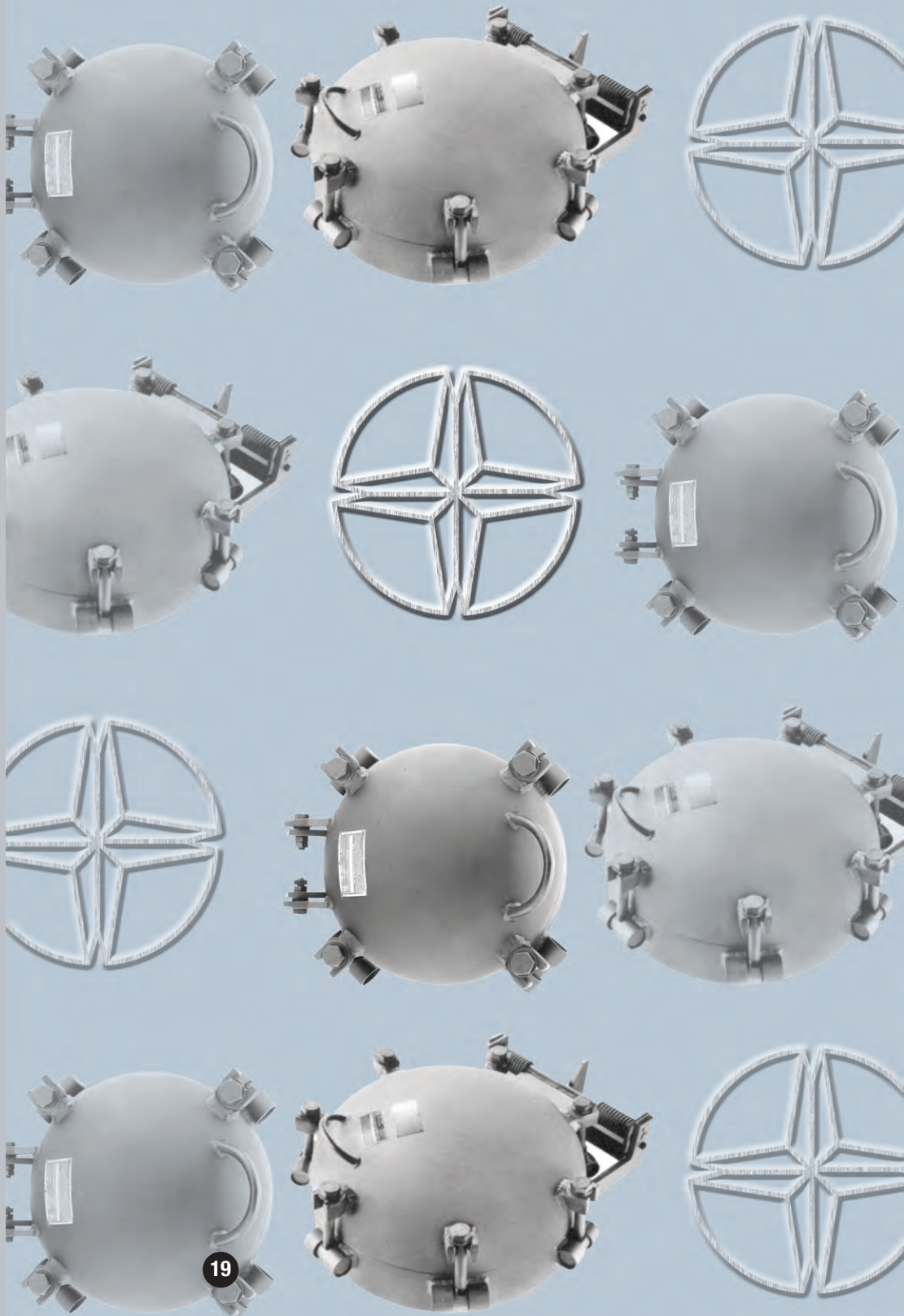


T-BOLT STYLE CLOSURES



T-BOLT HINGED CLOSURES

GENERAL INFORMATION

Tube Turns' exclusive T-Bolt Closure is designed expressly for nominal pressure applications. Less expensive and much more satisfactory than blind flanges and job-fabricated closure devices, it is ideal for:

1. Manways for storage tanks, mixing vessels, filters, separators and other batch equipment.
2. Caps for inspection ports and other access openings on towers and reactors.
3. Handholes on processing equipment and medical or laboratory apparatus such as hyperbaric chambers.

Economically Priced

Low initial cost is an especially attractive feature of the Tube Turns T-Bolt Closure. A complete unit normally costs less than the component parts for a blind and slip-on flange combination. There are no additional expenses for hinges, hoists, davits, etc., as the closure is fully assembled when shipped. Furthermore, installation and labor charges are held to a minimum; a single butt weld joins the closure to the nozzle vessel.

