



A Unit of Robbins & Myers, Inc.



**YALE**<sup>®</sup>

QUICK OPENING CLOSURES

For fast, easy and economical accessibility to pipelines and other vessel applications, think first of the broad family of Yale® closures. Yale closures feature quick-opening threaded or swing-bolt caps. The Yale product line includes a low pressure series of Swing-Bolt® Figure 510™ closures and high pressure Figure 500™, 500R™ and 515™ threaded closures.



## Yale® Figure 500™ The Original Threaded Closure

Over 45 years of reliable field service has made Yale the leader in the industry. With the original Figure 500™ closure, Yale was first to develop the inherent safety and operating ease of a threaded closure. The Figure 500 closure design combines simplicity and reliability through the use of a rugged, modified Acme thread to fasten the cap to the hub. The pressure seal is achieved by an O-ring set in the face of the hub. Figure 500 closures are manufactured in sizes 2"-14".



## Yale® Figure 500R™ Closures

The Figure 500R™ was designed for larger diameter closure applications. Figure 500R closures are machined with a bevel seat. The bevel seat on the hub provides the operator an accurate stabbing section and reduces the risk for thread and seal damage. All Figure 500R closures also have a minimum of 3" thread length for greater safety and mechanical sealing integrity. The Figure 500R design is available in sizes 16" or larger.



## Yale® Figure 510™ Swing-Bolt® Closures

Swing-Bolt® closures consist of an ellipsoidal cap hinged to a hub. Heat treated, high tensile eye bolts, pinned to lugs on the hub, swing clear of the cap after the nuts are loosened. For faster operation, CAMLOCK bolts can be furnished. Figure 510™ Swing-Bolt® closures are designed to enable fast, frequent opening into low pressure vessels and lines. They are available in sizes 8"-36".

## Yale® Figure 515™ Closures

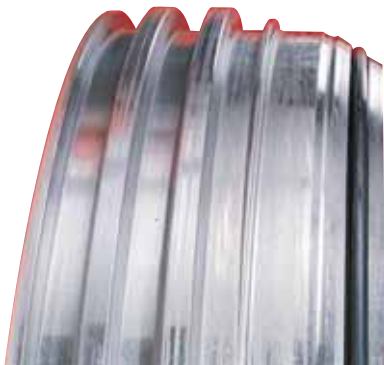
The Figure 515™ flanged closure offers a bolted flange-to-flange configuration. A rugged Acme thread fastens the cap to the hub, making the Figure 515 the safest in the industry. The pressure seal is achieved by an O-ring set in the face of the hub. Figure 515 closures are available in diameter from 2"-72" and ANSI class 150 through 2500.

## Yale® Figure 500™ - 500R™ - 515™ Design Features



### Field Weldable Hubs

The closure hub is field weldable using welding instructions furnished with each closure. When attaching the closure hub to high-strength, thin-wall pipe, the O.D. of the hub weld bevel can be increased to compensate for the different Specified Minimum Yield Strengths (SMYS) as recommended in ASME B16.5, B31.4 and other pipeline codes. Thus, the standard closure hub of SA 350 LF2-CL1 forged steel can be jointed to pipe having a SMYS of up to 1.5 times the SMYS of SA 350 LF2-CL1. Materials to match higher strength pipe are available on request.



### Double Safety Protection

The most important feature of the Yale® closures is safety. Preventing serious injuries, or even deaths, is of primary concern to R&M Energy Systems. Pressure Alert Valves (PAV™), standard on 6" and larger closures, provide warning of internal pressure. Furthermore, the threaded design makes Yale closures among the safest in the industry. For example, if pressure was trapped behind the cap of the closure, it would be extremely difficult to unscrew the cap because of the thread friction. However, if the cap was rotated less than 1/4 turn, the pressure energized O-ring would relax and the trapped pressure would bleed around the threads. At this point, there would still be over 90% of thread engagement holding the cap onto the hub.

### Pressure Alert Valve (PAV™)

A Pressure Alert Valve (PAV™) is furnished as standard equipment on all 6" and larger closures (may be purchased as an option on smaller sizes). The PAV is installed on the closure hub. A chain attaches the PAV stem to the closure cap (see photo below). Before the cap can be rotated, the valve stem must be removed from the PAV body. This action is designed to warn the operator of any residual pressure in the vessel before the closure cap is loosened. **The PAV is NOT designed to function as a bleed down or blowdown valve.**



A Yale® Figure 500R™ Closure installed on pig launcher.

## Closure Design Options

To accommodate most applications Yale® closures are available for HORIZONTAL, VERTICAL or ANGLE installations.

Horizontal closures are equipped with side arm hinges or jib arm hinges depending on closure size and pressure rating.

Side arm hinges are hinged on the left side (facing the closure) unless ordered otherwise.

Jib arm hinges will permit the cap to swing to either side after opening, thus providing greater installation and operational flexibility.

Six inch and larger closure caps for vertical installations are suspended from a davit hinge by a threaded center pin having the same thread pitch as the closure.

Angled closure hinges are custom designed to match the specified incline or decline angle.

