

Key Operated Packed Valves for Chlorine & other Corrosive Gases - CAV-06

Standard Chlorine Institute Design

Detailed Series Catalogue – Valves & Accessories



Cylinder Valves



Ton Container Valves

Members since 2004

*Your safety is valued*

ISO 9001 & TPED certified valve manufacturer



	Page
<b>1. Operating Principle &amp; Identifying Features</b>	1.3
<b>2. Features &amp; Benefits for Best-in-Class Performance</b>	
Standard Chlorine Institute Cylinder Valve Design	2.1
Ton Container Valves	2.2
<b>3. Valve Selection Guide</b>	3
<b>4. Fusible Plug for Ton Containers &amp; Cylinder Valves</b>	4
<b>5. Cylinder &amp; Ton Container Valve Accessories</b>	5
<b>6. Cylinder &amp; Ton Container Valve Maintenance Tools &amp; Gauges</b>	6
<b>7. Material of Construction &amp; Assembly Arrangement</b>	
Cylinder Valves	7.1
Ton Container Valves	7.2
<b>8. Valve Maintenance</b>	8.1 – 8.2



## Series CAV-06

### Identifying Features

The Standard Chlorine Institute design is metal seated, key (wrench) operated, single stem compression packed valve. These valves use compressed packing to make a seal around the valve stem & body. To ensure a good seal, the packing nut is tightened to compress the packing against the stem. As this results in higher torques, the valve is required to be operated with a wrench. The design allows for tightening of the packing nut in case of leakage past the packings & is suitable for Chlorine & other corrosive gases because of the ability of operating mechanism to withstand higher torques to overcome any build-up of salts or contaminants in the seating area.

NOTE Particulate generation from valve seat & packing wear does not make the valves suitable for high purity application.

### Recommended Opening Procedure

It is not necessary to open this valve to the fully open position due to large flow from the valve. Further the full opening may be hindered due to space constraint if the cylinder is used in tight quarters. The new cylinder valve requires approximately 1 1/4 turns while the new ton container valve requires just over 1 1/2 turns from full open to full close. In the case of an emergency, if the valve is opened to the recommended 1/2 turn, the valve can be quickly closed. The other benefit of not opening the valve fully is the protection of the upper section of threads. The threads are in the wetted gas stream & due to the corrosive nature of Chlorine, the threads can become jammed with corrosion by-products. If the valve is opened to the recommended 1/2 turn & the threads become jammed, the upper threads usually remain clear. This allows the operator to further open the valve & to free the threads. Use of twisted wrench having a square hole sized to fit the stem & an open-end wrench on the opposite end that fits the packing nut is recommended. Following sequence should be followed:

1. Connect the cylinder to the system
2. Ensure packing nut is tight
3. Place the wrench on the stem & slap the valve open in anticlockwise direction by striking the wrench with the gloved palm of the hand
4. Continue opening the valve until it is 1/2 turn open.

### Recommended Closing Procedure

Close the valve by rotating the stem in clockwise direction using a twisted wrench up to a torque of 30 ft.lb. To ensure that the valve operating mechanism is completely shut, give the wrench a closing slap with the gloved palm of the hand.

### Valve Installation

Valving tool (e.g. sockets or jaws) used to screw the valve into the cylinder must make contact only with the flats in the valve body.

We recommend hand tight + 3 turns wrench tight to install the valve in the cylinders.

