is designed for “ideal” work conditions; in real life conditions, certain factors can come into play that affect the actual operationg position of the spring. For instance, a spring located on a draining line will normally be in the cold position, and will only move when draining really causes change of load and temperature on the piping.









VARIABLE LOAD SPRING SUPPORTS

SECTION D
7

GENERAL INSTALLATION AND OPERATION CONSIDERATIONS:

In this section, we set out to indicate the general aspects to be considered in order to carry out a correct installation of the variable load spring supports, as well as explaining precautions to take for correct working order and subsequent maintenance of said elements.

Firstly, in order to avoid the thermal movements of the piping being restrained, it should be taken into account that the installed accessories may cause interference with other elements that have nothing to do with supporting the piping.

This possibility often occurs when the supports are fitted with rods of a certain length, since throughout their length, they may approach the beams, other piping or accessories which, due to their proximity, may cause said interference.

To make identification of the supports easy, it is advisable to position the spring support in such a manner that the scaleplate is on the side with the best visibility.

When welding to install the support, they must be coated with the appropriate paint in order to avoid any oxidation that may spread to the housing, leading to undesirable damage.

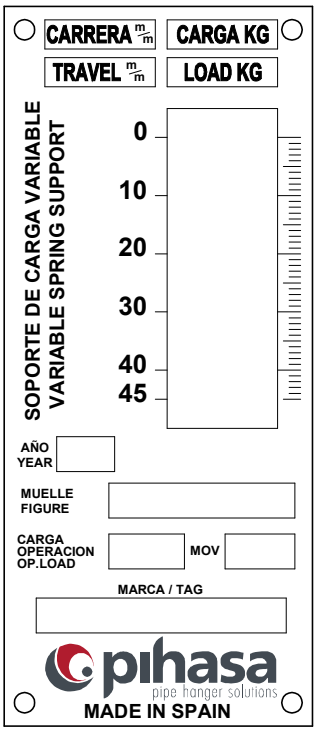
It is appropriate that, in the threaded zones, grease is applied in order to avoid deterioration due to oxidation, that may make subsequent adjustment or dismantling operations difficult.

We recommend that once the spring support is finally installed, the travel stops should be kept so that they can be used in the event of having to dismount the support for inspection, recalibrating, etc., or to carry out changes of piping accessories. However, if not available, temporary blocking may be achieved with plates and profiles that may be tack welded to the spring casing.

Since during plant maintenance operations, touching up paintwork of the supporting elements is part of these activities, special care should be taken not to paint the sliding surfaces, threaded zones and scaleplates.

As a final recommendation, it should be remembered that it is appropriate to conduct a visual inspection of all the spring supports installed on the pipeline before starting up, in order to ensure that all the travel stops have been removed, that the springs are correctly positioned and that all the lock nuts are tightened.

IDENTIFICATION CARD
MODEL CVC



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1	20/10/98	INFORMATION	JMD	EAR
0	04/09/94	INFORMATION	BM	JMD

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INSTALLATION INSTRUCTIONS FOR VARIABLE LOAD SPRING SUPPORTS

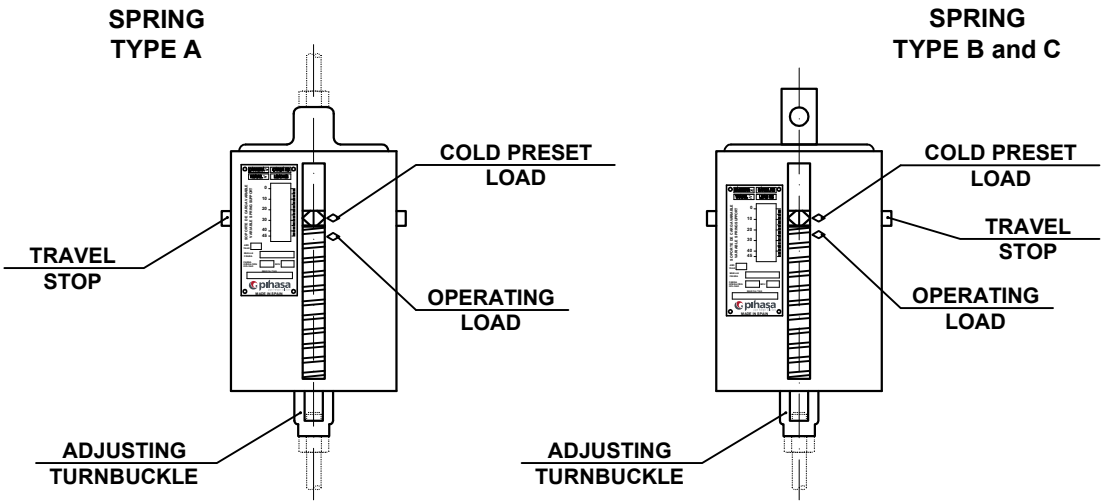
Before installing a variable load support, there must be a provisional, rigid support able to sustain the piping in its correct position so that no deformities occur on the same nor overstresses occur at any of its points.

Once the point has been located where the variable load support should be fitted, install all the accessories, both on the piping and on the supporting structure, according to the design drawings for the support.

Depending on the type of spring support selected, certain manoeuvres will have to be carried out, until the supporting element can take the required load.

INSTALLATION INSTRUCTIONS

SPRINGS TYPE A, B and C.



For these types of springs, once the relevant accessories have been installed (clamp, lug, rods, eye nuts, beam attachments, etc.), locate them in the position of COLD PRESET LOAD. To do so, act on the adjustment turnbuckles until the travel stops are loose and can be removed by hand or, at the most, with the help of pliers.

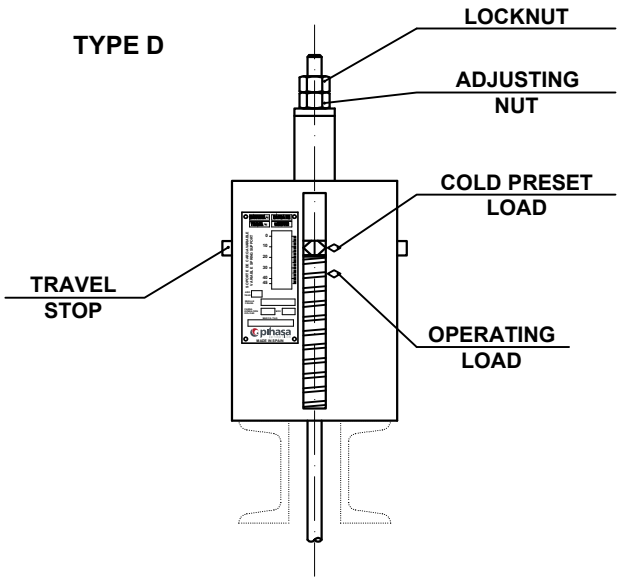
The operation of removing the travel stops must be carried out once the hydraulic test is completed, and on the condition that no other manoeuvres are going to be carried out on the piping that may leave the spring out of its position in COLD PRESET LOAD.

When the piping reaches the temperature considered in the stress analysis, the spring position indicator should indicate OPERATING LOAD, which will be located above or below that of COLD PRESET LOAD, depending on the vertical displacement at that point.

INSTALLATION INSTRUCTIONS

TYPE D SPRINGS

To install this type of spring, once the corresponding accessories have been fitted (clamp, lug, rods, etc.), some welding may have to be carried out to join the spring housing to the supporting structure in order to ensure the position of the element in terms of any incident caused by manoeuvres close to the supporting point, or any transitional vibration in the piping.



In order to ensure that the spring takes the COLD PRESET LOAD, act on the nut located in the upper part of the rod, until the travel stops can be released by hand or, at the most, with the help of a hand tool such as pliers.

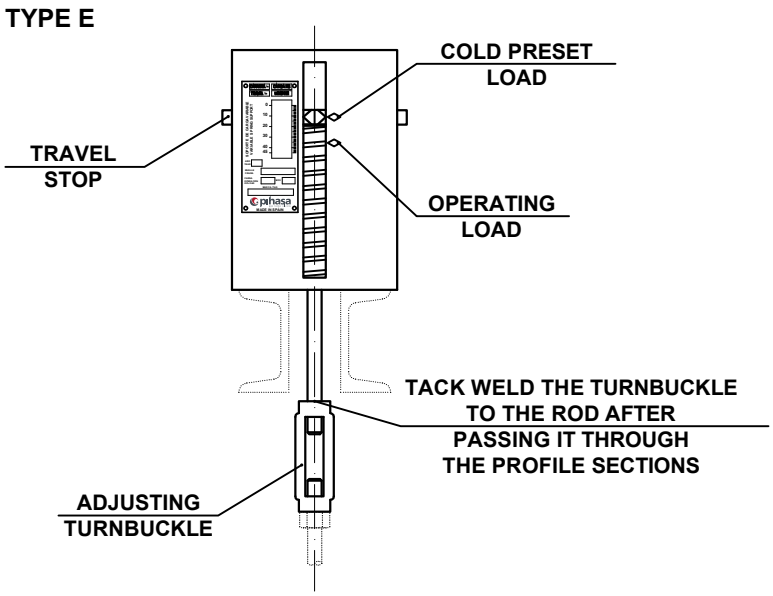
The operation of removing the travel stops must be carried out once the hydraulic test is completed, and on the condition that no other manoeuvres are going to be carried out on the piping that may leave the spring out of its position in COLD PRESET LOAD.

When the piping reaches the temperature considered in the stress analysis, the spring position indicator should indicate OPERATING LOAD, which will be located above or below that of COLD PRESET LOAD, depending on the vertical displacement at that point.

INSTALLATION INSTRUCTIONS

SPRINGS TYPE E

As in the case of Type D springs, to install this type of spring, once the corresponding accessories have been fitted (clamp, lug, rods, etc.), some welding may have to be carried out to join the spring housing to the supporting structure in order to ensure the position of the element in terms of any incident caused by manoeuvres close to the supporting point, or any transitional vibration in the piping.



In order to ensure that the spring takes the COLD PRESET LOAD, act on the adjustment turnbuckle located on the rod, until the travel stops can be released by hand or, at the most, with the help of a hand tool such as pliers.

The operation of removing the travel stops must be carried out once the hydraulic test is completed, and on the condition that no other manoeuvres are going to be carried out on the piping that may leave the spring out of its position in COLD PRESET LOAD.

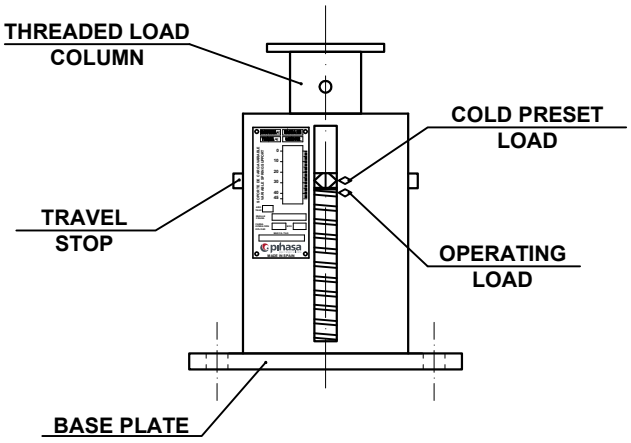
When the piping reaches the temperature considered in the stress analysis, the spring position indicator should indicate OPERATING LOAD, which will be located above or below that of COLD PRESET LOAD, depending on the vertical displacement at that point.

INSTALLATION INSTRUCTIONS

SPRINGS TYPE F

Installation of this type of spring on the supporting structure is made by means of bolts located in the holes in the base plate, although if the structural arrangement does not allow for this, or if it is preferred, said spring base plate can also be welded to the supporting structure, in order to ensure that the unit does not turn over or move from its position in the case of movements, in the horizontal plane, of the pipe.

TYPE F



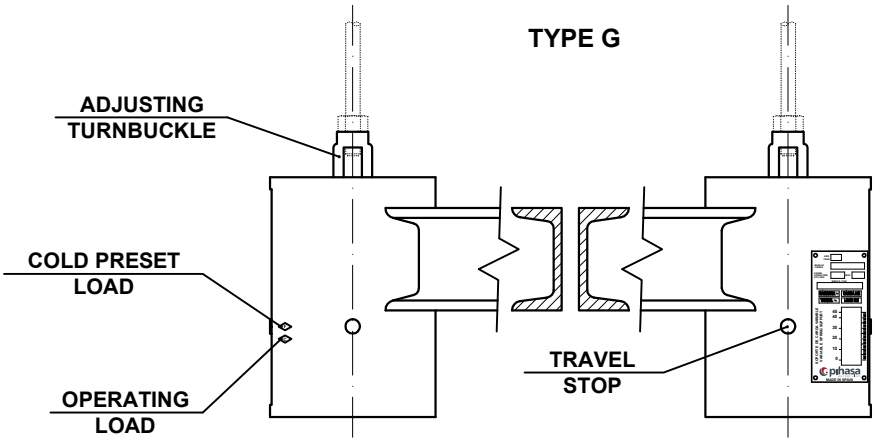
To ensure that the spring takes the COLD PRESET LOAD, act on the threaded load column located in the upper part of the housing, until the travel stops can be released by hand or, at the most, with the help of a hand tool such as pliers.

The operation of removing the travel stops must be carried out once the hydraulic test is completed, and on the condition that no other manoeuvres are going to be carried out on the piping that may leave the spring out of its position in COLD PRESET LOAD.

When the piping reaches the temperature considered in the stress analysis, the spring position indicator should indicate OPERATING LOAD, which will be located above or below that of COLD PRESET LOAD, depending on the vertical displacement at that point.

INSTALLATION INSTRUCTIONS

SPRINGS TYPE G



For these types of springs, once the relevant accessories have been installed (clamp, lug, rods, eye nut, beam attachment, etc.), locate them in the position of COLD PRESET LOAD.

To ensure that the springs take the COLD PRESET LOAD, act on the adjustment turnbuckles until the travel stops are loose and can be removed by hand or, at the most, with the help of pliers. It is advisable that the adjustment operation is carried out alternating between the two springs, or simultaneously on both, if possible.

The operation of removing the travel stops must be carried out once the hydraulic test is completed, and on the condition that no other manoeuvres are going to be carried out on the piping that may leave the spring out of its position in COLD PRESET LOAD.

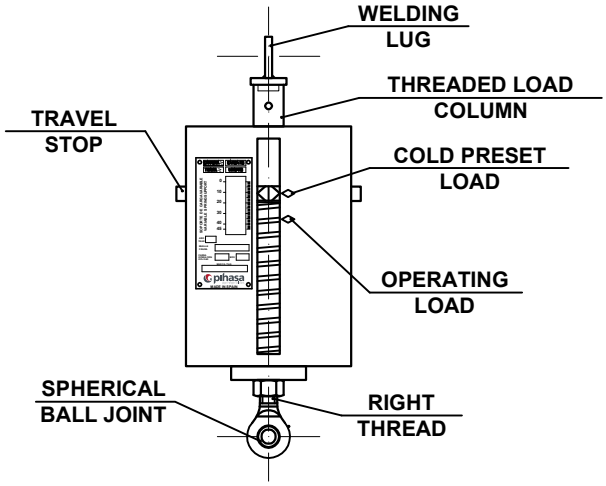
When the piping reaches the temperature considered in the stress analysis, the spring position indicator should indicate OPERATING LOAD, which will be located above or below that of COLD PRESET LOAD, depending on the vertical displacement at that point.

It is advisable to apply some welding points to join the pipe shoe (if there is one) to the center of the beams which connect the springs, if the movements occurring in the horizontal plane justify it. In this way, it will avoid the piping displacement towards one of the springs and thus ensure that both are subject to the same load.

INSTALLATION INSTRUCTIONS

SPRINGS TYPE H

TYPE H



As in the case of Type F springs, the installation of this type of spring is by means of welding the lower element, the rear bracket, to the support structure. At the upper end, a clamp can be installed (Option 1) or another rear bracket (Option 2).

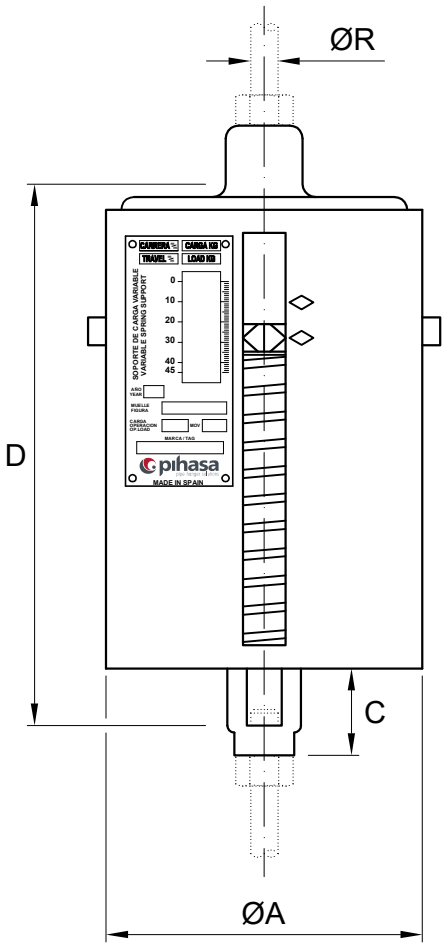
In order to ensure that the spring reaches the COLD PRESET LOAD, it is essential to act on the upper threaded load column until the travel stops can be released by hand, or at the most, with the help of a hand tool such as pliers.

The operation of removing the travel stops must be carried out once the hydraulic test is completed, and on the condition that no other manoeuvres are going to be carried out on the piping that may leave the spring out of its position in COLD PRESET LOAD.

When the piping reaches the temperature considered in the stress analysis, the spring position indicator should indicate OPERATING LOAD, which will be located above or below that of COLD PRESET LOAD, depending on the vertical displacement at that point.

VARIABLE LOAD SPRING SUPPORT
TYPE A

SECTION D
14



SIZE	MOD.	ØA	C*	D*	ØR	WEIGHT (Kg.)
1	CVC	98	45	177	M12x1,75	3,5
	CV		10	236		5
	CVL		10	401		7
	CVLL		10	588		8,5
2	CVC	98	45	177	M12x1,75	3,5
	CV		10	241		5
	CVL		10	415		7
	CVLL		10	609		8,5
3	CVC	98	45	182	M12x1,75	3,5
	CV		10	246		5
	CVL		10	435		7,5
	CVLL		10	639		9,5
4	CVC	98	45	182	M12x1,75	4
	CV		10	246		5
	CVL		10	439		7,5
	CVLL		10	645		9,5
5	CVC	98	45	187	M12x1,75	4
	CV		10	251		5
	CVL		10	451		7,5
	CVLL		10	663		9,5
6	CVC	134	50	204	M12x1,75	7
	CV		15	268		9
	CVL		15	485		14
	CVLL		15	696		18
7	CVC	134	50	209	M16x2	7
	CV		15	278		10
	CVL		15	508		15
	CVLL		15	738		19
8	CVC	134	50	214	M16x2	7,5
	CV		15	298		11
	CVL		15	543		17
	CVLL		15	788		22
9	CVC	134	50	230	M16x2	8
	CV		25	330		11
	CVL		25	595		18
	CVLL		25	850		23
10	CVC	134	55	245	M20x2,5	8
	CV		25	340		12
	CVL		25	605		19
	CVLL		25	870		24
11	CVC	168	55	247	M20x2,5	18
	CV		25	342		23
	CVL		25	622		35
	CVLL		25	902		44
12	CVC	168	55	257	M24x3	19
	CV		25	357		25
	CVL		25	652		38
	CVLL		25	947		49
13	CVC	168	50	282	M24x3	21
	CV		25	377		27
	CVL		25	680		43
	CVLL		25	987		57
14	CVC	168	70	312	M30x3,5	23
	CV		30	415		30
	CVL		30	750		50
	CVLL		30	1085		68
15	CVC	236	80	325	M30x3,5	46
	CV		30	415		59
	CVL		30	750		89
	CVLL		30	1085		113
16	CVC	236	80	340	M36x4	52
	CV		40	450		67
	CVL		40	810		106
	CVLL		40	1170		139
17	CVC	236	80	350	M36x4	59
	CV		40	510		79
	CVL		40	900		130
	CVLL		40	1290		172
18	CVC	304	60	370	M42x4,5	106
	CV		40	510		134
	CVL		40	900		204
	CVLL		40	1290		264
19	CVC	304	60	380	M48x5	120
	CV		40	525		152
	CVL		40	955		243
	CVLL		40	1385		323
20	CVC	304	60	390	M56x5,5	138
	CV		40	550		176
	CVL		40	1005		291
	CVLL		40	1460		390
21	CVC	304	60	420	M64x6	160
	CV		70	680		219
	CVL		70	1240		373
	CVLL		70	1790		520

N.B.:

* C and D are approximate dimensions which correspond to the vertical position at the lowest load value of the working range. Therefore, the actual dimensions will vary depending on the load applied.

REV.	DATE	EDITED FOR :	DRAW.	REV.
3	21/07/10	GENERAL REVISION	DDG	EAR
2	12/07/91	INFORMATION	JMD	EAR
1	17/01/85	INFORMATION	JRS	EAR

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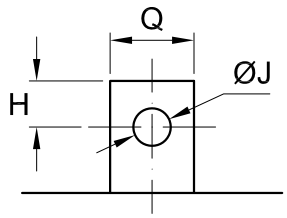
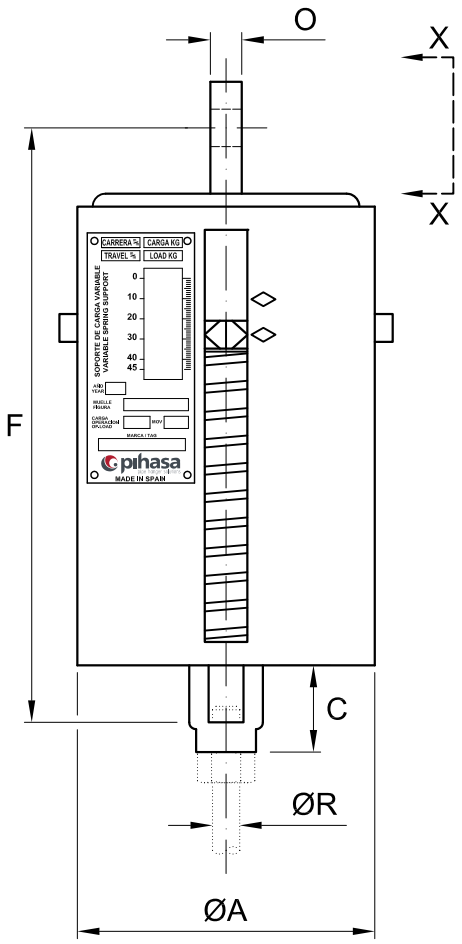
VARIABLE LOAD SPRING SUPPORT
TYPE B

SECTION D
15



VIEW "X-X"



SIZE	MOD.	ØA	C*	F*	H	ØJ	O	Q	ØR	WEIGHT (Kg.)
1	CVC	98	45	217	20	13,5	6	65	M12x1,75	3,5
	CV		10	277						5
	CVL		10	442						7
	CVLL		10	629						8,5
2	CVC	98	45	217	20	13,5	6	65	M12x1,75	3,5
	CV		10	282						5
	CVL		10	456						7
	CVLL		10	650						8,5
3	CVC	98	45	222	20	13,5	6	65	M12x1,75	3,5
	CV		10	289						5
	CVL		10	476						7,5
	CVLL		10	678						9,5
4	CVC	98	45	222	20	13,5	6	65	M12x1,75	4
	CV		10	289						5
	CVL		10	480						7,5
	CVLL		10	684						9,5
5	CVC	98	45	227	20	13,5	6	65	M12x1,75	4
	CV		10	292						5
	CVL		10	492						7,5
	CVLL		10	704						9,5
6	CVC	134	50	244	20	13,5	6	65	M12x1,75	7
	CV		15	309						9
	CVL		15	509						14
	CVLL		15	737						18
7	CVC	134	50	254	25	17,5	8	65	M16x2	7
	CV		15	324						10
	CVL		15	554						15
	CVLL		15	784						19
8	CVC	134	50	259	25	17,5	8	65	M16x2	7,5
	CV		15	344						11
	CVL		15	589						17
	CVLL		15	834						22
9	CVC	134	50	275	25	17,5	8	65	M16x2	8
	CV		25	365						11
	CVL		25	649						18
	CVLL		25	905						23
10	CVC	134	55	290	35	21,5	8	65	M20x2,5	8
	CV		25	375						12
	CVL		25	650						19
	CVLL		25	925						24
11	CVC	168	55	280	35	21,5	8	65	M20x2,5	18
	CV		25	389						23
	CVL		25	669						35
	CVLL		25	949						44
12	CVC	168	55	307	40	26,5	10	75	M24x3	19
	CV		25	412						25
	CVL		25	707						38
	CVLL		25	1002						49
13	CVC	168	50	322	40	26,5	10	75	M24x3	21
	CV		25	427						27
	CVL		25	730						43
	CVLL		25	1037						57
14	CVC	168	70	372	50	33	12	75	M30x3,5	23
	CV		30	480						30
	CVL		30	815						50
	CVLL		30	1140						68
15	CVC	236	80	375	50	33	12	75	M30x3,5	46
	CV		30	470						59
	CVL		30	805						89
	CVLL		30	1130						113
16	CVC	236	80	410	55	38	15	100	M36x4	52
	CV		40	520						67
	CVL		40	890						106
	CVLL		40	1240						139
17	CVC	236	80	390	55	38	15	100	M36x4	59
	CV		40	570						79
	CVL		40	960						130
	CVLL		40	1360						172
18	CVC	304	60	415	75	43	20	125	M42x4,5	106
	CV		40	575						134
	CVL		40	965						204
	CVLL		40	1365						264
19	CVC	304	60	450	75	48	25	150	M48x5	120
	CV		40	625						152
	CVL		40	1070						243
	CVLL		40	1485						323
20	CVC	304	60	480	90	53	25	150	M56x5,5	138
	CV		40	665						176
	CVL		40	1115						291
	CVLL		40	1575						390
21	CVC	304	60	555	115	58	30	170	M64x6	160
	CV		70	815						219
	CVL		70	1375						373
	CVLL		70	1935						520

N.B.:

* C and F are approximate dimensions which correspond to the vertical position at the lowest load value of the working range. Therefore, the actual dimensions will vary depending on the load applied.

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3	21/07/10	GENERAL REVISION	DDG	EAR
2	12/07/91	INFORMATION	JMD	EAR
1	17/01/85	INFORMATION	JRS	EAR

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VARIABLE LOAD SPRING SUPPORT
TYPE C

SECTION D
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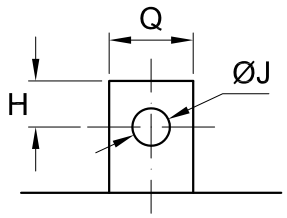
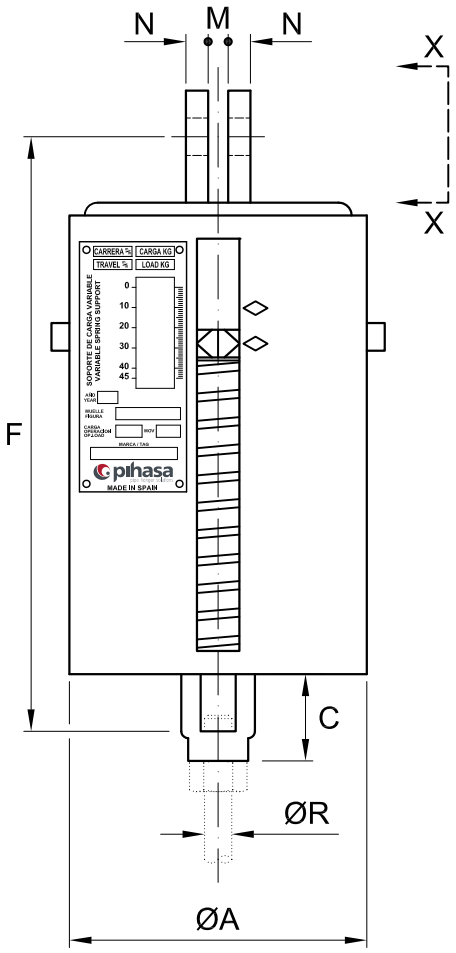


VIEW "X-X"



SIZE	MOD.	ØA	C*	F*	H	ØJ	M	N	Q	ØR	WEIGHT (Kg.)
1	CVC	98	45	217	20	13,5	18	6	65	M12x1,75	3,5
	CV		10	277							5
	CVL		10	442							7
	CVLL		10	629							8,5
2	CVC	98	45	217	20	13,5	18	6	65	M12x1,75	3,5
	CV		10	282							5
	CVL		10	456							7
	CVLL		10	650							8,5
3	CVC	98	45	222	20	13,5	18	6	65	M12x1,75	3,5
	CV		10	289							5
	CVL		10	476							7,5
	CVLL		10	678							9,5
4	CVC	98	45	222	20	13,5	18	6	65	M12x1,75	4
	CV		10	289							5
	CVL		10	480							7,5
	CVLL		10	684							9,5
5	CVC	98	45	227	20	13,5	18	6	65	M12x1,75	4
	CV		10	292							5
	CVL		10	492							7,5
	CVLL		10	704							9,5
6	CVC	134	50	244	20	13,5	18	6	65	M12x1,75	7
	CV		15	309							9
	CVL		15	509							14
	CVLL		15	737							18
7	CVC	134	50	254	25	17,5	22	6	65	M16x2	7
	CV		15	324							10
	CVL		15	554							15
	CVLL		15	784							19
8	CVC	134	50	259	25	17,5	22	6	65	M16x2	7,5
	CV		15	344							11
	CVL		15	589							17
	CVLL		15	834							22
9	CVC	134	50	275	25	17,5	22	6	65	M16x2	8
	CV		25	365							11
	CVL		25	649							18
	CVLL		25	905							23
10	CVC	134	55	290	35	21,5	22	6	65	M20x2,5	8
	CV		25	375							12
	CVL		25	650							19
	CVLL		25	925							24
11	CVC	168	55	280	35	21,5	22	6	65	M20x2,5	18
	CV		25	389							23
	CVL		25	669							35
	CVLL		25	949							44
12	CVC	168	55	307	40	26,5	24	6	75	M24x3	19
	CV		25	412							25
	CVL		25	707							38
	CVLL		25	1002							49
13	CVC	168	50	322	40	26,5	24	6	75	M24x3	21
	CV		25	427							27
	CVL		25	730							43
	CVLL		25	1037							57
14	CVC	168	70	372	50	33	32	8	75	M30x3,5	23
	CV		30	480							30
	CVL		30	815							50
	CVLL		30	1140							68
15	CVC	236	80	375	50	33	32	8	75	M30x3,5	46
	CV		30	470							59
	CVL		30	805							89
	CVLL		30	1130							113
16	CVC	236	80	410	55	38	38	12	100	M36x4	52
	CV		40	520							67
	CVL		40	890							106
	CVLL		40	1240							139
17	CVC	236	80	390	55	38	38	12	100	M36x4	59
	CV		40	570							79
	CVL		40	960							130
	CVLL		40	1360							172
18	CVC	304	60	415	75	43	44	15	125	M42x4,5	106
	CV		40	575							134
	CVL		40	965							204
	CVLL		40	1365							264
19	CVC	304	60	450	75	48	50	20	150	M48x5	120
	CV		40	625							152
	CVL		40	1070							243
	CVLL		40	1485							323
20	CVC	304	60	480	90	53	57	20	150	M56x5,5	138
	CV		40	665							176
	CVL		40	1115							291
	CVLL		40	1575							390
21	CVC	304	60	555	115	58	57	25	170	M64x6	160
	CV		70	815							219
	CVL		70	1375							373
	CVLL		70	1935							520

N.B.:

* C and F are approximate dimensions which correspond to the vertical position at the lowest load value of the working range. Therefore, the actual dimensions will vary depending on the load applied.

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3	21/07/10	GENERAL REVISION	DDG	EAR
2	12/07/91	INFORMATION	JMD	EAR
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VARIABLE LOAD SPRING SUPPORT
TYPE D

SECTION D
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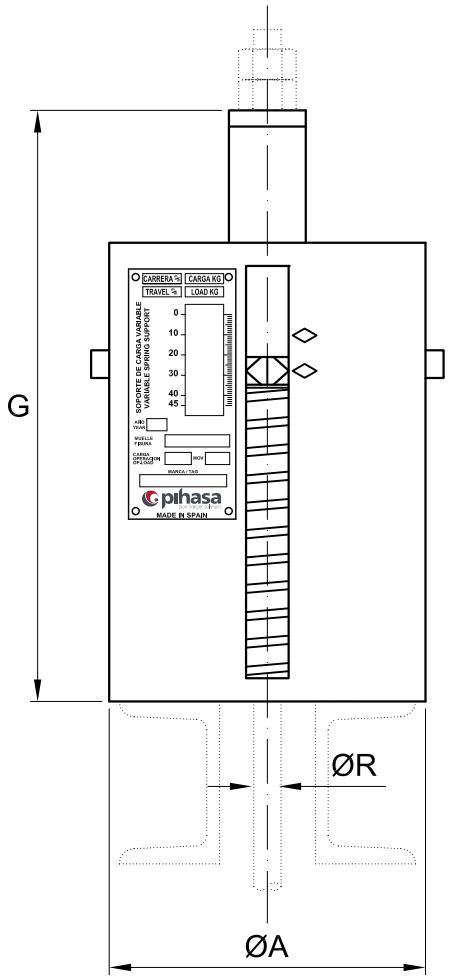

SIZE	MOD.	ØA	G*	ØR	WEIGHT (Kg.)
1	CVC	98	205	M12x1,75	3,5
	CV		355		5
	CVL		630		7
	CVLL		927		8,5
2	CVC	98	205	M12x1,75	3,5
	CV		360		5
	CVL		645		7
	CVLL		948		8,5
3	CVC	98	210	M12x1,75	3,5
	CV		365		5
	CVL		665		7,5
	CVLL		978		9,5
4	CVC	98	210	M12x1,75	4
	CV		365		5
	CVL		670		7,5
	CVLL		984		9,5
5	CVC	98	215	M12x1,75	4
	CV		370		5
	CVL		680		7,5
	CVLL		1002		9,5
6	CVC	134	225	M12x1,75	7
	CV		380		9
	CVL		700		14
	CVLL		1028		18
7	CVC	134	230	M16x2	7
	CV		390		10
	CVL		730		15
	CVLL		1070		19
8	CVC	134	240	M16x2	7,5
	CV		410		11
	CVL		765		17
	CVLL		1120		22
9	CVC	134	250	M16x2	8
	CV		420		11
	CVL		790		18
	CVLL		1160		23
10	CVC	134	255	M20x2,5	8
	CV		430		12
	CVL		805		19
	CVLL		1180		24
11	CVC	168	280	M20x2,5	18
	CV		460		23
	CVL		850		35
	CVLL		1240		45
12	CVC	168	290	M24x3	19
	CV		475		25
	CVL		880		38
	CVLL		1285		47
13	CVC	168	295	M24x3	21
	CV		490		27
	CVL		905		43
	CVLL		1320		50
14	CVC	168	315	M30x3,5	23
	CV		520		30
	CVL		975		50
	CVLL		1430		55
15	CVC	236	325	M30x3,5	46
	CV		520		59
	CVL		960		89
	CVLL		1400		114
16	CVC	236	340	M36x4	52
	CV		550		67
	CVL		1020		106
	CVLL		1490		138
17	CVC	236	365	M36x4	59
	CV		595		79
	CVL		1115		130
	CVLL		1625		172
18	CVC	304	385	M42x4,5	106
	CV		600		134
	CVL		1095		204
	CVLL		1585		262
19	CVC	304	415	M48x5	120
	CV		645		152
	CVL		1185		243
	CVLL		1720		323
20	CVC	304	430	M56x5,5	138
	CV		670		176
	CVL		1235		291
	CVLL		1790		390
21	CVC	304	455	M64x6	160
	CV		770		219
	CVL		1440		373
	CVLL		2110		520

N.B.:

* G is an approximate dimension which corresponds to the vertical position at the lowest load value of the working range. Therefore, the actual dimension will vary depending on the load applied.

REV.	DATE	EDITED FOR :	DRAW.	REV.
3	21/07/10	GENERAL REVISION	DDG	EAR
2	12/07/91	INFORMATION	JMD	EAR
1	17/01/85	INFORMATION	JRS	EAR

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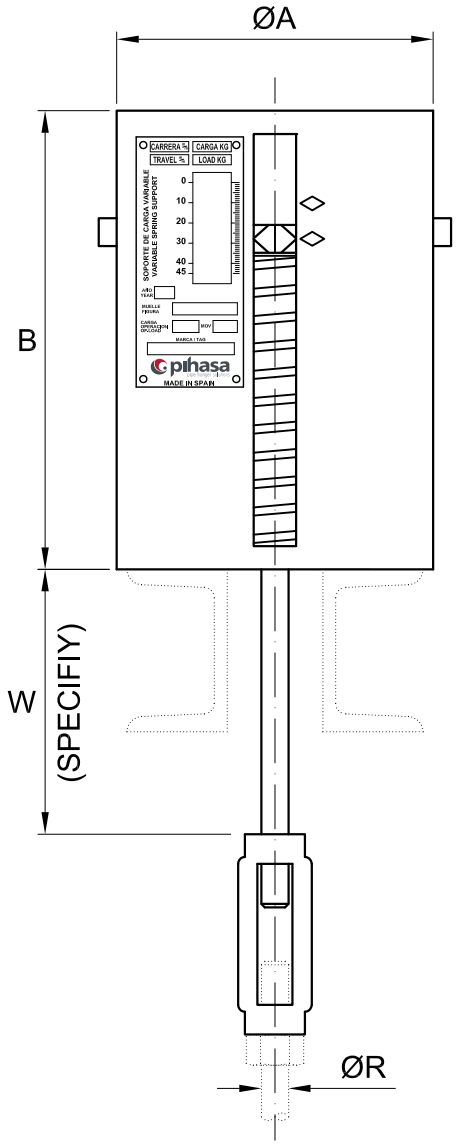
VARIABLE LOAD SPRING SUPPORT
TYPE E

SECTION D
18



SIZE	MOD.	ØA	B	ØR	WEIGHT (Kg.)
1	CVC	98	145	M12x1,75	3,5
	CV		240		5
	CVL		405		7
	CVLL		592		8,5
2	CVC	98	145	M12x1,75	3,5
	CV		245		5
	CVL		419		7
	CVLL		613		8,5
3	CVC	98	150	M12x1,75	3,5
	CV		250		5
	CVL		439		7,5
	CVLL		643		9,5
4	CVC	98	150	M12x1,75	4
	CV		250		5
	CVL		442		7,5
	CVLL		649		9
5	CVC	98	155	M12x1,75	4
	CV		255		5
	CVL		455		7,5
	CVLL		667		9
6	CVC	134	165	M12x1,75	7
	CV		265		9
	CVL		477		14
	CVLL		693		18
7	CVC	134	170	M16x2	7
	CV		275		10
	CVL		505		15
	CVLL		735		19
8	CVC	134	180	M16x2	7,5
	CV		295		11
	CVL		540		17
	CVLL		785		20
9	CVC	134	190	M16x2	8
	CV		305		11
	CVL		565		18
	CVLL		825		22
10	CVC	134	195	M20x2,5	8
	CV		315		12
	CVL		580		19
	CVLL		845		24
11	CVC	168	220	M20x2,5	18
	CV		345		23
	CVL		625		35
	CVLL		905		45
12	CVC	168	230	M24x3	19
	CV		360		25
	CVL		655		38
	CVLL		950		47
13	CVC	168	235	M24x3	21
	CV		375		27
	CVL		680		43
	CVLL		985		50
14	CVC	168	255	M30x3,5	23
	CV		410		30
	CVL		750		50
	CVLL		1090		55
15	CVC	236	265	M30x3,5	46
	CV		405		59
	CVL		735		89
	CVLL		1065		114
16	CVC	236	280	M36x4	52
	CV		435		67
	CVL		795		106
	CVLL		1155		138
17	CVC	236	305	M36x4	59
	CV		480		79
	CVL		890		130
	CVLL		1290		172
18	CVC	304	325	M42x4,5	106
	CV		485		134
	CVL		870		204
	CVLL		1250		262
19	CVC	304	355	M48x5	120
	CV		530		152
	CVL		960		243
	CVLL		1385		323
20	CVC	304	370	M56x5,5	138
	CV		555		176
	CVL		1010		291
	CVLL		1455		390
21	CVC	304	395	M64x6	160
	CV		655		219
	CVL		1215		373
	CVLL		1765		520

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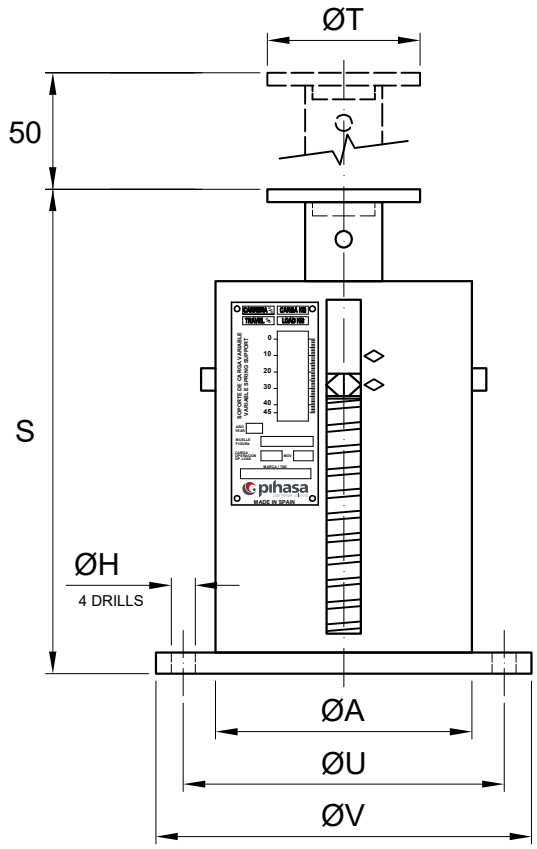
VARIABLE LOAD SPRING SUPPORT
TYPE F

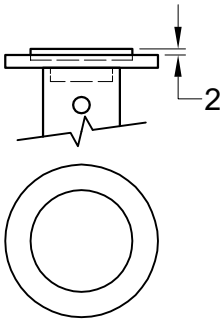
SECTION D
19



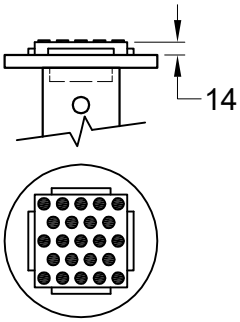
N.B.:

For this type of spring, a PTFE plate or bronze-graphite plate can optionally be installed on the load plate.

PTFE



BRONZE - GRAPHITE



SIZE	MOD.	S MIN.	S MAX.	ØA	ØH	ØU	ØV	ØT	WEIGHT (Kg.)
1	CVC	192	242	98	17,5	155	195	95	5
	CV	287	337						6,5
	CVL	452	502						9
	CVLL	665	715						11
2	CVC	192	242	98	17,5	155	195	95	5
	CV	292	342						6,5
	CVL	466	516						9
	CVLL	686	736						11
3	CVC	197	247	98	17,5	155	195	95	5
	CV	297	347						6,5
	CVL	486	536						9,5
	CVLL	716	766						12
4	CVC	197	247	98	17,5	155	195	95	6
	CV	297	347						7
	CVL	490	540						9,5
	CVLL	722	772						12
5	CVC	202	252	98	17,5	155	195	95	6
	CV	307	357						7
	CVL	502	552						9,5
	CVLL	740	790						12
6	CVC	227	277	134	17,5	190	230	120	9
	CV	327	377						11
	CVL	539	589						16
	CVLL	770	820						20
7	CVC	232	282	134	17,5	190	230	120	9
	CV	337	387						12
	CVL	567	617						17
	CVLL	813	863						21
8	CVC	242	292	134	17,5	190	230	120	10
	CV	357	407						13
	CVL	602	652						19
	CVLL	863	913						23
9	CVC	252	302	134	17,5	190	230	120	10
	CV	367	417						13
	CVL	627	677						20
	CVLL	903	953						24
10	CVC	257	307	134	17,5	190	230	120	11
	CV	377	427						15
	CVL	642	692						21
	CVLL	923	973						26
11	CVC	291	341	168	21,5	225	265	150	22
	CV	416	466						28
	CVL	695	745						40
	CVLL	990	1040						49
12	CVC	301	351	168	21,5	225	265	150	23
	CV	431	481						30
	CVL	725	775						44
	CVLL	1035	1085						53
13	CVC	306	356	168	21,5	225	265	150	25
	CV	446	496						32
	CVL	750	800						47
	CVLL	1070	1120						56
14	CVC	326	376	168	21,5	225	265	150	26
	CV	481	531						34
	CVL	820	870						54
	CVLL	1175	1225						64
15	CVC	363	413	236	21,5	295	335	220	55
	CV	503	553						68
	CVL	835	885						98
	CVLL	1160	1210						123
16	CVC	378	428	236	21,5	295	335	220	59
	CV	533	583						76
	CVL	895	945						114
	CVLL	1250	1300						144
17	CVC	403	453	236	21,5	295	335	220	66
	CV	578	628						86
	CVL	990	1040						134
	CVLL	1385	1435						174
18	CVC	433	483	304	21,5	365	405	275	114
	CV	593	643						141
	CVL	980	1030						208
	CVLL	1355	1405						266
19	CVC	463	513	304	21,5	365	405	275	125
	CV	638	688						157
	CVL	1070	1120						250
	CVLL	1490	1540						332
20	CVC	478	528	304	21,5	365	405	275	145
	CV	663	713						173
	CVL	1120	1170						300
	CVLL	1550	1600						410
21	CVC	535	585	304	21,5	365	405	275	166
	CV	795	845						215
	CVL	1355	1405						387
	CVLL	1915	1965						537

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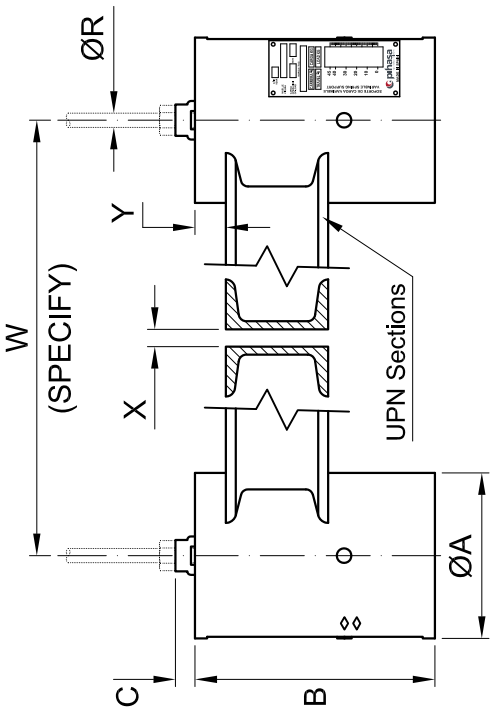
VARIABLE LOAD SPRING SUPPORT
TYPE G

SECTION D
20



SIZE	MOD.	B	C	Y	ØA	ØR	X	2 UPN	W (MAX.)
1	CVC	145	45	20	98	M12x1,75	20	80	2500
	CV	240	10	30					
	CVL	405	10	50					
	CVLL	592	10	70					
2	CVC	145	45	20	98	M12x1,75	20	80	2500
	CV	245	10	30					
	CVL	419	10	50					
	CVLL	613	10	70					
3	CVC	150	45	20	98	M12x1,75	20	80	2500
	CV	250	10	30					
	CVL	439	10	50					
	CVLL	643	10	70					
4	CVC	150	45	20	98	M12x1,75	20	80	2500
	CV	250	10	30					
	CVL	442	10	50					
	CVLL	649	10	70					
5	CVC	155	45	20	98	M12x1,75	20	80	2500
	CV	255	10	30					
	CVL	455	10	50					
	CVLL	667	10	70					
6	CVC	165	50	20	134	M12x1,75	28	100	2500
	CV	265	15	30					
	CVL	477	15	50					
	CVLL	693	15	70					
7	CVC	170	50	20	134	M16x2	28	100	2500
	CV	275	15	30					
	CVL	505	15	50					
	CVLL	735	15	70					
8	CVC	180	50	20	134	M16x2	28	100	2500
	CV	295	15	30					
	CVL	540	15	50					
	CVLL	785	15	70					
9	CVC	190	50	20	134	M16x2	28	100	2500
	CV	305	25	30					
	CVL	565	25	50					
	CVLL	825	25	70					
10	CVC	195	55	20	134	M20x2,5	28	100	2500
	CV	315	25	30					
	CVL	580	25	50					
	CVLL	845	25	70					
11	CVC	220	55	20	168	M20x2,5	36	140	2500
	CV	345	25	40					
	CVL	625	25	60					
	CVLL	905	25	80					
12	CVC	230	55	20	168	M24x3	36	140	2500
	CV	360	25	40					
	CVL	655	25	60					
	CVLL	950	25	80					
13	CVC	235	50	20	168	M24x3	36	140	2500
	CV	375	25	40					
	CVL	680	25	60					
	CVLL	985	25	80					
14	CVC	255	70	20	168	M30x3,5	36	140	2500
	CV	410	30	40					
	CVL	750	30	60					
	CVLL	1090	30	80					
15	CVC	265	80	20	236	M30x3,5	50	220	2500
	CV	405	30	40					
	CVL	735	30	60					
	CVLL	1065	30	80					
16	CVC	280	80	20	236	M36x4	50	220	2500
	CV	435	40	40					
	CVL	795	40	60					
	CVLL	1155	40	80					
17	CVC	305	80	20	236	M36x4	50	220	2500
	CV	480	40	40					
	CVL	890	40	60					
	CVLL	1290	40	80					
18	CVC	325	60	15	304	M42x4,5	66	220	1400
	CV	485	40	50					
	CVL	870	40	80				300	2500
	CVLL	1250	40	110					
19	CVC	355	60	15	304	M48x5	66	220	1400
	CV	530	40	50					
	CVL	960	40	80				300	2500
	CVLL	1385	40	110					
20	CVC	370	60	15	304	M56x5,5	66	220	1400
	CV	555	40	50					
	CVL	1010	40	80				300	2500
	CVLL	1455	40	110					

N.B.:

The weight of the unit will be double the corresponding "E" type spring, plus the weight of the sections with length= W-A.

