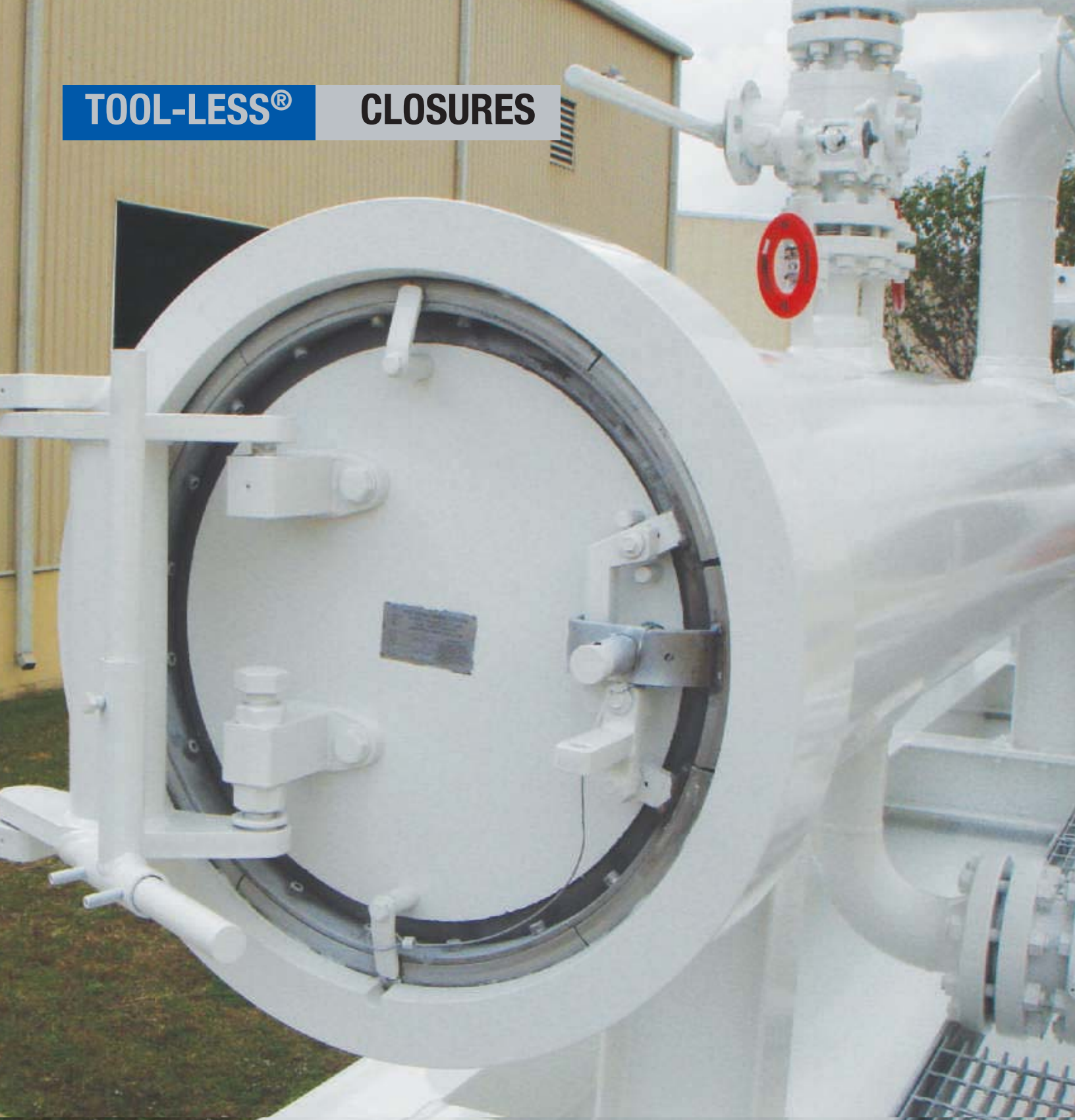


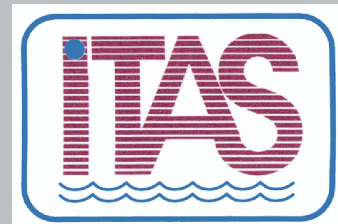
TOOL-LESS®

CLOSURES



For Blanking
Off Pipeline Ends,
Tank and Vessel
Openings

For more information:
Please visit www.itas.biz
or email: itas@itas-no.com



HISTORY

Tube Turns was founded in 1927 in Louisville, Kentucky, USA. We were the first American manufacturer of forged seamless pipe elbows and returns. Over the years, our products have evolved to exceed the ever changing market demands of the industries that we serve.

In 1959, we developed Yoke Style Hinged Closures. We then added T-Bolt Closures, Threaded Closures and Tool-less® Closures in order to satisfy customer requirements.

Applications include scraper traps, filters, strainers, separators/ coalescers, terminal manifolds, meter provers, distillation towers, storage tanks or any pressure vessel requiring frequent access.



DESIGN

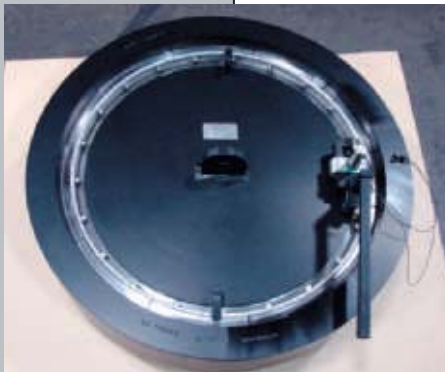
The Tool-less® Closure satisfies design requirements in ASME B31.3, B31.4, B31.8, and Section VIII, Div. 1. The entire design has been verified through proven stress calculations, the latest finite element analysis (FEA) software, and strain gage testing, establishing a high level of confidence in the structural integrity of the Tool-less® Closure. In addition, fatigue analysis based on severe field condition data has been successfully conducted on all closure sizes and classes.

FAST, EASY OPERATION

Tool-less® operation is smooth and direct and even the largest unit can be opened or closed in a matter of seconds by one person. Complete Installation, Operation and Maintenance Instructions are furnished with each Tool-less® Closure.

SAFETY

Our Pressure Warning Screw (PWS) assures both pressure warning and mechanical interlocking of the closure prior to commencement of operation. Additionally the PWS serves the purpose of alerting the operator to any residual pressure inside the vessel should the operator inadvertently attempt to open the closure before all pressure has been relieved. Tool-less® Closure safety system meets the requirements of UG-35 of ASME Section VIII Division 1. The Tool-less® Closure can also be easily fitted with key interlock systems.



CONFIGURATION

Tool-less® Closure is available in horizontal and vertical configurations. Horizontal closures are available in left (standard) or right hand hinging and include a robust double pivot adjustable hinge. Vertical closures can be offered with a davit or lifting lug depending on customer preference.



TOOL-LESS® CLOSURES

MATERIALS OF CONSTRUCTION

We maintain an inventory of ASME compliant components in carbon and stainless steel including low temperature and high yield materials to accommodate quick delivery. Materials conforming to the latest NACE requirement standard MR0175/ISO 15156, duplex stainless steel, and other specialty alloys are available upon request.

CORROSION RESISTANT WELD OVERLAY

Weld overlay of the sealing and wetted surfaces can be provided in a variety of corrosion resistant alloys.

