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## Valves

Vertical and horizontal check and diaphragm valves with PP, PVDF, or PFA resin

**Sales Specification: Effective January 17, 2001 · Supersedes: October 27, 2000**

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### TEST REQUIREMENTS: CHECK VALVES

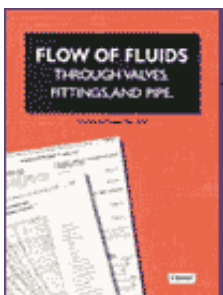
TEST ITEM AND CONDITION	LIMIT	UNIT	METHOD
<b>PP LINER (WITH GLASS)</b>			
Tensile @ Yield	2500 Min	psi	<a href="#">ASTM D638</a>
Elongation @ Yield	2 Min	%	<a href="#">ASTM D638</a>
Colorants	1 Max	% wt	<a href="#">ASTM F1545</a>
Glass Fiber Filler	30 Max	% wt	<a href="#">ASTM F1545</a>

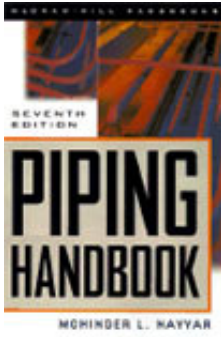
### PFA LINER

Tensile	3800 Min	psi	<a href="#">ASTM D3307</a>
Elongation	300 Min	%	<a href="#">ASTM D3307</a>
Colorants	0 Max	% wt	<a href="#">ASTM F1545</a>

### DIAPHRAGM VALVES

TEST ITEM AND CONDITION	LIMIT	UNIT	METHOD
<b>PP LINER (WITHOUT GLASS)</b>			





Tensile @ Yield	4000 Min	psi	<a href="#">ASTM D638</a>
Elongation @ Yield	10 Min	%	<a href="#">ASTM D638</a>
Colorants	1 Max	% wt	<a href="#">ASTM F1545</a>

**CHECK & DIAPHRAGM VALVES**

**PVDF/HFP COPOLYMER LINER (1" through 4"):**

Tensile @ Yield	4500 Min	psi	<a href="#">ASTM D638</a>
Elongation @ Yield	10 Min	%	<a href="#">ASTM D638</a>
Colorants	225-475	ppm	<a href="#">ASTM F1545</a>

**PVDF HOMOPOLYMER LINER (6" & 8"):**

Tensile @ Yield	5000 Min	psi	<a href="#">ASTM D638</a>
Elongation @ Yield	8 Min	%	<a href="#">ASTM D638</a>
Colorants	250-500	ppm	<a href="#">ASTM F1545</a>

**PFA LINER:**

Tensile @ Yield	3800 Min	psi	<a href="#">ASTM D638</a>
Elongation @ Yield	300 Min	%	<a href="#">ASTM D638</a>
Colorants	0 Max	% wt	<a href="#">ASTM F1545</a>

**1. MATERIAL REQUIREMENTS:**

- Class 150 ductile iron valves conform to [ASTM A395](#) with flange dimensions and drilling per [ANSI B16.42](#).
- Class 150 cast steel valves conform to [ASTM A216](#) Grade WCB with flange dimensions and drilling per [ANSI B16.5](#). Cast steel diaphragm valves have ductile iron bonnets.
- For all valves, [ASTM A193](#) Grade B7 bolting is used.



**2. LINER REQUIREMENTS:**

- PP Resin
  - For Diaphragm Valves, the polypropylene (PP) resin is a Type I homopolymer per [ASTM F1545](#).
  - For Check Valves, the polypropylene (PP) resin is a Type I homopolymer per [ASTM F1545](#) with 30% E-glass milled fibers.
  - Standard PP liners are orange in color.
- PVDF Resin
  - The PVDF resin for 1" through 4" is a polyvinylidene fluoride/hexafluoropropylene copolymer per [ASTM F1545](#).
  - The PVDF resin for 6" and 8" is a polyvinylidene fluoride compound per [ASTM F1545](#).
  - Standard PVDF liners are black in color.
- PFA Resin
  - The PFA resin is a perfluoroalkoxy per [ASTM F1545](#).
  - Standard PFA liners are translucent with no pigment.
- The minimum liner thicknesses are:



Size	Liner Thickness
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Resistoflex Valves

