



**R42 AND 456 SERIES PACKLESS METAL
DIAPHRAGM GLOBE VALVE
INSTALLATION, OPERATION, AND
MAINTENANCE MANUAL**

NO.: K-1521

REV.: A

DATE: 07JAN2022

PAGE: 1 OF 11

**KEROTEST R42 and 456 SERIES
PACKLESS METAL DIAPHRAGM GLOBE VALVES
INSTALLATION, OPERATION, AND MAINTENANCE MANUAL**

Table of Contents

1	PURPOSE	2
2	SCOPE	2
3	DEFINITIONS	2
4	RISKS	2
5	ENVIRONMENTAL, HEALTH & SAFETY (EHS)	2
6	PRODUCT DESCRIPTION AND FEATURES	2
7	VALVE IDENTIFICATION	3
8	FACTORY TESTING	3
9	STORAGE AND INSTALLATION	3
9.1	STORAGE	3
9.2	INSTALLATION.....	3
10	OPERATION	4
11	MAINTENANCE – DISASSEMBLY	4
11.1	BONNET, STEM, AND DIAPHRAGM REMOVAL.....	4
11.2	INTERNAL ASSEMBLY REMOVAL & DISASSEMBLY	5
11.3	RECONDITIONING THE VALVE	5
12	REASSEMBLY	5
12.1	GENERAL NOTES	5
12.2	INTERNAL COMPONENT ASSEMBLY	6
12.3	BONNET, STEM AND DIAPHRAGM ASSEMBLY	6

Table of Tables

Table 1 - R42 Valve Parts List	7
Table 2 - 456 Valve Parts List	8
Table 3 - Packless Globe Valve Ordering Information	9
Table 4 - Dimensions and Cv	9
Table 5 - Globe Valve Replacement Kits	10



R42 AND 456 SERIES PACKLESS METAL DIAPHRAGM GLOBE VALVE INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

NO.: K-1521

REV.: A

DATE: 07JAN2022

PAGE: 2 OF 11

1 PURPOSE

The purpose of this installation, operation, and maintenance manual is to define the procedures for the proper use and common repairs on the Kerotest Globe Valve. This manual is only to be used by personnel familiar with this guide and operation of the R42 and 456 Globe Valves.

2 SCOPE

The scope of the procedure covers the R42 and 456 Series "T" Type Globe Valves manufactured by Kerotest Manufacturing Corp.

3 DEFINITIONS

- SW – Socket Weld
- FPT – Female Pipe Thread
- CS – Carbon Steel
- CWP – Cold Working Pressure



- General Advisory Marking – for information or operational procedures, order of operation, etc.



- Caution Marking – note designates an action or step that may result in personal injury or death or equipment/property damage. Personnel performing activities should be fully aware of the hazards and take necessary steps to prevent any injuries, damage, or unsafe operating/repair conditions.

4 RISKS

Not following the Installation, Operation and Maintenance procedures can result in incomplete or inadequate assembly of valves, non-conforming products, damage to nearby equipment or property, serious personal injury, and/or death.

5 ENVIRONMENTAL, HEALTH & SAFETY (EHS)

- Follow all Safety Data Sheet recommendations for all chemicals used in this procedure.
- Use appropriate personal protective equipment during Installation, Operation, and Maintenance.

6 PRODUCT DESCRIPTION AND FEATURES

Below are some of the features/benefits of the Kerotest R42 and 456 globe valves:

- Extremely low fugitive emissions
- No packing to maintain or replace
- Dual seals above and below
- Compact design – quick opening



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NO.: K-1521

REV.: A

DATE: 07JAN2022

PAGE: 3 OF 11

- Variety of body and seat material
- Cycle life varies with application
- Spring loaded soft seated spindle assembly
- Integral back seating
- Low maintenance

R42 and 456 Globe Valves are uniquely designed to prevent liquid or gas media from escaping to the atmosphere by utilizing a packless-metal diaphragm concept to seal between the body and bonnet. This design eliminates environmental leakage as well as costly packing maintenance. Applications include hazardous liquids and gases, controlling contaminants, refrigerant service, vacuum service, instrumentation, compressed gases, volatile fluids, natural gas odorizing, leakage monitoring and hydrogen cooled generators. The R42 valves are available in 1/8" thru 1" NPT or 1/4" to 1" Socket Weld and the 456 valves are available in NPS 1-1/2 and NPS 2 Socket Weld.