* C is an approximate dimension which corresponds to the vertical position at the lowest load value of the working range. Therefore, the actual dimension will vary depending on the load applied.

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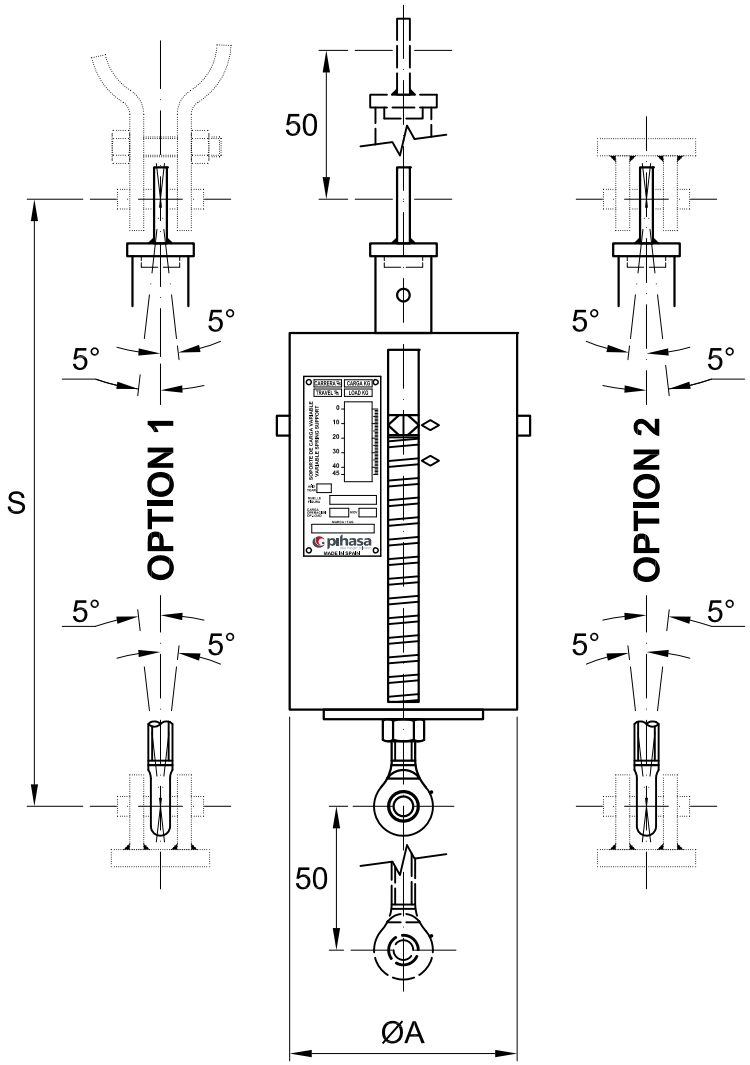
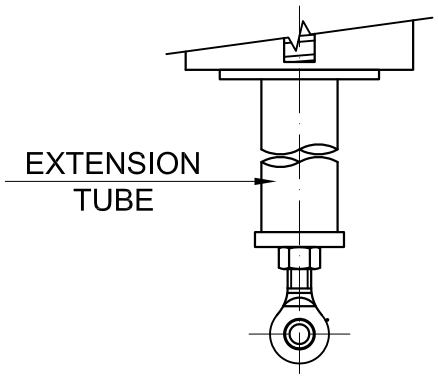
VARIABLE LOAD SPRING SUPPORT
TYPE H

SECTION D
21



N.B.: The "S" dimension can be increased by using an extension tube.



SIZE	MOD.	S mín	ØA	STRUCTURE CONNECTION FIG. 2400
1	CVC	286	98	00
	CV	381		00
	CVL	546		00
	CVLL	759		00
2	CVC	286	98	00
	CV	386		00
	CVL	560		00
	CVLL	780		00
3	CVC	291	98	00
	CV	391		00
	CVL	580		00
	CVLL	810		00
4	CVC	291	98	00
	CV	391		00
	CVL	584		00
	CVLL	816		00
5	CVC	296	98	00
	CV	401		00
	CVL	596		00
	CVLL	834		00
6	CVC	319	134	00
	CV	419		00
	CVL	631		00
	CVLL	862		00
7	CVC	324	134	00
	CV	429		00
	CVL	659		00
	CVLL	905		00
8	CVC	334	134	00
	CV	449		00
	CVL	694		00
	CVLL	955		00
9	CVC	369	134	0
	CV	484		0
	CVL	744		0
	CVLL	1020		0
10	CVC	374	134	0
	CV	494		0
	CVL	759		0
	CVLL	1040		0
11	CVC	404	168	0
	CV	529		0
	CVL	808		0
	CVLL	1103		0
12	CVC	414	168	0
	CV	544		0
	CVL	838		0
	CVLL	1148		0
13	CVC	464	168	1
	CV	604		1
	CVL	908		1
	CVLL	1228		1
14	CVC	484	168	1
	CV	639		1
	CVL	978		1
	CVLL	1333		1
15	CVC	548	236	2
	CV	688		2
	CVL	1020		2
	CVLL	1345		2
16	CVC	563	236	2
	CV	718		2
	CVL	1080		2
	CVLL	1435		2
17	CVC	588	236	2
	CV	763		2
	CVL	1175		2
	CVLL	1570		2
18	CVC	653	304	3
	CV	813		3
	CVL	1200		3
	CVLL	1575		3
19	CVC	683	304	3
	CV	858		3
	CVL	1290		3
	CVLL	1710		3
20	CVC	763	304	4
	CV	948		4
	CVL	1405		4
	CVLL	1835		4
21	CVC	1035	304	4
	CV	1295		4
	CVL	1855		4
	CVLL	2415		4

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SPECIAL CORROSION RESISTANT VARIABLE SPRINGS WITH CONTINUOUS BLOCKING SYSTEM

The standard surface finish is a two-coat epoxy-polyurethane paint system, with a total dry film thickness of approximately 100 µm.

However, when environmental conditions are particularly severe, we are ready to apply special surface treatments that further protect the spring support against corrosion, either by the application of more complex paint systems (three or even four coats up to 200-300 µm DFT) or by hot dip galvanizing the spring casing, once specified and agreed with the client.

Special corrosion resistant variable springs with hot dip galvanized casing use a hybrid welded/bolted construction, while standard variable springs are all welded.

In addition, special corrosion resistant variable springs with hot dip galvanized casing include the continuous blocking system, so the spring can be blocked at any working position, while standard variable springs use travel stops that are also valid for blocking at the unique cold preset load that is specified for each individual unit.

The continuous blocking system can also be used to establish a limited travel range or specific load stops.

Selection of spring model, size and type for special corrosion resistant supports with continuous blocking system is the same as with standard supports.

DESCRIPTION OF THE CONTINUOUS BLOCKING SYSTEM

The purpose of the continuous blocking system in the variable load spring supports manufactured at PIHASA is the capacity to block the spring in any working position, with the following requirements:

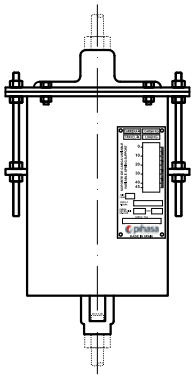
- Block the support by absorbing the expansion strength of the spring itself, in each position.
- At the same time, the purpose is to block the spring in terms of compression (downwards), being able to support loads during the inspection and assembly stage. The value achieved in these stages is up to two and a half times the operating load.
- Blocking should act on all the travel range of the spring.
- The system will continue to be available in the support housing throughout the life cycle of the spring, so that it allows for blocking whenever required.

VARIABLE LOAD SPRING SUPPORTS

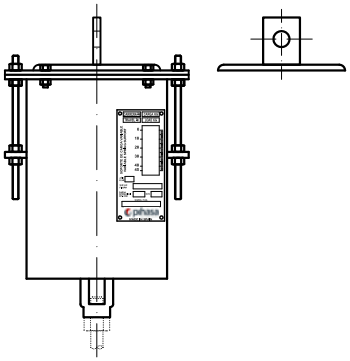
SECTION D
23

SPECIAL CORROSION RESISTANT VARIABLE SPRINGS WITH CONTINUOUS BLOCKING SYSTEM

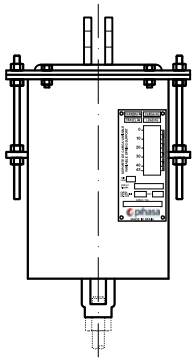
TYPE A



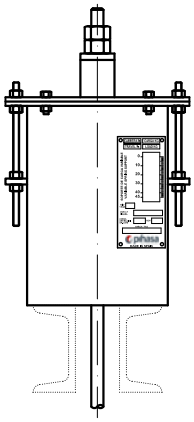
TYPE B



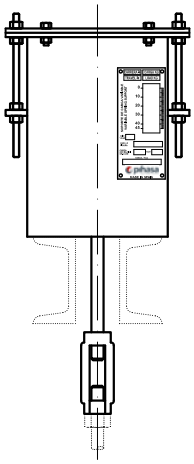
TYPE C



TYPE D



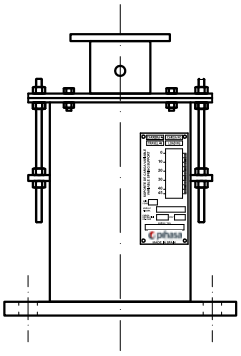
TYPE E



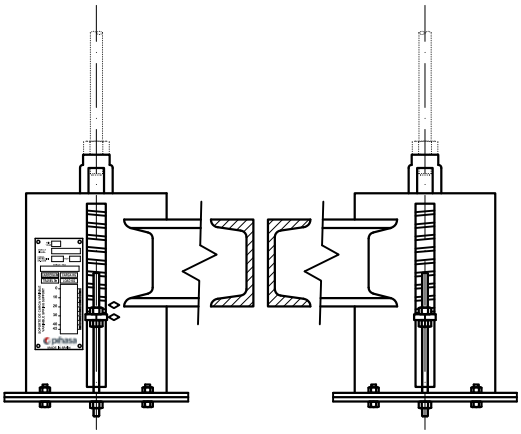
N.B.:

The welded assembly for type E is not considered.

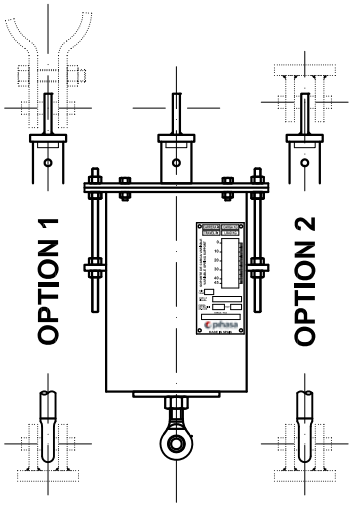
TYPE F



TYPE G



TYPE H



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1.- BLOCKING PROCESS:

1.1 Having completed the surface finish operations (PIHASA standards or any specified by the client), proceed to blocking the support. The rods and nuts are electro-galvanized to ensure protection against corrosion.

1.2 Once the spring has been calibrated to its cold preset load/position, tighten up the lower and upper nuts on the guides against the load plate.

1.3 The upper side of the load plate should coincide with the installation load mark or cold mark of the scaleplate.

2.- INSTALLATION INSTRUCTIONS - UNBLOCKING THE SYSTEM:

Please first read sheets D7-D13 for a description of the different types. The blocking system does not affect the way of installing the support, but only affects the way of blocking and unblocking it.

The upper and lower blocking nuts should be in permanent contact with the load plate until such time as it is decided to proceed with the unblocking manoeuvres, which should be carried out once known that no loads other than operational loads are going to occur, such as in the hydraulic test, during cleaning operations or in the course of other situations.

The unblocking process involves following these steps:

- First, loosen the lower blocking nuts and turn them (on both sides) till they reach the end of the spring travel, as indicated on the support scaleplate.

- Then, tighten up the support to reach the installation or cold load (weight of the piping at the point where the support is installed). This operation involves:

  - Acting on the adjusting turnbuckles (types A-B-C-E or G).
  - Acting on the upper nuts on the hanging rod on supports installed on the structure (Type D).
  - Acting on the threaded load column on supports installed on the ground (Type F).

- The installation load is reached when the load plate starts to move downwards.

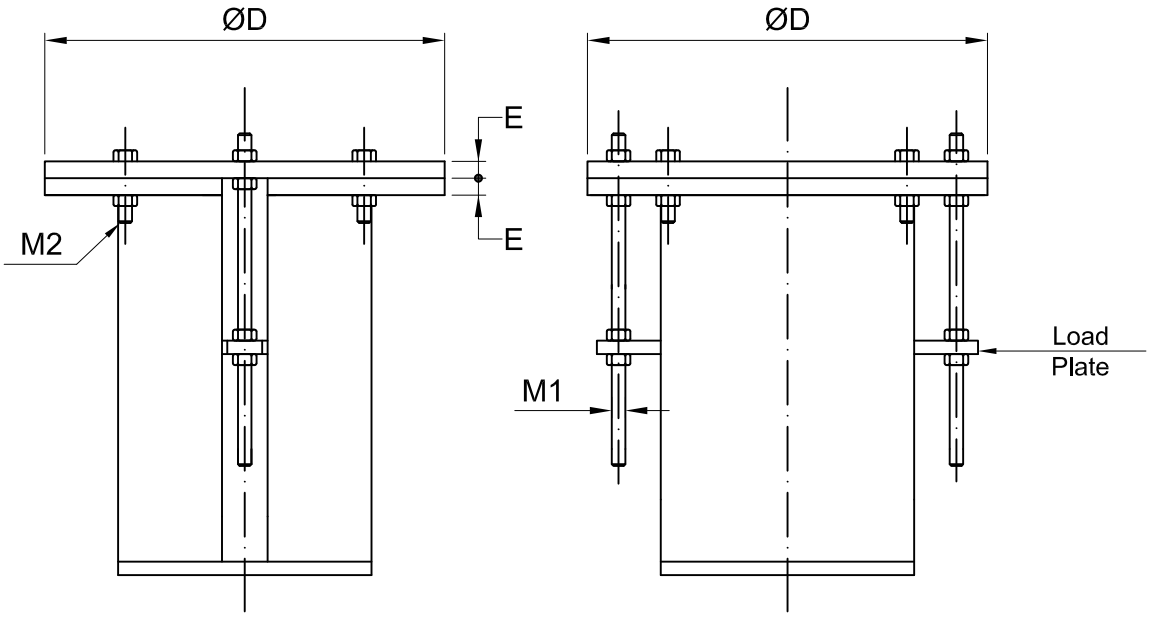
- The final step is to loosen the upper blocking nuts until reaching the start of the spring travel: point “O” indicated on the label.

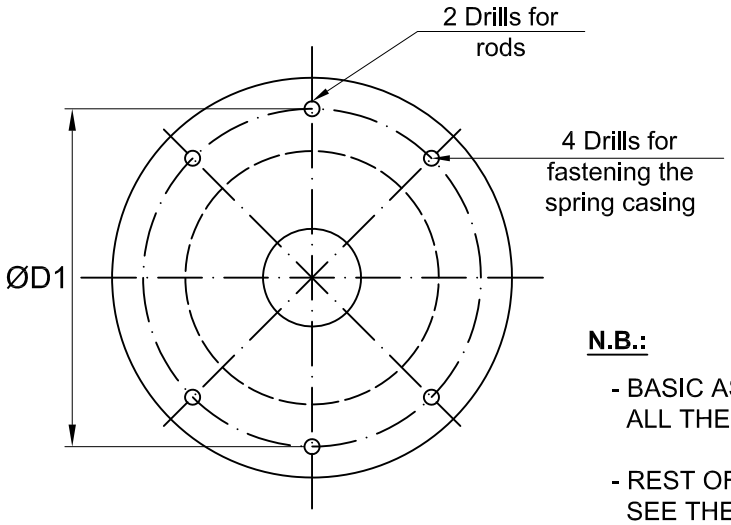
SUPPLEMENTARY NOTES:

- For any subsequent operation on the piping system, it is essential to first block the support in order to prevent modifications in the work conditions of the support. This is achieved by tightening the upper and lower blocking nuts until they come into contact with the load plate. Then, unblock by following the steps in point 2 of these instructions.

- The continuous blocking system on PIHASA's variable load supports makes it possible to insert travel limits. These limits can be set to avoid the spring going past certain points (upwards or downwards) if this is required by the engineering company. Quite simply, this is achieved by setting the upper and/or lower blocking nuts in the required position.

CORROSION RESISTANT VARIABLE LOAD SUPPORTS WITH CONTINUOUS BLOCKING SYSTEM





N.B.:

- BASIC ASSEMBLY APPLIES FOR ALL THE DIFFERENT MODELS.

- REST OF DIMENSIONS: SEE THE CORRESPONDING TYPE IN PREVIOUS PAGES D-14 TO D-21.

SIZE	ØD	ØD1	E	M1	M2
1 / 5	145	124	8	M10	M8
6 / 10	205	174	10	M16	M12
11 / 14	260	216	15	M20	M16
15 / 17	360	300	20	M27	M22
18 / 21	455	385	25	M36	M27

OPERATION AND MAINTENANCE RECOMMENDATIONS FOR SPRING SUPPORTS:

In the course of the normal operation of elastic supports (variable load or constant load spring supports), there is no need for a direct action on the same during service or operation in the plant. But on the other hand, preventive maintenance tasks are recommended to be performed on a regular basis. These involve a regular visual inspection (this can often be done using binoculars) to evaluate the general status of cleanness, rust, as well as to detect any potential important anomalies such as deformed components, the presence of external interferences limiting movement, loose and unthreaded parts, etc.

In the event of detecting anomalies in the course of the visual inspection, or as a recommended practice once every 5-10 years, and more frequently in corrosive conditions more prone to rusting or environmental fouling, or in the case of significant vibrations, or pressure shocks, we suggest acting physically on each spring support during plant shutdowns ("cold inspection"), performing the following activities:

- Cleaning, removing grease and fouling.
- Retouch painting.
- Greasing threaded parts.
- Replacing scaleplates (if lost or deteriorated).
- Check tags and markings.
- Check the position of the load indicator and compare with the theoretical position (cold or installation position) and adjust using the spring adjustment elements to reach the theoretical position if appropriate (evaluated by the technical department).
- Any other incident, such as: interferences, degrees of rust, etc.

After these inspections, it is advisable to draft historical reports. In the course of visual inspections or direct checks, when noting a notable deterioration or highly significant or recurrent deviations from the work positions on the load indicator, consideration should be given to replacing the support with a new one or, alternatively, carry out a more thorough revision of the supports.

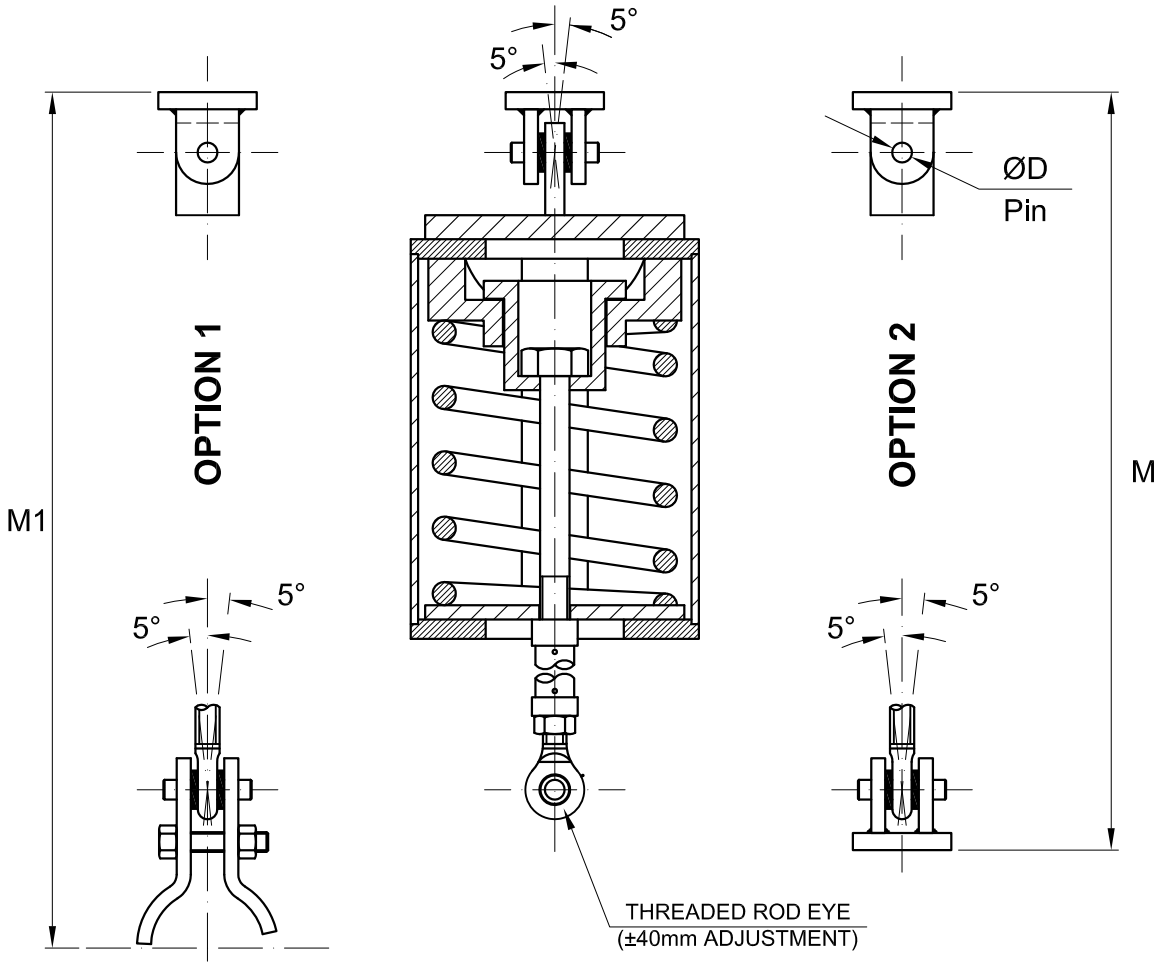
Revisions are more complete inspections, with the following characteristics:

* Carried out by specialised companies during the programmed maintenance stops.
* In addition to the regular periodic inspection activities, the following operations are performed:
  - Disassemble variable or constant load supports in order to proceed to internal and external cleaning.
  - Full calibration of variable and constant spring supports obtaining load-displacement functional graphs.
  - These graphs show the "k" spring rate for the variable supports and the variability of load in the constants, apart from the operating load deviation for both supports.
  - All the information compiled is included in a final revision Dossier, where all the comments and recommendations that the company specializing in inspections considers essential are noted, based on objective data (relevant regulations) and acceptance criteria arising from the experience itself.

SPRING SWAY BRACES

FIG.: APV

SECTION D 28



SIZE No.	LOAD (Kg)		M (mm)		ØD (mm)	MAX. MOVEMENTS (mm)	STRUCTURE CONNECTION (Fig. 2400)
	MIN.	MAX.	MIN.	MAX.			
1	22	70	560	3000	12	±50	00
2	50	150	570	3000	12	±50	00
3	125	350	660	3000	15	±50	0
4	280	850	800	3000	25	±50	1
5	650	1900	925	3000	25	±50	1
6	1500	4500	1100	3000	25	±50	2

APPLICATION: As an element for mitigating vibrations in pipelines and equipment.

MANUFACTURE: According to the dimensions indicated in the table. Can be manufactured for load capacities of up to 10000 kg, on special order. Likewise, they can be manufactured for other assembly arrangements, with or without ball joints.

ORDER FORM:

- Name.
- Figure y size.
- Estimated operating load.
- Option.
- Dimension "M" or "M1".
- Pipe size, quality, operating temperature and insulation thickness, for option 1.

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0	12/01/85	INFORMATION	JRS	EAR

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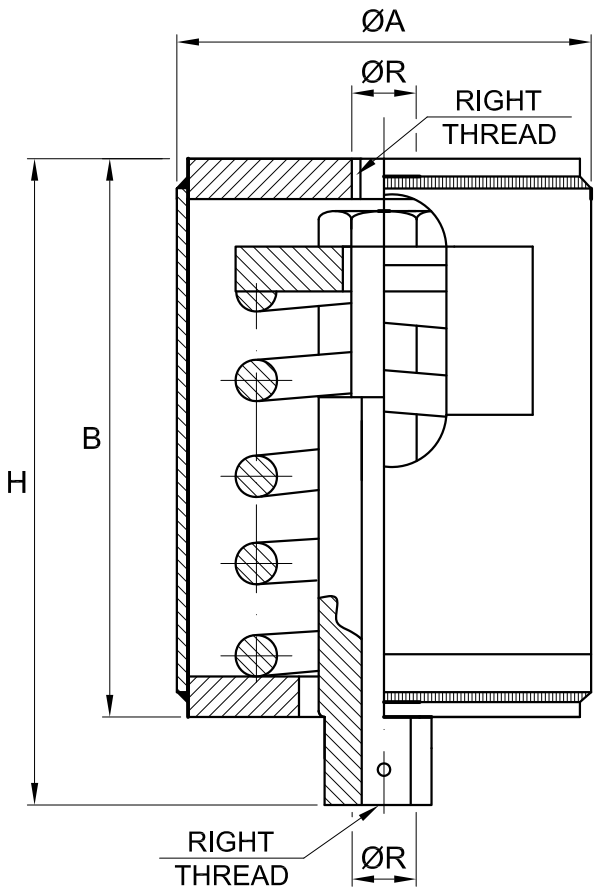
SMALL SPRING

FIG.: 2500

SECTION D 29



SIZE	SPRING RATE (Kg/mm)	ØA (mm)	B (mm)	H (mm)	ØR (mm)	MAX. REC. LOAD (Kg)
1	0,72	42	102	118	M10	22
2	1,28	42	129	142	M10	38
3	2,31	60	130	170	M12	68
4	3,83	60	171	184	M12	122

APPLICATION: To support light loads, with a maximum travel of 32 mm.

ORDER FORM:

- Name.
- Figure.
- Size.

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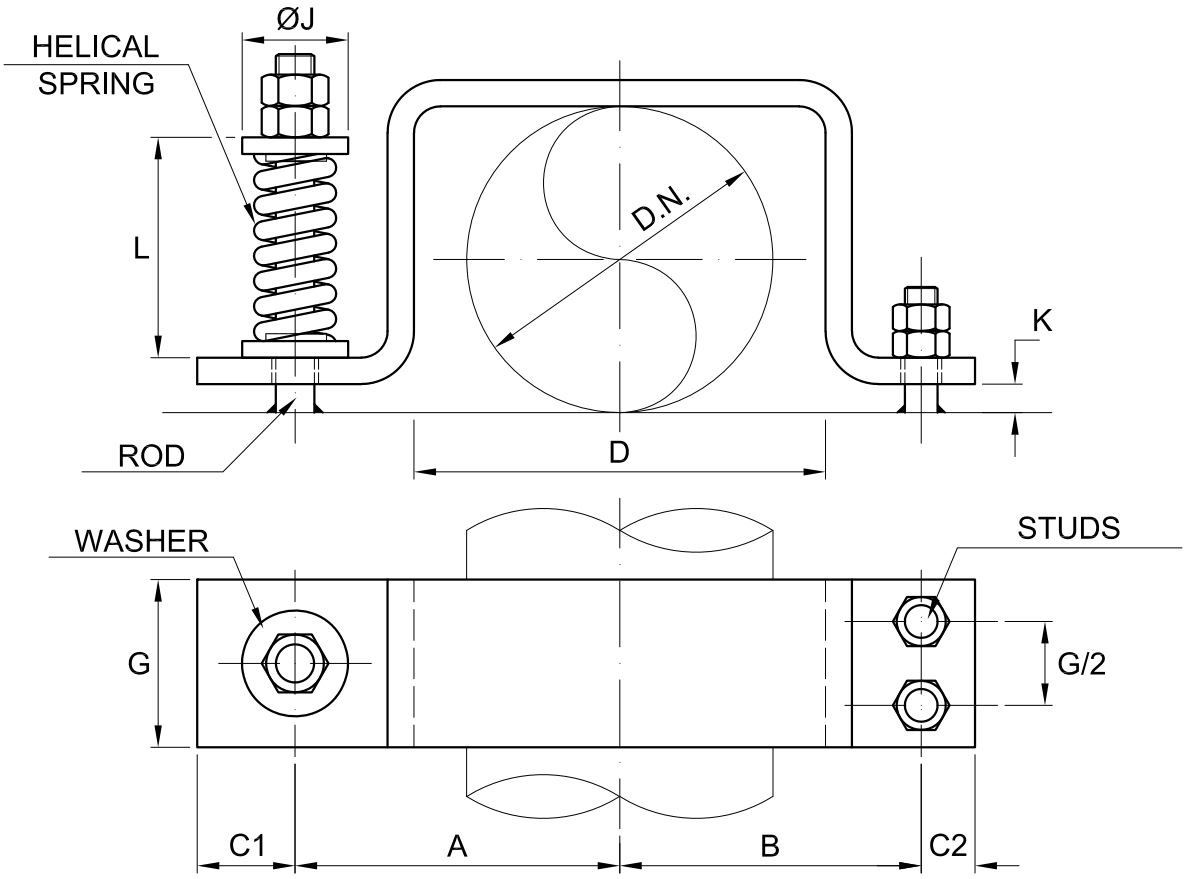
SPRING ANTI-VIBRATING CLAMP | FIG.: 2260 | SECTION D 30



D.N.	A (mm)	B (mm)	C1 (mm)	C2 (mm)	D (mm)	G (mm)	ØJ (mm)	K (mm)	SPRING	SPRING RATE (Kg/mm)	ROD / STUD	LOAD (Kg) MIN.	LOAD (Kg) MAX.	L (mm) MIN.	L (mm) MAX.	WEIGHT (Kg)
2"	110	90	35	15	100	60	58	10	Nº 1	3.7	M12 / M10	30	110	132	154	2,75
2 1/2"	115	100	35	15	120	60	58	12	Nº 1	3.7	M12 / M10	30	110	132	154	3,1
3"	125	110	35	15	140	60	58	12	Nº 1	3.7	M12 / M10	30	110	132	154	3,5
4"	160	120	50	24	160	100	95	15	Nº 2	10.7	M16 / M12	70	285	140	161	7,5
5"	180	140	50	24	190	100	95	15	Nº 2	10.7	M16 / M12	70	285	140	161	8,5
6"	195	155	50	24	225	100	95	15	Nº 2	10.7	M16 / M12	70	285	140	161	9,5
8"	225	185	50	24	275	100	95	15	Nº 2	10.7	M16 / M12	70	285	140	161	11,5
10"	265	230	50	30	340	100	90	20	Nº 3	21.2	M20 / M16	160	640	132	155	17
12"	280	250	50	30	385	100	90	20	Nº 3	21.2	M20 / M16	160	640	132	155	20,5
14"	300	265	50	30	415	100	90	20	Nº 3	21.2	M20 / M16	160	640	132	155	23
16"	330	305	50	30	470	100	90	25	Nº 3	21.2	M20 / M16	160	640	132	155	29
18"	360	335	50	30	525	120	90	25	Nº 3	21.2	M20 / M16	160	640	132	155	35
20"	385	360	50	30	575	120	90	25	Nº 3	21.2	M20 / M16	160	640	132	155	37

APLICATION: As an element for mitigating vibrations in pipelines. The load level, adjusted by tightening nuts on the spring, should be set by the engineering company, within the specified range.

ORDER FORM:

- Name.
- Figure.
- Pipe diameter.

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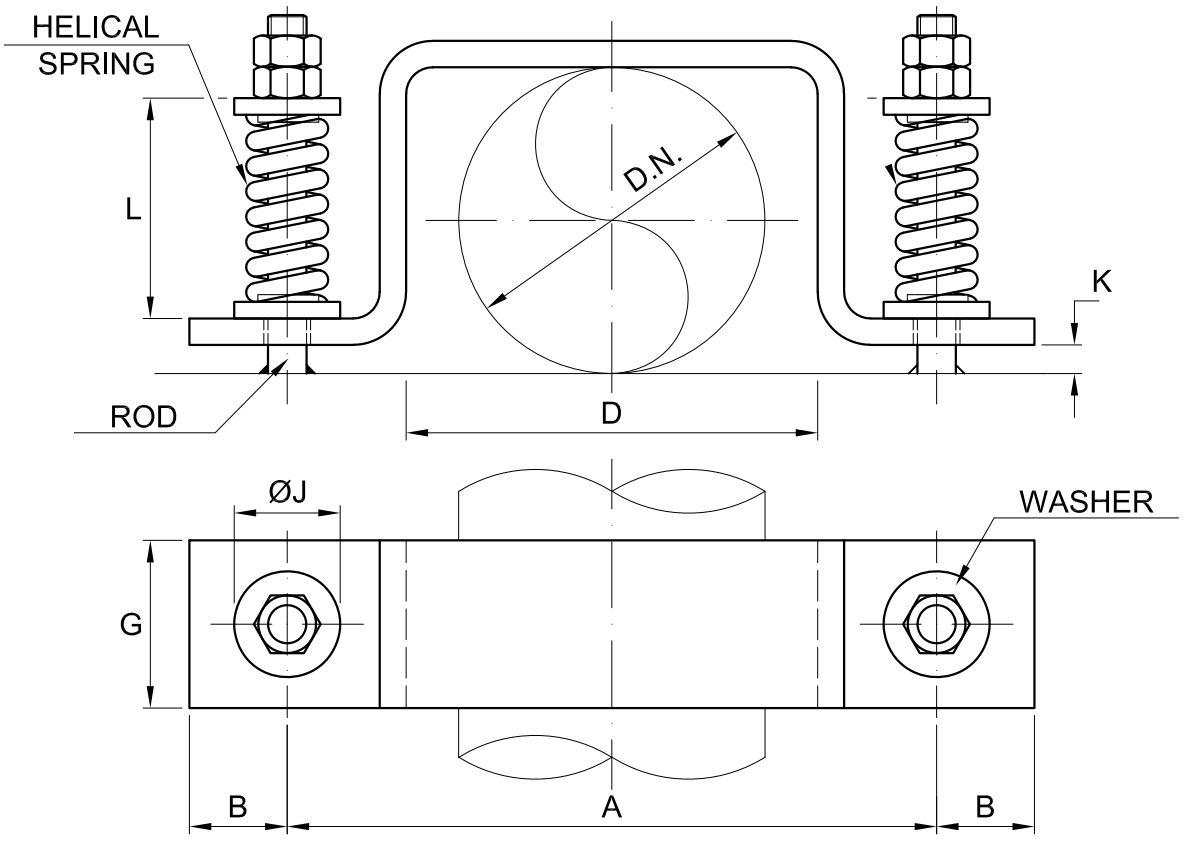
DOUBLE-SPRING ANTI-VIBRATING CLAMP

FIG.: 2261

SECTION D 31



D.N.	A (mm)	B (mm)	D (mm)	G (mm)	ØJ (mm)	K (mm)	SPRING	SPRING RATE (kg/mm)	ROD	LOAD PER SPRING (Kg)		L (mm)		WEIGHT (Kg)
										MIN.	MAX.	MIN.	MAX.	
2"	220	35	100	60	58	10	Nº 1	3.7	M12	30	110	132	154	4,1
2 1/2"	230	35	120	60	58	12	Nº 1	3.7	M12	30	110	132	154	4,4
3"	250	35	140	60	58	12	Nº 1	3.7	M12	30	110	132	154	4,9
4"	280	35	160	60	58	15	Nº 1	3.7	M12	30	110	132	154	8,4
5"	360	50	190	100	95	15	Nº 2	10.7	M16	70	285	140	161	11,5
6"	390	50	225	100	95	15	Nº 2	10.7	M16	70	285	140	161	12,5
8"	450	50	275	100	95	15	Nº 2	10.7	M16	70	285	140	161	14,5
10"	530	50	340	100	95	20	Nº 2	10.7	M16	70	285	140	161	20
12"	560	50	385	100	95	20	Nº 2	10.7	M16	70	285	140	161	22
14"	595	50	415	100	95	20	Nº 2	10.7	M16	70	285	140	161	23
16"	660	50	470	100	90	25	Nº 3	21.2	M20	160	640	132	155	33,5
18"	720	50	525	120	90	25	Nº 3	21.2	M20	160	640	132	155	39
20"	770	50	575	120	90	25	Nº 3	21.2	M20	160	640	132	155	41

APPLICATION: As an element for mitigating vibrations in pipelines. The load level, adjusted by tightening nuts on the spring, should be set by the engineering company, within the specified range.

ORDER FORM:

- Name.
- Figure.
- Pipe diameter.

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SECTION E

CONSTANT LOAD SPRING SUPPORTS

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CONTENTS

CONSTANT LOAD SUPPORTS

SECTION E
1

As a result of the collaboration agreement with the company CARPENTER AND PATERSON, leading manufacturer of this type of equipment, PIHASA supplies the market with leading edge technology elements, such as constant load spring supports.

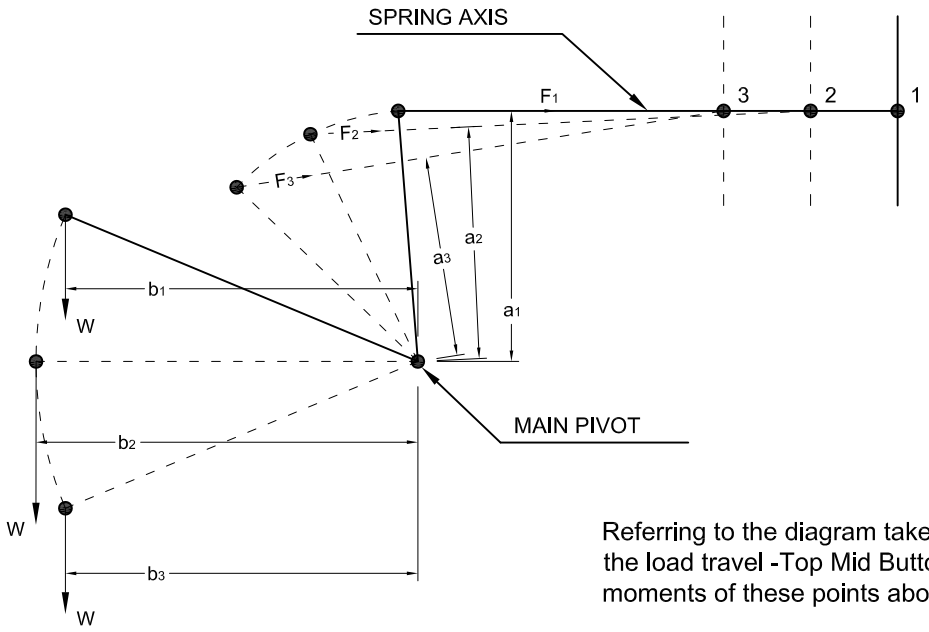
GENERAL DESCRIPTION:

The Constant Effort Support designed and manufactured by Carpenter and Paterson incorporates the latest desing concepts, resulting in a constant supporting effort through the total travel of the unit.

The simplifield construction together with the established principle of a compression spring working in conjunction with a bell crank lever, achieves a mathematically perfect counter-balancing of spring and load moments about the main pivot point.

With a fixed spring housing of substantial construction the unit can be installed in many arrangements. The spring housing prevents the ingress of foreign bodies such as construction debris, thus reducing the danger of damage or restriction of the unit's function.

The Constant Support is based on a simple mechanical principle:
In order to produce a Constant Supporting Effect, the load moment about the Main Pivot must be counter-balanced by an equal spring moment throughout the travel range.



Referring to the diagram take three positions of the load travel -Top Mid Buttom- and equate the moments of these points about the Main Pivot.

$$F_1 a_1 = W b_1$$
$$F_2 a_2 = W b_2$$
$$F_3 a_3 = W b_3$$

$$\frac{F_1 a_1}{b_1} = \frac{F_2 a_2}{b_2} = \frac{F_3 a_3}{b_3} = W$$

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CONSTANT LOAD SUPPORTS

STANDARD RANGE:

Carpenter and Paterson Constant Effort Supports are constructed to accommodate loads between 10 Kg and 33500 Kg with a standard range of travels from 40 mm to 610 mm in 10 mm increments.

Constant Supports are manufactured having a deviation of ±5 per cent of the specified load.

Upper and lower travel stops are incorporated in all units to prevent excessive overtravel.

All supports are fitted with a cleary visible travel scale.

SPECIAL RANGE:

Special Constant Supports are designed to suit customer's specific requirements, i.e. higher loads, travels and configurations other than those indicated in the standard range.

LOAD ADJUSTMENT:

Although the supports are preset to the customer's specified load and travel, it is sometimes necessary to adjust this preset load to accommodate minor variations in actual site conditions. A simple operation of turning the load adjuster screw in the appropriate direction to increase or decrease the load is all necessary. The amount of adjustment is shown on the adjacent scale calibrated in 2 per cent divisions. The maximum adjustment being ±20 per cent of the mean load.

PRESETTING:

All Constant Supports are fitted with preset pins which are painted red. These pins are factory positioned within the unit to suit the customer's specified installation condition. On completion of installation and prior to removal of the pins, the pipework system can be hydraulically tested or acid cleaned without further deflection of the spring assembly. The preset pins must be removed before commissioning the system (refer to installation instructions).

Our standard presetting pins will enable loads of up to twice the capacity of the support to be taken during the hydraulic testing period.

Should it be necessary to carry loads in excess of this, we must be notified at time of ordering to ensure the supports are designed with adequate safety margins.

INFINITELY VARIABLE TRAVEL LOCKING MECHANISM:

The Constant Support may be fitted with an Infinitely variable locking device (within the travel limits of the unit) that will lock the supports thus preventing upward and downward movement for temporary conditions of underload or overload.

The locking mechanism is only incorporated when specified.

The locking mechanism should always be positioned at the extreme of the adjustment before the pipework system is commissioned.

SELECTION:

To select a Constant Support, first calculate the load and travel which the support is to accommodate. It is then good practice to add overtravel to the calculated travel.

Recommended overtravel:
- Add 25 mm for travels up to 125 mm
- For travels in excess of 125 mm add 20% of the calculated travel.

This should then be rounded up to the next whole 10 mm increment giving the total travel thus enabling a standard support to be selected.

To determine the correct constant support refer to the selection table and select a support frame size to accommodate the calculated load and the total travel. It should be noted that the travel given in the table is the total travel, this being the maximum vertical travel the unit will accommodate. When selecting vertical constants, Fig.C51, these should always be selected from the right side of the heavy black line. For vertical constants, Fig. C52, these should always be selected from the right side of the heavy red line.

EXAMPLE:

Actual Load: 1020 Kg
Actual Movement (vertical): 90 mm

Total Travel = 90 + 25 = 115, rounded up to next whole 10 mm increment = 120 mm.

USING THE SELECTION TABLE (PAGES E7 TO E10):

Locate Total Travel Column of 120 mm, and follow down column for next load up from 1020 Kg. This reads 1061 Kg. Next, move horizontally to the left under column headed "Constant Support Size". In this example the selected unit would be size 22.

CONSTANT LOAD SUPPORTS

FINISH:

We consider hot dip galvanized casings as our standard finish. Other corrosion resistant finishes are available if required at extra cost.

MAINTENANCE:

P.T.F.E. Dry bearings are used on all pivoting points and are totally enclosed, no maintenance or lubrication is required.

INFORMATION REQUIRED WHEN ORDERING:

- Quantity Required.
- Figure Nº.
- Frame Size.
- Drop Rod Size and Threaded form if not standard (standard metric coarse).
- Mounting Type.
- Operating Load.
- Hydro Test Load.
- Pre-set Position.
- Finish if not standard.
- Actual travel.
- Total travel.
- Travel Direction (Up / Down).

LONG TRAVEL CONSTANTS:

On occasions it may be necessary to use a constant support with a total travel which exceeds the standard travel range shown in our selection table. To determine the size of a constant support with a total travel larger than the standard range, the following should be carried out:

Calculate revised loads

$$\text{Revised Load} = \frac{\text{Operating Load}}{100} \times \text{Total Travel}$$

Using the revised load, select the correct size constant support from the 100 mm total travel column within the selection table.

Example:

Operating Load = 146 Kg.
Total travel = 450 mm.

$$\text{Revised load} = \frac{146}{100} \times 450 = 657 \text{ Kg.}$$

Select unit from 100 total travel column.

Unit Size = 16.
Unit Required = Size 16
Total Travel 450 mm.
Operating load 146 Kg.

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INSTALLATION INSTRUCTIONS:

1.0- Attachment to Supporting Steelwork.

The Constant Support Units are attached to the supporting steelwork by means of welding or bolting.

2.0- Connecting and Loading of Constant Support Units.

2.1- In the case of Constant Support Units figures C50-C51-C52-C53 utilising sling rods, these should be connected between the equipmen support attachment and the support unit connector (turnbuckle o yoke). The load is transferred from the temporary installation condicion to the Constant Support Unit by adjustment of the turnbuckle or yoke arrangement.
The correct load setting is attained by adjusting the turnbuckle or yoke arrangement until the preset pin is easily removed.

2.2- In the case of Constant Support Units figure C54 and C55 where the equipment is supported from below, the Constant Support Units is positioned between the equipment support bracket and supporting steelwork, differences in height are accommodated using the height adjusting nut. The load is transferred from the temporary installation condition to the Constant Support Unit by further adjustment of the height adjusting nut. The correct load setting is attained by rotation of the height adjusting nut until the preset pin is easily removed.

3.0- Pre-Commissioning.

3.1- The red painted preset pins should normally remain in position for any pre-commissioning overload condition, but must be removed prior to operation and stored for future use.

4.0- Load Adjustment.

4.1- In the event that the load is greater or lesser than the load for which the unit is calibrated, it will be necessary to make use of the load adjustment facility. The load adjuster allows for an increase or decrease of load carrying capacity of plus or minus 20% of the mean load. Rotating the load adjuster nut in the appropriate direction will increase or decrease the load accordingly. The load adjustment scale is calibrated in 2% divisions.

5.0- Operating.