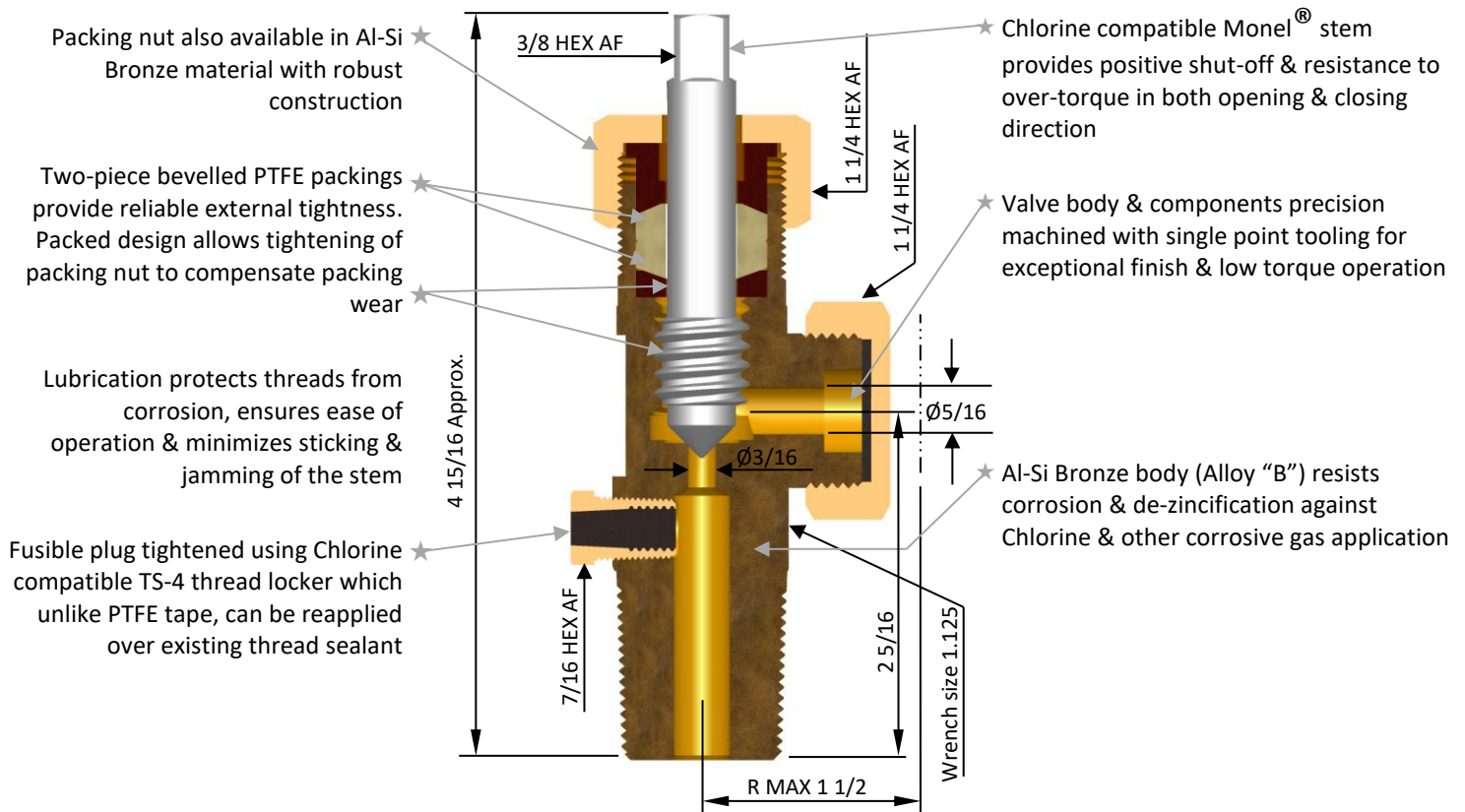
#### **CAUTION**

1. Back seating the valve fully & applying excessive torque in the open direction may cause permanent deformation to the stem threads. This can prevent the valve stem to move freely in the closing direction.
2. Ensure the full length of the stem square is engaged with the wrench. Partial engagement & / or use of incorrect tools to operate the valve can cause premature twisting of the valve stem.



## Features & Benefits for Best-in-Class Performance

### Series CAV-06 (Standard Chlorine Institute Cylinder Valve Design)



All Dimensions are in inch

Dimensions shown are for 3/4-14 NGT (CI)-1 inlet & CGA 820 outlet

### Design Specifications

• Minimum life	: 2000 cycles
• Maximum design service pressure	: 3000 psig
• Operating temperature range	: -4 °F & +149 °F
• Storage temperature range	: -40 °F & +149 °F
• Pressure relief device (PRD)	: CG-2
• Fusible alloy yield temperature	: 158 °F to 165 °F
• Flow coefficient (C <sub>v</sub> )	: 0.78
• Minimum closing torque*	: 9 ft.lb
• Packing nut installation torque	: 40 ft.lb
• Fusible plug installation torque	: 12.5 ft.lb
• Failure torque in closing direction	: >80 ft.lb
• Lubricant	: Krytox GPL 225