7 VALVE IDENTIFICATION

Each valve will have markings with the following information:

- Manufacturing company
- CWP from Table 3 shall be marked on valve.
- Flow direction

8 FACTORY TESTING

To be certain that valves shipped from the factory are bubble tight, they are all subjected to a Shell Test and Seat Test.

9 STORAGE AND INSTALLATION

9.1 Storage

Store the valve carefully before installation, preferably in a well-ventilated, dry place, on a shelf or a wooden grid/pallet, preferably in the original packaging, to protect it from ground water and moisture. Leave port protectors in place to provide limited internal corrosion and contamination protection.

Protect the valve from sand, dust, and water when storing or transporting.

When properly stored, the valve has an unlimited shelf life.

9.2 Installation

9.2.1 General Notes on Installation



CAUTION: Incorrect installation may result in serious personal injury or damage to nearby equipment or property. These instructions must therefore be followed carefully when installing the valve.



Note: The valve must only be installed in intended applications.

Prior to installation, remove port protectors and check that the inside of the valve is clean and free of corrosion.



R42 AND 456 SERIES PACKLESS METAL DIAPHRAGM GLOBE VALVE INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

NO.: K-1521

REV.: A

DATE: 07JAN2022

PAGE: 4 OF 11

- 9.2.2 Install the valve with the flow arrow in the direction of fluid flow.
- 9.2.3 The valve should not be used as a support point for piping. Pipe should be supported on each side of the valve.
- 9.2.4 When installing, sufficient clearance should be left above the valve to allow internal disassembly for maintenance.
- 9.2.5 If the valve end connections are of the socket weld style, care should be taken to ensure that the valve is in the full-open position before welding.
- 9.2.6 Good welding practices should be followed when welding the valve in-line. High weld heats should be avoided, and the valve should be allowed to cool between passes.
- 9.2.7 Any post-installation testing performed should be limited to the CWP of the valve.

10 OPERATION



- Once installed, caution should be taken to avoid applying pressure greater than the maximum working pressure shown in Table 3.
- Failure to adhere to the maximum pressures and operating temperature range could cause possible diaphragm and/or seat damage.
- Once in operation, cycle the valve manually several times open and close. Clockwise rotation to close valve and counterclockwise to open.
- Valve should be hand operated only. No tools should be used to operate the valve.

11 MAINTENANCE – DISASSEMBLY

Figure 1 applies to R42 Valves and Figure 2 applies to 456 Valves

11.1 Bonnet, Stem, and Diaphragm Removal

11.1.1 Remove line pressure completely. Valve should be in the fully open position.

11.1.2 Remove the handwheel screw or retaining nut (Item 1) and washer (Item 2)

Note: Washer is not used with retaining nut

11.1.3 Remove valve handwheel or T-handle (Item 3). On valves equipped, remove customer supplied lock and lock pin and lockplate.

11.1.4 For R42 valve, remove the bonnet (Item 4) from valve body by turning counterclockwise. For 456 valves, remove bonnet (Item 4) from the valve body by loosening the eight bonnet cap screws (Item 11).

11.1.5 Remove the diaphragm (Item 5), noting the quantity and the order the different materials are placed in the stack. 456 Valves also have a diaphragm gasket (Item 12) which must be removed.

11.1.6 Remove the stem (Item 6) from the bottom of the bonnet by turning counterclockwise.



**R42 AND 456 SERIES PACKLESS METAL
DIAPHRAGM GLOBE VALVE
INSTALLATION, OPERATION, AND
MAINTENANCE MANUAL**

NO.: K-1521

REV.: A

DATE: 07JAN2022

PAGE: 5 OF 11

11.2 Internal Assembly Removal & Disassembly

11.2.1 Remove the internal assembly from the valve by turning the bushing (Item 7) counterclockwise. 456 Valves have a gasket (Item 13) between the bushing and the body which must be removed.