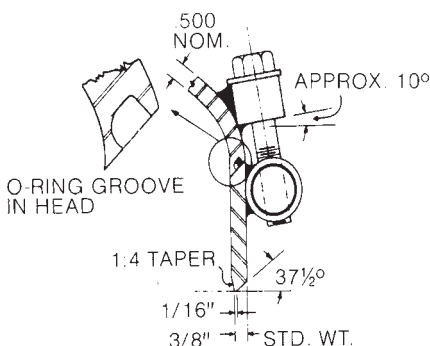
Compact Design

Simplicity of construction and operation are keynotes of the Tube Turns T-Bolt Hinged Closure. The closure consists of a thick semi-ellipsoidal head that is hinged to a matching hub, a self energized O-ring and a suitable number of T-Bolts to effect and maintain a tight seal. For most services, the standard materials—carbon steel and a "Buna-N" O-ring are satisfactory. Other metals and elastomers are furnished on special request. The T-Bolt Hinged Closure is opened quickly and easily. The operator merely loosens the T-Bolts until they clear the head lugs and allow the head to be swung open on its hinge. Complete, unrestricted access is provided, too, since the standard hinging permits a full 180° opening.

Warning Feature

The holding lugs are mounted on the closure head at an angle of approximately 10°. This provides a valuable feature, for the angular mounting requires that the T-bolt be backed off an extra turn or two before it will swing out of the holding position.

Thus, if there is pressure in the vessel while it is being opened, initial turns of the



bolts permit the head to lift slightly and the contained fluid escapes, alerting the operator to possible danger. Further movement of the head is restrained, since the T-bolt is confined within the holding lug.

Operating Savings

Tube Turns T-Bolt Hinged Closures provide savings of time and labor. The semi-ellipsoidal shape of the T-Bolt Closure has greater pressure-holding capacity than a flat plate of equal thickness. This permits substantial weight reduction: the head of a 24" T-Bolt Closure, for instance, weighs only 100 pounds, as compared with 410 pounds for a comparable size 150 lb blind flange. *And the mechanical advantage afforded by the hinge arrangement further reduces the force needed to open a T-Bolt Closure.* Bolting is also simplified. A 24" T-Bolt Closure has but five bolts, while the same size 150 lb flange requires 20. Furthermore, the T-bolts remain attached to the closure when it is opened, eliminating possibilities of dropped or misplaced nuts, bolts and washers.

Full Size Range

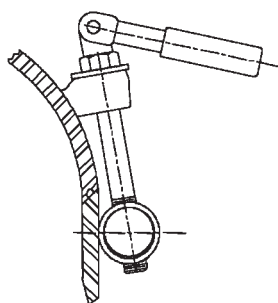
Standard Tube Turns T-Bolt Hinged Closures are furnished in carbon steel, stainless steel, & other alloys. Sizes range from 6" thru 66".



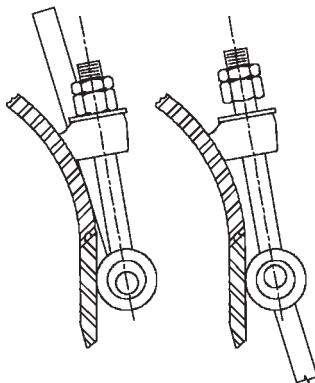
T-BOLT HINGED CLOSURES

T-BOLT CLOSURE OPTIONS

Break-Over Wrenches and Camlocks are optional attachments and accessories adding further to the versatility and utility of our T-Bolt Closures. Attachment of either of these options to the closure's T-Bolts provides extra convenience, speed and ease in tightening the bolts. These attachments eliminate the need for separate wrenches.



**Break-Over
Wrench Assembly**



**Tightened Loosened
Camlock Assembly**

The Break-Over Wrench Lug is welded to the T-Bolt (head bolt) and a handle is inserted over this lug. A pin is then inserted through the handle and the lug allowing the handle to act as a wrench and making the Break-Over Wrench an integral part of the T-Bolt Assembly.

In a Camlock Assembly, components replace the tapped swing nut (in the hub nut mount). The Camlock bolting unit consists of a high strength eye bolt that is pinned through an eccentric cam to provide the necessary clamping action. The caming action is adjustable by moving the adjustable nut at the threaded end of the eye bolt. This allows the camlock assembly to be loosened & tightened merely by lowering or raising the cam handle.



Vertical T-Bolt Closures

T-Bolt Closures with a spring loaded head for vertical applications are furnished in sizes 10" - 42". The need for spring loading can be determined by reference to the table below. The tabulated "Force to Lift Head" is the force to lift the head **without** the springs.