ALLOWABLE WORKING PRESSURES (RATINGS)

In general, the pressure classes established for Tube Turns Tool-less® Closures refer to ASME/ANSI B16.5 ratings used in normal piping terminology. This is done as a matter of convenience to give the engineer the exact Tool-less® Closure design required for a particular application. Maximum allowable working pressures for carbon steel Tube Turns Tool-less® Closures are:


ASME/ANSI Pressure Class	Closure Service to 250°F (121°C) PSI (bar)
150	285 (19.65)
300	740 (51.02)
600	1480 (102.04)
900	2220 (153.06)
1500	3705 (255.45)



ASME CODE STAMPED CLOSURES

Code stamping of Tube Turns Tool-less® Closures is available on request at a nominal fee. This includes (1) the furnishing of a Partial Data Report (Form U-2A) verifying shop inspection of the unit by a commissioned inspector of the National Board of Boiler and Pressure Vessel Inspectors, and (2) the affixing of the ASME stamp.





SERIAL NUMBER

PART CERTIFIED BY
SYPRIS TECHNOLOGIES, INC.
TUBE TURNS DIVISION

MANUFACTURER'S STATEMENT OF CODE COMPLIANCE

In the event that shop inspection and stamping in accordance with Section VIII of the ASME Boiler and Pressure Vessel Code is not required, Tube Turns can furnish a Manufacturer's Statement of Code Compliance at no charge. This document affirms that the Tool-less® Closure is manufactured in accordance with the applicable requirements of the Code.



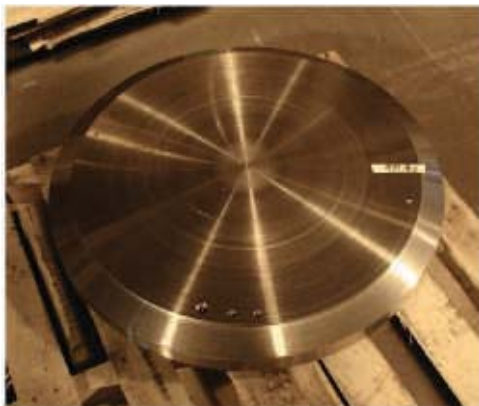
TOOL-LESS® CLOSURES



ORDERING DATA

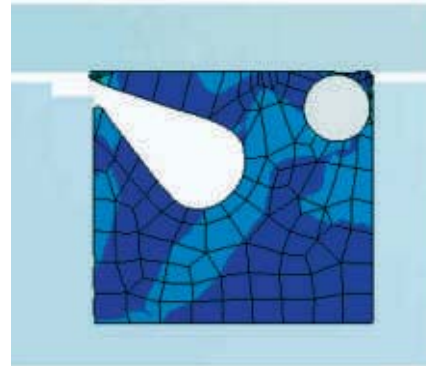
When inquiring and/or purchasing Tube Turns Tool-less® Closures, please specify the following:

1. Quantity
2. Size
3. Materials of construction
4. Design conditions - both pressure and temperature
5. Minimum design metal temperature (MDMT)
6. Application - horizontal (opens like a car door) or vertical (opens like a car hood)
7. Bore or wall thickness
8. ASME code stamp and partial data reports
9. Seal material
10. Corrosion allowance, if applicable.
11. Design Codes and/or specifications, if applicable.



LIP SEAL

The Tool-less® Closure lip seal was developed using FEA. This allowed for the behavior and the stresses of the seal to be examined before physical testing. We have analyzed the seal at the worst case scenarios to ensure that the seal will successfully perform in the closure.



Designed for long life, each Tool-less® Closure is furnished with a fully molded self energized lip seal with an integral stainless steel backing ring located in the closure door. Standard lip seal material is Buna-N; optional seal materials available include FKM (commonly called Viton), HNBR, Ethylene Propylene, and Explosive Decompression Resistant FKM. Special compounds are available for low temperature applications.

Common materials used for seals are discussed below. Technical information as to properties and usages of lip seal material are based on data and recommendations of the manufacturers of the materials.

Buna-N is used for general service. It is resistant to petroleum-base hydraulic and lubricating oils, animal and vegetable oils, gases such as butane, propane, acetylene, and natural gas, aromatic and non-aromatic fuels such as gasoline, kerosene, diesel fuel and fuel oils, anhydrous ammonia, and water. Operating temperature limits are -40°F to 250°F (-40°C to 121°C).

FKM is generally used for high-temperature services. It is resistant to synthetic lubricants, petroleum-base products, some chlorinated solvents, benzene, toluene, and many acids and alkalis. Operating temperature limits are -40°F to 400°F (-40°C to 204°C).

Note: Determination of the compatibility of the seal is the responsibility of the purchaser.

FEA AND STRAIN GAGE TESTING

The Tool-less® Closure product line has been designed in accordance with ASME Section VIII, Division 1, B31.3, B31.4, and B31.8 using FEA. All pressure retaining components are designed for long life and verified through fatigue analysis.

Furthermore, strain gage testing was performed for various sizes and classes. The results obtained through strain gage testing were compared to FEA for theoretical agreement and meet the allowable stresses prescribed in the ASME Section VIII Division 1. All strain gage testing was witnessed by an independent authorized inspection agency.

PRESSURE FATIGUE TESTING

A 36" Class 600 Tool-Less® Closure was subjected to hydrostatic pressure fatigue test and showed no signs of leaking, deforming, or yielding.



ADVANTAGES

Simple and Quick Operation

Operation of closure requires no tools and can be opened and closed in a matter of seconds by one person reducing costly downtime.

Low Maintenance

Designed to be durable and to minimize spare parts.

Actuation

Robust and fatigue resistant actuation for ease of use and long life.

Segmented Locking Ring

Locking ring segments rigidly attached to a spring band allow for smooth operation and prevent binding. Heavy duty locking ring provides maximum safety.

Safety

Positive mechanical locking prevents inadvertent opening under pressure. Complete with pressure warning screw in accordance with UG-35 of ASME Section VIII Div 1.

Economical and Readily Available

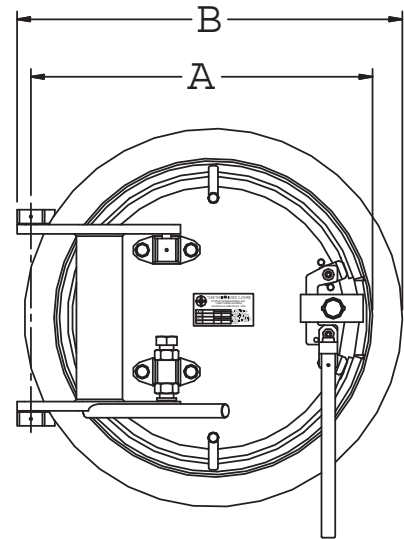
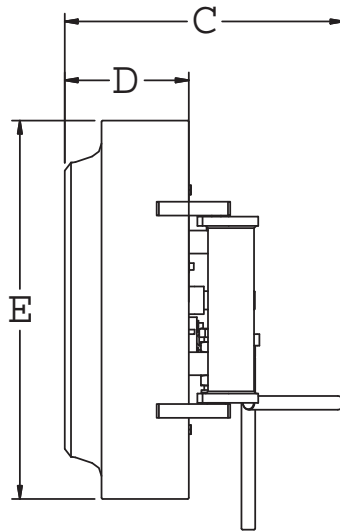
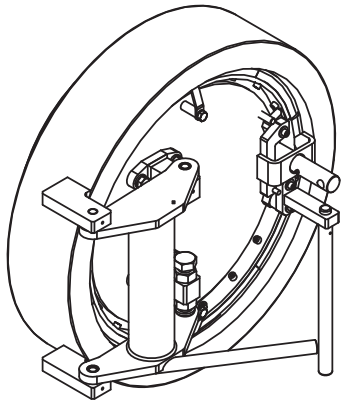
Competitive pricing and best in class lead times driven by inventoried materials.

Fully Molded Seal

Eliminates need for splicing resulting in higher strength and longer life. Ensures optimal performance under the most stringent design requirements.

