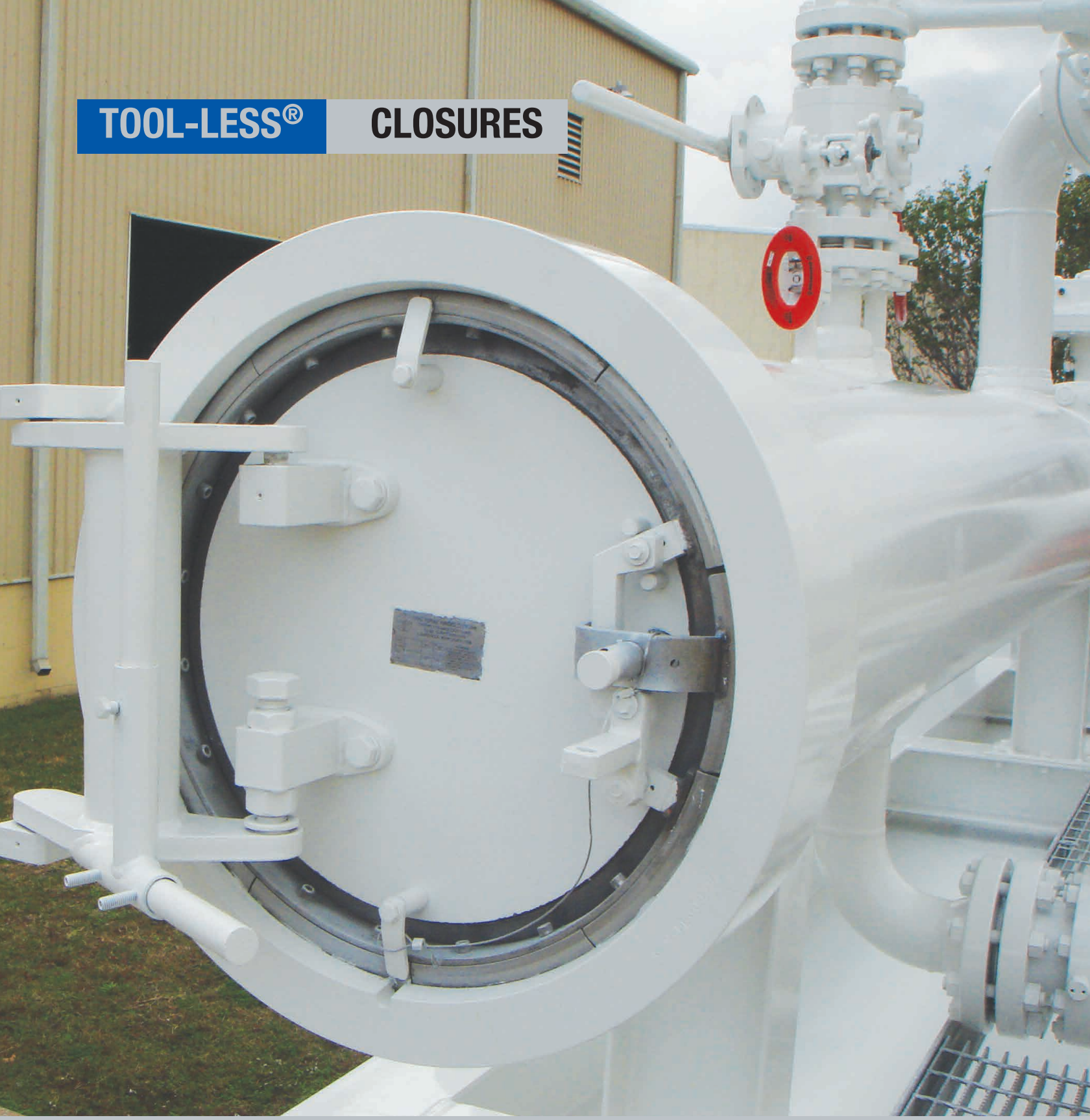
TOOL-LESS® CLOSURES



For Filter Vessels, Pig Launchers & Receivers, Strainers, Hydrocyclones, and Processing Tanks.

SYPRIS® TECHNOLOGIES
Tube Turns Products

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

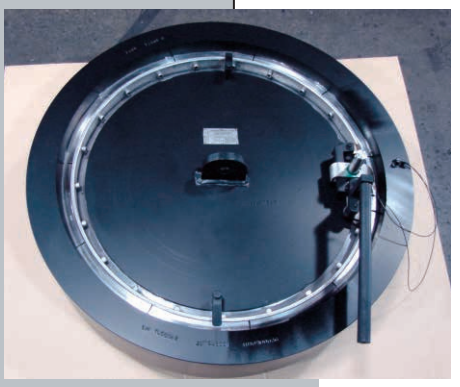
The Tool-less® Closure satisfies design requirements in ASME B31.3, B31.4, B31.8, and Section VIII, Div. 1. The entire design has been verified through proven stress calculations, the latest finite element analysis (FEA) software, and strain gage testing, establishing a high level of confidence in the 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.

SYPRIS® TECHNOLOGIES
Tube Turns Products

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.

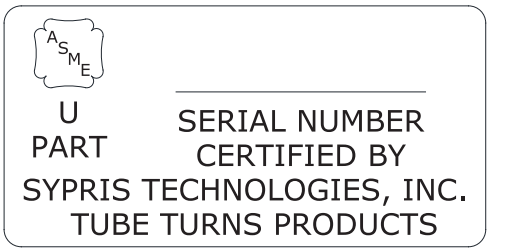
ALLOWABLE WORKING PRESSURES (RATINGS)

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 450°F (232°C) PSI (bar)
150	285 (19.65)
300	740 (51.02)
600	1480 (102.04)
900	2220 (153.06)
1500	3705 (255.45)
2500	6170 (425.4)

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.



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.

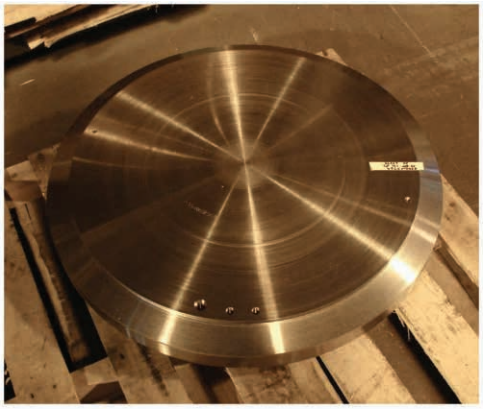
SYPRIS® TECHNOLOGIES Tube Turns Products

TOOL-LESS® CLOSURES

ORDERING DATA

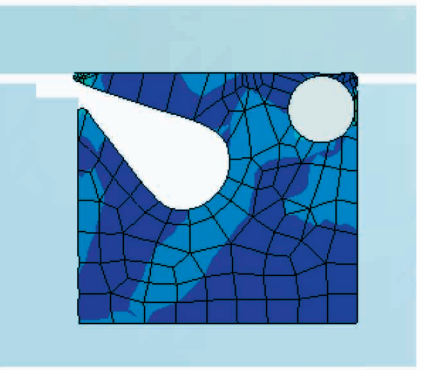
When inquiring and/or purchasing Tube Turns Tool-less® Closures, please specify the following:

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.
12. LH or RH when ordering.