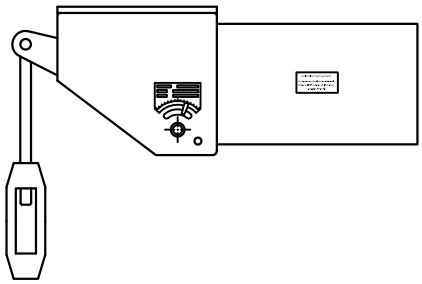
5.1- Prior to start up the following checks must be carried out:
5.1.1- All preset pins are removed and stored.
5.1.2- The unit travel indicator is set at the correct cold setting.

5.2- During normal runnig operation a check should be made to ensure that the unit travel indicator is at the correct hot position.

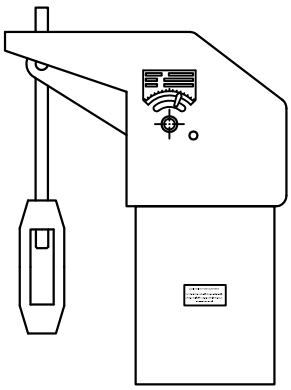
5.3- A periodic check during the first few months of operation should be made to ensure that equipment movement is within the travel range of the unit. Minor site adjustments may be necessary during this period.

CONSTANT LOAD SUPPORT MODELS

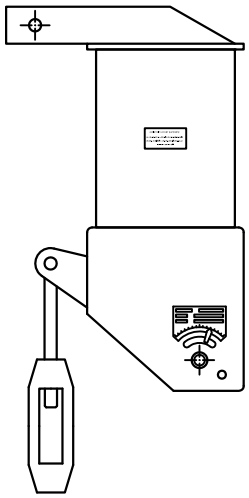
C50



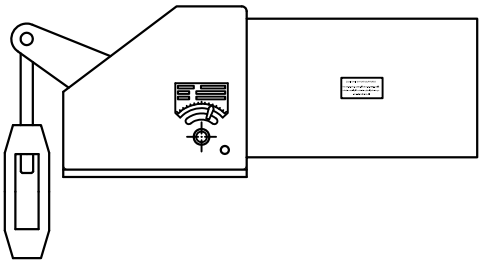
C51



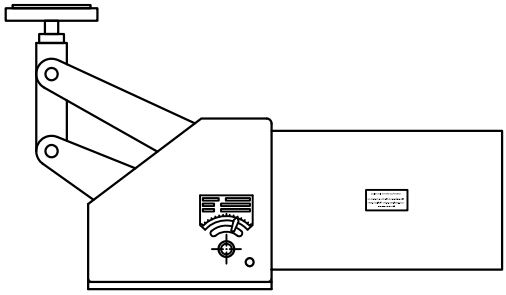
C52



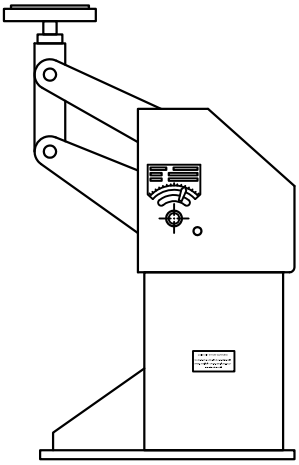
C53



C54



C55



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CONSTANT LOAD SUPPORTS

SECTION E
7

Constant effort supports - Selection Table
Standard travel range - Sizes 1 to 33

LOADS IN Kg.

For the selection of vertical Mod.
* C51: From right side of heavy black line.
* C52: From right side of heavy red line.

Constant Support Size	TOTAL TRAVEL IN mm.																										
	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
Min. Load	61	49	41	35	31	27	25	22	20	19	18	16	15	14	14	13	12	12	11	11	10	10	10	9	9	9	8
1	78	63	52	45	39	35	31	28	26	24	22	21	20	18	17	16	16	15	14	13	13	12	12	11	11	11	10
2	100	80	67	57	50	44	40	36	33	31	29	27	25	23	22	21	20	19	18	17	17	16	15	15	14	14	13
3	127	101	84	72	63	56	51	46	42	39	36	34	32	30	28	27	25	24	23	22	21	20	20	19	18	17	17
4	161	129	107	92	81	72	64	59	54	50	46	43	40	38	36	34	32	31	29	28	27	26	25	24	23	22	21
5	204	164	136	117	102	91	82	74	68	63	58	55	51	48	45	43	41	39	37	36	34	33	32	30	29	28	27
6	260	208	173	149	130	116	104	95	87	80	74	69	65	61	58	55	52	50	47	45	43	42	40	38	37	36	35
7	331	265	221	189	166	147	133	121	110	102	95	88	83	78	74	70	66	63	60	58	55	53	51	49	47	46	44
8	422	337	281	241	211	187	169	153	141	130	120	112	105	99	94	89	84	80	77	74	70	68	65	63	60	58	56
9	537	430	358	307	269	239	215	195	179	165	153	143	134	126	119	113	107	102	98	93	90	86	83	80	77	74	72
10	680	544	453	388	340	302	272	247	227	209	194	181	170	160	151	143	136	129	124	118	113	109	105	101	97	94	91
11	864	691	576	494	432	384	346	314	288	266	247	230	216	203	192	182	173	165	157	150	144	138	133	128	124	119	115
12	1097	877	731	627	548	487	439	399	366	337	313	292	274	258	244	231	219	209	200	191	183	176	169	163	157	151	146
13			824	706	618	549	494	449	412	380	353	330	309	291	275	260	247	235	225	215	206	198	190	183	176	170	165
14			927	795	696	618	556	506	464	428	397	371	348	327	309	293	278	265	253	242	232	223	214	206	199	192	185
15			1041	892	781	694	624	568	520	480	446	416	390	367	347	329	312	297	284	272	260	250	240	231	223	215	208
16			1152	988	846	768	691	628	576	532	494	461	432	407	384	364	346	329	314	301	288	277	266	256	247	238	230
17			1271	1090	953	847	763	693	636	587	545	508	477	449	424	401	381	363	347	332	318	305	293	283	273	263	254
18			1444	1238	1083	963	866	788	722	666	619	578	542	510	481	456	433	413	394	377	361	347	333	321	309	299	289
19			1640	1406	1230	1093	984	894	820	757	703	656	615	579	547	518	492	469	447	428	410	394	378	364	351	339	328
20			1786	1531	1339	1191	1071	974	893	824	765	714	670	630	595	564	536	510	487	466	446	429	412	397	383	369	357
21			1943	1666	1457	1296	1166	1060	972	897	833	777	729	686	648	614	583	555	530	507	486	466	448	432	416	402	389
22			2122	1819	1591	1415	1273	1157	1061	979	909	849	796	749	707	670	637	606	579	554	530	509	490	472	455	439	424
23			2315	1984	1736	1543	1389	1263	1157	1068	992	926	868	817	772	731	694	661	631	604	579	556	534	514	496	479	463
24			2516	2156	1887	1677	1510	1372	1258	1161	1078	1006	943	888	839	794	755	719	686	656	629	604	581	559	539	521	503
25			2766	2371	2074	1844	1659	1508	1383	1276	1185	1106	1037	976	922	873	830	790	754	721	691	664	638	615	593	572	553
26			3054	2617	2290	2036	1832	1666	1527	1409	1309	1221	1145	1078	1018	964	916	872	833	797	763	733	705	679	654	632	611
27				2979	2607	2317	2085	1896	1738	1604	1490	1390	1303	1227	1159	1098	1043	993	948	907	869	834	802	772	745	719	695
28				3374	2952	2624	2362	2147	1968	1817	1687	1575	1476	1389	1312	1243	1181	1125	1074	1027	984	945	908	875	844	814	787
29				3687	3226	2868	2581	2346	2151	1985	1843	1721	1613	1518	1434	1358	1290	1229	1173	1122	1075	1032	993	956	922	890	860
30				4016	3514	3124	2811	2556	2343	2162	2008	1874	1757	1654	1562	1480	1406	1339	1278	1222	1171	1124	1081	1041	1004	969	937
31				4378	3831	3405	3065	2786	2554	2357	2189	2043	1915	1803	1703	1613	1532	1459	1393	1332	1277	1226	1179	1135	1095	1057	1022
32				4773	4177	3712	3341	3037	2784	2570	2387	2227	2088	1965	1856	1759	1671	1591	1519	1453	1392	1336	1285	1237	1193	1152	1114
33				5464	4781	4250	3825	3477	3188	2942	2732	2550	2391	2250	2125	2013	1913	1821	1739	1663	1594	1530	1471	1417	1366	1319	1275

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Constant effort supports - Selection Table
Standard travel range - Sizes 34 to 66

LOAD IN Kg.

Constant support size	TOTAL TRAVEL IN mm.																										
	310	320	330	340	350	360	370	380	390	400	410	420	430	440	450	460	470	480	490	500	510	520	530	540	550	560	570
Min. Load																											
1																											
2																											
3																											
4																											
5																											
6																											
7	43	42	40	39	38	37	36	35	34	33	32	32															
8	55	53	51	50	48	47	46	44	43	42	41	40															
9	69	67	65	63	61	60	58	57	55	54	52	51															
10	88	85	82	80	78	76	74	72	70	68	66	65															
11	112	108	105	102	99	96	94	91	89	87	84	82															
12	142	137	133	129	125	122	119	116	113	110	107	105															
13	159	154	150	145	141	137	134	130	127	124	121	118															
14	179	174	169	163	159	154	150	146	143	139	136	132															
15	201	195	189	184	178	173	169	164	160	156	152	149															
16	223	216	209	203	197	192	187	182	177	173	169	165															
17	246	238	231	224	218	212	206	201	196	191	186	182															
18	279	271	262	255	247	241	234	228	222	217	211	206															
19	317	307	298	289	281	273	266	259	252	246	240	234	229	224	219	214	209	205	201	197							
20	346	335	325	315	306	298	289	282	275	268	261	255	249	243	238	233	228	223	219	214							
21	376	364	353	343	333	324	315	307	299	292	284	278	271	265	259	253	248	243	238	233							
22	411	398	386	374	364	354	344	335	326	318	310	303	296	289	283	277	271	265	260	255							
23	448	434	421	408	397	386	375	366	356	347	339	331	323	316	309	302	296	289	283	278							
24	487	472	457	444	431	419	408	397	387	378	368	360	351	343	336	328	321	315	308	302							
25	535	519	503	488	474	461	448	437	425	415	405	395	386	377	369	361	353	346	339	332							
26	591	573	555	539	523	509	495	482	470	458	447	436	426	416	407	398	390	382	374	366							
27	673	652	632	613	596	579	564	549	535	521	509	496	485	474	463	453	444	434	426	417							
28	762	738	716	695	675	656	638	622	606	591	576	562	549	537	525	514	503	492	482	472							
29	833	807	782	759	737	717	698	679	662	645	630	615	600	587	574	561	549	538	527	516							
30	907	879	852	827	803	781	760	740	721	703	686	669	654	639	625	611	598	586	574	562							
31	989	958	929	901	876	851	828	807	786	766	748	730	713	697	681	666	652	639	626	613							
32	1078	1044	1012	983	955	928	903	879	857	835	815	795	777	759	742	726	711	696	682	668							
33	1234	1195	1159	1125	1093	1063	1034	1007	981	956	933	911	890	869	850	832	814	797	781	765							

CONSTANT LOAD SUPPORTS

SECTION E
8

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CONSTANT LOAD SUPPORTS

SECTION E
9

Constant effort supports - Selection Table
Standard travel range - Sizes 34 to 66

LOAD IN Kg.

For the selection of Vertical Mod.
* C51: From right hand side of heavy black line.
* C52: From right hand side of heavy red line.

Constant support size	TOTAL TRAVEL IN mm.																									
	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340
34	4698	4228	3844	3524	3253	3020	2819	2643	2487	2349	2225	2114	2013	1922	1838	1762	1691	1626	1566	1510	1458	1409	1364	1321	1281	1244
35	5146	4632	4211	3860	3563	3308	3088	2895	2724	2573	2438	2316	2206	2105	2014	1930	1853	1781	1715	1654	1597	1544	1494	1447	1404	1362
36	5850	5265	4787	4388	4050	3761	3510	3291	3097	2925	2771	2633	2507	2393	2289	2194	2106	2025	1950	1880	1816	1755	1698	1645	1596	1549
37	6657	5991	5446	4993	4608	4279	3994	3744	3524	3328	3153	2996	2853	2723	2605	2496	2396	2304	2219	2140	2066	1997	1933	1872	1815	1762
38	7259	6533	5939	5444	5025	4666	4355	4083	3843	3629	3438	3266	3111	2969	2840	2722	2613	2513	2420	2333	2253	2178	2107	2041	1980	1921
39	7911	7120	6473	5934	5477	5086	4747	4450	4188	3956	3748	3560	3391	3236	3096	2967	2848	2739	2637	2543	2455	2373	2297	2252	2158	2094
40			7060	6471	5973	5547	5177	4853	4568	4314	4087	3883	3698	3530	3376	3236	3106	2987	2876	2773	2678	2588	2505	2427	2353	2284
41			7687	7047	6504	6040	5637	5285	4974	4698	4450	4228	4027	3844	3676	3523	3382	3252	3132	3020	2916	2819	2728	2642	2562	2487
42			8421	7719	7126	6617	6176	5790	5449	5146	4875	4632	4411	4211	4028	3860	3705	3563	3431	3308	3194	3088	2988	2895	2807	2724
43			9573	8776	8100	7522	7020	6582	6194	5850	5542	5265	5015	4787	4578	4388	4212	4050	3900	3761	3631	3510	3397	3291	3191	3097
44			10893	9985	9217	8559	7988	7489	7048	6657	6306	5991	5706	5447	5210	4993	4793	4609	4438	4279	4132	3994	3865	3744	3631	3524
45			11878	10888	10050	9332	8710	8166	7685	7259	6876	6533	6222	5939	5681	5444	5226	5025	4839	4666	4505	4355	4215	4083	3959	3843
46			12946	11867	10954	10171	9494	8900	8377	7911	7495	7120	6781	6473	6192	5934	5696	5477	5274	5086	4911	4747	4594	4450	4315	4188
47			14119	12942	11947	11094	10354	9707	9136	8628	8174	7765	7396	7060	6753	6471	6212	5973	5752	5547	5355	5177	5010	4853	4706	4568
48			15376	14095	13010	12081	11276	10571	9949	9396	8902	8457	8054	7688	7354	7047	6765	6505	6264	6041	5832	5638	5456	5285	5125	4975
49			16601	15218	14047	13044	12174	11413	10742	10145	9611	9131	8696	8301	7940	7609	7305	7024	6764	6522	6297	6087	5891	5707	5534	5371
50			18015	16514	15244	14155	13211	12386	11657	11009	10430	9908	9437	9008	8616	8257	7927	7622	7340	7077	6833	6606	6393	6193	6005	5829
51			19377	17762	16396	15225	14210	13322	12538	11842	11218	10657	10150	9689	9267	8881	8526	8198	7894	7612	7350	7105	6876	6661	6459	6269
52			20948	19202	17725	16459	15362	14402	13555	12802	12128	11521	10973	10474	10019	9601	9217	8863	8534	8230	7946	7681	7433	7201	6983	6777
53			22624	20739	19143	17776	16591	15554	14639	13826	13098	12443	11851	11312	10820	10369	9955	9572	9217	8888	8582	8295	8028	7777	7541	7320
54			24090	22083	20384	18928	17666	16562	15588	14722	13947	13250	12619	12045	11521	11041	10600	10192	9815	9464	9138	8833	8548	8281	8030	7794
55			25838	23685	21863	20301	18948	17764	16719	15790	14959	14211	13534	12919	12357	11843	11369	10932	10527	10151	9801	9474	9168	8882	8613	8359
56			27713	25404	23450	21775	20323	19053	17932	16936	16044	15242	14516	13857	13254	12702	12194	11725	11291	10887	10512	10161	9834	9526	9238	8966
57			29724	27247	25151	23354	21797	20435	19233	18164	17208	16348	15570	14862	14216	13623	13078	12575	12110	11677	11275	10899	10547	10218	9908	9616
58			31881	29224	26976	25049	23379	21918	20629	19483	18457	17534	16699	15940	15247	14612	14027	13488	12988	12524	12092	11689	11312	10959	10627	10314
59							24578	23042	21686	20482	19404	18433	17556	16758	16029	15361	14747	14180	13654	13167	12713	12289	11893	11521	11172	10843
60							25838	24224	22799	21532	20399	19379	18456	17617	16851	16149	15503	14907	14355	13842	13365	12919	12503	12112	11745	11399
61							27164	25466	23968	22637	21445	20373	19403	18521	17716	16977	16298	15671	15091	14552	14050	13582	13144	12733	12347	11984
62							28557	26772	25198	23798	22545	21418	20398	19471	18624	17848	17134	16475	15865	15299	14771	14279	13818	13386	12981	12599
63							29723	27866	26226	24769	23466	22292	21231	20266	19385	18577	17834	17148	16513	15923	15374	14862	14382	13933	13511	13113
64							30937	29003	27297	25781	24424	23203	22098	21093	20176	19336	18562	17848	17187	16573	16002	15468	14969	14502	14062	13649
65							32200	30187	28412	26833	25421	24150	23000	21954	21000	20125	19320	18577	17889	17250	16655	16100	15581	15094	14636	14206
66							33515	31420	29572	27929	26459	25136	23939	22851	21857	20947	20109	19335	18619	17954	17335	16757	16217	15710	15234	14786

CONSTANT LOAD SUPPORT

Constant effort supports - Selection Table
Standard travel range - Sizes 34 to 66

LOAD IN Kg.

Constant support size	TOTAL TRAVEL IN mm.																													
	350	360	370	380	390	400	410	420	430	440	450	460	470	480	490	500	510	520	530	540	550	560	570	580	590	600	610
34	1208	1175	1143	1113	1084	1057	1031	1007	983	961	940	919	900	881	863	846	829	813	798	783	769	755	742	729	717	705	693
35	1323	1287	1252	1219	1188	1158	1130	1103	1077	1053	1029	1007	986	965	945	926	908	891	874	858	842	827	813	799	785	772	759
36	1504	1463	1423	1386	1350	1316	1284	1254	1224	1197	1170	1145	1120	1097	1074	1053	1032	1013	993	975	957	940	924	908	892	876	863
37	1712	1664	1619	1577	1536	1498	1461	1426	1393	1362	1331	1302	1275	1248	1223	1198	1175	1152	1130	1109	1089	1070	1051	1033	1015	999	982
38	1866	1815	1766	1719	1675	1633	1593	1555	1519	1485	1452	1420	1390	1361	1333	1307	1281	1256	1233	1210	1188	1167	1146	1126	1107	1089	1071
39	2034	1978	1924	1874	1826	1780	1737	1695	1656	1618	1582	1548	1515	1483	1453	1424	1396	1369	1343	1319	1295	1271	1249	1228	1207	1187	1167
40	2219	2157	2099	2044	1991	1941	1894	1849	1806	1765	1726	1688	1652	1618	1585	1553	1523	1493	1465	1438	1412	1387	1362	1339	1316	1294	1273
41	2416	2349	2285	2225	2168	2114	2062	2013	1966	1922	1879	1838	1799	1762	1726	1691	1658	1626	1595	1566	1537	1510	1483	1458	1433	1409	1386
42	2647	2573	2504	2438	2375	2316	2259	2206	2154	2105	2059	2014	1971	1930	1890	1853	1816	1781	1748	1715	1684	1654	1625	1597	1570	1544	1519
43	3009	2925	2846	2771	2700	2633	2568	2507	2449	2393	2340	2289	2241	2194	2149	2106	2065	2025	1987	1950	1915	1880	1847	1816	1785	1755	1726
44	3424	3328	3238	3153	3072	2996	2923	2853	2787	2723	2663	2605	2549	2496	2445	2396	2349	2304	2261	2219	2179	2140	2102	2066	2031	1997	1964
45	3733	3629	3531	3438	3350	3266	3187	3111	3038	2969	2903	2840	2780	2722	2666	2613	2562	2513	2465	2420	2376	2333	2292	2253	2214	2178	2142
46	4069	3956	3849	3748	3651	3560	3473	3391	3312	3236	3165	3096	3030	2967	2906	2848	2792	2739	2687	2637	2589	2543	2498	2455	2414	2373	2335
47	4437	4314	4198	4087	3982	3883	3788	3698	3612	3530	3451	3376	3304	3236	3170	3106	3045	2987	2930	2876	2824	2773	2725	2678	2632	2588	2546
48	4832	4698	4571	4451	4337	4228	4125	4027	3933	3844	3759	3677	3599	3524	3452	3333	3316	3253	3191	3132	3075	3020	2967	2916	2867	2819	2773
49	5218	5073	4936	4806	4682	4565	4454	4348	4247	4150	4058	3970	3885	3804	3727	3652	3581	3512	3446	3382	3320	3261	3204	3149	3095	3044	2994
50	5662	5505	5356	5215	5081	4954	4833	4718	4609	4504	4404	4308	4216	4129	4044	3963	3886	3811	3739	3670	3603	3539	3477	3417	3359	3303	3249
51	6090	5921	5761	5609	5465	5329	5199	5075	4957	4844	4737	4634	4535	4441	4350	4263	4179	4099	4022	3947	3875	3806	3739	3675	3613	3552	3494
52	6584	6401	6228	6064	5908	5761	5620	5486	5359	5237	5121	5009	4903	4801	4703	4609	4518	4431	4348	4267	4190	4115	4043	3973	3906	3840	3778
53	7110	6913	6726	6549	6381	6222	6070	5925	5788	5656	5530	5410	5295	5185	5079	4977	4880	4786	4696	4609	4525	4444	4366	4291	4218	4148	4080
54	7571	7361	7162	6974	6795	6625	6463	6309	6163	6023	5889	5761	5638	5521	5408	5300	5196	5096	5000	4907	4818	4732	4649	4569	4491	4417	4344
55	8121	7895	7682	7479	7288	7106	6932	6767	6610	6460	6316	6179	6047	5921	5800	5684	5573	5466	5363	5263	5168	5075	4986	4900	4817	4737	4659
56	8710	8468	8239	8022	7817	7621	7435	7258	7089	6928	6774	6627	6486	6351	6221	6097	5977	5862	5752	5645	5543	5444	5348	5256	5167	5081	4997
57	9342	9082	8837	8604	8384	8174	7975	7785	7604	7431	7266	7108	6957	6812	6673	6539	6411	6288	6169	6055	5945	5839	5736	5637	5542	5449	5360
58	10019	9741	9478	9228	8992	8767	8553	8350	8155	7970	7793	7624	7461	7306	7157	7014	6876	6744	6617	6494	6376	6262	6152	6046	5944	5845	5749
59	10533	10241	9964	9702	9453	9217	8992	8778	8574	8379	8193	8015	7844	7681	7524	7373	7229	7090	6956	6827	6703	6583	6468	6356	6249	6144	6044
60	11074	10766	10475	10199	9938	9689	9453	9228	9013	8809	8613	8426	8246	8075	7910	7752	7600	7453	7313	7177	7047	6921	6800	6682	6569	6460	6354
61	11642	11318	11012	10723	10448	10186	9938	9701	9476	9260	9055	8858	8669	8489	8315	8149	7989	7836	7688	7546	7408	7276	7148	7025	6906	6791	6680
62	12239	11899	11577	11273	10984	10709	10448	10199	9962	9735	9519	9312	9114	8924	8742	8567	8399	8238	8082	7933	7788	7649	7515	7385	7260	7139	7022
63	12739	12385	12050	11733	11432	11146	10874	10615	10369	10133	9908	9692	9486	9289	9099	8917	8742	8574	8412	8256	8106	7962	7822	7687	7557	7431	7309
64	13259	12890	12542	12212	11899	11601	11318	11049	10792	10547	10312	10088	9873	9668	9470	9281	9099	8924	8756	8594	8437	8287	8141	8001	7865	7734	7607
65	13800	13417	13054	12710	12385	12075	11780	11500	11233	10977	10733	10500	10277	10062	9857	9660	9471	9288	9113	8944	8782	8625	8474	8328	8186	8050	7918
66	14363	13964	13587	13229	12890	12568	12261	11969	11691	11425	11172	10929	10696	10473	10260	10054	9857	9668	9845	9310	9140	8977	8820	8668	8521	8379	8241

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CONSTANT LOAD SUPPORT
MODELS C50

SECTION E
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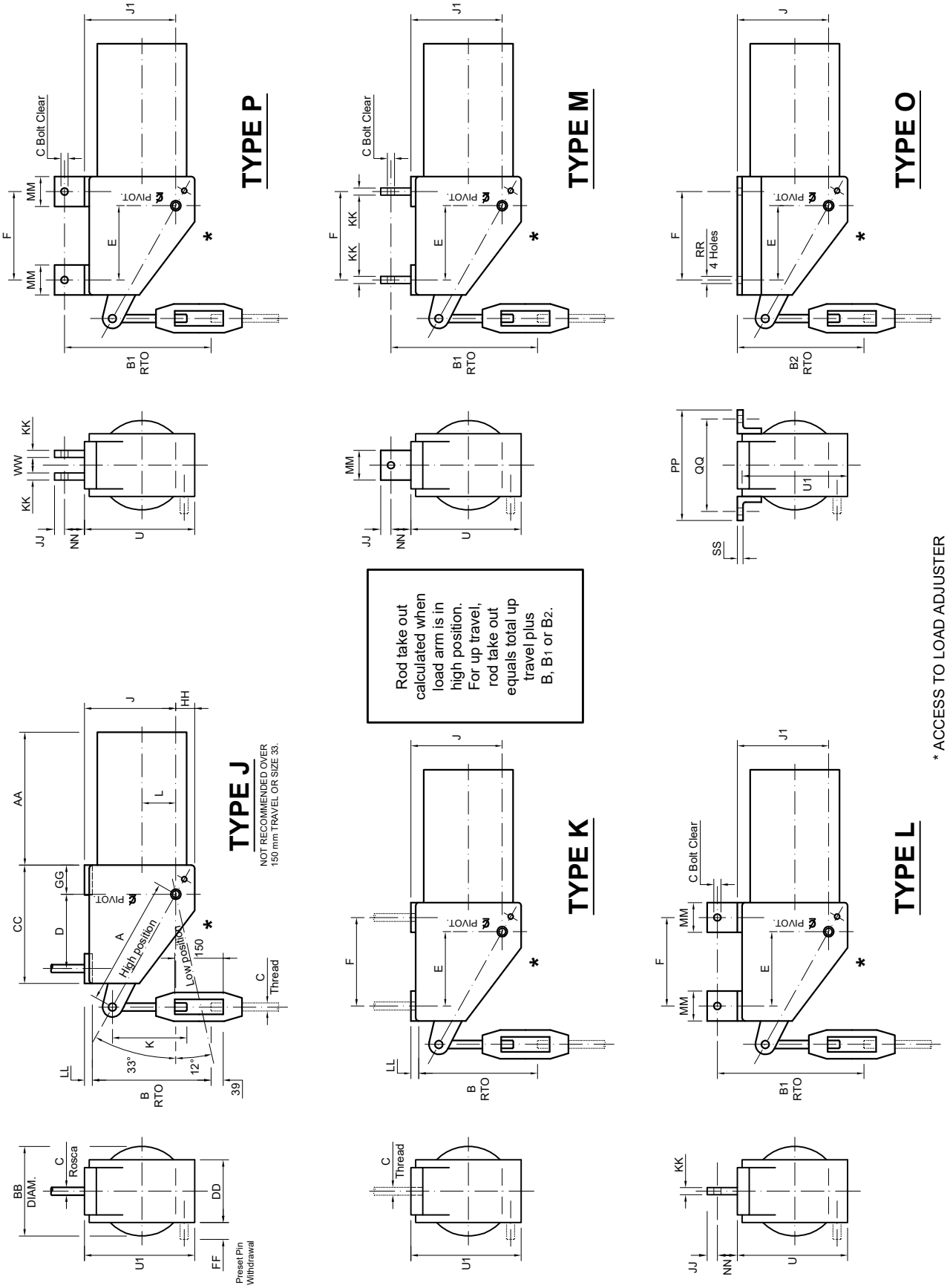

Rod take out calculated when load arm is in high position. For up travel, rod take out equals total up travel plus B, B_1 or B_2.

REV.	DATE	EDITED FOR :	DRAW.	REV.
1	21/07/10	GENERAL REVISION	DDG	EAR
0	20/10/98	INFORMATION	JMD	EAR

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REV.	0	1	
DATE	20/10/98	21/07/10	
EDITED FOR :	INFORMATION	GENERAL REVISION	
DRAW.	JMD	DDG	
REV.	EAR	EAR	

TABLE OF DIMENSIONS - SIZES 1 to 26

SIZE 1 to 6

TRAVEL	A	B	B1	B2	C	D	E	F	J	J1	U	U1
40	54	311	405	326	M12	40	105	140				
50	67	304	400	319	M12	50	105	140				
60	80	296	395	311	M12	60	105	140				
70	94	289	385	304	M12	70	105	140				
80	107	282	380	297	M12	70	105	140				
90	120	275	370	290	M12	80	105	140	130		185	
100	134	267	360	282	M12	95	105	140				
110	147	260	355	275	M12	100	105	140				
120	160	253	350	268	M12	105	105	140				
130	174	245	340	260	M12	115	105	140				
140	187	238	335	253	M12	125	105	140				
150	200	271	330	286	M12	140	105	140	170	130	185	225
160	214	263	320	278	M12		105	140	170	130	185	225
170	227	256	310	271	M12		105	140	170	130	185	225
180	240	249	305	264	M12		105	140	170	130	185	225
190	254	242	300	257	M12		105	140	170	130	185	225
200	267	235	290	250	M12		105	140	170	130	185	225
210	280	228	285	243	M12		105	140	170	130	185	225
220	294	250	275	265	M12		105	140	200	130	185	255
230	307	245	265	260	M12		105	140	200	130	185	255
240	320	235	260	250	M12		105	140	200	130	185	255
250	334	250	255	265	M12		105	140	220	130	185	275
260	347	240	245	255	M12		105	140	220	130	185	275
270	360	255	240	270	M12		105	140	240	130	185	295
280	374	245	230	260	M12		105	140	240	130	185	295
290	387	240	235	255	M12		105	140	240	140	195	295
300	400	230	225	245	M12		105	140	240	140	195	295

SIZE 7 to 12

TRAVEL	A	B	B1	B2	C	D	E	F	J	J1	U	U1
40	54	336	415	356	M20	50	120	155				
50	67	329	410	349	M16	60	120	155				
60	80	321	400	341	M16	75	120	155				
70	94	314	395	334	M16	85	120	155				
80	107	307	385	327	M12	85	120	155				
90	120	300	380	320	M12	100	120	155				
100	134	292	370	312	M12	115	120	155	160		225	
110	147	285	365	305	M12	125	120	155				
120	160	278	360	298	M12	125	120	155				
130	174	270	350	290	M12	135	120	155				
140	187	263	345	283	M12	150	120	155				
150	200	256	335	276	M12	160	120	155				
160	214	248	330	268	M12		120	155				
170	227	241	320	261	M12		120	155				
180	240	254	315	274	M12		120	155	180	160	225	245
190	254	247	305	267	M12		120	155	180	160	225	245
200	267	240	300	260	M12		120	155	180	160	225	245
210	280	233	295	253	M12		120	155	180	160	225	245
220	294	255	285	275	M12		120	155	210	160	225	275
230	307	250	280	270	M12		120	155	210	160	225	275
240	320	240	270	260	M12		120	155	210	160	225	275
250	334	255	265	275	M12		120	155	230	160	225	295
260	347	245	255	265	M12		120	155	230	160	225	295
270	360	260	250	280	M12		120	155	250	160	225	315
280	374	250	240	270	M12		120	155	250	160	225	315
290	387	245	235	265	M12		120	155	250	160	225	315
300	400	235	225	255	M12		120	155	250	160	225	315
310	414	270	250	290	M12		120	155	290	190	255	355
320	427	260	240	280	M12		120	155	290	190	255	355
330	440	255	235	275	M12		120	155	290	190	255	355
340	454	250	230	270	M12		120	155	290	190	255	355
350	467	240	220	260	M12		120	155	290	190	255	355
360	480	275	255	295	M12		120	155	330	230	295	395
370	494	265	245	285	M12		120	155	330	230	295	395
380	507	260	240	280	M12		120	155	330	230	295	395
390	520	250	230	270	M12		120	155	330	230	295	395
400	534	245	225	265	M12		120	155	330	230	295	395
410	547	235	215	255	M12		120	155	330	230	295	395
420	560	230	210	250	M12		120	155	330	230	295	395

SIZE 13 to 18

TRAVEL	A	B	B1	B2	C	D	E	F	J	J1	U	U1
60	80	361	450	386	M20	70	155	190	215	205		
70	94	354	445	379	M20	80	155	190	215	205		
80	107	347	435	372	M20	80	155	190	215	205		
90	120	340	430	365	M16	90	155	190	215	205		
100	134	332	425	357	M16	105	155	190	215	205		
110	147	325	415	350	M16	115	155	190	215	205		
120	160	318	410	348	M16	115	155	190	215	205		
130	174	310	400	335	M16	130	155	190	215	205		
140	187	303	395	328	M16	140	155	190	215	205		
150	200	296	385	321	M16	155	155	190	215	205		
160	214	288	380	313	M12		155	190	215	205	280	295
170	227	281	370	306	M12		155	190	215	205		
180	240	274	365	299	M12		155	190	215	205		
190	254	267	355	292	M12		155	190	215	205		
200	267	260	350	282	M12		155	190	215	205		
210	280	253	345	278	M12		155	190	215	205		
220	294	245	335	270	M12		155	190	215	205		
230	307	238	330	263	M12		155	190	215	205		
240	320	231	320	256	M12		155	190	215	205		
250	334	223	315	248	M12		155	190	215	205		
260	347	216	305	241	M12		155	190	215	205		
270	360	250	300	280	M12		155	190	250	205	280	325
280	374	240	290	270	M12		155	190	250	205	280	325
290	387	235	285	265	M12		155	190	250	205	280	325
300	400	245	275	275	M12		155	190	270	205	280	345
310	414	240	270	270	M12		155	190	270	205	280	345
320	427	230	260	260	M12		155	190	270	205	280	345
330	440	245	255	275	M12		155	190	290	205	280	365
340	454	240	250	270	M12		155	190	290	205	280	365
350	467	230	240	260	M12		155	190	290	205	280	365
360	480	225	235	255	M12		155	190	290	205	280	365
370	494	260	250	290	M12		155	190	335	230	300	410
380	507	255	245	285	M12		155	190	335	230	300	410
390	520	245	235	275	M12		155	190	335	230	300	410
400	534	240	230	270	M12		155	190	335	230	300	410
410	547	230	220	260	M12		155	190	335	230	300	410
420	560	225	215	255	M12		155	190	335	230	300	410

SIZE 19 to 26

TRAVEL	A	B	B1	B2	C	D	E	F	J	J1	U	U1
60	80	446	590	476	M30	50	190	240				
70	94	441	585	471	M30	60	190	240				
80	107	432	575	462	M24	60	190	240				
90	120	425	570	455	M24	75	190	240				
100	134	417	560	447	M24	90	190	240				
110	147	410	555	440	M24	100	190	240				
120	160	403	550	433	M20	100	190	240				
130	174	395	540	425	M20	113	190	240				
140	187	388	535	418	M20	125	190	240				
150	200	381	525	411	M20	140	190	240				
160	214	373	520	403	M20		190	240	245		340	
170	227	366	510	396	M20		190	240				
180	240	359	505	389	M16		190	240				
190	254	352	495	382	M16		190	240				
200	267	345	490	375	M16		190	240				
210	280	338	480	368	M16		190	240				
220	294	330	475	360	M16		190	240				
230	307	323	470	353	M16		190	240				
240	320	316	460	346	M16		190	240				
250	334	308	455	338	M16		190	240				
260	347	301	445	331	M16		190	240				
270	360	294	440	324	M16		190	240				
280	374	336	430	366	M16		190	240	295	245	340	390
290	387	329	425	359	M16		190	240	295	245	340	390
300	400	322	415	352	M16		190	240	295	245	340	390
310	414	315	410	345	M16		190	240	295	245	340	390
320	427	307	400	337	M16		190	240	295	245	340	390
330	440	300	395	330	M12		190	240	295	245	340	390
340	454	293	390	323	M12		190	240	295	245	340	390
350	467	285	380	315	M12		190	240	295	245	340	390
360	480	279	375	309	M12		190	240	295	245	340	390
370	494	300	365	330	M12		190	240	325	245	340	420
380	507	295	360	325	M12		190	240	325	245	340	420
390	520	285	350	315	M12		190	240	325	245	340	420
400	534	305	345	335	M12		190	240	350	245	340	445
410	547	295	335	325	M12		190	240	350	245	340	445
420	560	290	330	320	M12		190	240	350	245	340	445
430	574	305	320	335	M12		190	240	375	245	340	470
440	587	300	315	330	M12		190	240	375	245	340	470
450	600	295	310	325	M12		190	240	375	245	340	470
460	614	285	300	315	M12		190	240	375	245	340	470
470	627	295	295	325	M12		190	240	390	245	340	485
480	641	285	285	315	M12		190	240	390	245	340	485
490	654	280	290	310	M12		190	240	390	255	350	485
500	667	270	280	300	M12		190	240	390	255	350	485

CONSTANT SUPPORT 1 to 66

-	1-6	7-12	13-18	19-26	27-33	34-39	40-47	48-50	51-54	55-58	59-66
AA	250	300	350	400	600	750	1100	1265	1265	1265	1620
BB	150	220	295	330	390	440	525	525	525	525	640
CC	180	215	270	325	405	495	610	685	685	685	760
DD	115	120	135	150	180	225	280	345	345	345	455
FF	135	140	160	175	215	270	330	405	405	405	560
GG	55	65	75	95	115	145	198	250	250	250	280
HH	55	65	75	95	115	145	180	190	190	190	215
KK	10	12	12	20	25	25	30	40	40	40	40
LL	15	20	30	30	35	40	50	60	70	80	80
MM	40	50	70	80	100	130	150	200	200	200	200
NN	80	60	65	115	75	85	100	140	140	140	150
PP	215	220	255	280	320	425	480	745	745	745	855
QQ	165	180	205	220	265	335	395	520	520	520	685
RR	14	18	22	22	22	27	33	45	45	45	51
SS	6	6	8	8	10	10	15	20	20	20	25
WW	35	35	50	50	65	75	90	110	110	110	120
K	150	150	150	200	200	200	250	300	300	300	300
L	33	38	65	66	83	100	Tabla	182	182	182	Tabla

"JJ" DIMENSION ACCORDING TO "C"

-	M12	M16	M20	M24	M30	M36	M42	M48	M56	M64	M72	M80	M90
JJ	25	25	30	35	40	50	60	65	80	85	100	110	120

"L" DIMENSION

-	40-44	45-47	59	60	61	62	63	64	65	66
L	121	165	188	193	197	203	207	211	216	220

NOTE: Type J not recommended over 150 mm travel or size 33.

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CONSTANT LOAD SUPPORT
MODELS C50

SECTION E
12

CONSTANT LOAD SUPPORT
MODELS C50

SECTION E
13

TABLE OF DIMENSIONS - SIZES 27 to 50

SIZE 27 to 33

TRAVEL	A	B	B1	B2	C	D	E	F	J	J1	U	U1
70	94	495	605	530	M36	75	235	300				
80	107	485	600	520	M36	75	235	300				
90	120	480	590	515	M36	90	235	300				
100	134	470	580	505	M36	100	235	300				
110	147	465	575	500	M30	115	235	300				
120	160	460	570	495	M30	115	235	300				
130	174	450	560	485	M30	125	235	300				
140	187	445	555	480	M30	140	235	300				
150	200	435	545	470	M30	155	235	300				
160	214	430	540	465	M30		235	300				
170	227	420	530	455	M24		235	300				
180	240	415	525	450	M24		235	300				
190	254	405	515	440	M24		235	300				
200	267	400	510	435	M24		235	300				
210	280	395	505	430	M24		235	300				
220	294	395	495	420	M24		235	300				
230	307	380	490	415	M24		235	300				
240	320	370	480	405	M20		235	300				
250	334	365	475	400	M20		235	300				
260	347	355	465	390	M20		235	300				
270	360	350	460	385	M20		235	300				
280	374	340	450	375	M20		235	300				
290	387	335	445	370	M20		235	300				
300	400	325	435	360	M20		235	300				
310	414	320	430	355	M20		235	300				
320	427	315	425	350	M20		235	300				
330	440	305	415	340	M20		235	300				
340	454	300	410	335	M20		235	300				
350	467	290	400	325	M20		235	300				
360	480	285	395	320	M20		235	300				
370	494	305	385	340	M20		235	300	335	305	420	450
380	507	300	380	335	M20		235	300	335	305	420	450
390	520	290	370	325	M20		235	300	335	305	420	450
400	534	300	365	335	M20		235	300	350	305	420	465
410	547	290	355	325	M20		235	300	350	305	420	465
420	560	285	350	320	M20		235	300	350	305	420	465
430	574	300	340	330	M20		235	300	370	305	420	485
440	587	290	335	325	M20		235	300	370	305	420	485
450	600	285	330	315	M20		235	300	370	305	420	485
460	614	275	320	310	M20		235	300	370	305	420	485
470	627	290	315	325	M20		235	300	390	305	420	505
480	641	280	305	315	M20		235	300	390	305	420	505
490	654	275	300	310	M20		235	300	390	305	420	505
500	667	265	290	300	M20		235	300	390	305	420	505

SIZE 34 to 39

TRAVEL	A	B	B1	B2	C	E	F	J	J1	U	U1
90	120	540	665	580	M48	290	365				
100	134	530	655	570	M42	290	365				
110	147	525	650	565	M42	290	365				
120	160	520	645	560	M42	290	365				
130	174	510	635	550	M42	290	365				
140	187	505	630	545	M36	290	365				
150	200	495	620	535	M36	290	365				
160	214	490	615	530	M36	290	365				
170	227	480	605	520	M36	290	365				
180	240	475	600	515	M36	290	365				
190	254	465	590	505	M30	290	365				
200	267	460	585	500	M30	290	365				
210	280	455	580	495	M30	290	365				
220	294	445	570	485	M30	290	365				
230	307	440	565	480	M30	290	365				
240	320	430	555	470	M30	290	365				
250	334	425	550	465	M30	290	365				
260	347	415	540	455	M30	290	365				
270	360	410	535	450	M30	290	365				
280	374	400	525	440	M30	290	365				
290	387	395	520	435	M30	290	365				
300	400	385	510	425	M30	290	365				
310	414	380	505	420	M24	290	365				
320	427	375	500	415	M24	290	365				
330	440	365	490	405	M24	290	365				
340	454	360	485	400	M24	290	365				
350	467	350	475	390	M24	290	365				
360	480	345	470	385	M24	290	365				
370	494	335	460	375	M24	290	365				
380	507	330	455	370	M24	290	365				
390	520	320	445	360	M24	290	365				
400	534	315	440	355	M24	290	365				
410	547	305	430	345	M24	290	365	400	370	515	545
420	560	330	425	370	M24	290	365	400	370	515	545
430	574	320	415	360	M24	290	365	400	370	515	545
440	587	315	410	355	M24	290	365	400	370	515	545
450	600	310	405	355	M24	290	365	400	370	515	545
460	614	300	395	340	M24	290	365	400	370	515	545
470	627	295	390	335	M24	290	365	400	370	515	545
480	641	335	380	375	M24	290	365	450	370	515	545
490	654	330	375	370	M24	290	365	450	370	515	545
500	667	320	365	360	M24	290	365	450	370	515	545
510	680	315	360	355	M24	290	365	450	370	515	545
520	695	305	350	345	M24	290	365	450	370	515	545
530	708	300	345	340	M24	290	365	450	370	515	545
540	720	325	335	365	M24	290	365	480	370	515	545
550	734	315	330	355	M24	290	365	480	370	515	545
560	747	310	325	350	M24	290	365	480	370	515	545
570	761	300	315	340	M24	290	365	480	370	515	545
580	774	295	310	335	M24	290	365	480	370	515	545
590	787	285	300	325	M24	290	365	480	370	515	545
600	800	280	295	320	M24	290	365	480	370	515	545
610	815	270	285	310	M24	290	365	480	370	515	545

SIZE 40 to 47

TRAVEL	A	B	B1	B2	C	E	F	J	J1	U	U1
110	147	645	795	695	M64	355	455				
120	160	640	790	690	M56	355	455				
130	174	630	780	680	M56	355	455				
140	187	625	775	675	M56	355	455				
150	200	615	765	665	M56	355	455				
160	214	610	760	660	M48	355	455				
170	227	600	750	650	M48	355	455				
180	240	595	745	645	M48	355	455				
190	254	585	735	635	M48	355	455				
200	267	580	730	630	M48	355	455				
210	280	575	725	625	M42	355	455				
220	294	565	715	615	M42	355	455				
230	307	560	710	610	M42	355	455				
240	320	550	700	600	M42	355	455				
250	334	545	695	595	M42	355	455				
260	347	535	685	585	M42	355	455				
270	360	530	680	580	M42	355	455				
280	374	520	670	570	M42	355	455				
290	387	515	665	565	M36	355	455				
300	400	505	655	555	M36	355	455				
310	414	500	650	550	M36	355	455				
320	427	495	645	545	M36	355	455				
330	440	485	635	535	M36	355	455				
340	454	480	630	530	M36	355	455				
350	467	470	620	520	M36	355	455				
360	480	465	615	515	M36	355	455				
370	494	455	605	505	M36	355	455				
380	507	450	600	500	M36	355	455				
390	520	440	590	490	M36	355	455				
400	534	435	585	485	M36	355	455				
410	547	425	575	475	M36	355	455	450	630		
420	560	420	570	470	M36	355	455				
430	574	410	560	460	M36	355	455				
440	587	405	555	455	M36	355	455				
450	600	395	545	445	M36	355	455				
460	614	390	540	440	M36	355	455				
470	627	385	535	435	M36	355	455				
480	641	375	525	425	M36	355	455				
490	654	370	520	420	M36	355	455				
500	667	450	600	500	M36	355	455				
510	680	445	595	495	M36	355	455				
520	695	435	585	485	M36	355	455				
530	708	430	580	480	M36	355	455				
540	720	420	570	470	M36	355	455				
550	734	415	565	465	M36	355	455	540	720		
560	747	405	555	455	M36	355	455				
570	761	400	550	450	M36	355	455				
580	774	390	540	440	M36	355	455				
590	787	385	535	435	M36	355	455				
600	800	380	530	430	M36	355	455				
610	815	370	520	420	M36	355	455				

SIZE 48 to 50

TRAVEL	A	B	B1	B2	C	E	F	J	J1	U	U1
110	147	780	980	840	M80	340	480				
120	160	775	975	835	M72	340	480				
130	174	765	965	825	M72	340	480				
140	187	760	960	820	M72	340	480				
150	200	750	950	810	M64	340	480				
160	214	745	945	805	M64	340	480				
170	227	735	935	795	M64	340	480				
180	240	730	930	790	M64	340	480				
190	254	720	920	780	M64	340	480				
200	267	715	915	775	M56	340	480				
210	280	710	910	770	M56	340	480				
220	294	700	900	760	M56	340	480				
230	307	695	895	755	M56	340	480				
240	320	685	885	745	M56	340	480				
250	334	680	880	740	M56	340	480				
260	347	670	870	730	M56	340	480				
270	360	665	865	725	M48	340	480				
280	374	655	855	715	M48	340	480				
290	387	650	850	710	M48	340	480				
300	400	640	840	700	M48	340	480	545	735		
310	414	635	835	695	M48	340	480				
320	427	630	830	690	M48	340	480				
330	440	620	820	680	M48	340	480				
340	454	615	815	675	M48	340	480				
350	467	605	805	665	M48	340	480				
360	480	600	800	660	M42	340	480				
370	494	590	790	650	M42	340	480				
380	507	585	785	645	M42	340	480				
390	520	575	775	635	M42	340	480				
400	534	570	770	630	M42	340	480				
410	547	560	760	620	M42	340	480				
420	560	555	755	615	M42	340	480				
430	574	545	745	605	M42	340	480				
440	587	540	740	600	M42	340	480				
450	600	530	730	590	M42	340	480				
460	614	525	725	585	M42	340	480				
470	627	520	720	580	M42	340	480				
480	641	510	710	570	M42	340	480				
490	654	505	705	565	M42	340	480				
500	667	495	695	555	M42	340	480				
510	680	490	690	550	M42	340	480	545	735		
520	695	480	680	540	M42	340	480				
530	708	475	675	535	M42	340	480				
540	720	465	665	525	M42	340	480				
550	734	460	660	520	M42	340	480				
560	747	450	650	510	M42	340	480				
570	761	445	645	505	M42	340	480				
580	774	435	635	495	M42	340	480				
590	787	430	630	490	M42	340	480				
600	800	425	625	485	M42	340	480				
610	815	415	615	475	M42	340	480				

SEE TABLES IN SHEET E-12 FOR STANDARD DIMENSIONS.