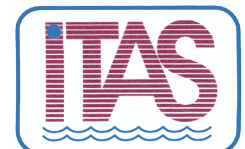
Integrated Backing Spring

One piece seal construction simplifies installation and reduces spare parts required.



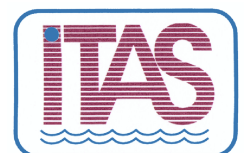
	Nominal Size		Swing Radius A		Over-all Width B		Over-all Height C		Hub Length D		Hub OD E		Approx. Weight	
	In.	(Dn)	In.	(cm)	In.	(cm)	In.	(cm)	In.	(cm)	In.	(cm)	lbs	(Kg)
CLASS 150-H & 300-H	8	(200)	10 13/16	(27.46)	12 11/16	(32.23)	11 3/8	(28.89)	5 1/16	(12.86)	12 1/16	(30.64)	100	(45)
	10	(250)	12 13/16	(32.54)	14 15/16	(37.94)	11 3/8	(28.89)	5 1/4	(13.34)	14 1/2	(36.83)	140	(64)
	12	(300)	15 3/16	(38.58)	17 1/2	(44.45)	13	(33.02)	5 7/8	(14.92)	16 7/8	(42.86)	220	(100)
	14	(350)	15 15/16	(40.48)	17 7/8	(45.40)	14 5/16	(36.35)	5 7/16	(13.81)	17 7/16	(44.29)	200	(91)
	16	(400)	17 7/8	(45.40)	19 7/8	(50.48)	14 11/16	(37.31)	5 7/8	(14.92)	19 9/16	(49.69)	260	(118)
	18	(450)	19 13/16	(50.32)	21 7/8	(55.56)	14 7/8	(37.78)	6 1/8	(15.56)	21 3/4	(55.25)	320	(145)
	20	(500)	22 3/16	(56.36)	24 13/16	(63.02)	17 3/16	(43.66)	7	(17.78)	24 3/8	(61.91)	480	(218)
	22	(550)	24 1/16	(61.12)	26 3/4	(67.95)	17 1/4	(43.82)	7 1/8	(18.10)	26 1/2	(67.31)	570	(259)
	24	(600)	25 3/4	(65.41)	28 1/2	(72.39)	17 11/16	(44.93)	7 5/8	(19.37)	28 3/8	(72.07)	680	(308)
	26	(650)	27 7/8	(70.80)	30 7/8	(78.42)	20 5/8	(52.39)	8 1/16	(20.48)	30 9/16	(77.63)	850	(386)
	28	(700)	29 3/4	(75.57)	32 13/16	(83.34)	20 13/16	(52.86)	8 5/16	(21.11)	32 11/16	(83.03)	1000	(454)
	30	(750)	31 11/16	(80.49)	34 7/8	(88.58)	21 3/16	(53.82)	8 11/16	(22.07)	34 7/8	(88.58)	1180	(535)
	32	(800)	33 7/8	(86.04)	37 5/8	(95.57)	29 3/4	(75.57)	9 5/8	(24.45)	37 9/16	(95.41)	1550	(703)
	34	(850)	35 3/4	(90.81)	39 1/2	(100.33)	30 1/8	(76.52)	9 7/8	(25.08)	39 11/16	(100.81)	1780	(807)
	36	(900)	37 11/16	(95.73)	41 1/2	(105.41)	30 1/4	(76.84)	10 1/8	(25.72)	41 7/8	(106.36)	2030	(921)
	38	(950)	39 15/16	(101.44)	44 3/16	(112.24)	31 13/16	(80.80)	10 3/4	(27.31)	44 3/16	(112.24)	2430	(1102)
	40	(1000)	41 3/8	(105.09)	45 11/16	(116.05)	32 5/8	(82.87)	11 5/8	(29.53)	45 13/16	(116.36)	2710	(1229)
	42	(1050)	42 13/16	(108.74)	47 3/16	(119.86)	32 11/16	(83.03)	11 11/16	(29.69)	47 7/16	(120.49)	2970	(1347)
	44	(1100)	45	(114.30)	49 3/4	(126.37)	38 15/16	(98.90)	12 1/8	(30.80)	49 3/4	(126.37)	3480	(1579)
	46	(1150)	46 15/16	(119.22)	51 3/4	(131.45)	39 1/4	(99.70)	12 5/16	(31.27)	51 15/16	(131.92)	3850	(1746)
48	(1200)	49	(124.46)	54	(137.16)	39 3/8	(100.01)	13 1/16	(33.18)	54 7/16	(138.27)	4450	(2018)	
50	(1250)	51 1/4	(130.18)	56 5/8	(143.83)	40 11/16	(103.35)	13 5/16	(33.81)	56 5/8	(143.83)	4990	(2263)	
52	(1300)	52 11/16	(133.83)	58 1/16	(147.48)	41 15/16	(106.52)	13 15/16	(35.40)	58 1/4	(147.96)	5410	(2454)	
54	(1350)	54 5/8	(138.75)	60 1/16	(152.56)	42 3/8	(107.63)	14 3/16	(36.04)	60 7/16	(153.51)	5940	(2694)	

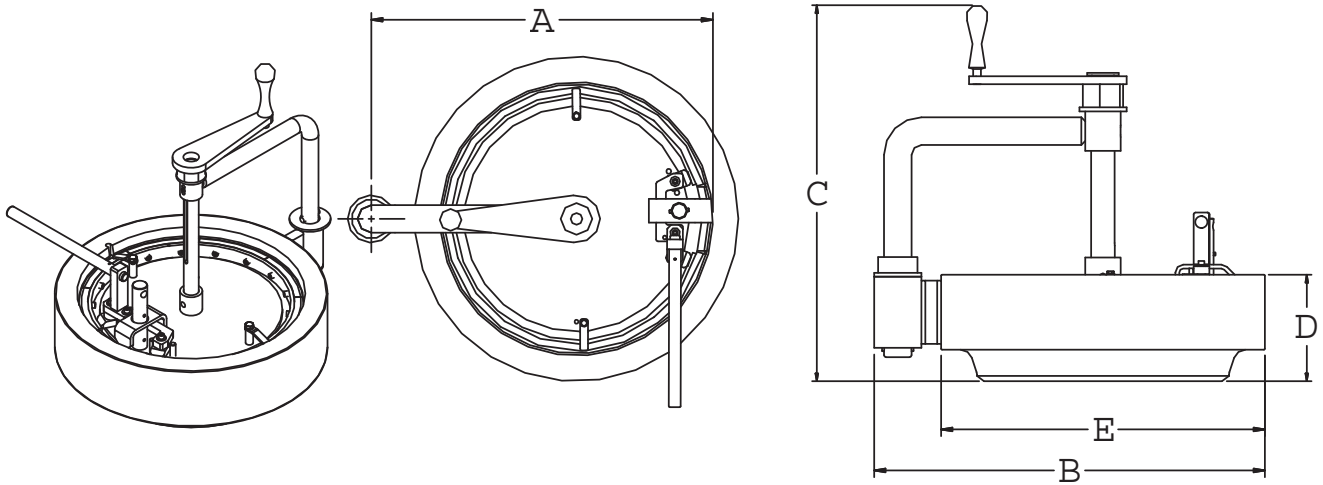
See notes on Page 7.



