Hydraulic Snubbers

Description

Hydraulic snubbers are dynamic linear supports designed to protect piping systems and components by restraining undesirable displacements due to the following:

- Seismic / earthquake loadings
- Water Hammer effects
- Violent thrusts due to safety valve discharges
- Extreme wind conditions
- Other similar conditions

The snubbers allow free movement during the thermal displacement, but lock up and transfer the energy to the fixed structure when seismic loadings occur; this is achieved by using the snubbers' sophisticated valve mechanism.

Once the disturbance has passed, the device returns to its initial state and enables slow movements once again. In this way the snubber provides temporary additional support to the installation in order to prevent it from entering into resonance and thereby minimising the risk of breaking due to vibrations.

Hydraulic Snubbers are used on:

- Piping
- Tanks
- Control Valves
- Stream Generators
- Safety Valves
- Pumps, motors, etc.

Snubber selection considerations

Dynamic Load

At normal loading, check that the snubber is capable of handling dynamic forces during normal operation.

Stroke

The selected snubber must be able to accommodate the maximum travel between the assembly position and the extreme operation position.

Available space

Ensure that once the snubber is in place, the expected movements are achievable within the space envelope.
An extension adaptor should be included If the space available is larger than the travel capacity of the snubber.

Snubber Types

Our hydraulic snubbers are available as standard configurations, but large loads and extended travels can be accommodated. In the first instance please email your snubber requirements to enquiries@qps.co.uk; we will then provide technical recommendations, generate specific drawings and provide prices / delivery periods.

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300R 301R 302R	130/131	Riser Clamp	

Dynamic Equipment – Fig. 230

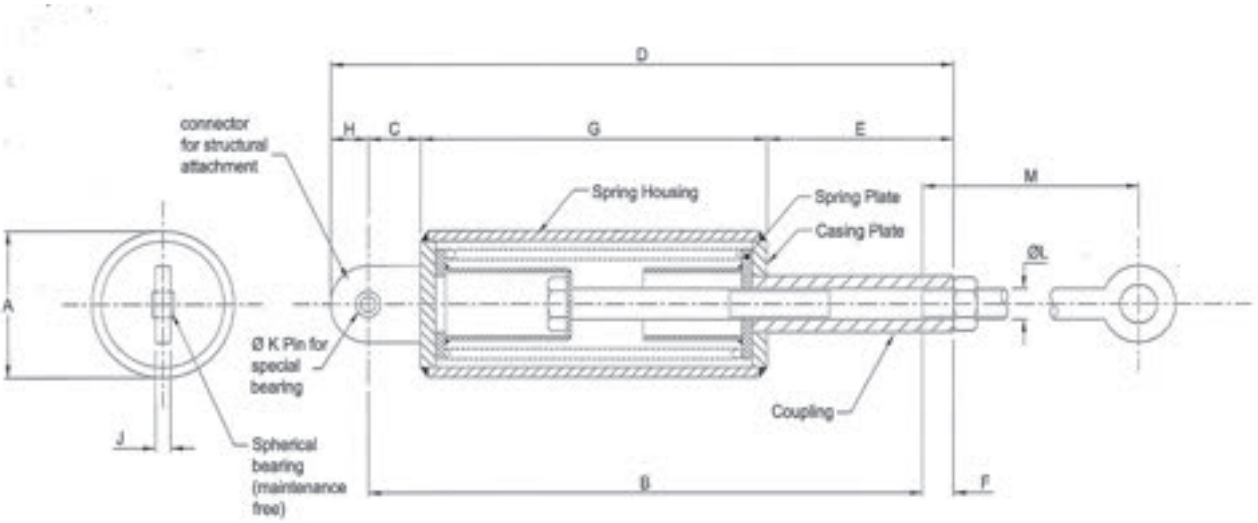


Fig.230 – Sway Brace

Size	Pipe Size	Preload Kg	Spring Rate Kg mm	Max Force Kg	Max Rod Length at Max force M mm	L	Pin Ø K	Plate Thick J	A	RTO B	C	D	E	F	G	H	Use With Structural Attachment
1	50-90	23	0.89	90	1500	20	12	12	115	345	42	395	100	25	225	25	Fig.280-15
2	100-200	68	2.68	270	1000	24	12	12	115	360	42	410	120	25	225	25	Fig.280-15
3	225-600	204	8.04	815	1000	24	12	12	115	450	42	500	150	25	280	25	Fig.280-15
4	225-600	400	16.07	1630	1000	30	20	25	168	430	58	500	140	40	270	30	Fig.280-55
5	225-600	614	24.48	2540	1000	36	20	25	168	470	58	555	150	50	312	30	Fig.280-55
6	225-600	820	32.66	3270	1000	36	20	25	168	520	58	605	150	50	362	30	Fig.280-55

Our Spring Sway Brace is recommended for controlling vibration, absorbing shock loading, or restraining the pipe movement due to thermal expansion. The Sway Brace is available in six sizes with a maximum load of 3270 kg.

