

SANWA TEKKI CORPORATION

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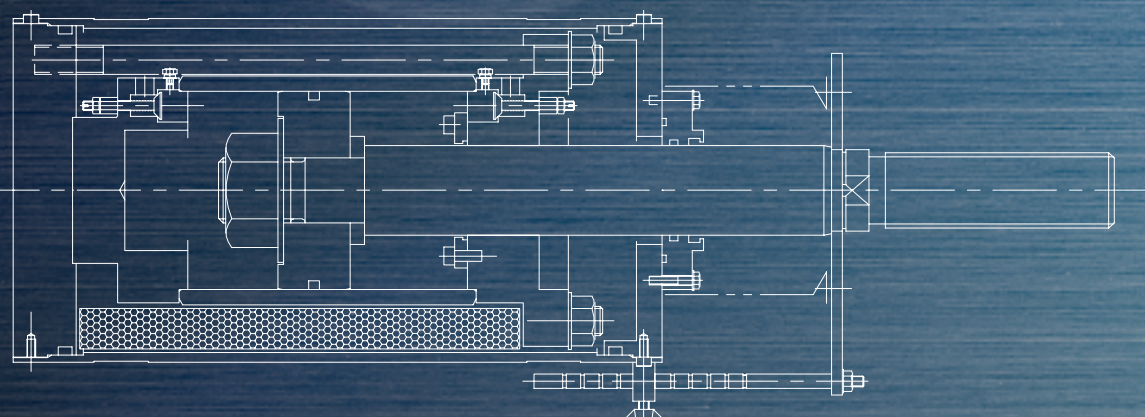
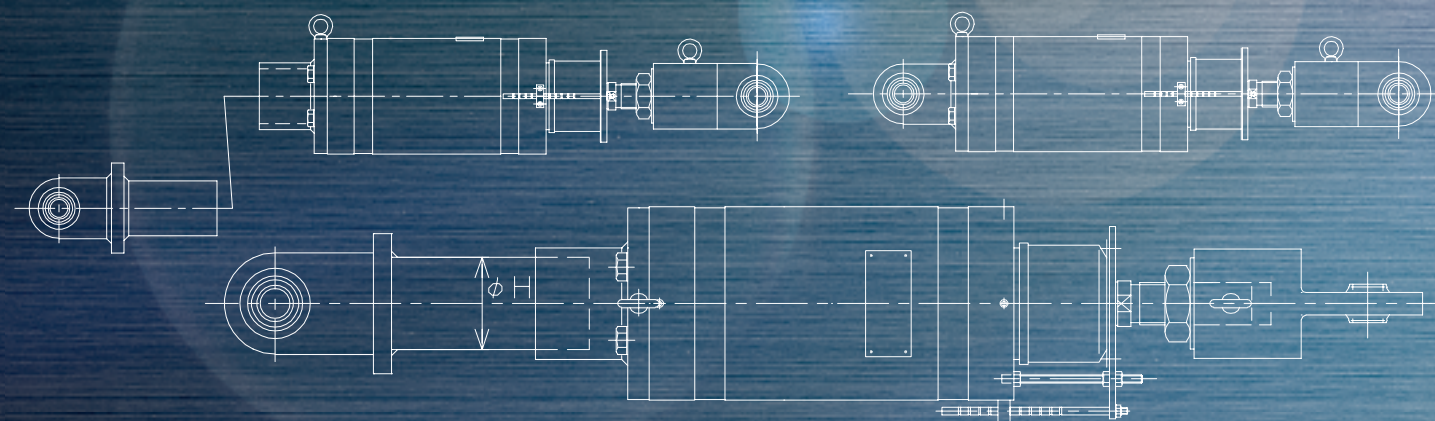
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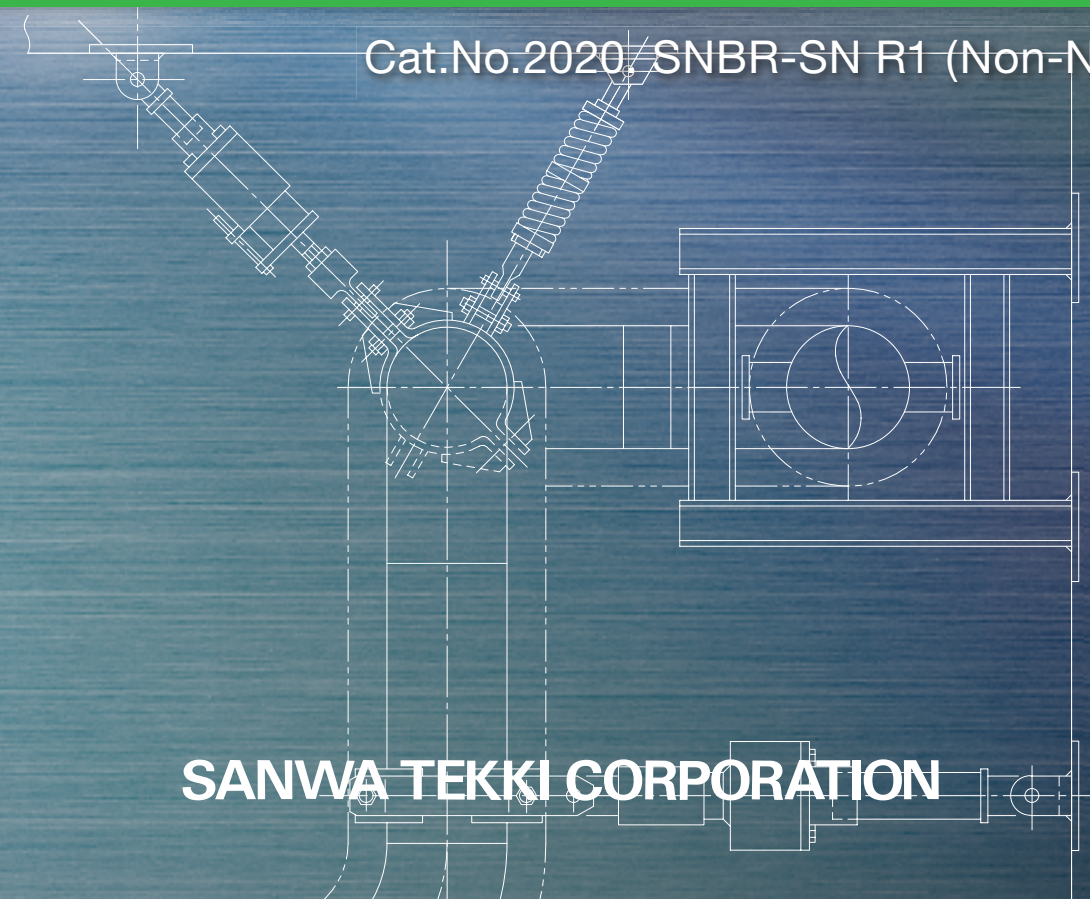
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HYDRAULIC SNUBBERS



Cat.No.2020/SNBR-SN R1 (Non-Nuclear)



SANWA TEKKI CORPORATION

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Items	Type	
BRACKET	BSN&BSNA	19
PIPE CLAMP (Carbon Steel)	PCBC-M,PCBCZ-M	20
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PIPE CLAMP (SB-Carbon Steel)	PCBB-M,PCBBZ-M	27
PIPE CLAMP (SB-Carbon Steel)	PCBB-1,PCBBZ-1	28
PIPE CLAMP (SB-Carbon Steel)	PCBB-3,PCBBZ-3	29
PIPE CLAMP (SB-Carbon Steel)	PCBB-6,PCBBZ-6	30
PIPE CLAMP (SB-Carbon Steel)	PCBB-T,PCBBZ-T	31
PIPE CLAMP (SB-Carbon Steel)	PCBB-S,PCBBZ-S	32
PIPE CLAMP (SB-Carbon Steel)	PCBB-Q,PCBBZ-Q	33
PIPE CLAMP (Alloy Steel)	PCBA-M,PCBAZ-M	34
PIPE CLAMP (Alloy Steel)	PCBA-1,PCBAZ-1	35
PIPE CLAMP (Alloy Steel)	PCBA-3,PCBAZ-3	36
PIPE CLAMP (Alloy Steel)	PCBA-6,PCBAZ-6	37
PIPE CLAMP (Alloy Steel)	PCBA-T,PCBAZ-T	38
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Introduction

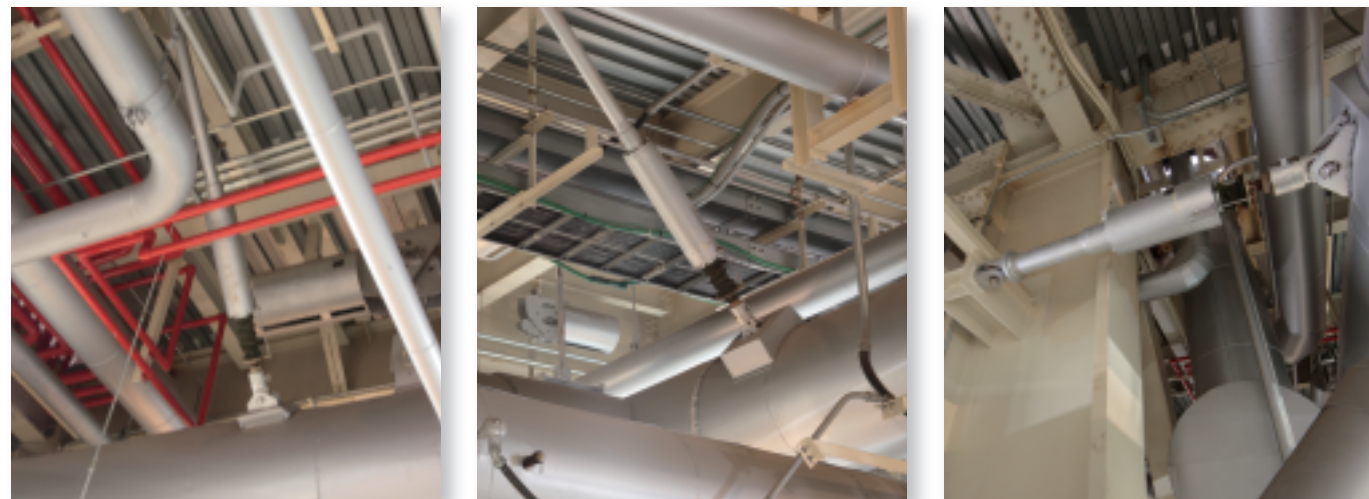
We, SANWA TEKKI CORPORATION (STC) was founded in 1907 to meet the increasing demands for modernizing the public railway facilities as Japan's very first manufacturer and specialist of hardware and equipment for overhead power supply(catenary)systems in the railway electrification program.

Since then, STC has been continuously contributing to Japan's industrial development through its high quality products and its ceaseless research and development of new products for infrastructure in Japan.

In 1953, STC began to manufacture pipe hangers and supports including variable spring hangers and constant spring hangers for high temperature and high pressure pipings in thermal power plants and large ships as the first and only manufacturer in Japan. Through its strict quality control, STC's pipe hangers & supports could receive high evaluation from customers, and expanded the market into petrochemical plants and nuclear power plants in Japan and also in the world.

Furthermore, STC originally developed hydraulic snubbers, mechanical snubbers, and computer programs for analysis of thermal stress and displacement, supporting load and static & dynamic seismic effects of piping systems. At the present, STC can prepare and supply 3D-CAD design data for efficient and easy checking of the support design by virtually examining the interface of the support assemblies by objects in the vicinity.

And then, STC have been the only one manufacturer having a full line services of piping hangers, supports, hydraulic & mechanical snubbers and engineering services in the world.



To prove its high quality and excellent performance in every phase of our business activities – customers relations, engineering and design, manufacturing, output products, after-sales services and quality control, STC is registered as an ISO 9001 company.

Trade Name:	SANWA TEKKI CORPORATION	
Head office Address	6-4-6 Minami-Shinagawa, Shinagawa-Ku, Tokyo 140-0004, Japan	
Established:	September, 1907	
Paid-in Capital:	Yen 423,800,000	
No. of Employees	388 (As of April 2020)	
Plants:	Utsunomiya	
	Kumamoto	
Branches:	Tohoku (Sendai)	
	Chubu (Nagoya)	
	Kansai (Osaka)	
	Kyushu (Fukuoka)	
Sales Offices:	Sapporo	
	Niigata	
	Shizuoka	
	Hiroshima	
	Takamatsu	



1. OUTLINE OF PIPE HANGERS AND SUPPORTS

Depending on their function and uses, hangers and supports are classified as follows:

- (A) Items designed to support the weight of piping and equipment; these are collectively referred to as Hangers or Supports.
- (B) Items designed to restrain or limit three-dimensional displacements due to thermal expansion; these are known by the generic term of Restraints.

(C) Items designed to prevent piping systems from cyclic loading due to forces other than gravity or thermal expansion, such as impact by vibration, earthquake, and water-hammer; these products are called Braces or Snubbers

Each of the above three categories is subdivided, according to applications and functions, as shown in Table 1-1 and Fig. 1-1.

Table 1-1 Classification of Hangers and Supports

Item No.	Divisions		Subdivisions	
	Designation	Application	Classification	Application
A	Hangers and Supports	To support weight of piping systems, either from above (Hangers) or from below (Supports)	① Rigid Hangers	For point without vertical displacement.
			② Variable Spring Hangers	For point with small vertical displacement. (upto approx. 50mm)
			③ Constant Spring Hangers	For points with large vertical displacement. (over approx. 50mm)
B	Restraints	To restrain or limit movement of piping systems due to thermal expansion.	④ Anchors	To completely fix the piping systems at certain points.
			⑤ Stops	To prevent longitudinal movement of pipes while allowing them to rotate.
			⑥ Guides	To permit displacement only for specified direction.
			⑦ Rod Restraints	To prevent pipe movement from voluntary directions.
C	Braces or Snubbers	To limit pipe movement due to forces other than thermal expansion and gravity.	⑧ Vibration Eliminators	To prevent or diminish vibrations.
			⑨ Hydraulic Snubbers Mechanical Snubbers Shock Absorbers	To suppress movement due to earthquake, water-hammer, relief valve reaction without restraining thermal movement.

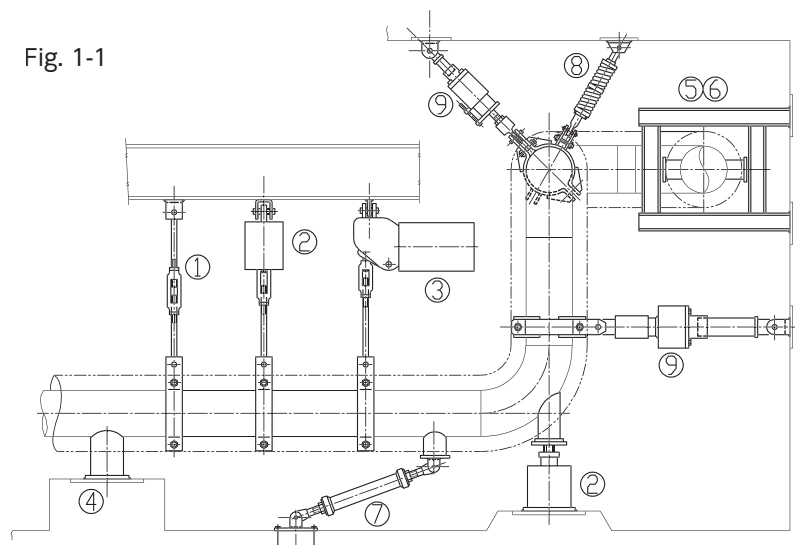
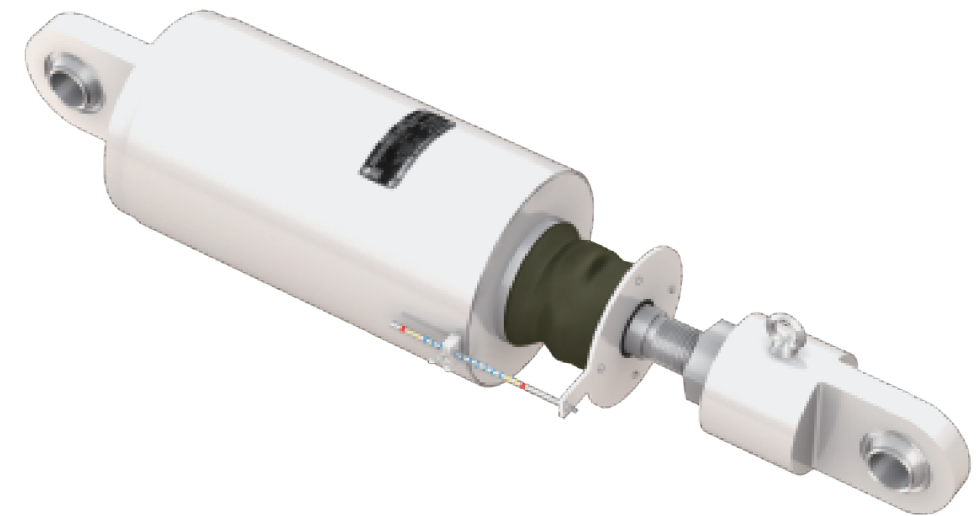


Fig. 1-1

2. HYDRAULIC SNUBBER

2.1 General

Hydraulic Snubber is a device developed to protect high pressure/temperature piping system in power generating plants and various types of industrial plants. They function to restrain undesirable displacement of piping system or components when they are about to oscillate due to seismic or other types of dynamic loading, while, to allow their free movement during the thermal displacement mode. Our hydraulic snubber is designed to provide such essential two-way functions by means of a sophisticated combination of hydraulic cylinder with a valve mechanism. A built-in flexible reservoir is also a dominant design feature. As an important step among entire development works, comprehensive design verifications and thorough testing were conducted to assure the highest reliability. Since they were put into service decades ago, they have been proving perfect trouble-free performance and excellent maintainability, and thus assuring maximum safeness for operation of various piping systems when they were subjected to occasional dynamic events.



2. HYDRAULIC SNUBBER

2.2 Model, Type and Size of Hydraulic Snubbers

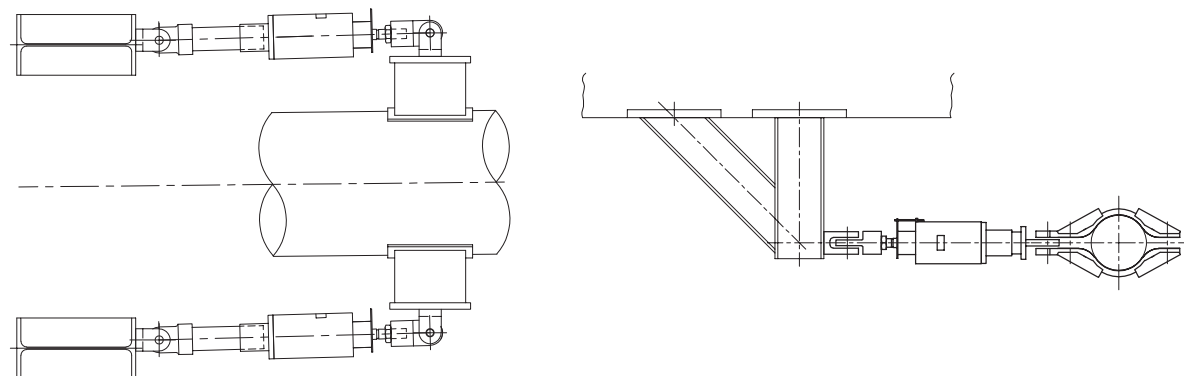
SANWA TEKKI's Hydraulic Snubber models are classified by means of the symbols explained in the Table 2.2.

	03				
	06				100
	1				160
SN	3	E	A		250
or	:	or	or		:
SNS	100	F	B		550
SN	16	E	A	—	160
Model	Size	Type ₁	Type ₂		Stroke

Table 2.2

Item	Symbol	Description
Model	SN	Model of Hydraulic Snubber having poppet valves at both side. For reciprocating motion such as earthquake, steam hammer, water hammer, etc.
	SNS	Model of Hydraulic Snubber having single valve at tension side. For one way thrust motion such as safety valve reaction, etc.
Size	A numeral from 03 to 100	Indicate sizes (size x 10 = Rated Load in kN) 03, 06, 1, 3, 6, 10, 16, 25, 40, 60, and 100 is available. * For larger size up to 5000kN is available on request.
Assembly Type ₁	E	With extension attachments, for a longer installation space.
	F	With the shortest attachments, for a limited installation space.
Main Unit Type ₂	A	Model Number for size 03 ~ 25.
	B, G	Model Number for size 40 ~ 100. B is for standard model. G is for special short model. (Details, please see page 15)
Stroke	A numeral from 100 to 550	Total stroke length (mm) 100, 160, 250, 310, 400, 460, and 550 is available.