11.2.2 Remove the spindle cap (Item 8) by turning counterclockwise while holding the spindle and seat assembly (Item 9).

11.2.3 Remove the spring (Item 10) and bushing (Item 7) from the spindle and seat assembly. On 456 Valves, remove the soft seated lower back seat (Item 15) from between the bushing (Item 7) and the spindle and seat assembly (Item 9). Note: Item 15 is also used as the seat on 456 valves, therefore, two are required for spare parts.

11.3 Reconditioning the Valve

11.3.1 Handle all parts with care to ensure they are not damaged, especially threads and stem sealing surfaces, during the assembly process.

11.3.2 Make sure body internal is free of all foreign material.

11.3.3 Inspect the diaphragm sealing surfaces of the bonnet and body. If there are any nicks or scratches, polish the sealing surface taking care not to change the contour.

11.3.4 Inspect the stem. If excessive wear or galling is apparent on the threads, the stem will have to be replaced. Inspect the nose portion of the stem. If score marks appear on the spherical surface, polish the surface, taking care not to change the radius contour. Do not remove more than 0.010" (0.25 mm) of material.

11.3.5 Inspect the body seating surface for marks or scratches. If any are present, polish the seating surface to remove them, taking care not to remove more than .010" (0.25 mm) of material.

11.3.6 Inspect the soft seat (Item 15) for wear, tears, or cuts. If any are present, the soft seat will have to be replaced. See Table 5 for replacement kit part numbers.

11.3.7 If the soft seat is held in the spindle by crimping of the spindle, the soft seat is not reusable, and the spindle and seat assembly must be replaced as a unit.

11.3.8 If the soft seat is held in the spindle with a screw, remove the screw (Item 16), the washer (Item 17), the lock washer (Item 18 on 456 only), and the soft seat (Item 15). Verify the seat cavity is free of any residual seat material or foreign matter. Install the new soft seat and replace the retaining washer, lock washer (456 only), and screw. Secure the screw threads with Loctite® on the 456 valve only.

11.3.9 Contact Kerotest if the bonnet, or other non-service kit part is required.

12 REASSEMBLY

12.1 General Notes

12.1.1 Figure 1 depicts R42 Valves, Figure 2 depicts 456 Valves



**R42 AND 456 SERIES PACKLESS METAL
DIAPHRAGM GLOBE VALVE
INSTALLATION, OPERATION, AND
MAINTENANCE MANUAL**

NO.: K-1521

REV.: A

DATE: 07JAN2022

PAGE: 6 OF 11

12.1.2 The diaphragm sealing surfaces (Bonnet and Body) shall be coated with one coat of Fluorolube® or equivalent.

12.1.3 Handle all parts with care to ensure they are not damaged, especially threads and stem sealing surfaces, during the assembly process.

12.1.4 Make sure body internal is free of all foreign material.

12.2 Internal Component Assembly

12.2.1 Place Bushing (Item 7) over the spindle and seat assembly (Item 9). On 456 Valves, place Seat (Item 15) between the lower back seat of the Spindle/Seat Assembly and Bushing. Place the Spring (Item 10) over the Spindle and into the Bushing cavity.

12.2.2 Place Spindle Washer on the Spindle Cap (Item 8) and thread onto the Spindle, compressing the Spring. Tighten clockwise while holding the Spindle/Seat Assembly. Secure Spindle Cap to the Spindle using Loctite on the 456 Valve only

12.2.3 Install the internal component assembly and Bushing Gasket into the Valve Body by threading the Bushing clockwise and tighten to 15 to 20 Ft-Lbs (20 to 27 N-m)

12.3 Bonnet, Stem and Diaphragm Assembly

12.3.1 Install the Stem (Item 6) in the Bonnet (Item 4) from the bottom. Turn the Stem clockwise to position.

12.3.2 Place the diaphragm (Item 5) on top of the body, keeping the bubble up. For 456 Valves, install the Diaphragm Gasket (Item 12). For assembly order of diaphragm stacks, alternate by diaphragm material (stainless steel then beryllium copper). For units with 1 stainless steel and 2 beryllium copper diaphragms, place the stainless steel first then the Beryllium Copper diaphragms. Diaphragms should be replaced anytime the valve is opened for service.