Please note these handles may not be an option for certain sizes and/or orientations.

Closure Size	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
Weight of Head (lbs)	7	12	19	22	32	41	53	67	74	100	112	125	139	169	184	269	295	322	346
Force to Lift Head (lbs)	4	9	12	15	20	26	32	40	44	58	62	71	76	90	106	149	168	186	231

T-BOLT RATINGS*

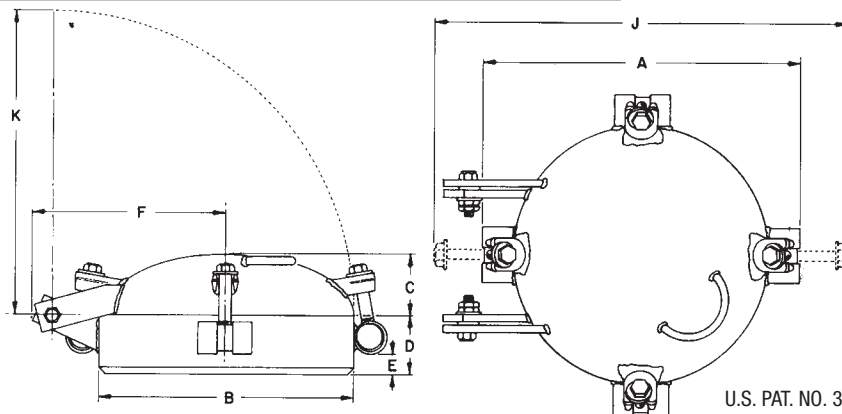
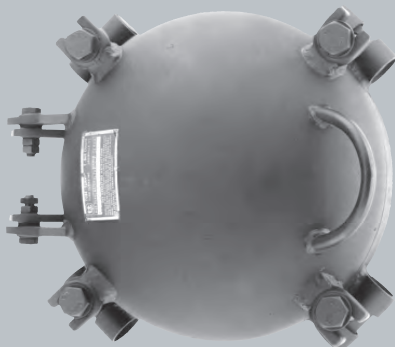
Closure Size	Class 75		Class 150		Class 300	
	Carbon Steel	Stainless Steel**	Carbon Steel	Stainless Steel**	Carbon Steel	Stainless Steel**
6	-	-	320	320	510	510
8	-	-	185	185	390	390
10	115	115	245	245	365	365
12	170	170	255	255	380	380
14	140	140	210	210	365	365
16	105	105	185	185	385	380
18	125	125	185	185	375	365
20	100	100	175	175	355	345
22	100	100	200	195	330	320
24	115	105	190	190	310	305
26	115	105	180	180	265	255
28	110	100	190	190	255	245
30	105	95	180	180	240	235
32	100	90	175	160	210	190
34	150	135	170	165	205	200
36	120	110	165	160	185	180
38	125	115	175	170	-	-
40	105	95	170	165	-	-
42	110	100	165	160	-	-
48	120	120	135	130	-	-

** Ratings apply to stainless steel closures with carbon steel bolts and attachments. Closures of all stainless steel are rated lower. For temperatures higher than 450F (232C), consult Tube Turns stating temperature, pressure, fluid and type of o-ring required. Ratings apply for closures with ASME SA325 bolts. Slightly higher ratings are available in some sizes upon application by using ASME SA193 Grade B7 bolts, resulting in a slightly higher price.

Above ratings good for 450F (232C). "Buna-N" is the standard O-ring gasket material. For services above 250F (121C) or where special corrosive conditions are to be encountered, O-rings of "Viton", Silicone Rubber, "Neoprene" Ethylene Propylene, "Teflon Encapsulated" (Viton or Silicone Core) can be furnished at an extra charge. Refer to Page 7