All closure hinges are adjusted at the factory to support the entire weight of the closure cap. This prevents the cap from resting on the threads of the mating hub and allows even the heaviest of caps to be easily rotated off and on the threaded hub. If field adjustment is necessary, the horizontal jib and the 26" and larger vertical davit have adjustment in two planes permitting fast, positive positioning of the cap relative to the hub. Twenty-four inch and smaller vertical davits have adjustments in the vertical plane only.



Vertical Closure



Angled Closure

(Inclined shown, declined available)

**NOTE:** From pipeline horizontal centerline, incline angles up, decline angles down.

Twelve inch and smaller closures can be ordered with any of the following options or combinations.

- Cap and hub only
- Cap and hub with chain and swivel
- Cap and hub with Figure 500 bleeder plug
- Cap and hub with PAV
- Cap and hub with hinge (excluding 2")
- Closure caps 12" and smaller can be center drilled and tapped 1/4", 1/2" or 3/4" NPT.
- Cap pins on vertically hinged closures can be drilled and tapped as follows: Sizes 8" to 14" drilled 1/4" thru and tapped 3/8" NPT; sizes 16" and larger, drilled 1/2" thru and tapped 1/2" NPT. Larger NPT couplings available upon request.



Horizontal Closure  
(Side arm hinge shown)

## Code Compliance

Yale® closures are designed and proof tested in accordance with the requirements of ASME Section VIII, Division 1 Boiler and Pressure Vessel Code. The table on page 6 lists suggested allowable working pressures based on ANSI B16.5 class designations.

It is important to provide R&M Energy Systems with system design pressure, line size, operating temperature, and application code to ensure the most economical closure selection.

### ASME Code Stamped Closures

Yale® closures can be code stamped and U-2A Partial Data Reports furnished. Code stamping verifies shop inspection of the closure and materials by an ASME Authorized Inspector.

### Manufacturer's Statement of Code Compliance

A manufacturer's statement of code compliance can be furnished affirming that the closure is manufactured in accordance with the requirements of an applicable code including ASME, API 6-H, ANSI, DOT and customer specifications.

## Materials

Standard materials used in closures are made to ASTM specifications and are types permitted under ASME Section VIII, Division 1, Boiler and Pressure Vessel Code. Closure hubs and most 14" and smaller caps use SA 350 LF2-CL1. The standard material for 16" and larger caps is SA 516 Grade 70 normalized. Standard material for flanges for Figure 515™ closures is SA105N. Materials for special applications, including hinges for offshore service, can be furnished upon request.

## O-Ring Material

Pressure, temperature and chemical environments need to be considered when selecting O-Ring material.

The standard O-ring material for Yale® closures is **Nitrile (NBR)** which has both excellent resistance to the effects of most hydrocarbons and very good flexibility at low temperature. The maximum operating temperature is 250° F.

**FKM (Viton®)** O-rings are recommended for higher temperature applications to 400° F.

**Ethylene Propylene (EP) Rubber** compounds are available for glycol and steam service up to 300° F.

Other elastomers are available for specific service conditions.



Viton is a registered trademark of E.I. DuPont.



A Unit of Robbins & Myers, Inc.

R&M Energy Systems  
10906 F.M. 2920  
Tomball, Texas, U.S.A. 77375-8934  
(800) 654-5603  
(281) 351-2222 • Fax: (281) 351-6557

R&M Energy Systems Canada  
3703 - 98th Street  
Edmonton, Alberta T6E 5N2  
(877) 465-9500  
(780) 465-9500 • Fax: (780) 465-9535

## How to Order Yale® Closures

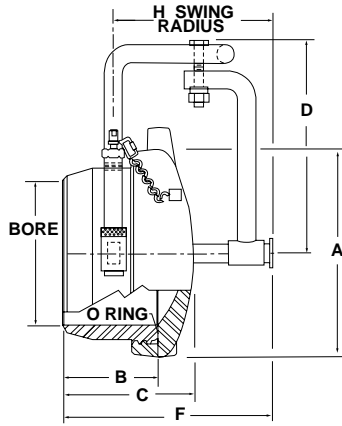
To assure proper handling of your order, the following information must be provided:

1. Maximum design pressure or ANSI rating and minimum and maximum design temperature.
2. Design factor.
3. Maximum field test pressure.
4. O.D., wall thickness and grade of material of the matching pipe.
5. Type of hinge as determined by position of the installation:
  - (a) *Horizontal*—Horizontal hinges – Sizes 3" - 14" are hinged on the left side (facing the closure) unless ordered otherwise. Larger sizes are hinged in the center and will swing to either side.
  - (b) *Vertical*—Vertical hinge.
  - (c) *Angle*—Angle hinge (specify inclined or declined and degree of angle) refer to photo on pg. 4.
  - (d) *Flanged*—for bolt up applications.
6. Mating flange type and rating.
7. Service to determine proper O-Ring material. Use only factory replacement O-Rings.
8. Specific codes or special material requirements applicable to the closure design.