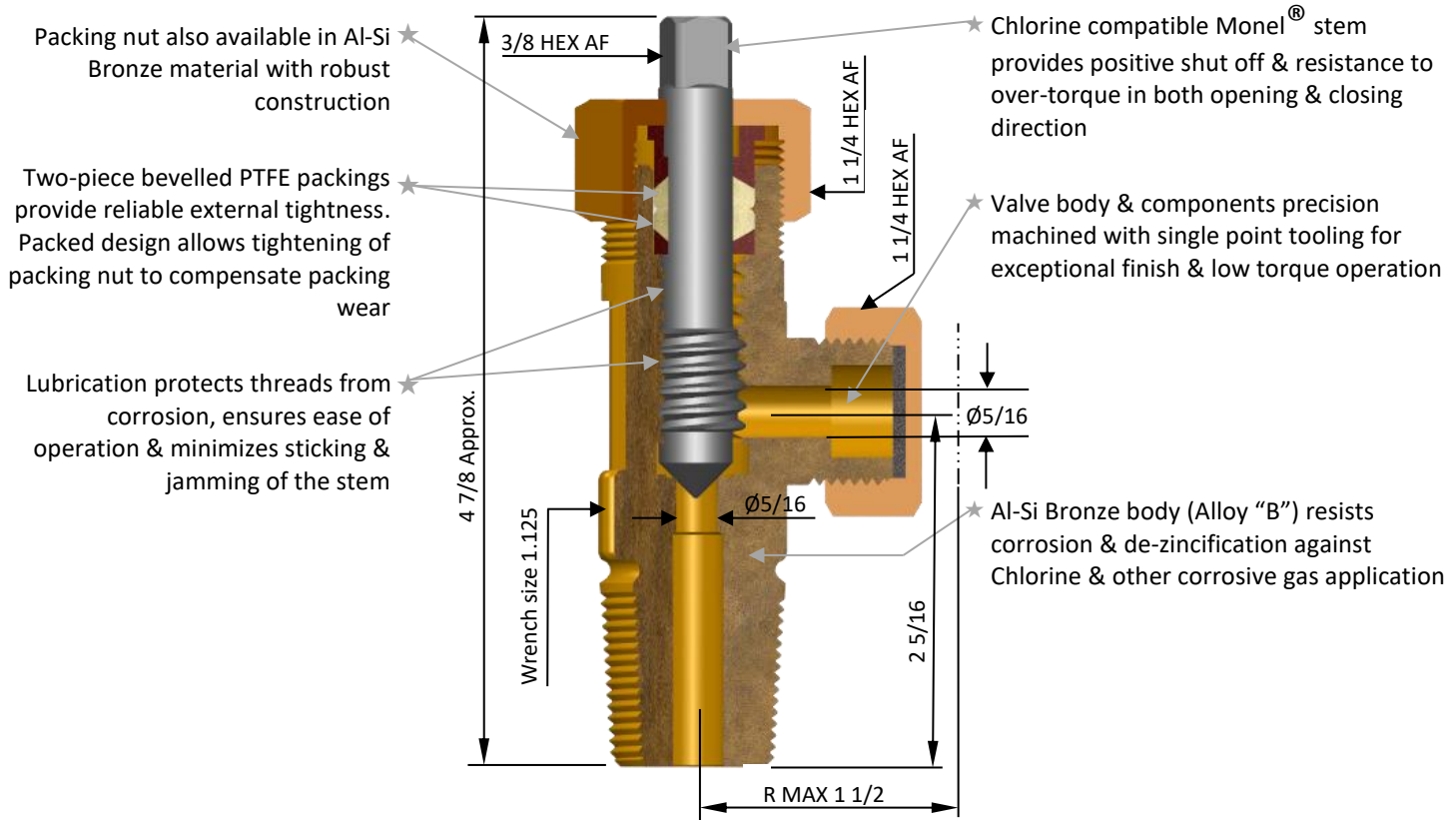
\* Higher torques may be required to operate the valve in service  
(Maximum recommended 25 ft.lb)

### Testing & Certification

- Valves meet performance requirements of Pamphlet 17 of the Chlorine Institute (CI)
- Valves meet CGA V-9:2019
- Fusible plug complies with CGA S-1.1
- Cylinder valves compatible with CI Emergency Kit A



**Series CAV-06 (Ton Container Valves)**



*All Dimensions are in inch  
Dimensions shown are for 3/4-14 NGT (CI)-1 inlet & CGA 820 outlet*

**Design Specifications**

• Minimum life	: 2000 cycles
• Maximum design service pressure	: 3000 psig
• Operating temperature range	: -4 °F & +149 °F
• Storage temperature range	: -40 °F & +149 °F
• Flow coefficient (C <sub>v</sub> )	: 1.6
• Minimum closing torque*	: 9 ft.lb
• Packing nut installation torque	: 40 ft.lb
• Failure torque in closing direction	: >80 ft.lb
• Lubricant	: Krytox GPL 225

*\* Higher torques may be required to operate the valve in service  
(Maximum recommended 25 ft.lb)*