12.3.3 Thread R42 Bonnet with the Stem installed into the Valve Body and tighten clockwise to 60 to 80 Ft-Lbs (81 to 108 N-m). On 456 Valves, the Bonnet is secured to the Body by eight (8) Hex Head Cap Screws. Tighten Cap Screws in a star pattern to obtain a uniform gasket load. Tighten to 13-15 Ft-Lbs (18 to 20 N-m)

12.3.4 Install the Handwheel or T-Handle (Item 3). Install Lockpin (not shown) on 456 Valves. Place stainless steel wire in hole in Lockpin on 456 Valves to retain pin in Lockplate.

12.3.5 Install the handwheel screw or retaining nut (Item 1) and washer (Item 2), if applicable, and tighten.

12.3.6 Cycle the valve full open and full closed at least 2 times to make sure it operates smoothly but does not free spin. Open the valve one full turn off the seat

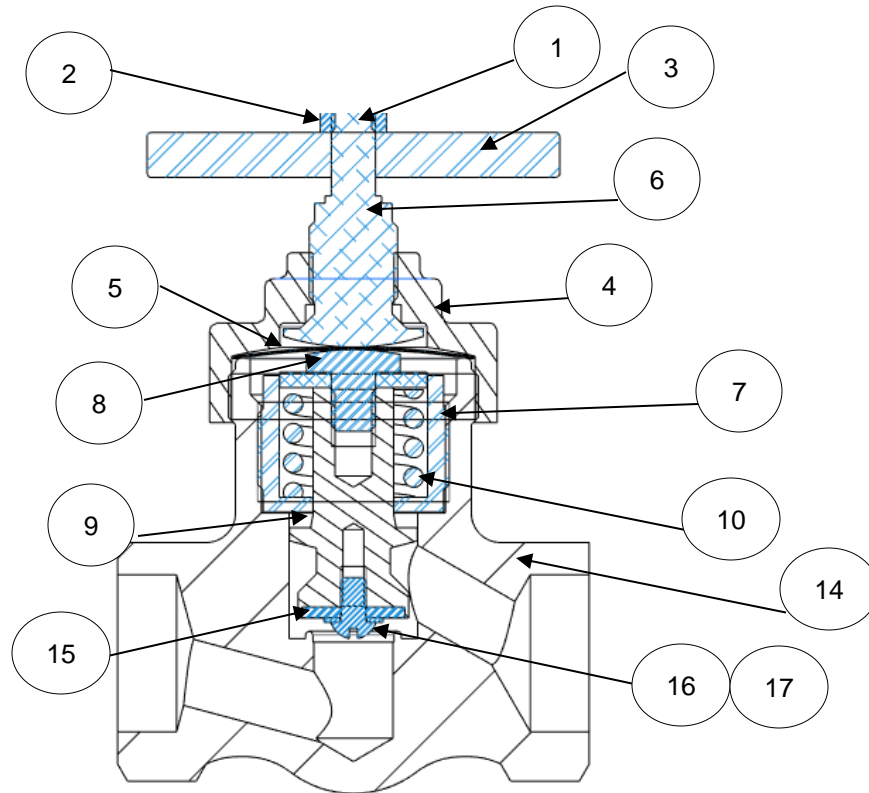


Figure 1: R42 Valve

ITEM #	NAME OF PART	QTY
1	Handwheel Screw/Nut (Carbon Steel)	1
2	Retaining Washer (Stainless Steel)	1
3	Handwheel (Malleable Iron ASTM A47 or CS A216)	1
4	Bonnet (Brass)	1
5	Diaphragms (Beryllium Cooper and Stainless Steel)	As Req
6	Stem (Copper Alloy)	1
7	Bushing (See Table 3 – Internal)	1
8	Spindle Cap (Stainless Steel)	1
9	Spindle (See Table 3 – Internal)	1
10	Spring (Stainless Steel)	1
14	Body (See Table 3)	1
15	Seat (See Table 3)	1
16	Retaining Screw (If applicable) (Stainless)	1
17	Retaining Washer (If applicable) (Stainless)	1