2.3 Typical Application of Hydraulic Snubbers



2. HYDRAULIC SNUBBER

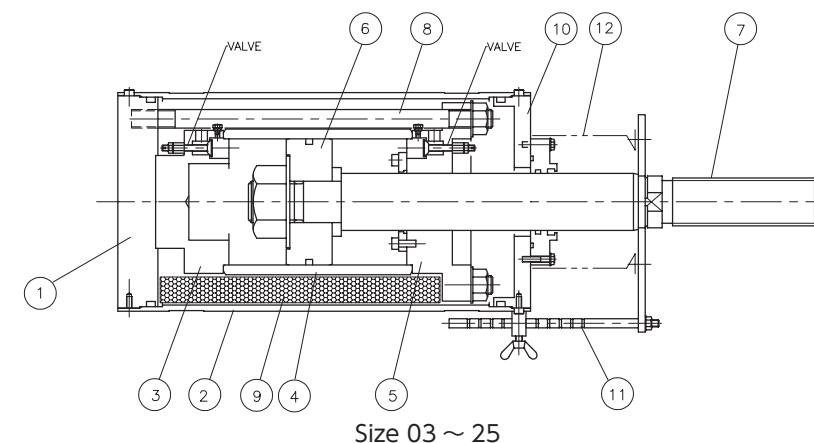
2.4 Construction and Features

Design principle of our hydraulic snubber is a hydraulic system controlled by a valve mechanism. The magnitude of generated resistance force is a function of input velocity.

Namely, $CV^n = F$ (C = constant, V = piston velocity, n = valve property, F = force generated)

- ① Hydraulic cylinder is fully enclosed in the outer casing and they are filled with hydraulic fluid. A piston divides the cylinder into two pressure chambers. They are hydraulically linked each other through a fluid path formed by a pair of poppet valves and outer casing.
- ② A poppet valve, being loaded by a built-in coil spring, stays open so far as the pressure in a fluid chamber is lower than the pre-determined threshold, and thus allowing reciprocal free movement of the piston during the thermal displacement mode of piping.
- ③ The cubic volume of lateral piston rod, penetrating one of the chambers, causes a difference in fluid volume in each chamber. An elastic accumulator, inserted between the cylinder wall and outer casing, functions as the self-adjustment means for offsetting the difference. For this design advantage, Model SN/SNS snubber has no projection on the cylindrical body unlike conventional snubbers having outside oil reservoirs.
- ④ Dynamic input displacement gives a quick driving force to the piston, and then causes a rapid pressure increase inside the compressed chamber. The valve on the compressed chamber side closes and the fluid path is shut off on the spot. Complete stop of fluid flow generates the resistant force inside the cylinder to restrain the displacement.
- ⑤ The entire process takes place against a reverse loading, and completely suppress the dynamic loading. (For Model SN only)
- ⑥ Very precise through hole on the valve or peripherals keeps a minimum fluid flow even when it is in shut off position. For this design feature, the snubber unit is capable of allowing thermal displacement of the piping even during a dynamic oscillation of the piping system. This ability is defined by so-called release rate or bleed rate. This function is not equipped for model SNS, as to withstand continuous one-way reaction force from safety valve, etc.

2.5 Parts of Hydraulic Snubber



No.	Part Name	Material
1	Holder	SS400/S25C
2	Casing	SGP
3	Cylinder Cover	SS400
4	Cylinder Tube	STKM13C
5	Rod Cover	SS400/S25C
6	Piston	SS400
7	Piston Rod	S45C
8	Tie-Rod	S45C/SCM435
9	Accumulator	EPDM
10	Casing Cover	SS400
11	Travel Indicator	SUS304
12	Canvas Cover	CLOTH

2. HYDRAULIC SNUBBER

2.6 Size Selection Guideline

Selection of the proper snubber assembly shall be made based on the following design elements:

- ① Design dynamic load.
- ② Amount of Piston Displacement (calculated from pipe thermal travel) and its direction.
- ③ Overall installation length allotted for the snubber assembly.
- ④ Details of end conditions (Bracket or Pipe clamp).
- ⑤ Pipe size, material, and operating temperature, insulation thickness, if any.

(1) Rated Load

Select Snubber unit having a rated load nearest to but greater than the design load (calculated dynamic load).

For example, when the calculated design load is 45kN(≒ 4,500kgf), size SN 6 (rated load = 60kN(≒ 6,000kgf)) is the proper size to be selected.

Min. Snubber size is recommended depending on applicable pipe size as per below table.

Size No.	Rated Load(N)	Rated Load(kgf)	Size No.	Rated Load(N)	Rated Load(kgf)	Pipe Size	Min.Snubber Size
SN 03	3,000	305	SN 16	160,000	16,315	~ 5"	03
SN 06	6,000	611	SN 25	250,000	25,492	6" ~ 10"	06
SN 1	10,000	1,019	SN 40	400,000	40,788	12" ~ 16"	1
SN 3	30,000	3,059	SN 60	600,000	61,182	18" ~ 24"	3
SN 6	60,000	6,118	SN 100	1,000,000	101,971	25" ~	6
SN 10	100,000	10,197					

(2) Stroke

The total stroke of the snubber unit selected must be sufficiently greater than the calculated piston displacement so as to provide a safety margin for the extra movement not counted in at the designing stage of the piping system. STC recommends to consider Min. 25mm margin at both side. [25mm margin + design piston displacement + 25mm margin ≤ Total Stroke]

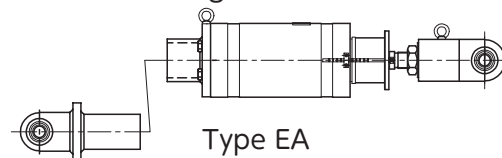
Total Stroke and Design Displacement		(mm)								
Total Stroke	100	160	250	310	400	460	550	630 *	710 *	
Recm. Design Piston Displacement	0 ~ 50	51 ~ 110	111 ~ 200	201 ~ 260	261 ~ 350	351 ~ 410	411 ~ 500	501 ~ 580	581 ~ 660	

* For special stroke 630, 710 is available upon request.

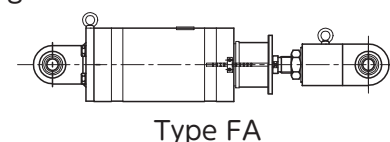
Each snubber unit is factory pre-set at designated Cold Position (C.P.) to provide the ready-to-install length of the assembly based on the design amount and direction of the piston displacement. Customer does not need to adjust piston position at site during installation works.

(3) Assembly Type

Type EA/EB : With extension attachments, for a longer installation length between the range L1(Max) and L1(Min) as given in the table of Page 12 & 14.



Type FA/FB : With the shortest attachments, for a limited installation length. The overall dimensions are as given by L2 in the table of Page 12 & 14.



2. HYDRAULIC SNUBBER

2.7 Major Design Specifications

1. Applicable Code and Standard

- ① JIS (Japanese Industrial Standard) Code
- ② MSS (Manufacturers Standardization Society) Standard
- ③ ASTM (American Society of Testing and Materials) Standard
- ④ SSPC (Steel Structure Painting Council) Standard

2. Design Parameters and Conditions

Drag Force (Frictional Resistance)	Max. 2% of the rated load, or 0.49kN, Whichever is greater.
Bleed Rate (Release Rate)	0.2 ~ 2.0 mm/sec.
Lock-up Rate	2.0 ~ 6.0 mm/sec.
Applicable Frequency Range	1 Hz ~ 33 Hz
Lost Motion	Max. 2.0 mm
Design Safety Margin (*)	Withstand 150% of the rated load without loss of proper function.
Ultimate Strength (*)	Withstand 200% of the rated load without loss of structural integrity.
Loading Capacity (under 100% rated load)	20,000 loading cycles.
Applicable Ambient Temperature	Max. 70° C
Design Life	40 years.
Recommended Maintenance Period	Once every 10 years.
Angular Offset	Max. ± 7.5°

* This value is applicable to Size SN25 and less, and the stroke shorter than 250mm.

3. Minimum Spring Rate (kN/mm)

Size	Stroke (mm)	
	100/160	250
SN-03	2.45	1.47
SN-06	2.94	1.96
SN- 1	4.90	2.94
SN- 3	14.70	9.81
SN- 6	29.40	19.61
SN-10	49.03	29.42

Size	Stroke (mm)	
	100/160	250
SN-16	68.65	44.13
SN-25	98.07	63.74
SN-40	117.68	78.45
SN-60	137.29	88.26
SN-100	230.46	147.10

*For Spring Rate of larger size, longer stroke snubbers, contact the manufacturer.

4. Properties of Seals and Hydraulic Fluid

Group	Parts / Parameters	Material / Characteristics
Seals	O-Ring	FKM
	Dust Seal	NBR
	Accumulator	EPDM
Fluid	Fluid	Non-Flammable Silicone Oil
	Appearance	Transparent and odorless
	Viscosity	47.5 - 52.5 (CS-25° C)
	Specific Gravity	0.955 - 0.965 (25° C)
	Flash Point	300° C or over
	Volatile	5% or lower (150° C-24 Hour)
	Pour Point	-50° C or lower

3. HYDRAULIC SNUBBER ASSEMBLIES

SIZE : SN03 ~ 25

Snubber sizes 03 to 25 are classified as Type EA and FA.

Ordering Instruction and major dimensions are as follows.

Notes.

1. Model Number

The model number of the Hydraulic Snubber is shown by the following procedure



2. Ordering Instruction

Part Code-Size,Type-Stroke

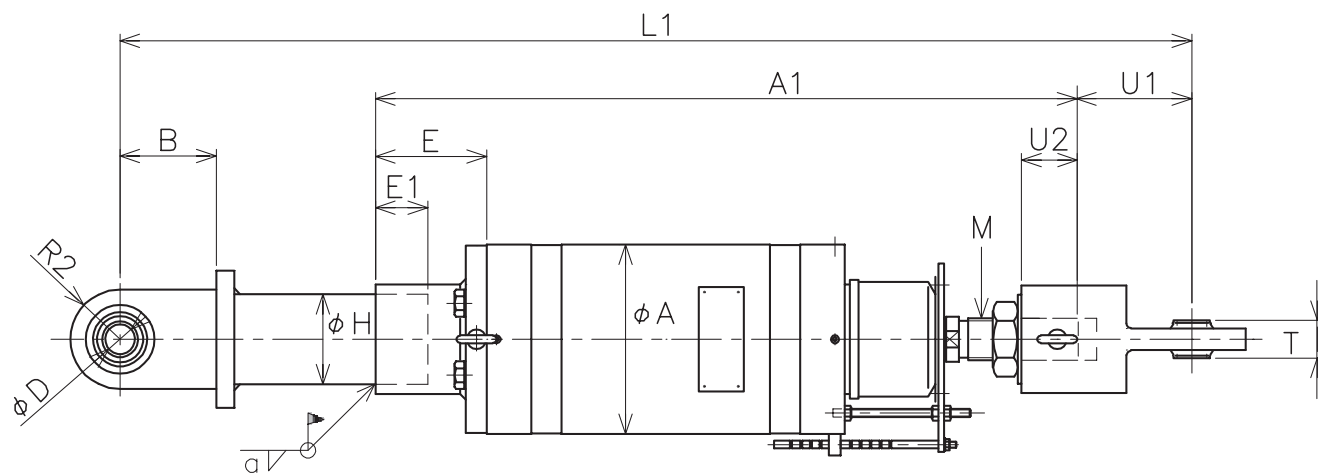
Example : (1)SN-3EA-160 (Poppet Valve)

(2)SNS-3EA-160 (Single Valve)

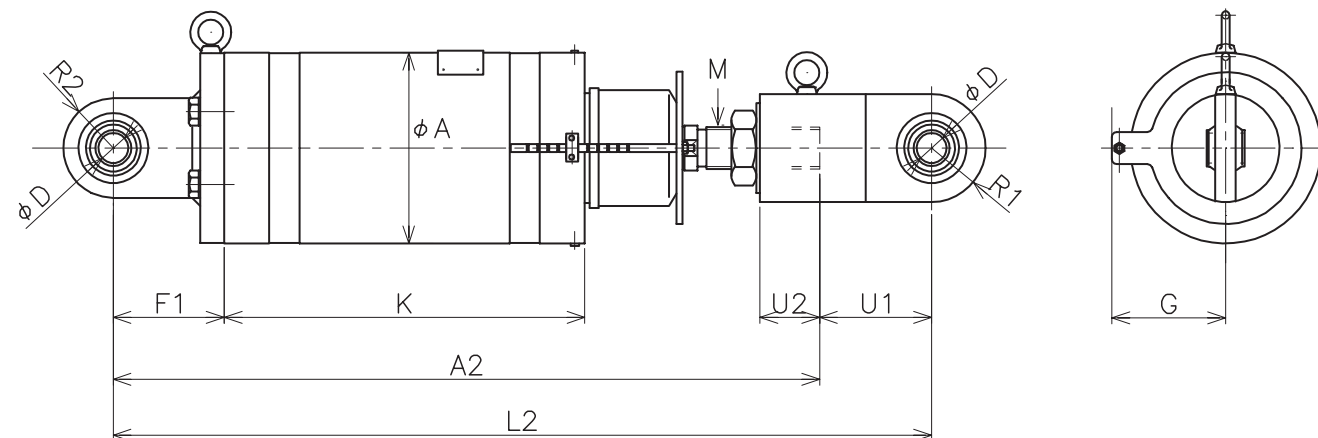
3. If the designed installation length is shorter than L₁ (Min.) for EA Type in the table on the right, change the installation length so that it is the L₂ dimension for FA Type.

If the designed installation length is shorter than L₁ (Min.) and longer than L₂ in the table on the right, or shorter than L₂, please consult with STC.

Type EA (with Extension Pipe)



Type FA (with Direct Ear)



3. HYDRAULIC SNUBBER ASSEMBLIES

Dimension Table for Type EA/FA

(mm)

Size	Stroke	L ₁ (Min.)	L ₁ (Max.)	L ₂	A ₁	A ₂	K	ØA	M	ØD	E	E ₁	F ₁	G	ØH	R ₁	R ₂	U ₁	U ₂	B	T	a															
SN-03	100	642	1,340	563	500	501	255	76.3	M16	12	49	28	50	55.5	27.2	18.0	19.0	62	44	47	22	4															
	160	732	1,340	653	590	591	315																														
	250	867	1,340	788	725	726	405																														
SN-06	100	659	1,567	573	517	511	255	89.1	M20	12	56	35	50	61.5	34.0	20.0	19.0	62	48	47	22	4															
	160	749	1,567	663	607	601	315																														
	250	884	1,567	798	742	736	405																														
SN-1	100	683	1,718	580	524	511	250	101.6	M20	15	68	44	55	68.5	42.7	24.0	25.0	69	48	52	26	4															
	160	773	1,718	670	614	601	310																														
	250	908	1,718	805	749	736	400																														
SN-3	100	811	1,917	671	611	591	293	139.8	M30	17	94	62	74	87.5	60.5	31.5	32.5	80	58	73.5	31.5	4															
	160	901	1,917	761	701	681	353																														
	250	1,036	1,917	896	836	816	443																														
	310	1,126	-	986	926	906	503						87	100.5				85	64																		
	400	1,321	-	1,199	1,121	1,114	638																														
	460	1,411	-	1,289	1,211	1,204	698																														
550	1,546	-	1,424	1,346	1,339	788	165.2	M36	25	114	78	87	100.5	76.3	41.5	37.5	85	64	80	34	6																
100	906	2,152	749	691	664	338																															
160	996	2,152	839	781	754	398																															
SN-6	250	1,131	2,152	974	916	889	488	165.2	M36	25	114	78	87	100.5	76.3	41.5	37.5	85	64	80	34	6															
	310	1,221	-	1,064	1,006	979	548																														
	400	1,356	-	1,199	1,141	1,114	638																														
	460	1,446	-	1,289	1,231	1,204	698																														
	550	1,628	-	1,492	1,400	1,394	810																190.7	M42	30	133	91	108	113.5	89.1	54.0	50.0	98	70	97	38	8
	100	1,002	2,405	817	744	719	360																														
SN-10	160	1,092	2,405	907	834	809	420	190.7	M42	30	133	91	108	113.5	89.1	54.0	50.0	98	70	97	38	8															
	250	1,227	2,405	1,042	969	944	510																														
	310	1,317	-	1,132	1,059	1,034	570																														
	400	1,452	-	1,267	1,194	1,169	660																														
	460	1,608	-	1,445	1,331	1,328	753																216.3	M48	40	165	116	130	126.5	114.3	63.0	62.5	117	76	116	47	10
	550	1,799	-	1,666	1,506	1,533	868																														
SN-16	100	1,130	3,024	905	823	788	393	216.3	M48	40	165	116	130	126.5	114.3	63.0	62.5	117	76	116	47	10															
	160	1,220	3,024	995	913	878	453																														
	250	1,355	3,024	1,130	1,048	1,013	543																														
	310	1,445	-	1,220	1,138	1,103	603																														
	400	1,636	-	1,441	1,313	1,308	718																														
	460	1,726	-	1,531	1,403	1,398	778																267.4	M56	50	195	142	160	152.5	139.8	73.0	75.0	133	84	139	68	12
550	1,861	-	1,666	1,538	1,533	868																															
SN-25	100	1,256	3,497	991	893	858	418	267.4	M56	50	195	142	160	152.5	139.8	73.0	75.0	133	84	139	68	12															
	160	1,346	3,497	1,081	983	948	478																														
	250	1,481	3,497	1,216	1,118	1,083	568																														
	310	1,571	-	1,306	1,208	1,173	628																														
400	1,706	-	1,441	1,343	1,308	718																															

NOTE 1. Adjustable range of U₂ = +/- 25mm

NOTE 2. L₁(Min.), L₂, A₁ and A₂ dimensions are those when the indicator position is at the center of the total stroke.

NOTE 3. When the piston design movement direction (from Cold to Hot condition) is the extension direction (plus direction), the snubber is pre-set at the stroke position 25mm from the fully retracted end of stroke.
In this case, the L₁(Min.), L₂, A₁ and A₂ dimensions are the value obtained by subtracting [(Total Stroke / 2) - 25mm] from the values in the above table.

NOTE 4. When the piston design movement direction (from Cold to Hot condition) is the compression direction (minus direction), the snubber is pre-set at the stroke position 25mm from the fully extended end of stroke.
In this case, the L₁(Min.), L₂, A₁ and A₂ dimensions are the value obtained by adding [(Total Stroke / 2) - 25mm] from the values in the above table.

NOTE 5. Check with STC for the Max. Dimensions of L₁ when the stroke is 310 mm or more.

3. HYDRAULIC SNUBBER ASSEMBLIES

SIZE : SN40 ~ 100

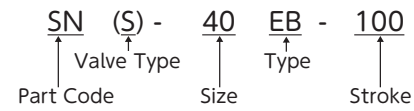
Snubber sizes 40, 60 and 100 are classified as Type EB and FB.

Ordering Instruction and major dimensions are as follows.

Notes.