**Testing & Certification**

- Valves meet performance requirements of Pamphlet 17 of the Chlorine Institute (CI)
- Valves meet CGA V-9:2019
- Ton container valves compatible with CI Emergency Kit B



## Valve Selection Guide – CAV-06

Cylinder Valves						
Inlet		Outlet	Pressure Relief Device	Item Code		
Designation*	Size					
3/4-14 NGT (CI)-1	Standard	CGA 660 / 820 Thread 1.030-14NGO-RH-EXT	CG-2, 158 °F to 165 °F	VC-52/1		
3/4-14 NGT (CI)-2	4 Turns oversize			VC-52/2		
3/4-14 NGT (CI)-3	8 ½ Turns oversize			VC-52/3		
3/4-14 NGT (CI)-4	14 Turns oversize			VC-52/4		
3/4-14 NGT (CI)-5	28 Turns oversize			VC-52/5		
1-11.5 NGT (CI)-1	Standard			VC-76/1		
1-11.5 NGT (CI)-2	4 Turns oversize			VC-76/2		
1-11.5 NGT (CI)-3	8 ½ Turns oversize			VC-76/3		
1-11.5 NGT (CI)-4	14 Turns oversize			VC-76/4		
1-11.5 NGT (CI)-5	28 Turns oversize	VC-76/5				

Ton Container Valves						
Inlet		Outlet	Pressure Relief Device	Item Code		
Designation*	Size					
3/4-14 NGT (CI)-1	Standard size	CGA 660 / 820 Thread 1.030-14NGO-RH-EXT	None	VC-54/1		
3/4-14 NGT (CI)-2	4 Turns oversize			VC-54/2		
3/4-14 NGT (CI)-3	8 ½ Turns oversize			VC-54/3		
3/4-14 NGT (CI)-4	14 Turns oversize			VC-54/4		
3/4-14 NGT (CI)-5	28 Turns oversize			VC-54/5		
1-11.5 NGT (CI)-1	Standard size			VC-73/1		
1-11.5 NGT (CI)-2	4 Turns oversize			VC-73/2		
1-11.5 NGT (CI)-3	8 ½ Turns oversize			VC-73/3		
1-11.5 NGT (CI)-4	14 Turns oversize			VC-73/4		
1-11.5 NGT (CI)-5	28 Turns oversize	VC-73/5				

**\* Valve Inlet Designation Terminology**

<b>¾" or 1"</b>	→ Thread nominal pipe size
<b>14 or 11 ½</b>	→ Number of threads per inch
<b>NGT</b>	→ Type of thread (NGT) national gas taper
<b>CL</b>	→ Class of thread (CL) chlorine
<b>X</b>	→ Over size thread

NOTE Oversize valve thread categories were selected many years ago with the primary purpose of having enough sizes to ensure a proper fit between a new valve & a used cylinder.



## Fusible Plugs for Ton Containers

### Features

- Meets Chlorine Institute specification, 1-1/4" HEX flats
- Manufactured from Naval Brass (Alloy "N") with fusible alloy yield temperature range 158 °F - 165 °F
- Standard Combination Bore prevents extrusion of fuse alloy



### Selection Guide

Designation	Inlet		Item Code
		Size	
3/4-14 NGT (CI)-1		Standard	PB-02/1
3/4-14 NGT (CI)-2		4 Turns oversize	PB-02/2
3/4-14 NGT (CI)-3		8 ½ Turns oversize	PB-02/3
3/4-14 NGT (CI)-4		14 Turns oversize	PB-02/4
3/4-14 NGT (CI)-5		28 Turns oversize	PB-02/5
1-11.5 NGT (CI)-1		Standard size	PB-05/1
1-11.5 NGT (CI)-2		4 Turns oversize	PB-05/2
1-11.5 NGT (CI)-3		8 ½ Turns oversize	PB-05/3
1-11.5 NGT (CI)-4		14 Turns oversize	PB-05/4
1-11.5 NGT (CI)-5		28 Turns oversize	PB-05/5

## Fusible Plugs for Cylinder Valves (PA00002)



### Features

- Meets Chlorine Institute specification, 7/16" HEX flats
- Manufactured from Naval Brass (Alloy "N") with fusible alloy yield temperature range 158 °F - 165 °F
- Inlet size 1/8-27 NGT (Modified)
- Standard Combination Bore prevents extrusion of fuse alloy