(NPS)	(Inch)	(Millimeters)
1"	0.170	4.3
1-1/2"	0.180	4.6
2"	0.190	4.8
2-1/2"	0.200	5.1
3"	0.210	5.3
4"	0.210	5.3
6"	0.250	6.4
8"	0.250	6.4

E. The minimum outside diameter of the plastic sealing surface per [ASTM F1545](#) is:

Size	Minimum Sealing Diameter	
	(NPS)	(Millimeters)
1"	1-7/8"	48
1-1/2"	2-11/16"	68
2"	3-7/16"	87
2-1/2"	3-15/16"	100
3"	4-5/8"	117
4"	5-15/16"	151
6"	8"	203
8"	10-1/16"	256

F. The minimum liner flange face thickness is 0.100" (2.54 mm).

**3. POPPET REQUIREMENTS:**



- Poppets 1" through 3" are 25% glass-filled solid polytetrafluoroethylene (PTFE).
- Poppets 4", 6", and 8" are made with steel encapsulated in the same material as the valve liner.

**4. GASKET REQUIREMENTS:**



- Nordel EPDM gaskets conform to the following base properties:

Durometer, Shore A	70 +/- 5
Tensile, Min.	2031 psi
Elongation, Min.	200%
Temperature, Max.	300°F

B. PTFE gaskets conform to the following base properties:

Specific Gravity	2.13 - 2.21
Tensile, Min.	3000 psi
Elongation, Min.	250%
Temperature, Max.	400°F

C. Viton®\* fluoroelastomer B) gaskets conform to the following base properties:

Durometer, Shore A	70 +/- 5
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Tensile, Min.	2031 psi
Elongation, Min.	175%
Temperature, Max.	300°F

## 5. DIAPHRAGM REQUIREMENTS:



- Chlorosulfonated polyethylene (Hypalon<sup>®\*</sup>) diaphragms conform to the following base properties:

Durometer, Shore A	70 +/- 5
Tensile, Min.	2030 psi
Elongation, Min.	300%
Temperature, Max.	225°F

- B. Viton<sup>®\*</sup> fluoroelastomer B) diaphragms conform to the following properties:

Durometer, Shore A	70 +/- 5
Tensile, Min.	2030 psi
Elongation, Min.	175%
Temperature, Max.	300°F

- C. Ethylene propylene diene terpolymer (EPDM) diaphragms conform to the following base properties:

Durometer, Shore A	70 +/- 5
Tensile, Min.	1015 psi
Elongation, Min.	200%
Temperature, Max.	300°F

- D. Ethylene propylene diene terpolymer (EPDM) backers used in one piece diaphragms with PTFE face and in two-piece diaphragms with PTFE shield conform to the following base properties:

Durometer, Shore A	70 +/- 5
Tensile, Min.	2031 psi
Elongation, Min.	300%
Temperature, Max.	300°F

- E. Polytetrafluoroethylene (PTFE) shields used in one-piece diaphragm to face EPDM backer and in two-piece diaphragm to shield EPDM backer conform to the following base properties:

Specific Gravity, Min.	2.15
Tensile, Min.	2400 psi
Elongation, Min.	320%
Temperature, Max.	300°F (Limited by EPDM backer)

Note: Base properties are physical properties of the elastomeric diaphragms exclusive of the reinforcing fabric used in diaphragm construction. PTFE

shields are not reinforced.

- F. Diaphragm materials should not be exposed to excessive temperature, ozone, or ultraviolet radiation. General shelf life for elastomeric diaphragms is five years while all other valve parts have an indefinite life as long as properly protected.

## 6. LINER/METALLURGY AVAILABILITY:



Size (NPS)	Cast Steel	Ductile Iron
<b>Vertical Check Valves</b>		
1"-4"	PP, PVDF, PFA	PP
6" & 8"	PP, PVDF	PP
<b>Horizontal Check Valves</b>		
1"-4"	PP, PVDF, PFA	PP
6"	PP, PVDF	PP
8"	PP	PP
<b>Diaphragm Valves</b>		
1"-4"	PP, PVDF	PP, PFA, PVDF
6"	PP, PVDF	PP, PVDF
8"	PP	PP

## 7. OPERATING REQUIREMENTS:



- Service Temperature:

### Liners:

PP	= 0°F (-18°C)	to 225°F (107°C)
PVDF	= 0°F (-18°C)	to 275°F (135°C)
PVDF/HFP	= 20°F (-29°C)	to 275°F (135°C)
PFA	= 0°F (-18°C)	to 300°F (149°C)

### Gaskets:

EPDM	= 300°F (149°C)
Viton®* fluoroelastomer B	= 300°F (149°C)
PTFE	= 400°F (204°C)

Note: The maximum service temperature is determined by the lesser of (1) the maximum service temperature of the liner, and (2) the maximum service temperature of the gasket. Operating temperature limitations may be encountered depending upon specific chemical environments.