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.

SYPRIS® TECHNOLOGIES
Tube Turns Products

DESIGN VALIDATION

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. Not applicable to CL500.

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.

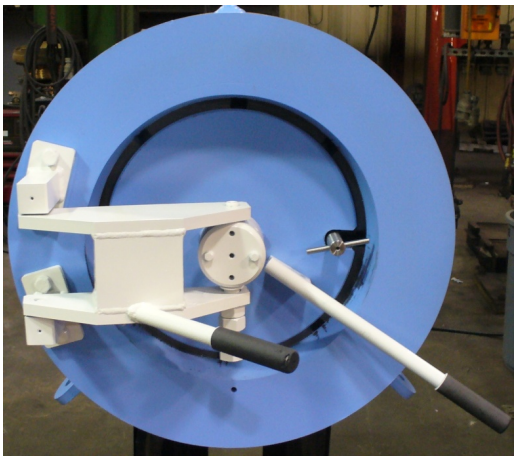
Fully Molded Seal
Eliminates need for splicing resulting in higher strength and longer life. Ensures optimal performance under the most stringent design requirements.

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

SYPRIS® TECHNOLOGIES
Tube Turns Products

CL2500 TOOL-LESS® CLOSURES

Tube Turns' latest product innovation is the Class 2500 Tool-Less® Closure. This high pressure design can be rated per ASME/ANSI Class 2500, for service up to 6170 PSIG @ 250°F (425 bar @ 121°C), and is compatible with piping systems and vessels designed in accordance with the ASME/ANSI standard.



FEA AND PROOF-TESTED DESIGN

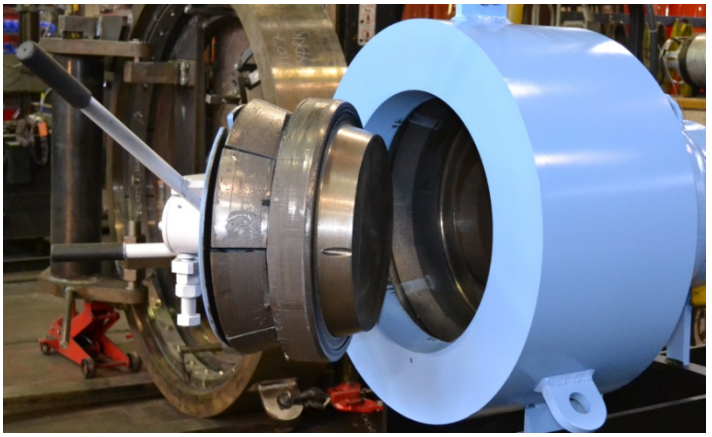
Drawing from the thousands of installations of our Class 150 through Class 1500 Tool-Less® closures, Tube Turns' engineers have employed the latest techniques in Finite Element Analysis (FEA), followed by proof testing, to devise the new Class 2500 Tool-Less® design.

INNOVATIVE CHANGES FOR CRITICAL APPLICATIONS PRESERVE EASE OF USE.

The critical environments for which the Class 2500 closure will be used require innovative changes to preserve the safe and reliable operating characteristics Tube Turns' customers have come to expect, while continuing to provide ease of use. As the name of this family of closures implies, operators can open and close any Tool-less® closure by hand, in a matter of seconds, without tools.

FAMILIAR FEATURES

The Class 2500 Tool-Less® closure features the familiar hub component, robustly designed for the higher pressure class, and a hinged internal door. Customers familiar with previous installations of Tool-Less® closures will recognize that the lip seal remains in a similar position on the inside of the door, and rests against a sealing surface in the hub.



SYPRIS® TECHNOLOGIES
Tube Turns Products

CL2500 TOOL-LESS® CLOSURES

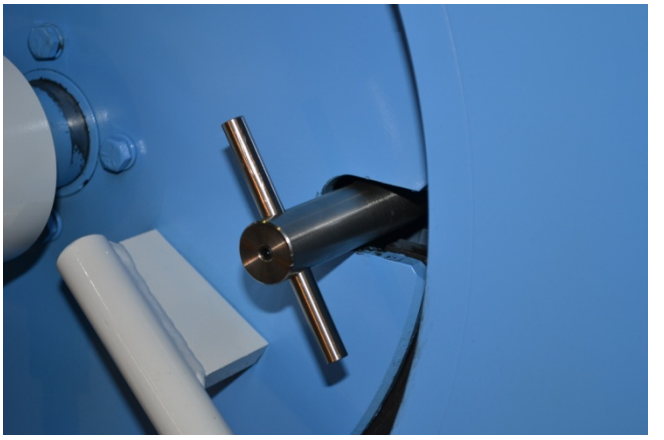
ROBUST COMPONENTS

The door also carries the moving locking segments that provide the powerful and positive locking mechanism to hold the door closed against internal pressure. The Class 2500 Tool-Less closure differs from its predecessors in the locking segment actuation mechanism. At very high pressures, the components for pressure containment must be larger and thicker. This means that the actuating force to move these components is likewise increased.

ROTARY LOCKING SEGMENT ACTUATION SYSTEM

To allow for the easy and reliable operation of the Class 2500 closure, Tube Turns' engineers devised a central rotary mechanism that connects individually to each locking segment, driving them in and out of locking position, as opposed to the prior design, which withdraws the locking segments inward from a single camlock pivot point along a circumferential carrier band.

LOW OPERATOR EFFORT



The Class 2500 design multiplies the torque applied to the locking segments without increasing the operator's effort to move the components, and the handle only requires movement of 90 degrees (1/4 turn) to lock and unlock the closure. A guide track for each individual locking segment assures each segment is properly positioned every time it is withdrawn or extended for locking.

SAFETY FEATURES

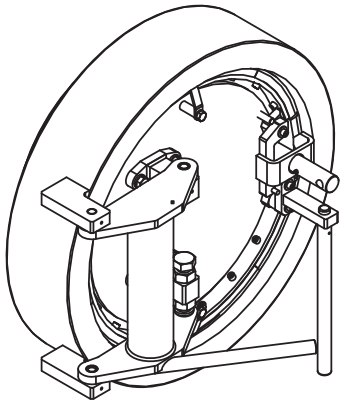
The Class 2500 Tool-Less® also features a Pressure Warning Device (PWD) which must be removed prior to attempting to open the closure. The PWD produces an audible sound (in gas service) or a visible liquid stream (in liquid service) if the closure is under pressure. When closing and re-pressurizing the closure, this safety device must be fully engaged. Otherwise, the PWD will produce a noise or release of process fluid to warn the operator that the closure is not ready for use. In accordance with industry standards, this closure's locking segments are visible at all times, providing a secondary method of confirming the closure's "locked" or "unlocked" status.