The Sway Brace should be in a neutral position when the pipe is at operating condition, at which time the two spring plates should be in contact with the end plates. Any adjustment required should be undertaken by use of the load coupling.

Sizes available: 1 to 6
Preset Loads: 23kg to 820kg
Maximum Force: 90kg to 3270kg

Features

- Vibration is dampened with an immediate opposing force thus allowing the pipe to return to its normal position.
- All units have 75mm travel in either direction.
- The preloaded spring provides two-way movement
- Accurate neutral adjustment is assured
- A wide range of Surface Finishes is available
- The Sway Brace is shipped ready for installation.

Optional Features

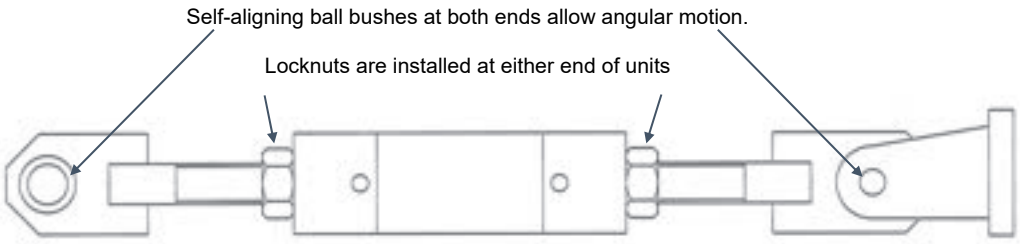
- Larger sizes can be supplied to suit.