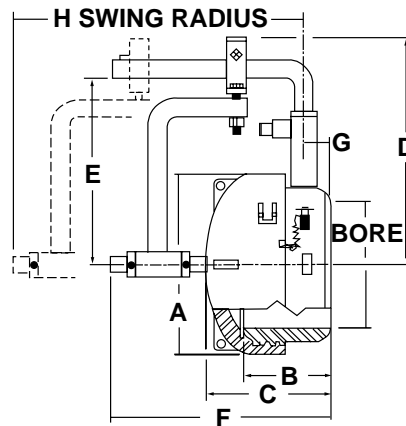


**YALE® Figure 500™ with PAV™**

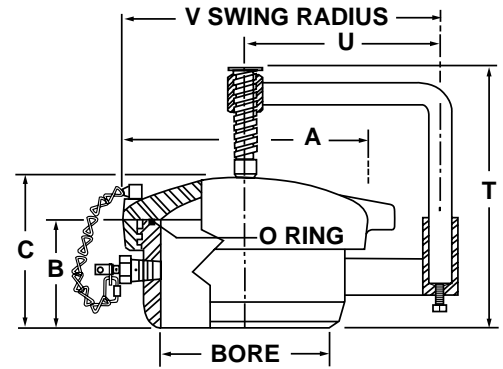
ASME B16.5 Class Designations and Pressures						
Closure Series	ANSI Working Pressure -20° to 250° F			Hydrostatic Test Pressure		
	PSI	bar	kPa	PSI	bar	kPa
150	285	19.6	1960	450	30	3000
300	740	51.1	5110	1125	77	7700
400	990	68.3	6828	1500	103	10300
600	1480	102.1	10210	2225	154	15400
900	2220	153.2	15320	3350	230	23000
1500	3705	255.3	25530	5575	383	38300
2500	6170	425.5	42550	9275	639	63900