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#### Diaphragms:

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Hypalon <sup>®*</sup>	= 225°F (107°C)
Viton <sup>®*</sup> fluoroelastomer B	= 300°F (149°C)
EPDM	= 300°F (149°C)
PTFE	= 300°F (149°C) - Limited by EPDM backer

Note: The maximum service temperature is determined by the lesser of (1) the maximum service temperature of the liner, and (2) the maximum service temperature of the gasket. Operating temperature limitations may be encountered depending upon specific chemical environments.

- B. Pressure: Pressure capabilities are dependent on operating temperatures and metallurgy.
- C. Vacuum:
- Check valves are not approved for vacuum service.
  - For Diaphragm Valves, only 1" through 4" sizes with two-piece diaphragms can be used in vacuum service.

#### 8. STORAGE AND HANDLING REQUIREMENTS:



- Avoid dropping or impacting valves with heavy objects or storing near high traffic areas.
- Uninstalled PP, PVDF, and PFA lined valves should not be stored or handled at temperatures below 0°F (-18°C).

#### 9. PAINT:



Paint is a two component epoxy primer, formulated on proprietary polymer technology, which provides rapid cure and overcoating even under low temperature conditions. The maximum external temperature rating is 212°F (100°C).

#### 10. INSPECTION AND QUALITY CONTROL:



- Each lined valve passes a 15,000 volt minimum electrostatic spark test to ensure the integrity of the plastic liner.
- All parts pass visual inspection.
- All assembled valves pass shell and closure testing as follows:
  - Shell Testing - Check Valves
    - All 1"-8" valves are hydrostatically tested to the following pressures:  
Ductile iron - 375 psig  
Cast steel - 450 psig
    - The duration of this test depends on the size of the

valves:

1"-2" - not less than 15 seconds

2-1/2"-8" - not less than 60 seconds

- Criteria for acceptance: No visible leakage through pressure boundary walls.
  - Shell Testing - Diaphragm Valves
    - All 1"-4" valves are hydrostatically tested to 225 psig.
    - All 6" valves are hydrostatically tested to 200 psig.
    - All 8" valves are hydrostatically tested to 150 psig.
    - The duration of this test depends on the size of the valve:
      - 1"-2" - not less than 15 seconds
      - 2-1/2"-8" - not less than 60 seconds
    - Criteria for acceptance: No visible leakage through pressure boundary walls.
  - Closure Testing
    - Closure tests are performed with 80 psig air.
    - Check valves are uni-directional and are tested in the direction of required shut-off.
    - Diaphragm valves are bi-directional and are tested in both directions of required shut-off.
    - The duration of this test depends on the size of the valve:
      - 1"-2" - not less than 15 seconds
      - 2-1/2"-8" - not less than 30 seconds
    - Criteria for acceptance: Visual examination of a bubbler with zero visible bubbles.
- The sealing surface of the liner is free of defects that would impair sealing effectiveness.
- Wooden or plastic end protectors are used to protect the plastic faces. End protectors should stay in place until immediately prior to installation.
- Valves are labeled with a sticker located on the wooden end protectors which identifies the plastic liner type and the flange material.
- Diaphragms have tabs with raised letters to identify diaphragm material.
- Color coded nylon bands are affixed to valves to identify the liner type. The color codes are:
  - PP-G = Blue
  - PP = Orange
  - PVDF = Black
  - PFA = Brown
- Products are identified with molded date tabs on the plastic faces or are impression marked for material traceability.

## REFERENCES

For more information please [contact us](#).

THIS PRODUCT IS SHIPPED IN COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS REGARDING CLASSIFICATION, PACKAGING, SHIPPING AND LABELING.

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