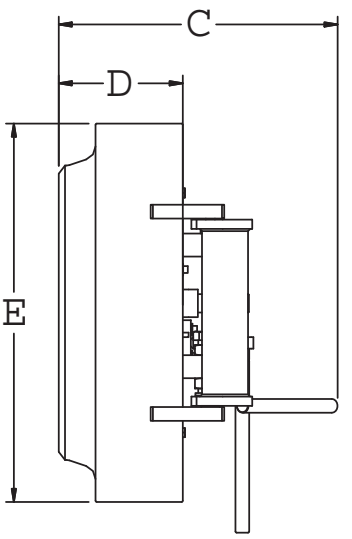
SIZE AND MATERIAL AVAILABILITY

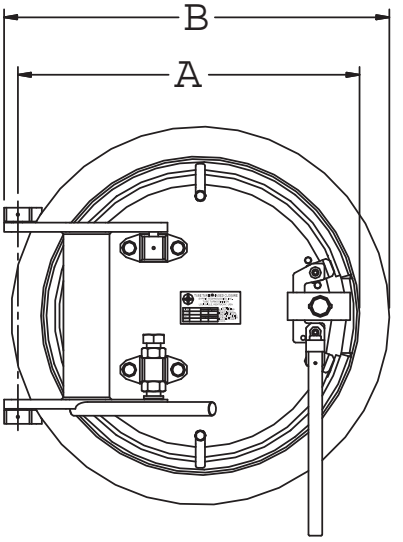
The Class 2500 Tool-Less® is available in sizes from 12" to 30", and can be supplied with same choice of materials, metallurgy, seal types, and other options common to the Tool-Less® family of closures.

SYPRIS® TECHNOLOGIES
Tube Turns Products

TOOL-LESS® HORIZONTAL DIMENSIONS







	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)

Note: Type H Tool-less Horizontal model closure is 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 application limits , see Page 3.

SYPRIS® TECHNOLOGIES
Tube Turns Products

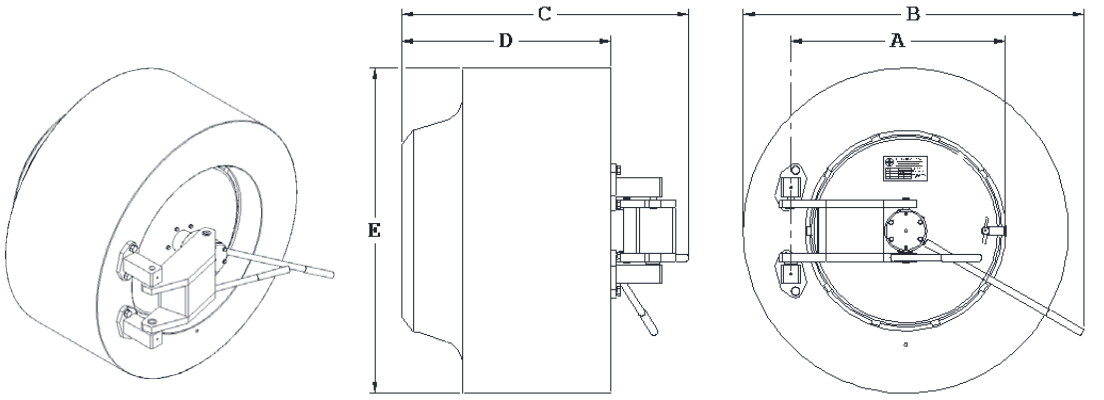
TOOL-LESS® HORIZONTAL DIMENSIONS

	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 3/16	(33.5)	13 1/2	(34.29)	6	(15.24)	12 9/16	(31.91)	123	(56)
	10	(250)	13 1/4	(33.66)	15 3/4	(40.01)	14 1/2	(36.83)	6 7/16	(16.35)	15 1/16	(38.26)	190	(86)
	12	(300)	15 1/2	(39.37)	18 3/16	(46.2)	14 11/16	(37.31)	6 15/16	(17.62)	17 9/16	(44.61)	278	(126)
	14	(350)	16 3/4	(42.55)	19 1/2	(49.53)	17 1/8	(43.5)	7 3/4	(19.69)	19 1/16	(48.42)	357	(162)
	16	(400)	19 1/2	(49.53)	23	(58.42)	19 1/4	(48.9)	9 3/16	(23.34)	22 1/16	(56.04)	577	(262)
	18	(450)	21 7/16	(54.45)	25 1/8	(63.82)	21 1/8	(53.66)	9 7/8	(25.08)	24 7/16	(62.07)	750	(340)
	20	(500)	23 1/4	(59.06)	27 1/4	(69.22)	21 1/2	(54.61)	10 9/16	(26.83)	27	(68.58)	975	(442)
	22	(550)	25 3/4	(65.41)	30 3/16	(76.68)	23 1/8	(58.74)	11 1/4	(28.58)	29 3/8	(74.61)	1237	(561)
	24	(600)	27 9/16	(70.01)	32 1/4	(81.92)	22 7/8	(58.1)	12 1/8	(30.8)	31 9/16	(80.17)	1528	(693)
	26	(650)	29 13/16	(75.72)	35 1/4	(89.54)	23 3/4	(60.33)	13 3/16	(33.5)	34 3/8	(87.31)	2032	(922)
	28	(700)	32	(81.28)	37 1/2	(95.25)	25 3/8	(64.45)	15 1/8	(38.42)	37	(93.98)	2601	(1180)
	30	(750)	34	(86.36)	39 3/4	(100.97)	25 1/2	(64.77)	15 5/16	(38.89)	39 3/8	(100.01)	3011	(1366)
	32	(800)	36 5/8	(93.03)	43	(109.22)	29 11/16	(75.41)	16 1/8	(40.96)	42 1/4	(107.32)	3712	(1684)
	34	(850)	38 5/8	(98.11)	45 1/4	(114.94)	29 3/4	(75.57)	16 1/2	(41.91)	44 11/16	(113.51)	4239	(1923)
	36	(900)	40 5/8	(103.19)	47 1/2	(120.65)	31 3/8	(79.69)	18 1/4	(46.36)	47 3/16	(119.86)	5143	(2333)
	38	(950)	43 7/16	(110.33)	50 7/8	(129.22)	31 5/8	(80.33)	19 1/8	(48.58)	50	(127)	6150	(2790)
	40	(1000)	45	(114.3)	52 11/16	(133.83)	31 11/16	(80.49)	19 3/8	(49.21)	51 15/16	(131.92)	6750	(3062)
	42	(1050)	46 1/2	(118.11)	54 3/8	(138.11)	33 1/4	(84.46)	21 1/8	(53.66)	53 3/4	(136.53)	7680	(3484)
	44	(1100)	49 1/8	(124.78)	57 9/16	(146.21)	36 1/2	(92.71)	23 1/16	(58.58)	56 9/16	(143.67)	9240	(4191)
	46	(1150)	51 3/16	(130.02)	59 3/4	(151.77)	36 9/16	(92.87)	23 3/8	(59.37)	59	(149.86)	10215	(4633)
	48	(1200)	53 1/4	(135.26)	62 1/8	(157.8)	38 1/8	(96.84)	25 1/4	(64.14)	61 9/16	(156.37)	11820	(5361)
	50	(1250)	55 1/4	(140.34)	64 9/16	(163.99)	41 1/2	(105.41)	25 1/2	(64.77)	63 15/16	(162.4)	13075	(5931)
	52	(1300)	57	(144.78)	66 3/4	(169.55)	42 3/8	(107.63)	26 1/4	(66.68)	66 3/16	(168.12)	14475	(6566)
	54	(1350)	59 3/8	(150.81)	69 3/16	(175.74)	42 1/2	(107.95)	26 9/16	(67.47)	68 5/8	(174.31)	15750	(7144)

Note: Type H Tool-less Horizontal model closure is 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 application limits , see Page 3.