T-BOLT HORIZONTAL DIMENSIONS



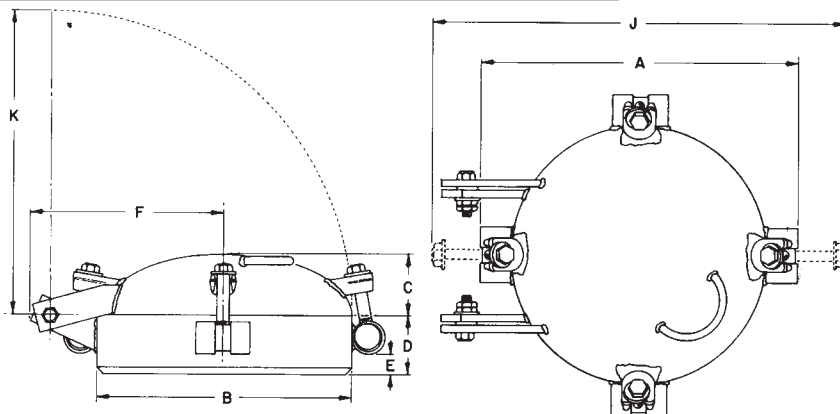
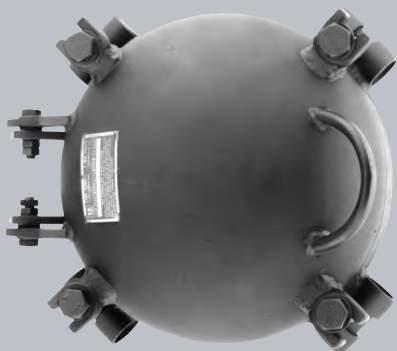
U.S. PAT. NO. 3,187,929

	Nom. Pipe Size	Nom.* Wall Thickness	Over-all A	OD at Welding Bevel B	Back to Face C	Hub Length D	Clear Hub Length E	Center to Hinge End F	Swing Bolt Clearance J	Opening Clearance K	No. Bolts	Bolt Size	Approx. Weight Lbs
Class 75-TB T-Bolt Horizontal	10	.500	13 3/8	10 3/4	2 13/16	2 1/2	1 1/16	7 5/8	18	12 1/4	3	1/2	30
	12	.500	16 1/8	12 3/4	3 1/8	2 5/8	3/4	8 15/16	21	14 1/4	4	5/8	50
	14	.500	17 3/8	14	3 9/16	2 7/8	1	9 9/16	22	15 1/2	4	5/8	60
	16	.500	19 3/8	16	4	2 7/8	1	10 1/2	24	17 1/2	4	5/8	70
	18	.500	21 3/8	18	4 1/2	3 3/8	1 3/8	11 11/16	30	19 1/2	4	3/4	95
	20	.500	23 3/8	20	4 15/16	3 7/8	1 7/8	12 15/16	32	21 11/16	4	3/4	115
	22	.500	25 3/8	22	5 1/4	4 3/8	2 3/8	13 15/16	34	23 11/16	5	3/4	140
	24	.500	27 7/8	24	5 3/4	4 3/8	1 13/16	15	38	25 11/16	5	7/8	165
	26	.500	29 7/8	26	6 1/4	4 3/8	1 13/16	16 1/4	40	28	6	7/8	180
	28	.500	31 7/8	28	6 3/4	4 3/8	2 1/8	17 1/4	42	30	7	7/8	200
	30	.500	33 7/8	30	7 1/4	4 3/8	1 7/8	18 5/16	45	32	8	7/8	230
	32	.500	35 7/8	32	7 3/4	4 3/8	2	19 5/8	47	34	9	7/8	265
	34	.625	38 3/4	34	8 3/16	4 3/8	1 5/16	20 5/8	51	36	9	1 1/8	325
	36	.625	40 3/4	36	8 11/16	4 1/2	1 5/8	21 9/16	53	38	9	1 1/8	410
	38	.625	42 3/4	38	9 3/16	4 1/2	1 5/8	22 9/16	55	40	10	1 1/8	450
	40	.625	44 3/4	40	9 11/16	4 1/2	1 5/8	22 3/4	57	42	10	1 1/8	480
	42	.625	46 3/4	42	10 3/16	4 1/2	1 5/8	25 5/16	61	44 3/4	11	1 1/8	550
	48	.750	52 3/4	48	11 3/4	7	4 1/8	28 1/8	67	49 1/2	14	1 1/8	830
Class 150-TB T-Bolt Horizontal	6	.500	9 1/4	6 5/8	2 1/8	1 11/16	1/4	5 1/2	13	8	3	1/2	15
	8	.500	11 1/4	8 5/8	2 3/16	2 1/4	13/16	6 5/8	15	10 1/8	3	1/2	20
	10	.500	14 1/8	10 3/4	2 13/16	2 1/2	3/4	7 5/8	19	12 1/4	4	5/8	35
	12	.500	16 1/8	12 3/4	3 1/8	2 5/8	3/4	9	23	14 5/16	4	3/4	55
	14	.500	17 3/8	14	3 9/16	2 7/8	1	9 9/16	24	15 1/2	4	3/4	65
	16	.500	19 3/8	16	4	2 7/8	1	10 1/2	26	17 1/2	7	5/8	80
	18	.500	21 3/8	18	4 1/2	3 3/8	1 3/8	11 11/16	30	19 1/2	6	3/4	100
	20	.500	23 3/8	20	4 15/16	3 7/8	1 7/8	12 15/16	32	21 11/16	7	3/4	125
	22	.500	25 3/4	22	5 1/4	4 3/8	1 13/16	15 1/2	36	23 3/16	7	7/8	150
	24	.500	27 7/8	24	5 3/4	4 3/8	1 7/8	15	38	25 11/16	8	7/8	180
	26	.500	29 7/8	26	6 1/4	4 3/8	1 13/16	16 1/4	40	28	9	7/8	200
	28	.500	31 7/8	28	6 3/4	4 3/8	2 1/8	17 1/4	43	30	11	7/8	225
	30	.500	33 7/8	30	7 1/4	4 3/8	1 7/8	18 5/16	45	32	12	7/8	250
	32	.500	36 3/4	32	7 3/4	4 3/8	1 5/16	19 5/8	49	34	10	1 1/8	310
	34	.625	38 3/4	34	8 3/16	4 3/8	1 5/16	20 5/8	53	36	10	1 1/8	380
	36	.625	40 3/4	36	8 11/16	4 1/2	1 5/8	21 9/16	55	38	11	1 1/8	460
	38	.625	42 3/4	38	9 3/16	4 1/2	1 5/8	22 9/16	59	40 1/16	13	1 1/8	500
	40	.625	44 3/4	40	9 11/16	4 1/2	1 5/8	26 1/16	57	44 7/16	14	1 1/8	550
	42	.625	46 3/4	42	10 3/16	4 1/2	1 5/8	25	61	44 7/16	15	1 1/8	600
	48	.750	52 3/4	48	11 3/4	7	4 1/8	28	67	52	16	1 1/8	860