Table 1 - R42 Valve Parts List

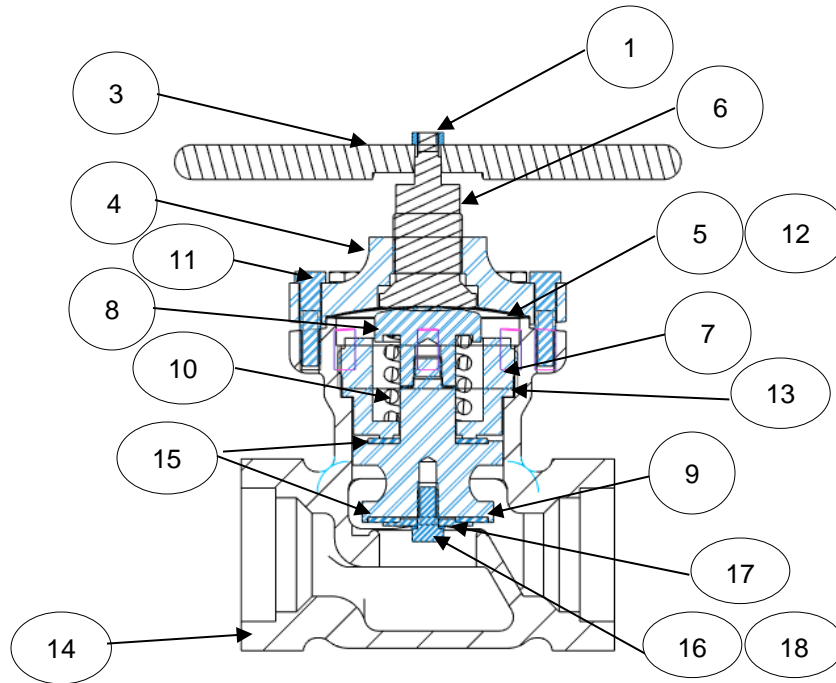


Figure 2: 456 Valve

ITEM #	NAME OF PART	QTY
1	Locking Nut (Carbon Steel)	1
3	Handwheel (Carbon Steel)	1
4	Bonnet (Carbon Steel)	1
5	Diaphragm (Beryllium Cooper and Stainless Steel)	1
6	Stem (Copper Alloy)	3
7	Bushing (See Table 3 - Internal)	1
8	Spindle Cap (Carbon Steel)	1
9	Spindle Carbon Steel)	1
10	Spring (Spring Steel)	1
11	Cap Screw (Carbon Steel)	8
12	Diaphragm Gasket (Copper)	1
13	Gasket (Copper)	1
14	Body (See Table 3)	1
15	Seat (See Table 3)	2
16	Seat Screw (Carbon Steel)	1
17	Lower Seat Washer (Carbon Steel)	1
18	Lock Washer (Carbon Steel)	1