REV.	DATE	EDITED FOR :	DRAW.	REV.
1	21/07/10	GENERAL REVISION	DDG	EAR
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CONSTANT LOAD SUPPORT
MODELS C50

SECTION E
14

TABLE OF DIMENSIONS - SIZES 51 to 66

SIZE 51 to 54

TRAVEL	A	B	B1	B2	C	E	F	J	J1	U	U1
110	147	770	980	840	M80	340	480				
120	160	765	975	835	M90	340	480				
130	174	755	965	825	M72	340	480				
140	187	750	960	820	M72	340	480				
150	200	740	950	810	M80	340	480				
160	214	735	945	805	M64	340	480				
170	227	725	935	795	M64	340	480				
180	240	720	930	790	M64	340	480				
190	254	710	920	780	M64	340	480				
200	267	705	915	775	M56	340	480				
210	280	700	910	770	M56	340	480				
220	294	690	900	760	M56	340	480				
230	307	685	895	755	M56	340	480				
240	320	675	885	745	M56	340	480				
250	334	670	880	740	M56	340	480				
260	347	660	870	730	M56	340	480	545		735	
270	360	655	865	725	M48	340	480				
280	374	645	855	715	M48	340	480				
290	387	640	850	710	M48	340	480				
300	400	630	840	700	M48	340	480				
310	414	625	835	695	M48	340	480				
320	427	620	830	690	M48	340	480				
330	440	610	820	680	M48	340	480				
340	454	605	815	675	M48	340	480				
350	467	595	805	665	M48	340	480				
360	480	590	800	660	M42	340	480				
370	494	580	790	650	M42	340	480				
380	507	575	785	645	M42	340	480				
390	520	565	775	635	M42	340	480				
400	534	560	770	630	M42	340	480				
410	547	550	760	620	M42	340	480				
420	560	545	755	615	M42	340	480				
430	574	535	745	605	M42	340	480				
440	587	530	740	600	M42	340	480				
450	600	520	730	590	M42	340	480				
460	614	515	725	585	M42	340	480				
470	627	510	720	580	M42	340	480				
480	641	500	710	570	M42	340	480				
490	654	495	705	565	M42	340	480				
500	667	485	695	555	M42	340	480				
510	680	480	690	550	M42	340	480	545		735	
520	695	470	680	540	M42	340	480				
530	708	465	675	535	M42	340	480				
540	720	455	665	525	M42	340	480				
550	734	450	660	520	M42	340	480				
560	747	440	650	510	M42	340	480				
570	761	435	645	505	M42	340	480				
580	774	425	635	495	M42	340	480				
590	787	420	630	490	M42	340	480				
600	800	415	625	485	M42	340	480				
610	815	405	615	475	M42	340	480				

SIZE 55 to 58

TRAVEL	A	B	B1	B2	C	E	F	J	J1	U	U1
110	147	760	980	840	M90	340	480				
120	160	755	975	835	M90	340	480				
130	174	745	965	825	M80	340	480				
140	187	740	960	820	M80	340	480				
150	200	730	950	810	M80	340	480				
160	214	725	945	805	M72	340	480				
170	227	715	935	795	M72	340	480				
180	240	710	930	790	M72	340	480				
190	254	700	920	780	M72	340	480				
200	267	695	915	775	M64	340	480				
210	280	690	910	770	M64	340	480				
220	294	680	900	760	M64	340	480				
230	307	675	895	755	M64	340	480				
240	320	665	885	745	M64	340	480				
250	334	660	880	740	M64	340	480				
260	347	650	870	730	M56	340	480	545		735	
270	360	645	865	725	M56	340	480				
280	374	635	855	715	M56	340	480				
290	387	630	850	710	M56	340	480				
300	400	620	840	700	M56	340	480				
310	414	615	835	695	M56	340	480				
320	427	610	830	690	M56	340	480				
330	440	600	820	680	M56	340	480				
340	454	595	815	675	M56	340	480				
350	467	585	805	665	M56	340	480				
360	480	580	800	660	M48	340	480				
370	494	570	790	650	M48	340	480				
380	507	565	785	645	M48	340	480				
390	520	555	775	635	M48	340	480				
400	534	550	770	630	M48	340	480				
410	547	540	760	620	M48	340	480				
420	560	535	755	615	M48	340	480				
430	574	525	745	605	M48	340	480				
440	587	520	740	600	M48	340	480				
450	600	510	730	590	M48	340	480				
460	614	505	725	585	M48	340	480				
470	627	500	720	580	M48	340	480				
480	641	490	710	570	M48	340	480				
490	654	485	705	565	M48	340	480				
500	667	475	695	555	M48	340	480				
510	680	470	690	550	M48	340	480	545		735	
520	695	460	680	540	M48	340	480				
530	708	455	675	535	M48	340	480				
540	720	445	665	525	M48	340	480				
550	734	440	660	520	M48	340	480				
560	747	430	650	510	M48	340	480				
570	761	425	645	505	M48	340	480				
580	774	415	635	495	M48	340	480				
590	787	410	630	490	M48	340	480				
600	800	405	625	485	M48	340	480				
610	815	395	615	475	M48	340	480				

SIZE 59 to 62

TRAVEL	A	B	B1	B2	C	E	F	J	J1	U	U1
150	200	785	1015	865	M80	380	560				
160	214	780	1010	860	M80	380	560				
170	227	770	1000	850	M80	380	560				
180	240	765	995	845	M80	380	560				
190	254	760	990	840	M72	380	560				
200	267	750	980	830	M72	380	560				
210	280	745	975	825	M72	380	560				
220	294	735	965	815	M72	380	560				
230	307	730	960	810	M72	380	560				
240	320	720	950	800	M64	380	560				
250	334	715	945	795	M64	380	560				
260	347	705	935	785	M64	380	560				
270	360	700	930	780	M64	380	560	600		815	
280	374	690	920	770	M64	380	560				
290	387	685	915	765	M64	380	560				
300	400	680	910	760	M64	380	560				
310	414	670	900	750	M64	380	560				
320	427	665	890	745	M56	380	560				
330	440	655	885	735	M56	380	560				
340	454	650	880	730	M56	380	560				
350	467	640	870	720	M56	380	560				
360	480	635	865	715	M56	380	560				
370	494	625	855	705	M56	380	560				
380	507	620	850	700	M56	380	560				
390	520	610	840	690	M56	380	560				
400	534	605	835	685	M56	380	560				
410	547	600	830	680	M56	380	560				
420	560	590	820	670	M56	380	560				
430	574	580	810	660	M56	380	560				
440	587	575	805	655	M56	380	560				
450	600	565	795	645	M56	380	560				
460	614	560	790	640	M56	380	560				
470	627	555	785	635	M56	380	560				
480	641	545	775	625	M56	380	560				
490	654	540	770	620	M56	380	560				
500	667	530	760	610	M56	380	560				
510	680	525	755	605	M56	380	560	600		815	
520	695	515	745	595	M56	380	560				
530	708	510	740	590	M56	380	560				
540	720	500	730	580	M56	380	560				
550	734	495	725	575	M56	380	560				
560	747	485	715	570	M56	380	560				
570	761	480	710	560	M56	380	560				
580	774	470	700	550	M56	380	560				
590	787	465	695	545	M56	380	560				
600	800	460	690	540	M56	380	560				
610	815	450	680	530	M56	380	560				

SIZE 63 to 66

TRAVEL	A	B	B1	B2	C	E	F	J	J1	U	U1
150	200	785	1015	865	M90	380	560				
160	214	780	1010	860	M90	380	560				
170	227	770	1000	850	M90	380	560				
180	240	765	995	845	M80	380	560				
190	254	760	990	840	M80	380	560				
200	267	750	980	830	M80	380	560				
210	280	745	975	825	M80	380	560				
220	294	735	965	815	M80	380	560				
230	307	730	960	810	M72	380	560				
240	320	720	950	800	M72	380	560				
250	334	715	945	795	M72	380	560				
260	347	705	935	785	M72	380	560				
270	360	700	930	780	M72	380	560	600		815	
280	374	690	920	770	M72	380	560				
290	387	685	915	765	M64	380	560				
300	400	680	910	760	M64	380	560				
310	414	670	900	750	M64	380	560				
320	427	665	890	745	M64	380	560				
330	440	655	885	735	M64	380	560				
340	454	650	880	730	M64	380	560				
350	467	640	870	720	M64	380	560				
360	480	635	865	715	M64	380	560				
370	494	625	855	705	M64	380	560				
380	507	620	850	700	M56	380	560				
390	520	610	840	690	M56	380	560				
400	534	605	835	685	M56	380	560				
410	547	600	830	680	M56	380	560				
420	560	590	820	670	M56	380	560				
430	574	580	810	660	M56	380	560				
440	587	575	805	655	M56	380	560				
450	600	565	795	645	M56	380	560				
460	614	560	790	640	M56	380	560				
470	627	555	785	635	M56	380	560				
480	641	545	775	625	M56	380	560				
490	654	540	770	620	M56	380	560				
500	667	530	760	610	M56	380	560				
510	680	525	755	605	M56	380	560	600		815	
520	695	515	745	595	M56	380	560				
530	708	510	740	590	M56	380	560				
540	720	500	730	580	M56	380	560				
550	734	495	725	575	M56	380	560				
560	747	485	715	570	M56	380	560				
570	761	480	710	560	M56	380	560				
580	774	470	700	550	M56	380	560				
590	787	465	695	545	M56	380	560				
600	800	460	690	540	M56	380	560				
610	815	450	680	530	M56	380	560				

SEE TABLES IN SHEET E-12 FOR STANDARD DIMENSIONS.

REV.	DATE	EDITED FOR :	DRAW.	REV.
1	21/07/10	GENERAL REVISION	DDG	EAR
0	20/10/98	INFORMATION	JMD	EAR

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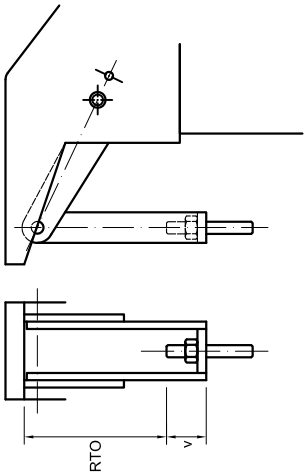
CONSTANT LOAD SUPPORT
MODELS C51

NOTE:

TYPE "R" NOT RECOMMENDED OVER:
150 mm TRAVEL OR SIZE 33.

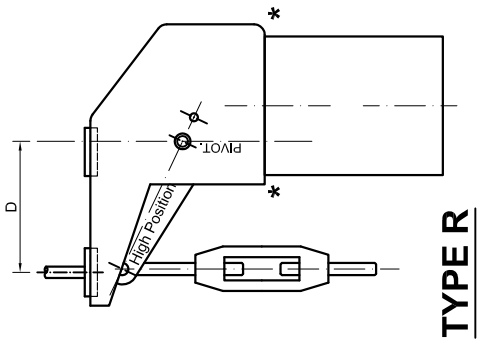
ROD TAKE OUT CALCULATED WHEN LOAD ARM IS IN HIGH POSITION. FOR UP TRAVEL ROD TAKE OUT EQUALS TOTAL UP TRAVEL PLUS B, B_1 OR B_3.



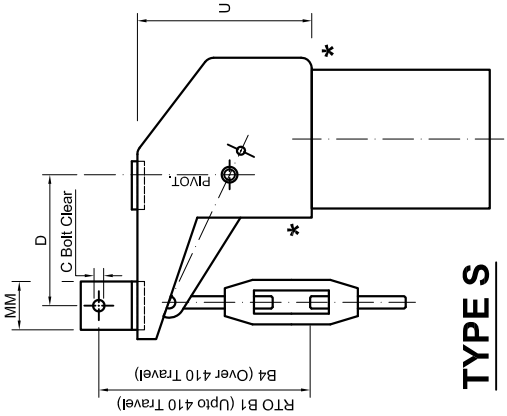
TYPICAL YOKE ARRANGEMENT.
(USED ON SPRING SIZES 48 TO 66. ALL TYPES)

NOTE:

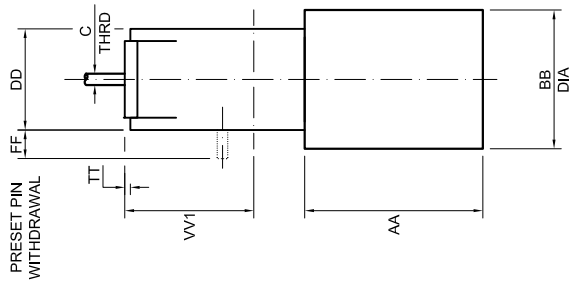
TYPE "S" NOT RECOMMENDED OVER:
* 190 TRAVEL AND SIZES 1 TO 12.
* 210 TRAVEL AND SIZES 13 TO 18.
* 290 TRAVEL AND SIZES 19 TO 26.
* 300 TRAVEL AND SIZES 27 TO 33.
* 500 TRAVEL AND SIZES 34 TO 39.

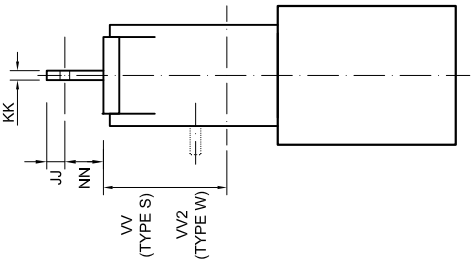


TYPE R

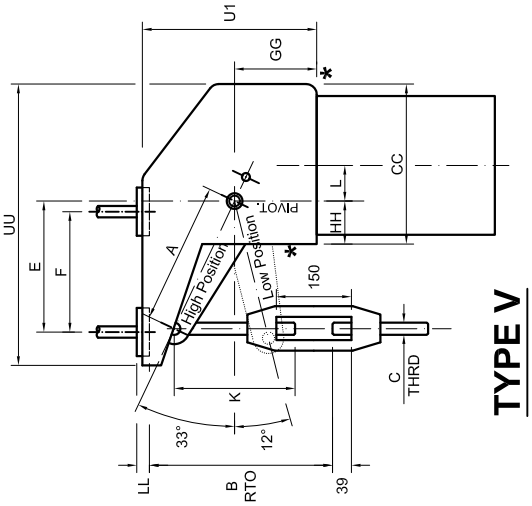


TYPE S

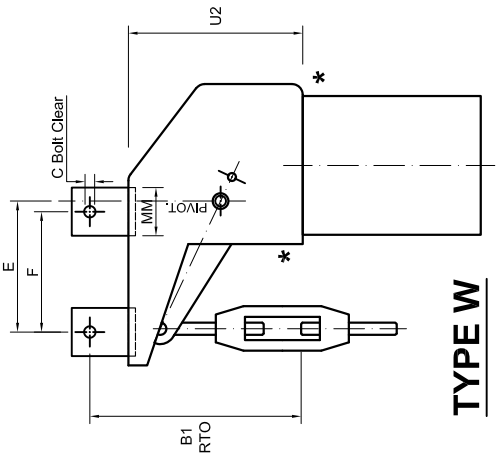




* ACCESS TO LOAD ADJUSTER



TYPE V



TYPE W

REV.	DATE	EDITED FOR :	DRAW.	REV.
1	21/07/10	GENERAL REVISION	DDG	EAR
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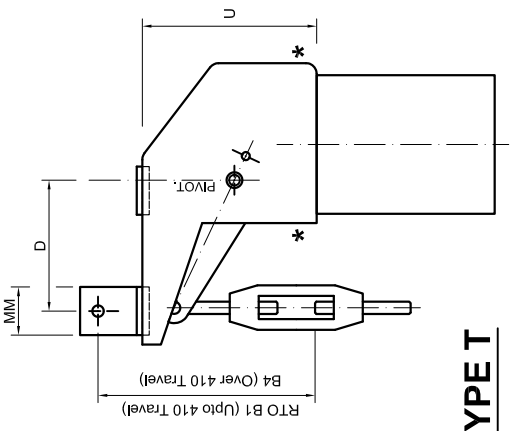
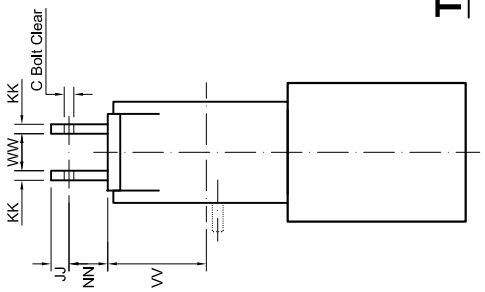
CONSTANT LOAD SUPPORT
MODELS C51

SECTION E
16

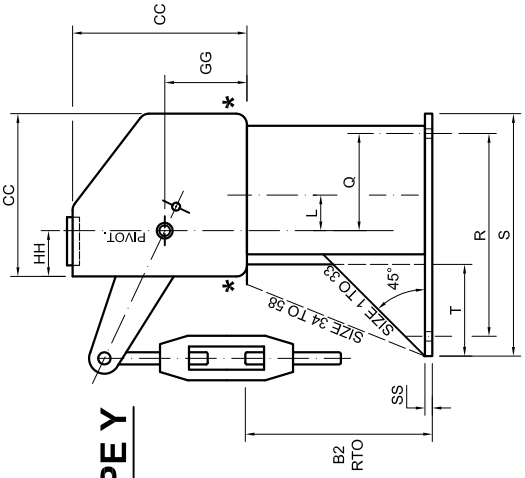


TYPE T

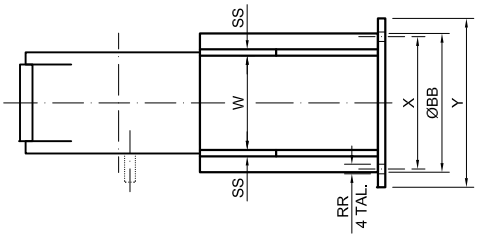


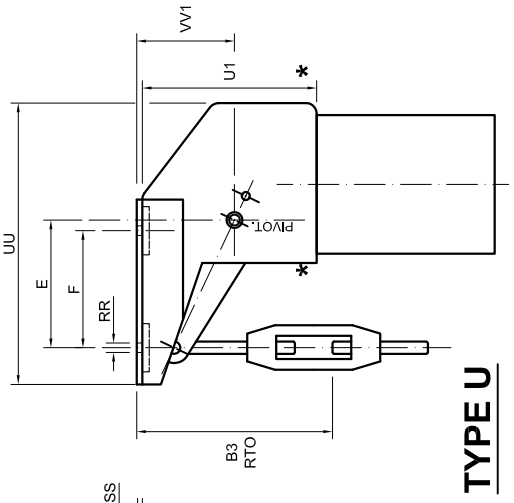
NOTE:
IT IS CONSIDERED EXTENDED BASE FOR TYPE Y WHEN TRAVEL IS OVER 150 MM. FOR TRAVELS UP TO 150 MM THE BASE IS SQUARE GIVEN BY YXY.

NOTE:
TYPE "T" NOT RECOMMENDED OVER:
* 190 TRAVEL AND SIZES 1 TO 12.
* 210 TRAVEL AND SIZES 13 TO 18.
* 290 TRAVEL AND SIZES 19 TO 26.
* 300 TRAVEL AND SIZES 27 TO 33.



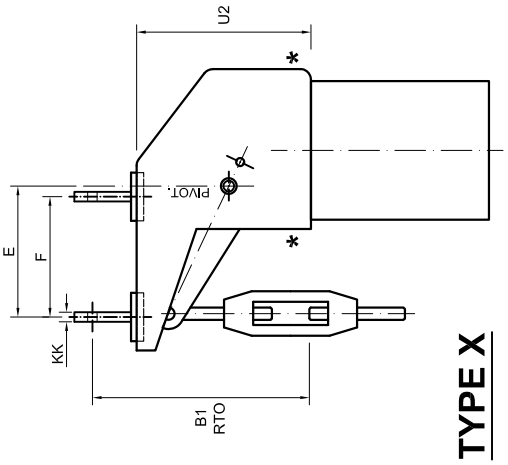
TYPE Y



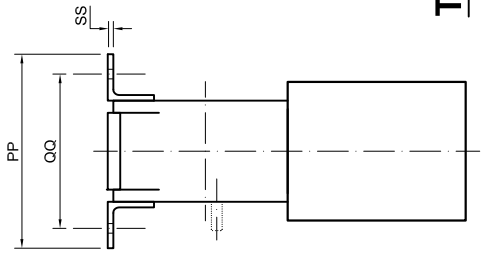


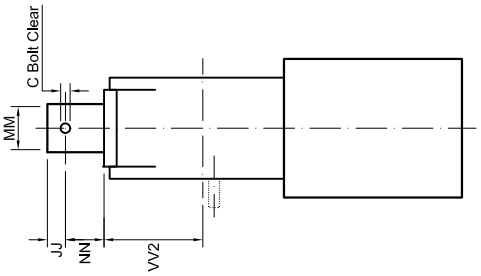
TYPE U

* ACCESS TO LOAD ADJUSTER



TYPE X





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REV.	0	1	
DATE	20/10/98	21/07/10	
EDITED FOR :	INFORMATION	GENERAL REVISION	
DRAW.	JMD	DDG	
REV.	EAR	EAR	

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TABLE OF DIMENSIONS - SIZES 1 to 18

SIZE 1 to 6

TRAVEL	A	B	B1	B2	B3	C	D	E	F	VV	VV1	VV2	U	U1	U2
60	80	340	395	130	355	M12	64	150	130						
70	94	335	390	135	350	M12	64	150	130						
80	107	325	380	145	340	M12	86	150	130						
90	120	320	375	150	335	M12	97	150	130						
100	134	315	365	160	330	M12	107	150	130						
110	147	305	360	165	320	M12	118	150	130						
120	160	300	355	175	315	M12	128	150	130						
130	174	290	345	180	305	M12	140	150	130						
140	187	285	340	185	300	M12	150	150	130	175			225		
150	200	275	330	195	290	M12	161	150	130						
160	214	270	325	200	285	M12	172	150	130						
170	227	260	315	210	275	M12	182	150	130						
180	240	255	310	215	270	M12	193	150	130						
190	254	245	300	225	260	M12	203	150	130						
200	267	240	295	230	255	M12		150	130						
210	280	235	290	240	250	M12		150	130						
220	294	250	280	245	265	M12		150	130	175	200	175	225	250	225
230	307	245	275	255	260	M12		150	130	175	200	175	225	250	225
240	320	235	265	260	250	M12		150	130	175	200	175	225	250	225
250	334	250	260	270	265	M12		150	130	175	220	175	225	270	225
260	347	240	250	275	255	M12		150	130	175	220	175	225	270	225
270	360	235	245	280	250	M12		150	130	175	220	175	225	270	225
280	374	245	235	290	260	M12		150	130	175	240	175	225	290	225
290	387	240	230	295	255	M12		150	130	175	240	175	225	290	225
300	400	230	220	305	245	M12		150	130	175	240	175	225	290	225

CONSTANT SUPPORT 1 to 66

-	1-6	7-12	13-18	19-26	27-33	34-39	40-47	48-50	51-54	55-58	59-66
AA	250	300	350	400	600	750	1100	1265	1265	1265	1620
BB	150	220	295	330	390	440	525	525	525	525	640
CC	180	215	270	325	405	495	610	685	685	685	760
DD	115	120	135	150	180	225	280	345	345	345	455
FF	135	140	160	175	215	270	330	405	405	405	560
GG	55	65	75	95	115	145	198	250	250	250	280
HH	55	65	75	95	115	145	180	190	190	190	215
KK	10	12	12	20	25	25	30	40	40	40	40
LL	15	20	30	30	35	40	50	60	70	80	80
MM	40	50	70	80	100	130	150	200	200	200	200
NN	40	40	50	65	75	75	90	140	140	140	150
PP	215	220	255	280	320	425	480	745	745	745	855
QQ	165	180	205	220	265	335	395	520	520	520	685
RR	14	18	22	22	22	27	33	45	45	45	51
SS	6	6	8	8	10	10	15	20	20	20	25
TT	5	5	10	15	10	30	15	15	15	15	40
UU	295	330	455	550	615	815	945	1080	1080	1080	1100
WW	35	35	50	50	65	75	90	110	110	110	120
K	150	150	150	200	200	200	250	300	300	300	300
L	33	38	65	66	83	100	TABLA	182	182	182	TABLA
Q	100	130	195	215	255	285	TABLA	460	460	460	-
R	180	255	370	395	510	510	740	830	830	830	-

SIZE 7 to 12

TRAVEL	A	B	B1	B2	B3	C	D	E	F	VV	VV1	VV2	U	U1	U2
90	120	320	380	215	340	M12	96	155	125						
100	134	310	370	220	330	M12	107	155	125						
110	147	305	365	230	325	M12	117	155	125						
120	160	300	360	235	320	M12	128	155	125						
130	174	290	350	245	310	M12	139	155	125						
140	187	285	345	250	305	M12	150	155	125						
150	200	275	335	260	295	M12	160	155	125	180			240		
160	214	270	330	265	290	M12	171	155	125						
170	227	260	320	270	280	M12	181	155	125						
180	240	255	315	280	275	M12	192	155	125						
190	254	250	310	285	270	M12	204	155	125						
200	267	240	300	295	260	M12		155	125						
210	280	235	295	300	255	M12		155	125						
220	294	255	285	305	275	M12		155	125	180	210	180	240	270	240
230	307	250	280	315	270	M12		155	125	180	210	180	240	270	240
240	320	240	270	320	260	M12		155	125	180	210	180	240	270	240
250	334	255	265	330	275	M12		155	125	180	230	180	240	290	240
260	347	245	255	335	265	M12		155	125	180	230	180	240	290	240
270	360	240	250	340	260	M12		155	125	180	230	180	240	290	240
280	374	245	240	350	265	M12		155	125	180	245	180	240	305	240
290	387	240	235	355	260	M12		155	125	180	245	180	240	305	240
300	400	230	225	365	250	M12		155	125	180	245	180	240	305	240
310	414	270	250	370	290	M12		155	125	210	290	210	270	350	270
320	427	260	240	380	280	M12		155	125	210	290	210	270	350	270
330	440	255	235	385	275	M12		155	125	210	290	210	270	350	270
340	454	250	230	395	270	M12		155	125	210	290	210	270	350	270
350	467	240	220	400	260	M12		155	125	210	290	210	270	350	270
360	480	275	255	405	295	M12		155	125	250	330	250	310	390	310
370	494	265	245	415	285	M12		155	125	250	330	250	310	390	310
380	507	260	240	420	280	M12		155	125	250	330	250	310	390	310
390	520	250	230	430	270	M12		155	125	250	330	250	310	390	310
400	534	245	225	435	265	M12		155	125	250	330	250	310	390	310
410	547	235	215	445	255	M12		155	125	250	330	250	310	390	310
420	560	230	210	450	250	M12		155	125	250	330	250	310	390	310

CONSTANT SUPPORT 1 to 66

-	1-6	7-12	13-18	19-26	27-33	34-39	40-47	48-50	51-54	55-58	59-66
S	220	305	420	460	585	610	840	930	930	930	-
T	80	100	170	180	230	170	300	350	350	350	-
W	102	127	203	254	305	206	257	305	305	405	-
X	170	230	280	355	410	460	560	560	560	560	-
Y	210	280	330	420	485	560	660	660	660	660	-
V	-	-	-	-	-	-	-	275	275	290	340

NOTE: Units are supplied with yokes for the aside table travels.
All other travels units are supplied with turnbuckle.

SIZE 13 to 18

TRAVEL	A	B	B1	B2	B3	C	D	E	F	VV	VV1	VV2	U	U1	U2
100	134	345	425	280	375	M16	105	225	195						
110	147	340	420	290	370	M16	116	225	195						
120	160	335	415	295	365	M16	126	225	195						
130	174	325	405	305	355	M16	138	225	195						
140	187	320	400	310	350	M16	148	225	195						
150	200	310	390	315	340	M16	158	225	195						
160	214	305	385	325	335	M12	169	225	195						
170	227	295	375	330	325	M12	179	225	195						
180	240	290	370	340	320	M12	189	225	195	225			290		
190	254	280	360	345	310	M12	200	225	195						
200	267	275	355	355	305	M12	211	225	195						
210	280	270	350	360	300	M12	221	225	195						
220	294	260	340	370	290	M12		225	195						
230	307	255	335	375	285	M12		225	195						
240	320	245	325	380	275	M12		225	195						
250	334	240	320	390	270	M12		225	195						
260	347	230	310	395	260	M12		225	195						
270	360	255	305	405	285	M12		225	195	225	255	225	290	320	290
280	374	245	295	410	275	M12		225	195	225	255	225	290	320	290
290	387	240	290	420	270	M12		225	195	225	255	225	290	320	290
300	400	255	280	425	285	M12		225	195	225	280	225	290	345	290
310	414	250	275	435	280	M12		225	195	225	280	225	290	345	290
320	427	240	265	440	270	M12		225	195	225	280	225	290	345	290
330	440	255	260	450	285	M12		225	195	225	300	225	290	365	290
340	454	250	255	455	280	M12		225	195	225	300	225	290	365	290
350	467	240	245	460	270	M12		225	195	225	300	225	290	365	290
360	480	235	240	470	265	M12		225	195	225	300	225	290	365	290
370	494	260	230	475	290	M12		225	195	225	335	225	290	400	290
380	507	255	245	485	285	M12		225	195	245	335	245	310	400	310
390	520	245	235	490	275	M12		225	195	245	335	245	310	400	310
400	534	240	230	500	270	M12		225	195	245	335	245	310	400	310
410	547	230	220	505	260	M12		225	195	245	335	245	310	400	310
420	560	225	215	515	255	M12		225	195	245	335	245	310	400	310

"JJ" DIMENSION ACCORDING TO "C"

-	M12	M16	M20	M24	M30	M36	M42	M48	M56	M64	M72	M80	M90
JJ	25	25	30	35	40	50	60	65	80	85	100	110	120

"L" DIMENSION

-	40-44	45-47	59	60	61	62	63	64	65	66
L	121	165	188	193	197	203	207	211	216	220

YOKE TABLE

TAMAÑO	CARRERA
48-58	170-350
59-66	180-350

"Q" DIMENSION

-	40-44	45-47
Q	360	405

CONSTANT LOAD SUPPORT
MODELS C51

SECTION E
17

CONSTANT LOAD SUPPORT
MODELS C51

TABLE OF DIMENSIONS - SIZES 19 to 39

SIZE 19 to 26

TRAVEL	A	B	B1	B2	B3	C	D	E	F	VV	VV1	VV2	U	U1	U2
120	160	470	565	315	500	M20	129	260	220						
130	174	460	555	325	490	M20	141	260	220						
140	187	455	550	330	485	M20	152	260	220						
150	200	445	540	335	475	M20	162	260	220						
160	214	440	535	345	470	M20	173	260	220						
170	227	430	525	350	460	M20	184	260	220						
180	240	425	520	360	455	M16	195	260	220						
190	254	415	510	365	445	M16	206	260	220						
200	267	410	505	375	440	M16	217	260	220						
210	280	405	500	380	435	M16	227	260	220						
220	294	395	490	390	425	M16	239	260	220						
230	307	390	480	395	420	M16	249	260	220						
240	320	380	475	400	410	M16	259	260	220						
250	334	375	470	410	405	M16	271	260	220						
260	347	365	460	415	395	M16	282	260	220						
270	360	360	455	425	390	M16	292	260	220						
280	374	350	445	430	380	M16	304	260	220						
290	387	345	440	440	375	M16	315	260	220						
300	400	335	430	445	365	M16		260	220						
310	414	330	425	455	360	M16		260	220						
320	427	325	420	460	355	M16		260	220						
330	440	315	410	470	345	M12		260	220						
340	454	310	405	475	340	M12		260	220						
350	467	300	395	480	330	M12		260	220						
360	480	295	390	490	325	M12		260	220						
370	494	315	380	495	345	M12		260	220	310	340	310	390	420	390
380	507	310	375	505	340	M12		260	220	310	340	310	390	420	390
390	520	300	365	510	330	M12		260	220	310	340	310	390	420	390
400	534	295	360	520	325	M12		260	220	310	340	310	390	420	390
410	547	315	350	525	345	M12		260	220	310	370	310	390	450	390
420	560	310	345	535	340	M12		260	220	310	370	310	390	450	390
430	574	300	335	540	330	M12		260	220	310	370	310	390	450	390
440	587	295	330	550	325	M12		260	220	310	370	310	390	450	390
450	600	290	325	555	320	M12		260	220	310	370	310	390	450	390
460	614	310	315	560	340	M12		260	220	310	400	310	390	480	390
470	627	305	310	570	335	M12		260	220	310	400	310	390	480	390
480	641	295	300	575	325	M12		260	220	310	400	310	390	480	390
490	654	290	295	585	320	M12		260	220	310	400	310	390	480	390
500	667	280	285	590	310	M12		260	220	310	400	310	390	480	390

SIZE 27 to 33

TRAVEL	A	B	B1	B2	B3	C	D	E	F	VV	VV1	VV2	U	U1	U2
130	174	440	550	545	475	M30	142	285	240						
140	187	435	545	550	470	M30	153	285	240						
150	200	425	535	560	460	M30	164	285	240						
160	214	420	530	570	455	M30	175	285	240						
170	227	410	520	575	445	M24	185	285	240						
180	240	405	515	580	440	M24	196	285	240						
190	254	395	505	590	430	M24	208	285	240						
200	267	390	500	595	425	M24	219	285	240						
210	280	385	495	605	420	M24	230	285	240						
220	294	375	485	610	410	M24	241	285	240						
230	307	370	480	620	405	M24	251	285	240						
240	320	360	470	625	395	M20	262	285	240						
250	334	355	465	635	390	M20	273	285	240						
260	347	345	455	640	380	M20	284	285	240						
270	360	340	450	645	375	M20	295	285	240						
280	374	330	440	655	365	M20	306	285	240						
290	387	325	435	660	360	M20	317	285	240						
300	400	315	425	670	350	M20	327	285	240						
310	414	310	420	675	345	M20		285	240						
320	427	305	415	685	340	M20		285	240						
330	440	295	405	690	330	M20		285	240						
340	454	290	400	700	325	M20		285	240						
350	467	280	390	705	315	M20		285	240						
360	480	275	385	710	310	M20		285	240						
370	494	310	375	720	345	M20		285	240	295	340	295	405	450	405
380	507	305	370	725	340	M20		285	240	295	340	295	405	450	405
390	520	295	360	735	330	M20		285	240	295	340	295	405	450	405
400	534	290	355	740	325	M20		285	240	295	340	295	405	450	405
410	547	310	345	750	345	M20		285	240	295	370	295	405	480	405
420	560	305	340	755	340	M20		285	240	295	370	295	405	480	405
430	574	295	330	765	330	M20		285	240	295	370	295	405	480	405
440	587	290	325	770	325	M20		285	240	295	370	295	405	480	405
450	600	315	320	775	350	M20		285	240	295	400	295	405	510	405
460	614	305	310	785	340	M20		285	240	295	400	295	405	510	405
470	627	300	305	790	335	M20		285	240	295	400	295	405	510	405
480	641	290	295	800	325	M20		285	240	295	400	295	405	510	405
490	654	285	290	805	320	M20		285	240	295	400	295	405	510	405
500	667	275	280	815	310	M20		285	240	295	400	295	405	510	405

SIZE 34 to 39

TRAVEL	A	B	B1	B2	B3	B4	C	D	E	F	VV	VV1	VV2	U	U1	U2
170	227	530	645	750	670		M36	187	400	355						
180	240	525	640	760	665		M36	197	400	355						
190	254	515	630	765	555		M30	209	400	355						
200	267	510	625	770	550		M30	220	400	355						
210	280	505	620	780	545		M30	230	400	355						
220	294	495	610	785	535		M30	242	400	355						
230	307	490	605	790	530		M30	252	400	355						
240	320	480	595	800	520		M30	262	400	355						
250	334	475	590	810	515		M30	274	400	355						
260	347	465	580	815	505		M30	285	400	355						
270	360	460	575	825	500		M30	296	400	355						
280	374	450	565	830	490		M30	307	400	355						
290	387	445	560	840	485		M30	318	400	355						
300	400	435	550	845	475		M30	328	400	355						
310	414	430	545	850	470		M24	340	400	355						
320	427	425	540	860	465		M24	351	400	355						
330	440	415	530	870	455		M24	361	400	355						
340	454	410	525	875	450		M24	373	400	355						
350	467	400	515	880	440		M24	384	400	355						
360	480	395	510	890	435		M24	394	400	355						
370	494	385	500	895	425		M24	405	400	355						
380	507	380	495	905	420		M24	416	400	355						
390	520	370	485	910	410		M24	427	400	355						
400	534	365	480	920	405		M24	439	400	355						
410	547	355	470	925	395		M24	449	400	355	420	420	420	585	535	535
420	560	350	465	935	390	515	M24	460	400	355	470	420	420	585	535	535
430	574	340	455	945	380	505	M24	470	400	355	470	420	420	585	535	535
440	587	335	450	950	375	500	M24	480	400	355	470	420	420	585	535	535
450	600	330	445	955	370	495	M24	495	400	355	470	420	420	585	535	535
460	614	320	435	965	360	485	M24	505	400	355	470	420	420	585	535	535
470	627	315	430	970	355	480	M24	515	400	355	470	420	420	585	535	535
480	641	305	420	980	345	470	M24	530	400	355	470	420	420	585	535	535
490	654	340	415	985	380	465	M24	540	400	355	470	460	420	585	575	535
500	667	330	405	995	370	455	M24	550	400	355	470	460	420	585	575	535
510	680	325	400	1000	365		M24		400	355		460	420		575	535
520	695	315	390	1010	355		M24		400	355		460	420		575	535
530	708	310	385	1015	350		M24		400	355		460	420		575	535
540	720	305	380	1020	345		M24		400	355		460	420		575	535
550	734	335	370	1030	375		M24		400	355		500	420		615	535
560	747	330	365	1035	370		M24		400	355		500	420		615	535
570	761	320	355	1045	360		M24		400	355		500	420		615	535
580	774	315	350	1050	355		M24		400	355		500	420		615	535
590	787	305	340	1060	345		M24		400	355		500	420		615	535
600	800	300	335	1065	340		M24		400	355		500	420		615	535
610	815	290	325	1075	330		M24		400	355		500	420		615	535

REV.	DATE	EDITED FOR :	DRAW.	REV.
1	21/07/10	GENERAL REVISION	DDG	EAR
0	20/10/98	INFORMATION	JMD	EAR

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pipe hanger solutions

CONSTANT LOAD SUPPORT
MODELS C51

SECTION E
19

TABLE OF DIMENSIONS - SIZES 40 a 54

SIZE 40 to 47

TRAVEL	A	B	B1	B2	B3	B4	C	E	F	VV	VV1	VV2	U	U1	U2
170	227	575	715	1115	625		M48	430	370	500	500	500	685	685	685
180	240	570	710	1120	620		M48	430	370	500	500	500	685	685	685
190	254	560	700	1130	610		M48	430	370	500	500	500	685	685	685
200	267	555	695	1135	605		M48	430	370	500	500	500	685	685	685
210	280	545	690	1145	595		M42	430	370	500	500	500	685	685	685
220	294	540	680	1150	590		M42	430	370	500	500	500	685	685	685
230	307	535	675	1160	585		M42	430	370	500	500	500	685	685	685
240	320	525	665	1165	575		M42	430	370	500	500	500	685	685	685
250	334	520	660	1175	570		M42	430	370	500	500	500	685	685	685
260	347	510	650	1180	560		M42	430	370	500	500	500	685	685	685
270	360	505	645	1185	555		M42	430	370	500	500	500	685	685	685
280	374	495	635	1195	545		M42	430	370	500	500	500	685	685	685
290	387	490	630	1200	540		M36	430	370	500	500	500	685	685	685
300	400	480	620	1210	530		M36	430	370	500	500	500	685	685	685
310	414	475	615	1215	525		M36	430	370	500	500	500	685	685	685
320	427	470	610	1225	520		M36	430	370	500	500	500	685	685	685
330	440	460	600	1230	510		M36	430	370	500	500	500	685	685	685
340	454	455	595	1240	505		M36	430	370	500	500	500	685	685	685
350	467	445	585	1245	495		M36	430	370	500	500	500	685	685	685
360	480	440	580	1250	490		M36	430	370	500	500	500	685	685	685
370	494	430	570	1260	480		M36	430	370	500	500	500	685	685	685
380	507	425	565	1270	475		M36	430	370	500	500	500	685	685	685
390	520	415	555	1275	465		M36	430	370	500	500	500	685	685	685
400	534	410	550	1280	460		M36	430	370	500	500	500	685	685	685
410	547	400	540	1290	450		M36	430	370	500	500	500	685	685	685
420	560	470	610	1290	520	610	M36	430	370	500	500	500	685	685	685
430	574	460	600	1300	510	600	M36	430	370	500	500	500	685	685	685
440	587	455	595	1305	505	595	M36	430	370	500	500	500	685	685	685
450	600	445	585	1315	495	590	M36	430	370	500	500	500	685	685	685
460	614	440	580	1320	490	580	M36	430	370	500	500	500	685	685	685
470	627	435	575	1330	485	575	M36	430	370	500	500	500	685	685	685
480	641	425	565	1335	475	565	M36	430	370	500	500	500	685	685	685
490	654	420	560	1345	470	560	M36	430	370	500	500	500	685	685	685
500	667	410	550	1350	460	550	M36	430	370	500	500	500	685	685	685
510	680	405	545	1355	455	610	M36	430	370	565	500	500	750	685	685
520	695	395	535	1365	445	600	M36	430	370	565	500	500	750	685	685
530	708	390	530	1375	440	595	M36	430	370	565	500	500	750	685	685
540	720	380	520	1380	430	590	M36	430	370	565	500	500	750	685	685
550	734	375	515	1385	425	580	M36	430	370	565	500	500	750	685	685
560	747	365	505	1395	415	575	M36	430	370	565	500	500	750	685	685
570	761	360	500	1400	410	565	M36	430	370	565	500	500	750	685	685
580	774	350	490	1410	400	560	M36	430	370	565	500	500	750	685	685
590	787	345	485	1415	395	550	M36	430	370	565	500	500	750	685	685
600	800	340	480	1425	390	545	M36	430	370	565	500	500	750	685	685
610	815	330	470	1430	380	535	M36	430	370	565	500	500	750	685	685

SIZE 48 a 50

TRAVEL	A	B	B1	B2	B3	B4	C	E	F	VV	VV1	VV2	U	U1	U2
170	227	635	835	1285	695		M64	460	365	540	445	530	775	680	765
180	240	630	830	1290	690		M64	460	365	540	445	530	775	680	765
190	254	620	820	1300	680		M64	460	365	540	445	530	775	680	765
200	267	615	815	1305	675		M56	460	365	540	445	530	775	680	765
210	280	610	810	1310	670		M56	460	365	540	445	530	775	680	765
220	294	600	800	1320	660		M56	460	365	540	445	530	775	680	765
230	307	595	795	1330	655		M56	460	365	540	445	530	775	680	765
240	320	585	785	1335	645		M56	460	365	540	445	530	775	680	765
250	334	580	780	1340	640		M56	460	365	540	445	530	775	680	765
260	347	570	770	1350	630		M56	460	365	540	445	530	775	680	765
270	360	565	765	1355	625		M48	460	365	540	445	530	775	680	765
280	374	555	755	1365	615		M48	460	365	540	445	530	775	680	765
290	387	550	750	1370	610		M48	460	365	540	445	530	775	680	765
300	400	540	740	1380	600		M48	460	365	540	445	530	775	680	765
310	414	535	735	1385	595		M48	460	365	540	445	530	775	680	765
320	427	530	730	1395	590		M48	460	365	540	445	530	775	680	765
330	440	520	720	1400	580		M48	460	365	540	445	530	775	680	765
340	454	515	715	1410	575		M48	460	365	540	445	530	775	680	765
350	467	505	705	1415	565		M48	460	365	540	445	530	775	680	765
360	480	500	700	1420	560		M42	460	365	540	445	530	775	680	765
370	494	490	690	1430	550		M42	460	365	540	445	530	775	680	765
380	507	485	685	1435	545		M42	460	365	540	445	530	775	680	765
390	520	475	675	1445	535		M42	460	365	540	445	530	775	680	765
400	534	470	670	1450	530		M42	460	365	540	445	530	775	680	765
410	547	460	660	1460	520		M42	460	365	540	445	530	775	680	765
420	560	540	740	1465	600	750	M42	460	365	540	445	530	775	680	765
430	574	530	730	1475	590	740	M42	460	365	540	445	530	775	680	765
440	587	525	725	1480	585	735	M42	460	365	540	445	530	775	680	765
450	600	515	715	1485	575	730	M42	460	365	540	445	530	775	680	765
460	614	510	710	1495	570	720	M42	460	365	540	445	530	775	680	765
470	627	505	705	1500	565	715	M42	460	365	540	445	530	775	680	765
480	641	495	695	1510	555	705	M42	460	365	540	445	530	775	680	765
490	654	490	690	1515	550	700	M42	460	365	540	445	530	775	680	765
500	667	480	680	1525	540	690	M42	460	365	540	445	530	775	680	765
510	680	475	675	1530	535	745	M42	460	365	600	445	530	835	680	765
520	695	465	665	1540	525	735	M42	460	365	600	445	530	835	680	765
530	708	460	660	1545	520	730	M42	460	365	600	445	530	835	680	765
540	720	450	650	1550	510	725	M42	460	365	600	445	530	835	680	765
550	734	445	645	1560	505	715	M42	460	365	600	445	530	835	680	765
560	747	435	635	1565	495	710	M42	460	365	600	445	530	835	680	765
570	761	430	630	1575	490	700	M42	460	365	600	445	530	835	680	765
580	774	420	620	1580	480	695	M42	460	365	600	445	530	835	680	765
590	787	415	615	1590	475	685	M42	460	365	600	445	530	835	680	765
600	800	410	610	1595	470	680	M42	460	365	600	445	530	835	680	765
610	815	400	600	1605	460	670	M42	460	365	600	445	530	835	680	765