1. Model Number

The model number of the Hydraulic Snubber is shown by the following procedure



2. Ordering Instruction

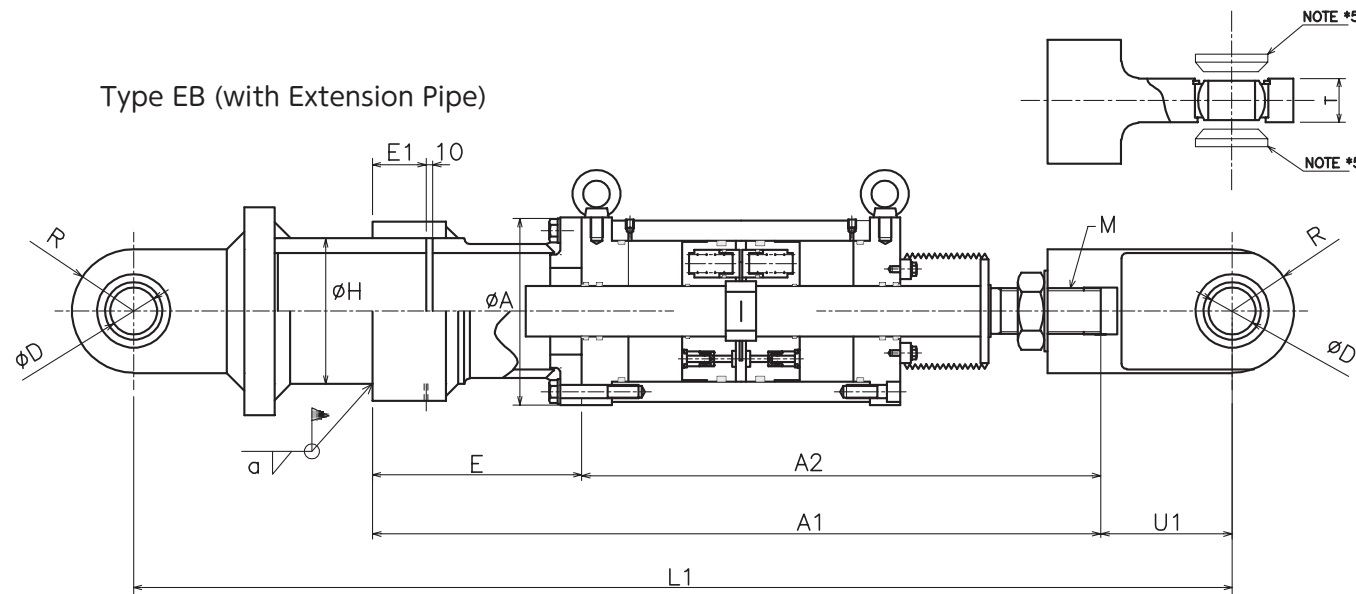
Part Code-Size,Type-Stroke

Example : (1)SN-40EB-100 (Poppet Valve)

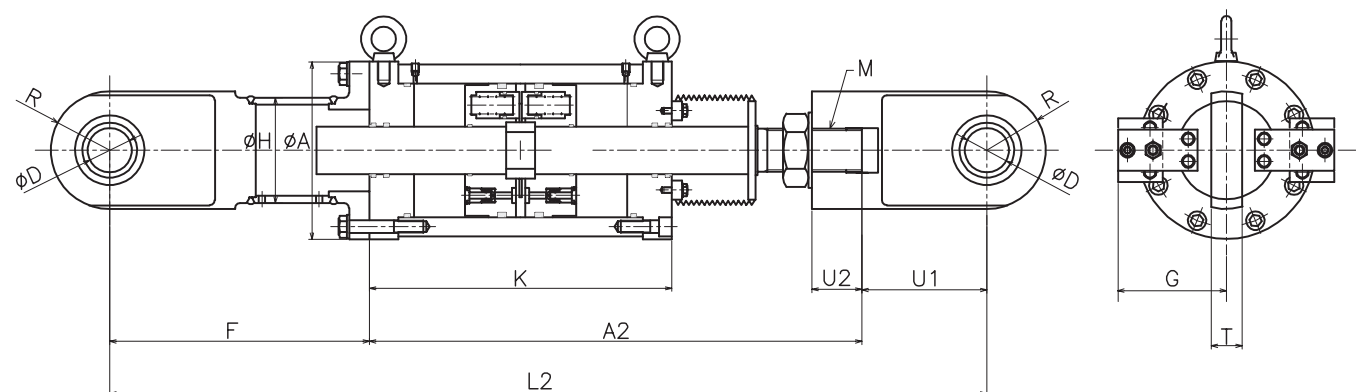
(2)SNS-40FB-100 (Single Valve)

3. If the designed installation length is shorter than L₁ (Min.) for EB Type in the table on the right, change the installation length so that it is the L₂ dimension for FB Type.

If the designed installation length is shorter than L₁ (Min.) and longer than L₂ in the table on the right, or shorter than L₂, please consult with STC.



Type EB (with Extension Pipe)



Type FB (with Direct Ear)

3. HYDRAULIC SNUBBER ASSEMBLIES

Dimension Table for Type EB/FB

																			(mm)		
Type	Size	Stroke	L ₁ (Min.)	L ₁ (Max.)	L ₂	A ₁	A ₂	K	F	ØA	M	ØD	E	E ₁	ØH	R	T	G	U ₁	U ₂	a
EB,FB	40	100	1,297	1,920	1,110	1,052	639	385	299	238	60	60	241	70	139.8	80	56	150	172	73	16
		160	1,387	2,010	1,260	1,142	729	445	359												
		250	1,522	2,145	1,485	1,277	864	535	449												
	60	100	1,472	2,020	1,223	1,187	679	415	348	280	68	70	312	80	165.2	93	65	170	196	79	20
		160	1,562	2,110	1,373	1,277	769	475	408												
		250	1,697	2,245	1,598	1,412	904	565	498												
100	100	1,651	2,155	1,357	1,306	727	445	399	326	80	80	348	90	216.3	118	75	195	231	89	25	
	160	1,741	2,245	1,507	1,396	817	505	459													
	250	1,876	2,380	1,732	1,531	952	595	549													

NOTE 1. Adjustable range of U₂ = +/- 25mm

NOTE 2. L₁(Min.), L₂, A₁ and A₂ dimensions are those when the indicator position is at the center of the total stroke.

NOTE 3. When the piston design movement direction (from Cold to Hot condition) is the extension direction (plus direction), the snubber is pre-set at the stroke position 25mm from the fully retracted end of stroke. In this case, the L₁(Min.), L₂, A₁ and A₂ dimensions are the value obtained by subtracting [(Total Stroke / 2) - 25mm] from the values in the above table.

NOTE 4. When the piston design movement direction (from Cold to Hot condition) is the compression direction (minus direction), the snubber is pre-set at the stroke position 25mm from the fully extended end of stroke. In this case, the L₁(Min.), L₂, A₁ and A₂ dimensions are the value obtained by adding [(Total Stroke / 2) - 25mm] from the values in the above table.

NOTE 5. Collars will be supplied along with Bracket and/or Clamps for type EB/FB Snubbers.

NOTE 6. Clamps for size 40, 60, and 100 are specially designed and supplied in each request.

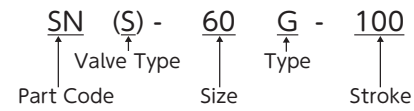
3. HYDRAULIC SNUBBER ASSEMBLIES

This Type G can be selected when Type EB or FB cannot be adopted due to the designed installation dimensions for Size 40, 60 and 100. Ordering Instruction and major dimensions are as follows.

Notes.

1. Model Number

The model number of the Hydraulic Snubber is shown by the following procedure

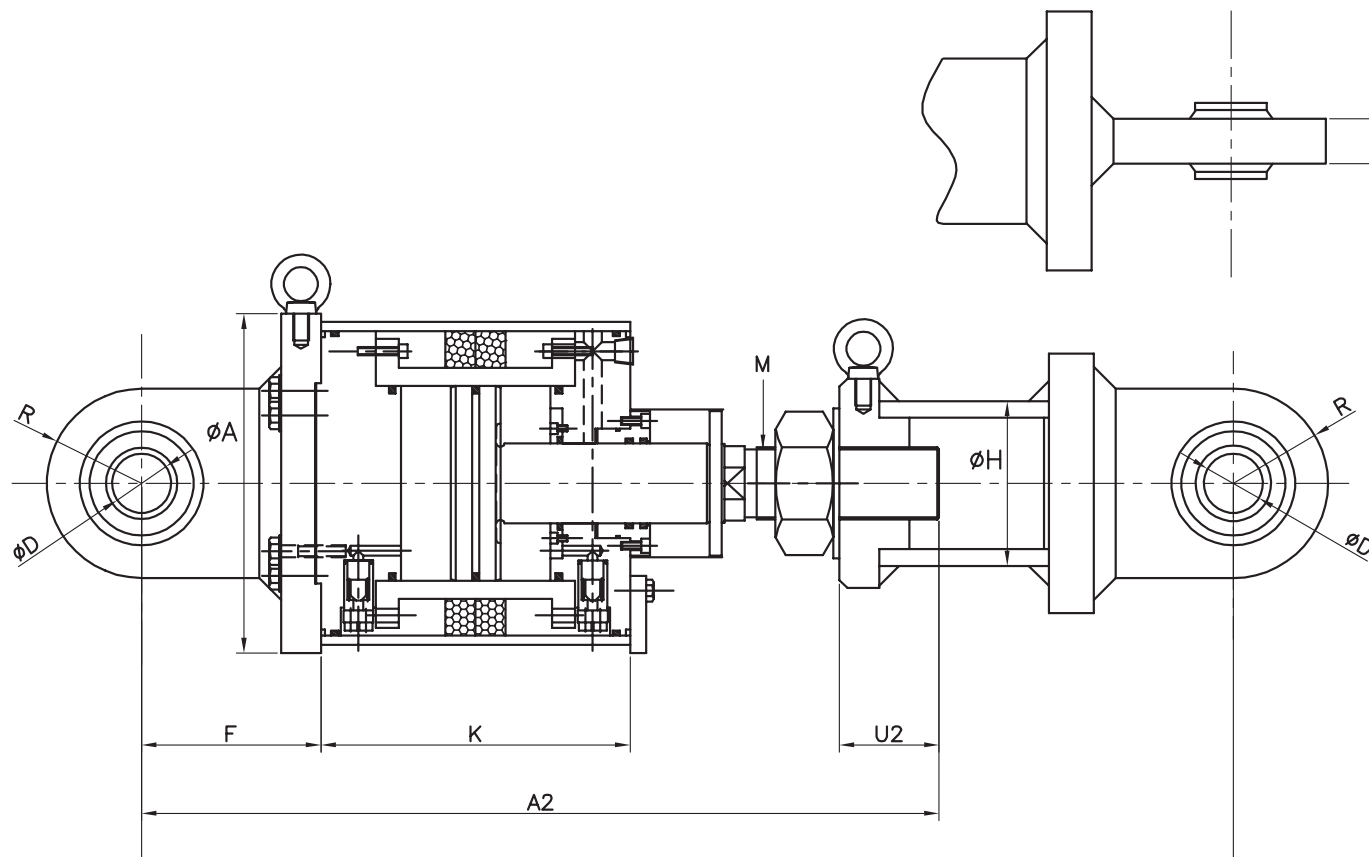


2. Ordering Instruction

Part Code-Size,Type-Stroke

- Example : (1)SN-60G-100 (Poppet Valve)
- (2)SNS-60G-100 (Single Valve)

Type G



3. HYDRAULIC SNUBBER ASSEMBLIES

Dimension Table for Type G

														(mm)
Type	Size	Stroke	L(Min.)	L(Max.)	A ₂	K	ØA	M	ØD	F	ØH	R	T	U ₂
G	40	100	1,095	1,920	800	310	340	72	60	180	165.2	95	76	100
		160	1,185	2,010	890	370								
		250	1,320	2,145	1,025	460								
	60	100	1,180	2,020	870	335	375	80	70	210	216.3	115	86	110
		160	1,270	2,110	960	395								
		250	1,405	2,245	1,095	485								
100	100	1,300	2,155	970	375	425	90	80	250	267.4	155	96	120	
	160	1,390	2,245	1,060	435									
	250	1,525	2,380	1,195	525									

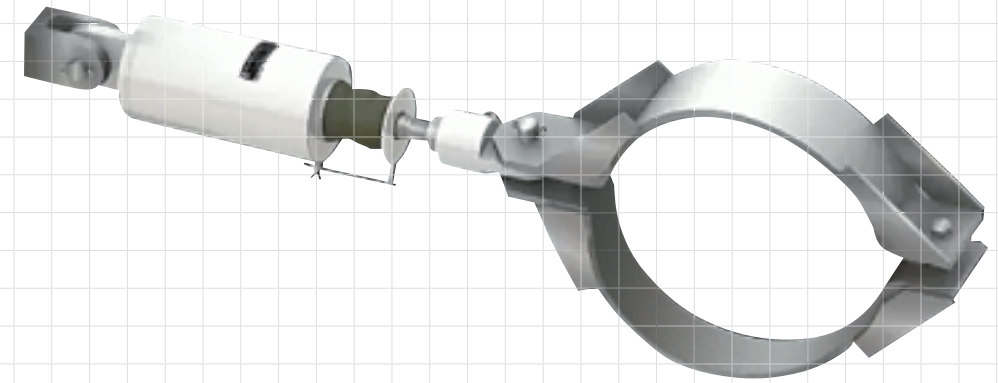
NOTE 1. Adjustable range of U₂ = +/- 25mm

NOTE 2. L(Min.) and A₂ dimensions are those when the indicator position is at the center of the total stroke.

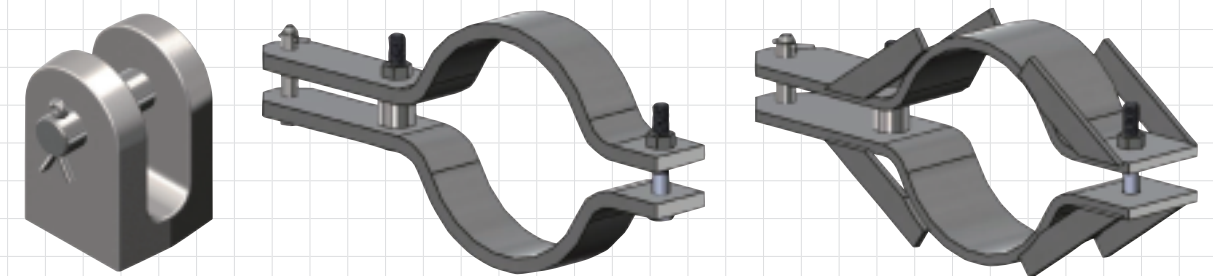
NOTE 3. When the piston design movement direction (from Cold to Hot condition) is the extension direction (plus direction), the snubber is pre-set at the stroke position 25mm from the fully retracted end of stroke. In this case, the L(Min.) and A₂ dimensions are the value obtained by subtracting [(Total Stroke / 2) - 25mm] from the values in the above table.

NOTE 4. When the piston design movement direction (from Cold to Hot condition) is the compression direction (minus direction), the snubber is pre-set at the stroke position 25mm from the fully extended end of stroke. In this case, the L(Min.) and A₂ dimensions are the value obtained by adding [(Total Stroke / 2) - 25mm] from the values in the above table.

NOTE 5. Clamps for size 40, 60, and 100 are specially designed and supplied in each request.



4. BRACKET & PIPE CLAMPS for Hydraulic Snubber Assemblies



BRACKET FOR SNUBBER AND ROD RESTRAINT (TYPE : BSN & BSNA)



SIZE RANGE

01 ~ 100

MATERIAL

- (1)BSN : Carbon steel (JIS G4051 S25C)
(ASTM Equivalent A668 CL70)
- (2)BSNA : Carbon steel (JIS G3101 SS400)
(ASTM Equivalent A36)
- (3)Ream pin : Carbon steel (JIS G4051 S45C)
(ASTM Equivalent A576 Gr1045)

FINISH

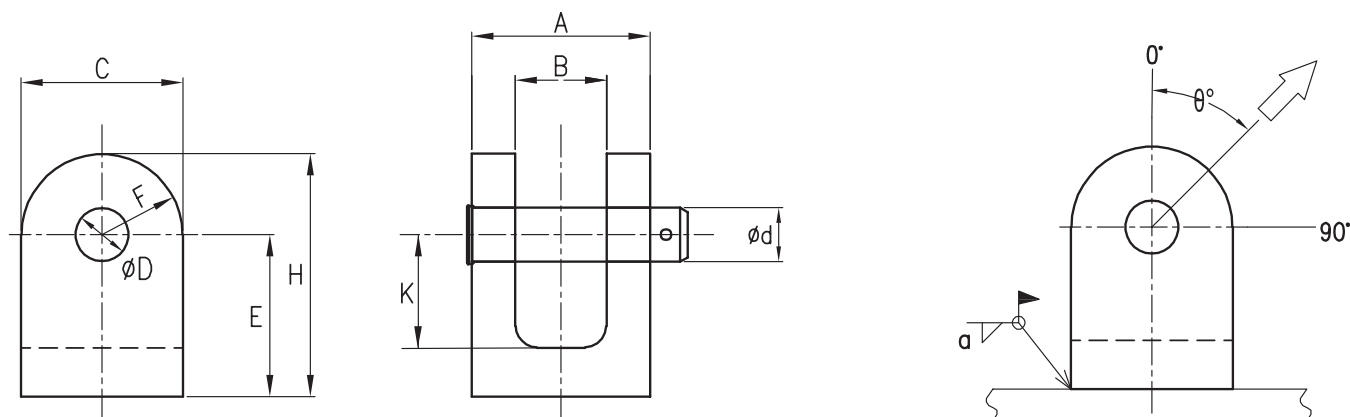
- (1)Bracket Body: Applied STC's standard anti-corrosive paint unless otherwise specified.
- (2)Ream pin : Electro-plated.
- (3)Ream Pin and Pin Holes on the Bracket are machined to close tolerances.

SERVICE

Connected with each size of Hydraulic or Mechanical Snubber and Rod Restraint.

ORDERING

Ex: Indicate the Size No. like
BSN6, BSN25, BSNA60, etc.



SIZE NO.	MAX.RECOM LOAD(kN)	A	B	C	phi D	E	F	H	K	phi d	WELD SIZE : a			Weight (N)
											theta:0°±7.5°	theta:45°±7.5°	theta:90°-7.5°	
											BSN 01,03,06	6	37	
BSN 1	10	51	27	50	15	56	25	81	42	15	4	4	4	11
BSN 3	30	61	33	60	17	66	30	96	50	17	4	7	8	17
BSN 6	60	75	35	75	25	83	37.5	120.5	60	25	6	11	12	40
BSN 10	100	90	39	90	30	99	45	144	72	30	8	15	16	65
BSN 16	160	110	48	110	40	116	55	171	81	40	10	19	20	118
BSN 25	250	145	69	145	50	150	72.5	222.5	110	50	12	23	24	226
BSNA 40	400	200	80	175	60	185	87.5	272.5	120	60	16	30	31	510
BSNA 60	600	220	90	210	70	225	105	330	145	70	21	40	42	805
BSNA 100	1000	290	100	255	80	280	127.5	407.5	170	80	27	52	55	1697

Applicable Temperature : ~ 350°C

PIPE CLAMP FOR BRACING USE CARBON STEEL (TYPE : PCBC-M , PCBCZ-M)

LOAD CAPACITY : 6kN



SIZE RANGE

1-1/2 through 12 inch pipe outer diameter

MATERIAL

- (1)Clamp plate : Carbon steel (JIS G3101 SS400)
(ASTM Equivalent A36)
- (2)Hex bolts, nuts : Carbon steel (JIS G3101 SS400)
(ASTM Equivalent A307 Gr.B & A563 Gr.A)
- (3)Ream pin : Carbon steel (JIS G4051 S45C)
(ASTM Equivalent A576 Gr1045)

FINISH

- (1)Clamp Plate : Applied STC's standard anti-corrosive paint unless otherwise specified.
- (2)Hex bolts, nuts and ream pin : Electro-plated.
- (3)Ream Pin and Ream Pin Holes on the clamp are machined to close tolerances.

SERVICE

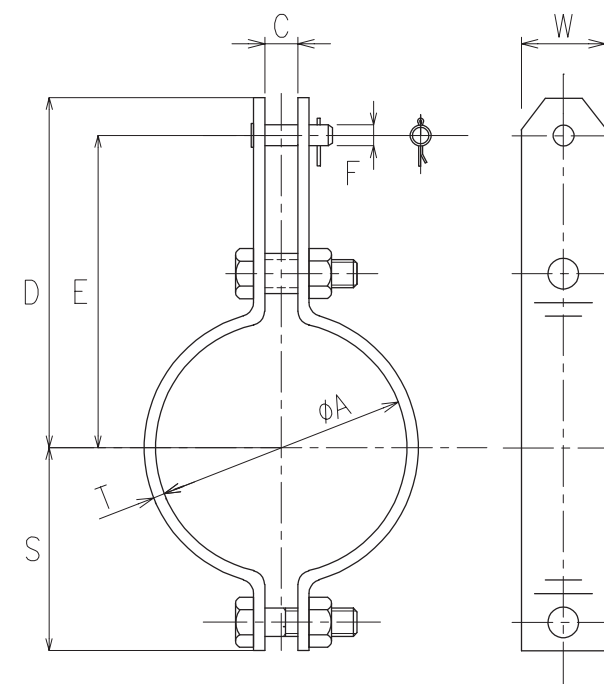
Used for occasional loads of insulated pipe with temperature less than 350°C .
Connected with Hydraulic or Mechanical Snubber and Rod Restraint for the Load Capacity 6.00kN or less.