Table 2 - 456 Valve Parts List



**R42 AND 456 SERIES PACKLESS METAL
DIAPHRAGM GLOBE VALVE
INSTALLATION, OPERATION, AND
MAINTENANCE MANUAL**

NO.: K-1521

REV.: A

DATE: 07JAN2022

PAGE: 9 OF 11

Catalog Number	Size	Body	Internal	Seat	Maximum W.P Psi (Bar)	Maximum Temp °F (°C)	Approx. Weight lbs. (kg)
R42A01P	1/8" FPT	Brass	Brass	Nylon	750 (51)	275 (135)	1 (.45)
R42A02P	1/4" FPT	Brass	Brass	Nylon	750 (51)	275 (135)	1 (.45)
R42A03P	3/8" FPT	Brass	Brass	Nylon	500 (34)	275 (135)	2 (.91)
R42A04P	1/2" FPT	Brass	Brass	Nylon	500 (34)	275 (135)	2 (.91)
R42R02P	1/4" FPT	316 SS-A182	303 SS	PTFE	750 (51)	300 (148)	1 (.45)
R42R03P	3/8" FPT	316 SS-A182	303 SS	PTFE	500 (34)	300 (148)	2 (.91)
R42R04P	1/2" FPT	316 SS-A182	303 SS	PTFE	500 (34)	300 (148)	2 (.91)
R42U02P	1/4" FPT	316 SS-A182	303 SS	Nylon	750 (51)	275 (135)	2 (.91)
R42U03P	3/8" FPT	316 SS-A182	303 SS	Nylon	500 (34)	270 (132)	2 (.91)
R42U04P	1/2" FPT	316 SS-A182	303 SS	Nylon	500 (34)	275 (135)	2 (.91)
R42U06P	3/4" FPT	316 SS-A182	303 SS	Nylon	300 (20)	275 (135)	5 (2.27)
R42U08P	1" FPT	316 SS-A182	303 SS	Nylon	300 (20)	275 (135)	5 (2.27)
R42X60FT	1/2" FPT	316 SS-A182	303 SS	PTFE	1000 (68)	300 (148)	2 (.91)
R42U02SW	1/4" SW	316 SS-A182	303 SS	Nylon	750 (51)	275 (135)	1 (.45)
R42U03SW	3/8" SW	316 SS-A182	303 SS	Nylon	500 (34)	275 (135)	2 (.91)
R42U04SW	1/2" SW	316 SS-A182	303 SS	Nylon	500 (34)	275 (135)	2 (.91)
R42X33W	1/2" SW	316 SS-A182	Brass	Nylon	500 (34)	275 (135)	2 (.91)
R42U06SW	3/4" SW	316 SS-A182	303 SS	Nylon	300 (20)	275 (135)	5 (2.27)
R42U08SW	1" SW	316 SS-A182	303 SS	Nylon	300 (20)	275 (135)	4 (1.81)
R42X23TC	3/8" FPT	CS-A105	303 SS	PTFE	500 (34)	300 (148)	2 (.91)
R42X23T	1/2" FPT	CS-A105	303 SS	PTFE	500 (34)	300 (148)	2 (.91)
R42X23	1/2" FPT	CS-A105	303 SS	Nylon	500 (34)	275 (135)	2 (.91)
R42C06P	3/4" FPT	CS-A105	303 SS	Nylon	300 (20)	275 (135)	5 (2.27)
R42C08P	1" FPT	CS-A105	303 SS	Nylon	300 (20)	275 (135)	5 (2.27)
R42X48T	1/2" FPT	CS-A105	303 SS	PTFE	1000 (68)	300 (148)	2 (.91)
R42X24A	1/4" SW	CS-A105	303 SS	PTFE	500 (34)	300 (148)	2 (.91)
R42X24B	3/8" SW	CS-A105	303 SS	PTFE	500 (34)	300 (148)	2 (.91)
R42X24WC	1/2" SW	CS-A105	303 SS	Nylon	500 (34)	275 (135)	2 (.91)
R42X24WCT	1/2" SW	CS-A105	303 SS	PTFE	500 (34)	300 (148)	2 (.91)
R42C06SW	3/4" SW	CS-A105	303 SS	Nylon	300 (20)	275 (135)	5 (2.27)
R42C08SW	NPS 1 SW	CS-A105	303 SS	Nylon	300 (20)	275 (135)	5 (2.27)
456-C12SWT	NPS 1-1/2 SW	CS-A105	CS	PTFE	300 (20)	300 (148)	22 (9.98)
456-C16SWT	NPS 2 SW	CS-A105	CS	PTFE	300 (20)	300 (148)	22 (9.98)

Table 3 - Packless Globe Valve Ordering Information

Valve End Connection Size	Flow Diameter inch (mm)	Seat Diameter inch (mm)	End to End Dimension inch (mm)	Center of Valve port to top of Handle inch (mm)	Approximate Cv
1/8	.44 (11.1)	.34 (8.7)	2.25 (57)	2.63 (67)	0.7
1/4	.28 (7.2)	.34 (8.7)	2.75 (70)	3.06 (78)	0.8
3/8	.38 (9.5)	.47 (11.9)	2.75 (70)	3.06 (78)	1.5
1/2	.38 (9.5)	.47 (11.9)	2.75 (70)	3.06 (78)	1.5
3/4	.50 (12.7)	.69 (17.5)	4 (102)	4.63 (118)	2.3
1	.56 (14.3)	.69 (17.5)	4 (102)	4.63 (118)	4.0
NPS 1-1/2	1.50 (38.1)	1.75 (44.5)	6.75 (171)	4.63 (118)	21
NPS 2	1.50 (38.1)	1.75 (44.5)	6.75 (171)	4.63 (118)	24