TOOL-LESS® HORIZONTAL DIMENSIONS

	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 1500-H	8	(200)	12 1/16	(30.64)	15	(38.1)	16 1/4	(41.28)	9 1/4	(23.5)	13 5/16	(33.81)	250	(113)
	10	(250)	14 1/4	(36.2)	17 1/2	(44.45)	18 1/8	(46.04)	10 7/8	(27.62)	16 3/4	(42.55)	620	(281)
	12	(300)	16 9/16	(42.07)	20 5/16	(51.59)	21 1/4	(53.98)	11 11/16	(29.69)	19 3/4	(50.17)	775	(352)
	14	(350)	17 7/8	(45.4)	21 7/8	(55.56)	22 1/16	(56.04)	12 9/16	(31.91)	21 3/8	(54.29)	1183	(537)
	16	(400)	20 9/16	(52.23)	25 9/16	(64.93)	25 1/2	(64.77)	14 3/8	(36.51)	24 1/2	(62.23)	1555	(705)
	18	(450)	22 3/4	(57.79)	28 1/16	(71.28)	26 5/8	(67.63)	15 3/4	(40.01)	27 1/4	(69.22)	2135	(968)
	20	(500)	25 1/4	(64.14)	31 1/16	(78.9)	27 1/8	(68.9)	17 1/2	(44.45)	30 3/16	(76.68)	2675	(1213)
	22	(550)	27 7/16	(69.69)	33 5/8	(85.41)	27 7/8	(70.8)	18 5/8	(47.31)	32 15/16	(83.66)	3442	(1561)
	24	(600)	29 7/16	(74.77)	36 1/16	(91.6)	30 13/16	(78.26)	20 11/16	(52.55)	35 5/8	(90.49)	4250	(1928)
	26	(650)	31 5/8	(80.33)	38 11/16	(98.27)	32 7/16	(82.39)	22 3/4	(57.79)	38 7/16	(97.63)	4330	(1964)
	28	(700)	31 5/8	(80.33)	38 11/16	(98.27)	31 7/8	(80.96)	22 1/8	(56.2)	38 7/16	(97.63)	5250	(2381)
	30	(750)	34 1/8	(86.68)	41 15/16	(106.52)	35 1/4	(89.54)	23 1/4	(59.06)	41 1/2	(105.41)	6380	(2894)
	32	(800)	36 11/16	(93.19)	44 3/4	(113.67)	41 1/4	(104.78)	25 1/4	(64.14)	44 1/8	(112.08)	7880	(3574)
	34	(850)	39 5/8	(100.65)	48 3/8	(122.87)	40 3/4	(103.51)	26 3/4	(67.95)	47 7/16	(120.49)	9450	(4286)
	36	(900)	42 3/8	(107.63)	51 1/2	(130.81)	39 7/8	(101.28)	28 7/8	(73.34)	50 3/16	(127.48)	10725	(4865)
	38	(950)	44 7/8	(113.98)	54 3/8	(138.11)	40 1/4	(102.24)	29 3/8	(74.61)	52 15/16	(134.46)	12680	(5752)
	40	(1000)	47 3/4	(121.29)	57 1/2	(146.05)	41 3/4	(106.05)	31 9/16	(80.17)	55 3/4	(141.61)	13620	(6178)
	42	(1050)	49 1/2	(125.73)	59 1/2	(151.13)	42	(106.68)	32	(81.28)	57 3/4	(146.69)	6150	(2790)

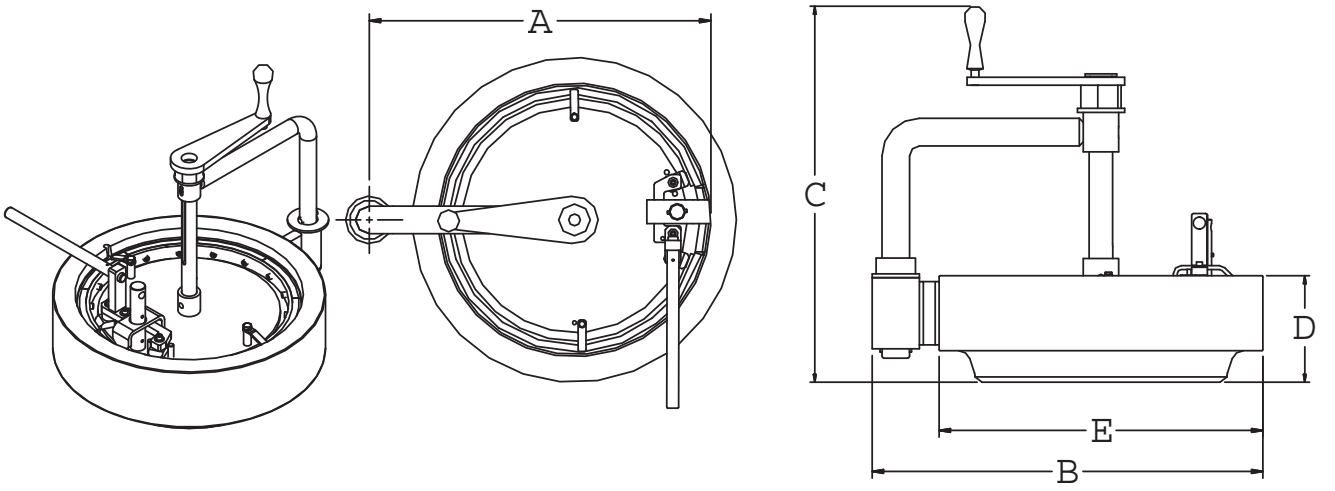


	Nominal Size		Swing Radius A		Over-all Width B		Over-all Height C		Hub Length D		Hub OD E		Approx. Weight	
	In.	(Dn)	In.	(cm)	In.	(cm)	In.	(cm)	In.	(cm)	In.	(cm)	lbs	(Kg)
CLASS 2500-H	8	(200)	11 1/8	(28.26)	19 1/2	(49.53)	16	(40.64)	10 3/4	(27.31)	16 1/4	(41.28)	397	(180)
	10	(250)	12 1/2	(31.75)	22 1/4	(56.52)	18	(45.72)	12 3/4	(32.39)	19 3/4	(50.17)	695	(315)
	12	(300)	15	(38.1)	25 3/4	(65.41)	20 3/4	(52.71)	15 1/2	(39.37)	23	(58.42)	1149	(521)
	14	(350)	17 1/8	(43.5)	28 3/8	(72.07)	25	(63.5)	16 1/2	(41.91)	25 1/4	(64.14)	1482	(672)
	16	(400)	19 3/4	(50.17)	32	(81.28)	27 3/4	(70.49)	19	(48.26)	28 1/2	(72.39)	2211	(1003)
	18	(450)	22 1/4	(56.52)	35 1/2	(90.17)	29 3/4	(75.57)	21 1/8	(53.66)	32	(81.28)	3027	(1373)
	20	(500)	23 5/8	(60.01)	36 7/8	(93.66)	30 5/8	(77.79)	22 1/2	(57.15)	33 1/2	(85.09)	3537	(1604)
	22	(550)	24 3/4	(62.87)	38 3/4	(98.43)	31	(78.74)	23	(58.42)	35	(88.9)	4047	(1836)
	24	(600)	27 1/2	(69.85)	43 1/8	(109.54)	36 3/4	(93.35)	25 3/16	(63.98)	38 3/4	(98.43)	5239	(2376)
	26	(650)	29 7/8	(75.88)	46 1/4	(117.48)	38 3/16	(97)	27 1/2	(69.85)	41 3/4	(106.05)	6608	(2997)
	28	(700)	30 7/8	(78.42)	50 1/8	(127.32)	40 7/8	(103.82)	29 1/2	(74.93)	45	(114.3)	8261	(3747)
	30	(750)	31 7/8	(80.96)	51 1/8	(129.86)	42 3/8	(107.63)	31 3/8	(79.69)	48 1/2	(123.19)	10157	(4607)