	Nominal Size	Swing Radius A		Over-all Width B		Over-all Height C		Hub Length D		Hub OD E		Approx. Weight	
	In. (Dn)	In.	(cm)	In.	(cm)	In.	(cm)	In.	(cm)	In.	(cm)	lbs	(Kg)
CLASS 600-H	8 (200)	10 13/16	(27.46)	12 11/16	(32.23)	11 3/8	(28.89)	5 1/16	(12.86)	12 1/16	(30.64)	100	(45)
	10 (250)	12 13/16	(32.54)	14 15/16	(37.94)	11 3/8	(28.89)	5 1/4	(13.34)	14 1/2	(36.83)	140	(64)
	12 (300)	15 3/16	(38.58)	17 1/2	(44.45)	13	(33.02)	5 7/8	(14.92)	16 7/8	(42.86)	220	(100)
	14 (350)	16 7/16	(41.75)	18 3/4	(47.63)	14 15/16	(37.94)	6 3/8	(16.19)	18 1/4	(46.36)	270	(122)
	16 (400)	18 7/16	(46.83)	20 15/16	(53.18)	15 3/16	(38.58)	6 3/4	(17.15)	20 9/16	(52.23)	350	(159)
	18 (450)	20 7/16	(51.91)	23 1/16	(58.58)	15 5/8	(39.69)	7 5/16	(18.57)	22 13/16	(57.94)	550	(249)
	20 (500)	26 1/8	(66.36)	22 15/16	(58.26)	18 1/8	(46.04)	8 1/16	(20.48)	25 9/16	(64.93)	660	(299)
	22 (550)	25	(63.50)	28 3/8	(72.07)	18 7/16	(46.83)	8 9/16	(21.75)	28	(71.12)	820	(372)
	24 (600)	26 11/16	(67.79)	30 3/16	(76.68)	19 1/8	(48.58)	9 5/16	(23.65)	29 15/16	(76.04)	1000	(454)
	26 (650)	28 7/8	(73.34)	32 3/4	(83.19)	21 13/16	(55.40)	9 15/16	(25.24)	32 1/4	(81.92)	1250	(567)
	28 (700)	30 15/16	(78.58)	35	(88.90)	21 15/16	(55.72)	10 3/16	(25.88)	34 11/16	(88.11)	1490	(676)
	30 (750)	32 15/16	(83.66)	37 1/8	(94.30)	22 3/16	(56.36)	10 9/16	(26.83)	36 15/16	(93.82)	1750	(794)
	32 (800)	35 1/8	(89.22)	39 13/16	(101.12)	23	(58.42)	11 15/16	(30.32)	39 9/16	(100.49)	2280	(1034)
	34 (850)	37 1/8	(94.30)	42 1/16	(106.84)	23 3/16	(58.90)	12 5/16	(31.27)	42	(106.68)	2640	(1197)
	36 (900)	39 1/8	(99.38)	44 1/4	(112.40)	23 15/16	(60.80)	13 1/4	(33.66)	44 5/16	(112.55)	3120	(1415)
	38 (950)	41 9/16	(105.57)	47 3/16	(119.86)	25 1/8	(63.82)	13 13/16	(35.08)	46 7/8	(119.06)	3710	(1683)
	40 (1000)	43 1/16	(109.38)	48 3/4	(123.83)	25 5/16	(64.29)	14 1/8	(35.88)	48 9/16	(123.35)	4030	(1828)
	42 (1050)	44 9/16	(113.19)	50 3/8	(127.95)	26 5/8	(67.63)	15 1/2	(39.37)	50 5/16	(127.79)	4630	(2100)
	44 (1100)	46 13/16	(118.90)	53 1/16	(134.78)	30 9/16	(77.63)	15 15/16	(40.48)	52 3/4	(133.99)	5330	(2418)
	46 (1150)	48 13/16	(123.98)	55 3/16	(140.18)	30 3/4	(78.11)	16 1/4	(41.28)	55	(139.70)	5910	(2681)
48 (1200)	51 7/16	(130.65)	57 3/4	(146.69)	30 3/4	(78.11)	16 1/2	(41.91)	57 13/16	(146.84)	6870	(3116)	
50 (1250)	53 3/8	(135.57)	60 1/2	(153.67)	31 1/4	(79.38)	17 1/2	(44.45)	60 1/8	(152.72)	7660	(3475)	
52 (1300)	54 7/8	(139.38)	62 1/16	(157.64)	32 9/16	(82.71)	18 7/8	(47.94)	61 13/16	(157.00)	8540	(3874)	
54 (1350)	56 7/8	(144.46)	64 3/16	(163.04)	32 11/16	(83.03)	19 1/16	(48.42)	64 1/8	(162.88)	9350	(4241)	
CLASS 900-H	8 (200)	11 1/4	(28.58)	13 1/4	(33.66)	12 1/16	(30.64)	6	(15.24)	12 9/16	(31.91)	130	(59)
	10 (250)	13 1/4	(33.66)	15 1/2	(39.37)	13 9/16	(34.45)	6 7/16	(16.35)	15 1/16	(38.26)	190	(86)
	12 (300)	15 3/4	(40.01)	18 1/4	(46.36)	13 13/16	(35.08)	6 15/16	(17.62)	17 9/16	(44.61)	280	(127)
	14 (350)	17 1/16	(43.34)	19 11/16	(50.01)	15 15/16	(40.48)	7 3/4	(19.69)	19 1/16	(48.42)	360	(163)
	16 (400)	19 9/16	(49.69)	22 9/16	(57.31)	16 11/16	(42.39)	9 3/16	(23.34)	22 1/16	(56.04)	560	(254)
	18 (450)	21 7/16	(54.45)	24 7/8	(63.18)	19 9/16	(49.69)	9 7/8	(25.08)	24 7/16	(62.07)	740	(336)
	20 (500)	23 9/16	(59.85)	27 3/16	(69.06)	20	(50.80)	10 1/2	(26.67)	26 15/16	(68.42)	940	(426)
	22 (550)	25 11/16	(65.25)	29 3/4	(75.57)	21 11/16	(55.09)	11 3/16	(28.42)	29 5/16	(74.45)	1190	(540)
24 (600)	27 11/16	(70.33)	32	(81.28)	22 3/8	(56.83)	12 1/8	(30.80)	31 9/16	(80.17)	1470	(667)	

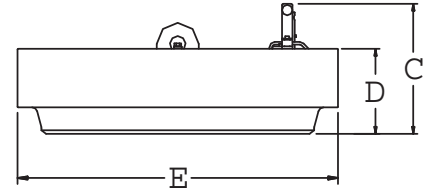
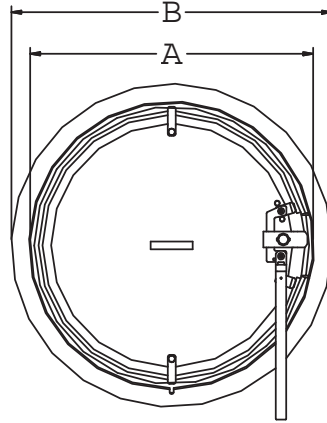
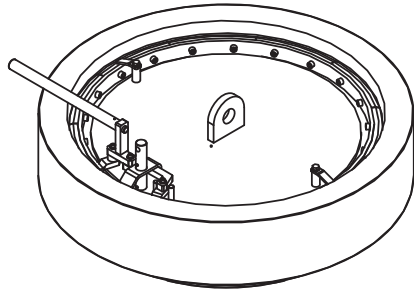
Note: Horizontal Tool-less® Closures are normally installed with hinge at the left (left hand hinge) when viewed facing the closure. If right hand hinge is required, this information needs to be made available at time of order. Otherwise, closure will not operate properly when installed. For Pressure-Temperature, see Page 3.