All dimension are in inches. When ordering, please specify class, nominal size, bore, material and service conditions. T-Bolt Closures with longer hubs; Closures made to I.D. dimensions; or Closures equipped with Sight Glasses, Break-over Wrenches, Camlocks and other accessories are available on special order. *Standard Closures are taper bored to match standard wall thickness.



T-BOLT HORIZONTAL DIMENSIONS



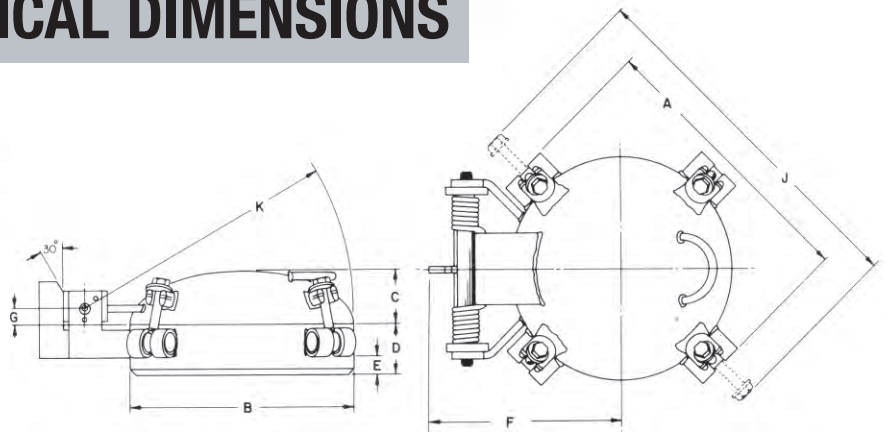
	Nom. Pipe Size	Nom.* Wall Thickness	Over-all A	OD at Welding Bevel B	Back to Face C	Hub Length D	Clear Hub Length E	Center to Hinge End F	Swing Bolt Clearance J	Opening Clearance K	No. Bolts	Bolt Size	Approx. Weight Lbs
Class 300-TB T-Bolt Horizontal	6	.500	9 7/8	6 5/8	2 1/8	2 1/16	5/16	5 5/8	16	8 1/8	3	5/8	18
	8	.500	11 7/8	8 5/8	2 3/16	2 1/4	7/16	6 9/16	19	10 1/8	4	5/8	27
	10	.500	14 1/8	10 3/4	2 13/16	2 1/2	5/8	7 5/8	20	12 1/4	4	3/4	35
	12	.500	16 1/8	12 3/4	3 1/8	2 5/8	3/4	9 3/4	23	15 3/16	6	3/4	55
	14	.500	17 3/8	14	3 9/16	2 7/8	1	9 1/2	25	15 7/8	7	3/4	70
	16	.500	19 7/8	16	4	2 7/8	3/8	10 1/8	29	17 1/2	7	7/8	85
	18	.500	22 3/4	18	4 1/2	3 3/8	5/8	11 3/4	33	20	6	1 1/8	130
	20	.500	24 3/4	20	4 15/16	3 7/8	1 1/8	12 5/16	36	21 9/16	7	1 1/8	175
	22	.500	26 3/4	22	5 1/4	4 3/8	1 5/8	13 15/16	38	23 11/16	8	1 1/8	200
	24	.500	28 3/4	24	5 3/4	4 3/8	1 5/8	16	40	26 11/16	9	1 1/8	230
	26	.500	30 3/4	26	6 1/4	4 3/8	1 1/4	16 5/8	42	28 5/8	9	1 1/8	250
	28	.500	32 3/4	28	6 3/4	4 3/8	1 5/8	17 5/16	45	30	10	1 1/8	275
	30	.500	34 3/4	30	7 1/4	4 3/8	1 11/16	18 5/16	47	32	11	1 1/8	300
	32	.500	36 3/4	32	7 3/4	4 3/8	1 5/16	19 11/16	49	34 7/16	11	1 1/8	360
	34	.625	38 3/4	34	8 3/16	4 3/8	1 5/16	21 1/8	53	36 1/2	12	1 1/8	440
	36	.625	40 3/4	36	8 11/16	4 1/2	1 5/8	25 5/16	55	38 3/4	12	1 1/8	510