**Horizontal 3" - 14"**



**Horizontal 16" and Larger**



**Vertical**

Closure Size & Series (Note 1)	A Cap O.D.	B Hub Length	C Cap/Hub Makeup	Horizontal					Vertical			
				D	E	F	G Min.	H Swing Radius	T Height	U	V Swing Radius	
2 150/900	4 <sup>3</sup> / <sub>8</sub>	2 <sup>5</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>4</sub>	NO HINGE								
3 150/900	5 <sup>1</sup> / <sub>2</sub>	2 <sup>7</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>4</sub>	6	N/A	7	N/A	8 <sup>3</sup> / <sub>4</sub>	7	7	8 <sup>3</sup> / <sub>4</sub>	
4 150/900	6 <sup>3</sup> / <sub>4</sub>	3 <sup>1</sup> / <sub>2</sub>	5	7	N/A	8	N/A	9 <sup>1</sup> / <sub>4</sub>	7	8	9 <sup>1</sup> / <sub>4</sub>	
6 150/600	9 <sup>3</sup> / <sub>4</sub>	4 <sup>1</sup> / <sub>2</sub>	5 <sup>3</sup> / <sub>4</sub>	9	N/A	10 <sup>1</sup> / <sub>2</sub>	N/A	13	11	8	13	
8 150/600	11 <sup>1</sup> / <sub>4</sub>	5	6 <sup>3</sup> / <sub>4</sub>	9 <sup>1</sup> / <sub>2</sub>	N/A	11	N/A	15	12	8 <sup>1</sup> / <sub>2</sub>	14 <sup>1</sup> / <sub>4</sub>	
8 900	12 <sup>1</sup> / <sub>4</sub>	5 <sup>1</sup> / <sub>2</sub>	7 <sup>3</sup> / <sub>4</sub>	13 <sup>1</sup> / <sub>2</sub>	N/A	13 <sup>1</sup> / <sub>2</sub>	N/A	16	14 <sup>1</sup> / <sub>4</sub>	9	15 <sup>1</sup> / <sub>4</sub>	
10 150/600	13 <sup>7</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>2</sub>	8	14 <sup>3</sup> / <sub>4</sub>	N/A	13 <sup>1</sup> / <sub>2</sub>	N/A	18	14 <sup>1</sup> / <sub>4</sub>	11 <sup>1</sup> / <sub>2</sub>	18 <sup>1</sup> / <sub>2</sub>	
10 900	15 <sup>3</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>2</sub>	10 <sup>1</sup> / <sub>2</sub>	15 <sup>1</sup> / <sub>2</sub>	N/A	13 <sup>3</sup> / <sub>4</sub>	N/A	18	14	12 <sup>3</sup> / <sub>4</sub>	20	
12 150/600	15 <sup>5</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>2</sub>	8	15 <sup>1</sup> / <sub>2</sub>	N/A	13 <sup>1</sup> / <sub>2</sub>	N/A	20	14 <sup>1</sup> / <sub>4</sub>	12 <sup>1</sup> / <sub>4</sub>	20	
12 900	16 <sup>3</sup> / <sub>4</sub>	5 <sup>1</sup> / <sub>2</sub>	11 <sup>1</sup> / <sub>4</sub>	15 <sup>1</sup> / <sub>2</sub>	N/A	13 <sup>3</sup> / <sub>4</sub>	N/A	20	13 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	21	
14 150/600	18	5 <sup>1</sup> / <sub>2</sub>	8	17 <sup>1</sup> / <sub>4</sub>	N/A	13 <sup>1</sup> / <sub>2</sub>	N/A	22	14 <sup>1</sup> / <sub>4</sub>	13	22	
14 900	18 <sup>3</sup> / <sub>4</sub>	8 <sup>1</sup> / <sub>2</sub>	14 <sup>1</sup> / <sub>4</sub>	24	20	24 <sup>3</sup> / <sub>4</sub>	22	32	24	18 <sup>3</sup> / <sub>4</sub>	28	
16 150/600	19 <sup>7</sup> / <sub>8</sub>	9 <sup>1</sup> / <sub>4</sub>	14 <sup>1</sup> / <sub>2</sub>	24 <sup>3</sup> / <sub>4</sub>	20 <sup>3</sup> / <sub>8</sub>	25 <sup>5</sup> / <sub>4</sub>	2 <sup>1</sup> / <sub>4</sub>	33	25	20 <sup>5</sup> / <sub>4</sub>	30	
16 900	20 <sup>7</sup> / <sub>8</sub>	10	15 <sup>5</sup> / <sub>4</sub>	24 <sup>3</sup> / <sub>4</sub>	20 <sup>3</sup> / <sub>8</sub>	26 <sup>1</sup> / <sub>4</sub>	3	33	26 <sup>1</sup> / <sub>4</sub>	20	30 <sup>1</sup> / <sub>2</sub>	
18 150/600	22 <sup>1</sup> / <sub>8</sub>	9 <sup>1</sup> / <sub>4</sub>	15 <sup>1</sup> / <sub>4</sub>	25 <sup>5</sup> / <sub>4</sub>	21 <sup>3</sup> / <sub>8</sub>	26 <sup>1</sup> / <sub>4</sub>	2 <sup>1</sup> / <sub>4</sub>	33	25 <sup>3</sup> / <sub>4</sub>	21	32 <sup>1</sup> / <sub>4</sub>	
18 900	23 <sup>1</sup> / <sub>8</sub>	10	16	25 <sup>5</sup> / <sub>4</sub>	21 <sup>3</sup> / <sub>8</sub>	26 <sup>1</sup> / <sub>4</sub>	3	33	27	21	32 <sup>3</sup> / <sub>4</sub>	
20 150/600	24 <sup>3</sup> / <sub>8</sub>	11	16 <sup>3</sup> / <sub>4</sub>	27 <sup>1</sup> / <sub>2</sub>	27 <sup>3</sup> / <sub>8</sub>	27 <sup>1</sup> / <sub>2</sub>	3 <sup>3</sup> / <sub>4</sub>	47	27 <sup>1</sup> / <sub>2</sub>	22	34 <sup>1</sup> / <sub>4</sub>	
20 900	25 <sup>1</sup> / <sub>2</sub>	13	19 <sup>1</sup> / <sub>2</sub>	29 <sup>1</sup> / <sub>2</sub>	27 <sup>3</sup> / <sub>8</sub>	29 <sup>1</sup> / <sub>2</sub>	4 <sup>1</sup> / <sub>4</sub>	47	28 <sup>3</sup> / <sub>4</sub>	23	35 <sup>5</sup> / <sub>8</sub>	
22 150/600	26 <sup>7</sup> / <sub>8</sub>	11	17 <sup>3</sup> / <sub>4</sub>	28 <sup>1</sup> / <sub>2</sub>	28 <sup>3</sup> / <sub>8</sub>	28 <sup>1</sup> / <sub>2</sub>	4 <sup>1</sup> / <sub>4</sub>	47	28 <sup>1</sup> / <sub>4</sub>	23 <sup>1</sup> / <sub>4</sub>	36 <sup>3</sup> / <sub>4</sub>	
22 900	28 <sup>1</sup> / <sub>4</sub>	13	19 <sup>1</sup> / <sub>4</sub>	29 <sup>1</sup> / <sub>4</sub>	28 <sup>3</sup> / <sub>8</sub>	30	3 <sup>3</sup> / <sub>4</sub>	47	29 <sup>1</sup> / <sub>2</sub>	23 <sup>1</sup> / <sub>4</sub>	37 <sup>1</sup> / <sub>2</sub>	