Note: Type H Tool-less Horizontal model closure is 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 application limits , see Page 3.

SYPRIS® TECHNOLOGIES
Tube Turns Products

TOOL-LESS® VERTICAL DIMENSIONS

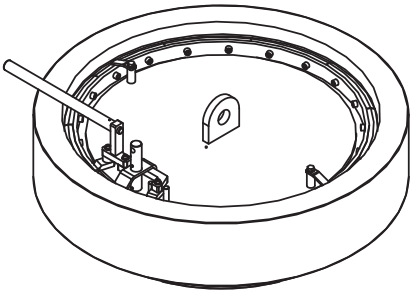


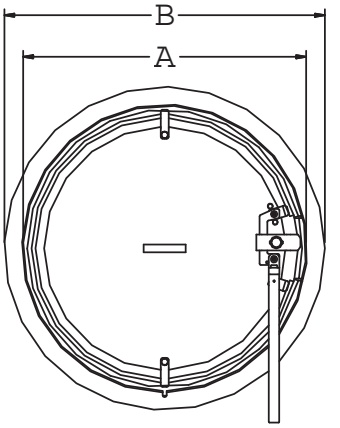
	Nominal Size		Swing Radius A		Over-all Width B		Over-all Height C		Hub Length D		Hub OD E		Approx. Weight	
	In.	(Dn)	In.	(cm)	In.	(cm)	In.	(cm)	In.	(cm)	In.	(cm)	lbs	(Kg)
CLASS 1150-V & 300V	8	(200)	13 1/16	(33.18)	15 15/16	(40.48)	18 3/4	(47.63)	5 1/16	(12.86)	12 1/16	(30.64)	100	(45)
	10	(250)	15 5/16	(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)

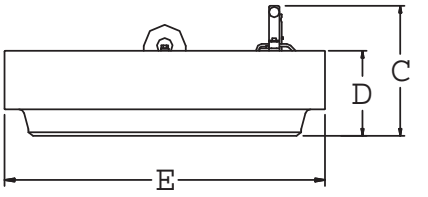
Vertical Tool-less® Closures are furnished with a davit or lifting eye. For sizes 8" through 24", the davit is standard. For sizes larger than 24", the lifting eye is standard. For Pressure-Temperature application limits, see page 3.

SYPRIS® TECHNOLOGIES
Tube Turns Products

TOOL-LESS® VERTICAL DIMENSIONS







	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 application limits, see page 3.

SYPRIS® TECHNOLOGIES
Tube Turns Products

TOOL-LESS® VERTICAL DIMENSIONS

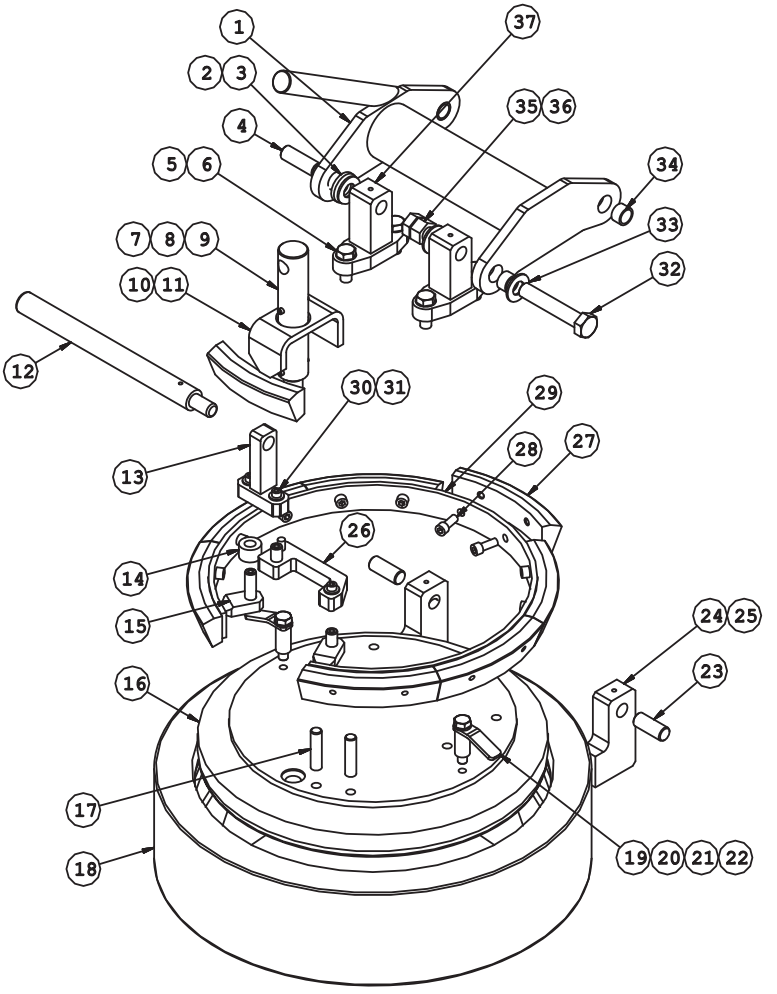
	Nominal Size		Swing Radius A		Over-all Width B		Over-all Height C		Hub Length D		Hub OD E		Approx. Weight	
	In.	(Dn)	In.	(cm)	In.	(cm)	In.	(cm)	In.	(cm)	In.	(cm)	lbs	(Kg)
CLASS 900-V	26	(650)	26 11/16	(67.79)	34 3/8	(87.31)	16 13/16	(42.7)	13 3/16	(33.5)	34 3/8	(87.31)	1930	(875)
	28	(700)	28 3/4	(73.03)	37	(93.98)	18 1/2	(46.99)	15 1/8	(38.42)	37	(93.98)	2500	(1134)
	30	(750)	30 3/4	(78.11)	39 3/8	(100.01)	18 11/16	(47.47)	15 5/16	(38.89)	39 3/8	(100.01)	2920	(1324)
	32	(800)	32 3/4	(83.19)	42 1/4	(107.32)	19 3/16	(48.74)	16 1/8	(40.96)	42 1/4	(107.32)	3575	(1622)
	34	(850)	34 13/16	(88.42)	44 11/16	(113.51)	19 9/16	(49.69)	16 1/2	(41.91)	44 11/16	(113.51)	4080	(1851)
	36	(900)	36 7/8	(93.66)	47 3/16	(119.86)	21 1/16	(53.5)	18 1/4	(46.36)	47 3/16	(119.86)	4980	(2259)
	38	(950)	38 7/8	(98.74)	50	(127)	21 1/2	(54.61)	19 1/8	(48.58)	50	(127)	5910	(2681)
	40	(1000)	40 3/8	(102.55)	51 15/16	(131.92)	21 5/8	(54.93)	19 3/8	(49.21)	51 15/16	(131.92)	6475	(2937)
	42	(1050)	41 7/8	(106.36)	53 3/4	(136.53)	23 5/16	(59.21)	21 1/8	(53.66)	53 3/4	(136.53)	7430	(3370)
	44	(1100)	43 15/16	(111.6)	56 9/16	(143.67)	24 1/16	(61.12)	23 1/16	(58.58)	56 9/16	(143.67)	8905	(4039)
	46	(1150)	46	(116.84)	59	(149.86)	24 1/4	(61.6)	23 3/8	(59.37)	59	(149.86)	9860	(4472)
	48	(1200)	48	(121.92)	61 9/16	(156.37)	26	(66.04)	25 1/4	(64.14)	61 9/16	(156.37)	11460	(5198)
	50	(1250)	50 1/16	(127.16)	63 15/16	(162.4)	26 3/16	(66.52)	25 1/2	(64.77)	63 15/16	(162.4)	12570	(5702)
	52	(1300)	51 5/8	(131.13)	66 3/4	(169.55)	26 7/16	(67.15)	26 1/4	(66.68)	66 3/4	(169.55)	13955	(6330)
	54	(1350)	53 5/8	(136.21)	68 5/8	(174.31)	26 9/16	(67.47)	26 9/16	(67.47)	68 5/8	(174.31)	15250	(6917)
CLASS 1500-V	26	(200)	26 11/16	(67.79)	38 7/16	(97.63)	24 1/2	(62.23)	22 3/4	(57.79)	38 7/16	(97.63)	4250	(1928)
	28	(201)	26 11/16	(67.79)	38 7/16	(97.63)	24	(60.96)	22 1/8	(56.2)	38 7/16	(97.63)	4300	(1950)
	30	(202)	28 3/4	(73.03)	41 1/2	(105.41)	24 1/4	(61.6)	23 1/4	(59.06)	41 1/2	(105.41)	5085	(2307)
	32	(203)	30 3/4	(78.11)	44 1/8	(112.08)	26 1/4	(66.68)	25 1/4	(64.14)	44 1/8	(112.08)	6230	(2826)
	34	(204)	32 3/4	(83.19)	47 7/16	(120.49)	27 3/8	(69.53)	26 3/4	(67.95)	47 7/16	(120.49)	7710	(3497)
	36	(205)	34 13/16	(88.42)	50 3/16	(127.48)	29 1/2	(74.93)	28 7/8	(73.34)	50 3/16	(127.48)	9260	(4200)
	38	(206)	36 7/8	(93.66)	52 15/16	(134.46)	29 7/8	(75.88)	29 3/8	(74.61)	52 15/16	(134.46)	10475	(4751)
	40	(207)	38 7/8	(98.74)	55 3/4	(141.61)	32 1/4	(81.92)	31 9/16	(80.17)	55 3/4	(141.61)	12415	(5631)
	42	(208)	40 3/8	(102.55)	57 3/4	(146.69)	32 1/2	(82.55)	32	(81.28)	57 3/4	(146.69)	13420	(6087)