All dimension are in inches. When ordering, please specify class, nominal size, bore, material and service conditions. T-Bolt Closures with longer hubs; Closures made to I.D. dimensions; or Closures equipped with Sight Glasses, Break-over Wrenches, Camlocks and other accessories are a available on special order. *Standard Closures are taper bored to match standard wall thickness.



We stock T-Bolt Closures in many sizes, pressure classes and materials.

T-BOLT VERTICAL DIMENSIONS



	Nom. Pipe Size	Nom.* Wall Thickness	Over-all A	OD at Welding Bevel B	Back to Face C	Hub Length D	Clear Hub Length E	Center to Hinge End F	Face to Hinge G	Swing Bolt Clearance J	Opening Clearance K	No. Bolts	Bolt Size	Approx. Weight Lbs
Class 75-TBV T-Bolt Vertical	10	.500	13 3/8	10 3/4	2 13/16	2 1/2	1 1/16	8 1/4	1 3/8	18	1 11/16	3	1/2	35
	12	.500	16 1/8	12 3/4	3 1/8	2 5/8	3/4	9 7/8	1 1/2	21	13 15/16	4	5/8	55
	14	.500	17 3/8	14	3 9/16	2 7/8	1	10 1/4	1 1/2	22	15 1/16	4	5/8	65
	16	.500	19 3/8	16	4	2 7/8	1	11 1/4	1 1/2	24	17 1/16	4	5/8	75
	18	.500	21 3/8	18	4 1/2	3 3/8	1 3/8	13 5/8	1 7/16	30	20 1/16	4	3/4	105
	20	.500	23 3/8	20	4 15/16	3 7/8	1 7/8	14 3/4	1 11/16	32	22 1/16	4	3/4	130
	22	.500	25 3/8	22	5 1/4	4 3/8	2 3/8	17 1/4	2 1/4	34	25 9/16	5	3/4	160
	24	.500	27 7/8	24	5 3/4	4 3/8	1 13/16	19 3/8	1 3/4	38	28 5/16	5	7/8	190
	26	.500	29 7/8	26	6 1/4	4 3/8	1 13/16	21 1/4	1 7/8	40	31 1/4	6	7/8	200
	28	.500	31 7/8	28	6 3/4	4 3/8	2 1/8	23	2 1/8	42	33 13/16	7	7/8	225
	30	.500	33 7/8	30	7 1/4	4 3/8	1 7/8	23	1 7/8	45	35 1/16	8	7/8	260
	32	.500	35 7/8	32	7 3/4	4 3/8	2	23	2	47	36 1/16	9	7/8	295
	34	.625	38 3/4	34	8 3/16	4 3/8	1 5/16	25 1/4	2 5/16	51	38 9/16	9	1 1/8	365
	36	.625	40 3/4	36	8 11/16	4 1/2	1 5/8	27	2 1/2	53	41 1/16	9	1 1/8	480
	38	.625	42 3/4	38	9 3/16	4 1/2	1 5/8	28	2 1/2	55	43 1/16	10	1 1/8	515
	40	.625	44 3/4	40	9 11/16	4 1/2	1 5/8	28 13/16	2 7/8	57	45 1/16	10	1 1/8	550
	42	.625	46 3/4	42	10 3/16	4 1/2	1 5/8	30 7/16	2 7/8	61	47 1/16	11	1 1/8	630
Class 150-TBV T-Bolt Vertical	10	.500	14 1/8	10 3/4	2 13/16	2 1/2	3/4	9 7/8	1 1/8	19	13 1/2	4	5/8	35
	12	.500	16 1/8	12 3/4	3 1/8	2 5/8	3/4	10 7/8	1 1/2	23	14 7/8	4	3/4	60
	14	.500	17 3/8	14	3 9/16	2 7/8	1	10 1/4	1 1/2	24	15	4	3/4	70