24 150/600	29	11	19	35 <sup>1</sup> / <sub>4</sub>	30 <sup>3</sup> / <sub>8</sub>	29 <sup>1</sup> / <sub>4</sub>	3 <sup>3</sup> / <sub>4</sub>	48	29 <sup>1</sup> / <sub>2</sub>	25 <sup>1</sup> / <sub>4</sub>	39	
24 900	30 <sup>5</sup> / <sub>8</sub>	13	20 <sup>1</sup> / <sub>2</sub>	35 <sup>3</sup> / <sub>4</sub>	30 <sup>3</sup> / <sub>8</sub>	33 <sup>1</sup> / <sub>2</sub>	3 <sup>3</sup> / <sub>4</sub>	48	30	25 <sup>1</sup> / <sub>4</sub>	40	
26 150/600	31 <sup>1</sup> / <sub>4</sub>	11	18 <sup>1</sup> / <sub>2</sub>	35 <sup>3</sup> / <sub>4</sub>	31 <sup>3</sup> / <sub>8</sub>	32 <sup>1</sup> / <sub>2</sub>	3 <sup>3</sup> / <sub>4</sub>	48	34 <sup>1</sup> / <sub>2</sub>	27 <sup>3</sup> / <sub>4</sub>	43 <sup>1</sup> / <sub>2</sub>	
26 900	32 <sup>7</sup> / <sub>8</sub>	13	21 <sup>1</sup> / <sub>4</sub>	39 <sup>3</sup> / <sub>4</sub>	29 <sup>1</sup> / <sub>4</sub>	34 <sup>1</sup> / <sub>4</sub>	4 <sup>1</sup> / <sub>4</sub>	48				
28 150/600	33 <sup>1</sup> / <sub>2</sub>	11	19	40 <sup>3</sup> / <sub>4</sub>	30 <sup>1</sup> / <sub>4</sub>	33 <sup>3</sup> / <sub>4</sub>	3 <sup>3</sup> / <sub>4</sub>	48	34 <sup>1</sup> / <sub>2</sub>	28 <sup>3</sup> / <sub>4</sub>	45 <sup>3</sup> / <sub>4</sub>	
28 900	35 <sup>7</sup> / <sub>8</sub>	13	21 <sup>3</sup> / <sub>4</sub>	40 <sup>3</sup> / <sub>4</sub>	30 <sup>1</sup> / <sub>4</sub>	34 <sup>1</sup> / <sub>4</sub>	4 <sup>1</sup> / <sub>4</sub>	48				
30 150/600	35 <sup>7</sup> / <sub>8</sub>	12	20 <sup>1</sup> / <sub>2</sub>	41 <sup>3</sup> / <sub>4</sub>	31 <sup>1</sup> / <sub>4</sub>	33 <sup>3</sup> / <sub>4</sub>	3 <sup>3</sup> / <sub>4</sub>	48	36 <sup>1</sup> / <sub>4</sub>	29	47	
30 900	37 <sup>1</sup> / <sub>2</sub>	16	22 <sup>1</sup> / <sub>4</sub>	50 <sup>1</sup> / <sub>4</sub>	33 <sup>1</sup> / <sub>4</sub>	35 <sup>5</sup> / <sub>4</sub>	5	59				
32 150/600	38 <sup>7</sup> / <sub>8</sub>	12	21	42 <sup>3</sup> / <sub>4</sub>	32 <sup>3</sup> / <sub>4</sub>	34	3 <sup>3</sup> / <sub>4</sub>	48	36 <sup>1</sup> / <sub>2</sub>	30	49 <sup>1</sup> / <sub>4</sub>	
32 900	39 <sup>7</sup> / <sub>8</sub>	16	26 <sup>1</sup> / <sub>4</sub>	51 <sup>1</sup> / <sub>4</sub>	34 <sup>1</sup> / <sub>4</sub>	38 <sup>3</sup> / <sub>4</sub>	5	59				
34 150/600	40 <sup>1</sup> / <sub>4</sub>	12	21 <sup>1</sup> / <sub>2</sub>	43 <sup>3</sup> / <sub>4</sub>	33 <sup>3</sup> / <sub>4</sub>	34 <sup>1</sup> / <sub>2</sub>	3 <sup>3</sup> / <sub>4</sub>	48	36 <sup>3</sup> / <sub>4</sub>	31	51 <sup>1</sup> / <sub>4</sub>	
34 900	42 <sup>3</sup> / <sub>8</sub>	16	27	51 <sup>1</sup> / <sub>4</sub>	34 <sup>1</sup> / <sub>4</sub>	39	5	59				
36 150/300	40 <sup>3</sup> / <sub>8</sub>	13	22 <sup>1</sup> / <sub>4</sub>	53 <sup>3</sup> / <sub>4</sub>	36 <sup>1</sup> / <sub>4</sub>	36	4	59	38 <sup>1</sup> / <sub>2</sub>	36	56 <sup>1</sup> / <sub>4</sub>	
36 400/600	42 <sup>3</sup> / <sub>8</sub>	15	25 <sup>1</sup> / <sub>4</sub>	53 <sup>3</sup> / <sub>4</sub>	36 <sup>1</sup> / <sub>4</sub>	38 <sup>3</sup> / <sub>4</sub>	5	59	40 <sup>1</sup> / <sub>2</sub>	36	57 <sup>1</sup> / <sub>4</sub>	
36 900	44 <sup>1</sup> / <sub>2</sub>	16	27 <sup>1</sup> / <sub>4</sub>	53 <sup>3</sup> / <sub>4</sub>	36 <sup>1</sup> / <sub>4</sub>	40 <sup>1</sup> / <sub>4</sub>	5	59	52 <sup>1</sup> / <sub>4</sub>	37 <sup>3</sup> / <sub>4</sub>	59 <sup>3</sup> / <sub>4</sub>	
38 150/300	42 <sup>3</sup> / <sub>4</sub>	14	23 <sup>3</sup> / <sub>4</sub>	54 <sup>1</sup> / <sub>2</sub>	37 <sup>1</sup> / <sub>2</sub>	37	4	60				
38 400/600	44 <sup>7</sup> / <sub>8</sub>	15	25 <sup>3</sup> / <sub>4</sub>	55 <sup>1</sup> / <sub>2</sub>	38 <sup>3</sup> / <sub>4</sub>	38 <sup>3</sup> / <sub>4</sub>	5	59				
38 900	47	17	28 <sup>3</sup> / <sub>4</sub>	54 <sup>1</sup> / <sub>2</sub>	37 <sup>1</sup> / <sub>2</sub>	43 <sup>3</sup> / <sub>4</sub>	5	59				
40 150/300	44 <sup>7</sup> / <sub>8</sub>	13	23 <sup>1</sup> / <sub>2</sub>	55 <sup>1</sup> / <sub>4</sub>	39 <sup>1</sup> / <sub>2</sub>	37 <sup>1</sup> / <sub>2</sub>	5	59				
40 400/600	47	15	26 <sup>1</sup> / <sub>4</sub>	55 <sup>1</sup> / <sub>2</sub>	38 <sup>3</sup> / <sub>4</sub>	39	5	59	41 <sup>1</sup> / <sub>4</sub>	38	61 <sup>1</sup> / <sub>2</sub>	
42 150/300	46 <sup>7</sup> / <sub>8</sub>	13	23 <sup>3</sup> / <sub>4</sub>	56 <sup>1</sup> / <sub>2</sub>	39 <sup>1</sup> / <sub>4</sub>	37 <sup>3</sup> / <sub>4</sub>	4	60				
42 400/600	49 <sup>1</sup> / <sub>4</sub>	15	26 <sup>3</sup> / <sub>4</sub>	56 <sup>1</sup> / <sub>2</sub>	39 <sup>1</sup> / <sub>4</sub>	39 <sup>1</sup> / <sub>2</sub>	5	60	41 <sup>3</sup> / <sub>4</sub>	39	63 <sup>3</sup> / <sub>4</sub>	