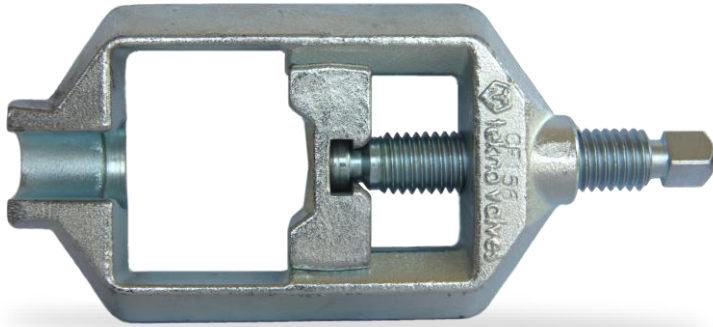




## Cylinder & Ton Container Valve Accessories

### Series CAV-06

#### Yoke Assembly (YSEN002)



#### Features

- Cadmium plated Yoke body & Yoke follower manufactured from EN-9 medium carbon steel by Investment casting process to close tolerances
- Yoke body & follower hardened for high cycle life. Yoke Screw machined from EN-8 grade steel resists torque >65 ft.lb.
- Complies with Chlorine Institute DWG 131, Issue-3
- Replacement screw (SC-EN-1)

#### Yoke Adapters

AISI Bronze Yoke Adapter  
as per Chlorine Institute DWG 130, Issue-5

End connection	Item code
CGA 820 X 1/2-14 NPT THD	AD-AB-1
CGA 820 X 1/4-18 NPT THD	AD-AB-4
CGA 820 X 3/8" SAE Flare	AD-AB-5
CGA 820 X 1/2" SAE Flare	AD-AB-8



#### Yoke Adapter Gaskets



Pure 100% Lead Gaskets  
as per Chlorine Institute DWG 184, Issue-3  
OD 0.937" & ID 0.531"

Thickness	Item code
0.047"	WAPB004
0.062"	WAPB007
0.125"	WAPB006

#### Twisted Wrench (WR-EN-1)

#### Features

- 1 1/4" open end; 3/8" stem square
- Manufactured from EN-9 medium carbon steel by Investment casting process (Cadmium plated)
- Hardened & tempered to 38-45 HRC to resist torque >75 ft.lb.



#### Flexible Connector

#### Features

- Zinc plated annealed Copper tube, C12200 as per ASTM B88
- 3/8" OD X 1/4" ID, Heavy duty wall thickness (Type-K)
- Provided with CGA 660 nuts for non-yoke applications
- Adapters are brazed using solder alloy containing 43% Silver
- 100% pressure tested at 3000 psig



Connection	Length	Item code
CGA 820 X CGA 820	2.5 ft	FCC3814-025
CGA 820 X CGA 820	4 ft	FCC3814-040
CGA 820 X CGA 820	6 ft	FCC3814-060
CGA 820 X CGA 820	10 ft	FCC3814-100





## Seat Cutter (SC00001)



### Features

- Interchangeable stopper provided to reseat cylinder/ton container valve to restrict depth of cut to maximum permissible limit (0.118" for ton container valve & 0.177" for cylinder valve)
- ACME thread provides guide during seat cutting to maintain concentricity

### ⚠ CAUTION

Seat cutter shall only be used by trained personnel as per work instruction provided with each supply.