Fig. 230
Material: Carbon Steel

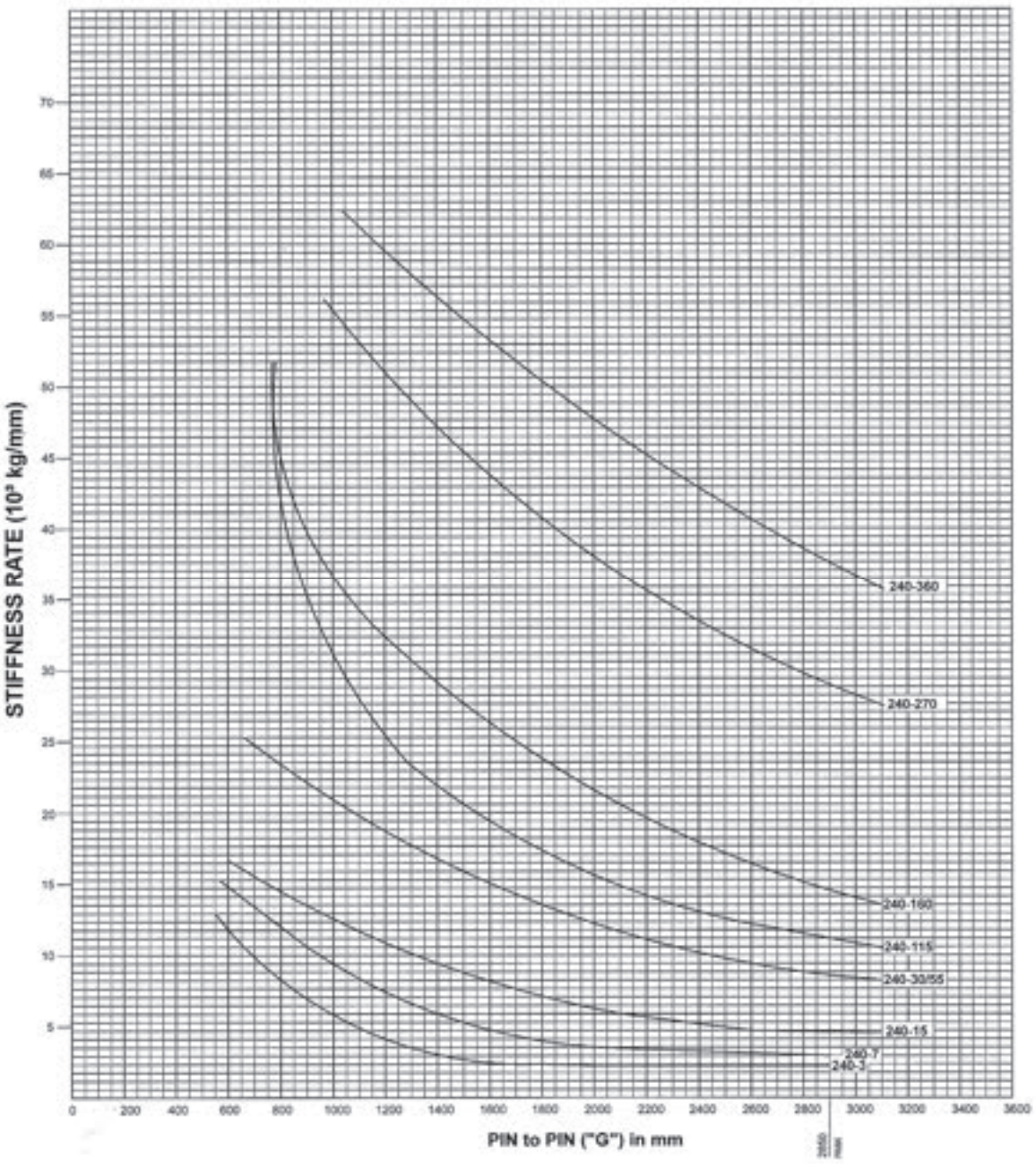
Please Specify:-

- Figure Number:
- Size:
- Finish:

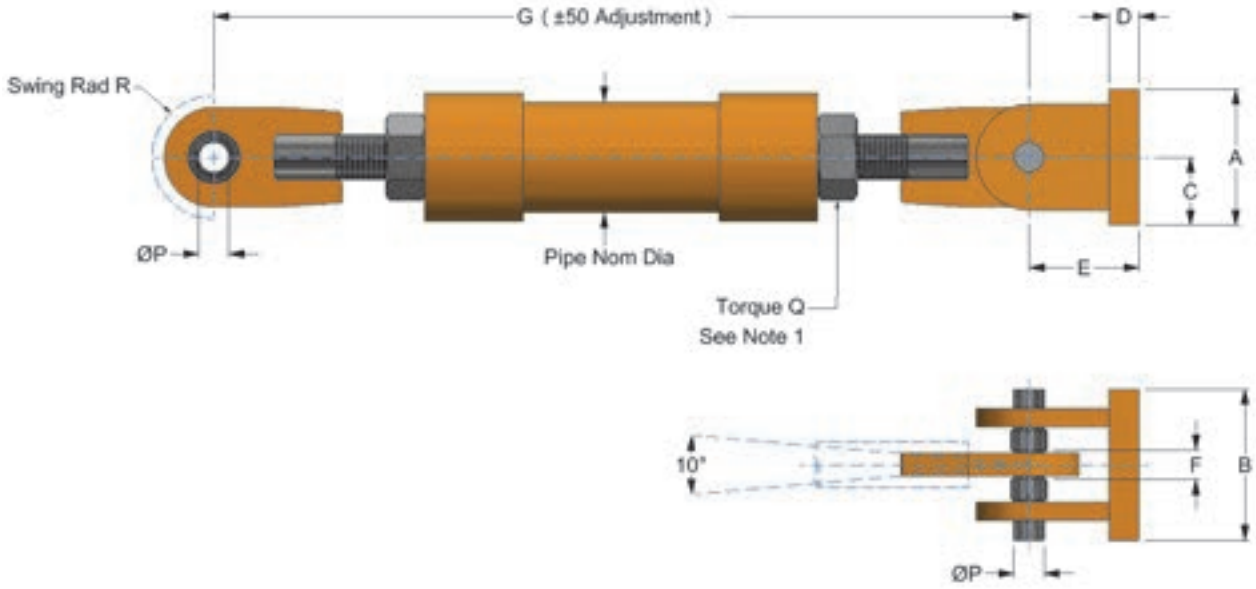
Dynamic Equipment – Fig. 240



Our range of Rigid Struts is available in ten sizes ranging from 300Kg to 60,000Kg.
Stiffness values shown are for Pin to Pin dimensions shown.



Dynamic Equipment – Fig. 240



Description
Our Rigid Strut is used to restrain movement of piping in one direction whilst providing for movement due to thermal expansion or contraction in another direction.

Features.

- Used in either tensile or compressive loadings.
- Provides between 50mm-100mm on site adjustment in either direction.
- The spherical ball bushing at either end allows +/- 5 degrees angular motion.
- Positive control of piping systems is allowed by tight fitting connections.