Sizes 44" and larger available upon request.

Note 1: All Dimensions Nominal. Dimensions are for higher numbered series shown. Dimension drawings upon request at time of order.

N/A - not applicable



A Unit of Robbins & Myers, Inc.

R&M Energy Systems  
10906 F.M. 2920  
Tomball, Texas, U.S.A. 77375-8934  
(800) 654-5603  
(281) 351-2222 • Fax: (281) 351-6557

R&M Energy Systems Canada  
3703 - 98th Street  
Edmonton, Alberta T6E 5N2  
(877) 465-9500  
(780) 465-9500 • Fax: (780) 465-9535



**Closure Caps**



**Pipeline Union**



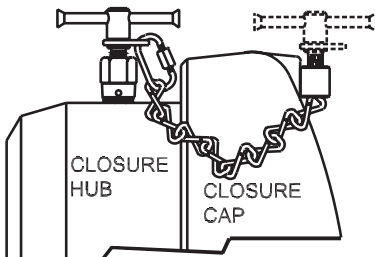
**Thread Inspection Gauge**

**Conversion:  
Closure to Figure 505™ Pipeline  
Union**

Twelve inch and smaller ANSI Series 150 - 600 closures can be converted to Yale Figure 505 unions. This is a convenient method to extend the pipeline without welding.

**Pressure Alert Valve (PAV™)**

An additional safety feature — a PAV™ is furnished as standard equipment on all 6" and larger closures and may be purchased as an option on smaller sizes. Before the cap can be rotated, the seating screw must be removed from the PAV body. This action will warn the operator of any residual pressure in the vessel before the closure cap is loosened. **The PAV is NOT designed to release internal pressure.**



**Pressure Alert Valve (PAV™)**

**Closure Actuator Tool**

For easy operation, 16" and larger closures are furnished with a Closure Actuator Tool (CAT). The CAT tool is designed to assist in both opening and closing the closure.



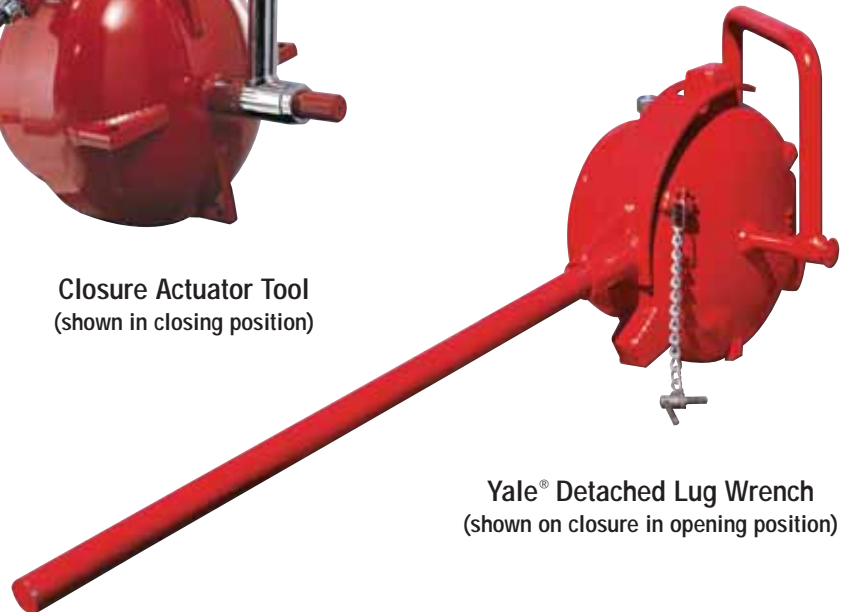
**Closure Actuator Tool  
(shown in closing position)**

**Thread Inspection Gauge/Training**

Corroded, severely worn or damaged threads can be a safety hazard. Thread gauges and seminars are available for training field personnel in proper maintenance and thread inspection procedures.