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 application limits, see page 3.

SYPRIS® TECHNOLOGIES
Tube Turns Products

TOOL-LESS® 8”-10” HORIZONTAL PARTS

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

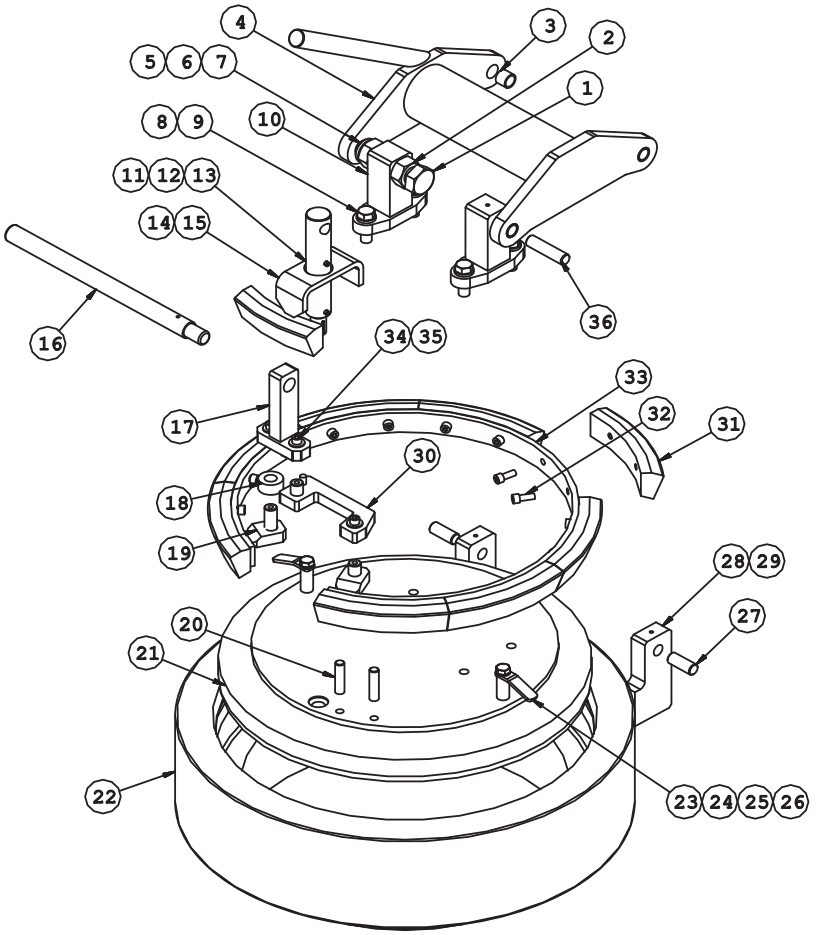
*These recommendations are for normal service; spare quantities may require adjustment based on service and operating conditions.