Fig.240 – Rigid Strut

Size	A	B	C	D	E	F	G Min	G Max	Pipe N.B./Sch	Q/Q1 KgF/Metre	P	R	Max Load Kg
240-3	60	60	30	10	48	9	360	2850	40/S40	2.1/2.1	10	22	300
240-7	65	65	32	12	57	10	375	2850	40/S40	2.1/2.8	12	29	700
240-15	65	65	32	12	57	10	375	3050	50/S80	4.8/9.0	12	29	1500
240-30	90	100	45	20	73	16	555	3050	65/S80	13.8/41.5	20	35	3000
240-55	90	100	45	20	73	16	555	3050	65/S80	13.8/41.5	20	35	5500
240-115	140	120	58	25	98	20	660	3050	80/S80	13.8/82.9	25	60	11500
240-160	150	140	63	30	108	22	790	3050	90/S80	13.8/138.2	30	65	16000
240-270	190	170	78	40	143	28	850	3050	125/S80	13.8/69.1	40	85	27000
240-360	230	200	100	45	159	32	960	3050	150/S80	13.8/69.1	45	85	36000
240-600	290	250	115	45	216	44	1120	3050	200/S80	13.8	60	135	60000

Please note for Installation:

Adjust the Strut to the required “pin to pin” dimension G and then tighten the locking nuts to the torque value ‘Q’ shown.

In order to arrive at the larger Torque Value Q1, just tighten the nuts to higher torque value shown.

Fig. 240
Material: Carbon Steel

Please Specify:-

- Figure Number:
- Size:
- Finish:

Dynamic Equipment – Fig. 260A/260AH & 260/260H

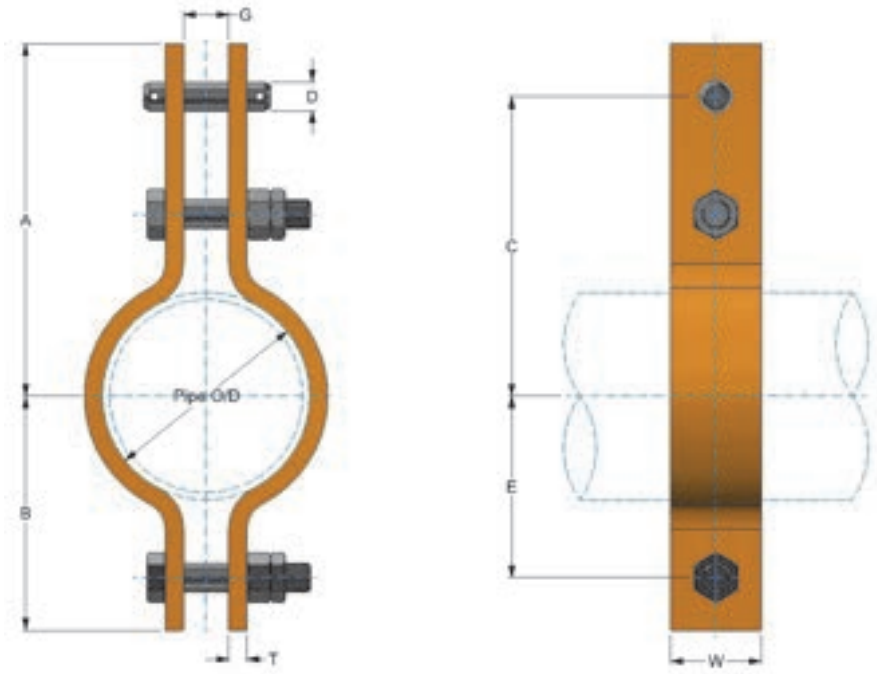


Fig. 260 & 260A – Restraint Pipe Clamp								
NPS	Pipe O/D	A	B	C	D	FxT	G	H
15	21.3	92	32	12	12	30 x 6	110	50
20	26.9	95	38	12	12	30 x 6	113	56
25	33.7	97	44	12	12	30 x 6	115	62
32	42.4	102	46	12	12	30 x 6	120	64
40	48.3	102	49	25	12	30 x 6	120	68
50	60.3	127	54	25	12	30 x 6	149	76
65	76.1	140	67	25	12	45 x 8	162	89
80	88.9	152	76	25	12	45 x 8	175	99
90	101.6	159	82	25	12	45 x 8	181	104
100	114.3	165	100	25	16	50 x 10	194	129
125	139.7	178	114	25	16	50 x 10	206	142
150	168.3	216	135	38	20	65 x 10	254	173
175	193.7	230	150	38	20	65 x 10	268	188
200	219.1	241	163	38	20	65 x 10	279	201
225	244.5	265	180	38	20	65 x 12	303	218
250	273	279	192	38	20	65 x 12	317	230
300	323.9	305	220	38	20	65 x 12	343	258
350	355.6	330	243	51	24	80 x 15	378	291
400	406.4	356	273	51	24	80 x 15	403	320
450	457.2	381	300	51	24	80 x 15	429	348
500	508	406	329	51	24	80 x 20	457	380
550	558.8	432	365	51	24	100 x 20	489	422
600	610	457	390	51	24	100 x 20	514	447
650	660.4	559	431	51	30	130 x 25	622	494
700	711.2	585	457	51	30	130 x 25	648	520
750	762	610	482	51	30	130 x 25	673	545
800	812.8	647	508	51	30	130 x 25	710	571
900	914.4	699	560	51	30	130 x 25	762	623