**Yale® Lug Wrench**

Closure caps, 4" - 14", are formed with the characteristic "Yale" lugs. A specially designed detached wrench slips over the lugs for quick closure closing and opening.



**Yale® Detached Lug Wrench  
(shown on closure in opening position)**





**CAMLOCK Bolt**



**Swing-Bolt®**

Figure 510™ Swing-Bolt® Closures provide a simple, fast and economical means of access to low pressure vessels and lines. Three pressure ranges are available in Type 100, Type 200 and Type 300 closures, as shown on page 11.

**Design Features**

Swing-Bolt Closures consist of an ellipsoidal cap hinged to a hub. Heat treated, high strength eye bolts, pinned to lugs on the hub, swing clear of the cap after the nuts are loosened. If faster operation is desired, CAMLOCK bolts can be furnished.

An O-ring in the cap provides a positive pressure energized seal. The mating surfaces are machined to provide self-alignment between the cap and hub.

**Safety Features**

The holding lugs on the cap are angled inward. This feature insures that the bolt cannot slide off the top lugs under load or in the course of tightening the nut. It also requires that the nut be loosened a few extra turns to clear the cap lugs, thus permitting the cap to lift and bleed any residual pressure that might be present while the cap remains securely retained.



**Swing-Bolt®**



**CAMLOCK Bolt**

**Materials**

Standard materials used in all components of Swing-Bolt® closures are made to ASTM specifications and are the types permitted under ASME Section VIII, Division I, Boiler and Pressure Vessel Code.

Standard Swing-Bolt closure material is SA 516 Grade 70 normalized. Bolts are SA 449 and lugs are SA 36 steel. All sizes of closures can be furnished with stainless steel parts upon request.

**Code Compliance**

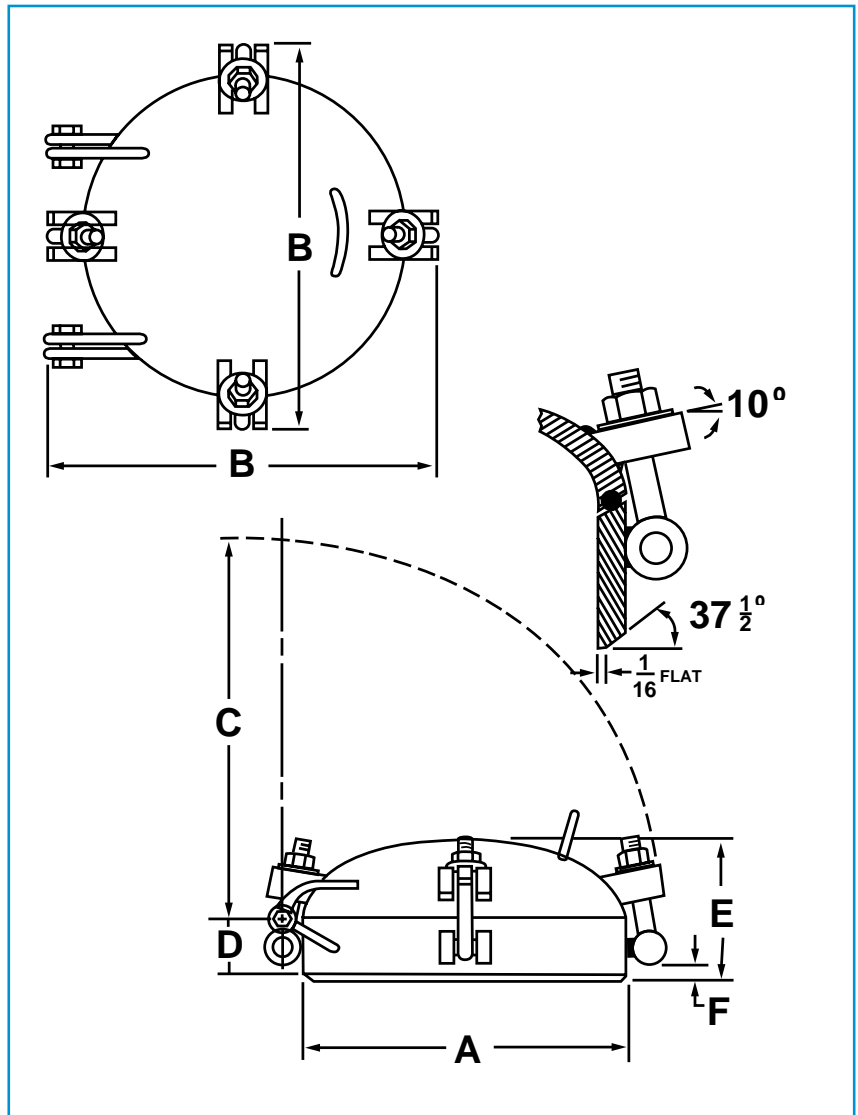
Swing-Bolt closures are designed in accordance with the requirements of ASME Section VIII, Division 1, Boiler and Pressure Vessel Code and can be provided with the code stamp and U-2A Partial Data Report.

**O-Ring Materials**

Swing-Bolt closure O-Rings are available in Nitrile (NBR), FKM, (Viton®) and Ethylene Propylene (EP) materials. Pressure, temperature and chemical environments need to be considered when selecting O-Ring material. See page 5 of this catalog for more O-Ring material recommendations.