	Nominal Size		Swing Radius A		Over-all Width B		Over-all Height C		Hub Length D		Hub OD E		Approx. Weight	
	In.	(Dn)	In.	(cm)	In.	(cm)	In.	(cm)	In.	(cm)	In.	(cm)	lbs	(Kg)
CLASS 150-V & 300-V	8	(200)	13 1/16	(33.18)	15 15/16	(40.48)	18 3/4	(47.63)	5 1/16	(12.86)	12 1/16	(30.64)	100	(45)
	10	(250)	15 5/16	(38.89)	17 1/2	(44.45)	19 13/16	(50.32)	5 1/4	(13.34)	14 1/2	(36.83)	150	(68)
	12	(300)	17 7/16	(44.29)	19 7/8	(50.48)	20 5/8	(52.39)	5 7/8	(14.92)	16 7/8	(42.86)	220	(100)
	14	(350)	18 7/16	(46.83)	20 15/16	(53.18)	20 7/16	(51.91)	5 7/16	(13.81)	17 7/16	(44.29)	210	(95)
	16	(400)	20 1/2	(52.07)	23 1/16	(58.58)	20 3/4	(52.71)	5 7/8	(14.92)	19 9/16	(49.69)	250	(113)
	18	(450)	23 1/4	(59.06)	26	(66.04)	23 3/8	(59.37)	6 1/8	(15.56)	21 3/4	(55.25)	330	(150)
	20	(500)	25 5/8	(65.09)	28 5/8	(72.71)	24 1/2	(62.23)	7	(17.78)	24 3/8	(61.91)	480	(218)
	22	(550)	28 3/16	(71.60)	31 1/2	(80.01)	24 5/8	(62.55)	7 1/8	(18.10)	26 1/2	(67.31)	570	(259)
24	(600)	30 1/16	(76.36)	33 3/8	(84.77)	25 1/8	(63.82)	7 5/8	(19.37)	28 3/8	(72.07)	680	(308)	
CLASS 600-V	8	(200)	13 1/16	(33.18)	15 15/16	(40.48)	18 3/4	(47.63)	5 1/16	(12.86)	12 1/16	(30.64)	100	(45)
	10	(250)	15 5/16	(38.89)	17 1/2	(44.45)	19 13/16	(50.32)	5 1/4	(13.34)	14 1/2	(36.83)	150	(68)
	12	(300)	17 7/16	(44.29)	19 7/8	(50.48)	20 5/8	(52.39)	5 7/8	(14.92)	16 7/8	(42.86)	220	(100)
	14	(350)	18 3/8	(46.67)	20 15/16	(53.18)	21 1/4	(53.98)	6 3/8	(16.19)	18 1/4	(46.36)	270	(122)
	16	(400)	21 9/16	(54.77)	24 13/16	(63.02)	23 9/16	(59.85)	6 3/4	(17.15)	20 9/16	(52.23)	350	(159)
	18	(450)	23 5/16	(59.21)	26 13/16	(68.10)	24	(60.96)	7 5/16	(18.57)	22 13/16	(57.94)	550	(249)
	20	(500)	27	(68.58)	30 9/16	(77.63)	24 15/16	(63.34)	8 1/16	(20.48)	25 9/16	(64.93)	650	(295)
	22	(550)	28 15/16	(73.50)	32 11/16	(83.03)	25 5/16	(64.29)	8 9/16	(21.75)	28	(71.12)	820	(372)
24	(600)	30 11/16	(77.95)	34 15/16	(88.74)	26 5/8	(67.63)	9 5/16	(23.65)	29 15/16	(76.04)	1020	(463)	
CLASS 900-V	8	(200)	13 9/16	(34.45)	15 9/16	(39.53)	20 9/16	(52.23)	6	(15.24)	12 9/16	(31.91)	130	(59)
	10	(250)	15 9/16	(39.53)	18 1/16	(45.88)	21 1/16	(53.50)	6 7/16	(16.35)	15 1/16	(38.26)	190	(86)
	12	(300)	17 13/16	(45.24)	20 9/16	(52.23)	21 11/16	(55.09)	6 15/16	(17.62)	17 9/16	(44.61)	280	(127)
	14	(350)	19 3/16	(48.74)	22 1/16	(56.04)	22 11/16	(57.63)	7 3/4	(19.69)	19 1/16	(48.42)	360	(163)
	16	(400)	22 3/8	(56.83)	26 5/16	(66.83)	24 3/4	(62.87)	9 3/16	(23.34)	22 1/16	(56.04)	560	(254)
	18	(450)	24 3/4	(62.87)	29 1/8	(73.98)	25 9/16	(64.93)	9 7/8	(25.08)	24 7/16	(62.07)	740	(336)
	20	(500)	27 3/4	(70.49)	31 15/16	(81.12)	28	(71.12)	10 1/2	(26.67)	26 15/16	(68.42)	940	(426)
	22	(550)	29 15/16	(76.04)	34 5/16	(87.15)	28 1/4	(71.76)	11 3/16	(28.42)	29 5/16	(74.45)	1190	(540)
24	(600)	31 15/16	(81.12)	36 9/16	(92.87)	29 3/8	(74.61)	12 1/8	(30.80)	31 9/16	(80.17)	1470	(667)	

Vertical Tool-less® Closures are furnished with a davit or lifting eye. For sizes 8" through 24", the davit is standard. For sizes larger than 24", the lifting eye is standard. For Pressure-Temperature, see page 3.