Fig. 260AH & 260H – Restraint Pipe Clamp								
NPS	Pipe O/D	A	B	C	D	FxT	G	H
150	168.3	229	143	44	30	100x12	279	193
175	193.7	241	158	44	30	110x12	291	208
200	219.1	254	172	44	30	110x12	305	223
225	244.5	305	198	51	36	100x20	359	258
250	273	305	214	51	36	100x20	359	268
300	323.9	330	240	51	36	100x20	384	294
350	355.6	356	262	57	42	110x20	419	325
400	406.4	381	292	57	42	110x25	444	355
450	457	406	317	57	42	110x25	469	380
500	508	457	353	57	42	130x25	521	417
550	558.8	483	393	57	42	150x30	559	469
600	610	508	418	57	42	150x30	584	494
650	660.4	581	443	57	42	150x30	657	519
700	711.2	610	472	57	42	150x30	686	548
750	762	635	497	57	42	150x30	711	573
800	812.8	661	525	57	42	150x30	737	601
900	914.4	711	575	57	42	150x30	787	651

Dynamic Equipment – Fig. 260/260H & 260A/260AH

Fig. 260/260H & 260A/260AH - SWL in Kg												
Material			Carbon Steel				Alloy Steel					
Temperature			340ºC		400ºC		510ºC		538ºC		566ºC	
NPS	Pipe O/D	Clip I/D	Figure Number				Figure Number					
			260	260H	260	260H	260A	260AH	260A	260AH	260A	260AH
15	21.3	23	250		250		210		210		210	
20	26.9	28	250		250		210		210		210	
25	33.7	36	250		250		210		210		210	
32	42.4	44	250		250		210		210		210	
40	48.3	50	680		635		635		455		315	
50	60.3	62	680		635		635		455		315	
65	76.1	80	680		635		635		455		315	
80	88.9	92	680		635		635		455		315	
90	101.6	106	680		635		635		455		315	
100	114.3	118	1135		1000		1045		725		500	
125	139.7	144	1135		1000		1045		725		500	
150	168.3	172	1270	3630	1135	3220	1180	3310	815	2360	590	1680
175	193.7	198	1270	3630	1135	3220	1180	3310	815	2360	590	1680
200	219.1	224	1270	3630	1135	3220	1180	3310	815	2360	590	1680
225	244.5	248	1450	4990	1315	4445	1360	4535	950	3265	680	2270
250	273	278	1450	4990	1315	4445	1360	4535	950	3265	680	2270
300	323.9	330	1450	4990	1315	4445	1360	4535	950	3265	680	2270
350	355.6	362	1450	5760	1725	5125	1770	5260	1270	3765	910	2720
400	406.4	412	1950	5760	1725	5125	1770	5260	1270	3765	910	2720
450	457	464	1950	5760	1725	5125	1770	5260	1270	3765	910	2720
500	508	516	2495	6805	2220	6805	2270	6185	1450	4810	1135	3400
550	558.8	566	2720	6805	2405	6805	2495	6185	1590	5900	1225	4080
600	610	618	2720	6805	2405	6805	2495	6185	1590	5900	1225	4080
650	660.4	670	3630	6805	3175	6805	3265	6185	2085	5900	1590	4080
700	711.2	721	3630	6805	3175	6805	3265	6185	2085	5900	1590	4080
750	762	773	3630	6805	3175	6805	3265	6185	2085	5900	1590	4080
800	812.8	824	3630	6805	3175	6805	3265	6185	2085	5900	1590	4080
900	914.4	926	3630	6805	3175	6805	3265	6185	2085	5900	1590	4080

This range of Pipe Clamps is primarily used with Hydraulic Shock Arrestor and Rigid Strut dynamic supports.

When selecting, please note that the load rating of the rigid struts and snubbers should not exceed the SWL of the pipe clamp.

Please consult our Technical Department for advice.

The pin diameters and gap dimension G should always be specified.