**Vertical Installations**

The specification table gives the approximate force required to open the vertical closure cap. On larger closures, hinge springs are an available option to assist in opening.



**How to Order Figure 510™ Swing-Bolt® Closures**

- Please specify:
- |   |   |
|---|---|
| 1. Design Pressure                          | 5. O-ring material  |
| 2. Maximum and minimum design temperature   | 6. Closure material (carbon steel-standard, stainless steel-optional) |
| 3. O.D. and wall thickness of matching pipe | 7. Bolt and nut material  |
| 4. Type of Bolt (bolted or CAMLOCK)         | 8. ASME Code Stamp, if required                                       |

Viton is a registered trademark of E.I. DuPont.

Size	Working Pressure (PSI)			No. of Bolts & Size			Weight (lbs.)			Force Required To Lift Cap (lbs.)		
	Type			Type			Type			Type		
	100	200	300	100	200	300	100	200	300	100	200	300
8		240	300		3 - 5/8	4 - 5/8		27	30		9	10
10	150	200	300	3 - 5/8	4 - 5/8	5 - 3/4	35	40	45	11	12	15
12	120	200	300	3 - 5/8	4 - 3/4	6 - 3/4	42	50	60	14	18	20
14	100	200	300	3 - 5/8	5 - 3/4	8 - 3/4	49	70	78	16	21	26
16	100	200	300	4 - 5/8	6 - 3/4	9 - 3/4	65	80	90	22	27	30
18	115	200	300	4 - 3/4	6 - 7/8	9 - 7/8	87	110	125	29	33	42
20	95	200	300	4 - 3/4	7 - 7/8	9 - 1	105	135	160	35	46	54
22	115	200	300	6 - 3/4	7 - 1	10 - 1	140	165	200	47	49	68
24	110	200	300	5 - 7/8	8 - 1	11 - 1 1/4	157	185	220	53	58	74
26	115	200	300	6 - 7/8	9 - 1	14 - 1	185	210	285	62	66	96
28	115	200	300	7 - 7/8	11 - 1	12 - 1 1/4	202	235	325	68	80	110
30	115	200	300	8 - 7/8	9 - 1 1/4	12 - 1 1/4	239	334	375	81	120	127
32	110	200	275	9 - 7/8	10 - 1 1/4	14 - 1 1/4	262	357	455	89	140	154
34	110	200	275	10 - 7/8	11 - 1 1/4	16 - 1 1/4	285	405	509	96	155	173
36	115	200	275	9 - 1	12 - 1 1/4	18 - 1 1/4	318	447	565	108	175	192

Standard Materials – Head - SA 516 Gr. 70  
 Bolts - SA 449  
 Lugs - SA 36

Lift Handles - Size 18" and up (optional on smaller sizes).  
 All Parts available in stainless steel upon request.

SIZE	A OD	ID† Type			B	C	D Min.	E Max.	F Min.
		100	200	300					
		8	8 5/8	7 7/8					
10	10 3/4	9 3/4	9 3/4	9 3/4	13 1/2	13	2 1/4	5 1/2	3/4
12	12 3/4	11 3/4	11 3/4	11 3/4	16	15 1/4	2 1/4	6	5/8
14	14	13	13	13	17 1/4	16 1/2	2 1/4	6 1/2	5/8
16	16	15	15	15	19 1/4	18 1/2	2 1/4	7	5/8
18	18	17	17	17	21 1/2	20 3/4	3	8	7/8
20	20	19	19	19	23 1/2	22 3/4	3	9	7/8
22	22	21	21	21	26	25	3 1/2	10	1
24	24	23	23	23	28	27	3 1/2	10 1/2	1
26	26	25	25	24 3/4	30	29	3 1/2	11	1
28	28	27	27	26 3/4	32	31	3	11 1/2	3/4
30	30	29	28 3/4	28 3/4	34 1/2	33 1/2	3 1/4	11 1/2	5/8
32	32	31	30 3/4	30 1/2	36 1/2	35 1/2	3 1/4	12	5/8
34	34	33	32 3/4	32 1/2	38 1/2	37 1/2	3 1/4	12 1/2	5/8
36	36	35	34 3/4	34 1/2	40 1/2	39 1/2	3 1/4	13	5/8

† Can be taper bored to match other I.D.s  
 Dimensions are nominal.

NOTE: R&M Energy Systems reserves the right to alter designs, materials and specifications given in this publication without notice.  
 All general Terms and Conditions of Sales, including limitations to our liability, apply to all products and services sold.



A Unit of Robbins & Myers, Inc.

**R&M Energy Systems**

10906 F.M. 2920  
Tomball, Texas, U.S.A. 77375-8934  
(800) 654-5603  
(281) 351-2222  
Fax: (281) 351-6557

**R&M Energy Systems Canada**

3703 - 98th Street  
Edmonton, Alberta, Canada T6E 5N2  
(877) 465-9500  
(780) 465-9500  
Fax: (780) 465-9535

---

**Web Site: [www.rmenergy.com](http://www.rmenergy.com)**

---

**E-mail: [info@rmenergy.com](mailto:info@rmenergy.com)**