	16	.500	19 3/8	16	4	2 7/8	1	13 13/16	1 1/2	26	19 3/16	7	5/8	85
	18	.500	21 3/8	18	4 1/2	3 3/8	1 3/8	14 3/8	1 5/8	30	20 1/2	6	3/4	110
	20	.500	23 3/8	20	4 15/16	3 7/8	1 7/8	15 7/8	1 1/8	32	22 1/2	7	3/4	140
	22	.500	25 3/4	22	5 1/4	4 3/8	1 13/16	19 3/8	1 1/4*	36	25 1/2	7	7/8	170
	24	.500	27 7/8	24	5 3/4	4 3/8	1 7/8	19 3/8	2	38	28 1/4	8	7/8	205
	26	.500	29 7/8	26	6 1/4	4 3/8	1 13/16	22 1/4	2 1/8	40	31 5/8	9	7/8	225
	28	.500	31 7/8	28	6 3/4	4 3/8	2 1/8	23	2 1/8	43	33 3/4	11	7/8	250
	30	.500	33 7/8	30	7 1/4	4 3/8	1 7/8	27	1 3/8*	45	35	12	7/8	280
	32	.500	36 3/4	32	7 3/4	4 3/8	1 5/16	25	2	49	37	10	1 1/8	340
Class 300-TBV T-Bolt Vertical	34	.625	38 3/4	34	8 3/16	4 3/8	1 5/16	27 7/8	1 3/4*	53	38 1/2	10	1 1/8	420
	36	.625	40 3/4	36	8 11/16	4 1/2	1 5/8	29 1/2	1 3/4*	55	41	11	1 1/8	530
	10	.500	14 1/8	10 3/4	2 13/16	2 1/2	5/8	9 7/8	1 1/8	20	13 1/2	4	3/4	40
	12	.500	16 1/8	12 3/4	3 1/8	2 5/8	3/4	12 5/8	1 3/8	23	16 3/8	6	3/4	65
	14	.500	17 3/8	14	3 9/16	2 7/8	1	12 3/8	1 1/2	25	17 1/4	7	3/4	75
	16	.500	19 7/8	16	4	2 7/8	3/8	13 7/8	1 1/2	29	19 1/2	7	7/8	90
	18	.500	22 3/4	18	4 1/2	3 3/8	5/8	16 3/4	1	33	23	6	1 1/8	120
	20	.500	24 3/4	20	4 15/16	3 7/8	1 1/8	18 5/8	1 1/2	36	26	7	1 1/8	145
	22	.500	26 3/4	22	5 1/4	4 3/8	1 5/8	20	2 3/8	38	27 5/8	8	1 1/8	180
	24	.500	28 3/4	24	5 3/4	4 3/8	1 5/8	20 1/4	1 7/8	40	28 7/8	9	1 1/8	210
	26	.500	30 3/4	26	6 1/4	4 3/8	1 1/4	20 3/4	2 1/8	42	31 1/2	9	1 1/8	230
	28	.500	32 3/4	28	6 3/4	4 3/8	1 5/8	22 3/4	2 1/8	45	33 3/4	10	1 1/8	260
	30	.500	34 3/4	30	7 1/4	4 3/8	1 11/16	23 5/8	1 3/8	47	35 1/4	11	1 1/8	290
	32	.500	36 3/4	32	7 3/4	4 3/8	1 5/16	25	1 5/8	49	37 1/4	11	1 1/8	350
	34	.625	38 3/4	34	8 3/16	4 3/8	1 5/16	26 1/2	1 1/2	53	39 1/2	12	1 1/8	435
	36	.625	40 3/4	36	8 11/16	4 1/2	1 5/8	27 1/2	2 1/8	55	41 1/2	12	1 1/8	540

All dimension are in inches. When ordering, please specify class, nominal size, bore, material and service conditions. T-Bolt Closures with longer hubs; Closures made to I.D. dimensions; or Closures equipped with Sight Glasses, Break-over Wrenches, Camlocks and other accessories are available on special order. *Standard Closures are taper bored to match standard wall thickness.