SIZE 51 to 54

TRAVEL	A	B	B1	B2	B3	B4	C	E	F	VV	VV1	VV2	U	U1	U2
170	227	625	835	1285	695		M64	460	365	540	445	530	775	680	765
180	240	620	830	1290	690		M64	460	365	540	445	530	775	680	765
190	254	610	820	1300	680		M64	460	365	540	445	530	775	680	765
200	267	605	815	1305	675		M56	460	365	540	445	530	775	680	765
210	280	600	810	1310	670		M56	460	365	540	445	530	775	680	765
220	294	590	800	1320	660		M56	460	365	540	445	530	775	680	765
230	307	585	795	1330	655		M56	460	365	540	445	530	775	680	765
240	320	575	785	1335	645		M56	460	365	540	445	530	775	680	765
250	334	570	780	1340	640		M56	460	365	540	445	530	775	680	765
260	347	560	770	1350	630		M56	460	365	540	445	530	775	680	765
270	360	555	765	1355	625		M48	460	365	540	445	530	775	680	765
280	374	545	755	1365	615		M48	460	365	540	445	530	775	680	765
290	387	540	750	1370	610		M48	460	365	540	445	530	775	680	765
300	400	530	740	1380	600		M48	460	365	540	445	530	775	680	765
310	414	525	735	1385	595		M48	460	365	540	445	530	775	680	765
320	427	520	730	1395	590		M48	460	365	540	445	530	775	680	765
330	440	510	720	1400	580		M48	460	365	540	445	530	775	680	765
340	454	505	715	1410	575		M48	460	365	540	445	530	775	680	765
350	467	495	705	1415	565		M48	460	365	540	445	530	775	680	765
360	480	490	700	1420	560		M42	460	365	540	445	530	775	680	765
370	494	480	690	1430	550		M42	460	365	540	445	530	775	680	765
380	507	475	685	1435	545		M42	460	365	540	445	530	775	680	765
390	520	465	675	1445	535		M42	460	365	540	445	530	775	680	765
400	534	460	670	1450	530		M42	460	365	540	445	530	775	680	765
410	547	450	660	1460	520		M42	460	365	540	445	530	775	680	765
420	560	530	740	1465	600	750	M42	460	365	540	445	530	775	680	765
430	574	520	730	1475	590	740	M42	460	365	540	445	530	775	680	765
440	587	515	725	1480	585	735	M42	460	365	540	445	530	775	680	765
450	600	505	715	1485	575	730	M42	460	365	540	445	530	775	680	765
460	614	500	710	1495	570	720	M42	460	365	540	445	530	775	680	765
470	627	495	705	1500	565	715	M42	460	365	540	445	530	775	680	765
480	641	485	695	1510	555	705	M42	460	365	540	445	530	775	680	765
490	654	480	690	1515	550	700	M42	460	365	540	445	530	775	680	765
500	667	470	680	1525	540	690	M42	460	365	540	445	530	775	680	765
510	680	465	675	1530	535	745	M42	460	365	600	445	530	835	680	765
520	695	455	665	1540	525	735	M42	460	365	600	445	530	835	680	765
530	708	450	660	1545	520	730	M42	460	365	600	445	530	835	680	765
540	720	440	650	1550	510	725	M42	460	365	600	445	530	835	680	765
550	734	435	645	1560	505	715	M42	460	365	600	445	530	835	680	765
560	747	425	635	1565	495	710	M42	460	365	600	445	530	835	680	765
570	761	420	630	1575	490	700	M42	460	365	600	445	530	835	680	765
580	774	410	620	1580	480	695	M42	460	365	600	445	530	835	680	765
590	787	405	615	1590	475	685	M42	460	365	600	445	530	835	680	765
600	800	400	610	1595	470	680	M42	460	365	600	445	530	835	680	765
610	815	390	600	1605	460	670	M42	460	365	600	445	530	835	680	765

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CONSTANT LOAD SUPPORT
MODELS C51

SECTION E
20

TABLE OF DIMENSIONS - SIZES 55 to 66

SIZE 55 to 58

TRAVEL	A	B	B1	B2	B3	B4	C	E	F	VV	VV1	VV2	U	U1	U2
180	240	610	830	1290	690		M72	460	365						
190	254	600	820	1300	680		M72	460	365						
200	267	595	815	1305	675		M64	460	365						
210	280	590	810	1310	670		M64	460	365						
220	294	580	800	1320	660		M64	460	365						
230	307	575	795	1330	655		M64	460	365						
240	320	565	785	1335	645		M64	460	365						
250	334	560	780	1340	640		M64	460	365						
260	347	550	770	1350	630		M56	460	365						
270	360	545	765	1355	625		M56	460	365						
280	374	535	755	1365	615		M56	460	365						
290	387	530	750	1370	610		M56	460	365						
300	400	520	740	1380	600		M56	460	365						
310	414	515	735	1385	595		M56	460	365						
320	427	510	730	1395	590		M56	460	365						
330	440	500	720	1400	580		M56	460	365						
340	454	495	715	1410	575		M56	460	365						
350	467	485	705	1415	565		M56	460	365						
360	480	480	700	1420	560		M48	460	365						
370	494	470	690	1430	550		M48	460	365						
380	507	465	685	1435	545		M48	460	365						
390	520	455	675	1445	535		M48	460	365						
400	534	450	670	1450	530		M48	460	365						
410	547	440	660	1460	520		M48	460	365						
420	560	520	740	1465	600	750	M48	460	365	540			775		
430	574	510	730	1475	590	740	M48	460	365	540			775		
440	587	505	725	1480	585	735	M48	460	365	540			775		
450	600	495	715	1485	575	730	M48	460	365	540			775		
460	614	490	710	1495	570	720	M48	460	365	540			775		
470	627	485	705	1500	565	715	M48	460	365	540			775		
480	641	475	695	1510	555	705	M48	460	365	540			775		
490	654	470	690	1515	550	700	M48	460	365	540			775		
500	667	460	680	1525	540	690	M48	460	365	540			775		
510	680	455	675	1530	535	745	M48	460	365	600	445	530	835	680	765
520	695	445	665	1540	525	735	M48	460	365	600			835		
530	708	440	660	1545	520	730	M48	460	365	600			835		
540	720	430	650	1550	510	725	M48	460	365	600			835		
550	734	425	645	1560	505	715	M48	460	365	600			835		
560	747	415	635	1565	495	710	M48	460	365	600			835		
570	761	410	630	1575	490	700	M48	460	365	600			835		
580	774	400	620	1580	480	695	M48	460	365	600			835		
590	787	395	615	1590	475	685	M48	460	365	600			835		
600	800	390	610	1595	470	680	M48	460	365	600			835		
610	815	380	600	1605	460	670	M48	460	365	600			835		

SIZE 59 to 62

TRAVEL	A	B	B1	B3	C	E	F	VV	VV1	VV2	U	U1	U2
180	240	745	975	825	M80	430	500						
190	254	740	970	820	M72	430	500						
200	267	730	960	810	M72	430	500						
210	280	725	955	805	M72	430	500						
220	294	715	945	795	M72	430	500						
230	307	710	940	790	M72	430	500						
240	320	700	930	780	M64	430	500						
250	334	695	925	775	M64	430	500						
260	347	685	915	765	M64	430	500						
270	360	680	910	760	M64	430	500						
280	374	670	900	750	M64	430	500						
290	387	665	895	745	M64	430	500	580			820		
300	400	660	890	740	M64	430	500						
310	414	650	880	730	M64	430	500						
320	427	645	875	725	M56	430	500						
330	440	635	865	715	M56	430	500						
340	454	630	860	710	M56	430	500						
350	467	620	850	700	M56	430	500						
360	480	615	845	695	M56	430	500						
370	494	605	835	685	M56	430	500						
380	507	600	830	680	M56	430	500						
390	520	595	825	675	M56	430	500						
400	534	585	815	665	M56	430	500						
410	547	580	810	660	M56	430	500						
420	560	570	800	650	M56	430	500						
430	574	560	790	640	M56	430	500						
440	587	555	785	635	M56	430	500						
450	600	550	775	625	M56	430	500						
460	614	540	770	620	M56	430	500						
470	627	535	765	615	M56	430	500						
480	641	525	755	605	M56	430	500						
490	654	520	750	600	M56	430	500						
500	667	510	740	590	M56	430	500						
510	680	505	735	585	M56	430	500						
520	695	495	725	575	M56	430	500						
530	708	490	720	570	M56	430	500						
540	720	480	710	560	M56	430	500						
550	734	475	705	555	M56	430	500						
560	747	470	700	545	M56	430	500						
570	761	460	690	540	M56	430	500						
580	774	450	685	530	M56	430	500						
590	787	445	675	525	M56	430	500						
600	800	440	670	520	M56	430	500						
610	815	430	660	510	M56	430	500						

SIZE 63 to 66

TRAVEL	A	B	B1	B3	C	E	F	VV	VV1	VV2	U	U1	U2
180	240	745	975	825	M80	430	500						
190	254	740	970	820	M80	430	500						
200	267	730	960	810	M80	430	500						
210	280	725	955	805	M80	430	500						
220	294	715	945	795	M80	430	500						
230	307	710	940	790	M72	430	500						
240	320	700	930	780	M72	430	500						
250	334	695	925	775	M72	430	500						
260	347	685	915	765	M72	430	500						
270	360	680	910	760	M72	430	500						
280	374	670	900	750	M72	430	500						
290	387	665	895	745	M64	430	500	580			820		
300	400	660	890	740	M64	430	500						
310	414	650	880	730	M64	430	500						
320	427	645	875	725	M64	430	500						
330	440	635	865	715	M64	430	500						
340	454	630	860	710	M64	430	500						
350	467	620	850	700	M64	430	500						
360	480	615	845	695	M64	430	500						
370	494	605	835	685	M64	430	500						
380	507	600	830	680	M56	430	500						
390	520	595	825	675	M56	430	500						
400	534	585	815	665	M56	430	500						
410	547	580	810	660	M56	430	500						
420	560	570	800	650	M56	430	500						
430	574	560	790	640	M56	430	500						
440	587	555	785	635	M56	430	500						
450	600	550	775	625	M56	430	500						
460	614	540	770	620	M56	430	500						
470	627	535	765	615	M56	430	500						
480	641	525	755	605	M56	430	500						
490	654	520	750	600	M56	430	500						
500	667	510	740	590	M56	430	500						
510	680	505	735	585	M56	430	500						
520	695	495	725	575	M56	430	500						
530	708	490	720	570	M56	430	500						
540	720	480	710	560	M56	430	500						
550	734	475	705	555	M56	430	500						
560	747	470	700	545	M56	430	500						
570	761	460	690	540	M56	430	500						
580	774	450	685	530	M56	430	500						
590	787	445	675	525	M56	430	500						
600	800	440	670	520	M56	430	500						
610	815	430	660	510	M56	430	500						

REV.	FECHA		DIBUJ.	REV.
1	21/07/10	REVISIÓN GENERAL	DDG	EAR
0	20/10/98	INFORMACIÓN	JMD	EAR
		EDITADO PARA :		

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CONSTANT LOAD SUPPORT
MODELS C52

SECTION E
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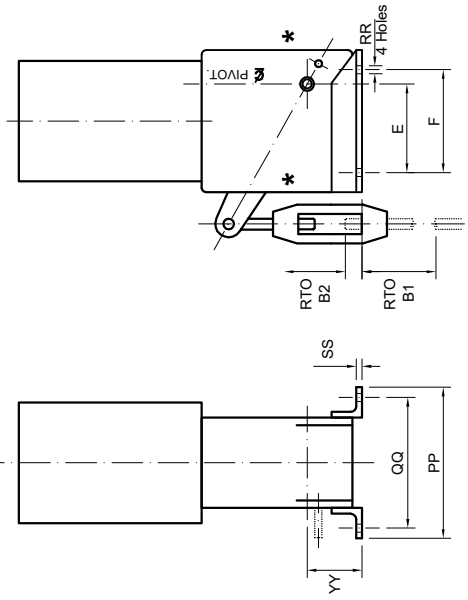
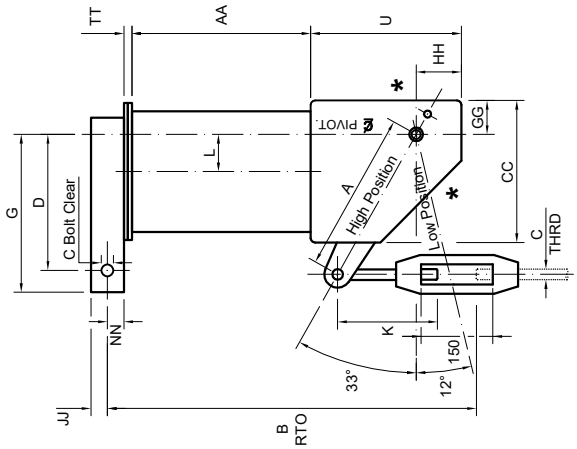
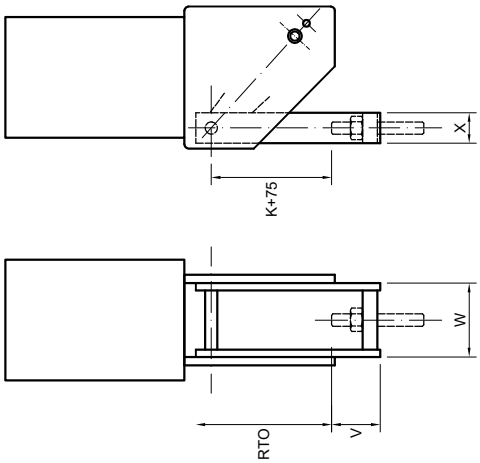


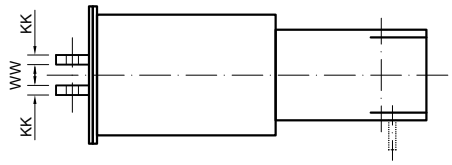
TYPE X

ROAD TAKE OUT CALCULATED WHEN LOAD ARM IS IN HIGH POSITION.
FOR UP TRAVEL, ROD TAKE OUT EQUALS TOTAL UP PLUS "B", "B1" OR TOTAL UP MINUS "B2".

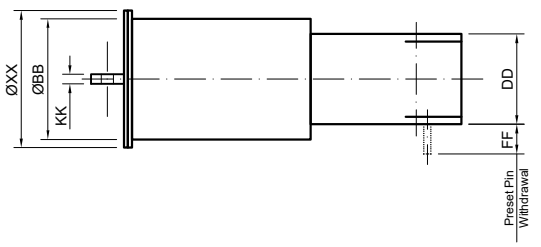
ROD TAKE OUT = "B" FOR TYPES "Y" Y "Z".
"B1" OR "B2" FOR TYPE "X".







TYPE Z



TYPE Y

* ACCES TO LOAD ADJUSTER

TYPICAL YOKE ARRANGEMENT, APPLIES TO TYPES "X", "Y" AND "Z". SEE TABLE IN THE NEXT SHEETS FOR UNIT SIZE AND TRAVEL RANGE APPLICABLE.

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CONSTANT LOAD SUPPORT
MODELS C52

SECTION E
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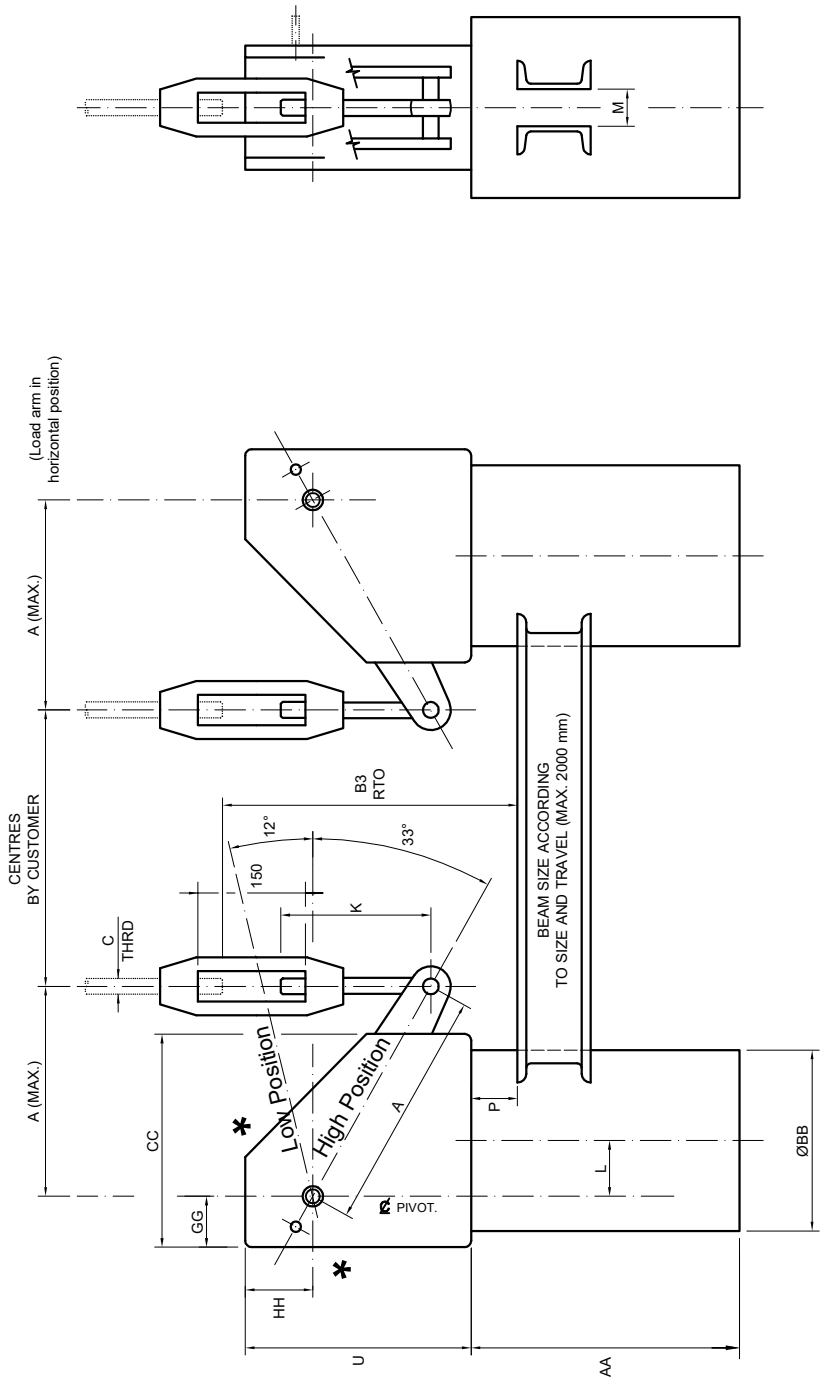

TYPE G

* ACCESS TO LOAD ADJUSTER

NOTES:

WHEN USING TYPE "G" THE WORKING LOAD MUST BE HALVED TO SELECT HANGER SIZE.

ARMS IN HIGH POSITION ALLOW DOWNWARD PIPE MOVEMENT.

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CONSTANT LOAD SUPPORT
MODELS C52

SECTION E
23

REV.	0	1	
DATE	20/10/98	21/07/10	
EDITED FOR :	INFORMATION	GENERAL REVISION	
DRAW.	JMD	DDG	
REV.	EAR	EAR	

TABLE OF DIMENSIONS - SIZES 1 to 26

SIZE 1 to 6

TRAVEL	A	B	B1	B2	B3	C	D	E	F	G	YY	P
40	54	620	130		375	M12	42	105	140	105	65	55
50	67	610	125		370	M12	53	105	140	105	65	55
60	80	605	115		360	M12	64	105	140	105	65	55
70	94	600	110		355	M12	76	105	140	110	65	55
80	107	590	105		345	M12	86	105	140	115	65	55
90	120	585	95		340	M12	97	105	140	130	65	55
100	134	575	90		330	M12	107	105	140	130	65	55
110	147	570	80		325	M12	118	105	140	140	65	55
120	160	560	75		320	M12	128	105	140	155	65	55
130	174	555	65		310	M12	140	105	140	160	65	55
140	187	550	60		305	M12	150	105	140	175	65	55
150	200	540	50		295	M12	161	105	140	180	65	55
160	214	530	45		290	M12	172	105	140	195	65	55
170	227	525	35		280	M12	182	105	140	210	65	55
180	240	520	30		275	M12	193	105	140	215	65	55
190	254	510	25		265	M12	203	105	140	230	65	55
200	267	505	15		260	M12	214	105	140	235	65	55
210	280	500	10		255	M12	225	105	140	250	65	55
220	294	490		25	275	M12	240	105	140	260	90	85
230	307	485		30	270	M12	250	105	140	270	90	85
240	320	475		40	260	M12	260	105	140	280	90	85
250	334	470		60	255	M12	270	105	140	290	105	85
260	347	N/A		70	N/A	M12	N/A	105	140	N/A	105	N/A
270	360	N/A		75	N/A	M12	N/A	105	140	N/A	105	N/A
280	374	N/A		85	N/A	M12	N/A	105	140	N/A	105	N/A
290	387	N/A		90	N/A	M12	N/A	105	140	N/A	105	N/A
300	400	N/A		100	N/A	M12	N/A	105	140	N/A	105	N/A

SIZE 7 to 12

TRAVEL	A	B	B1	B2	B3	C	D	E	F	G	YY	P
40	54	700	115		385	M20	41	120	155	150	80	40
50	67	695	110		380	M16	52	120	155	150	80	40
60	80	685	100		370	M16	63	120	155	150	80	40
70	94	680	95		365	M16	75	120	155	150	80	40
80	107	670	90		355	M12	85	120	155	150	80	40
90	120	665	80		350	M12	96	120	155	150	80	40
100	134	655	70		340	M12	107	120	155	150	80	40
110	147	650	65		335	M12	117	120	155	150	80	40
120	160	645	60		330	M12	128	120	155	160	80	40
130	174	635	50		320	M12	139	120	155	170	80	40
140	187	625	45		315	M12	150	120	155	180	80	40
150	200	620	35		305	M12	160	120	155	190	80	40
160	214	610	30		300	M12	171	120	155	200	80	40
170	227	605	20		290	M12	181	120	155	215	80	40
180	240	600	15		285	M12	192	120	155	220	80	40
190	254	590	10		280	M12	204	120	155	235	80	40
200	267	585	-	-	270	M12	214	120	155	245	80	40
210	280	575		10	265	M12	225	120	155	255	80	40
220	294	570		40	285	M12	240	120	155	260	105	70
230	307	565		45	280	M12	250	120	155	270	105	70
240	320	555		55	270	M12	260	120	155	280	105	70
250	334	550		60	295	M12	270	120	155	290	105	100
260	347	540		70	285	M12	280	120	155	300	105	100
270	360	535		75	280	M12	290	120	155	310	105	100
280	374	525		85	270	M12	305	120	155	325	105	100
290	387	520		90	265	M12	315	120	155	335	105	100
300	400	510		100	255	M12	325	120	155	345	105	100
310	414	N/A		125	N/A	M12	N/A	120	155	N/A	125	N/A
320	427	N/A		135	N/A	M12	N/A	120	155	N/A	125	N/A
330	440	N/A		140	N/A	M12	N/A	120	155	N/A	125	N/A
340	454	N/A		145	N/A	M12	N/A	120	155	N/A	125	N/A
350	467	N/A		155	N/A	M12	N/A	120	155	N/A	125	N/A
360	480	N/A		180	N/A	M12	N/A	120	155	N/A	145	N/A
370	494	N/A		190	N/A	M12	N/A	120	155	N/A	145	N/A
380	507	N/A		195	N/A	M12	N/A	120	155	N/A	145	N/A
390	520	N/A		205	N/A	M12	N/A	120	155	N/A	145	N/A
400	534	N/A		210	N/A	M12	N/A	120	155	N/A	145	N/A
410	547	N/A		220	N/A	M12	N/A	120	155	N/A	145	N/A
420	560	N/A		225	N/A	M12	N/A	120	155	N/A	145	N/A

SIZE 13 to 18

TRAVEL	A	B	B1	B2	B3	C	D	E	F	G	YY	P
40												
50												
60	80	790	90		415	M20	63	155	190	200	90	40
70	94	785	85		410	M20	75	155	190	200	90	40
80	107	780	75		400	M20	85	155	190	200	90	40
90	120	770	70		395	M16	95	155	190	200	90	40
100	134	765	60		385	M16	105	155	190	200	90	40
110	147	755	55		380	M16	116	155	190	200	90	40
120	160	750	50		375	M16	126	155	190	200	90	40
130	174	740	40		365	M16	138	155	190	200	90	40
140	187	735	35		360	M16	148	155	190	200	90	40
150	200	725	25		350	M16	158	155	190	200	90	40
160	214	720	20		345	M12	169	155	190	200	90	40
170	227	710	10		335	M12	179	155	190	215	90	40
180	240	705	5		330	M12	189	155	190	220	90	40
190	254	700		5	320	M12	200	155	190	230	90	40
200	267	690		10	315	M12	211	155	190	240	90	40
210	280	685		20	310	M12	221	155	190	255	90	40
220	294	675		25	300	M12	232	155	190	265	90	40
230	307	670		30	295	M12	242	155	190	275	90	40
240	320	660		40	285	M12	253	155	190	285	90	40
250	334	655		45	280	M12	264	155	190	295	90	40
260	347	650		55	270	M12	274	155	190	305	90	40
270	360	645		85	305	M12	290	155	190	310	115	110
280	374	635		95	295	M12	305	155	190	325	115	110
290	387	630		100	290	M12	315	155	190	335	115	110
300	400	620		110	280	M12	325	155	190	345	115	110
310	414	615		135	305	M12	340	155	190	360	135	80
320	427	605		145	295	M12	350	155	190	370	135	80
330	440	600		150	290	M12	360	155	190	380	135	80
340	454	595		155	285	M12	375	155	190	395	135	80
350	467	685		165	275	M12	385	155	190	405	135	80
360	480	580		170	270	M12	395	155	190	415	135	80
370	494	N/A		180	N/A	M12	N/A	155	190	N/A	135	N/A
380	507	N/A		200	N/A	M12	N/A	155	190	N/A	150	N/A
390	520	N/A		210	N/A	M12	N/A	155	190	N/A	150	N/A
400	534	N/A		215	N/A	M12	N/A	155	190	N/A	150	N/A
410	547	N/A		225	N/A	M12	N/A	155	190	N/A	150	N/A
420	560	N/A		230	N/A	M12	N/A	155	190	N/A	150	N/A

SIZE 19 to 26

TRAVEL	A	B	B1	B2	B3	C	D	E	F	G	YY	P
40												
50												
60												
70	94	945	115		535	M30	76	190	240	230	110	80
80	107	935	105		530	M24	87	190	240	230	110	80
90	120	930	100		520	M24	97	190	240	230	110	80
100	134	920	90		510	M24	108	190	240	230	110	80
110	147	915	85		505	M24	119	190	240	230	110	80
120	160	910	75		500	M20	129	190	240	230	110	80
130	174	900	70		490	M20	141	190	240	230	110	80
140	187	895	65		485	M20	152	190	240	230	110	80
150	200	885	55		475	M20	162	190	240	230	110	80
160	214	880	50		470	M20	173	190	240	230	110	80
170	227	870	40		460	M20	184	190	240	230	110	80
180	240	865	35		455	M16	195	190	240	230	110	80
190	254	855	30		450	M16	206	190	240	235	110	80
200	267	850	20		440	M16	217	190	240	245	110	80
210	280	845	15		435	M16	227	190	240	255	110	80
220	294	835	5		425	M16	239	190	240	270	110	80
230	307	830	-	-	420	M16	249	190	240	280	110	80
240	320	820		10	410	M16	259	190	240	290	110	80
250	334	815		15	405	M16	271	190	240	300	110	80
260	347	805		25	395	M16	282	190	240	310	110	80
270	360	800		30	390	M16	292	190	240	320	110	80
280	374	790		40	380	M16	304	190	240	335	110	80
290	387	785		45	375	M16	315	190	240	345	110	80
300	400	775		55	370	M16	324	190	240	355	110	80
310	414	770		60	360	M16	336	190	240	365	110	80
320	427	765		70	350	M16	347	190	240	375	110	80
330	440	755		75	345	M12	357	190	240	385	110	80
340	454	750		80	340	M12	369	190	240	400	110	80
350	467	740		90	330	M12	380	190	240	410	110	80
360	480	735		95	325	M12	390	190	240	420	110	80
370	494	725		150	355	M12	405	190	240	425	155	120
380	507	720		155	350	M12	415	190	240	435	155	120
390	520	710		165	340	M12	425	190	240	445	155	120
400	534	705		170	335	M12	440	190	240	460	155	120
410	547	695		180	325	M12	450	190	240	470	155	120
420	560	680		210	320	M12	460	190	240	480	180	120
430	574	N/A		220	N/A	M12	N/A	190	240	N/A	180	N/A
440	587	N/A		225	N/A	M12	N/A	190	240	N/A	180	N/A
450	600	N/A		230	N/A	M12	N/A	190	240	N/A	180	N/A
460	614	N/A		240	N/A	M12	N/A	190	240	N/A	180	N/A
470	627	N/A		245	N/A	M12	N/A	190	240	N/A	180	N/A
480	641	N/A		255	N/A	M12	N/A	190	240	N/A	180	N/A
490	654	N/A		260	N/A	M12	N/A	190	240	N/A	180	N/A
500	667	N/A		270	N/A	M12	N/A	190	240	N/A	180	N/A

CONSTANT SUPPORT 1 to 66

-	1-6	7-12	13-18	19-26	27-33	34-39	40-47	48-50	51-54	55-58	59-66
AA	250	300	350	400	600	750	1100	1265	1265	TAB.	TAB.
BB	150	220	295	330	390	440	525	525	525	525	640
CC	180	215	270	325	405	495	610	710	710	710	760
DD	115	120	135	150	180	225	280	345	345	345	455
FF	135	140	160	175	215	270	330	405	405	405	560
GG	55	65	75	95	115	145	180	250	250	250	280
HH	55	65	75	95	115	145	180	190	190	190	215
KK	10	12	12	20	25	25	30	40	40	40	40
NN	40	40	50	65	75	75	90	140	140	140	150
PP	215	220	255	270	320	425	480	745	745	745	855
QQ	165	180	205	220	265	335	395	520	520	520	685
RR	14	18	22	22	22	27	33	45	45	45	51
SS	6	6	8	8	10	10	15	20	20	20	25
TT	10	15	20	25	30	40	40	60	60	60	80
WW	35	35	50	50	65	75	90	110	110	110	120
XX	220	300	380	425	480	540	625	650	650	650	780
K	150	150	150	200	200	200	250	TAB.	TAB.	300	300
L	33	38	65	66	83	100	TAB.	182	182	182	TAB.
U	180	215	270	325	405	495	610	685	685	685	760
V	125	155	170	190	205	225	245	275	290	290	340
W	95	102	112	123	153	190	231	288	288	288	390
X	40	50	65	80	90	110	130	150	160	160	220
M	18	30	30	42	50	55	65	65	65	65	70

BEAMS FOR CONSTANT SUPPORT 1 to 66

-	1-6	7-12	13-18	19-26	27-33	34-39	40-47	48-50	51-54	55-58	59-66
TRAVEL ≤ 190	100 x50	125 x65	125 x65	200 x75	200 x90	260 x90	300 x90	380 x100	380 x100	380 x100	430 x100
TRAVEL > 190	100 x50	100 x50	100 x50	125 x65	150 x75	180 x75	230 x90	300 x90	300 x90	380 x100	430 x100

YOKE TABLE

SIZE	TRAVEL
1-6	40-100
7-12	40-120
13-18	60-150
19-26	70-180
27-33	80-200
34-39	100-250
40-47	120-320
48-54	150-410
55-58	170-410
59-60	180-410

"JJ" DIMENSION ACCORDING TO "C"

-	M12	M16	M20	M24	M30	M36	M42	M48	M56	M64	M72	M80	M90
JJ	25	25	30	35	40	50	60	65	80	85	100	110	120

"L" DIMENSION

-	40-44	45-47	59	60	61	62	63	64	65	66
L	121	165	188	193	197	203	207	211	216	220

NOTE: Units are supplied with yokes for the aside table travels. All other travels units are supplied with turnbuckle.

"AA" DIMENSION

-	55-58		59-66	
	TIPO GX	TIPO YZ	TIPO GX	TIPO YZ
AA	1265	1650	1620	1845

"K" DIMENSION (48-54)

CARRERA	150-410	420-610
K	135	300

phasa
pipe hanger solutions

CONSTANT LOAD SUPPORT
MODELS C52

SECTION E
24

TABLE OF DIMENSIONS - SIZES 27 to 50

SIZE 27 to 33

TRAVEL	A	B	B1	B2	B3	C	D	E	F	G	YY	P
80	107	210	85		550	M36	88	235	300	275	130	40
90	120	1205	80		540	M36	99	235	300	275	130	40
100	134	1195	70		530	M36	109	235	300	275	130	40
110	147	1190	65		525	M30	120	235	300	275	130	40
120	160	1185	60		520	M30	131	235	300	275	130	40
130	174	1175	50		510	M30	142	235	300	275	130	40
140	187	1170	45		505	M30	153	235	300	275	130	40
150	200	1160	35		495	M30	164	235	300	275	130	40
160	214	1155	30		490	M30	175	235	300	275	130	40
170	227	1145	20		480	**M24**	185	235	300	275	130	40
180	240	1140	15		475	M24	196	235	300	275	130	40
190	254	1130	10		470	M24	208	235	300	275	130	40
200	267	1125	-	-	460	M24	219	235	300	275	130	40
210	280	1120		10	455	M24	230	235	300	275	130	40
220	294	1110		15	445	M24	241	235	300	275	130	40
230	307	1105		20	440	M24	251	235	300	285	130	40
240	320	1095		30	430	M20	262	235	300	295	130	40
250	334	1090		35	425	M20	273	235	300	310	130	40
260	347	1080		45	415	M20	284	235	300	315	130	40
270	360	1075		50	410	M20	295	235	300	330	130	40
280	374	1065		60	400	M20	306	235	300	335	130	40
290	387	1060		65	395	M20	317	235	300	345	130	40
300	400	1050		70	390	M20	327	235	300	355	130	40
310	414	1045		80	380	M20	339	235	300	370	130	40
320	427	1040		90	370	M20	350	235	300	380	130	40
330	440	1030		95	365	M20	361	235	300	390	130	40
340	454	1025		100	360	M20	372	235	300	395	130	40
350	467	1015		110	350	M20	383	235	300	415	130	40
360	480	1010		115	345	M20	394	235	300	420	130	40
370	494	1000		175	405	M20	405	235	300	435	180	110
380	507	995		180	400	M20	415	235	300	445	180	110
390	520	985		190	390	M20	425	235	300	455	180	110
400	534	980		195	385	M20	440	235	300	470	180	110
410	547	970		205	375	M20	450	235	300	480	180	110
420	560	965		210	370	M20	460	235	300	490	180	110
430	574	955		220	360	M20	470	235	300	500	180	110
440	587	950		225	355	M20	480	235	300	510	180	110
450	600	945		230	350	M20	495	235	300	525	180	110
460	614	935		240	340	M20	505	235	300	535	180	110
470	627	930		245	335	M20	515	235	300	545	180	110
480	641	920		255	325	M20	530	235	300	560	180	110
490	654	915		260	320	M20	540	235	300	570	180	110
500	667	905		270	310	M20	550	235	300	580	180	110

SIZE 34 to 39

TRAVEL	A	B	B1	B2	B3	C	D	E	F	G	YY	P
100	134	1420	45		590	M42	110	290	365	345	155	40
110	147	1410	40		585	M42	121	290	365	345	155	40
120	160	1405	35		580	M42	131	290	365	345	155	40
130	174	1395	25		570	M42	143	290	365	345	155	40
140	187	1390	20		565	M36	154	290	365	345	155	40
150	200	1385	10		555	M36	165	290	365	345	155	40
160	214	1375	5		550	M36	176	290	365	345	155	40
170	227	1370		5	540	M36	187	290	365	345	155	40
180	240	1360		10	535	M36	197	290	365	345	155	40
190	254	1355		20	530	M30	209	290	365	345	155	40
200	267	1345		25	520	M30	220	290	365	345	155	40
210	280	1340		35	515	M30	230	290	365	345	155	40
220	294	1330		40	505	M30	242	290	365	345	155	40
230	307	1325		45	500	M30	252	290	365	345	155	40
240	320	1320		55	490	M30	262	290	365	345	155	40
250	334	1310		60	485	M30	274	290	365	345	155	40
260	347	1305		70	475	M30	285	290	365	355	155	40
270	360	1295		75	470	M30	296	290	365	360	155	40
280	374	1290		85	460	M30	307	290	365	370	155	40
290	387	1280		90	455	M30	318	290	365	380	155	40
300	400	1275		100	450	M30	328	290	365	390	155	40
310	414	1265		105	440	M24	340	290	365	405	155	40
320	427	1260		115	430	M24	351	290	365	415	155	40
330	440	1250		120	425	M24	361	290	365	420	155	40
340	454	1245		125	420	M24	373	290	365	430	155	40
350	467	1240		135	410	M24	384	290	365	445	155	40
360	480	1230		140	405	M24	394	290	365	455	155	40
370	494	1225		150	395	M24	405	290	365	465	155	40
380	507	1215		155	390	M24	416	290	365	485	155	40
390	520	1210		165	385	M24	427	290	365	495	155	40
400	534	1200		170	375	M24	439	290	365	500	155	40
410	547	1195		180	370	M24	449	290	365	515	155	40
420	560	1185		215	450	M24	460	290	365	500	185	70
430	574	1175		225	440	M24	470	290	365	510	185	70
440	587	1170		230	435	M24	480	290	365	515	185	70
450	600	1165		235	430	M24	495	290	365	530	185	70
460	614	1155		245	420	M24	505	290	365	540	185	70
470	627	1150		250	415	M24	515	290	365	550	185	70
480	641	1140		260	405	M24	530	290	365	565	185	70
490	654	1135		290	400	M24	540	290	365	575	210	70
500	667	1125		300	390	M24	550	290	365	585	210	70
510	680	N/A		305	N/A	M24	N/A	290	365	595	210	N/A
520	695	N/A		315	N/A	M24	N/A	290	365	N/A	210	N/A
530	708	N/A		320	N/A	M24	N/A	290	365	N/A	210	N/A
540	720	N/A		325	N/A	M24	N/A	290	365	N/A	210	N/A
550	734	N/A		335	N/A	M24	N/A	290	365	N/A	210	N/A
560	747	N/A		340	N/A	M24	N/A	290	365	N/A	210	N/A
570	761	N/A		350	N/A	M24	N/A	290	365	N/A	210	N/A
580	774	N/A		355	N/A	M24	N/A	290	365	N/A	210	N/A
590	787	N/A		365	N/A	M24	N/A	290	365	N/A	210	N/A
600	800	N/A		370	N/A	M24	N/A	290	365	N/A	210	N/A
610	815	N/A		380	N/A	M24	N/A	290	365	N/A	210	N/A

SIZE 40 to 47

TRAVEL	A	B	B1	B2	B3	C	D	E	F	G	YY	P
120	160	1895	50		740	M56	132	355	455	395	190	70
130	174	1890	40		730	M56	144	355	455	395	190	70
140	187	1880	35		725	M56	154	355	455	395	190	70
150	200	1875	25		715	M56	165	355	455	395	190	70
160	214	1865	20		710	M48	176	355	455	395	190	70
170	227	1860	10		700	M48	187	355	455	395	190	70
180	240	1850	5		695	M48	198	355	455	395	190	70
190	254	1845		5	690	M48	210	355	455	395	190	70
200	267	1835		10	680	M48	220	355	455	395	190	70
210	280	1830		20	675	M42	231	355	455	395	190	70
220	294	1820		25	665	M42	243	355	455	395	190	70
230	307	1815		35	660	M42	253	355	455	395	190	70
240	320	1810		40	650	M42	264	355	455	395	190	70
250	334	1800		50	645	M42	275	355	455	395	190	70
260	347	1795		55	635	M42	286	355	455	395	190	70
270	360	1785		60	630	M42	297	355	455	395	190	70
280	374	1780		70	620	M42	308	355	455	395	190	70
290	387	1770		75	615	M36	319	355	455	395	190	70
300	400	1765		85	610	M36	329	355	455	395	190	70
310	414	1755		90	600	M36	341	355	455	405	190	70
320	427	1750		100	595	M36	352	355	455	415	190	70
330	440	1740		105	585	M36	363	355	455	425	190	70
340	454	1735		110	580	M36	375	355	455	435	190	70
350	467	1730		120	570	M36	386	355	455	450	190	70
360	480	1720		125	565	M36	396	355	455	455	190	70
370	494	1715		135	555	M36	407	355	455	465	190	70
380	507	1705		140	550	M36	416	355	455	485	190	70
390	520	1700		150	545	M36	429	355	455	495	190	70
400	534	1690		155	535	M36	441	355	455	500	190	70
410	547	1685		165	525	M36	451	355	455	515	190	70
420	560	1680		230	550	M36	461	355	455	515	250	100
430	574	1670		235	540	M36	471	355	455	525	250	100
440	587	1665		245	535	M36	482	355	455	535	250	100
450	600	1655		250	525	M36	493	355	455	550	250	100
460	614	1650		260	520	M36	505	355	455	560	250	100
470	627	1645		265	515	M36	515	355	455	570	250	100
480	641	1635		275	505	M36	527	355	455	580	250	100
490	654	1630		280	500	M36	537	355	455	590	250	100
500	667	1620		285	490	M36	548	355	455	600	250	100
510	680	1615		295	485	M36	559	355	455	615	250	100
520	695	1605		305	475	M36	571	355	455	625	250	100
530	708	1600		310	470	M36	582	355	455	635	250	100
540	720	1590		315	460	M36	592	355	455	645	250	100
550	734	1585		325	455	M36	604	355	455	660	250	100
560	747	1575		330	445	M36	613	355	455	665	250	100
570	761	1570		340	440	M36	625	355	455	680	250	100
580	774	1560		345	430	M36	636	355	455	690	250	100
590	787	1555		355	425	M36	647	355	455	700	250	100
600	800	1550		360	420	M36	658	355	455	715	250	100
610	815	1540		370	410	M36	670	355	455	725	250	100

SIZE 48 to 50

TRAVEL	A	B	B2	B3	C	D	E	F	G	YY	P
150	200	2060	220	665	M64	164	340	480	465	320	70
160	214	2055	225	660	M64	175	340	480	465	320	70
170	227	2045	235	650	M64	186	340	480	465	320	70
180	240	2040	240	645	M64	197	340	480	465	320	70
190	254	2030	250	635	M64	209	340	480	465	320	70
200	267	2025	255	630	M56	220	340	480	465	320	70
210	280	2020	260	625	M56	231	340	480	465	320	70
220	294	2010	270	615	M56	242	340	480	465	320	70
230	307	2005	275	610	M56	252	340	480	465	320	70
240	320	1995	285	600	M56	263	340	480	465	320	70
250	334	1990	290	595	M56	275	340	480	465	320	70
260	347	1980	300	585	M56	285	340	480	465	320	70
270	360	1975	305	580	M48	296	340	480	465	320	70
280	374	1965	315	570	M48	308	340	480	465	320	70
290	387	1960	320	565	M48	318	340	480	465	320	70
300	400	1950	330	555	M48	328	340	480	465	320	70
310	414	1945	335	550	M48	340	340	480	465	320	70
320	427	1935	345	545	M48	351	340	480	465	320	70
330	440	1930	350	535	M48	362	340	480	465	320	70
340	454	1925	355	530	M48	373	340	480	465	320	70
350	467	1915	365	520	M48	384	340	480	475	320	70
360	480	1910	370	515	M42	395	340	480	485	320	70
370	494	1900	380	505	M42	406	340	480	495	320	70
380	507	1895	385	500	M42	416	340	480	520	320	70
390	520	1885	395	495	M42	427	340	480	525	320	70
400	534	1880	400	485	M42	439	340	480	535	320	70
410	547	1870	410	480	M42	450	340	480	545	320	70
420	560	2030	250	635	M42	461	340	480	525	320	70
430	574	2020	255	625	M42	471	340	480	535	320	70
440	587	2015	265	620	M42	482	340	480	545	320	70
450	600	2005	275	610	M42	493	340	480	555	320	70
460	614	2000	280	605	M42	505	340	480	570	320	70
470	627	1995	285	600	M42	515	340	480	580	320	70
480	641	1985	295	590	M42	527	340	480	590	320	70
490	654	1980	300	585	M42	537	340	480	600	320	70
500	667	1970	305	575	M42	548	340	480	610	320	70
510	680	1965	315	570	M42	559	340	480	625	320	70
520	695	1955	325	560	M42	571	340	480	635	320	70
530	708	1950	330	555	M42	582	340	480	645	320	70
540	720	1940	335	545	M42	592	340	480	655	320	70
550	734	1935	345	540	M42	604	340	480	665	320	70
560	747	1925	350	530	M42	613	340	480	675	320	70
570	761	1920	360	525	M42	625	340	480	690	320	70
580	774	1910	365	515	M42	636	340	480	700	320	70
590	787	1905	375	510	M42	647	340	480	710	320	70
600	800	1900	380	505	M42	658	340	480	720	320	70
610	815	1890	390	495	M42	670	340	480	735	320	70

REV.	DATE	EDITED FOR :	DRAW.	REV.
1	21/07/10	GENERAL REVISION	DDG	EAR
0	20/10/98	INFORMATION	JMD	EAR

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CONSTANT LOAD SUPPORT
MODELS C52

SECTION E
25

TABLE OF DIMENSIONS - SIZES 51 to 66

SIZE 51 to 54

TRAVEL	A	B	B2	B3	C	D	E	F	G	YY	P
150	200	2060	220	665	M64	164	340	480	465	320	70
160	214	2055	225	660	M64	175	340	480	465	320	70
170	227	2045	235	650	M64	186	340	480	465	320	70
180	240	2040	240	645	M64	197	340	480	465	320	70
190	254	2030	250	635	M64	209	340	480	465	320	70
200	267	2025	255	630	M56	220	340	480	465	320	70
210	280	2020	260	625	M56	231	340	480	465	320	70
220	294	2010	270	615	M56	242	340	480	465	320	70
230	307	2005	275	610	M56	252	340	480	465	320	70
240	320	1995	285	600	M56	263	340	480	465	320	70
250	334	1990	290	595	M56	275	340	480	465	320	70
260	347	1980	300	585	M56	285	340	480	465	320	70
270	360	1975	305	580	M48	296	340	480	465	320	70
280	374	1965	315	570	M48	308	340	480	465	320	70
290	387	1960	320	565	M48	318	340	480	465	320	70
300	400	1950	330	555	M48	328	340	480	465	320	70
310	414	1945	335	550	M48	340	340	480	465	320	70
320	427	1935	345	545	M48	351	340	480	465	320	70
330	440	1930	350	535	M48	362	340	480	465	320	70
340	454	1925	355	530	M48	373	340	480	465	320	70
350	467	1915	365	520	M48	384	340	480	475	320	70
360	480	1910	370	515	M42	395	340	480	485	320	70
370	494	1900	380	505	M42	406	340	480	495	320	70
380	507	1895	385	500	M42	416	340	480	520	320	70
390	520	1885	395	495	M42	427	340	480	525	320	70
400	534	1880	400	485	M42	439	340	480	535	320	70
410	547	1870	410	480	M42	450	340	480	545	320	70
420	560	2030	250	635	M42	461	340	480	525	320	70
430	574	2020	255	625	M42	471	340	480	535	320	70
440	587	2015	265	620	M42	482	340	480	545	320	70
450	600	2005	275	610	M42	493	340	480	560	320	70
460	614	2000	280	605	M42	505	340	480	570	320	70
470	627	1995	285	600	M42	515	340	480	580	320	70
480	641	1985	295	590	M42	527	340	480	590	320	70
490	654	1980	300	585	M42	537	340	480	600	320	70
500	667	1970	305	575	M42	548	340	480	610	320	70
510	680	1965	315	570	M42	559	340	480	625	320	70
520	695	1955	325	560	M42	571	340	480	635	320	70
530	708	1950	330	555	M42	582	340	480	645	320	70
540	720	1940	335	545	M42	592	340	480	655	320	70
550	734	1935	345	540	M42	604	340	480	665	320	70
560	747	1925	350	530	M42	613	340	480	675	320	70
570	761	1920	360	525	M42	625	340	480	690	320	70
580	774	1910	365	515	M42	363	340	480	700	320	70
590	787	1905	375	510	M42	647	340	480	710	320	70
600	800	1900	380	505	M42	658	340	480	720	320	70
610	815	1890	390	495	M42	670	340	480	735	320	70

SIZE 55 to 58

TRAVEL	A	B	B2	B3	C	D	E	F	G	YY	P
170	227	2595	70	815	M72	186	340	480	465	320	70
180	240	2590	75	810	M72	197	340	480	465	320	70
190	254	2580	85	800	M72	209	340	480	465	320	70
200	267	2575	90	795	M64	220	340	480	465	320	70
210	280	2570	100	790	M64	231	340	480	465	320	70
220	294	2560	105	780	M64	242	340	480	465	320	70
230	307	2555	110	775	M64	252	340	480	465	320	70
240	320	2545	120	765	M64	263	340	480	465	320	70
250	334	2540	125	760	M64	275	340	480	465	320	70
260	347	2530	135	750	M56	285	340	480	465	320	70
270	360	2525	140	745	M56	296	340	480	465	320	70
280	374	2515	150	735	M56	308	340	480	465	320	70
290	387	2510	155	730	M56	318	340	480	465	320	70
300	400	2500	165	720	M56	328	340	480	465	320	70
310	414	2495	170	715	M56	340	340	480	465	320	70
320	427	2485	180	710	M56	351	340	480	465	320	70
330	440	2480	185	700	M56	362	340	480	465	320	70
340	454	2475	190	695	M56	373	340	480	465	320	70
350	467	2465	200	685	M56	384	340	480	475	320	70
360	480	2460	205	680	M48	395	340	480	485	320	70
370	494	2450	215	670	M48	406	340	480	495	320	70
380	507	2445	220	665	M48	416	340	480	520	320	70
390	520	2435	230	660	M48	427	340	480	525	320	70
400	534	2430	235	650	M48	439	340	480	535	320	70
410	547	2420	245	640	M48	450	340	480	545	320	70
420	560	2030	250	635	M48	461	340	480	535	320	70
430	574	2020	255	625	M48	471	340	480	545	320	70
440	587	2015	265	620	M48	482	340	480	555	320	70
450	600	2005	270	610	M48	493	340	480	565	320	70
460	614	2000	280	605	M48	505	340	480	580	320	70
470	627	1995	285	600	M48	515	340	480	590	320	70
480	641	1985	295	590	M48	527	340	480	600	320	70
490	654	1980	300	585	M48	537	340	480	610	320	70
500	667	1970	305	575	M48	548	340	480	620	320	70
510	680	1965	315	570	M48	559	340	480	630	320	70
520	695	1955	325	560	M48	571	340	480	645	320	70
530	708	1950	330	555	M48	582	340	480	655	320	70
540	720	1940	335	545	M48	592	340	480	665	320	70
550	734	1935	345	540	M48	604	340	480	675	320	70
560	747	1925	350	530	M48	613	340	480	685	320	70
570	761	1920	360	525	M48	625	340	480	700	320	70
580	774	1910	365	515	M48	363	340	480	710	320	70
590	787	1905	375	510	M48	647	340	480	720	320	70
600	800	1900	380	505	M48	658	340	480	730	320	70
610	815	1890	390	495	M48	670	340	480	740	320	70