Note:

Pin dia. D and gap G will vary depending on whether used in conjunction with a strut or shock arrestor.

See component section for details. (Pin & Gap dimensions given are suitable for rigid rod connection)

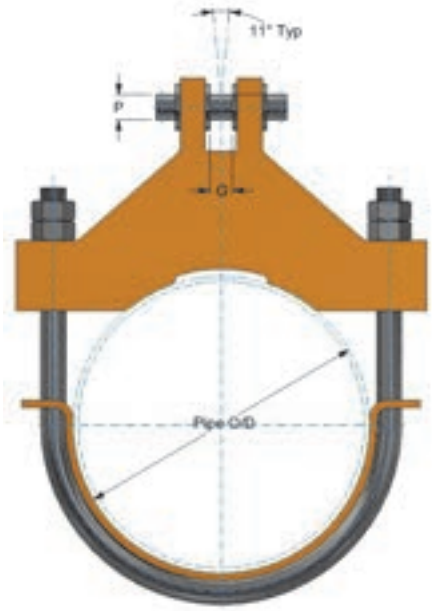
Fig.260 & 260H Material = Carbon Steel
Fig.260A & 260AH Material = Alloy Steel

Fig.260 & 260H up to 400°C
Fig.260A & 260AH above 400°C

Fig. 260/A/AH/H
Material: See Note

Please Specify:-
- Figure Number:
- NPS:
- Finish:

Dynamic Equipment – Fig. 250



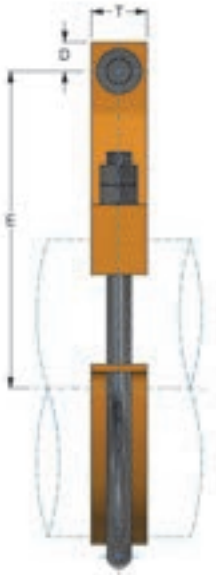


Fig.250 – Size 7 to 160

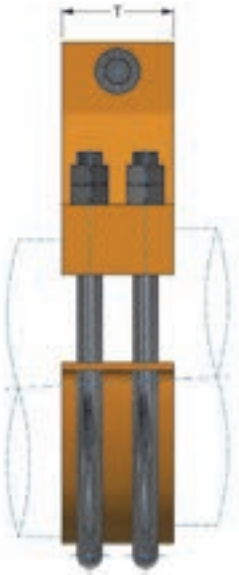


Fig.250 – Size 270 to 600

Our standard Yoke Clamps are recommended for the support of hot pipework, and where loadings are relatively high. They are used in conjunction with our range of hydraulic shock arrestors and rigid struts.

Please note that load pin dia. P and dimension G are dependent upon whether the clamp is used in conjunction with a rigid strut or a hydraulic shock arrestor.

Yoke Clamps

Size	D	G	P	T	Maximum Load Kg			
					350°C	510°C	538°C	566°C
250-7	20	10	12	25	700	415	195	80
250-15	20	10	12	30	1500	895	420	180
250-55	30	16	20	45	5500	3285	1550	670
250-115	50	20	25	75	11500	6865	3240	1400
250-160	60	22	30	90	16000	9555	4510	1945
250-270	60	28	40	150	27000	16125	7610	3285
250-360	80	32	45	200	36000	21500	10150	4380
250-600	100	44	60	200	60000	35835	16920	7305

Yoke Clamp - Materials

Component	Temp.	
	Up To 200°C	201°C & Over
Yoke Body	Carbon Steel	Alloy Steel
Saddle Strap	Carbon Steel	Alloy Steel
U-Bolt	Alloy Steel	Alloy Steel
Load Pin	Stainless Steel	Stainless Steel

Yoke Clamps – Dimension E

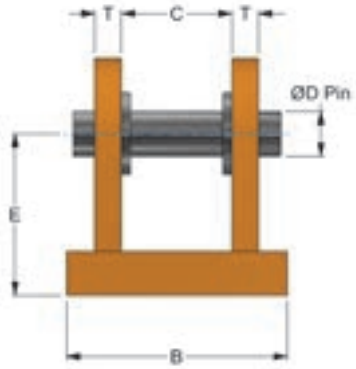
NPS	Size							
	250-7	250-15	250-55	250-115	250-160	250-270	250-360	250-600
65	125	125						
80	150	150	205					
90	160	160	210					
100	165	165	215					
125	180	180	235					
150	190	190	245	270				
175	220	220	260	285				
200	240	240	270	295				
225	255	255	285	310				
250	270	270	295	320				
300	295	295	320	350	385	390		
350		310	340	360	405	450	485	485
400		335	360	385	440	455	510	510
450			385	410	470	480	535	535
500			415	440	500	510	585	585
550			435	510	535	555	605	605
600			460	540	565	585	635	635
650			505	565	600	620	670	670
700			550	590	630	650	705	705
750			595	615	660	685	735	735
800				645	690	735	765	765
900				695	735	825	810	810