ORDERING

Specify Part Code, Pipe Size and Load Symbol required.

PCBCZ 6 - M
 ↑ ↑ ↑
 Part Code Pipe Size Load Symbol

Ex: PCBC 4-M & PCBCZ 8-M



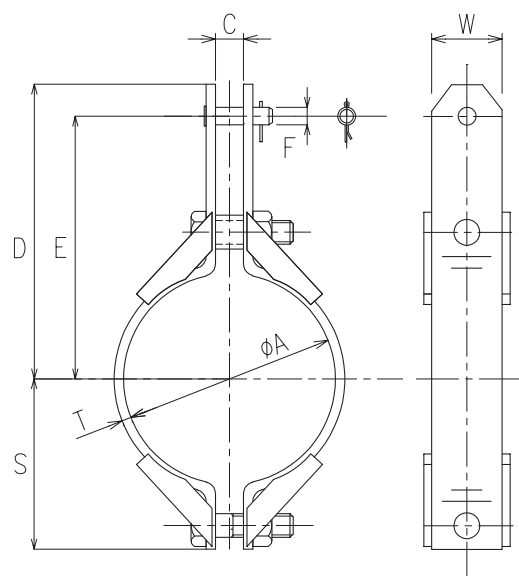
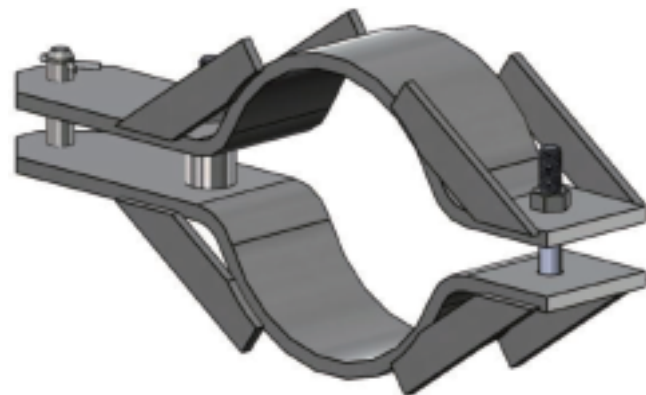
SIZE NO. & Load Symbol	PIPE DIA ANSI A	C	D	E	Standard Plate Size T x W	F	S	Weight (N)
PCBC 1-1/2 - M	48.3	24	180	160	6x50	12	80	15
PCBC 2 - M	60.3		190	170			85	16
PCBCZ 2-1/2 - M	73.0		210	190			95	18
PCBC 3 - M	88.9		220	200	9x50		110	27
PCBC 3-1/2 - M	101.6		225	205			115	28
PCBC 4 - M	114.3		235	215			125	30
PCBCZ 5 - M	141.3		255	235	12x50		135	33
PCBCZ 6 - M	168.3		265	245			155	47
PCBCZ 8 - M	219.1		300	280			185	55
PCBCZ 10 - M	273.0		330	310	16x50		210	63
PCBCZ 12 - M	323.8		355	335			250	94

For other pipe standards (JIS, API, etc.) are available on request.

(mm)

PIPE CLAMP FOR BRACING USE CARBON STEEL
(TYPE : PCBC-1 , PCBCZ-1)

LOAD CAPACITY : 10kN



SIZE RANGE

1-1/2 through 44 inch pipe outer diameter

MATERIAL

- (1) Clamp plate : Carbon steel (JIS G3101 SS400) (ASTM Equivalent A36)
- (2) Hex bolts, nuts : Carbon steel (JIS G3101 SS400) (ASTM Equivalent A307 Gr.B & A563 Gr.A)
- (3) Ream pin : Carbon steel (JIS G4051 S45C) (ASTM Equivalent A576 Gr1045)

FINISH

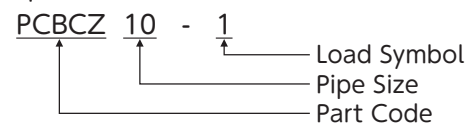
- (1) Clamp Plate : Applied STC's standard anti-corrosive paint unless otherwise specified.
- (2) Hex bolts, nuts and ream pin : Electro-plated.
- (3) Ream Pin and Ream Pin Holes on the clamp are machined to close tolerances.

SERVICE

Used for occasional loads of insulated pipe with temperature less than 350°C .
Connected with Hydraulic or Mechanical Snubber and Rod Restraint for the Load Capacity 6.01 through 10.0kN.

ORDERING

Specify Part Code, Pipe Size and Load Symbol required.



Ex: PCBC4-1 & PCBCZ 8-1

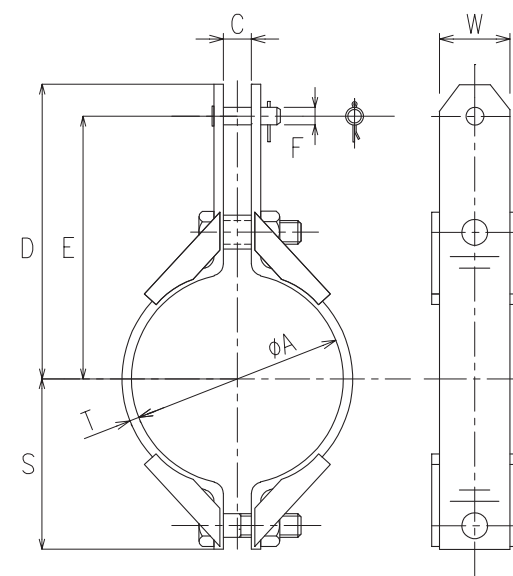
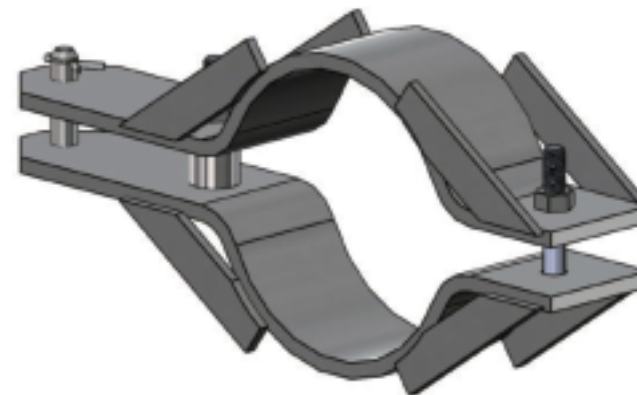
(mm)

SIZE NO. & Load Symbol	PIPE DIA ANSI A	C	D	E	Standard Plate Size TxW	F	S	Weight (N)
PCBC 1-1/2 -1	48.3	28	185	160	9x50	15	85	28
PCBC 2 -1	60.3		195	170			95	29
PCBCZ 2-1/2 -1	73.0		215	190			105	32
PCBC 3 -1	88.9		225	200			120	34
PCBC 3-1/2 -1	101.6		230	205			130	37
PCBC 4 -1	114.3		240	215			135	38
PCBCZ 5 -1	141.3		260	235	150		42	
PCBCZ 6 -1	168.3		270	245	165		62	
PCBCZ 8 -1	219.1		305	280	195		76	
PCBCZ 10 -1	273.0		335	310	230		89	
PCBCZ 12 -1	323.8		360	335	250		97	
PCBC 14 -1	355.6		28	390	365		9x75	15
PCBC 16 -1	406.4	415		390	290	113		
PCBC 18 -1	457.2	440		415	315	121		
PCBC 20 -1	508.0	465		440	350	138		
PCBC 22 -1	558.8	500		475	390	249		
PCBC 24 -1	609.6	525		500	415	265		
PCBC 26 -1	660.4	555		530	440	281		
PCBC 28 -1	711.2	580		555	470	299		
PCBC 30 -1	762.0	605		580	495	315		
PCBC 32 -1	812.8	630		605	520	331		
PCBC 34 -1	863.6	655		630	545	347		
PCBC 36 -1	914.4	680		655	570	362		
PCBC 40 -1	1016.0	735	710	625	391			
PCBC 44 -1	1117.6	785	760	675	422			

For other pipe standards (JIS, API, etc.) are available on request.

PIPE CLAMP FOR BRACING USE CARBON STEEL
(TYPE : PCBC-3 , PCBCZ-3)

LOAD CAPACITY : 30kN



SIZE RANGE

1-1/2 through 44 inch pipe outer diameter

MATERIAL

- (1) Clamp plate : Carbon steel (JIS G3101 SS400) (ASTM Equivalent A36)
- (2) Hex bolts, nuts : Carbon steel (JIS G3101 SS400) (ASTM Equivalent A307 Gr.B & A563 Gr.A)
- (3) Ream pin : Carbon steel (JIS G4051 S45C) (ASTM Equivalent A576 Gr1045)

FINISH

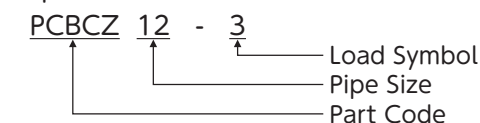
- (1) Clamp Plate : Applied STC's standard anti-corrosive paint unless otherwise specified.
- (2) Hex bolts, nuts and ream pin : Electro-plated.
- (3) Ream Pin and Ream Pin Holes on the clamp are machined to close tolerances.

SERVICE

Used for occasional loads of insulated pipe with temperature less than 350°C .
Connected with Hydraulic or Mechanical Snubber and Rod Restraint for the Load Capacity 10.01 through 30.0kN.

ORDERING

Specify Part Code, Pipe Size and Load Symbol required.



Ex: PCBC4-3 & PCBCZ 8-3

(mm)

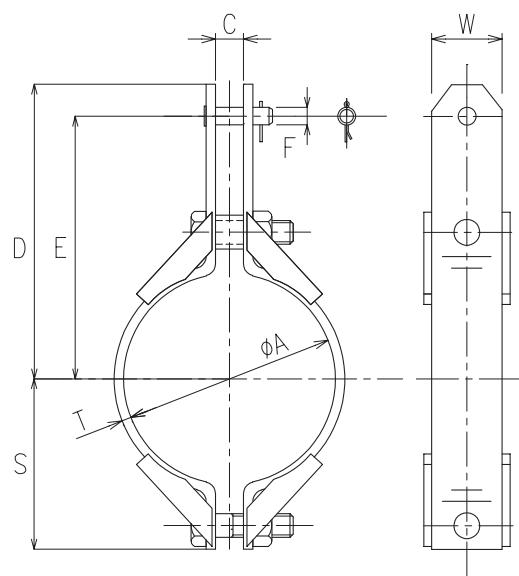
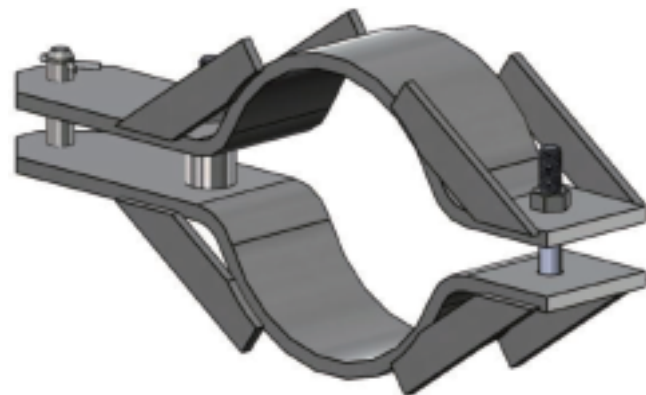
SIZE NO. & Load Symbol	PIPE DIA ANSI A	C	D	E	Standard Plate Size TxW	F	S	Weight (N)
PCBC 1-1/2 -3	48.3	34	210	175	12x75	17	80	49
PCBC 2 -3	60.3		225	190			90	53
PCBCZ 2-1/2 -3	73.0		240	205			105	58
PCBC 3 -3	88.9		245	210			115	61
PCBC 3-1/2 -3	101.6		255	220			125	65
PCBC 4 -3	114.3		265	230			130	68
PCBCZ 5 -3	141.3		280	245	145		75	
PCBCZ 6 -3	168.3		295	260	180		112	
PCBCZ 8 -3	219.1		330	295	205		132	
PCBCZ 10 -3	273.0		360	325	230		148	
PCBCZ 12 -3	323.8		385	350	250		162	
PCBC 14 -3	355.6		34	415	380		12x100	17
PCBC 16 -3	406.4	440		405	320	207		
PCBC 18 -3	457.2	465		430	340	221		
PCBC 20 -3	508.0	490		455	365	236		
PCBC 22 -3	558.8	535		500	385	310		
PCBC 24 -3	609.6	560		525	410	330		
PCBC 26 -3	660.4	585		550	435	349		
PCBC 28 -3	711.2	610		575	465	371		
PCBC 30 -3	762.0	635		600	490	390		
PCBC 32 -3	812.8	660		625	520	411		
PCBC 34 -3	863.6	695		660	540	432		
PCBC 36 -3	914.4	715		680	565	449		
PCBC 40 -3	1016.0	765	730	625	489			
PCBC 44 -3	1117.6	820	785	675	626			

For other pipe standards (JIS, API, etc.) are available on request.

Applicable Temperature : ~ 350°C

PIPE CLAMP FOR BRACING USE CARBON STEEL (TYPE : PCBC-6 , PCBCZ-6)

LOAD CAPACITY : 60kN



SIZE RANGE

3 through 44 inch pipe outer diameter

MATERIAL

- (1) Clamp plate : Carbon steel (JIS G3101 SS400) (ASTM Equivalent A36)
- (2) Hex bolts, nuts : Carbon steel (JIS G3101 SS400) (ASTM Equivalent A307 Gr.B & A563 Gr.A)
- (3) Ream pin : Carbon steel (JIS G4051 S45C) (ASTM Equivalent A576 Gr1045)

FINISH

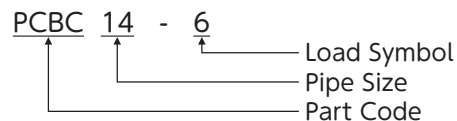
- (1) Clamp Plate : Applied STC's standard anti-corrosive paint unless otherwise specified.
- (2) Hex bolts, nuts and ream pin : Electro-plated.
- (3) Ream Pin and Ream Pin Holes on the clamp are machined to close tolerances.

SERVICE

Used for occasional loads of insulated pipe with temperature less than 350°C .
Connected with Hydraulic or Mechanical Snubber and Rod Restraint for the Load Capacity 30.01 through 60.0kN.

ORDERING

Specify Part Code, Pipe Size and Load Symbol required.



Ex: PCBC4-6 & PCBCZ 8-6

(mm)

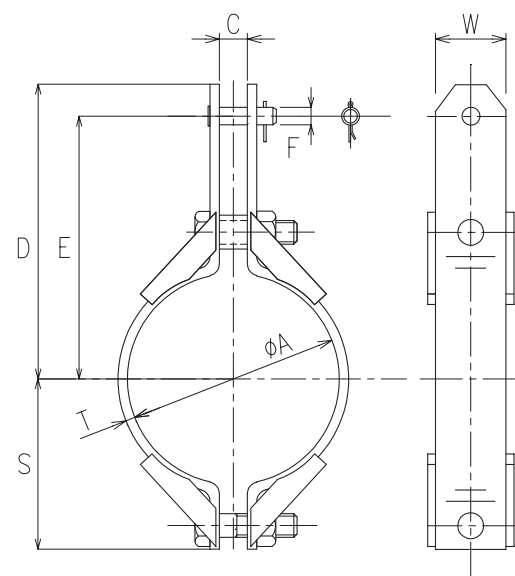
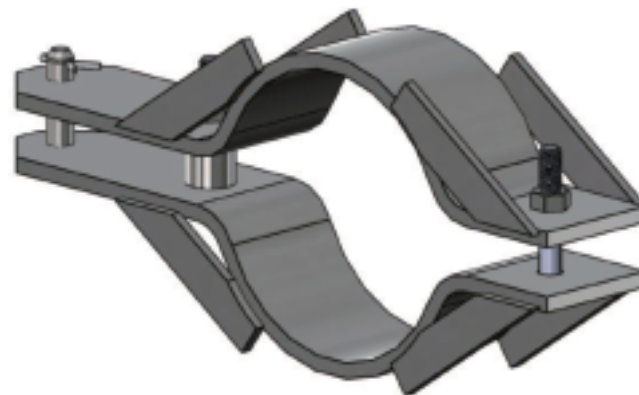
SIZE NO. & Load Symbol	PIPE DIA ANSI A	C	D	E	Standard Plate Size TxW	F	S	Weight (N)
PCBC 3 - 6	88.9	36	250	210	12x100	25	130	88
PCBC 3-1/2 - 6	101.6		135	92				
PCBC 4 - 6	114.3		270	230				
PCBCZ 5 - 6	141.3		285	245				
PCBCZ 6 - 6	168.3		300	260				
PCBCZ 8 - 6	219.1		335	295				
PCBCZ 10 - 6	273.0		365	325	12x125		245	194
PCBCZ 12 - 6	323.8		390	350			280	219
PCBC 14 - 6	355.6		420	380			300	236
PCBC 16 - 6	406.4		445	405			320	299
PCBC 18 - 6	457.2		470	430			345	322
PCBC 20 - 6	508.0		495	455			370	346
PCBC 22 - 6	558.8	540	500	395	373			
PCBC 24 - 6	609.6	565	525	420	395			
PCBC 26 - 6	660.4	590	550	445	418			
PCBC 28 - 6	711.2	615	575	470	443			
PCBC 30 - 6	762.0	640	600	505	468			
PCBC 32 - 6	812.8	665	625	530	492			
PCBC 34 - 6	863.6	690	650	555	515			
PCBC 36 - 6	914.4	720	680	580	539			
PCBC 40 - 6	1016.0	770	730	640	598			
PCBC 44 - 6	1117.6	825	785	690	645			

For other pipe standards (JIS, API, etc.) are available on request.

Applicable Temperature : ~ 350°C

PIPE CLAMP FOR BRACING USE CARBON STEEL (TYPE : PCBC-T , PCBCZ-T)

LOAD CAPACITY : 100kN



SIZE RANGE

6 through 44 inch pipe outer diameter

MATERIAL

- (1) Clamp plate : Carbon steel (JIS G3101 SS400) (ASTM Equivalent A36)
- (2) Hex bolts, nuts : Carbon steel (JIS G3101 SS400) (ASTM Equivalent A307 Gr.B & A563 Gr.A)
- (3) Ream pin : Carbon steel (JIS G4051 S45C) (ASTM Equivalent A576 Gr1045)

FINISH

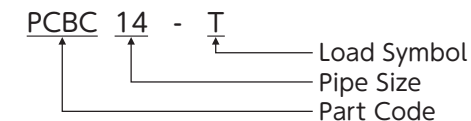
- (1) Clamp Plate : Applied STC's standard anti-corrosive paint unless otherwise specified.
- (2) Hex bolts, nuts and ream pin : Electro-plated.
- (3) Ream Pin and Ream Pin Holes on the clamp are machined to close tolerances.

SERVICE

Used for occasional loads of insulated pipe with temperature less than 350°C .
Connected with Hydraulic or Mechanical Snubber and Rod Restraint for the Load Capacity 60.01 through 100.0kN.

ORDERING

Specify Part Code, Pipe Size and Load Symbol required.