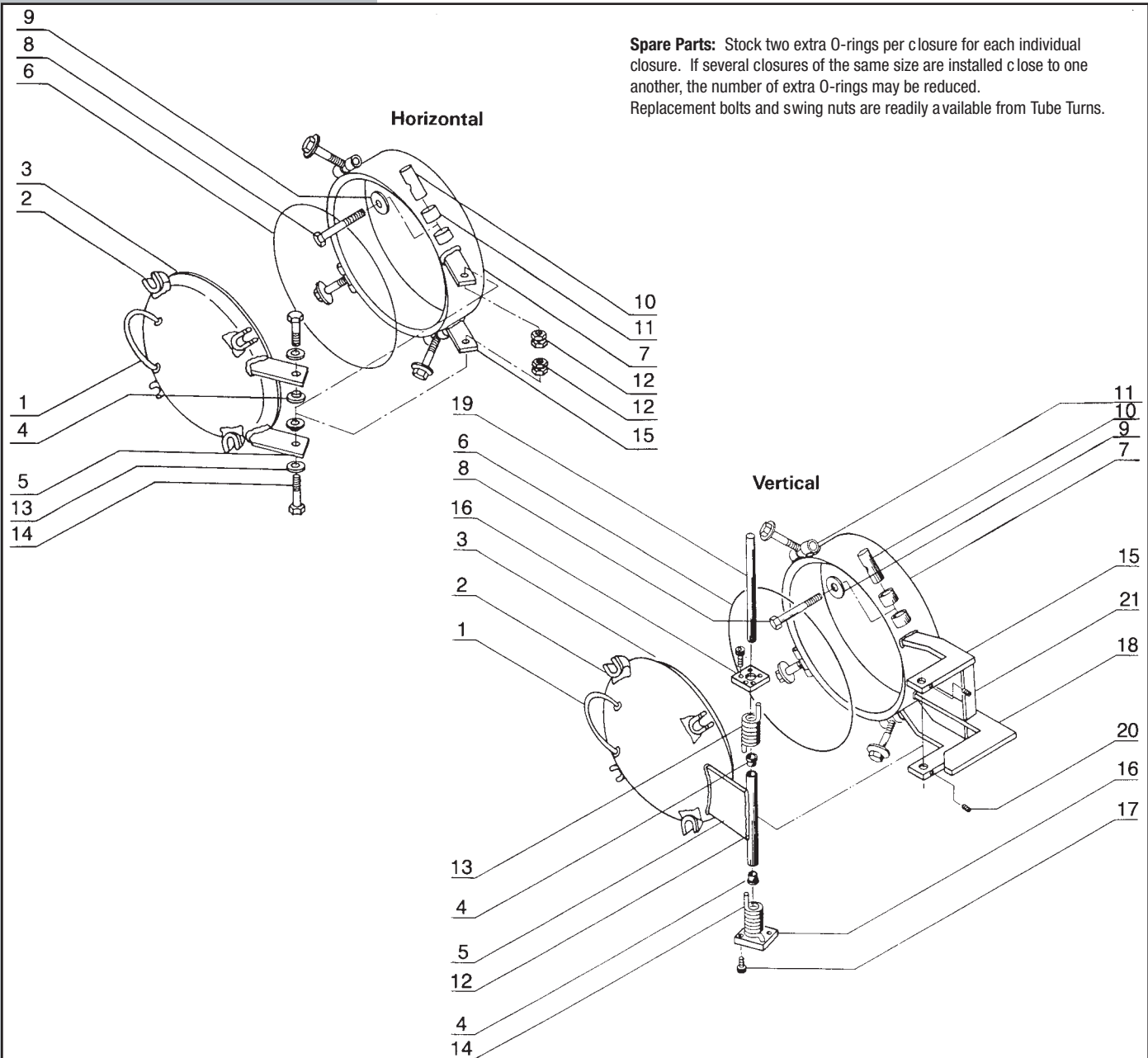
T-BOLT CLOSURE PARTS

T-Bolt Closure Horizontal Parts List

1. Head Handle	4. Hinge Bushings	7. Hub	10. Tapped Swing Nut	13. Hinge Bolt Washer
2. Head Bolt Lug	5. Head Hinge Arm	8. Head Bolt	11. Hub Nut Mounts	14. Hinge Bolt
3. Head	6. O-Ring	9. Head Bolt Washer	12. Hinge Bolt Nut	15. Hub Hinge Arms

T-Bolt Closure Vertical Parts List

1. Head Handle	6. O-ring	11. Hub Nut Mounts	16. Adjusting Plate	21. Hinge Brace
2. Head Bolt Lug	7. Hub	12. Hinge Tube	17. Lock Screw	
3. Head	8. Head Bolt	13. Spring (R.H.)	18. Head Stop	
4. Hinge Bushing	9. Head Bolt Washer	14. Spring (L.H.)	19. Hinge Rod	
5. Head Hinge Arm	10. Tapped Swing Nut	15. Hub Hinge Arms	20. Hinge Rod Set Screw	





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