SIZE 59 to 62

TRAVEL	A	B	B2	B3	C	D	E	F	G	YY	P
180	240	2870	75	910	M80	197	380	560	530	320	120
190	254	2865	80	900	M72	209	380	560	530	320	120
200	267	2855	90	895	M72	220	380	560	530	320	120
210	280	2850	95	890	M72	231	380	560	530	320	120
220	294	2840	105	880	M72	242	380	560	530	320	120
230	307	2835	110	875	M72	252	380	560	530	320	120
240	320	2825	120	865	M64	263	380	560	530	320	120
250	334	2820	125	860	M64	275	380	560	530	320	120
260	347	2810	135	850	M64	285	380	560	530	320	120
270	360	2805	140	845	M64	296	380	560	530	320	120
280	374	2795	150	835	M64	308	380	560	530	320	120
290	387	2790	155	830	M64	318	380	560	530	320	120
300	400	2785	160	820	M64	328	380	560	530	320	120
310	414	2775	170	815	M64	340	380	560	530	320	120
320	427	2770	175	810	M56	351	380	560	530	320	120
330	440	2760	185	800	M56	362	380	560	530	320	120
340	454	2755	190	795	M56	373	380	560	530	320	120
350	467	2745	200	785	M56	384	380	560	530	320	120
360	480	2740	205	780	M56	395	380	560	530	320	120
370	494	2730	215	770	M56	406	380	560	530	320	120
380	507	2725	220	765	M56	416	380	560	530	320	120
390	520	2720	225	760	M56	427	380	560	530	320	120
400	534	2710	235	750	M56	439	380	560	530	320	120
410	547	2705	240	745	M56	450	380	560	530	320	120
420	560	2465	250	735	M56	461	380	560	545	320	120
430	574	2455	255	725	M56	471	380	560	555	320	120
440	587	2450	265	720	M56	482	380	560	570	320	120
450	600	2440	270	710	M56	493	380	560	575	320	120
460	614	2435	280	705	M56	505	380	560	590	320	120
470	627	2430	285	700	M56	515	380	560	600	320	120
480	641	2420	295	690	M56	527	380	560	610	320	120
490	654	2415	300	685	M56	537	380	560	620	320	120
500	667	2405	305	675	M56	548	380	560	630	320	120
510	680	2400	315	670	M56	559	380	560	645	320	120
520	695	2390	325	660	M56	571	380	560	655	320	120
530	708	2385	330	655	M56	582	380	560	665	320	120
540	720	2380	335	645	M56	592	380	560	675	320	120
550	734	2370	345	640	M56	604	380	560	690	320	120
560	747	2360	350	630	M56	613	380	560	700	320	120
570	761	2355	360	625	M56	625	380	560	710	320	120
580	774	2345	365	615	M56	363	380	560	720	320	120
590	787	2340	375	610	M56	647	380	560	730	320	120
600	800	2335	380	605	M56	658	380	560	740	320	120
610	815	2325	390	595	M56	670	380	560	755	320	120

SIZE 63 to 66

TRAVEL	A	B	B2	B3	C	D	E	F	G	YY	P
180	240	2870	75	910	M80	197	380	560	530	320	120
190	254	2865	80	900	M80	209	380	560	530	320	120
200	267	2855	90	895	M80	220	380	560	530	320	120
210	280	2850	95	890	M80	231	380	560	530	320	120
220	294	2840	105	880	M80	242	380	560	530	320	120
230	307	2835	110	875	M72	252	380	560	530	320	120
240	320	2825	120	865	M72	263	380	560	530	320	120
250	334	2820	125	860	M72	275	380	560	530	320	120
260	347	2810	135	850	M72	285	380	560	530	320	120
270	360	2805	140	845	M72	296	380	560	530	320	120
280	374	2795	150	835	M72	308	380	560	530	320	120
290	387	2790	155	830	M64	318	380	560	530	320	120
300	400	2785	160	820	M64	328	380	560	530	320	120
310	414	2775	170	815	M64	340	380	560	530	320	120
320	427	2770	175	810	M64	351	380	560	530	320	120
330	440	2760	185	800	M64	362	380	560	530	320	120
340	454	2755	190	795	M64	373	380	560	530	320	120
350	467	2745	200	785	M64	384	380	560	530	320	120
360	480	2740	205	780	M64	395	380	560	530	320	120
370	494	2730	215	770	M64	406	380	560	530	320	120
380	507	2725	220	765	M56	416	380	560	530	320	120
390	520	2720	225	760	M56	427	380	560	530	320	120
400	534	2710	235	750	M56	439	380	560	530	320	120
410	547	2705	240	745	M56	450	380	560	530	320	120
420	560	2465	250	735	M56	461	380	560	545	320	120
430	574	2455	255	725	M56	471	380	560	555	320	120
440	587	2450	265	720	M56	482	380	560	570	320	120
450	600	2440	270	710	M56	493	380	560	575	320	120
460	614	2435	280	705	M56	505	380	560	590	320	120
470	627	2430	285	700	M56	515	380	560	600	320	120
480	641	2420	295	690	M56	527	380	560	610	320	120
490	654	2415	300	685	M56	537	380	560	625	320	120
500	667	2405	305	675	M56	548	380	560	635	320	120
510	680	2400	315	670	M56	559	380	560	645	320	120
520	695	2390	325	660	M56	571	380	560	655	320	120
530	708	2385	330	655	M56	582	380	560	665	320	120
540	720	2380	335	645	M56	592	380	560	675	320	120
550	734	2370	345	640	M56	604	380	560	690	320	120
560	747	2360	350	630	M56	613	380	560	700	320	120
570	761	2355	360	625	M56	625	380	560	710	320	120
580	774	2345	365	615	M56	363	380	560	720	320	120
590	787	2340	375	610	M56	647	380	560	730	320	120
600	800	2335	380	605	M56	658	380	560	740	320	120
610	815	2325	390	595	M56	670	380	560	755	320	120

REV.	DATE	EDITED FOR :	DRAW.	REV.
1	21/07/10	GENERAL REVISION	DDG	EAR
0	20/10/98	INFORMATION	JMD	EAR

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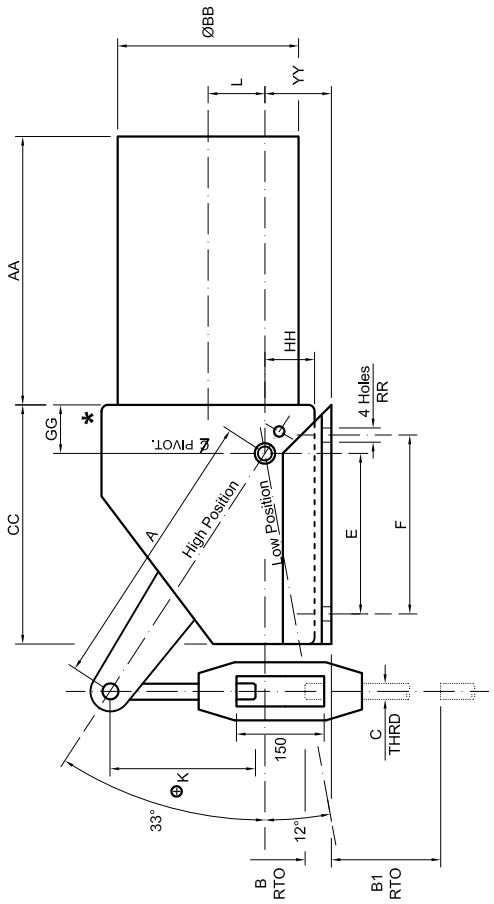
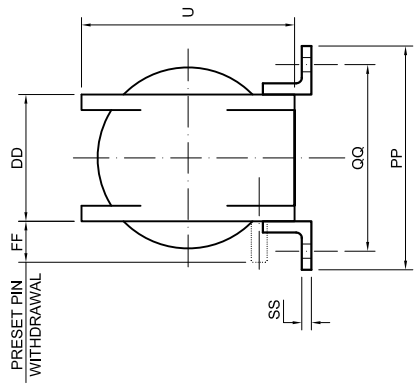
CONSTANT LOAD SUPPORT
MODELS C53

SECTION E
26





ROD LENGTHS ADD B OR SUBSTRACT B1.

ROD TAKE OUT CALCULATED WHEN LOAD ARM IS IN HIGH POSITION.

WHEN USING B FOR UP TRAVEL, ROD TAKE OUT EQUALS TOTAL UP TRAVEL PLUS B.

WHEN USING B1 FOR UP TRAVEL, ROD TAKE OUT EQUALS TOTAL UP TRAVEL MINUS B1.

* ACCESS TO LOAD ADJUSTER

⊕ LONGER TOP RODS CAN BE SUPPLIED ON REQUEST.

REV.	DATE	EDITED FOR :	DRAW.	REV.
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CONSTANT LOAD SUPPORT
MODELS C53

SECTION E
27

TABLE OF DIMENSIONS - SIZES 1 to 33

SIZE 1 to 6

TRAVEL	A	B	B1	C	E	F	YY
40	54		130	M12	105	140	65
50	67		125	M12	105	140	65
60	80		115	M12	105	140	65
70	94		110	M12	105	140	65
80	107		105	M12	105	140	65
90	120		95	M12	105	140	65
100	134		90	M12	105	140	65
110	147		80	M12	105	140	65
120	160		75	M12	105	140	65
130	174		65	M12	105	140	65
140	187		60	M12	105	140	65
150	200		50	M12	105	140	65
160	214		45	M12	105	140	65
170	227		35	M12	105	140	65
180	240		30	M12	105	140	65
190	254		25	M12	105	140	65
200	267		15	M12	105	140	65
210	280		10	M12	105	140	65
220	294	40		M12	105	140	105
230	307	45		M12	105	140	105
240	320	55		M12	105	140	105
250	334	60		M12	105	140	105
260	347	70		M12	105	140	105
270	360	75		M12	105	140	105
280	374	85		M12	105	140	105
290	387	90		M12	105	140	105
300	400	100		M12	105	140	105

SIZE 7 to 12

TRAVEL	A	B	B1	C	E	F	YY
40	54		115	M20	120	155	80
50	67		110	M16	120	155	80
60	80		100	M16	120	155	80
70	94		95	M16	120	155	80
80	107		90	M12	120	155	80
90	120		80	M12	120	155	80
100	134		70	M12	120	155	80
110	147		65	M12	120	155	80
120	160		60	M12	120	155	80
130	174		50	M12	120	155	80
140	187		45	M12	120	155	80
150	200		35	M12	120	155	80
160	214		30	M12	120	155	80
170	227		20	M12	120	155	80
180	240		15	M12	120	155	80
190	254		10	M12	120	155	80
200	267	-	-	M12	120	155	80
210	280	10		M12	120	155	80
220	294	40		M12	120	155	105
230	307	45		M12	120	155	105
240	320	55		M12	120	155	105
250	334	60		M12	120	155	105
260	347	70		M12	120	155	105
270	360	75		M12	120	155	105
280	374	85		M12	120	155	105
290	387	90		M12	120	155	105
300	400	100		M12	120	155	105
310	414	125		M12	120	155	125
320	427	135		M12	120	155	125
330	440	140		M12	120	155	125
340	454	145		M12	120	155	125
350	467	155		M12	120	155	125
360	480	180		M12	120	155	145
370	494	190		M12	120	155	145
380	507	195		M12	120	155	145
390	520	205		M12	120	155	145
400	534	210		M12	120	155	145
410	547	220		M12	120	155	145
420	560	225		M12	120	155	145

SIZE 13 to 18

TRAVEL	A	B	B1	C	E	F	YY
60	80		80	M20	155	190	100
70	94		75	M20	155	190	100
80	107		65	M20	155	190	100
90	120		60	M16	155	190	100
100	134		50	M16	155	190	100
110	147		45	M16	155	190	100
120	160		40	M16	155	190	100
130	174		30	M16	155	190	100
140	187		25	M16	155	190	100
150	200		15	M16	155	190	100
160	214		10	M12	155	190	100
170	227	-	-	M12	155	190	100
180	240	5		M12	155	190	100
190	254	15		M12	155	190	100
200	267	20		M12	155	190	100
210	280	30		M12	155	190	100
220	294	35		M12	155	190	100
230	307	40		M12	155	190	100
240	320	50		M12	155	190	100
250	334	55		M12	155	190	100
260	347	65		M12	155	190	100
270	360	100		M12	155	190	130
280	374	110		M12	155	190	130
290	387	115		M12	155	190	130
300	400	125		M12	155	190	130
310	414	130		M12	155	190	130
320	427	140		M12	155	190	130
330	440	145		M12	155	190	130
340	454	150		M12	155	190	130
350	467	160		M12	155	190	130
360	480	165		M12	155	190	130
370	494	195		M12	155	190	150
380	507	200		M12	155	190	150
390	520	210		M12	155	190	150
400	534	215		M12	155	190	150
410	547	225		M12	155	190	150
420	560	230		M12	155	190	150

SIZE 19 to 26

TRAVEL	A	B	B1	C	E	F	YY
60	80		120	M30	190	240	110
70	94		115	M30	190	240	110
80	107		105	M24	190	240	110
90	120		100	M24	190	240	110
100	134		90	M24	190	240	110
110	147		85	M24	190	240	110
120	160		80	M20	190	240	110
130	174		70	M20	190	240	110
140	187		65	M20	190	240	110
150	200		55	M20	190	240	110
160	214		50	M20	190	240	110
170	227		40	M20	190	240	110
180	240		35	M16	190	240	110
190	254		30	M16	190	240	110
200	267		20	M16	190	240	110
210	280		15	M16	190	240	110
220	294		5	M16	190	240	110
230	307	-	-	M16	190	240	110
240	320	10		M16	190	240	110
250	334	15		M16	190	240	110
260	347	25		M16	190	240	110
270	360	30		M16	190	240	110
280	374	40		M16	190	240	110
290	387	45		M16	190	240	110
300	400	55		M16	190	240	110
310	414	60		M16	190	240	110
320	427	70		M16	190	240	110
330	440	75		M12	190	240	110
340	454	80		M12	190	240	110
350	467	90		M12	190	240	110
360	480	95		M12	190	240	110
370	494	145		M12	190	240	150
380	507	150		M12	190	240	150
390	520	160		M12	190	240	150
400	534	165		M12	190	240	150
410	547	175		M12	190	240	150
420	560	210		M12	190	240	180
430	574	220		M12	190	240	180
440	587	225		M12	190	240	180
450	600	230		M12	190	240	180
460	614	240		M12	190	240	180
470	627	245		M12	190	240	180
480	641	255		M12	190	240	180
490	654	260		M12	190	240	180
500	667	270		M12	190	240	180

SIZE 27 to 33

TRAVEL	A	B	B1	C	E	F	YY
70	94		95	M36	235	300	130
80	107		85	M36	235	300	130
90	120		80	M36	235	300	130
100	134		70	M36	235	300	130
110	147		65	M30	235	300	130
120	160		60	M30	235	300	130
130	174		50	M30	235	300	130
140	187		45	M30	235	300	130
150	200		35	M30	235	300	130
160	214		30	M30	235	300	130
170	227		20	M24	235	300	130
180	240		15	M24	235	300	130
190	254		10	M24	235	300	130
200	267	-	-	M24	235	300	130
210	280	10		M24	235	300	130
220	294	15		M24	235	300	130
230	307	20		M24	235	300	130
240	320	30		M20	235	300	130
250	334	35		M20	235	300	130
260	347	45		M20	235	300	130
270	360	50		M20	235	300	130
280	374	60		M20	235	300	130
290	387	65		M20	235	300	130
300	400	70		M20	235	300	130
310	414	80		M20	235	300	130
320	427	90		M20	235	300	130
330	440	95		M20	235	300	130
340	454	100		M20	235	300	130
350	467	110		M20	235	300	130
360	480	115		M20	235	300	130
370	94	165		M20	235	300	170
380	507	170		M20	235	300	170
390	520	180		M20	235	300	170
400	534	185		M20	235	300	170
410	547	195		M20	235	300	170
420	560	200		M20	235	300	170
430	574	210		M20	235	300	170
440	587	215		M20	235	300	170
450	600	220		M20	235	300	170
460	614	230		M20	235	300	170
470	627	235		M20	235	300	170
480	641	245		M20	235	300	170
490	654	250		M20	235	300	170
500	667	260		M20	235	300	170

CONSTANT SUPPORT 1 to 66

-	1-6	7-12	13-18	19-26	27-33	34-39	40-47	48-50	51-54	55-58	59-66
AA	250	300	350	400	600	750	1100	1265	1265	1265	1620
BB	150	220	295	330	390	440	525	525	525	525	640
CC	180	215	270	325	405	495	610	685	685	685	760
DD	115	120	135	150	180	225	280	345	345	345	455
FF	135	140	160	175	215	270	330	405	405	405	560
GG	55	65	75	95	115	145	198	250	250	250	280
HH	55	65	75	95	115	145	180	190	190	190	215

CONSTANT SUPPORT 1 to 66

-	1-6	7-12	13-18	19-26	27-33	34-39	40-47	48-50	51-54	55-58	59-66
PP	215	220	255	270	320	425	480	745	745	745	855
QQ	165	180	205	220	265	335	395	520	520	520	685
RR	14	18	22	22	22	27	33	45	45	45	51
SS	6	6	8	8	10	10	15	20	20	20	25
K	150	150	150	200	200	200	250	300	300	300	300
L	33	38	65	66	83	100	TABLA	182	182	182	TABLA
U	180	215	270	325	405	495	610	710	710	710	760

"L" DIMENSION

-	40-44	45-47	59	60	61	62	63	64	65	66
L	121	165	188	193	197	203	207	211	216	220

REV.	0	1	
DATE	20/10/98	21/07/10	
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REV.	EAR	EAR	

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CONSTANT LOAD SUPPORT
MODELS C53

SECTION E
28

TABLE OF DIMENSIONS - SIZES 34 to 66

SIZE 34 to 39							
TRAVEL	A	B	B1	C	E	F	YY
90	120		55	M48	290	365	155
100	134		45	M42	290	365	155
110	147		40	M42	290	365	155
120	160		35	M42	290	365	155
130	174		25	M42	290	365	155
140	187		20	M36	290	365	155
150	200		10	M36	290	365	155
160	214		5	M36	290	365	155
170	227	5		M36	290	365	155
180	240	10		M36	290	365	155
190	254	20		M30	290	365	155
200	267	25		M30	290	365	155
210	280	35		M30	290	365	155
220	294	40		M30	290	365	155
230	307	45		M30	290	365	155
240	320	55		M30	290	365	155
250	334	60		M30	290	365	155
260	347	70		M30	290	365	155
270	360	75		M30	290	365	155
280	374	85		M30	290	365	155
290	387	90		M30	290	365	155
300	400	100		M30	290	365	155
310	414	105		M24	290	365	155
320	427	115		M24	290	365	155
330	440	120		M24	290	365	155
340	454	125		M24	290	365	155
350	467	135		M24	290	365	155
360	480	140		M24	290	365	155
370	494	150		M24	290	365	155
380	507	155		M24	290	365	155
390	520	165		M24	290	365	155
400	534	170		M24	290	365	155
410	547	180		M24	290	365	155
420	560	220		M24	290	365	190
430	574	230		M24	290	365	190
440	587	235		M24	290	365	190
450	600	240		M24	290	365	190
460	614	250		M24	290	365	190
470	627	255		M24	290	365	190
480	641	295		M24	290	365	220
490	654	300		M24	290	365	220
500	667	310		M24	290	365	220
510	680	315		M24	290	365	220
520	695	325		M24	290	365	220
530	708	330		M24	290	365	220
540	720	335		M24	290	365	220
550	734	345		M24	290	365	220
560	747	350		M24	290	365	220
570	761	360		M24	290	365	220
580	774	365		M24	290	365	220
590	787	375		M24	290	365	220
600	800	380		M24	290	365	220
610	815	390		M24	290	365	220

SIZE 40 to 47							
TRAVEL	A	B	B1	C	E	F	YY
110	147		55	M64	355	455	190
120	160		50	M56	355	455	190
130	174		40	M56	355	455	190
140	187		35	M56	355	455	190
150	200		25	M56	355	455	190
160	214		20	M48	355	455	190
170	227		10	M48	355	455	190
180	240		5	M48	355	455	190
190	254	5		M48	355	455	190
200	267	10		M48	355	455	190
210	280	20		M42	355	455	190
220	294	25		M42	355	455	190
230	307	35		M42	355	455	190
240	320	40		M42	355	455	190
250	334	50		M42	355	455	190
260	347	55		M42	355	455	190
270	360	60		M42	355	455	190
280	374	70		M42	355	455	190
290	387	75		M36	355	455	190
300	400	85		M36	355	455	190
310	414	90		M36	355	455	190
320	427	100		M36	355	455	190
330	440	105		M36	355	455	190
340	454	110		M36	355	455	190
350	467	120		M36	355	455	190
360	480	125		M36	355	455	190
370	494	135		M36	355	455	190
380	507	140		M36	355	455	190
390	520	150		M36	355	455	190
400	534	155		M36	355	455	190
410	547	165		M36	355	455	190
420	560	220		M36	355	455	240
430	574	225		M36	355	455	240
440	587	235		M36	355	455	240
450	600	240		M36	355	455	240
460	614	250		M36	355	455	240
470	627	255		M36	355	455	240
480	641	265		M36	355	455	240
490	654	270		M36	355	455	240
500	667	275		M36	355	455	240
510	680	285		M36	355	455	240
520	695	295		M36	355	455	240
530	708	300		M36	355	455	240
540	720	305		M36	355	455	240
550	734	315		M36	355	455	240
560	747	320		M36	355	455	240
570	761	330		M36	355	455	240
580	774	335		M36	355	455	240
590	787	345		M36	355	455	240
600	800	350		M36	355	455	240
610	815	360		M36	355	455	240

SIZE 48 to 54							
TRAVEL	A	B	C	E	F	YY	
110	147	25	M80	340	480	320	
120	160	30	M72	340	480	320	
130	174	40	M72	340	480	320	
140	187	45	M72	340	480	320	
150	200	55	M64	340	480	320	
160	214	60	M64	340	480	320	
170	227	70	M64	340	480	320	
180	240	75	M64	340	480	320	
190	254	85	M64	340	480	320	
200	267	90	M56	340	480	320	
210	280	100	M56	340	480	320	
220	294	105	M56	340	480	320	
230	307	110	M56	340	480	320	
240	320	120	M56	340	480	320	
250	334	125	M56	340	480	320	
260	347	135	M56	340	480	320	
270	360	140	M48	340	480	320	
280	374	150	M48	340	480	320	
290	387	155	M48	340	480	320	
300	400	165	M48	340	480	320	
310	414	170	M48	340	480	320	
320	427	180	M48	340	480	320	
330	440	185	M48	340	480	320	
340	454	190	M48	340	480	320	
350	467	200	M48	340	480	320	
360	480	205	M42	340	480	320	
370	494	215	M42	340	480	320	
380	507	220	M42	340	480	320	
390	520	230	M42	340	480	320	
400	534	235	M42	340	480	320	
410	547	245	M42	340	480	320	
420	560	250	M42	340	480	320	
430	574	255	M42	340	480	320	
440	587	265	M42	340	480	320	
450	600	270	M42	340	480	320	
460	614	280	M42	340	480	320	
470	627	285	M42	340	480	320	
480	641	295	M42	340	480	320	
490	654	300	M42	340	480	320	
500	667	305	M42	340	480	320	
510	680	315	M42	340	480	320	
520	695	325	M42	340	480	320	
530	708	330	M42	340	480	320	
540	720	335	M42	340	480	320	
550	734	345	M42	340	480	320	
560	747	350	M42	340	480	320	
570	761	360	M42	340	480	320	
580	774	365	M42	340	480	320	
590	787	375	M42	340	480	320	
600	800	380	M42	340	480	320	
610	815	390	M42	340	480	320	

SIZE 55 to 58							
TRAVEL	A	B	C	E	F	YY	
110	147	25	M90	340	480	320	
120	160	30	M90	340	480	320	
130	174	40	M80	340	480	320	
140	187	45	M80	340	480	320	
150	200	55	M80	340	480	320	
160	214	60	M72	340	480	320	
170	227	70	M72	340	480	320	
180	240	75	M72	340	480	320	
190	254	85	M72	340	480	320	
200	267	90	M64	340	480	320	
210	280	100	M64	340	480	320	
220	294	105	M64	340	480	320	
230	307	110	M64	340	480	320	
240	320	120	M64	340	480	320	
250	334	125	M64	340	480	320	
260	347	135	M56	340	480	320	
270	360	140	M56	340	480	320	
280	374	150	M56	340	480	320	
290	387	155	M56	340	480	320	
300	400	165	M56	340	480	320	
310	414	170	M56	340	480	320	
320	427	180	M56	340	480	320	
330	440	185	M56	340	480	320	
340	454	190	M56	340	480	320	
350	467	200	M56	340	480	320	
360	480	205	M48	340	480	320	
370	494	215	M48	340	480	320	
380	507	220	M48	340	480	320	
390	520	230	M48	340	480	320	
400	534	235	M48	340	480	320	
410	547	245	M48	340	480	320	
420	560	250	M48	340	480	320	
430	574	255	M48	340	480	320	
440	587	265	M48	340	480	320	
450	600	270	M48	340	480	320	
460	614	280	M48	340	480	320	
470	627	285	M48	340	480	320	
480	641	295	M48	340	480	320	
490	654	300	M48	340	480	320	
500	667	305	M48	340	480	320	
510	680	315	M48	340	480	320	
520	695	325	M48	340	480	320	
530	708	330	M43	340	480	320	
540	720	335	M48	340	480	320	
550	734	345	M48	340	480	320	
560	747	350	M48	340	480	320	
570	761	360	M48	340	480	320	
580	774	365	M48	340	480	320	
590	787	375	M48	340	480	320	
600	800	380	M48	340	480	320	
610	815	390	M48	340	480	320	

SIZE 59 to 62							
TRAVEL	A	B	C	E	F	YY	
150	200	55	M80	380	560	320	
160	214	60	M80	380	560	320	
170	227	70	M80	380	560	320	
180	240	75	M80	380	560	320	
190	254	80	M72	380	560	320	
200	267	90	M72	380	560	320	
210	280	95	M72	380	560	320	
220	294	105	M72	380	560	320	
230	307	110	M72	380	560	320	
240	320	120	M64	380	560	320	
250	334	125	M64	380	560	320	
260	347	135	M64	380	560	320	
270	360	140	M64	380	560	320	
280	374	150	M64	380	560	320	
290	387	155	M64	380	560	320	
300	400	160	M64	380	560	320	
310	414	170	M64	380	560	320	
320	427	175	M56	380	560	320	
330	440	185	M56	380	560	320	
340	454	190	M56	380	560	320	
350	467	200	M56	380	560	320	
360	480	205	M56	380	560	320	
370	494	215	M56	380	560	320	
380	507	220	M56	380	560	320	
390	520	230	M56	380	560	320	
400	534	235	M56	380	560	320	
410	547	240	M56	380	560	320	
420	560	250	M56	380	560	320	
430	574	255	M56	380	560	320	
440	587	265	M56	380	560	320	
450	600	270	M56	380	560	320	
460	614	280	M56	380	560	320	
470	627	285	M56	380	560	320	
480	641	295	M56	380	560	320	
490	654	300	M56	380	560	320	
500	667	305	M56	380	560	320	
510	680	315	M56	380	560	320	
520	695	325	M56	380	560	320	
530	708	330	M56	380	560	320	
540	720	335	M56	380	560	320	
550	734	345	M56	380	560	320	
560	747	350	M56	380	560	320	
570	761	360	M56	380	560	320	
580	774	365	M56	380	560	320	
590	787	375	M56	380	560	320	
600	800	380	M56	380	560	320	
610	815	390	M56	380	560	320	

SIZE 63 to 66							
TRAVEL	A	B	C	E	F	YY	
150	200	55	M90	380	560	320	
160	214	60	M90	380	560	320	
170	227	70	M90	380	560	320	
180	240	75	M80	380	560	320	
190	254	85	M80	380	560	320	
200	267	90	M80	380	560	320	
210	280	95	M80	380	560	320	
220	294	105	M80	380	560	320	
230	307	110	M72	380	560	320	
240	320	120	M72	380	560	320	
250	334	125	M72	380	560	320	
260	347	135	M72	380	560	320	
270	360	140	M72	380	560	320	
280	374	150	M72	380	560	320	
290	387	155	M64	380	560	320	
300	400	160	M64	380	560	320	
310	414	170	M64	380	560	320	
320	427	175	M64	380	560	320	
330	440	185	M64	380	560	320	
340	454	190	M64	380	560	320	
350	467	200	M64	380	560	320	
360	480	205	M64	380	560	320	
370	494	215	M64	380	560	320	
380	507	220	M56	380	560	320	
390	520	230	M56	380	560	320	
400	534	235	M56	380	560	320	
410	547	240	M56	380	560	320	
420	560	250	M56	380	560	320	
430	574	255	M56	380	560	320	
440	587	265	M56	380	560	320	
450	600	270	M56	380	560	320	
460	614	280	M56	380	560	320	
470	627	285	M56	380	560	320	
480	641	295	M56	380	560	320	
490	654	300	M56	380	560	320	
500	667	305	M56	380	560	320	
510	680	315	M56	380	560	320	
520	695	325	M56	380	560	320	
530	708	330	M56	380	560	320	
540	720	335	M56	380	560	320	
550	734	345	M56	380	560	320	
560	747	350	M56	380	560	320	
570	761	360	M56	380	560	320	
580	774	365	M56	380	560	320	
590	787	375	M56	380	560	320	
600	800	380	M56	380	560	320	
610	815	390	M56	380	560	320	

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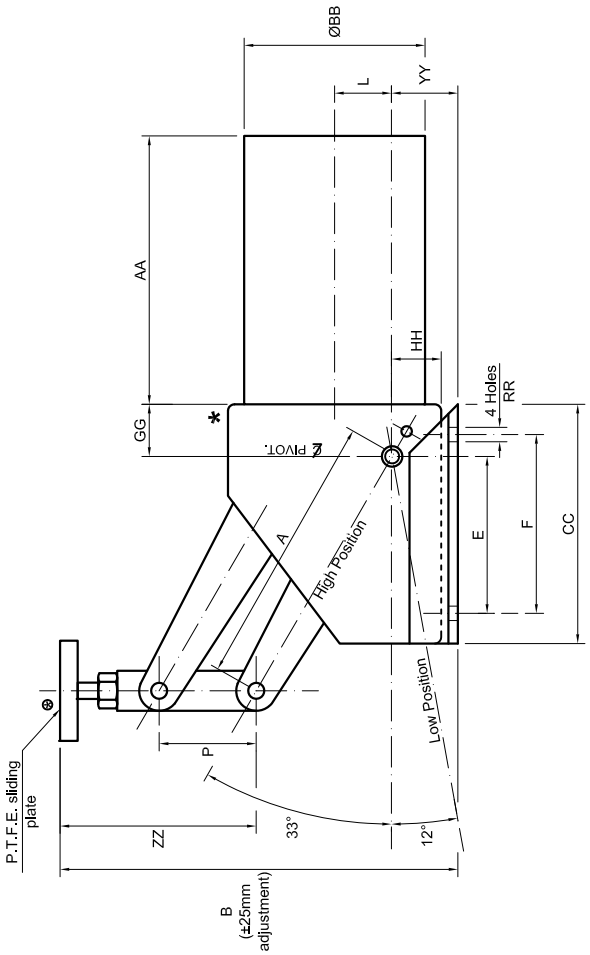
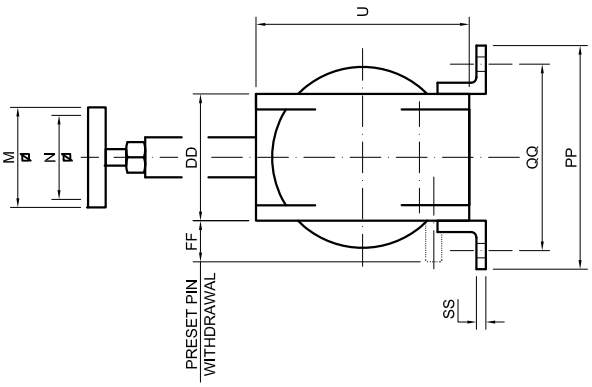
CONSTANT LOAD SUPPORT
MODELS C54





HEIGHT B CALCULATED WHEN LOAD ARM IS IN HIGH POSITION. FOR UP TRAVEL, INSTALLED HEIGHT EQUALS B MINUS UP TRAVEL.

* ACCESS TO LOAD ADJUSTER

⊛ P.T.F.E. LOW FRICTION PAD (SLIDING)

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CONSTANT LOAD SUPPORT
MODELS C54

SECTION E
30

TABLE OF DIMENSIONS

SIZE 1 to 6

TRAVEL	A	B	E	F	YY
40	54	325	105	140	65
50	67	330	105	140	65
60	80	340	105	140	65
70	94	345	105	140	65
80	107	355	105	140	65
90	120	360	105	140	65
100	134	370	105	140	65
110	147	375	105	140	65
120	160	380	105	140	65
130	174	390	105	140	65
140	187	400	105	140	65
150	200	405	105	140	65
160	214	410	105	140	65
170	227	420	105	140	65
180	240	425	105	140	65
190	254	435	105	140	65
200	267	440	105	140	65
210	280	450	105	140	65
220	294	495	105	140	105
230	307	500	105	140	105
240	320	510	105	140	105
250	334	515	105	140	105
260	347	525	105	140	105
270	360	530	105	140	105
280	374	540	105	140	105
290	387	545	105	140	105
300	400	555	105	140	105

SIZE 7 to 12

TRAVEL	A	B	E	F	YY
40	54	370	120	155	80
50	67	375	120	155	80
60	80	385	120	155	80
70	94	390	120	155	80
80	107	400	120	155	80
90	120	405	120	155	80
100	134	415	120	155	80
110	147	420	120	155	80
120	160	425	120	155	80
130	174	435	120	155	80
140	187	440	120	155	80
150	200	450	120	155	80
160	214	455	120	155	80
170	227	465	120	155	80
180	240	470	120	155	80
190	254	480	120	155	80
200	267	485	120	155	80
210	280	495	120	155	80
220	294	525	120	155	105
230	307	530	120	155	105
240	320	540	120	155	105
250	334	545	120	155	105
260	347	555	120	155	105
270	360	560	120	155	105
280	374	570	120	155	105
290	387	575	120	155	105
300	400	580	120	155	105

SIZE 13 to 18

TRAVEL	A	B	E	F	YY
60	80	460	155	190	100
70	94	465	155	190	100
80	107	475	155	190	100
90	120	480	155	190	100
100	134	490	155	190	100
110	147	495	155	190	100
120	160	500	155	190	100
130	174	510	155	190	100
140	187	515	155	190	100
150	200	525	155	190	100
160	214	530	155	190	100
170	227	540	155	190	100
180	240	545	155	190	100
190	254	555	155	190	100
200	267	560	155	190	100
210	280	570	155	190	100
220	294	575	155	190	100
230	307	580	155	190	100
240	320	590	155	190	100
250	334	595	155	190	100
260	347	605	155	190	100
270	360	640	155	190	130
280	374	650	155	190	130
290	387	655	155	190	130
300	400	665	155	190	130
310	414	670	155	190	130
320	427	680	155	190	130
330	440	685	155	190	130
340	454	690	155	190	130
350	467	700	155	190	130
360	480	705	155	190	130

SIZE 19 to 26

TRAVEL	A	B	E	F	YY
60	80	535	190	240	110
70	94	540	190	240	110
80	107	550	190	240	110
90	120	555	190	240	110
100	134	565	190	240	110
110	147	570	190	240	110
120	160	580	190	240	110
130	174	585	190	240	110
140	187	590	190	240	110
150	200	600	190	240	110
160	214	605	190	240	110
170	227	615	190	240	110
180	240	620	190	240	110
190	254	630	190	240	110
200	267	635	190	240	110
210	280	645	190	240	110
220	294	650	190	240	110
230	307	660	190	240	110
240	320	665	190	240	110
250	334	670	190	240	110
260	347	680	190	240	110
270	360	685	190	240	110
280	374	695	190	240	110
290	387	700	190	240	110
300	400	710	190	240	110
310	414	715	190	240	110
320	427	725	190	240	110
330	440	730	190	240	110
340	454	735	190	240	110
350	467	745	190	240	110
360	480	750	190	240	110
370	494	800	190	240	150
380	507	805	190	240	150
390	520	815	190	240	150
400	534	820	190	240	150
410	547	830	190	240	150
420	560	865	190	240	150
430	574	875	190	240	150
440	587	880	190	240	150
450	600	885	190	240	150
460	614	895	190	240	150
470	627	900	190	240	150
480	641	910	190	240	150
490	654	915	190	240	150
500	667	925	190	240	150

SIZE 27 to 33

TRAVEL	A	B	E	F	YY
70	94	670	235	300	130
80	107	680	235	300	130
90	120	685	235	300	130
100	134	695	235	300	130
110	147	700	235	300	130
120	160	705	235	300	130
130	174	715	235	300	130
140	187	720	235	300	130
150	200	730	235	300	130
160	214	735	235	300	130
170	227	745	235	300	130
180	240	750	235	300	130
190	254	760	235	300	130
200	267	765	235	300	130
210	280	775	235	300	130
220	294	780	235	300	130
230	307	785	235	300	130
240	320	795	235	300	130
250	334	800	235	300	130
260	347	810	235	300	130
270	360	815	235	300	130
280	374	825	235	300	130
290	387	830	235	300	130
300	400	835	235	300	130
310	414	845	235	300	130
320	427	855	235	300	130
330	440	860	235	300	130
340	454	865	235	300	130
350	467	875	235	300	130
360	480	880	235	300	130
370	494	930	235	300	170
380	507	935	235	300	170
390	520	945	235	300	170
400	534	950	235	300	170
410	547	960	235	300	170
420	560	965	235	300	170
430	574	975	235	300	170
440	587	980	235	300	170
450	600	985	235	300	170
460	614	995	235	300	170
470	627	1000	235	300	170
480	641	1010	235	300	170
490	654	1015	235	300	170
500	667	1025	235	300	170

SIZE 34 to 39

TRAVEL	A	B	E	F	YY
90	120	830	290	365	155
100	134	840	290	365	155
110	147	845	290	365	155
120	160	850	290	365	155
130	174	860	290	365	155
140	187	865	290	365	155
150	200	875	290	365	155
160	214	880	290	365	155
170	227	890	290	365	155
180	240	895	290	365	155
190	254	905	290	365	155
200	267	910	290	365	155
210	280	920	290	365	155
220	294	925	290	365	155
230	307	930	290	365	155
240	320	940	290	365	155
250	334	945	290	365	155
260	347	955	290	365	155
270	360	960	290	365	155
280	374	970	290	365	155
290	387	975	290	365	155
300	400	985	290	365	155
310	414	990	290	365	155
320	427	1000	290	365	155
330	440	1005	290	365	155
340	454	1010	290	365	155
350	467	1020	290	365	155
360	480	1025	290	365	155
370	494	1035	290	365	155
380	507	1040	290	365	155
390	520	1050	290	365	155
400	534	1055	290	365	155
410	547	1065	290	365	155
420	560	1105	290	365	190
430	574	1115	290	365	190
440	587	1120	290	365	190
450	600	1125	290	365	190
460	614	1135	290	365	190
470	627	1140	290	365	190
480	641	1180	290	365	220
490	654	1185	290	365	220
500	667	1195	290	365	220
510	680	1200	290	365	220
520	695	1210	290	365	220
530	708	1215	290	365	220
540	720	1220	290	365	220
550	734	1230	290	365	220
560	747	1235	290	365	220
570	761	1245	290	365	220
580	774	1250	290	365	220
590	787	1260	290	365	220
600	800	1265	290	365	220
610	815	1275	290	365	220

SIZE 40 to 47

TRAVEL	A	B	E	F	YY
110	147	955	355	455	190
120	160	960	355	455	190
130	174	970	355	455	190
140	187	975	355	455	190
150	200	985	355	455	190
160	214	990	355	455	190
170	227	1000	355	455	190
180	240	1005	355	455	190
190	254	1015	355	455	190
200	267	1020	355	455	190
210	280	1025	355	455	190
220	294	1035	355	455	190
230	307	1040	355	455	190
240	320	1050	355	455	190
250	334	1055	355	455	190
260	347	1065	355	455	190
270	360	1070	355	455	190
280	374	1080	355	455	190
290	387	1085	355	455	190
300	400	1095	355	455	190
310	414	1100	355	455	190
320	427	1110	355	455	190
330	440	1115	355	455	190
340	454	1120	355	455	190
350	467	1130	355	455	190
360	480	1135	355	455	190
370	494	1145	355	455	190
380	507	1150	355	455	190
390	520	1160	355	455	190
400	534	1165	355	455	190
410	547	1175	355	455	190
420	560	1230	355	455	240
430	574	1235	355	455	240
440	587	1245	355	455	240
450	600	1250	355	455	240
460	614	1260	355	455	240
470	627	1265	355	455	240
480	641	1275	355	455	240
490	654	1280	355	455	240
500	667	1285	355	455	240
510	680	1295	355	455	240
520	695	1305	355	455	240
530	708	1310	355	455	240
540	720	1315	355	455	240
550	734	1325	355	455	240
560	747	1330	355	455	240
570	761	1340	355	455	240
580	774	1345	355	455	240
590	787	1355	355	455	240
600	800	1360	355	455	240
610	815	1370	355	455	240

CONSTANT SUPPORT 1 to 47

-	1-6	7-12	13-18	19-26	27-33	34-39	40-44	45-47
AA	250	300	350	400	600	750	1100	1100
BB	150	220	295	330	390	440	525	525
CC	180	215	270	325	405	495	610	610
DD	115	120	135	150	180	225	280	280
FF	135	140	160	175	215	270	330	330
GG	55	65	75	95	115	145	198	198
HH	55	65	75	95	115	145	180	180
PP	215	220	255	270	320	425	480	480
QQ	165	180	205	220	265	335	395	395
RR	14	18	22	22	22	27	33	33
SS	6	6	8	8	10	10	15	15
ZZ	230	260	315	380	490	610	685	685
L	33	38	65	66	83	100	121	165
M	80	100	130	150	180	200	230	230
N	75	95	120	145	175	195	225	225
P	105	120	155	190	240	295	390	390
U	180	215	270	325	405	495	610	610

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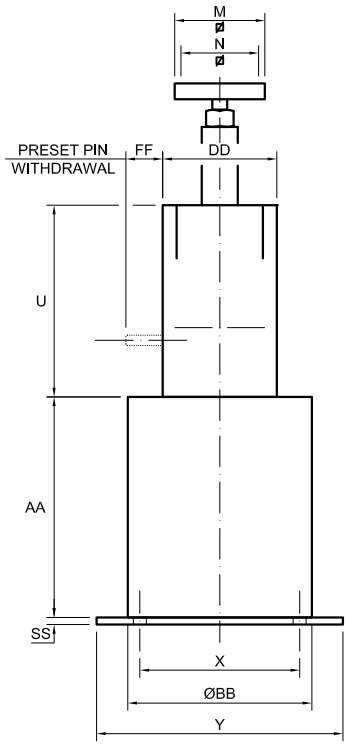
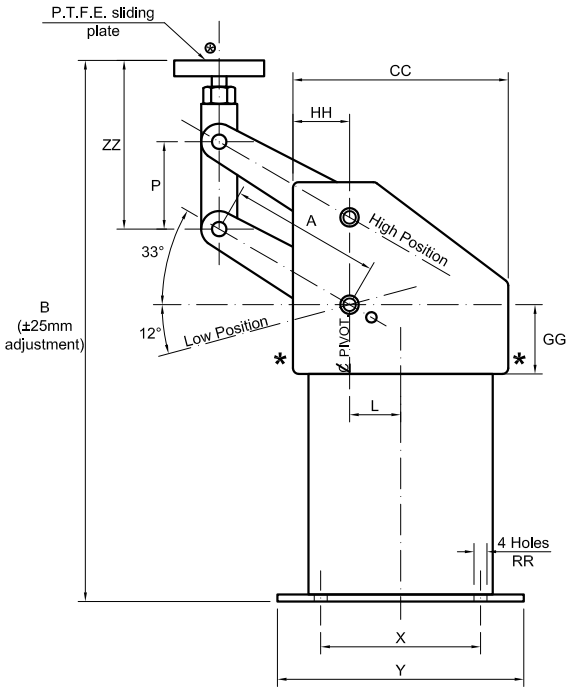
CONSTANT LOAD SUPPORT
MODELS C55

SECTION E
31



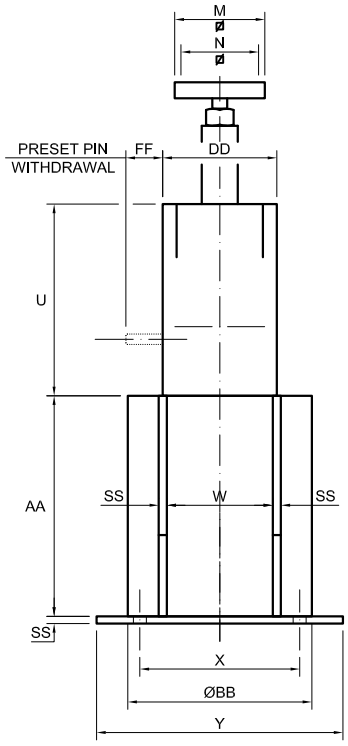


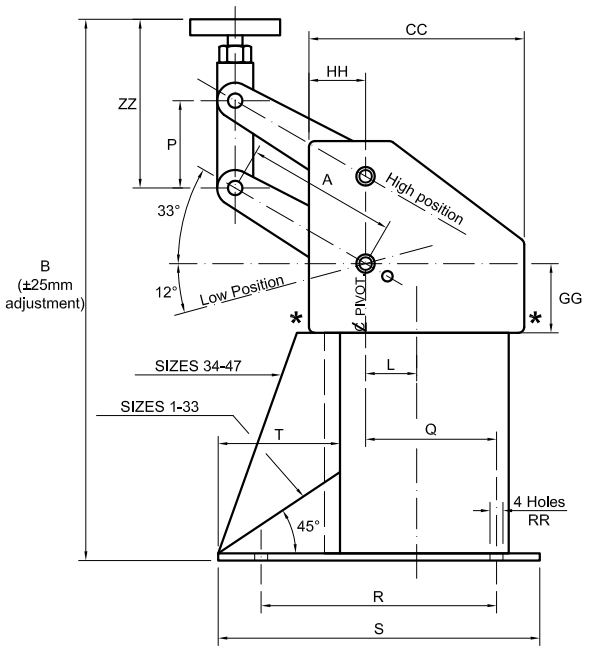
⊛ P.T.F.E. LOW FRICTION PAD (SLIDING)

* ACCESS TO LOAD ADJUSTER

SQUARE BASE PLATE USED FOR TRAVELS UP TO AND INCLUDING 150 mm.