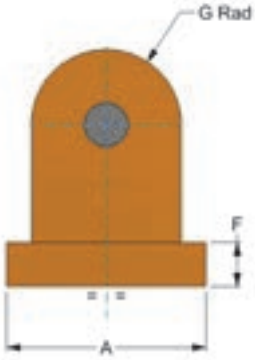
Note:
The Yoke Clamp is designed to accommodate a 10° cone in relation to the pipe.

Fig. 250 – available in
- Carbon Steel
- Alloy Steel
- Stainless Steel

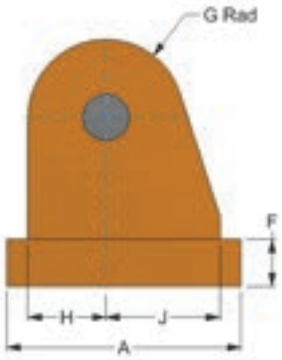
Please Specify:-
- Figure Number:
- Size:
- Surface Finish:

Dynamic Equipment – Fig. 280 & 290





Type 280 Size 3 to 55



Type 280 Size 115 to 600

Fig. 280– Rigid Strut Attachment

Size	A	B	C	D	E	F	G	H	J	T
280-3	60	60	25	10	48	10	22	22	~	10
280-7	65	65	30	12	57	12	25	25	~	10
280-15	65	65	30	12	57	12	25	25	~	10
280-30	90	100	50	20	73	20	34	34	~	12
280-55	90	100	50	20	73	20	34	34	~	12
280-115	140	120	60	25	98	25	45	45	70	15
280-160	150	140	70	30	108	30	50	50	73	20
280-270	190	170	80	40	143	40	65	65	100	25
280-360	230	200	95	45	159	45	75	75	105	30
280-600	290	250	110	60	216	45	90	90	150	45

Fig. 280
Material: Carbon Steel

Please Specify:-
- Figure Number:
- Size:
- Finish:

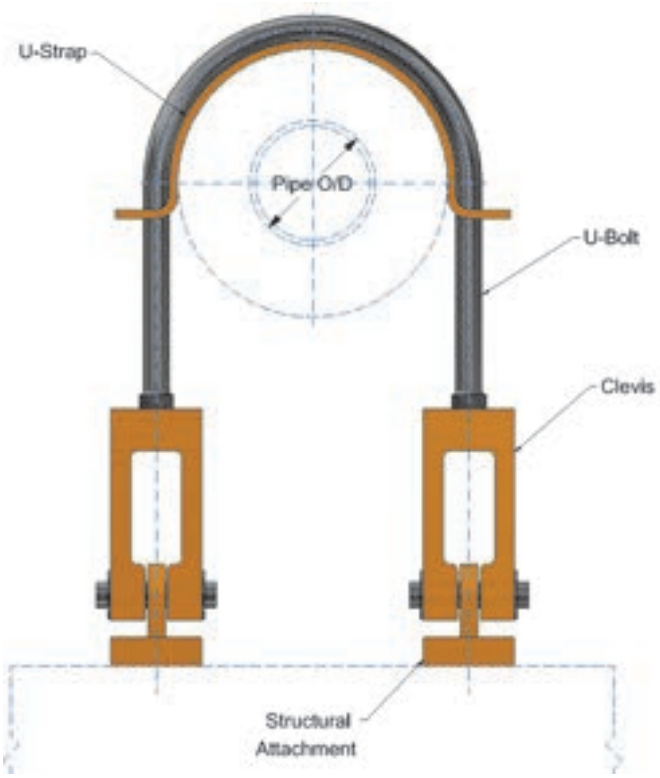


Fig 290 Pipe Whip Restraint.

Pipe Whip Restraints are exclusively used in the Nuclear Industry.

The restraints dampen and absorb the kinetic energy of bursting pipes in emergency cases. For this purpose the elongation capacity of the encompassing U-Bolts is used, as they are designed to absorb the expected dynamic loads.

Features
- The restraint absorbs the energy of the moving pipe and has high energy absorption in relation to its size.
- The restraint is compact in size.
- The restraint provides a relatively large normal clearance between the restraint and pipe to allow for normal thermal movement.
- Design of restraints can be undertaken to suit clients' requirements.