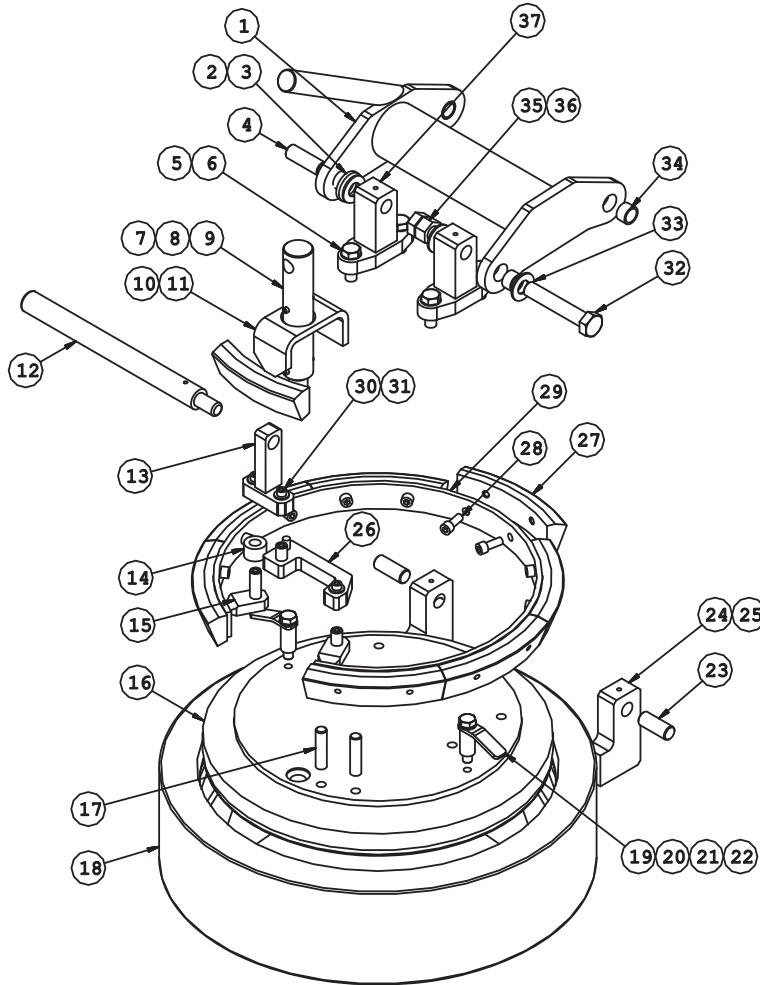


	Nominal Size		Swing Radius A		Over-all Width B		Over-all Height C		Hub Length D		Hub OD E		Approx. Weight	
	In.	(Dn)	In.	(cm)	In.	(cm)	In.	(cm)	In.	(cm)	In.	(cm)	lbs	(Kg)
CLASS 150-V & 300-V	26	(650)	26 11/16	(67.79)	30 9/16	(77.63)	12 5/16	(31.27)	8 1/16	(20.48)	30 9/16	(77.63)	790	(358)
	28	(700)	28 11/16	(72.87)	32 11/16	(83.03)	12 11/16	(32.23)	8 5/16	(21.11)	32 11/16	(83.03)	940	(426)
	30	(750)	30 3/4	(78.11)	34 7/8	(88.58)	13 1/16	(33.18)	8 11/16	(22.07)	34 7/8	(88.58)	1120	(508)
	32	(800)	32 3/4	(83.19)	37 9/16	(95.41)	14 1/2	(36.83)	9 5/8	(24.45)	37 9/16	(95.41)	1430	(649)
	34	(850)	34 3/4	(88.27)	39 11/16	(100.81)	14 3/4	(37.47)	9 7/8	(25.08)	39 11/16	(100.81)	1660	(753)
	36	(900)	36 13/16	(93.50)	41 7/8	(106.36)	14 15/16	(37.94)	10 1/8	(25.72)	41 7/8	(106.36)	1900	(862)
	38	(950)	38 13/16	(98.58)	44 3/16	(112.24)	15 11/16	(39.85)	10 3/4	(27.31)	44 3/16	(112.24)	2260	(1025)
	40	(1000)	40 3/8	(102.55)	45 13/16	(116.36)	16 9/16	(42.07)	11 5/8	(29.53)	45 13/16	(116.36)	2530	(1148)
	42	(1050)	41 7/8	(106.36)	47 7/16	(120.49)	16 5/8	(42.23)	11 11/16	(29.69)	47 7/16	(120.49)	2790	(1266)
	44	(1100)	43 15/16	(111.60)	49 3/4	(126.37)	16 15/16	(43.02)	12 1/8	(30.80)	49 3/4	(126.37)	3190	(1447)
	46	(1150)	45 15/16	(116.68)	51 15/16	(131.92)	17 1/16	(43.34)	12 5/16	(31.27)	51 15/16	(131.92)	3560	(1615)
	48	(1200)	48	(121.92)	54 7/16	(138.27)	17 7/16	(44.29)	13 1/16	(33.18)	54 7/16	(138.27)	4150	(1882)
	50	(1250)	50 1/16	(127.16)	56 5/8	(143.83)	18 1/8	(46.04)	13 5/16	(33.81)	56 5/8	(143.83)	4610	(2091)
	52	(1300)	51 9/16	(130.97)	58 1/4	(147.96)	18 11/16	(47.47)	13 15/16	(35.40)	58 1/4	(147.96)	5040	(2286)
54	(1350)	53 5/8	(136.21)	60 7/16	(153.51)	18 7/8	(47.94)	14 3/16	(36.04)	60 7/16	(153.51)	5550	(2517)	
CLASS 600-V	26	(200)	26 11/16	(67.79)	32 1/4	(81.92)	13 3/4	(34.93)	9 15/16	(25.24)	32 1/4	(81.92)	1190	(540)
	28	(201)	28 11/16	(72.87)	34 11/16	(88.11)	13 7/8	(35.24)	10 3/16	(25.88)	34 11/16	(88.11)	1440	(653)
	30	(202)	30 3/4	(78.11)	36 15/16	(93.82)	14 3/16	(36.04)	10 9/16	(26.83)	36 15/16	(93.82)	1690	(767)
	32	(203)	32 3/4	(83.19)	39 9/16	(100.49)	16 1/4	(41.28)	11 15/16	(30.32)	39 9/16	(100.49)	2160	(980)
	34	(204)	34 3/4	(88.27)	42	(106.68)	16 9/16	(42.07)	12 5/16	(31.27)	42	(106.68)	2520	(1143)
	36	(205)	36 13/16	(93.50)	44 5/16	(112.55)	17 3/8	(44.13)	13 1/4	(33.66)	44 5/16	(112.55)	2990	(1356)
	38	(206)	38 13/16	(98.58)	46 7/8	(119.06)	17 7/8	(45.40)	13 13/16	(35.08)	46 7/8	(119.06)	3540	(1606)
	40	(207)	40 3/8	(102.55)	48 9/16	(123.35)	18 1/8	(46.04)	14 1/8	(35.88)	48 9/16	(123.35)	3850	(1746)
	42	(208)	41 7/8	(106.36)	50 5/16	(127.79)	19 1/2	(49.53)	15 1/2	(39.37)	50 5/16	(127.79)	4460	(2023)
	44	(209)	43 15/16	(111.60)	52 3/4	(133.99)	19 3/4	(50.17)	15 15/16	(40.48)	52 3/4	(133.99)	5050	(2291)
	46	(210)	45 15/16	(116.68)	55	(139.70)	20 1/8	(51.12)	16 1/4	(41.28)	55	(139.70)	5620	(2549)
	48	(211)	48	(121.92)	57 13/16	(146.84)	20 7/8	(53.02)	16 1/2	(41.91)	57 13/16	(146.84)	6570	(2980)
	50	(212)	50 1/16	(127.16)	60 1/8	(152.72)	21 3/16	(53.82)	17 1/2	(44.45)	60 1/8	(152.72)	7280	(3302)
	52	(213)	51 9/16	(130.97)	61 13/16	(157.00)	22 1/2	(57.15)	18 7/8	(47.94)	61 13/16	(157.00)	8160	(3701)
54	(214)	53 5/8	(136.21)	64 1/8	(162.88)	24 5/16	(61.75)	19 1/16	(48.42)	64 1/8	(162.88)	8960	(4064)	

Vertical Tool-less® Closures are furnished with a davit or lifting eye. For sizes 8" through 24", the davit is standard. For sizes larger than 24", the lifting eye is standard. For Pressure-Temperature, see page 3.

8" - 10" Type "H" Tool-less® Closure Parts List

1. Hinge Beam	11. PWS Connecting Arm	21. Holding Clip Screw	31. Actuator Washer
2. Head Hinge Washer Plain	12. Crank Handle	22. Holding Clip Washer	32. Hinge Bolt
3. Head Hinge Thrust Washer	13. Crank	23. Hub Hinge Pin	33. Hinge Bolt Thrust Washer
4. Head Hinge Pin	14. Crank Spacer	24. Hub Hinge Arm	34. Hinge Plain Bushing
5. Head Hinge Bolt	15. Actuator Ear	25. Hinge Set Screw	35. Hinge Bolt Jam Nut
6. Head Hinge Washer	16. Door	26. Actuator U-Plate	36. Hinge Bolt Hex Nut
7. Pressure Warning Screw	17. Ear Stop Stud	27. Locking Segment	37. Head Hinge Arm
8. PWS O-Ring	18. Hub	28. Locking Segment Screw	38. Door Seal (Not Shown)
9. PWS Spring Pin	19. Holding Clip	29. Connecting Band	
10. Safety Interlock Segment	20. Holding Clip Spacer	30. Actuator	



Spares Parts - It is suggested that the following spare parts be stocked for each closure:

Start-Up & Commissioning requires the following spares:

- 1) One* door seal per closure.....Part No. 38
- 2) Two* pressure warning screw O-rings per closure.....Part No. 8

Operation:

- 1) Two* door seals per closure.....Part No. 38
- 2) Four* pressure warning screw O-rings per closure.....Part No. 8

*These recommendations are for normal service; spare quantities may require adjustment based on service and operating conditions.