Ex: PCBC14-T & PCBCZ 8-T

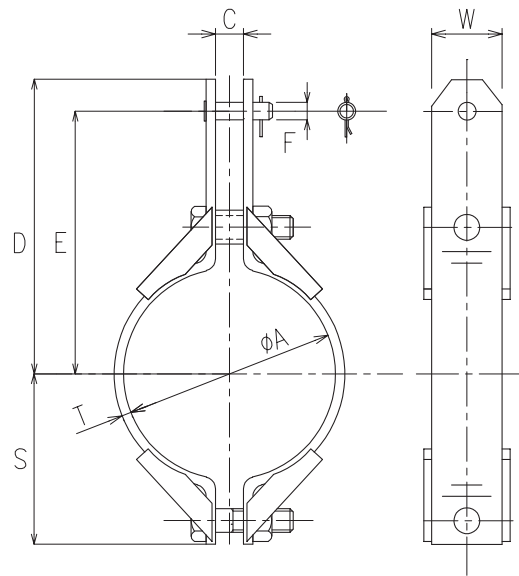
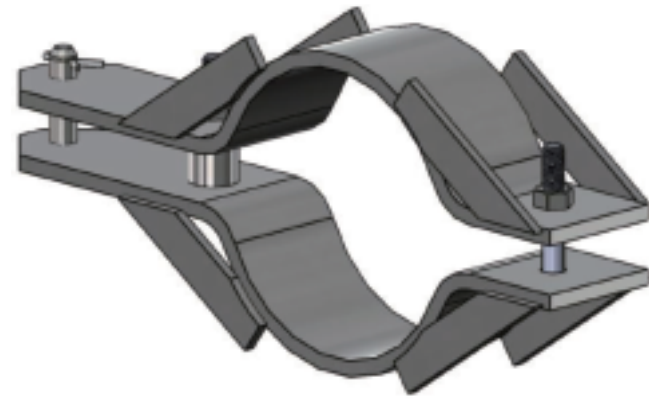
(mm)

SIZE NO. & Load Symbol	PIPE DIA ANSI A	C	D	E	Standard Plate Size TxW	F	S	Weight (N)
PCBCZ 6 - T	168.3	40	330	280	16x125	30	195	212
PCBCZ 8 - T	219.1		365	315				
PCBCZ 10 - T	273.0		395	345				
PCBCZ 12 - T	323.8		420	370				
PCBC 14 - T	355.6		450	400				
PCBC 16 - T	406.4		475	425				
PCBC 18 - T	457.2		500	450	16x150		365	466
PCBC 20 - T	508.0		525	475			390	496
PCBC 22 - T	558.8		560	510			415	531
PCBC 24 - T	609.6		585	535			440	561
PCBC 26 - T	660.4		615	565			470	598
PCBC 28 - T	711.2		640	590			495	628
PCBC 30 - T	762.0	665	615	520	659			
PCBC 32 - T	812.8	690	640	545	689			
PCBC 34 - T	863.6	715	665	585	863			
PCBC 36 - T	914.4	740	690	610	899			
PCBC 40 - T	1016.0	795	745	665	980			
PCBC 44 - T	1117.6	845	795	715	1052			

For other pipe standards (JIS, API, etc.) are available on request.

PIPE CLAMP FOR BRACING USE CARBON STEEL (TYPE : PCBC-S , PCBCZ-S)

LOAD CAPACITY : 160kN



SIZE RANGE

6 through 44 inch pipe outer diameter

MATERIAL

- (1) Clamp plate : Carbon steel (JIS G3101 SS400) (ASTM Equivalent A36)
- (2) Hex bolts, nuts : Carbon steel (JIS G3101 SS400) (ASTM Equivalent A307 Gr.B & A563 Gr.A)
- (3) Ream pin : Carbon steel (JIS G4051 S45C) (ASTM Equivalent A576 Gr1045)

FINISH

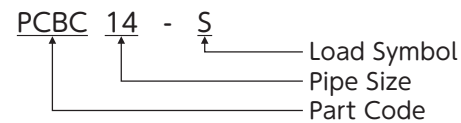
- (1) Clamp Plate : Applied STC's standard anti-corrosive paint unless otherwise specified.
- (2) Hex bolts, nuts and ream pin : Electro-plated.
- (3) Ream Pin and Ream Pin Holes on the clamp are machined to close tolerances.

SERVICE

Used for occasional loads of insulated pipe with temperature less than 350°C .
Connected with Hydraulic or Mechanical Snubber and Rod Restraint for the Load Capacity 100.01 through 160.0kN.

ORDERING

Specify Part Code, Pipe Size and Load Symbol required.



Ex: PCBC14-S & PCBCZ 8-S

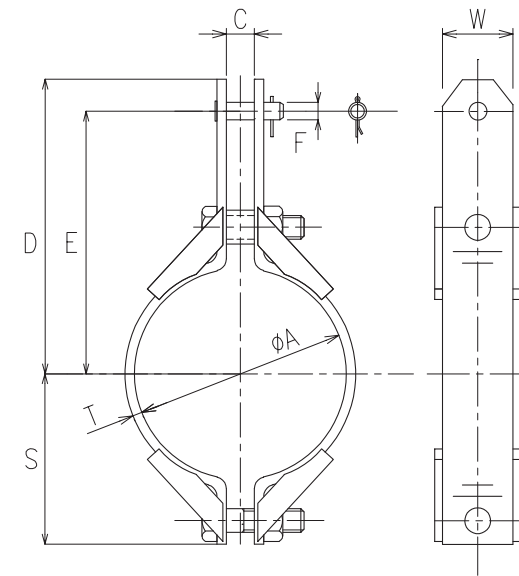
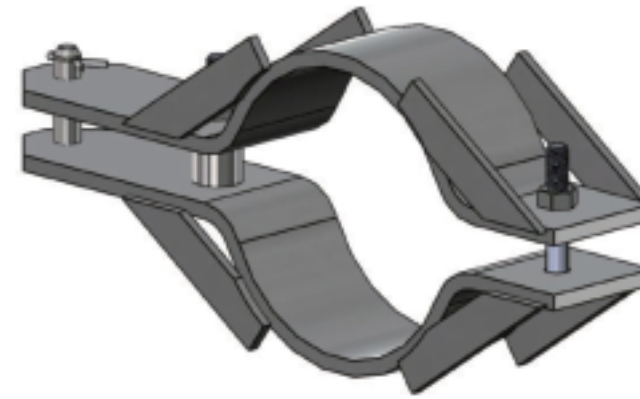
(mm)

SIZE NO. & Load Symbol	PIPE DIA ANSI A	C	D	E	Standard Plate Size TxW	F	S	Weight (N)
PCBCZ 6 -S	168.3	50	355	290	19x150	40	210	315
PCBCZ 8 -S	219.1		390	325			255	374
PCBCZ 10 -S	273.0		415	350			285	431
PCBCZ 12 -S	323.8		440	375			315	472
PCBC 14 -S	355.6		465	400			335	501
PCBC 16 -S	406.4		495	430			360	540
PCBC 18 -S	457.2		525	460	400	700		
PCBC 20 -S	508.0		550	485	415	731		
PCBC 22 -S	558.8		585	520	450	791		
PCBC 24 -S	609.6		610	545	475	834		
PCBC 26 -S	660.4		635	570	500	877		
PCBC 28 -S	711.2		660	595	525	921		
PCBC 30 -S	762.0		685	620	550	964		
PCBC 32 -S	812.8		710	645	580	1028		
PCBC 34 -S	863.6		735	670	605	1070		
PCBC 36 -S	914.4		760	695	640	1248		
PCBC 40 -S	1016.0	815	750	690	1346			
PCBC 44 -S	1117.6	865	800	745	1450			

For other pipe standards (JIS, API, etc.) are available on request.

PIPE CLAMP FOR BRACING USE CARBON STEEL (TYPE : PCBC-Q , PCBCZ-Q)

LOAD CAPACITY : 250kN



SIZE RANGE

10 through 44 inch pipe outer diameter

MATERIAL

- (1) Clamp plate : Carbon steel (JIS G3101 SS400) (ASTM Equivalent A36)
- (2) Hex bolts, nuts : Carbon steel (JIS G3101 SS400) (ASTM Equivalent A307 Gr.B & A563 Gr.A)
- (3) Ream pin : Carbon steel (JIS G4051 S45C) (ASTM Equivalent A576 Gr1045)

FINISH

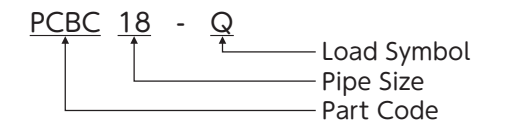
- (1) Clamp Plate : Applied STC's standard anti-corrosive paint unless otherwise specified.
- (2) Hex bolts, nuts and ream pin : Electro-plated.
- (3) Ream Pin and Ream Pin Holes on the clamp are machined to close tolerances.

SERVICE

Used for occasional loads of insulated pipe with temperature less than 350°C .
Connected with Hydraulic or Mechanical Snubber and Rod Restraint for the Load Capacity 160.01 through 250.0kN.

ORDERING

Specify Part Code, Pipe Size and Load Symbol required.



Ex: PCBC14-Q & PCBCZ 10-Q

(mm)

SIZE NO. & Load Symbol	PIPE DIA ANSI A	C	D	E	Standard Plate Size TxW	F	S	Weight (N)
PCBCZ 10 -Q	273.0	72	455	375	25x180	50	295	704
PCBCZ 12 -Q	323.8		480	400			330	785
PCBC 14 -Q	355.6		510	430			350	836
PCBC 16 -Q	406.4		535	455			380	901
PCBC 18 -Q	457.2		565	485			405	963
PCBC 20 -Q	508.0		590	510			440	1141
PCBC 22 -Q	558.8		625	545	465	1211		
PCBC 24 -Q	609.6		650	570	495	1285		
PCBC 26 -Q	660.4		675	595	520	1389		
PCBC 28 -Q	711.2		700	620	545	1454		
PCBC 30 -Q	762.0		725	645	575	1528		
PCBC 32 -Q	812.8		750	670	600	1592		
PCBC 34 -Q	863.6		775	695	625	1657		
PCBC 36 -Q	914.4		800	720	655	1752		
PCBC 40 -Q	1016.0		860	780	720	1916		
PCBC 44 -Q	1117.6		910	830	770	2042		

For other pipe standards (JIS, API, etc.) are available on request.

PIPE CLAMP FOR BRACING USE SB-CARBON STEEL (TYPE : PCBB-M , PCBBZ-M)

LOAD CAPACITY : 6kN



SIZE RANGE

1-1/2 through 12 inch pipe diameter.

MATERIAL

- (1) Clamp plate : Carbon steel (JIS G3103 SB410)
(ASTM Equivalent A515 Gr60)
- (2) Stud bolts, nuts and ream pin : Carbon Steel
(JIS G4051 S45C)
(ASTM Equivalent A576 Gr1045)

FINISH

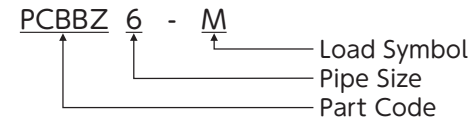
- (1) Clamp Plate : Applied STC's standard anti-corrosive paint unless otherwise specified.
- (2) Stud bolts, nuts and ream pin : Electro-plated.
- (3) Ream Pin and Ream Pin Holes on the clamp are machined to close tolerances.

SERVICE

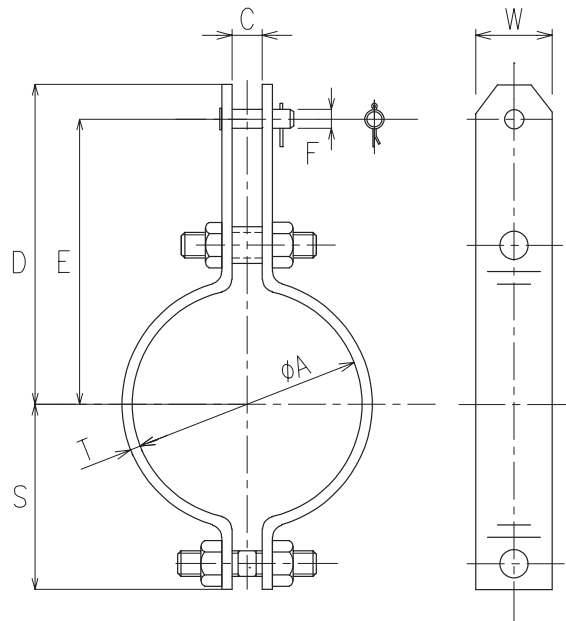
Used for occasional loads of insulated pipe with temperature range 351°C through 450°C .
Connected with Hydraulic or Mechanical Snubber and Rod Restraint for the Load Capacity 6.00kN or less.

ORDERING

Specify Part Code, Pipe Size and Load Symbol required.



Ex: PCBB 4-M & PCBBZ 6-M

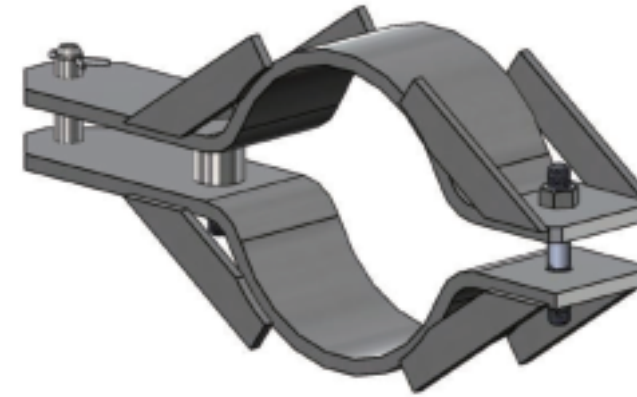


SIZE NO. & Load Symbol	PIPE DIA ANSI A	C	D	E	Standard Plate Size TxW	F	S	Weight (N)
PCBB 1-1/2 -M	48.3	24	180	160	6x50	12	80	15
PCBB 2 -M	60.3		190	170	9x50		90	23
PCBBZ 2-1/2 -M	73.0		210	190			100	26
PCBB 3 -M	88.9		220	200	9x50		110	27
PCBB 3-1/2 -M	101.6		225	205			115	28
PCBB 4 -M	114.3		235	215	12x50		125	30
PCBBZ 5 -M	141.3		255	235			140	43
PCBBZ 6 -M	168.3		265	245	12x50		155	47
PCBBZ 8 -M	219.1		300	280			185	56
PCBBZ 10 -M	273.0		330	310	16x50		220	84
PCBBZ 12 -M	323.8		355	335			250	94

For other pipe standards (JIS, API, etc.) are available on request.

PIPE CLAMP FOR BRACING USE SB-CARBON STEEL (TYPE : PCBB-1 , PCBBZ-1)

LOAD CAPACITY : 10kN



SIZE RANGE

1-1/2 through 44 inch pipe diameter.

MATERIAL

- (1) Clamp plate : Carbon steel (JIS G3103 SB410)
(ASTM Equivalent A515 Gr60)
- (2) Stud bolts, nuts and ream pin : Carbon Steel
(JIS G4051 S45C)
(ASTM Equivalent A576 Gr1045)

FINISH

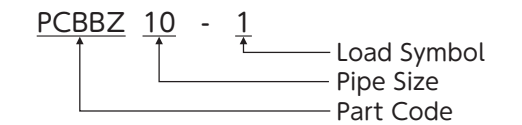
- (1) Clamp Plate : Applied STC's standard anti-corrosive paint unless otherwise specified.
- (2) Stud bolts, nuts and ream pin : Electro-plated.
- (3) Ream Pin and Ream Pin Holes on the clamp are machined to close tolerances.

SERVICE

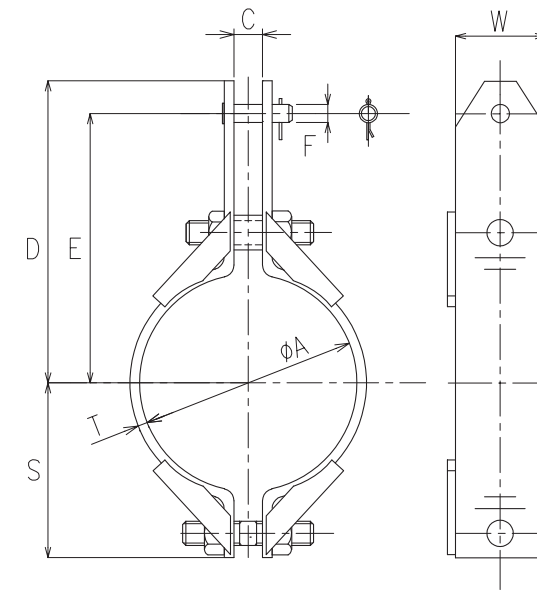
Used for occasional loads of insulated pipe with temperature range 351°C through 450°C .
Connected with Hydraulic or Mechanical Snubber and Rod Restraint for the Load Capacity 6.01 through 10.0kN.

ORDERING

Specify Part Code, Pipe Size and Load Symbol required.



Ex: PCBB 4-1 & PCBBZ 6-1

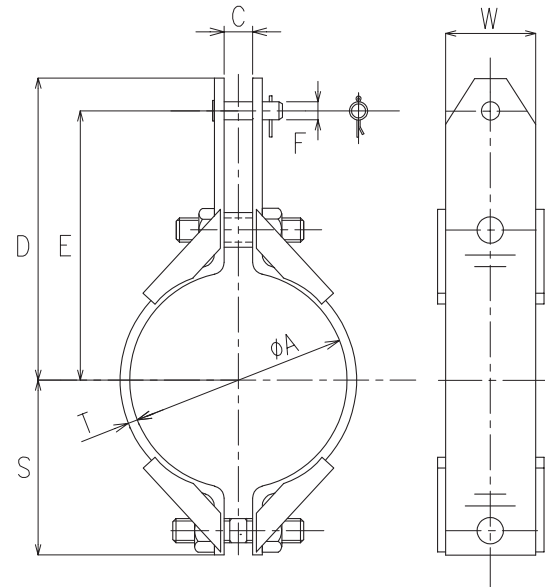
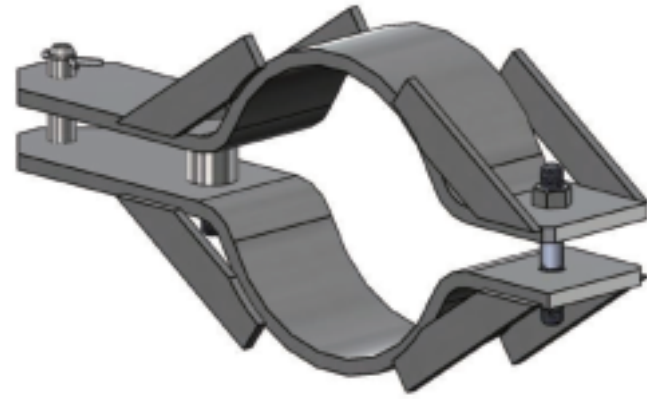


SIZE NO. & Load Symbol	PIPE DIA ANSI A	C	D	E	Standard Plate Size TxW	F	S	Weight (N)	
PCBB 1-1/2 -1	48.3	28	185	160	9x50	15	85	28	
PCBB 2 -1	60.3		195	170			9x50	95	30
PCBBZ 2-1/2 -1	73.0		215	190				105	32
PCBB 3 -1	88.9		225	200			9x50	120	35
PCBB 3-1/2 -1	101.6		230	205				130	37
PCBB 4 -1	114.3		240	215			9x75	135	38
PCBBZ 5 -1	141.3		260	235	150			42	
PCBBZ 6 -1	168.3		270	245	9x75		165	62	
PCBBZ 8 -1	219.1		305	280			195	76	
PCBBZ 10 -1	273.0		335	310	9x75		230	89	
PCBBZ 12 -1	323.8		360	335			250	97	
PCBB 14 -1	355.6		390	365	12x100		265	104	
PCBB 16 -1	406.4	415	390	290		113			
PCBB 18 -1	457.2	440	415	12x100	315	121			
PCBB 20 -1	508.0	465	440		350	138			
PCBB 22 -1	558.8	500	475	12x100	390	249			
PCBB 24 -1	609.6	525	500		415	265			
PCBB 26 -1	660.4	555	530	12x100	440	282			
PCBB 28 -1	711.2	580	555		470	300			
PCBB 30 -1	762.0	605	580	12x100	495	315			
PCBB 32 -1	812.8	630	605		520	332			
PCBB 34 -1	863.6	655	630	12x100	545	349			
PCBB 36 -1	914.4	680	655		570	362			
PCBB 40 -1	1016.0	735	710	12x100	625	391			
PCBB 44 -1	1117.6	785	760		675	422			

For other pipe standards (JIS, API, etc.) are available on request.

PIPE CLAMP FOR BRACING USE SB-CARBON STEEL (TYPE : PCBB-3, PCBBZ-3)

LOAD CAPACITY : 30kN



SIZE RANGE

1-1/2 through 44 inch pipe diameter.

MATERIAL

- (1) Clamp plate : Carbon steel (JIS G3103 SB410) (ASTM Equivalent A515 Gr60)
- (2) Stud bolts, nuts and ream pin : Carbon Steel (JIS G4051 S45C) (ASTM Equivalent A576 Gr1045)

FINISH

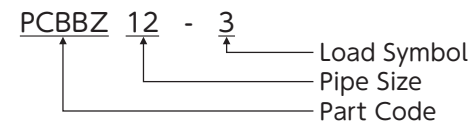
- (1) Clamp Plate : Applied STC's standard anti-corrosive paint unless otherwise specified.
- (2) Stud bolts, nuts and ream pin : Electro-plated.
- (3) Ream Pin and Ream Pin Holes on the clamp are machined to close tolerances.