Table 4 - Dimensions and Cv



**R42 AND 456 SERIES PACKLESS METAL
DIAPHRAGM GLOBE VALVE
INSTALLATION, OPERATION, AND
MAINTENANCE MANUAL**

NO.: K-1521
REV.: A
DATE: 07JAN2022
PAGE: 10 OF 11

Globe Valve		Replacement Spindle & Seat Assembly Kits		Replacement Diaphragm Kits	
Catalog Number	Part Number	Catalog Number	Part Number	Catalog Number	Part Number
BRASS VALVES					
R42A01P	72512403	R42A02-55	72606064	297-60	72540784
R42A02P	72512395	R42A02-55	72606064	297-60	72540784
R42A03P	72512361	R42A04-55N	72606049	148-60	72540792
R42A04P	72512379	R42A04-55N	72606049	148-60	72540792
R42E02P	72512411	R42E02-55	72606056	297-60	72540784
CARBON STEEL (A105) VALVES					
R42X23TC	72512270	147GD-55T	72540750	148-60	72540792
R42X23T	72512288	147GD-55T	72540750	148-60	72540792
R42X23	72512296	R42U04-55	72606106	148-60	72540792
R42C06P	72512502	R42C06-55	72540776	149-61	72540818
R42C08P	72512494	R42C06-55	72540776	149-61	72540818
R42X48T	72512163	R42X48-55T	72540768	297-63	72540800
R42X24A	72512304	147GD-55T	72540750	148-60	72540792
R42X24B	72512312	147GD-55T	72540750	148-60	72540792
R42X24WC	72512338	R42U04-55	72606106	148-60	72540792
R42X24WCT	72512320	147GD-55T	72540750	148-60	72540792
R42C06SW	72512486	R42C06-55	72540776	149-61	72540818
R42C06SWT	72512460	R42C06-55T	72559875	149-61	72540818
R42C08SW	72512478	R42C06-55	72540776	149-61	72540818
R42C08SWT	72512452	R42C06-55T	72559875	149-61	72540818
456-C12SW	72591084	456-55N	72545320	458-61	72552995
456-C12SWT	72512155	456-55T	72545411	458-61	72552995
456-C16SW	72567746	456-55N	72545320	458-61	72552995
456-C16SWT	72512148	456-55T	72545411	458-61	72552995
316 STAINLESS STEEL VALVES					
R42R02P	72561194	145GD-55T	72540743	297-60	72540784
R42R03P	72512205	147GD-55T	72540750	148-60	72540792
R42R04P	72512213	147GD-55T	72540750	148-60	72540792
R42U02P	72576994	R42U02-55	72606098	297-60	72540784
R42U03P	72512221	R42U04-55	72606106	148-60	72540792
R42U04P	72512239	R42U04-55	72606106	148-60	72540792
R42U06P	72512445	R42C06-55	72540776	149-61	72540818
R42U08P	72512437	R42C06-55	72540776	149-61	72540818
R42U02SW	72576986	R42U02-55	72606098	297-60	72540784
R42U02SWT	72583388	145GD-55T	72540743	297-60	72540784
R42U03SW	72512247	R42U04-55	72606106	148-60	72540792
R42U03SWT	72596331	147GD-55T	72540750	148-60	72540792
R42U04SW	72512254	R42U04-55	72606106	148-60	72540792
R42U04SWT	72512262	147GD-55T	72540750	148-60	72540792
R42U06SW	72512536	R42C06-55	72540776	149-61	72540818
R42U06SWT	72512528	R42C06-55T	72559875	149-61	72540818
R42U08SW	72512130	R42C06-55	72540776	149-61	72540818
R42U08SWT	72512510	R42C06-55T	72559875	149-61	72540818
R42X60FT	72591464	R42X48-55T	72540768	297-63	72540800
R42X33W	72512346	R42A04-55N	72606049	148-60	72540792

Table 5 - Globe Valve Replacement Kits



**R42 AND 456 SERIES PACKLESS METAL
DIAPHRAGM GLOBE VALVE
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MAINTENANCE MANUAL**

NO.: K-1521

REV.: A

DATE: 07JAN2022

PAGE: 11 OF 11

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