For Spare Parts Orders, supply the following information:

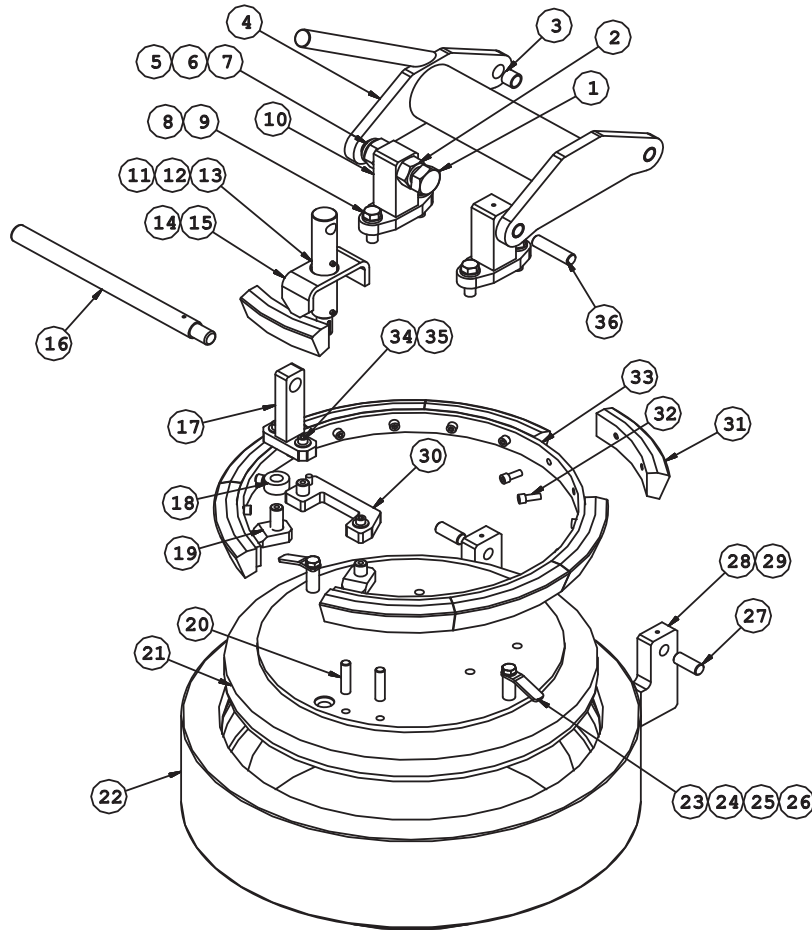
- 1) Quantity required
- 2) Description
- 3) Part number
- 4) Size and pressure class
- 5) Closure serial number

Example:

Qty: 2
 Material: Buna-N Door Seal
 Part No.: 38
 Size & Class: 8" CL600
 Serial No.: TL00109

12" - 72" Type "H" Tool-less® Closure Parts List

1. Hinge Bolt	11. Pressure Warning Screw	21. Door	31. Locking Segment
2. Hinge Bolt Jam Nut	12. PWS Spring Pin	22. Hub	32. Ring Segment Screw
3. Hinge Plain Bushing	13. PWS O-Ring	23. Holding Clip	33. Connecting Band
4. Hinge Beam	14. Safety Interlock Segment	24. Holding Clip Spacer	34. Actuator Screw
5. Hinge Bolt Hex Nut	15. PWS Connecting Arm	25. Holding Clip Screw	35. Actuator Screw
6. Hinge Bolt Thrust Washer	16. Crank Handle	26. Holding Clip Washer	36. Head Hinge Pin
7. Hinge Thrust Bushing	17. Crank	27. Hub Hinge Pin	37. Door Seal (Not Shown)
8. Head Hinge Arm Screw	18. Crank Spacer	28. Hub Hinge Arm	
9. Head Hinge Arm Washer	19. Actuator Ear	29. Hinge Pin Set Screw	
10. Hinge Arm	20. Ear Stop Stud	30. Actuator U-Plate	



Spare Parts - It is suggested that the following spare parts be stocked for each closure:

Start-Up & Commissioning requires the following spares:

- 3) One* door seal per closure.....Part No. 37
 4) Two* pressure warning screw O-rings per closure.....Part No. 13

Operation:

- 3) Two* door seals per closure.....Part No. 37
 4) Four* pressure warning screw O-rings per closure.....Part No. 13

*These recommendations are for normal service; spare quantities may require adjustment based on service and operating conditions.

For Spare Parts Orders, supply the following information:

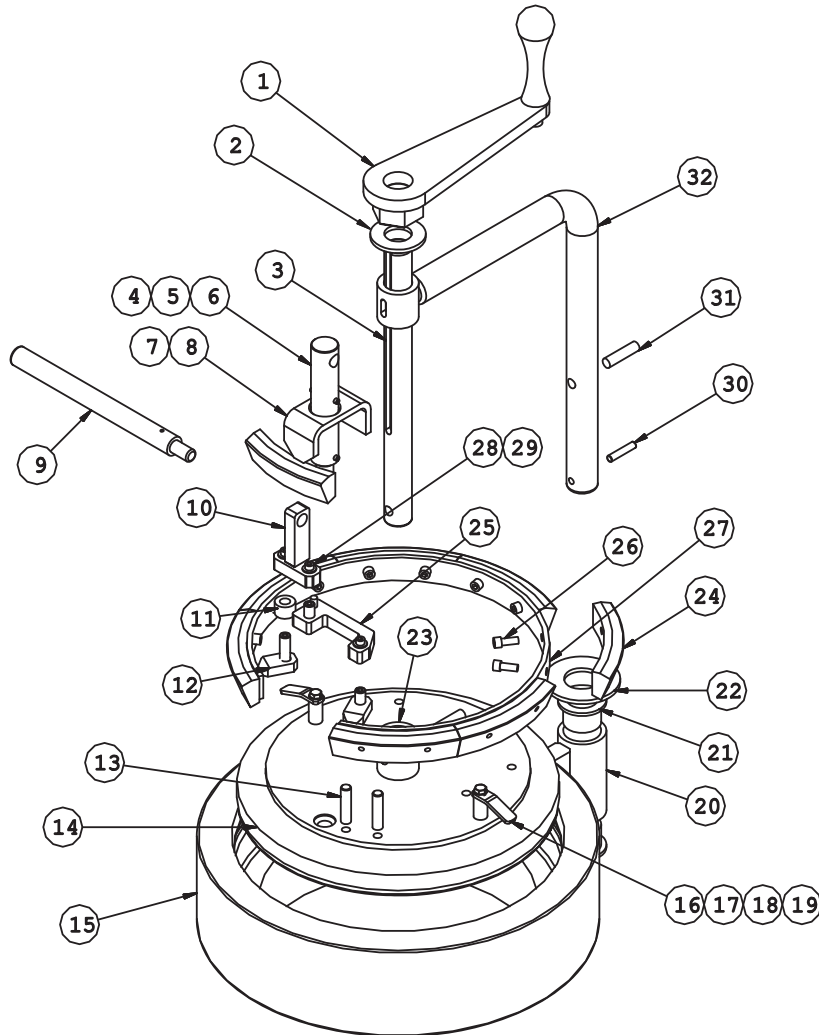
- 6) Quantity required
 7) Description
 8) Part number
 9) Size and pressure class
 10) Closure serial number

Example:

Qty: 1
 Material: Buna-N Door Seal
 Part No.: 37
 Size & Class: 54" CL600
 Serial No.: TL00273

8" - 24" Type "V" Tool-less® Closure Parts List

1. Wrench Handle	11. Crank Spacer	21. Davit Arm Flange Bushing	31. Davit Post Support Pin
2. Wrench Handle Washer	12. Actuator Ear	22. Davit Post Washer	32. Davit Arm
3. Davit Post	13. Ear Stop Stud	23. Davit Post Mount	33. Door Seal (Not Shown)
4. Pressure Warning Screw	14. Door	24. Locking Segment	
5. PWS Spring Pin	15. Hub	25. Actuator U-Plate	
6. PWS O-Ring	16. Holding Clip	26. Ring Segment Screw	
7. Safety Interlock Segment	17. Holding Clip Spacer	27. Connecting Band	
8. PWS Connecting Arm	18. Holding Clip Screw	28. Actuator Screw	
9. Crank Handle	19. Holding Clip Washer	29. Actuator Washer	
10. Crank	20. Davit Arm Mount	30. Davit Post Holding Pin	



Spare Parts - It is suggested that the following spare parts be stocked for each closure:

Start-Up & Commissioning requires the following spares:

5) One* door seal per closure.....Part No. 33

6) Two* pressure warning screw O-rings per closure.....Part No. 6

*These recommendations are for normal service; spare quantities may require adjustment based on service and operating conditions.