SERVICE

Used for occasional loads of insulated pipe with temperature range 351°C through 450°C. Connected with Hydraulic or Mechanical Snubber and Rod Restraint for the Load Capacity 10.01 through 30.0kN.

ORDERING

Specify Part Code, Pipe Size and Load Symbol required.



Ex: PCBB 4-3 & PCBBZ 6-3

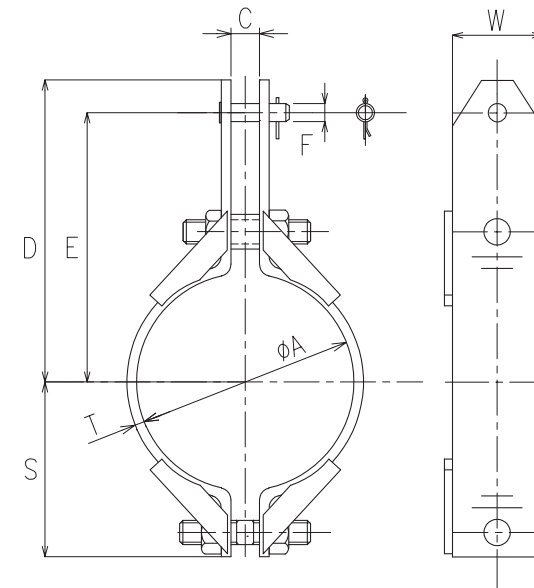
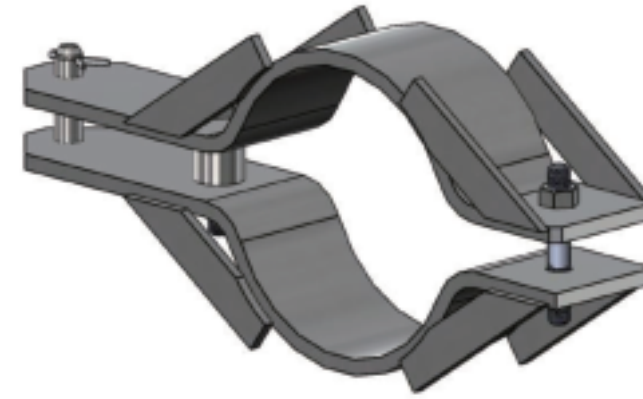
(mm)

SIZE NO. & Load Symbol	PIPE DIA ANSI A	C	D	E	Standard Plate Size TxW	F	S	Weight (N)
PCBB 1-1/2 -3	48.3	34	210	175	12x75	17	80	49
PCBB 2 -3	60.3		225	190			90	53
PCBBZ 2-1/2 -3	73.0		240	205			105	59
PCBB 3 -3	88.9		245	210			120	80
PCBB 3-1/2 -3	101.6		255	220	130		86	
PCBB 4 -3	114.3		265	230	135		89	
PCBBZ 5 -3	141.3		280	245	150		98	
PCBBZ 6 -3	168.3		295	260	190		139	
PCBBZ 8 -3	219.1		330	295	215		164	
PCBBZ 10 -3	273.0		360	325	235		183	
PCBBZ 12 -3	323.8		385	350	255		200	
PCBB 14 -3	355.6		415	380	300		233	
PCBB 16 -3	406.4		440	405	330		254	
PCBB 18 -3	457.2		465	430	355		323	
PCBB 20 -3	508.0		490	455	375		344	
PCBB 22 -3	558.8		535	500	395		371	
PCBB 24 -3	609.6		560	525	420		394	
PCBB 26 -3	660.4		585	550	445		417	
PCBB 28 -3	711.2		610	575	475		443	
PCBB 30 -3	762.0		635	600	500		465	
PCBB 32 -3	812.8		660	625	530		490	
PCBB 34 -3	863.6		695	660	550		515	
PCBB 36 -3	914.4		715	680	575		536	
PCBB 40 -3	1016.0		765	730	635		593	
PCBB 44 -3	1117.6		820	785	685		640	
PCBBZ 5 -3	141.3		280	245	150		98	
PCBBZ 6 -3	168.3		295	260	190		139	
PCBBZ 8 -3	219.1		330	295	215		164	
PCBBZ 10 -3	273.0		360	325	235		183	
PCBBZ 12 -3	323.8		385	350	255		200	
PCBBZ 14 -3	355.6		415	380	300		233	
PCBBZ 16 -3	406.4		440	405	330		254	
PCBBZ 18 -3	457.2		465	430	355		323	
PCBBZ 20 -3	508.0		490	455	375		344	
PCBBZ 22 -3	558.8		535	500	395		371	
PCBBZ 24 -3	609.6		560	525	420		394	
PCBBZ 26 -3	660.4		585	550	445		417	
PCBBZ 28 -3	711.2		610	575	475		443	
PCBBZ 30 -3	762.0		635	600	500		465	
PCBBZ 32 -3	812.8		660	625	530		490	
PCBBZ 34 -3	863.6		695	660	550		515	
PCBBZ 36 -3	914.4		715	680	575		536	
PCBBZ 40 -3	1016.0		765	730	635		593	
PCBBZ 44 -3	1117.6		820	785	685		640	

For other pipe standards (JIS, API, etc.) are available on request.

PIPE CLAMP FOR BRACING USE SB-CARBON STEEL (TYPE : PCBB-6, PCBBZ-6)

LOAD CAPACITY : 60kN



SIZE RANGE

3 through 44 inch pipe diameter.

MATERIAL

- (1) Clamp plate : Carbon steel (JIS G3103 SB410) (ASTM Equivalent A515 Gr60)
- (2) Stud bolts, nuts and ream pin : Carbon Steel (JIS G4051 S45C) (ASTM Equivalent A576 Gr1045)

FINISH

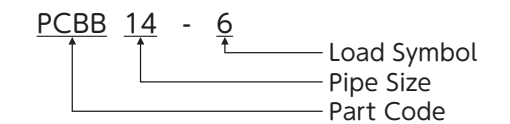
- (1) Clamp Plate : Applied STC's standard anti-corrosive paint unless otherwise specified.
- (2) Stud bolts, nuts and ream pin : Electro-plated.
- (3) Ream Pin and Ream Pin Holes on the clamp are machined to close tolerances.

SERVICE

Used for occasional loads of insulated pipe with temperature range 351°C through 450°C. Connected with Hydraulic or Mechanical Snubber and Rod Restraint for the Load Capacity 30.01 through 60.0kN.

ORDERING

Specify Part Code, Pipe Size and Load Symbol required.



Ex: PCBB 4-6 & PCBBZ 6-6

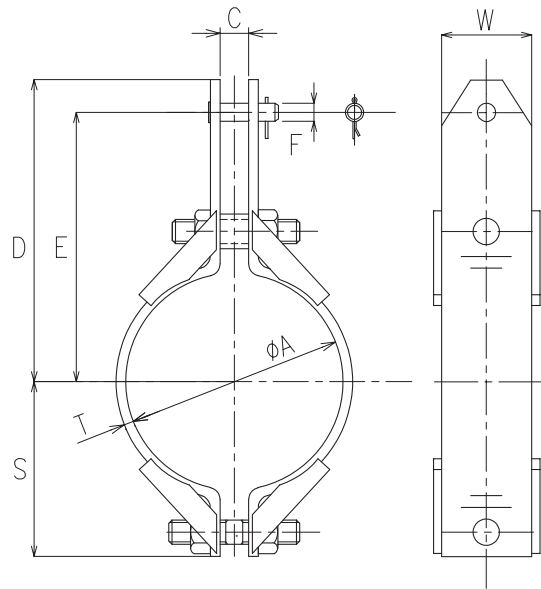
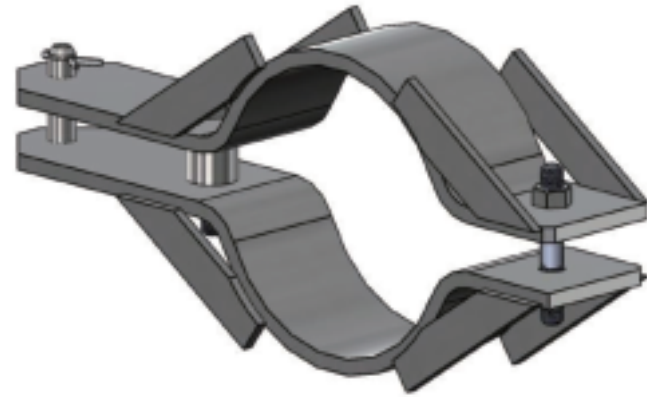
(mm)

SIZE NO. & Load Symbol	PIPE DIA ANSI A	C	D	E	Standard Plate Size TxW	F	S	Weight (N)
PCBB 3 -6	88.9	36	250	210	12x125	25	130	112
PCBB 3-1/2 -6	101.6		260	220			135	117
PCBB 4 -6	114.3		270	230			145	125
PCBBZ 5 -6	141.3		285	245			160	136
PCBBZ 6 -6	168.3		300	260	190		179	
PCBBZ 8 -6	219.1		335	295	215		206	
PCBBZ 10 -6	273.0		365	325	255		256	
PCBBZ 12 -6	323.8		390	350	290		288	
PCBB 14 -6	355.6		420	380	310		308	
PCBB 16 -6	406.4		445	405	330		330	
PCBB 18 -6	457.2		470	430	355		354	
PCBB 20 -6	508.0		495	455	380		378	
PCBB 22 -6	558.8		540	500	405		405	
PCBB 24 -6	609.6		565	525	430		429	
PCBB 26 -6	660.4		590	550	455		452	
PCBB 28 -6	711.2		615	575	480		477	
PCBB 30 -6	762.0		640	600	525		601	
PCBB 32 -6	812.8		665	625	550		630	
PCBB 34 -6	863.6		690	650	575		658	
PCBB 36 -6	914.4		720	680	600		687	
PCBB 40 -6	1016.0		770	730	650		767	
PCBB 44 -6	1117.6		825	785	700		825	
PCBBZ 5 -6	141.3		285	245	160		136	
PCBBZ 6 -6	168.3		300	260	190		179	
PCBBZ 8 -6	219.1		335	295	215		206	
PCBBZ 10 -6	273.0		365	325	255		256	
PCBBZ 12 -6	323.8		390	350	290		288	
PCBBZ 14 -6	355.6		420	380	310		308	
PCBBZ 16 -6	406.4		445	405	330		330	
PCBBZ 18 -6	457.2		470	430	355		354	
PCBBZ 20 -6	508.0		495	455	380		378	
PCBBZ 22 -6	558.8		540	500	405		405	
PCBBZ 24 -6	609.6		565	525	430		429	
PCBBZ 26 -6	660.4		590	550	455		452	
PCBBZ 28 -6	711.2		615	575	480		477	
PCBBZ 30 -6	762.0		640	600	525		601	
PCBBZ 32 -6	812.8		665	625	550		630	
PCBBZ 34 -6	863.6		690	650	575		658	
PCBBZ 36 -6	914.4		720	680	600		687	
PCBBZ 40 -6	1016.0		770	730	650		767	
PCBBZ 44 -6	1117.6		825	785	700		825	

For other pipe standards (JIS, API, etc.) are available on request.

PIPE CLAMP FOR BRACING USE SB-CARBON STEEL
(TYPE : PCBB-T , PCBBZ-T)

LOAD CAPACITY : 100kN



SIZE RANGE

6 through 44 inch pipe diameter.

MATERIAL

- (1) Clamp plate : Carbon steel (JIS G3103 SB410)
(ASTM Equivalent A515 Gr60)
- (2) Stud bolts, nuts and ream pin : Carbon Steel
(JIS G4051 S45C)
(ASTM Equivalent A576 Gr1045)

FINISH

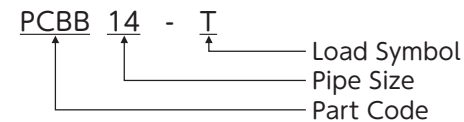
- (1) Clamp Plate : Applied STC's standard anti-corrosive paint unless otherwise specified.
- (2) Stud bolts, nuts and ream pin : Electro-plated.
- (3) Ream Pin and Ream Pin Holes on the clamp are machined to close tolerances.

SERVICE

Used for occasional loads of insulated pipe with temperature range 351°C through 450°C .
Connected with Hydraulic or Mechanical Snubber and Rod Restraint for the Load Capacity 60.01 through 100.0kN.

ORDERING

Specify Part Code, Pipe Size and Load Symbol required.



Ex: PCBB 14-T & PCBBZ 6-T

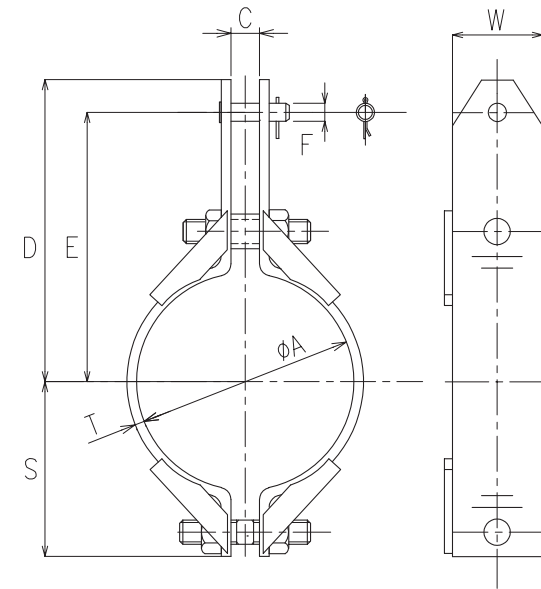
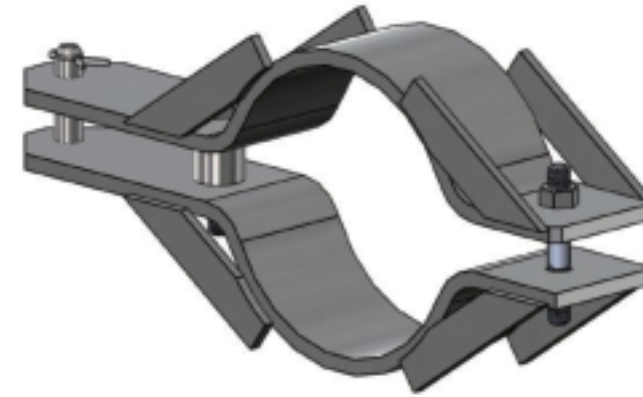
(mm)

SIZE NO. & Load Symbol	PIPE DIA ANSI A	C	D	E	Standard Plate Size TxW	F	S	Weight (N)
PCBBZ 6 - T	168.3	40	330	280	16x150	30	230	285
PCBBZ 8 - T	219.1		365	315			275	335
PCBBZ 10 - T	273.0		395	345			295	372
PCBBZ 12 - T	323.8		420	370			310	397
PCBB 14 - T	355.6		450	400			325	422
PCBB 16 - T	406.4		475	425			345	446
PCBB 18 - T	457.2		500	450			380	487
PCBB 20 - T	508.0		525	475			405	522
PCBB 22 - T	558.8		560	510			430	561
PCBB 24 - T	609.6		585	535			455	592
PCBB 26 - T	660.4		615	565			485	630
PCBB 28 - T	711.2		640	590			510	690
PCBB 30 - T	762.0		665	615	535	723		
PCBB 32 - T	812.8		690	640	560	755		
PCBB 34 - T	863.6		715	665	590	933		
PCBB 36 - T	914.4		740	690	615	969		
PCBB 40 - T	1016.0	795	745	670	1056			
PCBB 44 - T	1117.6	845	795	720	1131			
					16x180			

For other pipe standards (JIS, API, etc.) are available on request.

PIPE CLAMP FOR BRACING USE SB-CARBON STEEL
(TYPE : PCBB-S , PCBBZ-S)

LOAD CAPACITY : 160kN



SIZE RANGE

6 through 44 inch pipe diameter.

MATERIAL

- (1) Clamp plate : Carbon steel (JIS G3103 SB410)
(ASTM Equivalent A515 Gr60)
- (2) Stud bolts, nuts and ream pin : Carbon Steel
(JIS G4051 S45C)
(ASTM Equivalent A576 Gr1045)

FINISH

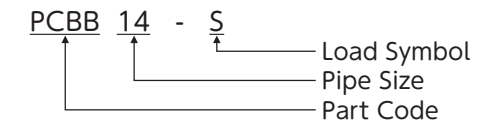
- (1) Clamp Plate : Applied STC's standard anti-corrosive paint unless otherwise specified.
- (2) Stud bolts, nuts and ream pin : Electro-plated.
- (3) Ream Pin and Ream Pin Holes on the clamp are machined to close tolerances.

SERVICE

Used for occasional loads of insulated pipe with temperature range 351°C through 450°C .
Connected with Hydraulic or Mechanical Snubber and Rod Restraint for the Load Capacity 100.01 through 160.0kN.

ORDERING

Specify Part Code, Pipe Size and Load Symbol required.



Ex: PCBB 14-S & PCBBZ 6-S

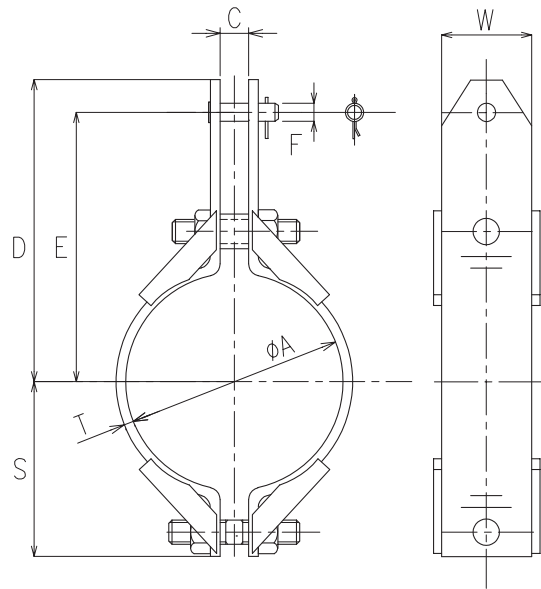
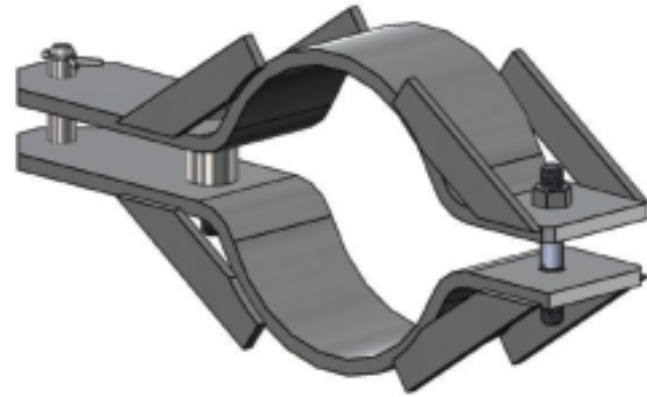
(mm)

SIZE NO. & Load Symbol	PIPE DIA ANSI A	C	D	E	Standard Plate Size TxW	F	S	Weight (N)
PCBBZ 6 - S	168.3	50	355	290	19x180	40	220	424
PCBBZ 8 - S	219.1		390	325			255	479
PCBBZ 10 - S	273.0		415	350			295	631
PCBBZ 12 - S	323.8		440	375			325	688
PCBB 14 - S	355.6		465	400			345	727
PCBB 16 - S	406.4		495	430			370	781
PCBB 18 - S	457.2		525	460			410	859
PCBB 20 - S	508.0		550	485			425	891
PCBB 22 - S	558.8		585	520			460	986
PCBB 24 - S	609.6		610	545			485	1036
PCBB 26 - S	660.4		635	570			510	1085
PCBB 28 - S	711.2		660	595			535	1135
PCBB 30 - S	762.0		685	620	560	1185		
PCBB 32 - S	812.8		710	645	590	1268		
PCBB 34 - S	863.6		735	670	615	1316		
PCBB 36 - S	914.4		760	695	655	1691		
PCBB 40 - S	1016.0	815	750	705	1815			
PCBB 44 - S	1117.6	865	800	760	1951			
					19x250			

For other pipe standards (JIS, API, etc.) are available on request.

PIPE CLAMP FOR BRACING USE SB-CARBON STEEL (TYPE:PCBB-Q, PCBBZ-Q)

LOAD CAPACITY : 250kN



SIZE RANGE

10 through 44 inch pipe diameter.