HEIGHT B CALCULATED WHEN LOAD ARM IS IN HIGH POSITION. FOR UP TRAVEL, INSTALLED HEIGHT EQUALS B MINUS UP TRAVEL.





EXTENDED BASE PLATE USED FOR TRAVELS OVER 150 mm.

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CONSTANT LOAD SUPPORT
MODELS C55

TABLE OF DIMENSIONS

SIZE 1 to 6		
TRAVEL	A	B
40	54	570
50	67	580
60	80	585
70	94	595
80	107	600
90	120	605
100	134	615
110	147	620
120	160	630
130	174	640
140	187	645
150	200	650
160	214	660
170	227	665
180	240	670
190	254	680
200	267	685
210	280	695
220	294	700
230	307	710
240	320	715
250	334	725
260	347	730
270	360	735
280	374	745
290	387	750
300	400	760

SIZE 7 to 12		
TRAVEL	A	B
40	54	660
50	67	670
60	80	675
70	94	685
80	107	690
90	120	695
100	134	705
110	147	710
120	160	720
130	174	725
140	187	735
150	200	740
160	214	750
170	227	755
180	240	760
190	254	770
200	267	775
210	280	785
220	294	790
230	307	800
240	320	805
250	334	815
260	347	820
270	360	825
280	374	835
290	387	840
300	400	850

SIZE 13 to 18		
TRAVEL	A	B
60	80	790
70	94	800
80	107	805
90	120	815
100	134	820
110	147	830
120	160	835
130	174	845
140	187	850
150	200	855
160	214	865
170	227	870
180	240	880
190	254	885
200	267	895
210	280	900
220	294	910
230	307	915
240	320	920
250	334	930
260	347	935
270	360	945
280	374	950
290	387	960
300	400	965
310	414	975
320	427	980
330	440	990
340	454	995
350	467	1000
360	480	1010

SIZE 19 to 26		
TRAVEL	A	B
60	80	925
70	94	935
80	107	940
90	120	950
100	134	955
110	147	965
120	160	970
130	174	980
140	187	985
150	200	990
160	214	1000
170	227	1005
180	240	1015
190	254	1020
200	267	1030
210	280	1035
220	294	1045
230	307	1050
240	320	1060
250	334	1065
260	347	1070
270	360	1080
280	374	1085
290	387	1095
300	400	1100
310	414	1110
320	427	1115
330	440	1125
340	454	1130
350	467	1140
360	480	1145
370	494	1150
380	507	1160
390	520	1165
400	534	1175
410	547	1180
420	560	1190
430	574	1195
440	587	1205
450	600	1210
460	614	1215
470	627	1225
480	641	1230
490	654	1240
500	667	1245

SIZE 27 to 33		
TRAVEL	A	B
70	94	1265
80	107	1275
90	120	1280
100	134	1290
110	147	1295
120	160	1300
130	174	1310
140	187	1315
150	200	1325
160	214	1330
170	227	1340
180	240	1345
190	254	1355
200	267	1360
210	280	1370
220	294	1375
230	307	1380
240	320	1390
250	334	1395
260	347	1405
270	360	1410
280	374	1420
290	387	1425
300	400	1435
310	414	1440
320	427	1450
330	440	1455
340	454	1460
350	467	1470
360	480	1475
370	494	1485
380	507	1490
390	520	1500
400	534	1505
410	547	1515
420	560	1520
430	574	1530
440	587	1535
450	600	1540
460	614	1550
470	627	1555
480	641	1565
490	654	1570
500	667	1580

SIZE 34 to 39		
TRAVEL	A	B
90	120	1575
100	134	1585
110	147	1590
120	160	1595
130	174	1605
140	187	1610
150	200	1620
160	214	1625
170	227	1635
180	240	1640
190	254	1650
200	267	1655
210	280	1665
220	294	1670
230	307	1675
240	320	1685
250	334	1690
260	347	1700
270	360	1705
280	374	1715
290	387	1720
300	400	1730
310	414	1735
320	427	1745
330	440	1750
340	454	1755
350	467	1765
360	480	1770
370	494	1780
380	507	1785
390	520	1795
400	534	1800
410	547	1810
420	560	1820
430	574	1830
440	587	1835
450	600	1840
460	614	1850
470	627	1855
480	641	1865
490	654	1870
500	667	1880
510	680	1885
520	695	1895
530	708	1900
540	720	1905
550	734	1915
560	747	1920
570	761	1930
580	774	1935
590	787	1945
600	800	1950
610	815	1960

SIZE 40 to 47		
TRAVEL	A	B
110	147	2080
120	160	2085
130	174	2095
140	187	2100
150	200	2105
160	214	2115
170	227	2120
180	240	2130
190	254	2135
200	267	2145
210	280	2150
220	294	2160
230	307	2165
240	320	2170
250	334	2180
260	347	2185
270	360	2195
280	374	2200
290	387	2210
300	400	2215
310	414	2225
320	427	2230
330	440	2240
340	454	2245
350	467	2250
360	480	2260
370	494	2265
380	507	2275
390	520	2280
400	534	2290
410	547	2295
420	560	2300
430	574	2310
440	587	2320
450	600	2325
460	614	2330
470	627	2340
480	641	2345
490	654	2355
500	667	2360
510	680	2365
520	695	2375
530	708	2385
540	720	2390
550	734	2400
560	747	2405
570	761	2410
580	774	2420
590	787	2425
600	800	2435
610	815	2440

CONSTANT SUPPORT 1 to 47								
-	1-6	7-12	13-18	19-26	27-33	34-39	40-44	45-47
AA	250	300	350	400	600	750	1100	1100
BB	150	220	295	330	390	440	525	525
CC	180	215	270	325	405	495	640	640
DD	115	120	135	150	180	225	280	280
FF	135	140	160	175	215	270	330	330
GG	55	65	75	95	115	145	198	198
HH	55	65	75	95	115	145	180	180
RR	14	18	22	22	22	27	33	33
SS	6	6	8	8	10	10	15	15
ZZ	230	260	315	380	490	610	685	685
L	33	38	65	66	83	100	121	165
M	80	100	130	150	180	200	230	230
N	75	95	120	145	175	195	225	225
P	105	120	155	190	240	295	390	390
Q	100	130	195	215	225	285	360	405
R	180	255	370	395	510	510	740	740
S	220	305	420	460	585	610	840	840
T	80	100	170	180	230	170	300	300
U	180	215	270	325	405	495	640	640
W	102	127	203	254	305	206	257	257
X	170	230	280	355	410	460	560	560
Y	210	280	330	420	485	560	660	660

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APROXIMATE WEIGHTS OF CONSTANT LOAD SUPPORTS

APROXIMATE WEIGHTS BY SIZE

SIZE	WEIGHT (Kg)
1	13
2	13
3	13
4	15
5	15
6	15
7	23
8	23
9	23
10	24
11	26
12	26
13	45
14	45
15	45
16	54
17	54
18	54
19	72
20	72
21	80
22	80
23	85
24	85
25	85
26	85
27	146
28	146
29	146
30	146
31	158
32	168
33	168

SIZE	WEIGHT (Kg)
34	275
35	275
36	275
37	357
38	369
39	369
40	627
41	627
42	627
43	627
44	627
45	783
46	783
47	945
48	945
49	945
50	960
51	960
52	960
53	960
54	960
55	1140
56	1140
57	1140
58	1140
59	1185
60	1185
61	1185
62	1185
63	1320
64	1320
65	1320
66	1320

VALID WEIGHTS FOR ANY SIZE AND TYPE

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SECTION F

SWAY STRUTS AND HYDRAULIC SNUBBERS

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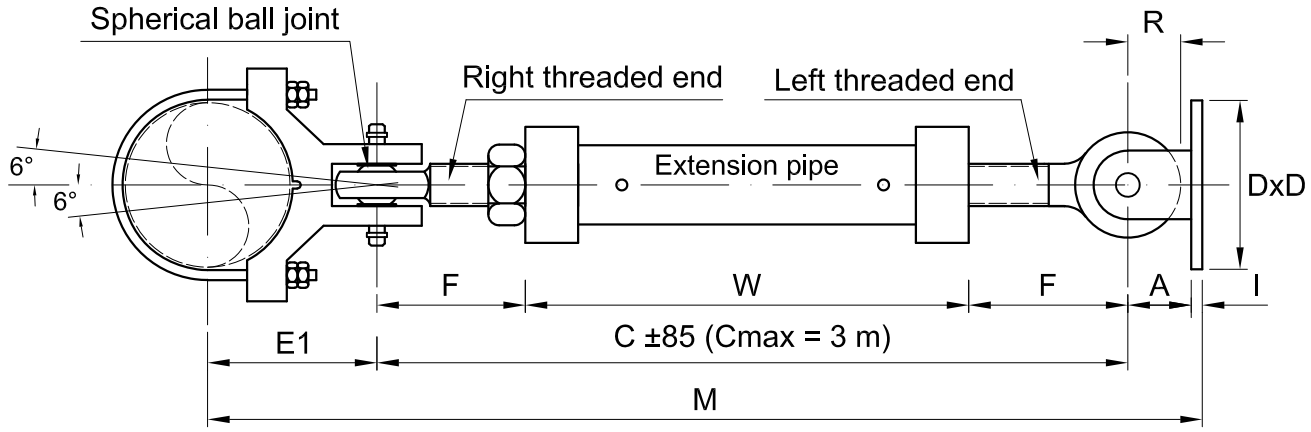
SWAY STRUT

FIG.: 2400

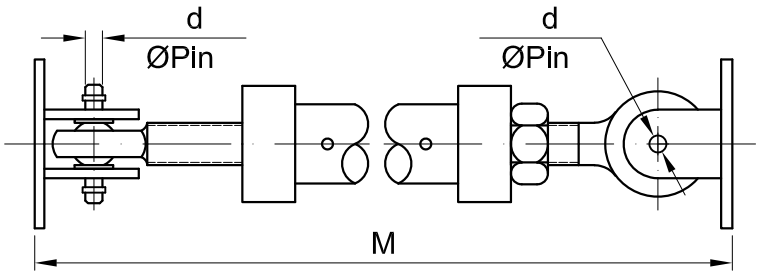
SECTION F 1

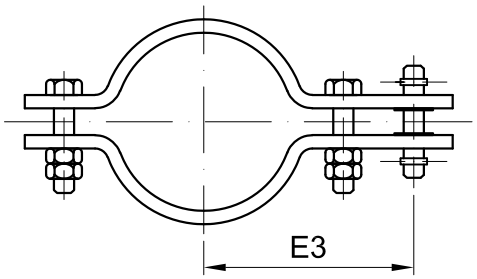
OPTIONS 1 AND 1-A



OPTION 2

(SYMMETRICAL)





- Recommended when the highest rigidity is not required.
- Not recommended for size 4.

APPLICATION: Restricts the movement of the piping in the axial direction of the support, allowing for movements in the transversal direction, guaranteeing high rigidity in the unit.

DESIGN:

1º: Determine the "M" total installation lenght.

2º: Determine the distance "C" between axes:

C= M-(E+I+A) o C= M-2(I+A)

3º: Determine the distance "W":

W= C-2·F

Where W > Wmin

MAINTENANCE: No maintenance required, since we use maintenance-free ball joints.

ASSEMBLY: Allows for regulating the distance "C" up to ± 85 mm.

ORDER FORM: Name, Figure No., Option, Size No., Load, Distance "M", Pipe size, quality and operating temperature for options 1, 1-A and 3, insulation thickness.

N.B.: For loads greater than those indicated here, please contact us.

No.	Associated ROD	I (mm)	A (mm)	F (mm)	R (mm)	D (mm)	W min (mm)	d (mm)	EXTENSION PIPE	LOAD (Kg)
00	M16	10	30	90	20	50	230	12	1" SCH 40	600
0	M20	12	35	100	27	60	255	15	2" SCH 40	1500
1	M30	20	60	122	43	80	275	25	2" SCH 160	3850
2	M39	25	75	137	58	100	275	25	2 1/2" SCH 160	6350
3	M48	25	95	161	78	125	295	30	3" SCH 160	12000
4	M64	30	125	201	106	150	345	45	4" SCH 120	24500

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DYNAMIC CLAMP

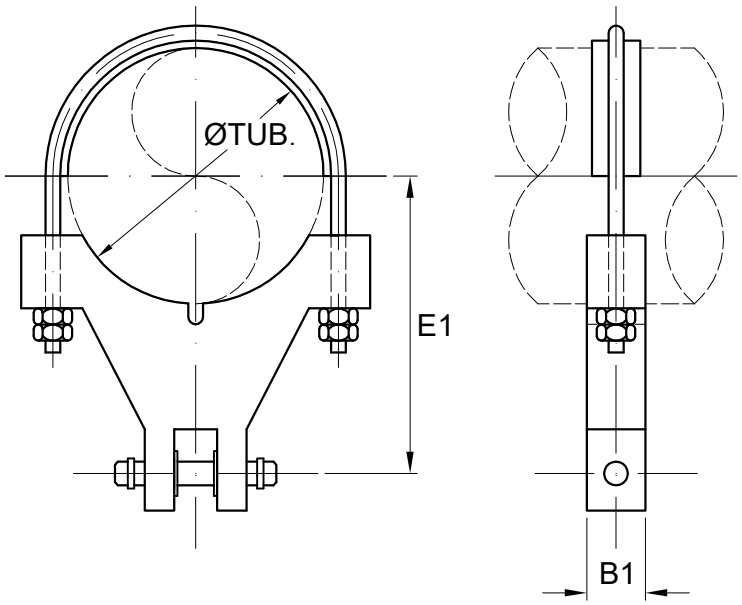
FIG.: 2400

SECTION F
2

TYPE OPTION 1

(TEMP. < 400ºC)

MATERIAL: Carbon steel for temperatures lower than 400ºC.



DIMENSIONS B1 AND E1 FOR CLAMPS TYPE 1 (mm)

Nº / Ø TUB.	00		0		1		2		3		4	
	B1	E1	B1	E1	B1	E1	B1	E1	B1	E1	B1	E1
1"	30	110	30	120	-	-	-	-	-	-	-	-
1 1/2 "	30	120	30	130	-	-	-	-	-	-	-	-
2"	30	130	30	145	-	-	-	-	-	-	-	-
2 1/2 "	30	140	45	155	-	-	-	-	-	-	-	-
3"	30	155	45	175	60	196	-	-	-	-	-	-
4"	30	171	45	189	60	210	-	-	-	-	-	-
5"	30	185	45	203	60	224	-	-	-	-	-	-
6"	30	198	45	215	60	236	90	249	-	-	-	-
8"	30	234	45	241	60	262	90	275	90	295	-	-
10"	30	261	45	267	60	288	90	301	90	321	120	356
12"	30	286	45	293	60	314	90	327	90	347	120	382
14"	30	302	45	309	60	330	90	343	90	363	120	398
16"	30	327	45	335	60	356	90	369	90	389	120	424
18"	-	-	45	361	60	380	90	393	90	413	120	448
20"	-	-	45	386	60	406	90	419	90	439	120	474
22"	-	-	45	412	60	432	90	445	90	465	120	500
24"	-	-	45	436	60	457	90	470	90	490	120	526
26"	-	-	45	461	60	482	90	495	90	515	120	550
28"	-	-	-	-	60	508	90	521	90	541	120	576
30"	-	-	-	-	60	533	90	547	90	567	120	602
32"	-	-	-	-	60	558	90	572	90	592	120	626
34"	-	-	-	-	60	584	90	597	90	617	120	652
36"	-	-	-	-	60	609	90	622	90	642	120	677

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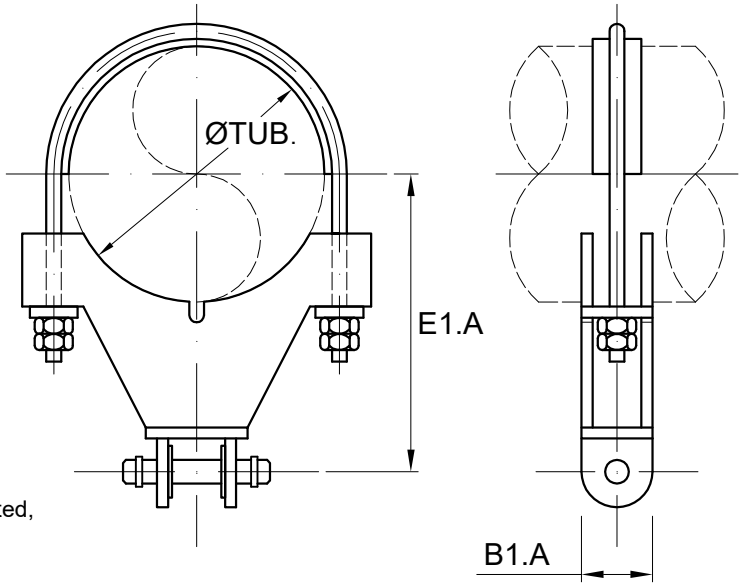
TYPE OPTION 1-A

(TEMP. > 350ºC)

APPLICACIÓN: support for insulated alloy steel piping.

MATERIAL:
For temperatures of up to 500ºC, alloy steel 16Mo3 (0.5 Mo).
For temperatures of up to 550ºC, alloy steel 13CrMo4.5 / A182F11-A387Gr12 (1Cr-0.5 Mo).
For temperatures of up to 600ºC, alloy steel 10CrMo9.10/ A182F22-A387Gr22 (2.25Cr-1Mo).

N.B.: This can be manufactured with values of "E1A" other than those indicated, according to the requirements for pipe insulation (Section F-3).



DIMENSIONS B1.A AND E1.A FOR CLAMPS TYPE 1-A (mm)

Nº / Ø TUB.	00		0		1		2		3		4	
	B1.A	E1.A	B1.A	E1.A	B1.A	E1.A	B1.A	E1.A	B1.A	E1.A	B1.A	E1.A
1"	30	157	30	164	-	-	-	-	-	-	-	-
1 1/2 "	30	164	30	171	-	-	-	-	-	-	-	-
2"	30	170	30	177	-	-	-	-	-	-	-	-
2 1/2 "	30	177	45	184	-	-	-	-	-	-	-	-
3"	30	184	45	191	60	224	-	-	-	-	-	-
4"	30	222	45	229	60	262	-	-	-	-	-	-
5"	30	236	45	243	60	276	-	-	-	-	-	-
6"	30	249	45	256	60	289	90	309	-	-	-	-
8"	30	275	45	282	60	315	90	335	90	355	-	-
10"	30	302	45	309	60	342	90	362	90	382	120	422
12"	30	352	45	359	60	392	90	412	90	432	120	472
14"	30	368	45	375	60	408	90	428	90	448	120	488
16"	30	393	45	400	60	433	90	453	90	473	120	513
18"	-	-	45	426	60	459	90	479	90	499	120	539
20"	-	-	45	451	60	484	90	504	90	524	120	564
22"	-	-	45	477	60	539	90	559	90	579	120	619
24"	-	-	45	502	60	565	90	585	90	605	120	645
26"	-	-	45	527	60	590	90	610	90	630	120	670
28"	-	-	-	-	60	616	90	636	90	656	120	696
30"	-	-	-	-	60	641	90	661	90	681	120	721
32"	-	-	-	-	60	666	90	686	90	706	120	746
34"	-	-	-	-	60	692	90	712	90	732	120	772
36"	-	-	-	-	60	717	90	737	90	757	120	797

FLATBAR CLAMP FOR STRUT

FIG.: 2400

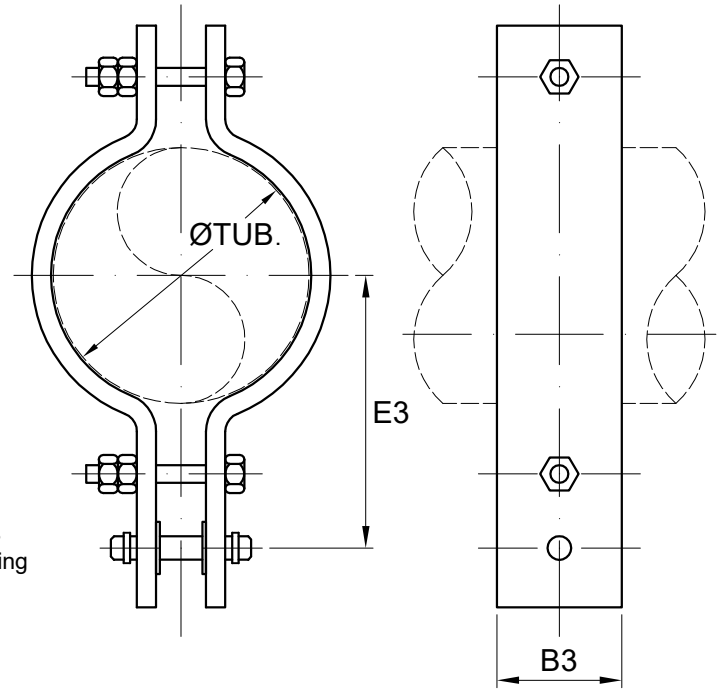
SECTION F 4

TYPE OPTION 3

APPLICATION: support for carbon steel or alloy steel piping, with no conditioning for high rigidity.

MATERIAL: carbon steel for temperatures of up to 380ºC. Alloy steel type 16Mo3 for temperatures of up to 500ºC. Alloy steel type 13CrMo4.5 for temperatures of up to 540ºC. Alloy steel type 10CrMo9.10 for temperatures of up to 600ºC.

N.B.: This can be manufactured with values of "E3" other than those indicated, according to the requirements for pipe insulation (Section F-4).



DIMENSIONS B3 AND E3 FOR CLAMPS TYPE 3 (mm)

Nº / Ø TUB.	00		0		1		2		3	
	B3	E3	B3	E3	B3	E3	B3	E3	B3	E3
1"	40	110	50	120	-	-	-	-	-	-
1 1/2 "	40	120	60	130	-	-	-	-	-	-
2"	50	130	60	145	-	-	-	-	-	-
2 1/2 "	50	140	60	155	-	-	-	-	-	-
3"	50	155	60	175	80	196	-	-	-	-
4"	50	160	60	189	80	210	-	-	-	-
5"	50	174	60	203	80	224	-	-	-	-
6"	60	185	80	215	100	236	100	249	-	-
8"	60	210	80	241	100	262	100	275	120	320
10"	60	245	80	267	100	288	120	301	150	358
12"	60	275	80	293	100	314	120	327	150	378
14"	60	291	80	309	120	330	150	343	150	402
16"	60	316	80	335	120	356	150	381	180	425
18"	-	-	80	357	150	380	150	408	180	450
20"	-	-	100	385	150	406	150	440	180	485
22"	-	-	100	420	150	432	150	475	180	522
24"	-	-	100	450	150	463	150	500	180	561
26"	-	-	100	475	150	490	180	539	180	585
28"	-	-	-	-	150	525	180	565	180	615
30"	-	-	-	-	150	567	180	588	200	636
32"	-	-	-	-	150	600	200	640	200	710
34"	-	-	-	-	150	625	200	665	200	735
36"	-	-	-	-	150	650	200	687	200	757

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HYDRAULIC SNUBBERS

Supplementing the scope of this support catalogue, Pihasa makes this type of basic element in the advanced design of piping systems available to the market.

These hydraulic snubbers are components that protect pipe systems from unwanted dynamic efforts, such as: earthquakes, pressure shock, effects of wind, physical impacts, breakages, explosions, sudden pressure increases due to the release of safety valves, water hammers, etc.

Furthermore, the hydraulic snubbers that we supply have an added function of dampening vibrations when they comply with the following conditions:
* Amplitude greater than 0.5 mm.
* Frequency in the range of 1 to 33 Hz.

The use of snubbers makes it possible to reduce the amplitude of unwanted dynamic movements. At the same time, snubbers make it possible to shift the piping due to thermal dilation, giving a very small friction load (free flow condition).

When the speed of the piston increases above the nominal blocking speed value (standard 2 mm/sec., adjustable to 6 mm/sec.), the block valve shuts off, preventing movement and absorbing the forces built up (blocking condition).

In alternative movements (vibrating waves), the two blocking valves open and shut off, alternating, opposing resistance in each direction in which there is an equal load capacity.

In order to ensure piston movement under load at a controlled speed and also to alleviate the pressure on the control valve, the snubbers are fitted with the same number of needle valves or relief valves that allow the flow to make a controlled bypass. The needle valves are calibrated to limit piston speed to below 2 mm/sec.
The snubbers incorporate a hydraulic fluid reserve tank, pressurized by loading a spring. This internal pressure ensures that no air enters during the operating process and that the tank can be installed in any position and orientation.

CHARACTERISTICS AND ASSEMBLY:

The hydraulic snubbers can be fitted into any installation position. Thermal displacement of the piping should be taken into account, either in terms of extension or in terms of compression, in order to ensure the maximum margin between the nominal and the actual travel. This amounts to assembling them when the travel is greater than 25% of the nominal travel, with the piston compressed or extended at a value equal to the half thermal displacement expected with extension or compression, respectively.

	UNIT	HYDRAULIC FLUID FOR NUCLEAR SERVICE	STANDARD HYDRAULIC FLUID
CONTINUOUS OPERATION TEMPERATURE	°C	-20 to 80	-50 to 80
MAXIMUM SHORT-TERM TEMPERATURE (*)	°C	150	150
MAXIMUM RADIATION DOSE	Megarad	100	20
AMBIENT PRESSURE, CONTINUOUS OPERATION	bar	1	1
AMBIENT PRESSURE, SHORT-TERM	bar	10	10
SOLIDIFICATION POINT	°C	-40	-67
FLASH POINT	°C	>550	600

N.B. (*): Maximum 40h per year and 1h maximum per cicle.

HYDRAULIC SNUBBERS

CHARACTERISTICS AND ASSEMBLY:

Rolling resistance / Friction ..... max. 2% of nominal load.
Response speed ..... 2-6 mm/sec.
Post-reaction speed ..... 0,2-2 mm/sec.
Frequency range ..... 1-33 Hz..

STANDARD FINISH:

The elements in the exterior housing are manufactured in high quality electro-galvanized treated carbon steel (15 µm thickness). Additionally, the piston is coated with a 40 µm nickel base electrolytic layer. On special order, they can be manufactured in stainless steel.

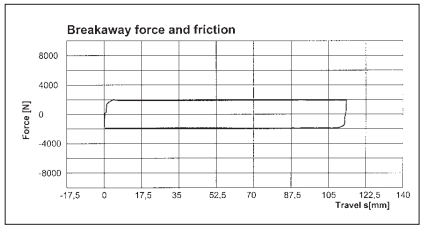
MAINTENANCE:

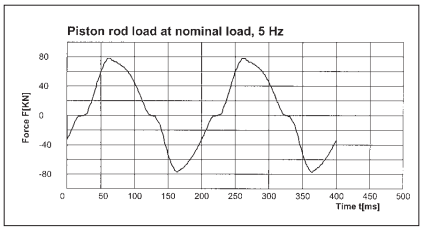
Metal parts are designed to have a life cycle of 40 years, but however, the organic parts, such as fluid and joints, are subject to a greater ageing process, the more unfavourable the operating conditions are. Depending on where they are located and their use, joints and fluid may have to be replaced after 20 years of operation. The following is advisable:

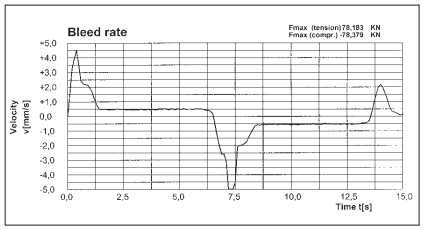
* Annual inspection to check on the piston level in the reserve tank.
* After 10-15 years, a functional test on the test bench.
* After 20 years, replace hydraulic fluid and joints.

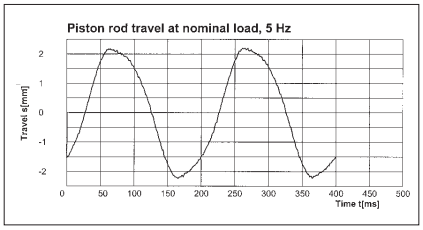
TEST PRIOR TO SUPPLY:

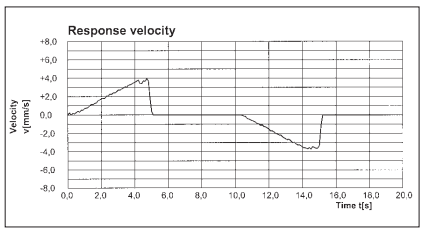
All snubbers are subjected to functional tests prior to dispatch, in order to obtain the standard operational values.

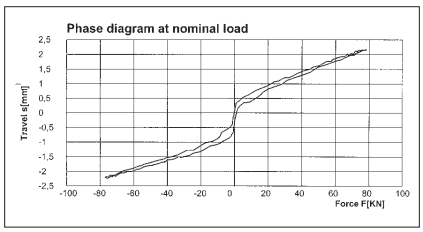












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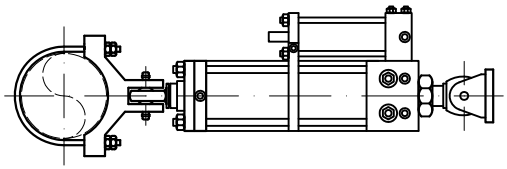
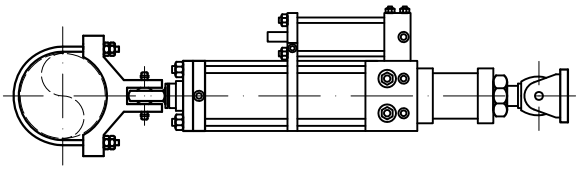
ASSEMBLY OPTIONS:

* OPTION 1

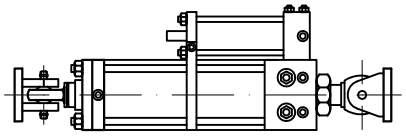


- Dynamic clamp Fig. 2400 Option 1 or 1A
- hydraulic snubber
- Rear bracket

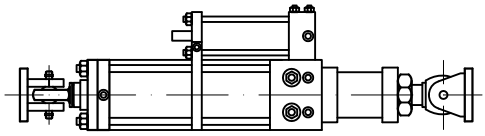


- Dynamic clamp Fig. 2400 Option 1 or 1A
- Hydraulic snubber
- Extension piece
- Rear bracket

* OPTION 2

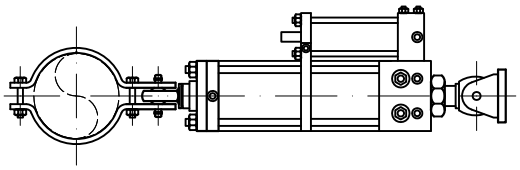


- Joint to beam
- Hydraulic snubber
- Rear bracket

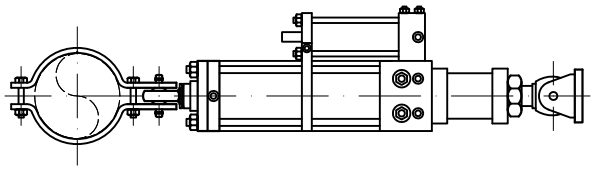


- Joint to beam
- Hydraulic snubber
- Extension piece
- Rear bracket

* OPTION 3



- Flatbar clamp Fig. 2400 Option 3
- Hydraulic snubber
- Rear bracket



- Flatbar clamp Fig. 2400 Option 3
- Hydraulic snubber
- Extension piece
- Rear bracket

FIGURE 200B:

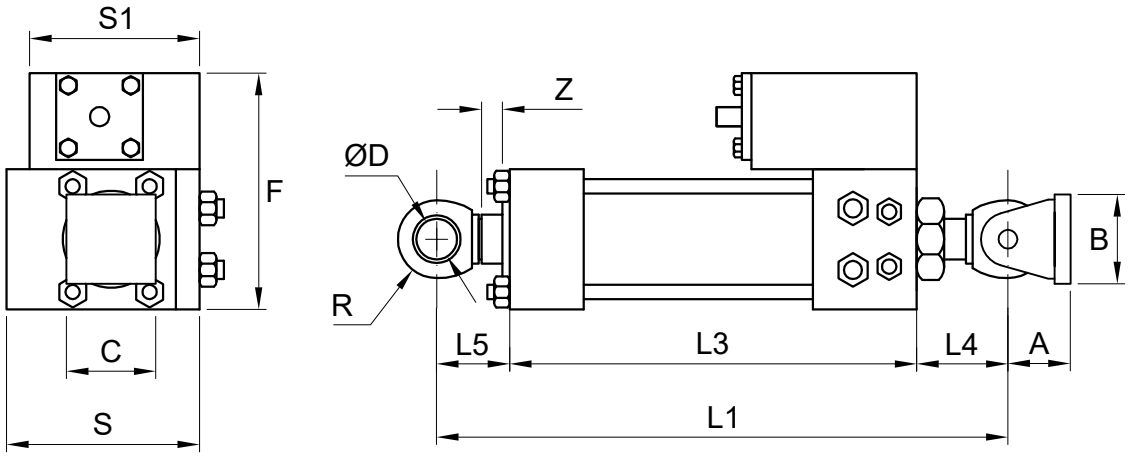


FIGURE 201B:

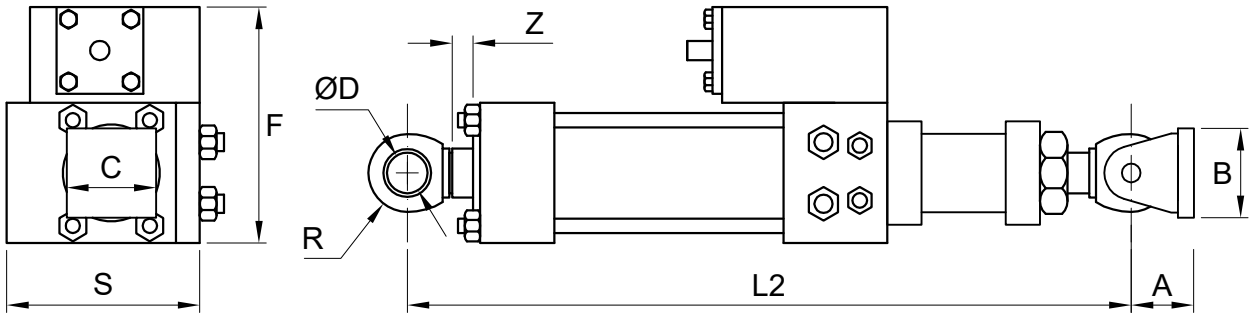


FIG. 200B/201B					A	B	C	L1	L1	L2	L2	L3	ØD	L4	L5	R	F	S	S1	Z	Weight
Size	Nominal Load		Stroke					min	max	min	max										
	kg	kN	Pulg.	mm	mm															mm	Kg
1/4"	305	3	5"	127	35	55	65	364	491	384	1000	287	10	28	49	15	120	87	81	7	10
1/2"	509	5	5"	127	35	55	65	364	491	384	1000	287	10	28	49	15	120	87	81	7	10
1"	815	8	5"	127	35	55	65	364	491	384	1000	287	10	28	49	15	120	87	81	7	10
1 1/2"	1325	13	5"	127	40	65	80	393	520	413	1500	310	15	45	38	22	135	103	96	9	13,5
			10"	254				520	774	540		437									15
			15"	381				647	1028	667		564									19,2
2 1/2"	4588	45	5"	127	60	120	120	442	569	477	2000	334	25	50	58	32	200	115	105	17	26,5
			10"	254				569	823	604		461									28,6
			15"	381				696	1077	731		588									30,7
			20"	508				823	1331	858		715									32,8
3 1/4"	7953	78	5"	127	75	140	140	495	622	536	2500	355	35	68	72	41	240	135	130	20	37,1
			10"	254				622	876	663		482									41,6
			15"	381				749	1130	790		609									47,7
			20"	508				876	1384	917		736									52,3

FIGURE 200A:

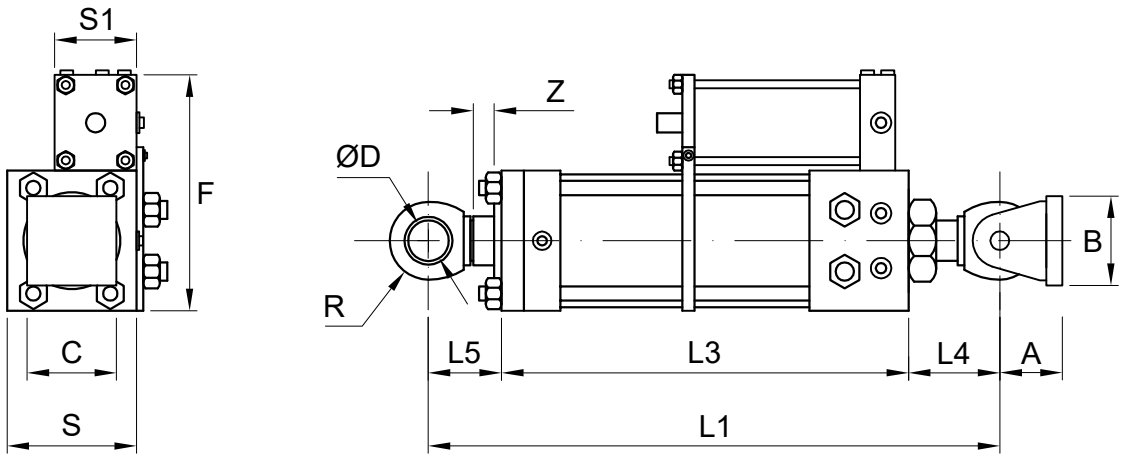


FIGURE 201A:

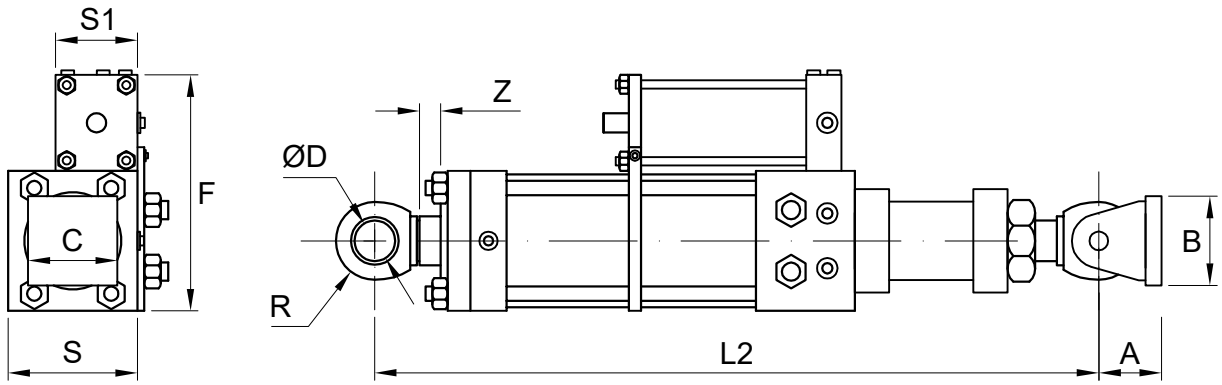


FIG. 200A/201A					A	B	C	L1	L1	L2	L2	L3	ØD	L4	L5	R	F	S	S1	Z	Weight
Size	Nominal Load		Stroke					min	max	min	max										
	kg	kN	Pulg.	mm	mm															mm	Kg
4"	12338	121	5"	127	90	180	180	545	672	603	3000	362	45	90	93	51	260	145	105	25	59
			10"	254				672	926	730		489									73
			15"	381				799	1180	857		616									83
			20"	508				926	1434	984		743									93,4
5"	20597	202	5"	127	120	260	240	625	752	695	3000	381	60	119	125	68	295	180	105	30	77
			10"	254				752	1006	822		508									93
			15"	381				879	1260	949		635					325		134		106,3
			20"	508				1006	1514	1076		762									119,6
6"	30896	303	5"	127	140	340	280	697	824	779	3000	420	70	137	140	80	355	210	134	30	106
			10"	254				824	1078	906		547									126
			15"	381				951	1332	1033		674									145,2
			20"	508				1078	1586	1160		801									164,4

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FIGURE 202A:

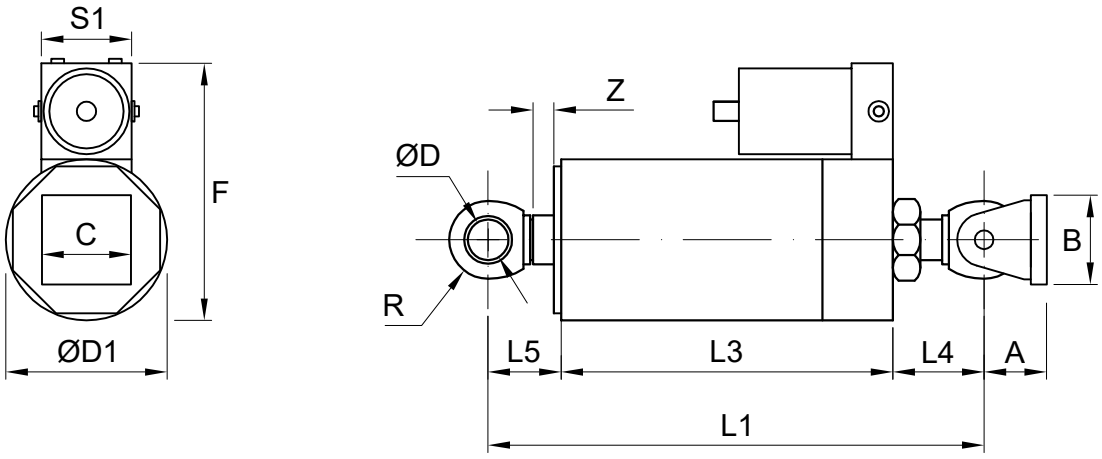

FIGURE 203A:

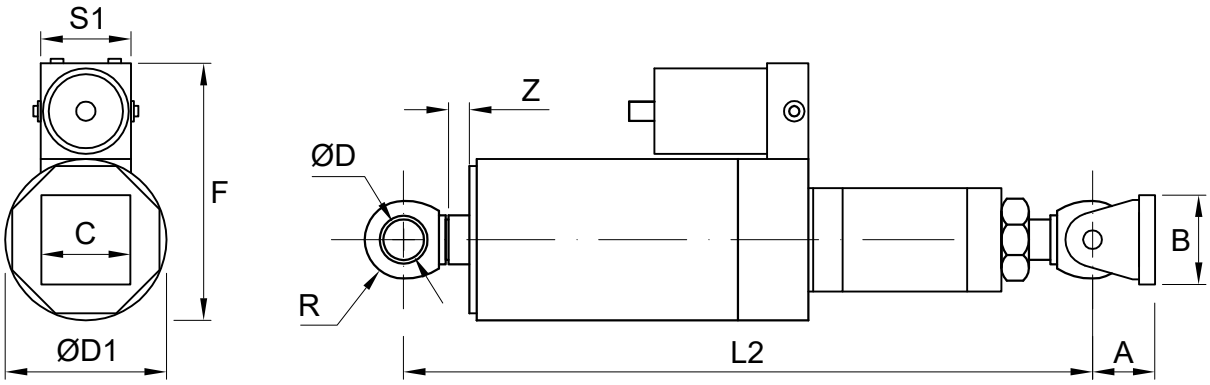

FIG. 202A/203A				A	B	C	L1	L1	L2	L2	L3	L4	L5	ØD	S1	R	F	ØD1	Z	Weight
Size	Nominal Load		Stroke				min	max	min	max										
	kg	kN	mm	mm																Kg
8 1/2"	60161	590	127	155	420	300	689	816	770	3100	399	157	133	80	145	90	428	268	3	161
			254				816	1070	897	3100	526									192
10"	85143	835	127	170	350	288	735	862	825	3400	443	157	135	90	170	100	488	310	5	250
			254				862	1116	952	3400	570									288
12"	127459	1250	127	200	460	315	829	956	927	3800	487	182	160	110	170	123	538	360	5	350
			254				956	1210	1054	3800	614									408
14"	176404	1730	127	225	470	330	908	1035	1024	4200	536	197	175	120	220	138	648	420	5	515
			254				1035	1289	1151	4200	663									587

APPENDIX

CHARTS AND ANNEXES

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All the piping systems should be supported in accordance with a specific engineering study.

During basic and detail engineering, especially in the case of piping subject to thermal dilation, firstly, it is essential to establish the location of the support points. Then, calculation of loads and the resulting thermal displacements are made for each support point. To do so, the following is taken into account:

Materials, dilation coefficients and acceptable tensions.
Weight of the piping, accessories, insulation, etc.
Working conditions, temperature, pressure, etc.
External factors such as wind, earthquake, etc.
Environmental conditions.

These calculations are made using computer-based calculation programmes, which are only fed with data on batches, geometry, operating conditions, modes of operation, etc.. It is advisable to comply with the following conditions:

- The sum of the weights of the line should be equal to the sum of the support forces.
- The sum of the moments of weight of the piping, at its centre of gravity, and the support forces, should be equal to zero.

SPECIAL CONSIDERATIONS:

The variable load supports should be located at points subjected to vertical movement with acceptable load variations of up to 25%.
Constant load supports are installed when the piping is subjected to vertical movements and a minimum load variation is required.
Anchors are installed to allow for the free expansion and contraction of the line towards one side and another of the anchoring point, and therefore, they should be designed in terms of the load conditions and their location.
When expansion joints are used, guides should be installed on the piping to allow for dilation in the direction of the joint.
Elements controlling vibration are installed on flexible lines when required to dampen vibration or side movement.

SUPPORT POINTS:

Support points should be selected taking into consideration:

The distance between supports should be sufficiently close as to avoid high flexion tensions due to the weight of the piping and insulation. (See maximum separation table between supports in terms of the diameter of the piping).
Generally, it is advisable to fit the supports near the concentrated loads, such as valves, flanges, etc.
Ensure that there is no interference between other equipment or piping.
Locate them taking into account the prior availability of existing structure.

MAXIMUM SPACING BETWEEN SUPPORTS																		
Nominal diam. of pipe	15	20	25	40	50	65	80	100	125	150	200	250	300	350	400	450	500	600
Gap in meters	2	2,5	3	3,5	4	4,5	5,5	6	6,5	7	8,5	9	10	10	10,5	11	12	14

This maximum spacing should be limited by factors such as insulation and operating conditions of the piping.