## Seat Depth Gauges

### Features

- Step marked "M" indicates maximum re-seating limit for the valve body seat

CG00001	For Cylinder valves
TG00001	For Ton Container valves

- Work instruction provided with each supply



## Valve Seat/Stem Combination Gauges (CG/TG/2)



For Ton Container Valves

For Cylinder Valves

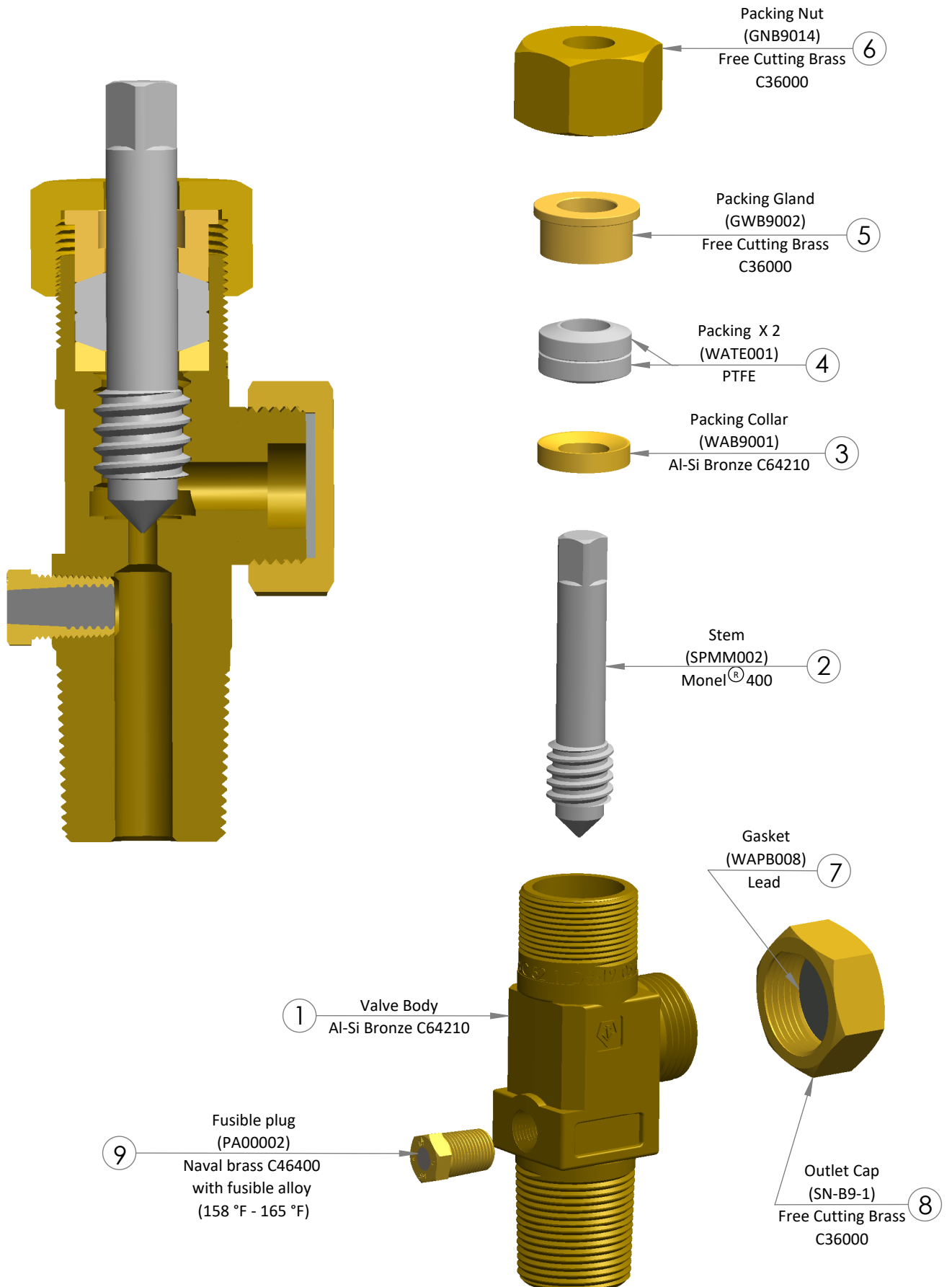
### Features

- Consists of separate gauge for cylinder & ton container valves
- Step marked "GO-NO GO" to indicate maximum re-seating limit of the valve seat in conjunction with the stem used with the valve
- Takes into account the wear of the stem cone & proportionately limits the maximum allowable depth to which the valve body can be re-seated
- Work instruction provided with each supply