Fig. 290
Material: Carbon Steel

Please Specify:-
- Figure Number:
- NPS:
- Finish:

Dynamic Equipment – Fig.300R, 301R & 302R – Riser Clamps

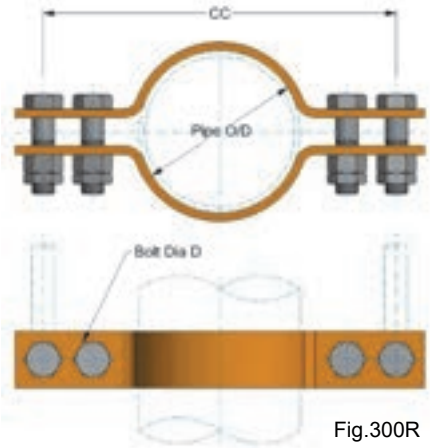


Fig.300R

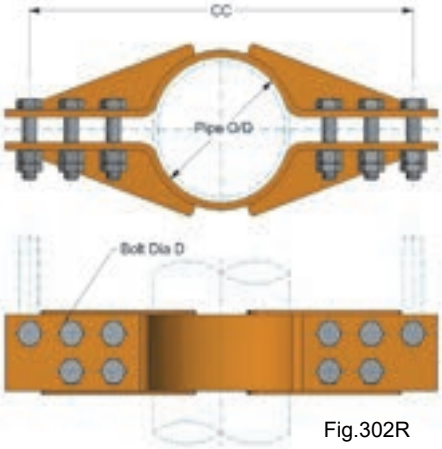


Fig.302R

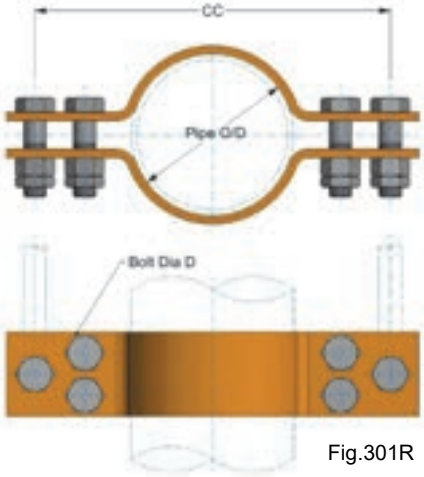


Fig.301R

Stress-Temperature Correction Factors			
Design °C Temperature	Material		
	Carbon Steel	2¼ Cr-1 Mo BS 1501 PT2-622	Stainless Steel Grade 316
343	0.80	0.80	0.70
371	0.85	0.80	0.71
399	0.93	0.80	0.71
427		0.80	0.72
454		0.83	0.73
482		0.92	0.75
510		1.10	0.80
538		1.50	0.86
566		2.20	0.99
593			1.20
620			1.80
640			2.30
650			3.00

The total load to be supported must be multiplied by 2 before the Stress Temperature Correction Factor is applied.

Stress Temperature Correction Factor

The selection chart is based on a maximum allowable stress in the clamp of 8.50 Kg/mm^2; the table of Stress Temperature Correction Factors provides details for the most commonly used materials.

$$\text{Stress Temperature Correction Factor.} = \frac{8.50}{\text{S. A. Design @ Temperature}}$$

Or: Corrected Load = calculated load x Stress Temperature Correction Factor.

Example:

- Pipe Nominal Bore = 400mm
- Support Load = 4545Kg
- Rod Centres (C) = 1100mm
- Temperature = 510°C
- Procedure = Stock Material – Alloy Steel 2% Cr 1% Mo.
- Correction Factor from table STCF = 1.1
- Corrected Load = 9090 x 1.1 = 10,000Kg.

Using Charts:

1. Enter lower chart @ rod centres = 1100mm, move horizontally until sloping line 400mm pipe size is intersected.
2. Project this intersection vertically upwards.
3. Enter upper chart @ load = 11000Kg. Move horizontally to the right until the vertical line from (B) is intersected.
4. Read stock size of curve immediately above the (C) intersection.

These Riser Clamps are similar to the ones shown in our Ancillary section and should be used together with our dynamic restraints.

For selection purposes please ensure that the load rating of the strut / snubber is not greater than the load capacity of the pipe clamp.

If the loads are greater then our Yoke Pipe clamp should be used. (Clamp gaps and load pins should always be checked)

Fig. 300R, 301R & 302R
Material: Carbon Steel

Please Specify:-

- Figure Number
- Nominal Pipe Size
- Temperature Range
- Surface Finish

Dynamic Equipment – Fig.300R, 301R & 302R

RISER SELECTION CHART