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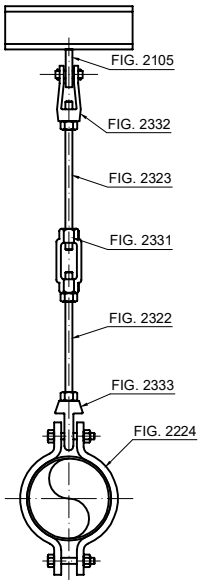
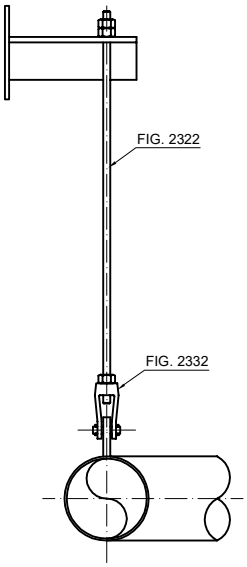
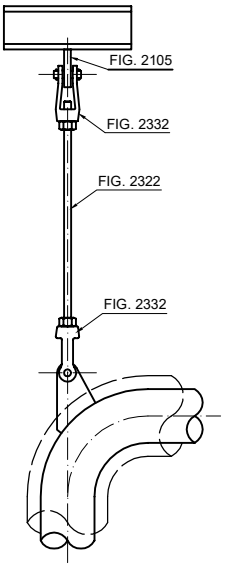
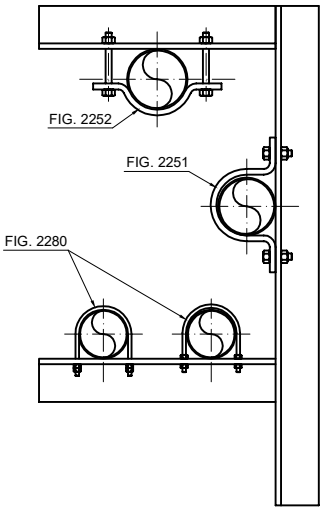
SUPPORTS AND HANGERS TYPICAL ASSEMBLIES

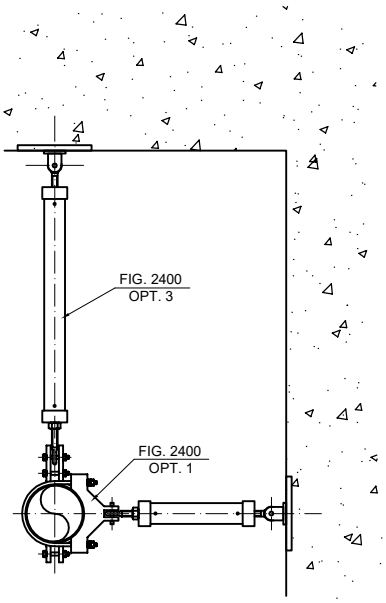
APPENDIX 2

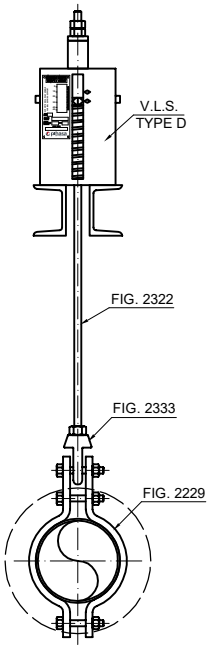


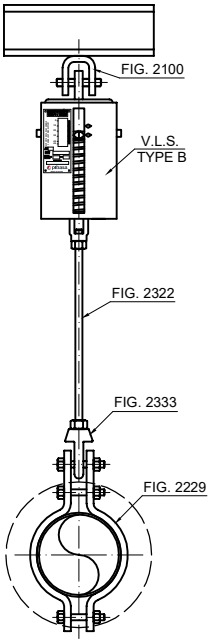


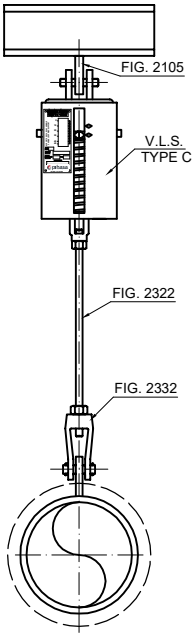


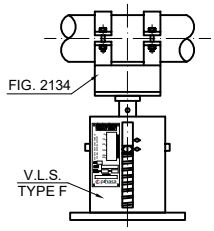


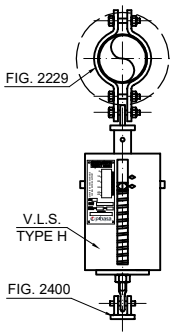


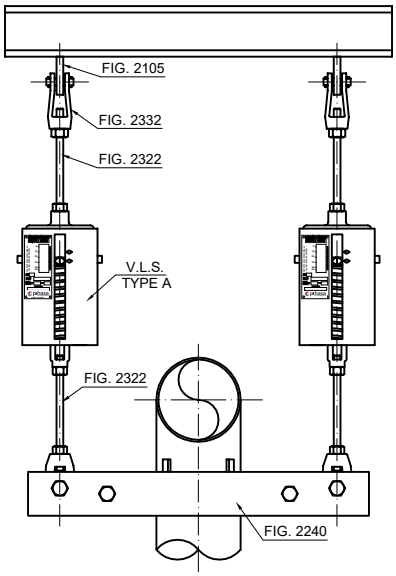


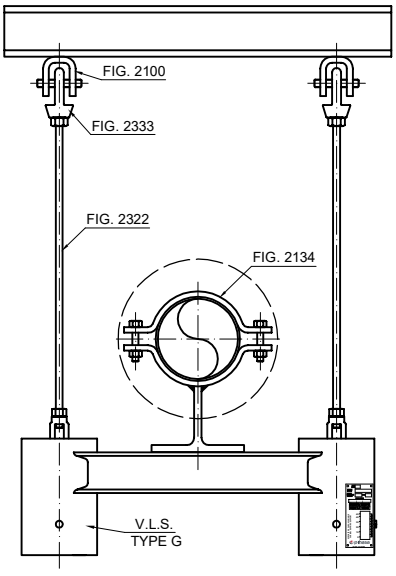






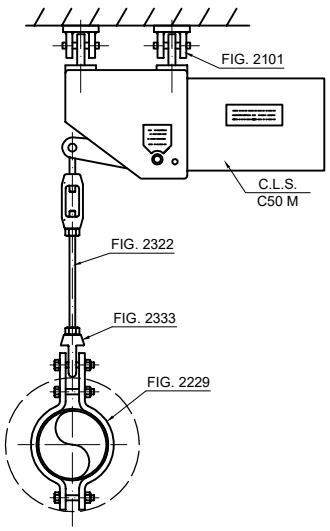


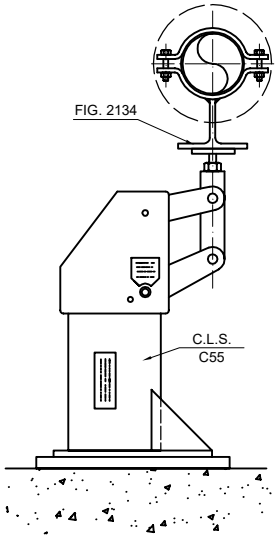


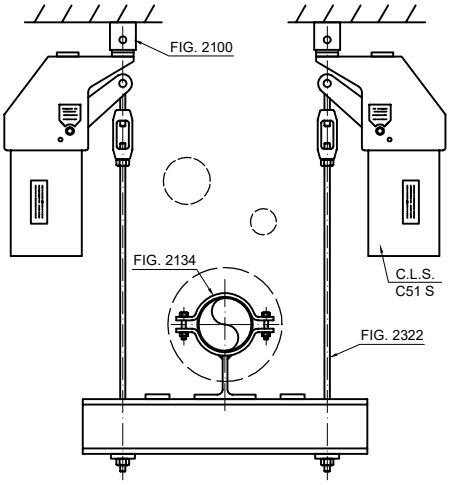


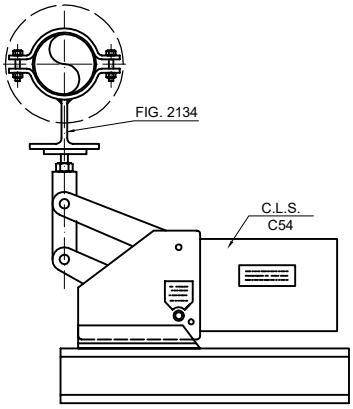
SUPPORTS AND HANGERS TYPICAL ASSEMBLIES

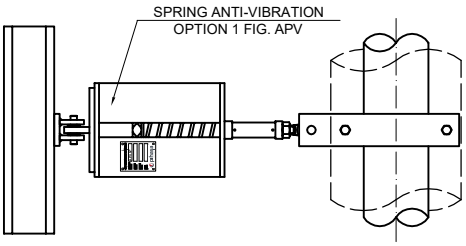
APPENDIX 3

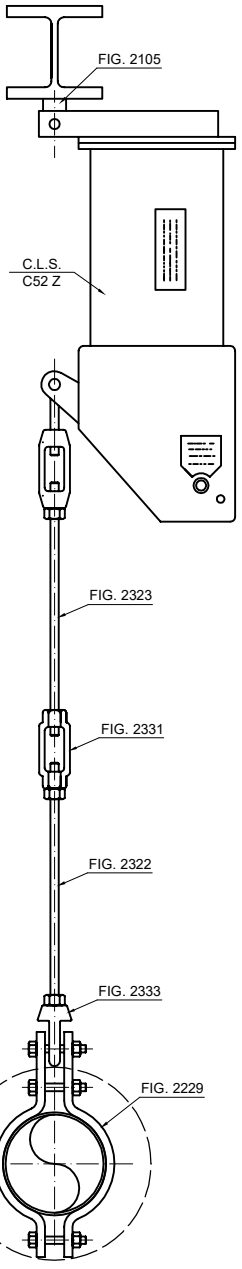


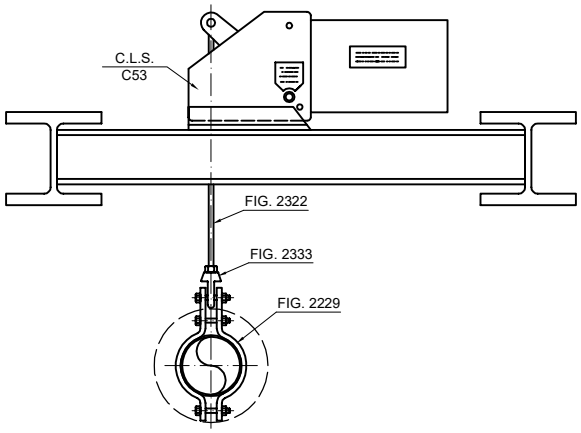


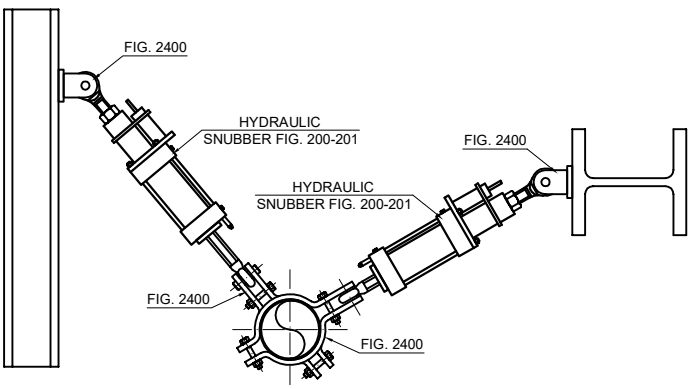












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DIMENSIONS AND WEIGHTS OF PIPES

APPENDIX 4

Ø Nominal	Ø Ext. (mm)	Thickness (mm)	Identification: S/ANSI-B16.10 or DIN	Weight (Kg/m)
1/8" DN-6	10,2	1,6	DIN-2448	0,344
		2	DIN-2440	0,41
		2,65	DIN-2441	0,493
	10,3	1,24	SCH-10S	0,28
		1,73	STD/SCH-40/SCH-40S	0,36
		2,41	XS/SCH-80/SCH-80S	0,46
1/4" DN-8	13,5	1,8	DIN-2448	0,522
		2,35	DIN-2440	0,65
		2,9	DIN-2441	0,769
	13,71	1,65	SCH-10S	0,49
		2,24	STD/SCH-40/SCH-40S	0,63
		3,02	XS/SCH-80/SCH-80S	0,8
3/8" DN-10	17,14	1,65	SCH-10S	0,63
		2,31	STD/SCH-40/SCH-40S	0,85
		3,2	XS/SCH-80/SCH-80S	1,1
	17,2	1,8	DIN-2448	0,688
		2,35	DIN-2440	0,852
		2,9	DIN-2441	1,02
1/2" DN-15	21,3	1,65	SCH-5S	0,8
		2	DIN-2448	0,962
		2,11	SCH-10S	1
		2,65	DIN-2440	1,22
		2,77	STD/SCH-40/SCH-40S	1,27
		3,25	DIN-2441	1,45
		3,73	XS/SCH-80/SCH-80S	1,62
		4,78	SCH-160	1,94
		7,47	XXS	2,55
3/4" DN-20	26,7	1,65	SCH-5S	1,03
		2,11	SCH-10S	1,28
		2,87	STD/SCH-40/SCH-40S	1,68
		3,91	XS/SCH-80/SCH-80S	2,19
		5,56	SCH-160	2,9
		7,82	XXS	3,63
	26,9	2,3	DIN-2448	1,41
		2,65	DIN-2440	1,68
		3,25	DIN-2441	1,9
1" DN-25	33,4	1,65	SCH-5S	1,29
		2,77	SCH-10S	2,08
		3,38	STD/SCH-40/SCH-40S	2,5
		4,55	XS/SCH-80/SCH-80S	3,23
		6,35	SCH-160	4,18
		9,09	XXS	5,45
	33,7	2,6	DIN-2448	2,01
		3,25	DIN-2440	2,44
		4,05	DIN-2441	2,97
-	38	2,6	DIN-2448	2,29
1 1/4" DN-32	42,2	1,65	SCH-5S	1,65
		2,77	SCH-10S	2,69
		3,56	STD/SCH-40/SCH-40S	3,38
		4,85	XS/SCH-80/SCH-80S	4,47
		6,35	SCH-160	5,58
		9,7	XXS	7,76
	42,4	2,6	DIN-2448	2,57
		3,25	DIN-2440	3,14
		4,05	DIN-2441	3,84
-	44,5	2,6	DIN-2448	2,7

Ø Nominal	Ø Ext. (mm)	Thickness (mm)	Identification: S/ANSI-B16.10 or DIN	Weight (Kg/m)
1 1/2" DN-40	48,3	1,65	SCH-5S	1,9
		2,6	DIN-2448	2,95
		2,77	SCH-10S	3,12
		3,25	DIN-2440	3,61
		3,68	STD/SCH-40/SCH-40S	4,05
		4,05	DIN-2441	4,43
		5,08	XS/SCH-80/SCH-80S	5,41
		7,14	SCH-160	7,22
		10,16	XXS	9,55
-	51	2,6	DIN-2448	3,12
-	57	2,9	DIN-2448	3,9
2" DN-50	60,3	1,65	SCH-5S	2,38
		2,77	SCH-10S	3,93
		2,9	DIN-2448	4,14
		3,65	DIN-2440	5,1
		3,91	STD/SCH-40/SCH-40S	5,44
		4,5	DIN-2441	6,17
		5,54	XS/SCH-80/SCH-80S	7,48
		8,74	SCH-160	11,08
		11,07	XXS	13,45
-	63,5	2,9	DIN-2448	4,36
-	70	2,9	DIN-2448	4,83
2 1/2" DN-65	73,02	2,11	SCH-5S	3,68
		3,05	SCH-10S	5,26
		5,16	STD/SCH-40/SCH-40S	8,62
		7,01	XS/SCH-80/SCH-80S	11,41
		9,52	SCH-160	14,88
		14,02	XXS	20,41
	76,1	2,9	DIN-2448	5,28
		3,65	DIN-2440	6,51
		4,5	DIN-2441	7,9
-	82,5	3,2	DIN-2448	6,31
3" DN-80	88,9	2,11	SCH-5S	4,52
		3,05	SCH-10S	6,45
		3,2	DIN-2448	6,81
		4,05	DIN-2440	8,47
		4,85	DIN-2441	10,1
		5,49	STD/SCH-40/SCH-40S	11,29
		7,62	XS/SCH-80/SCH-80S	15,27
		11,13	SCH-160	20,98
		15,24	XXS	27,67
3 1/2"	101,6	2,11	SCH-5S	5,17
		3,05	SCH-10S	7,4
		3,6	DIN-2448	8,76
		5,74	STD/SCH-40/SCH-40S	13,57
		8,08	XS/SCH-80/SCH-80S	18,63
-	108	3,6	DIN-2448	9,33
4" DN-100	114,3	2,11	SCH-5S	5,81
		3,05	SCH-10S	8,34
		3,6	DIN-2448	9,9
		4,5	DIN-2440	12,1
		5,4	DIN-2441	14,4
		6,02	STD/SCH-40/SCH-40S	16,07
		8,5	XS/SCH-80/SCH-80S	22,31
		11,13	SCH-120	28,35
		13,49	SCH-160	33,53
		17,12	XXS	41,02

pihasa pipe hanger solutions

DIMENSIONS AND WEIGHTS OF PIPES

APPENDIX 5

Ø Nominal	Ø Ext. (mm)	Thickness (mm)	Identification: S/ANSI-B16.10 or DIN	Weight (Kg/m)
-	127	4	DIN-2448	12,20
-	133	4	DIN-2448	12,80
5" DN-125	139,7	4	DIN-2448	13,50
		4,85	DIN-2440	16,20
		5,40	DIN-2441	17,80
	141,3	2,77	SCH-5S	9,45
		3,40	SCH-10S	11,56
		6,55	STD/SCH-40/SCH-40S	21,78
		9,52	XS/SCH-80/SCH-80S	30,95
		12,70	SCH-120	40,28
		15,88	SCH-160	49,09
		19,05	XXS	57,42
-	152,4	4,50	DIN-2448	16,40
-	159	4,50	DIN-2448	17,10
6" DN-150	165,1	4,50	DIN-2448	17,80
		4,85	DIN-2440	19,20
		5,40	DIN-2441	21,20
	168,3	2,77	SCH-5S	11,31
		3,40	SCH-10S	13,82
		4,50	DIN-2448	18,10
		7,11	STD/SCH-40/SCH-40S	28,26
		10,97	XS/SCH-80/SCH-80S	42,56
		14,27	SCH-120	54,20
		18,26	SCH-160	67,55
		21,95	XXS	79,18
-	177,8	5	DIN-2448	21,3
DN-175	193,7	5,4	DIN-2448	25
8" DN-200	219,1	2,77	SCH-5S	14,78
		3,76	SCH-10S	19,94
		5,90	DIN-2448	31
		6,35	SCH-20	33,3
		7,04	SCH-30	36,8
		8,18	STD/SCH-40/SCH-40S	42,5
		10,31	SCH-60	52,9
		12,70	XS/SCH-80/SCH-80S	64,6
		15,09	SCH-100	75,8
		18,26	SCH-120	90,4
		20,62	SCH-140	101
		22,22	XXS	107,9
		23,01	SCH-160	111,3
-	244,5	6,3	DIN-2448	37,1
-	159	6,3	DIN-2448	40,6
10" DN-250	273	3,4	SCH-5S	22,6
		4,19	SCH-10S	27,8
		6,35	SCH-20/DIN-2448	41,7
		7,8	SCH-30	51
		9,27	STD/SCH-40/SCH-40S	60,3
		12,7	XS/SCH-60/SCH-80S	81,5
		15,09	SCH-80	96
		18,26	SCH-100	114,7
		21,44	SCH-120	132,7
		25,4	XXS/SCH-140	154,9
		28,58	SCH-160	172,1
-	298,5	7,1	DIN-2448	51,1

Ø Nominal	Ø Ext. (mm)	Thickness (mm)	Identification: S/ANSI-B16.10 or DIN	Weight (Kg/m)
12" DN-300	323,85	3,96	SCH-5S	33
		4,57	SCH-10S	36
		6,35	SCH-20	49,7
		7,1	DIN-2448	55,6
		8,38	SCH-30	65,2
		9,52	STD/SCH-40S	73,8
		10,31	SCH-40	79,7
		12,7	XS/SCH-80S	93,4
		14,27	SCH-60	109
		17,48	SCH-80	132
		21,44	SCH-100	159,5
		25,4	XXS/SCH-120	186,8
		28,58	SCH-140	207
		33,34	SCH-160	238,1
14" DN-350	355,6	3,96	SCH-5S	34,2
		4,78	SCH-10S	41,3
		6,35	SCH-10	54,7
		7,92	SCH-20	67,9
		8	DIN-2448	68,3
		9,52	STD/SCH-30/SCH-40S	81,3
		11,13	SCH-40	94,5
		12,7	XS/SCH-80S	107,4
		15,09	SCH-60	126,5
		19,05	SCH-80	158,1
		23,83	SCH-100	194,9
		27,79	SCH-120	224,4
		31,57	SCH-140	253,1
		35,71	SCH-160	281,4
-	368	8	DIN-2448	70,8
16" DN-400	406,4	4,19	SCH-5S	41,6
		4,78	SCH-10S	47,3
		6,35	SCH-10	62,6
		7,92	SCH-20	77,9
		8,8	DIN-2448	85,9
		9,52	STD/SCH-30/SCH-40S	93,2
		12,7	XS/SCH-40/SCH-80S	123,3
		16,64	SCH-60	160
		21,44	SCH-80	203,2
		26,19	SCH-100	245,3
		30,96	SCH-120	286,4
		36,52	SCH-140	332,6
		40,49	SCH-160	364,8
-	419	10	DIN-2448	101
18" DN-450	457,2	4,19	SCH-5S	46,8
		4,78	SCH-10S	53,3
		6,35	SCH-10	70,6
		7,92	SCH-20	87,8
		9,52	STD/SCH-40S	105,1
		10	DIN-2448	110
		11,13	SCH-30	122,4
		12,7	XS/SCH-80S	139,2
		14,27	SCH-40	151,9
		19,05	SCH-60	205,8
		23,83	SCH-80	254,6
		29,36	SCH-100	309,4
		34,92	SCH-120	363,2
		39,69	SCH-140	408
		45,24	SCH-160	459,2

pihasa pipe hanger solutions

DIMENSIONS AND WEIGHTS OF PIPES

APPENDIX 6

Ø Nominal	Ø Ext. (mm)	Thickness (mm)	Identification: S/ANSI-B16.10 or DIN	Weight (Kg/m)
20" DN-500	508	4,78	SCH-5S	59,2
		5,54	SCH-10S	68,5
		6,35	SCH-10	78,5
		9,52	STD/SCH-20/SCH-40S	117,1
		11	DIN-2448	135
		12,7	XS/SCH-30/SCH-80S	155,1
		15,09	SCH-40	183,1
		20,62	SCH-60	247,8
		26,19	SCH-80	310,9
		32,54	SCH-100	381
		38,1	SCH-120	440,9
		44,45	SCH-140	509
		50,01	SCH-160	564,1
22" DN-550	558,8	6,35	SCH-10	86,5
		9,52	STD/SCH-20/SCH-40S	129
		12,5	DIN-2448	170
		12,7	XS/SCH-30/SCH-80S	171
		22,22	SCH-60	224
		28,58	SCH-80	373,6
		34,92	SCH-100	451,1
		41,28	SCH-120	526,8
		47,62	SCH-140	600
		53,98	SCH-160	671
24" DN-600	609,6	5,54	SCH-5S	82,6
		6,35	SCH-10/SCH-10S	94,5
		9,52	STD/SCH-20/SCH-40S	140,8
		12,7	XS/SCH-80S	186,9
		14,27	SCH-30	209,5
		17,48	SCH-40	255,1
		24,61	SCH-60	354,6
		30,96	SCH-80	441,1
		38,89	SCH-100	547
		46,02	SCH-120	639
		52,3	SCH-140	716
		59,54	SCH-160	807
26"	660,4	7,92	SCH-10	127,5
		9,52	STD/SCH-40S	152,9
		12,7	XS/SCH-20-SCH-80S	202,8
28" DN-700	711,2	7,92	SCH-10	137,4
		9,52	STD/SCH-40S	164,8
		12,7	XS/SCH-20/SCH-80S	218,7
		15,88	SCH-30	272,2
30"	762	7,92	SCH-10	147,4
		9,52	STD/SCH-40S	176,7
		12,7	XS/SCH-20/SCH-80S	234,6
		15,88	SCH-30	292,1
32" DN-800	812,8	7,92	SCH-10	157,3
		9,52	STD/SCH-40S	188,7
		12,7	XS/SCH-20/SCH-80S	250,5
		15,88	SCH-30	312
		17,48	SCH-40	342,7

Ø Nominal	Ø Ext. (mm)	Espesor (mm)	Identification: S/ANSI-B16.10 or DIN	Weight (Kg/m)
34"	863,6	7,92	SCH-10	162,2
		9,52	STD/SCH-40S	200,6
		12,7	XS/SCH-20/SCH-80S	266,5
		15,88	SCH-30	331,8
		17,48	SCH-40	364,6
36" DN-900	914,4	7,92	SCH-10	177,1
		9,52	STD/SCH-40S	212,5
		12,7	XS/SCH-20/SCH-80S	282,4
		15,88	SCH-30	351,7
		19,05	SCH-40	421
38"	965,2	7,92	STD/SCH-40S	224,5
		9,52	XS/SCH-80S	298,3
40" DN-1000	1016	7,92	STD/SCH-40S	236,4
		9,52	XS/SCH-80S	314,1
42"	1066,8	7,92	STD/SCH-40S	248,3
		9,52	XS/SCH-80S	330,1
44" DN-1100	1117,6	7,92	STD/SCH-40S	260,2
		9,52	XS/SCH-80S	346

N.B.: In pipes according to DIN-2448, only those considered as “essential series” are included.

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THERMAL DILATION PIPES (mm/m)

APPENDIX 7

Temperature		Cast Iron	Carbon steel and chromium molybdenum steel	Iron	Alloy steel 4-6% Cr.	Stainless steel 12% Cr.	Stainless steel 18% Cr. 8% Ni.	Copper	Brass	Aluminum	Monel
ºF.	ºC.										
-200	-128,9	-1,056	-1,260	-1,308	-1,237	-1,170	-1,989	-1,935	-2,032	-2,659	-1,525
-180	-117,8	-0,993	-1,172	-1,220	-1,154	-1,087	-1,839	-1,790	-1,886	-2,450	-1,417
-160	-106,7	-0,917	-1,080	-1,128	-1,054	-1,004	-1,689	-1,649	-1,732	-2,234	-1,309
-140	-95,5	-0,839	-0,982	-1,030	-1,004	-0,920	-1,539	-1,495	-1,568	-2,025	-1,184
-120	-84,4	-0,755	-0,880	-0,928	-0,862	-0,820	-1,380	-1,335	-1,401	-1,809	-1,067
-100	-73,3	-0,669	-0,774	-0,821	-0,779	-0,720	-1,205	-1,172	-1,226	-1,584	-0,934
-80	-62,2	-0,575	-0,661	-0,709	-0,654	-0,629	-1,030	-1,001	-1,051	-1,350	-0,817
-60	-51,1	-0,481	-0,549	-0,596	-0,554	-0,529	-0,855	-0,830	-0,872	-0,125	-0,675
-40	-40,0	-0,381	-0,432	-0,488	-0,437	-0,420	-0,672	-0,656	-0,705	-0,900	-0,542
-20	-28,9	-0,280	-0,313	-0,360	-0,316	-0,304	-0,485	-0,480	-0,500	-0,650	-0,400
0	-17,8	-0,175	-0,192	-0,234	-0,195	-0,195	-0,297	-0,305	-0,311	-0,417	-0,250
20	-6,7	-0,068	-0,069	-0,084	-0,079	-0,079	-0,111	-0,107	-0,117	-0,150	-0,084
32	0	0	0	0	0	0	0	0	0	0	0
40	4,4	0,051	0,059	0,059	0,039	0,039	0,075	0,071	0,078	0,109	0,059
60	15,6	0,168	0,182	0,217	0,167	0,164	0,261	0,265	0,265	0,359	0,209
80	26,7	0,285	0,292	0,359	0,222	0,264	0,447	0,442	0,456	0,617	0,367
100	37,8	0,383	0,436	0,506	0,347	0,380	0,633	0,640	0,648	0,859	0,517
120	48,9	0,518	0,567	0,649	0,472	0,489	0,819	0,834	0,848	1,117	0,675
140	60,0	0,625	0,695	0,800	0,597	0,605	0,991	1,020	1,044	1,375	0,834
160	71,1	0,751	0,809	0,950	0,722	0,714	1,190	1,199	1,244	1,634	1,000
180	82,2	0,860	0,942	1,084	0,847	0,830	1,370	1,405	1,440	1,892	1,167
200	93,3	0,985	1,075	1,225	0,972	0,955	1,562	1,609	1,640	2,150	1,317
212	100,0	1,060	1,150	1,325	1,055	1,022	1,671	1,719	1,745	2,317	1,417
220	104,4	1,101	1,209	1,384	1,097	1,064	1,754	1,972	1,840	2,425	1,475
240	115,6	1,218	1,342	1,534	1,239	1,180	1,920	1,992	2,048	2,692	1,642
260	126,7	1,343	1,492	1,684	1,372	1,297	2,137	2,183	2,248	2,975	1,809
280	137,8	1,462	1,625	1,825	1,514	1,414	2,329	2,377	2,452	3,250	1,967
300	148,9	1,601	1,767	1,992	1,639	1,539	2,529	2,580	2,660	3,534	2,142
320	160,0	1,716	1,915	2,142	1,780	1,655	2,716	2,775	2,873	3,834	2,309
340	171,1	1,851	2,059	2,300	1,914	1,772	2,904	2,980	3,077	4,109	2,475
360	182,2	1,985	2,209	2,459	2,055	1,897	3,120	3,175	3,315	4,400	2,650
380	193,3	2,118	2,359	2,621	2,189	2,030	3,325	3,382	3,531	4,692	2,834
400	204,4	2,251	2,500	2,784	2,314	2,155	3,520	3,584	3,748	4,975	3,009
420	215,6	2,401	2,660	2,950	2,455	2,289	3,704	3,790	3,981	5,284	3,184
440	226,7	2,535	2,805	3,117	2,597	2,414	3,915	3,990	4,190	5,575	3,367
460	237,8	2,668	2,962	3,267	2,747	2,547	4,120	4,202	4,423	5,875	3,550
480	248,9	2,801	3,105	3,434	2,889	2,680	4,320	4,405	4,648	6,167	3,734
500	260,0	2,935	3,268	3,600	3,022	2,805	4,537	4,617	4,873	6,459	3,909
520	271,1	3,076	3,427	3,775	3,172	2,939	4,745	4,819	5,106	6,759	4,109
540	282,2	3,226	3,580	3,950	3,305	3,080	4,937	5,037	5,340	7,067	4,292
560	293,3	3,368	3,750	4,117	3,472	3,214	5,137	5,234	5,581	7,375	4,492
580	304,4	3,518	3,918	4,292	3,605	3,347	5,354	5,461	5,815	7,700	4,675
600	315,6	3,660	4,084	4,450	3,764	3,489	5,554	5,682	6,040	8,009	4,850
620	326,7	3,818	4,250	4,634	3,905	3,622	5,762	5,889	6,290		5,067
640	337,8	3,968	4,417	4,809	4,055	3,764	5,970	6,103	6,523		5,259
660	348,9	4,118	4,600	4,975	4,222	3,897	6,179	6,320	6,772		5,459
680	360,0	4,263	4,767	5,159	4,372	4,039	6,384	6,525	7,023		5,642
700	371,1	4,426	4,942	5,325	4,514	4,180	6,604	6,755	7,256		5,834
720	382,2	4,585	5,109	5,500	4,680	4,330	6,804	6,952	7,515		6,125
740	393,3	4,743	5,284	5,684	4,830	4,472	7,020	7,195	7,756		6,242
760	404,4	4,901	5,467	5,867	4,989	4,614	7,245	7,409	8,006		6,434
780	415,6	5,060	5,642	6,042	5,147	4,764	7,454	7,639	8,273		6,642
800	426,7	5,218	5,834	6,209	5,314	4,905	7,687	7,852	8,523		6,842
820	437,8	5,376	6,017	6,400	5,472	5,055	7,887	8,085	8,789		7,050
840	448,9	5,535	6,192	6,584	5,639	5,205	8,120	8,285	9,040		7,267
860	460,0	5,700	6,450	6,767	5,797	5,355	8,345	8,537	9,298		7,475
880	471,1	5,866	6,559	6,959	5,955	5,505	8,562	8,838	9,573		7,684
900	482,2	6,043	6,759	7,159	6,122	5,647	8,787	8,992	9,831		7,900
920	493,3	6,218	6,925	7,325	6,280	5,805	9,020	9,213	10,106		8,117
940	504,4	6,378	7,117	7,517	6,447	5,955	9,254	9,451	10,365		8,342
960	515,6	6,554	7,300	7,700	6,614	6,105	9,479	9,675	10,640		8,559
980	526,7	6,743	7,492	7,884	6,772	6,255	9,704	9,920	10,906		8,775
1000	538	6,918	7,659	8,075	6,930	6,405	9,920	10,148	11,190		8,984
1020	549		7,850		7,097	6,555	10,162		11,473		9,217
1040	560		8,034		7,264	6,697	10,387		11,740		9,442
1060	571		8,209		7,430	6,855	10,620		12,023		9,667
1080	582		8,409		7,597	7,005	10,845		12,298		9,900
1100	593		8,617		7,755	7,164	11,054		12,581		10,109
1120	604		8,767		7,930	7,305	11,295		12,865		10,350
1140	616		8,959		8,097	7,455	11,512		13,156		10,567
1160	627		9,150		8,264	7,605	11,745		13,440		10,800
1180	638		9,334		8,439	7,764	11,970		13,740		11,042
1200	649		9,500		8,547	7,905	12,184		14,031		11,259
1220	660		9,700		8,764	8,055	12,420				11,500
1240	671		9,892		8,930	8,205	12,645				11,742
1260	682		10,084		9,097	8,364	12,879				11,984
1280	693		10,267		9,264	8,514	13,104				12,217
1300	704		10,434		9,430	8,664	13,320				12,450
1320	716		10,625		9,597	8,805	13,554				12,692
1340	727		10,817		9,764	8,955	13,787				12,934
1360	738		10,992		9,930	9,114	14,012				13,167
1380	749		11,184		10,097	9,264	14,229				13,417
1400	760		11,367		10,255	9,414	14,454				13,650
1420	771						14,687				
1440	782						14,912				
1460	792						15,137				
1480	804						15,370				
1500	816						15,595				
1520	827						15,812				
1540	838						16,037				
1560	849						16,270				
1580	860						16,495				
1600	871						16,720				

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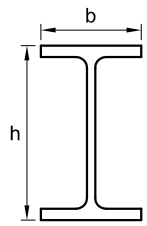
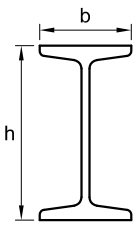
BEAM WEIGHTS

APPENDIX 8



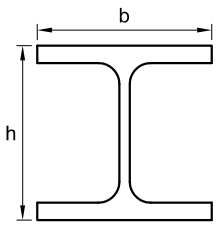
IPE

h	b	Weight Kg/m
80	46	6
100	55	8,1
120	64	10,4
140	73	12,9
160	82	15,8
180	91	18,8
200	100	22,4
220	110	26,2
240	120	30,7
270	135	36,1
300	150	42,2
330	160	49,1
360	170	57,1
400	180	66,3
450	190	77,6
500	200	90,7
550	210	106
600	220	122
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-



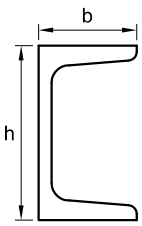
IPN

h	b	Weight Kg/m
80	42	5,95
100	50	8,32
120	58	11,1
140	66	14,4
160	74	17,9
180	82	21,9
200	90	26,3
220	98	31,1
240	106	36,2
260	113	41,9
280	119	48
300	125	54,2
320	131	61,1
340	137	68,1
360	143	76,2
380	149	84
400	155	92,6
450	170	115
500	185	141
550	200	167
600	215	199
-	-	-
-	-	-



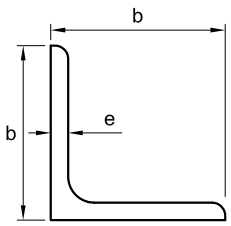
HEB

h	b	Weight Kg/m
100	100	20,4
120	120	26,7
140	140	33,7
160	160	42,6
180	180	51,2
200	200	61,3
220	220	71,5
240	240	83,2
260	260	93
280	280	103
300	300	117
320	300	127
340	300	134
360	300	142
400	300	155
450	300	171
500	300	187
550	300	199
600	300	212
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-



UPN

h	b	Weight Kg/m
80	45	8,64
100	50	10,6
120	55	13,4
140	60	16
160	65	18,8
180	70	22
200	75	25,3
220	80	29,4
240	85	33,2
260	90	37,9
280	95	41,8
300	100	46,2
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-



LPN

b	e	Weight Kg/m
20	3	0,88
20	4	1,14
25	3	1,12
25	4	1,46
30	3	1,36
30	4	1,78
35	3	1,60
35	4	2,09
40	4	2,42
40	5	2,97
50	5	3,77
50	6	4,47
60	6	5,42
60	8	7,09
70	7	7,38
80	8	9,63
80	10	11,9
90	8	10,9
90	10	13,4
100	10	15
120	12	21,6
150	12	27,3
150	15	33,8

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WEIGHTS OF BARS

APPENDIX 9

SIZE				
Milimeters	Inches	Kg/m	Kg/m	Kg/m
3		0,056	0,071	0,061
3,1750	1/8	0,062	0,079	0,069
3,5		0,076	0,096	0,083
3,9687	5/32	0,097	0,124	0,107
4		0,099	0,126	0,109
4,5		0,125	0,159	0,138
4,7625	3/16	0,140	0,178	0,154
5		0,154	0,196	0,170
5,5		0,187	0,237	0,206
5,5562	7/32	0,190	0,242	0,210
6		0,222	0,283	0,245
6,3500	1/4	0,247	0,317	0,274
6,5		0,261	0,332	0,287
7		0,302	0,385	0,333
7,1436	9/32	0,315	0,401	0,347
7,5		0,347	0,442	0,382
7,9375	5/16	0,388	0,495	0,428
8		0,395	0,502	0,435
8,5		0,445	0,567	0,491
8,7312	11/32	0,470	0,598	0,518
9		0,499	0,636	0,551
9,5		0,556	0,708	0,614
9,5250	3/8	0,559	0,712	0,617
10		0,617	0,785	0,680
10,3787	13/32	0,657	0,836	0,724
10,5		0,680	0,865	0,750
11		0,746	0,950	0,823
11,1125	7/16	0,761	0,969	0,840
11,5		0,815	1,035	0,899
11,9062	15/32	0,874	1,113	0,964
12		0,888	1,130	0,979
12,5		0,963	1,227	1,062
12,6698	1/2	0,994	1,266	1,096
13		1,042	1,327	1,149
13,4937	17/32	1,123	1,429	1,238
13,5		1,124	1,431	1,239
14		1,208	1,539	1,332
14,2875	9/16	1,259	1,602	1,388
14,5		1,296	1,650	1,429
15		1,387	1,766	1,530
15,0812	19/32	1,402	1,785	1,546
15,5		1,481	1,883	1,633
15,8750	5/8	1,557	1,978	1,713
16		1,578	2,010	1,740
16,5		1,678	2,137	1,851
16,6687	21/32	1,713	2,181	1,889
17		1,782	2,269	1,965
17,4625	11/16	1,880	2,394	2,073
17,5		1,888	2,404	2,082
18		1,998	2,543	2,203
18,2562	23/32	2,055	2,617	2,266
18,5		2,110	2,687	2,327
19		2,226	2,834	2,454
19,0500	3/4	2,237	2,849	2,467
19,5		2,344	2,985	2,585
19,8431	25/32	2,426	3,091	2,677
20		2,466	3,140	2,719
20,6375	13/16	2,626	3,343	2,895
21		2,719	3,462	2,998

SIZE				
Milimeters	Inches	Kg/m	Kg/m	Kg/m
21,4312	27/32	2,832	3,605	3,122
22		2,984	3,799	3,290
22,2250	7/8	3,045	3,875	3,358
23		3,262	4,153	3,596
23,0187	29/32	3,267	4,159	3,602
23,8125	15/16	3,496	4,451	3,855
24		3,551	4,522	3,916
24,6062	31/32	3,733	4,753	4,116
25		3,853	4,906	4,249
25,4000	1	3,978	5,065	4,352
26		4,168	5,307	4,593
27		4,495	5,723	4,956
28		4,824	6,154	5,330
28,5750	1 1/8	5,034	6,410	5,551
29		5,185	6,602	5,717
30		5,549	7,065	6,118
31		5,925	7,544	6,533
31,7499	1 1/4	6,215	7,913	6,853
32		6,313	8,038	6,961
33		6,714	8,549	7,403
34		7,127	9,075	7,859
34,9249	1 3/8	7,520	9,575	8,292
35		7,553	9,616	8,328
36		7,990	10,174	8,811
37		8,440	10,747	9,307
38		8,903	11,335	9,817
38,0999	1 1/2	8,950	11,395	9,868
39		9,378	11,940	10,340
40		9,865	12,560	10,877
41		10,364	13,190	11,428
41,2749	1 5/8	10,504	13,373	11,582
42		10,876	13,647	11,992
43		11,400	14,515	12,570
44		11,936	15,198	13,162
44,4499	1 3/4	12,181	15,510	13,432
45		12,485	15,896	13,767
46		13,046	16,611	14,385
47		13,619	17,341	15,017
47,6249	1 7/8	13,984	17,805	15,419
48		14,205	18,086	15,663
49		14,803	18,848	16,323
50		15,413	19,625	16,996
50,7999	2	15,911	20,258	17,544
51		16,036	20,418	17,682
52		16,671	21,226	18,383
53		17,319	22,051	19,096
53,9749	2 1/8	17,962	22,869	19,805
54		17,978	22,891	19,824
55		18,650	23,746	20,565
56		19,335	24,818	21,319
57		20,031	25,505	22,088
57,1499	2 1/4	20,137	25,639	22,201
58		20,740	26,407	22,869
59		21,462	27,326	23,665
60		22,195	28,260	24,474
60,3249		22,436	28,567	24,740
61	2 1/4	22,941	29,210	25,296
62		23,700	30,175	26,133
63		24,470	31,157	26,982

For density = 7.85 kg/dm ^{3}

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WEIGHTS OF BARS

APPENDIX 10

SIZE				
Milimeters	Inches	Kg/m	Kg/m	Kg/m
63,4999	2 1/2	24,861	31,653	27,412
64		25,253	32,154	27,846
65		26,049	33,166	28,723
66		26,856	34,195	29,613
66,6749	2 5/8	27,408	34,898	30,222
67		27,676	35,239	30,518
68		28,509	36,298	31,435
69		29,353	37,374	32,367
69,8499	2 3/4	30,081	38,300	33,169
70		30,210	38,465	33,312
72		31,961	40,694	35,242
73,0249	2 7/8	32,878	41,861	36,253
74		33,762	42,987	37,227
75		34,680	44,156	38,240
76		35,611	45,352	39,267
76,1199	3	35,799	45,580	39,474
78		37,510	47,759	41,361
80		39,458	50,240	43,509
82,5499	3 1/4	42,013	53,494	45,204
85		44,545	56,716	49,118
88,8998	3 1/2	48,726	62,040	53,728
90		49,939	63,585	55,066
95		55,642	70,846	61,355
95,2468	3 3/4	55,936	71,219	61,678
100		61,654	78,500	67,983
101,5988	4	63,642	81,032	70,175
105		67,973	86,546	74,951
107,9489	4 1/4	71,846	91,477	79,222
110		74,601	94,985	82,259
114,2998	4 1/2	80,547	102,556	88,816
115		81,537	103,816	89,907
120		88,781	113,040	97,895
120,6498	4 3/4	89,745	114,268	98,958
125		96,337	122,656	106,226
126,9998	5	99,441	126,612	108,649
130		104,195	132,665	114,891
133,3498	5 1/4	109,634	139,590	120,888
135		112,364	143,066	123,899
139,6998		120,323	153,201	132,676
140	5	120,841	153,860	133,247
145		129,627	165,046	142,934
146,0497	5 3/4	131,511	167,445	145,011
150		138,721	176,625	152,962
152,2997	6	143,195	182,321	157,895
155		148,123	188,596	163,329
158,7497	6 1/4	155,376	197,809	171,327
160		157,833	200,960	174,036
165		167,853	213,716	185,084
165,0997	6 1/2	168,055	213,975	185,307
170		178,179	226,865	196,471
171,4407	6 3/4	181,231	230,751	199,836
175		188,814	240,406	208,198
177,7997	7	194,904	248,160	214,913
180		199,757	254,340	220,265
184,1497	7 1/4	209,075	266,202	230,538
185		211,010	268,666	232,672

SIZE				
Milimeters	Inches	Kg/m	Kg/m	Kg/m
190		222,570	283,385	245,418
190,4997	7 1/2	223,742	284,799	246,711
195		234,438	298,496	258,505
196,8497	7 3/4	238,907	304,186	263,433
200		246,614	314,000	271,932
203,1996	8	254,509	324,127	280,702
205		259,100	329,896	285,698
210		271,893	346,185	299,805
215		284,994	362,866	314,251
215,8996	8 1/2	287,384	365,909	316,886
220		298,403	379,940	329,038
225		312,122	397,406	344,164
228,5996	9	322,189	410,224	355,264
230		326,148	415,265	359,630
235		340,483	433,516	375,436
240		355,125	452,160	391,582
241,2996	9 1/2	358,981	457,070	395,834
245		370,076	471,196	408,068
250		385,336	490,625	424,894
253,9996	10	397,768	506,433	438,583
255		400,903	510,446	442,059
260		416,779	530,660	459,565
265		432,963	551,266	477,410
266,6995	10 1/2	438,534	558,360	483,553
270		449,455	572,265	495,596
275		466,256	593,656	514,121
279,3995	11	481,294	612,803	530,702
280		483,365	615,440	532,986
285		500,782	637,616	552,192
290		518,508	660,185	571,737
292,0995	11 1/2	526,042	669,779	580,045
295		536,541	683,146	591,622
300		554,883	706,500	611,847
304,7995	12	572,780	729,286	631,580
305		573,534	730,246	632,411
310		592,492	754,385	653,316
315		611,759	778,916	674,561
317,4995	12 1/2	621,506	791,327	685,301
320		631,334	803,840	696,146
325		651,217	829,156	718,070
330		671,409	854,865	740,334
330,1994	13	672,220	855,898	741,229
335		691,909	880,966	762,933
340		712,717	907,460	786,883
342,8994	13 1/2	724,924	923,003	799,343
345		733,833	934,346	809,167
350		755,258	961,625	832,791
355		776,991	989,296	856,775
355,5994	14	779,617	992,640	859,650
360		799,032	1017,360	881,059
365		821,381	1045,816	905,703
368,2994	14 1/2	836,298	1064,809	922,150
370		844,039	1074,665	930,687
375		867,005	1103,906	956,010
380		890,279	1133,540	981,674
380,9993	15	894,968	1139,510	986,843

For density = 7.85 kg/dm ^{3}

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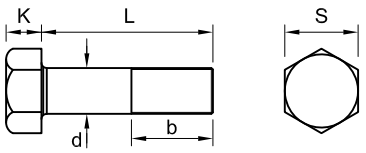
DIMENSIONS OF BOLTS AND HEXAGONAL NUTS

APPENDIX 11

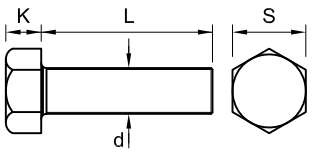


S/DIN-931

d	b			K	S	L min
	(1)	(2)	(3)			
M6	18	24	-	4	10	30
M8	22	28	-	5.5	13	35
M10	26	32	45	7	17	40
M12	30	36	49	8	19	45
M14	30	40	53	9	22	50
M16	38	44	57	10	24	55
M18	42	48	61	12	27	60
M20	46	52	65	13	30	65
M22	50	56	69	14	32	70
M24	54	60	73	15	36	75
M27	60	66	79	17	41	80
M30	66	72	85	19	46	90
M33	72	78	91	21	50	100
M36	78	84	97	23	55	110
M39	84	90	103	25	60	110
M42	90	96	109	26	65	120
M45	96	102	115	28	70	120
M48	-	108	121	30	75	130
M52	-	116	129	33	80	140
M56	-	124	137	35	85	160
M60	-	132	145	38	90	160
M64	-	140	153	40	95	170
M72	-	156	169	45	105	190
M80	-	172	185	50	115	200
M90	-	-	205	57	130	240
M100	-	-	225	63	145	260

(1) For: L<= 125 mm.
(2) For: 125 < L <= 200 mm.
(3) For: L > 200 mm.

- Recommended lengths from 10 to 10 mm.
- Qualities according to DIN 267.



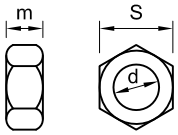
S/DIN-933

d	K	S	L min
M6	4	10	6
M8	5.5	13	8
M10	7	17	8
M12	8	19	10
M14	9	22	10
M16	10	24	12
M18	12	27	16
M20	13	30	16
M22	14	32	16
M24	15	36	16
M27	17	41	16
M30	19	46	35
M33	21	50	35
M36	23	55	35
M39	25	60	35
M42	26	65	40
M45	28	70	40
M48	30	75	40
M52	33	80	50
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

- Recommended lengths:

  * From 5 en 5 mm L <= 60 mm.
  * From 10 en 10 mm L > 60 mm.

- Qualities according to DIN 267.



S/DIN-934

d	m	S
M6	5	10
M8	6.5	13
M10	8	17
M12	10	19
M14	11	22
M16	13	24
M18	15	27
M20	16	30
M22	18	32
M24	19	36
M27	22	41
M30	24	46
M33	26	50
M36	29	55
M39	31	60
M42	34	65
M45	36	70
M48	38	75
M52	42	80
M56	45	85
M60	48	90
M64	51	95
M72	58	105
M80	64	115
M90	72	130
M100	80	145

- Qualities according to DIN 267.