For Spare Parts Orders, supply the following information:	Example:
1) Quantity required	Qty: 2
2) Description	Material: Buna-N Door Seal
3) Part number	Part No.: 38
4) Size and pressure class	Size & Class: 8” CL600
5) Closure serial number	Serial No.: TL00109

SYPRIS® TECHNOLOGIES
Tube Turns Products

TOOL-LESS® 12”-72” HORIZONTAL PARTS

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	

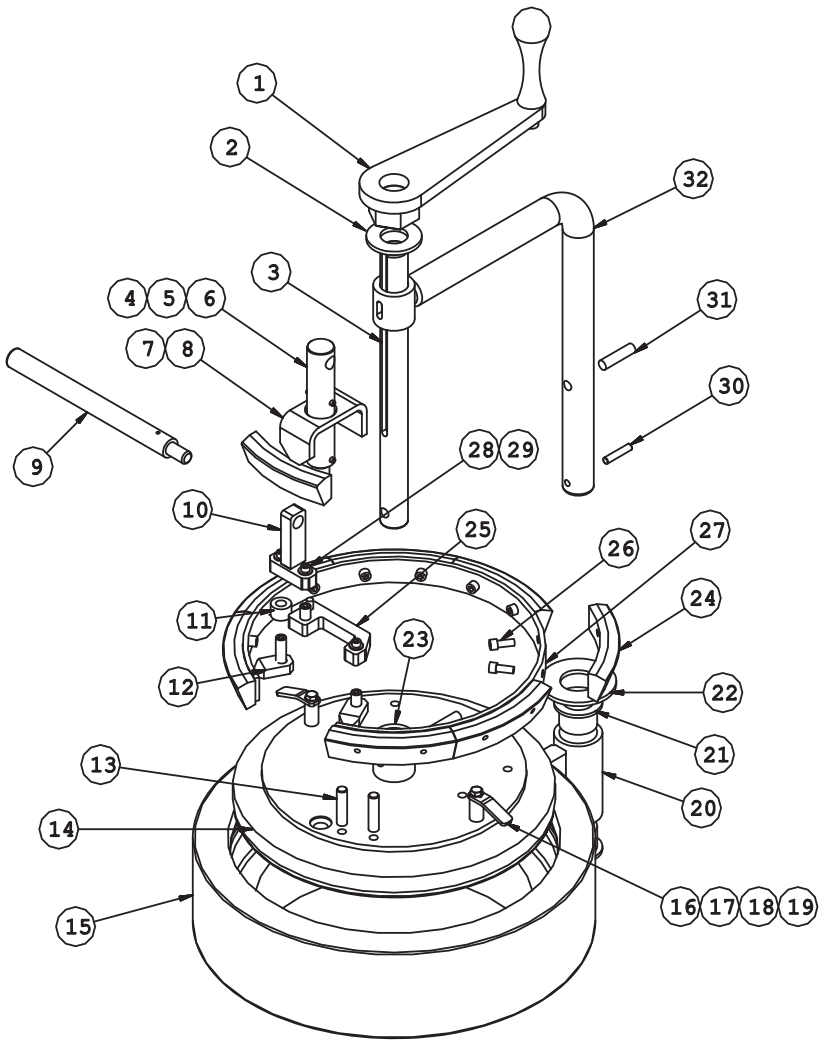


Spares Parts – It is suggested that the following spare parts be stocked for each closure:	
Start-Up & Commissioning requires the following spares:	Operation:
3) One* door seal per closure……...Part No. 37	3) Two* door seals per closure…….....Part No. 37
4) Two* pressure warning screw O-rings per closure……...…Part No. 13	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:	Example:
6) Quantity required	Qty: 1
7) Description	Material: Buna-N Door Seal
8) Part number	Part No.: 37
9) Size and pressure class	Size & Class: 54” CL600
10) Closure serial number	Serial No.: TL00273

SYPRIS® TECHNOLOGIES
Tube Turns Products

TOOL-LESS® 8”-24” VERTICAL PARTS

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	



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

Start-Up & Commissioning requires the following spares:	Operation:
5) One* door seal per closure.....Part No. 33	5) Two* door seals per closure.....Part No. 33
6) Two* pressure warning screw O-rings per closure.....Part No. 6	6) Four* pressure warning screw O-rings per closure.....Part No. 6

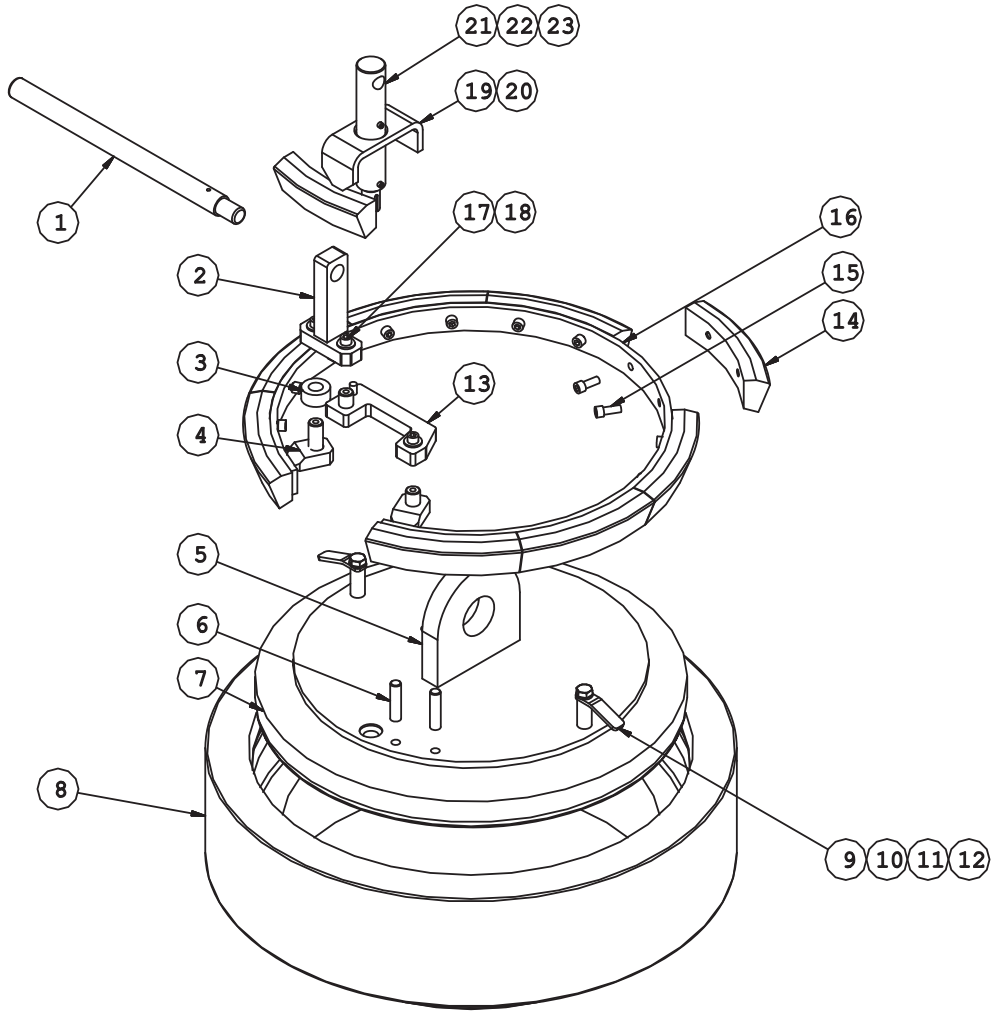
*These recommendations are for normal service; spare quantities may require adjustment based on service and operating conditions.