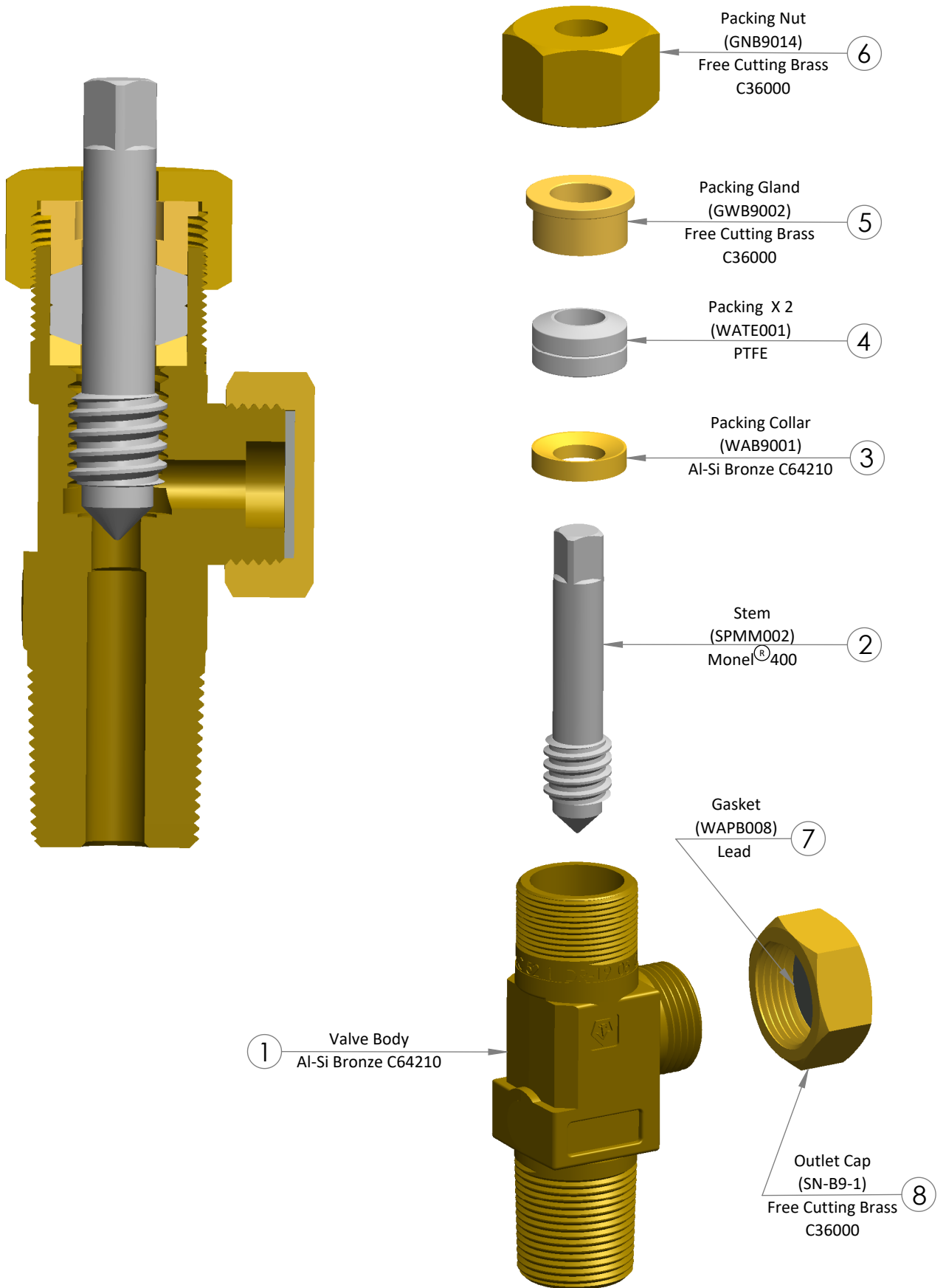
## Material of Construction and Assembly Arrangement

### CAV-06 (Cylinder Valve)





CAV-06 (Ton Container Valve)





## Valve Maintenance

### Series CAV-06

#### Disassembly of valve

Use twisted wrench (item code - WR-EN-1) with one end having 1 1/4" open end spanner to remove outlet cap (8) & packing nut (6). Fit opposite end of the same spanner having 3/8" square size open to remove stem (2) along with other internal fitments of packing gland (5), packing (4) & packing collar (3).

#### Cleaning of valve body & components

1. Clean valve body (1) & components observed "green", likely Copper Chloride due moisture either in the Chlorine or which has entered the system during connections & disconnections.
2. The greenish layer of Copper Chloride on threads of valve body & stem (2) can result in stem (2) becoming "Jammed". This results in high torque to open/close the valve &/or difficulty in fitting outlet cap (8).
3. Refer P-17 for recommended cleaning procedure.

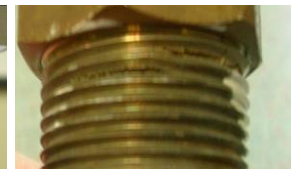
#### Inspection & Reconditioning of valve body & components

##### 1. Valve Body (1)

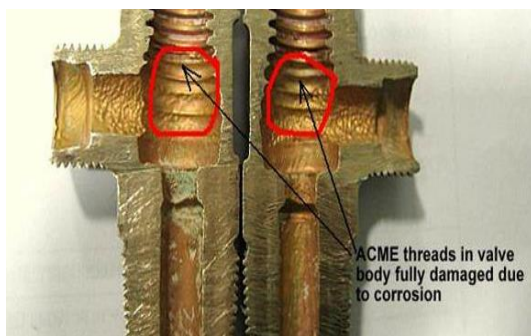
- a. Inspect the valve body for cracks, mainly along the forging parting line as well as in the area of the packing nut (6) threads.  
*(Refer appendix D of pamphlet 17 for more details)*