MATERIAL

- (1) Clamp plate : Carbon steel (JIS G3103 SB410) (ASTM Equivalent A515 Gr60)
- (2) Stud bolts, nuts and ream pin : Carbon Steel (JIS G4051 S45C) (ASTM Equivalent A576 Gr1045)

FINISH

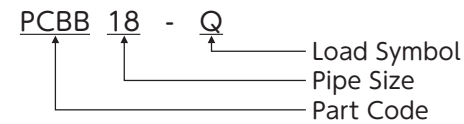
- (1) Clamp Plate : Applied STC's standard anti-corrosive paint unless otherwise specified.
- (2) Stud bolts, nuts and ream pin : Electro-plated.
- (3) Ream Pin and Ream Pin Holes on the clamp are machined to close tolerances.

SERVICE

Used for occasional loads of insulated pipe with temperature range 351°C through 450°C. Connected with Hydraulic or Mechanical Snubber and Rod Restraint for the Load Capacity 160.01 through 250.0kN.

ORDERING

Specify Part Code, Pipe Size and Load Symbol required.



Ex: PCBB 14-Q & PCBBZ 10-Q

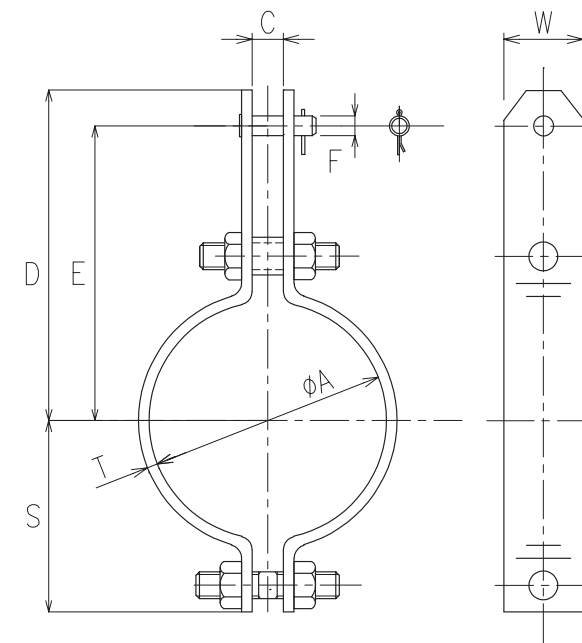
(mm)

SIZE NO. & Load Symbol	PIPE DIA ANSI A	C	D	E	Standard Plate Size TxW	F	S	Weight (N)
PCBBZ 10 - Q	273.0	72	455	375	25x200	50	295	844
PCBBZ 12 - Q	323.8		480	400			335	973
PCBB 14 - Q	355.6		510	430			355	1033
PCBB 16 - Q	406.4		535	455			385	1109
PCBB 18 - Q	457.2		565	485			410	1181
PCBB 20 - Q	508.0		590	510			455	1541
PCBB 22 - Q	558.8		625	545	480		1629	
PCBB 24 - Q	609.6		650	570	510		1726	
PCBB 26 - Q	660.4		675	595	535		1870	
PCBB 28 - Q	711.2		700	620	560		1952	
PCBB 30 - Q	762.0		725	645	590		2049	
PCBB 32 - Q	812.8		750	670	615		2130	
PCBB 34 - Q	863.6	775	695	640	2213			
PCBB 36 - Q	914.4	800	720	665	2295			
PCBB 40 - Q	1016.0	860	780	745	2975			
PCBB 44 - Q	1117.6	910	830	795	3164			

For other pipe standards (JIS, API, etc.) are available on request.

PIPE CLAMP FOR BRACING USE ALLOY STEEL (TYPE:PCBA-M, PCBAZ-M)

LOAD CAPACITY : 6kN



SIZE RANGE

1-1/2 through 12 inch pipe outer diameter.

MATERIAL

- (1) Clamp plate : Chromium Molybdenum steel (ASTM A387 Gr22)
- (2) Stud bolts and nuts : Chromium Molybdenum steel (JIS G4052 SCM435H) (ASTM Equivalent A322 Gr4137)
- (3) Ream pin : Carbon steel (JIS G4051 S45C) (ASTM Equivalent A576 Gr1045)

FINISH

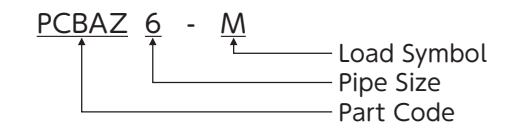
- (1) Clamp Plate : Applied STC's standard anti-corrosive paint unless otherwise specified.
- (2) Ream pin : Electro-plated.
- (3) Ream Pin and Ream Pin Holes on the clamp are machined to close tolerances.

SERVICE

Used for occasional loads of insulated pipe with temperature range 451°C through 575°C. Connected with Hydraulic or Mechanical snubber and Rod restraint for the load capacity of 6.00kN or less.

ORDERING

Specify Part Code, Pipe Size and Load Symbol required.



Ex: PCBA 4-M & PCBAZ 6-M

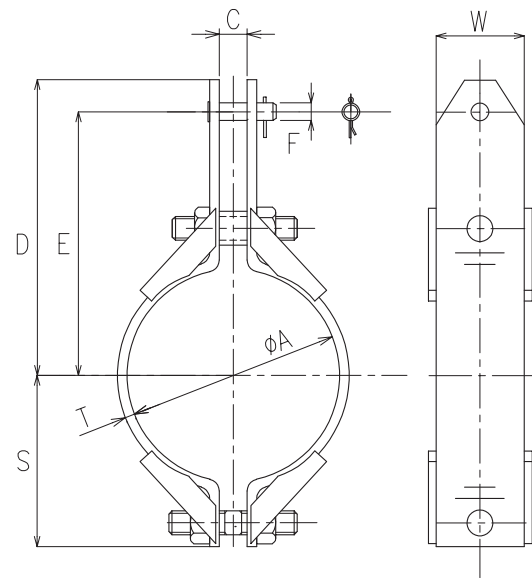
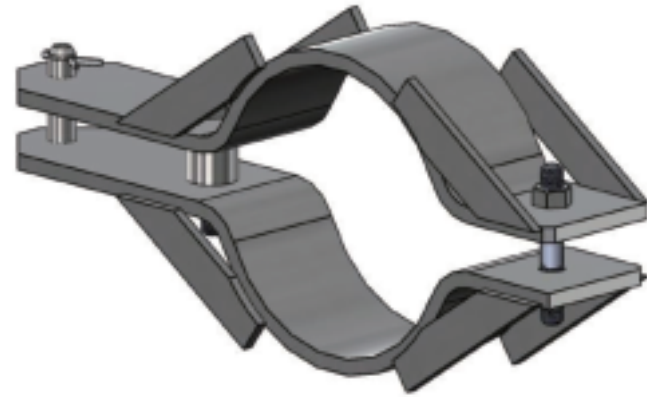
(mm)

SIZE NO. & Load Symbol	PIPE DIA ANSI A	C	D	E	Standard Plate Size TxW	F	S	Weight (N)
PCBA 1-1/2 - M	48.3	24	220	200	9x50	12	80	24
PCBA 2 - M	60.3		230	210			90	26
PCBAZ 2-1/2 - M	73.0		250	230			105	37
PCBA 3 - M	88.9		260	240	12x50		110	39
PCBA 3-1/2 - M	101.6		265	245			120	41
PCBA 4 - M	114.3		275	255			130	43
PCBAZ 5 - M	141.3		295	275	16x50		150	63
PCBAZ 6 - M	168.3		325	305			165	70
PCBAZ 8 - M	219.1		360	340			195	104
PCBAZ 10 - M	273.0		390	370	16x75		220	134
PCBAZ 12 - M	323.8		415	395	16x90		260	182

For other pipe standards (JIS, API, etc.) are available on request.

PIPE CLAMP FOR BRACING USE ALLOY STEEL (TYPE : PCBA-1 , PCBAZ-1)

LOAD CAPACITY : 10kN



SIZE RANGE

1-1/2 through 44 inch pipe outer diameter.

MATERIAL

- (1) Clamp plate : Chromium Molybdenum steel (ASTM A387 Gr22)
- (2) Stud bolts and nuts : Chromium Molybdenum steel (JIS G4052 SCM435H) (ASTM Equivalent A322 Gr4137)
- (3) Ream pin : Carbon steel (JIS G4051 S45C) (ASTM Equivalent A576 Gr1045)

FINISH

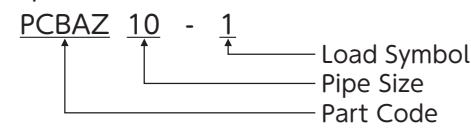
- (1) Clamp Plate: Applied STC's standard anti-corrosive paint unless otherwise specified.
- (2) Ream pin : Electro-plated.
- (3) Ream Pin and Ream Pin Holes on the clamp are machined to close tolerances.

SERVICE

Used for occasional loads of insulated pipe with temperature range 451°C through 575°C Connected with Hydraulic or Mechanical snubber and Rod restraint for the Load Capacity of 6.01 through 10.0kN

ORDERING

Specify Part Code, Pipe Size and Load Symbol required.



Ex: PCBA 4-1 & PCBAZ 6-1

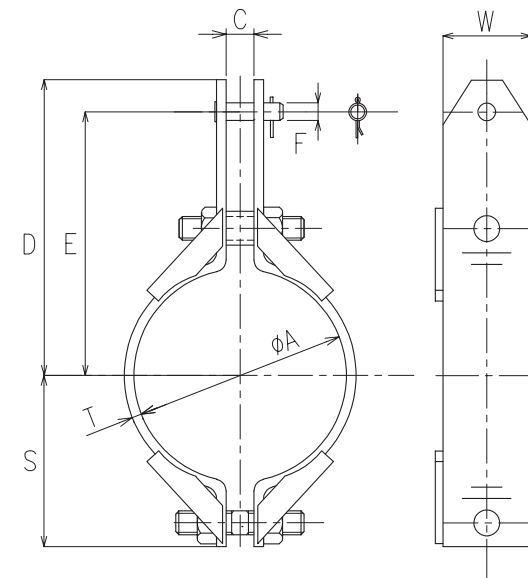
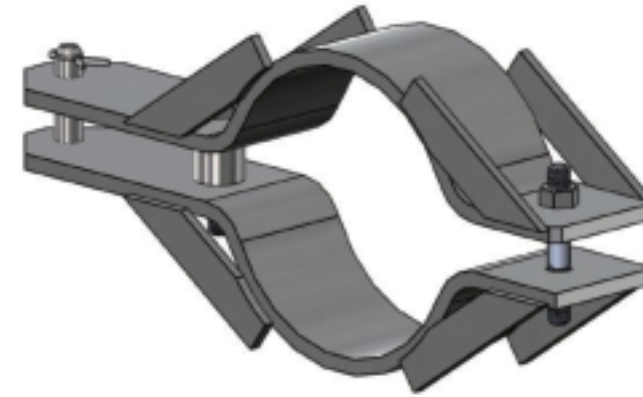
(mm)

SIZE NO. & Load Symbol	PIPE DIA ANSI A	C	D	E	Standard Plate Size TxW	F	S	Weight (N)
PCBA 1-1/2 -1	48.3	28	225	200	9x50	15	85	31
PCBA 2 -1	60.3		235	210			95	32
PCBAZ 2-1/2 -1	73.0		255	230			105	35
PCBA 3 -1	88.9		265	240			120	37
PCBA 3-1/2 -1	101.6		270	245			130	40
PCBA 4 -1	114.3		280	255			135	41
PCBAZ 5 -1	141.3		300	275			150	45
PCBAZ 6 -1	168.3		320	295			165	67
PCBAZ 8 -1	219.1		355	330			195	81
PCBAZ 10 -1	273.0		390	365			230	95
PCBAZ 12 -1	323.8		420	395			250	104
PCBA 14 -1	355.6		440	415			265	109
PCBA 16 -1	406.4		465	440	290		118	
PCBA 18 -1	457.2		500	475	320		165	
PCBA 20 -1	508.0		525	500	350		184	
PCBA 22 -1	558.8		550	525	390		259	
PCBA 24 -1	609.6		575	550	415		274	
PCBA 26 -1	660.4		630	605	440		295	
PCBA 28 -1	711.2		635	610	470		310	
PCBA 30 -1	762.0		660	635	495		325	
PCBA 32 -1	812.8		690	665	520		343	
PCBA 34 -1	863.6		715	690	545		358	
PCBA 36 -1	914.4		740	715	570		373	
PCBA 40 -1	1016.0		795	770	625		402	
PCBA 44 -1	1117.6		845	820	675		433	

For other pipe standards (JIS, API, etc.) are available on request.

PIPE CLAMP FOR BRACING USE ALLOY STEEL (TYPE : PCBA-3 , PCBAZ-3)

LOAD CAPACITY : 30kN



SIZE RANGE

1-1/2 through 44 inch pipe outer diameter.

MATERIAL

- (1) Clamp plate : Chromium Molybdenum steel (ASTM A387 Gr22)
- (2) Stud bolts and nuts : Chromium Molybdenum steel (JIS G4052 SCM435H) (ASTM Equivalent A322 Gr4137)
- (3) Ream pin : Carbon steel (JIS G4051 S45C) (ASTM Equivalent A576 Gr1045)

FINISH

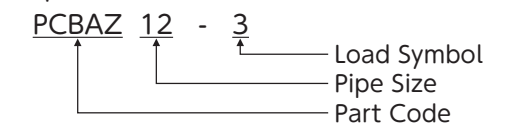
- (1) Clamp Plate : Applied STC's standard anti-corrosive paint unless otherwise specified.
- (2) Ream pin : Electro-plated.
- (3) Ream Pin and Ream Pin Holes on the clamp are machined to close tolerances.

SERVICE

Used for occasional loads of insulated pipe with temperature range 451°C through 575°C Connected with Hydraulic or Mechanical snubber and Rod restraint for the Load Capacity of 10.01 through 30.0kN

ORDERING

Specify Part Code, Pipe Size and Load Symbol required.



Ex: PCBA 4-3 & PCBAZ 6-3

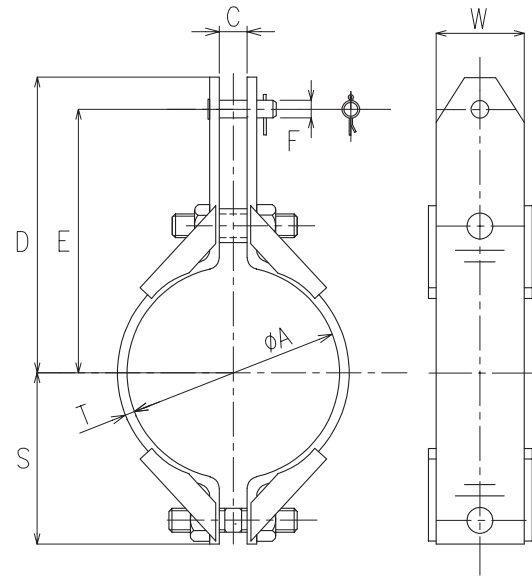
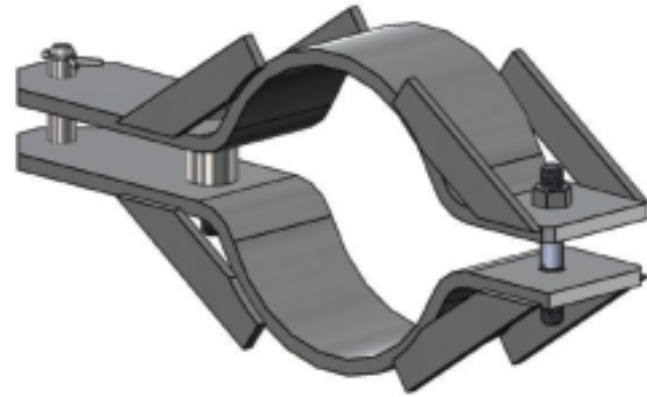
(mm)

SIZE NO. & Load Symbol	PIPE DIA ANSI A	C	D	E	Standard Plate Size TxW	F	S	Weight (N)
PCBA 1-1/2 -3	48.3	34	250	215	12x100	17	80	71
PCBA 2 -3	60.3		265	230			100	82
PCBAZ 2-1/2 -3	73.0		280	245			115	89
PCBA 3 -3	88.9		285	250			120	90
PCBA 3-1/2 -3	101.6		295	260			140	123
PCBA 4 -3	114.3		305	270			150	135
PCBAZ 5 -3	141.3		320	285			165	147
PCBAZ 6 -3	168.3		355	320			190	162
PCBAZ 8 -3	219.1		390	355			230	232
PCBAZ 10 -3	273.0		420	385			255	257
PCBAZ 12 -3	323.8		445	410			290	289
PCBA 14 -3	355.6		475	440			305	318
PCBA 16 -3	406.4		500	465	335		345	
PCBA 18 -3	457.2		525	490	350		364	
PCBA 20 -3	508.0		550	515	380		389	
PCBA 22 -3	558.8		595	560	405		418	
PCBA 24 -3	609.6		620	585	430		441	
PCBA 26 -3	660.4		645	610	455		465	
PCBA 28 -3	711.2		670	635	480		490	
PCBA 30 -3	762.0		695	660	505		514	
PCBA 32 -3	812.8		720	685	530		538	
PCBA 34 -3	863.6		755	720	560		566	
PCBA 36 -3	914.4		775	740	600		702	
PCBA 40 -3	1016.0		825	790	650		778	
PCBA 44 -3	1117.6		880	845	700		846	

For other pipe standards (JIS, API, etc.) are available on request.

PIPE CLAMP FOR BRACING USE ALLOY STEEL (TYPE : PCBA-6, PCBAZ-6)

LOAD CAPACITY : 60kN



SIZE RANGE

3 through 44 inch pipe outer diameter.

MATERIAL

- (1) Clamp plate : Chromium Molybdenum steel (ASTM A387 Gr22)
- (2) Stud bolts and nuts : Chromium Molybdenum steel (JIS G4052 SCM435H) (ASTM Equivalent A322 Gr4137)
- (3) Ream pin : Carbon steel (JIS G4051 S45C) (ASTM Equivalent A576 Gr1045)

FINISH

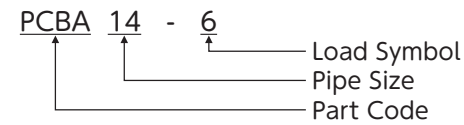
- (1) Clamp Plate : Applied STC's standard anti-corrosive paint unless otherwise specified.
- (2) Ream pin : Electro-plated.
- (3) Ream Pin and Ream Pin Holes on the clamp are machined to close tolerances.

SERVICE

Used for occasional loads of insulated pipe with temperature range 451°C through 575°C Connected with Hydraulic or Mechanical snubber and Rod restraint for the Load Capacity of 30.01 through 60.0kN

ORDERING

Specify Part Code, Pipe Size and Load Symbol required.