For Spare Parts Orders, supply the following information:

- 11) Quantity required
- 12) Description
- 13) Part number
- 14) Size and pressure class
- 15) Closure serial number

Operation:

5) Two* door seals per closure.....Part No. 33

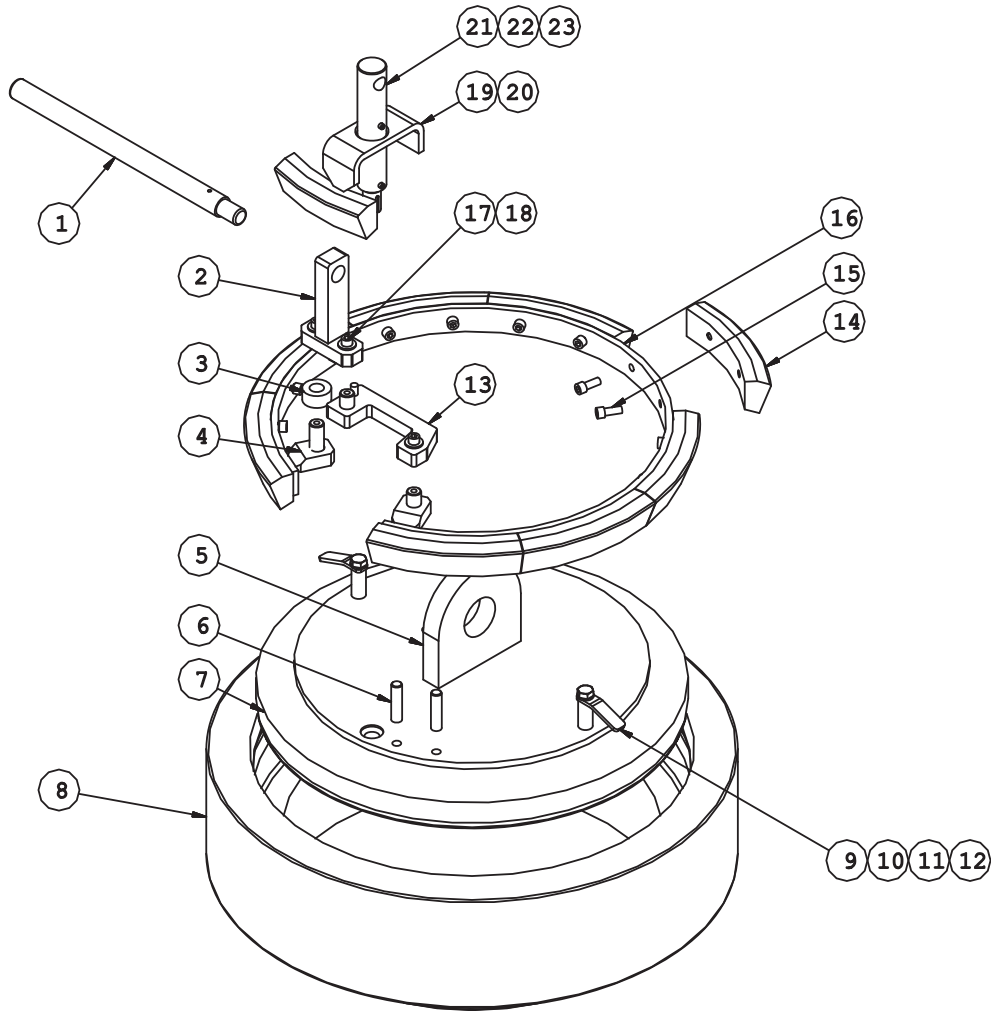
6) Four* pressure warning screw O-rings per closure.....Part No. 6

Example:

Qty: 22
Material: Buna-N Door Seal
Part No.: 33
Size & Class: 8" CL600
Serial No.: TL04025

26" - 72" Type "V" Tool-less® Closure Parts List

- | | | |
|-------------------------|------------------------------|----------------------------|
| 1. Crank Handle | 11. Holding Clip Screw | 21. Pressure Warning Screw |
| 2. Crank | 12. Holding Clip Washer | 22. PWS O-Ring |
| 3. Crank Spacer | 13. Actuator U-Plate | 23. PWS Spring Pin |
| 4. Actuator Ear | 14. Locking Segment | 24. Door Seal (Not Shown) |
| 5. Lifting Lug | 15. Locking Segment Screw | |
| 6. Ear Stop Stud | 16. Connecting Band | |
| 7. Door | 17. Actuator Screw | |
| 8. Hub | 18. Actuator Washer | |
| 9. Holding Clip | 19. Safety Interlock Segment | |
| 10. Holding Clip Spacer | 20. PWS Connecting Arm | |



Spares Parts – It is suggested that the following spare parts be stocked for each closure:

Start-Up & Commissioning requires the following spares:

- | | |
|--|---|
| 7) One* door seal per closure.....Part No. 24 | Operation: |
| 8) Two* pressure warning screw O-rings per closure.....Part No. 22 | 7) Two* door seals per closure.....Part No. 24 |
| | 8) Four* pressure warning screw O-rings per closure.....Part No. 22 |

*These recommendations are for normal service; spare quantities may require adjustment based on service and operating conditions.

For Spare Parts Orders, supply the following information:

- 16) Quantity required
- 17) Description
- 18) Part number
- 19) Size and pressure class
- 20) Closure serial number

Example:
 Qty: 14
 Material: Buna-N Door Seal
 Part No.: 24
 Size & Class: 36" CL600
 Serial No.: TL21890

QUALITY CONTROL

The Tool-less® Closure is manufactured in Louisville, Kentucky, USA. The Tube Turns Division quality system meets the ASME Section VIII, Division 1, Appendix 10 standard. The quality system is audited by an independent authorized inspection agency.

The quality system controls order analysis, calibration, drawings, documents, materials, processes, welding, nondestructive examination and inspection.

Raw materials are inspected for dimensional acceptability and proper heat code identification. Mill test reports are checked to ensure proper physical and chemical properties of all pressure retaining components. Certified material test reports are shipped with each closure.

A serial number is assigned to each Tool-less® Closure at order entry and is permanently stamped on the closure.

The actual heats of material used for the individual closures are permanently recorded and stamped on all pressure retaining components. This provides traceability to the material test reports for every closure.

The Tube Turns Division can meet the most stringent quality system, customer material and testing requirements. Special customer requirements are evaluated by the engineering department.

The Tube Turns Division offers optional hydrotest and helium leak test. Nondestructive examination per ASME Section V is available in-house and includes radiography, ultrasound, magnetic particle, and liquid penetrant.

When specified, the following documents are furnished for each closure

- ❖ Hydrostatic test certification
- ❖ Nondestructive test reports
- ❖ ASME code stamping available upon request