Crack on Parting Line



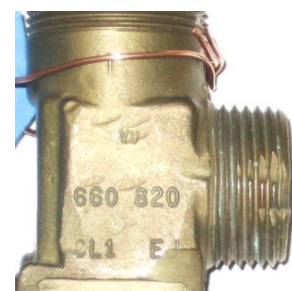
Crack along Thread Root



- b. Check internal bores & ACME threads for gross corrosion, material loss or material build-up. In case of material build-up use thread tap (item code – TAP0013) to clean the threads. Use plain plug gauge (item code – LM00066) & thread plug gauge (item code – TGSS081) to check if internal ACME thread is within specification. The threads closest to the body seat are the most susceptible to corrosion. Loss of these threads can lead to unengaged threads when the valve is closed, resulting in a "spinner" thread loss & should be rejected.

- c. The sharp edge of valve body seat will become bevelled with repeated closing requiring more & more torque to close the valve. Recondition seat using seat cutter (item code - SC00001) to restore sharp edge by refacing. Due to the smaller orifice of cylinder valve compared to ton container valve, the seat cutter allows for higher cutting depth on cylinder valve compared to ton container valve. Use depth gauge for cylinder valve (item code – CG00001) & ton container valve (item code – TG00001) to ensure the seat is not cut beyond the allowable limit.
- d. If stems (2) are also machined, use Combination gauge (item code - CG/TG/2) to ensure the refacing limit of Chlorine valve body assembled with the reconditioned stem is not exceeded.

- e. The external threads on valve body (inlet, outlet, & packing nut end) should be examined for corrosive damage, heavy wear, & material loss. Use Rethreading dies for outlet (item code – RDHS004) & packing nut (6) threads to remove material build-up. Re-died outlet threads should be subsequently checked by plain thread ring "GO" & "NO GO" gauges (item code – LM00009) and thread ring "GO" & "NO GO" gauges (item code – TGSS005)



- f. The valve outlet sealing face should be checked for nicks & crack & refaced if required.
- g. Inspect inlet threads visually & use soft wire brush to remove burrs.



## Series CAV-06

### 2. Components

- a. Check stem (2) for twisting due to excessive torque in both opening & closing direction. Twisted stem indicates that the valve seat may be damaged. Check stem shank for roughness, scratches & nick. Replace stems with above defects.
- b. Inspect packing (4) for wear & discard one or both rings if found in unusable condition.
- c. Inspect components for structural cracks, gross corrosion & other damages.
- d. Inspect fusible plug (9) in cylinder valve for signs of leakage, extrusion of fusible metal, corrosion &/or damage. Do not remove fusible plug from valve body (1) unless it is defective.



### Assembly of valve

1. Use only cleaned parts for assembly.
2. Apply minimum 200 mg Krytox GPL 225 or any equivalent Chlorine compatible lubricant on valve stem (2) threads & shank.
3. Screw in fully valve spindle into valve body (1).
4. Insert packing collar (3) with conical face upwards to rest on valve body counter bore.
5. Push packings (4) over stem shank to rest on packing collar. Ensure the bevelled side of the packings are on the top & bottom face respectively.
6. Insert packing gland (5) ensuring conical face downward.
7. Screw in packing nut (6) in valve body. Clamp valve body assembly in bench vice between soft pads.
8. Tighten the packing nut in clockwise direction using suitable torque wrenches (Tekno Valves item code - WR-EN-1) at 40 ft-lb.
9. Rotate stem using twisted wrench to ensure smooth movement.
10. Tighten fusible plug (9) (if applicable) in clockwise direction using PTFE tape or any Chlorine compatible thread sealant like Kyrtox TS4 at 12-15 ft-lb.

### Testing of valve

1. Connect the assembled valve inlet to oil free dry air or nitrogen at 500 psig.
2. Plug the valve outlet using outlet cap (8) & open the valve in anti-clockwise direction.
3. Check for leakage past the packings (4) using ammonia free soap solution for one minute.
4. Tighten the packing nut (6) in clockwise direction up to 40 ft-lb in case of gland leakage.
5. Close the valve by tightening the stem (2) at maximum 30 ft-lb in clockwise direction.
6. Check leakage through the valve outlet & fusible plug (9) for one minute.
7. After completion of testing, remove the outlet cap & dry the valve thoroughly.

NOTE Refer "Material of construction & assembly arrangement" page to identify the part no. given in the bracket.



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65+ Countries



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