Ex: PCBA 4-6 & PCBAZ 6-6

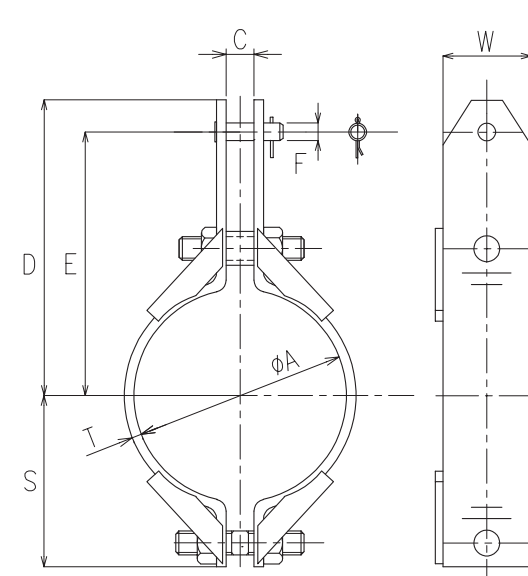
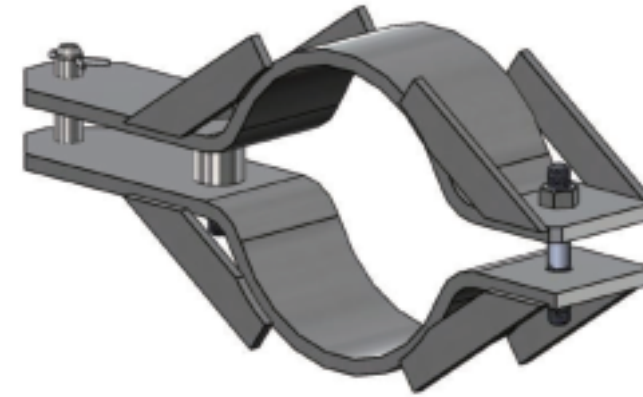
(mm)

SIZE NO. & Load Symbol	PIPE DIA ANSI A	C	D	E	Standard Plate Size TxW	F	S	Weight (N)
PCBA 3 - 6	88.9	36	290	250	12x150	25	140	158
PCBA 3-1/2 - 6	101.6		300	260			145	164
PCBA 4 - 6	114.3		310	270			155	171
PCBAZ 5 - 6	141.3		325	285			170	185
PCBAZ 6 - 6	168.3		360	320			200	227
PCBAZ 8 - 6	219.1		395	355			235	259
PCBAZ 10 - 6	273.0		425	385	270		347	
PCBAZ 12 - 6	323.8		450	410	295		377	
PCBA 14 - 6	355.6		480	440	325		428	
PCBA 16 - 6	406.4		505	465	340		447	
PCBA 18 - 6	457.2		530	490	370		480	
PCBA 20 - 6	508.0		555	515	395		510	
PCBA 22 - 6	558.8		600	560	420		544	
PCBA 24 - 6	609.6		625	585	445		574	
PCBA 26 - 6	660.4		650	610	480		688	
PCBA 28 - 6	711.2		675	635	505		719	
PCBA 30 - 6	762.0	700	660	535	758			
PCBA 32 - 6	812.8	725	685	565	806			
PCBA 34 - 6	863.6	750	710	590	838			
PCBA 36 - 6	914.4	780	740	615	871			
PCBA 40 - 6	1016.0	830	790	670	949			
PCBA 44 - 6	1117.6	885	845	720	1014			

For other pipe standards (JIS, API, etc.) are available on request.

PIPE CLAMP FOR BRACING USE ALLOY STEEL (TYPE : PCBA-T, PCBAZ-T)

LOAD CAPACITY : 100kN



SIZE RANGE

6 through 44 inch pipe outer diameter.

MATERIAL

- (1) Clamp plate : Chromium Molybdenum steel (ASTM A387 Gr22)
- (2) Stud bolts and nuts : Chromium Molybdenum steel (JIS G4052 SCM435H) (ASTM Equivalent A322 Gr4137)
- (3) Ream pin : Carbon steel (JIS G4051 S45C) (ASTM Equivalent A576 Gr1045)

FINISH

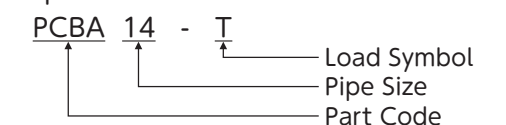
- (1) Clamp Plate : Applied STC's standard anti-corrosive paint unless otherwise specified.
- (2) Ream pin : Electro-plated.
- (3) Ream Pin and Ream Pin Holes on the clamp are machined to close tolerances.

SERVICE

Used for occasional loads of insulated pipe with temperature range 451°C through 575°C Connected with Hydraulic or Mechanical snubber and Rod restraint for the Load Capacity of 60.01 through 100.0kN

ORDERING

Specify Part Code, Pipe Size and Load Symbol required.



Ex: PCBA 14-T & PCBAZ 6-T

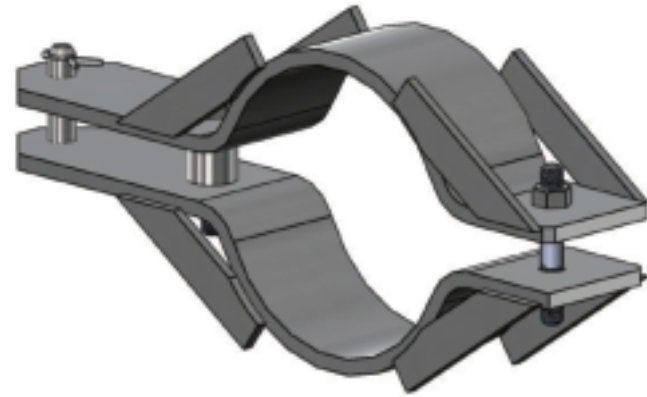
(mm)

SIZE NO. & Load Symbol	PIPE DIA ANSI A	C	D	E	Standard Plate Size TxW	F	S	Weight (N)
PCBAZ 6 - T	168.3	40	380	330	16x180	30	245	391
PCBAZ 8 - T	219.1		415	365			275	438
PCBAZ 10 - T	273.0		440	390			305	488
PCBAZ 12 - T	323.8		480	430			330	532
PCBA 14 - T	355.6		500	450			350	565
PCBA 16 - T	406.4		525	475			375	603
PCBA 18 - T	457.2		560	510	405		653	
PCBA 20 - T	508.0		585	535	430		697	
PCBA 22 - T	558.8		610	560	455		741	
PCBA 24 - T	609.6		635	585	480		780	
PCBA 26 - T	660.4		670	620	515		930	
PCBA 28 - T	711.2		695	645	540		973	
PCBA 30 - T	762.0		720	670	565		1024	
PCBA 32 - T	812.8		750	700	590		1069	
PCBA 34 - T	863.6		775	725	615		1117	
PCBA 36 - T	914.4		800	750	640		1158	
PCBA 40 - T	1016.0	855	805	695	1263			
PCBA 44 - T	1117.6	905	855	750	1386			

For other pipe standards (JIS, API, etc.) are available on request.

PIPE CLAMP FOR BRACING USE ALLOY STEEL (TYPE : PCBA-S , PCBAZ-S)

LOAD CAPACITY : 160kN



SIZE RANGE

6 through 44 inch pipe outer diameter.

MATERIAL

- (1) Clamp plate : Chromium Molybdenum steel (ASTM A387 Gr22)
- (2) Stud bolts and nuts : Chromium Molybdenum steel (JIS G4052 SCM435H) (ASTM Equivalent A322 Gr4137)
- (3) Ream pin : Carbon steel (JIS G4051 S45C) (ASTM Equivalent A576 Gr1045)

FINISH

- (1) Clamp Plate : Applied STC's standard anti-corrosive paint unless otherwise specified.
- (2) Ream pin : Electro-plated.
- (3) Ream Pin and Ream Pin Holes on the clamp are machined to close tolerances.

SERVICE

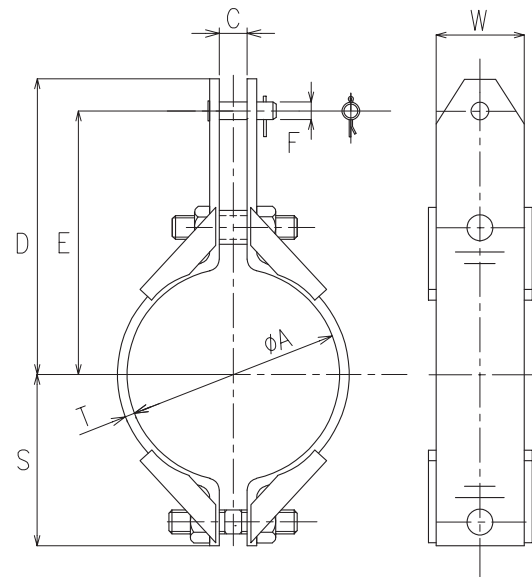
Used for occasional loads of insulated pipe with temperature range 451°C through 575°C
Connected with Hydraulic or Mechanical snubber and Rod restraint for the Load Capacity of 100.01 through 160.0kN

ORDERING

Specify Part Code, Pipe Size and Load Symbol required.

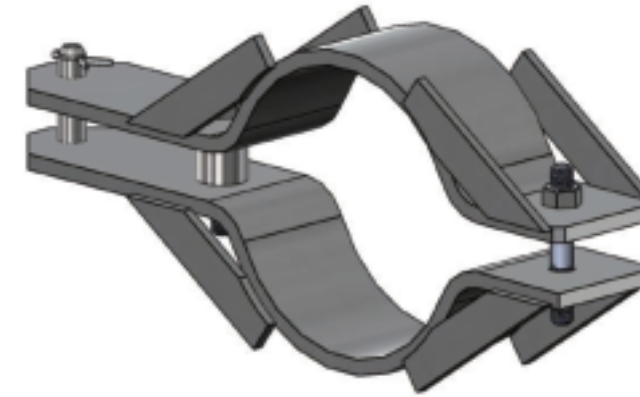
PCBA 14 - S
 ↑ ↑ ↑
 Part Code Pipe Size Load Symbol

Ex: PCBA 14-S & PCBAZ 6-S



PIPE CLAMP FOR BRACING USE ALLOY STEEL (TYPE : PCBA-Q , PCBAZ-Q)

LOAD CAPACITY : 250kN



SIZE RANGE

10 through 44 inch pipe outer diameter.

MATERIAL

- (1) Clamp plate : Chromium Molybdenum steel (ASTM A387 Gr22)
- (2) Stud bolts and nuts : Chromium Molybdenum steel (JIS G4052 SCM435H) (ASTM Equivalent A322 Gr4137)
- (3) Ream pin : Carbon steel (JIS G4051 S45C) (ASTM Equivalent A576 Gr1045)

FINISH

- (1) Clamp Plate : Applied STC's standard anti-corrosive paint unless otherwise specified.
- (2) Ream pin : Electro-plated.
- (3) Ream Pin and Ream Pin Holes on the clamp are machined to close tolerances.

SERVICE

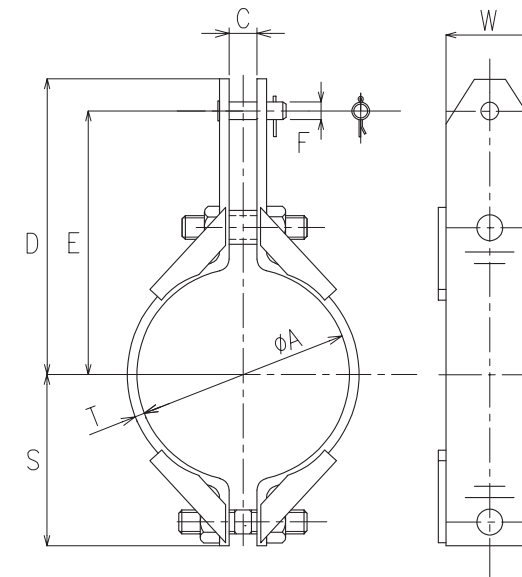
Used for occasional loads of insulated pipe with temperature range 451°C through 575°C
Connected with Hydraulic or Mechanical snubber and Rod restraint for the Load Capacity of 160.01 through 250.0kN

ORDERING

Specify Part Code, Pipe Size and Load Symbol required.

PCBA 18 - Q
 ↑ ↑ ↑
 Part Code Pipe Size Load Symbol

Ex: PCBA 14-Q & PCBAZ 10-Q



(mm)

SIZE NO. & Load Symbol	PIPE DIA ANSI A	C	D	E	Standard Plate Size TxW	F	S	Weight (N)
PCBAZ 6 - S	168.3	50	415	350	19x200	40	230	562
PCBAZ 8 - S	219.1		450	385			275	671
PCBAZ 10 - S	273.0		475	410			300	725
PCBAZ 12 - S	323.8		500	435			330	785
PCBA 14 - S	355.6		525	460			350	842
PCBA 16 - S	406.4		555	490			390	1101
PCBA 18 - S	457.2		585	520	420		1178	
PCBA 20 - S	508.0		610	545	445		1242	
PCBA 22 - S	558.8		645	580	475		1315	
PCBA 24 - S	609.6		670	605	500		1394	
PCBA 26 - S	660.4		695	630	525		1458	
PCBA 28 - S	711.2		720	655	575		1838	
PCBA 30 - S	762.0		745	680	600		1913	
PCBA 32 - S	812.8		770	705	630		2003	
PCBA 34 - S	863.6		795	730	655		2095	
PCBA 36 - S	914.4		820	755	680		2171	
PCBA 40 - S	1016.0	875	810	730	2322			
PCBA 44 - S	1117.6	925	860	785	2498			

For other pipe standards (JIS, API, etc.) are available on request.

(mm)

SIZE NO. & Load Symbol	PIPE DIA ANSI A	C	D	E	Standard Plate Size TxW	F	S	Weight (N)
PCBAZ 10 - Q	273.0	72	515	435	25x250	50	320	1231
PCBAZ 12 - Q	323.8		540	460	375		1636	
PCBA 14 - Q	355.6		570	490	395		1724	
PCBA 16 - Q	406.4		595	515	425		1819	
PCBA 18 - Q	457.2		625	545	450		1926	
PCBA 20 - Q	508.0		650	570	480		2033	
PCBA 22 - Q	558.8		685	605	505		2142	
PCBA 24 - Q	609.6		710	630	550		2361	
PCBA 26 - Q	660.4		735	655	575		2464	
PCBA 28 - Q	711.2		760	680	600		2560	
PCBA 30 - Q	762.0		785	705	630		2706	
PCBA 32 - Q	812.8		810	730	655		2806	
PCBA 34 - Q	863.6		835	755	680		2905	
PCBA 36 - Q	914.4		860	780	705		2998	
PCBA 40 - Q	1016.0		920	840	775		3810	
PCBA 44 - Q	1117.6		970	890	825		4030	

For other pipe standards (JIS, API, etc.) are available on request.

PIPE OUTER DIAMETER OF JIS, ANSI API STANDARD

B Nominal Pipe Out Dia. (In)	A Nominal Pipe Out Dia (mm)	Actual Outer Diameter		
		JIS (mm)	ANSI (mm)	API (mm)
1/8	6	10.5	10.29	10.3
1/4	8	13.8	13.72	13.7
3/8	10	17.3	17.15	17.1
1/2	15	21.7	21.34	21.3
3/4	20	27.2	26.67	26.7
1	25	34.0	33.40	33.4
1-1/4	32	42.7	42.16	42.2
1-1/2	40	48.6	48.26	48.3
2	50	60.5	60.33	60.3
2-1/2	65	76.3	73.03	73.0
3	80	89.1	88.90	88.9
3-1/2	90	101.6	101.60	101.6
4	100	114.3	114.30	114.3
5	125	139.8	141.30	141.3
6	150	165.2	168.28	168.3
8	200	216.3	219.08	219.1
10	250	267.4	273.05	273.0
12	300	318.5	323.85	323.8
14	350	355.6	355.60	355.6
16	400	406.4	406.40	406.4
18	450	457.2	457.20	457.2
20	500	508.0	508.00	508.0
22	550	558.8	558.80	558.8
24	600	609.6	609.60	609.6
26	650	660.4	660.40	660.4
28	700	711.2	711.20	711.2
30	750	762.0	762.00	762.0
32	800	812.8	812.80	812.8
34	850	863.6	863.60	863.6
36	900	914.4	914.40	914.4
40	1000	1016.0		1016.0
44	1100	1117.6		1117.6
48	1200	1219.2		1219.2
54	1350	1371.6		
60	1500	1524.0		

Note: JIS = Japanese Industrial Standards
 ANSI = American National Standards Institute
 API = American Petroleum Institute

JIS (Japanese Industrial Standards) Steel Materials mainly used for pipe supports
CHEMICAL COMPOSITION AND MECHANICAL PROPERTIES

JIS No. & Symbol	Thick (mm)	Chemical Composition (%)					
		C	Si	Mn	P	S	Cr
G3101-SS400	t ≤ 16	—	—	—	≤ 0.050	≤ 0.050	—
	16 < t ≤ 40	—	—	—	"	"	—
	40 < t	—	—	—	"	"	—
G3106-SM400B	t ≤ 16	≤ 0.20	≤ 0.35	0.60 ~ 1.50	≤ 0.035	≤ 0.035	—
	16 < t ≤ 40	"	"	"	"	"	—
	40 < t ≤ 50	"	"	"	"	"	—
	50 < t ≤ 100	≤ 0.22	"	"	"	"	—
G3103-SB410	t ≤ 25	≤ 0.24	0.15 ~ 0.40	≤ 0.90	≤ 0.020	≤ 0.020	—
	25 < T ≤ 50	≤ 0.27	"	"	"	"	—
	50 < t ≤ 100	≤ 0.29	"	"	"	"	—
G4304-SUS304		≤ 0.08	≤ 1.00	≤ 2.00	≤ 0.045	≤ 0.030	18.00 ~ 20.00
G4303-SUS304		"	"	"	"	"	"
G4051-S25C		0.22 ~ 0.28	0.15 ~ 0.35	0.30 ~ 0.60	≤ 0.030	≤ 0.035	—
G4051-S45C		0.42 ~ 0.48	0.15 ~ 0.35	0.60 ~ 0.90	≤ 0.030	≤ 0.035	—
G4052-SCM435H		0.32 ~ 0.39	0.15 ~ 0.35	0.55 ~ 0.95	≤ 0.030	≤ 0.030	0.85 ~ 1.25
G3452-SGP		—	—	—	≤ 0.040	≤ 0.040	—
G3454-STPG370		≤ 0.25	≤ 0.35	0.30 ~ 0.90	≤ 0.040	≤ 0.040	—
G3456-STPT370		≤ 0.25	0.10 ~ 0.35	0.30 ~ 0.90	≤ 0.035	≤ 0.035	—
G3456-STPT480		≤ 0.33	0.10 ~ 0.35	0.30 ~ 1.00	≤ 0.035	≤ 0.035	—
G3458-STPA24		≤ 0.15	≤ 0.50	0.30 ~ 0.60	≤ 0.030	≤ 0.030	1.90 ~ 2.60
G3459-SUS-304TP		≤ 0.08	≤ 1.00	≤ 2.00	≤ 0.045	≤ 0.030	18.00 ~ 20.00
G3201-SF390A		≤ 0.60	0.15 ~ 0.50	0.30 ~ 1.20	≤ 0.030	≤ 0.035	—
G4801-SUP9		0.52 ~ 0.60	0.15 ~ 0.35	0.65 ~ 0.95	≤ 0.030	≤ 0.030	0.65 ~ 0.95
G4801-SUP9A		0.56 ~ 0.64	"	0.70 ~ 1.00	"	"	0.70 ~ 1.00
G4801-SUP11A		0.56 ~ 0.64	0.15 ~ 0.35	0.70 ~ 1.00	"	"	"

Chemical Composition (%)	Mechanical Properties (N/mm ²)		Nearly Equivalent ASTM Material No. (Example)	Remarks
	Other	Yield P.		
—	245 ≤	400 ~ 510	A36 A36 A307GrB & A563GrA	For Plate
—	235 ≤	"		For rod,bar
—	215 ≤	"		For bolt and nuts
—	245 ≤	400 ~ 510	A516 Gr60	For plate
—	235 ≤	"		
—	215 ≤	"		
—	215 ≤	"		
—	225 ≤	410 ~ 550	A515 Gr60	For plate
—	"	"		
—	"	"		
Ni 8.00 ~ 10.50	205 ≤	520 ≤	A240Tp304 A276Tp304 A193GrB8 & A194Gr8	For plate
"	"	"		For rod
"	"	"		For bolt and nuts
—	265 ≤	440 ≤	A576Gr1025 A668CID A193GrB7 & A194Gr7	For rod, bar For Forgings For bolt and nuts
—	N345 ≤ , H490 ≤	N570 ≤ , H690 ≤	A576Gr1045 A193GrB7 & A194Gr7	For rod, bar For bolt and nuts
Mo 0.15 ~ 0.35 Ni ≤ 0.25	785 ≤	930 ≤	A322Gr4137 A540GrB23 & A194Gr2H	For rod, bar For bolt and nuts
—	—	290 ≤	A53GrA TpF	For ordinary piping
—	215 ≤	370 ≤	A53GrA TpE	For pressure service piping
—	215 ≤	370 ≤	A106GrA	For high temperature service piping
—	275 ≤	480 ≤	A106GrC	
Mo 0.87 ~ 1.13	205 ≤	410 ≤	A335GrP22	Alloy steel piping
Ni 8.00 ~ 11.00	205 ≤	520 ≤	A312GrTP304	Stainless steel piping
—	195 ≤	390 ~ 490	A105Gr1	Carbon steel forging
Cu ≤ 0.30	1080 ≤	1230 ≤	A322Gr5155	Spring steel
"	"	"	A322Gr5160	
B 0.0050 ≤	"	"	A322Gr51B60	
Cu ≤ 0.30	"	"	"	

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GENERAL NOTE

Specifications in this catalog are subject to change without notice.