For Spare Parts Orders, supply the following information:	Example:
11) Quantity required	Qty: 22
12) Description	Material: Buna-N Door Seal
13) Part number	Part No.: 33
14) Size and pressure class	Size & Class: 8” CL600
15) Closure serial number	Serial No.: TL04025

SYPRIS® TECHNOLOGIES
Tube Turns Products

TOOL-LESS® 26”-72” VERTICAL PARTS

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:	Operation:
7) One* door seal per closure.....Part No. 24	7) Two* door seals per closure.....Part No. 24
8) Two* pressure warning screw O-rings per closure.....Part No. 22	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:	Example:
16) Quantity required	Qty: 14
17) Description	Material: Buna-N Door Seal
18) Part number	Part No.: 24
19) Size and pressure class	Size & Class: 36” CL600
20) Closure serial number	Serial No.: TL21890

SYPRIS® TECHNOLOGIES
Tube Turns Products

QUALITY CONTROL

The Tool-less® Closure is manufactured in Louisville, . entucky, 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.

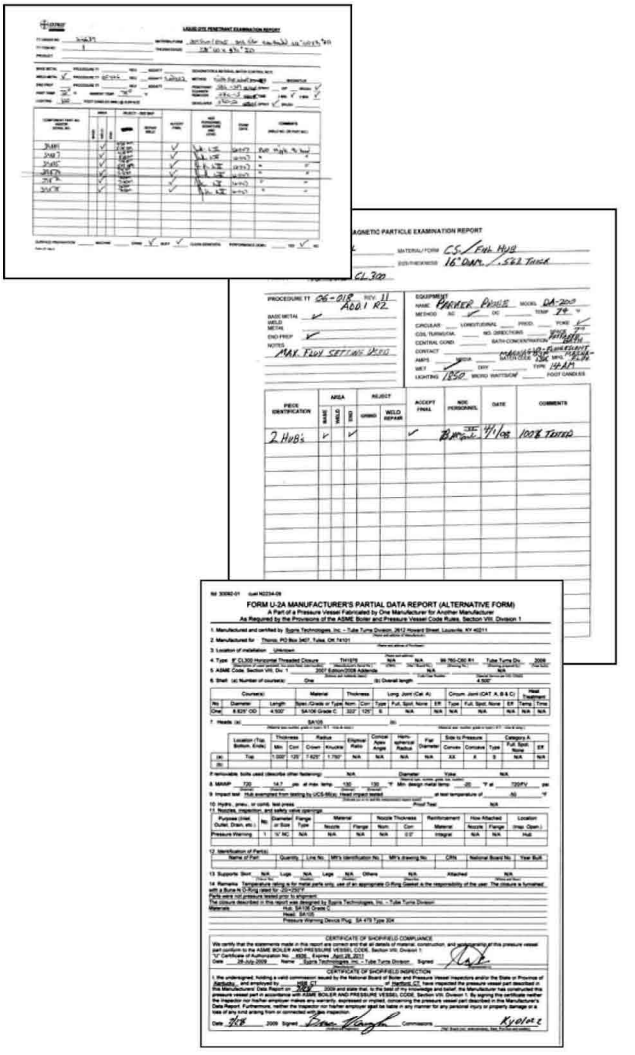
The actual heats of material used for the individual closures are permanently recorded and stamped on all pressure retaining components. This provides traceability to the material test reports for every closure.

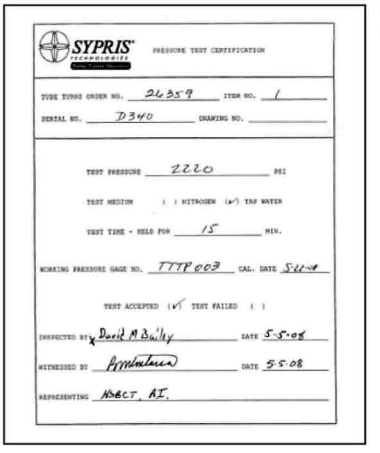
The Tube Turns Division can meet the most stringent quality system, customer material and testing requirements. Special customer requirements are evaluated by the engineering department.

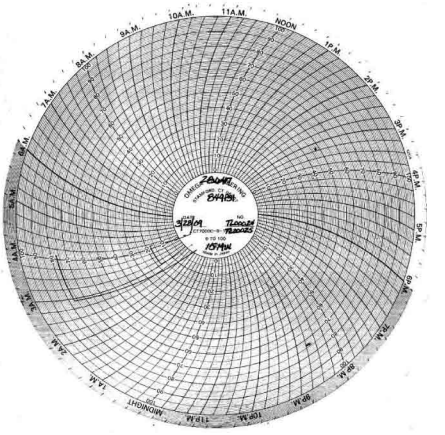
The Tube Turns Division offers optional hydrotest and helium leak test. Nondestructive examination per ASME Section V is available in-house and includes radiography, ultrasound, magnetic particle, and liquid penetrant.

When specified, the following documents are furnished for each closure

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







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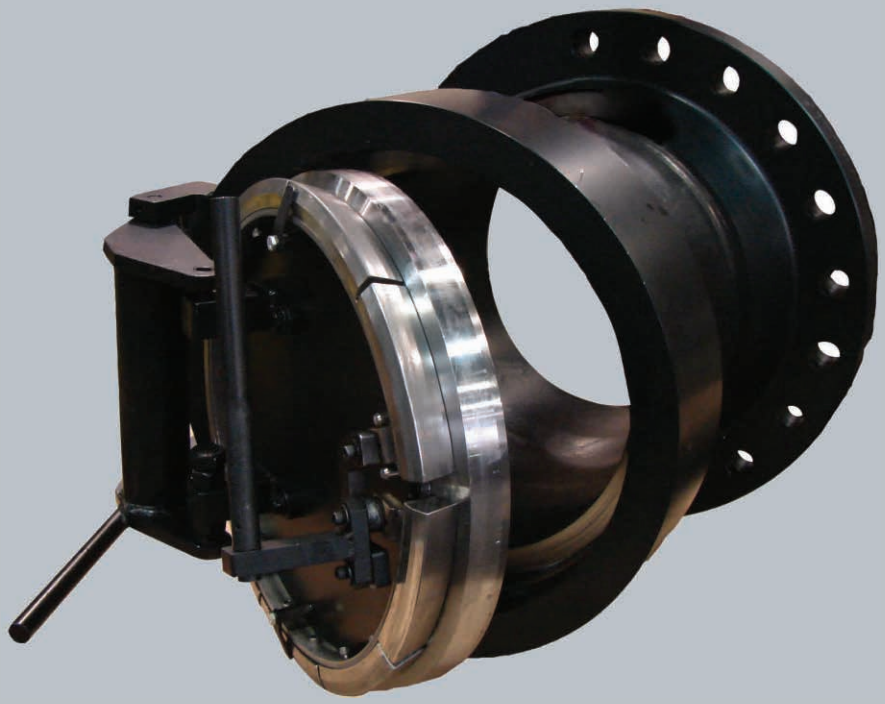
FOR GENERAL INQUIRIES:
louisvillettweb@sypris.com
2612 Howard Street
Louisville, Kentucky 40211 USA
Tel: +1 502.774.6011
Fax: +1 502.774.6300

FOR AFTERMARKET AND SERVICE:
ttaftermarket@sypris.com
2612 Howard Street
Louisville, Kentucky 40211 USA
Tel: +1 502.774.6011
Fax: +1 502.774.6300



Tool-less® Closure with Pipe Extension and Weld Neck Flange

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