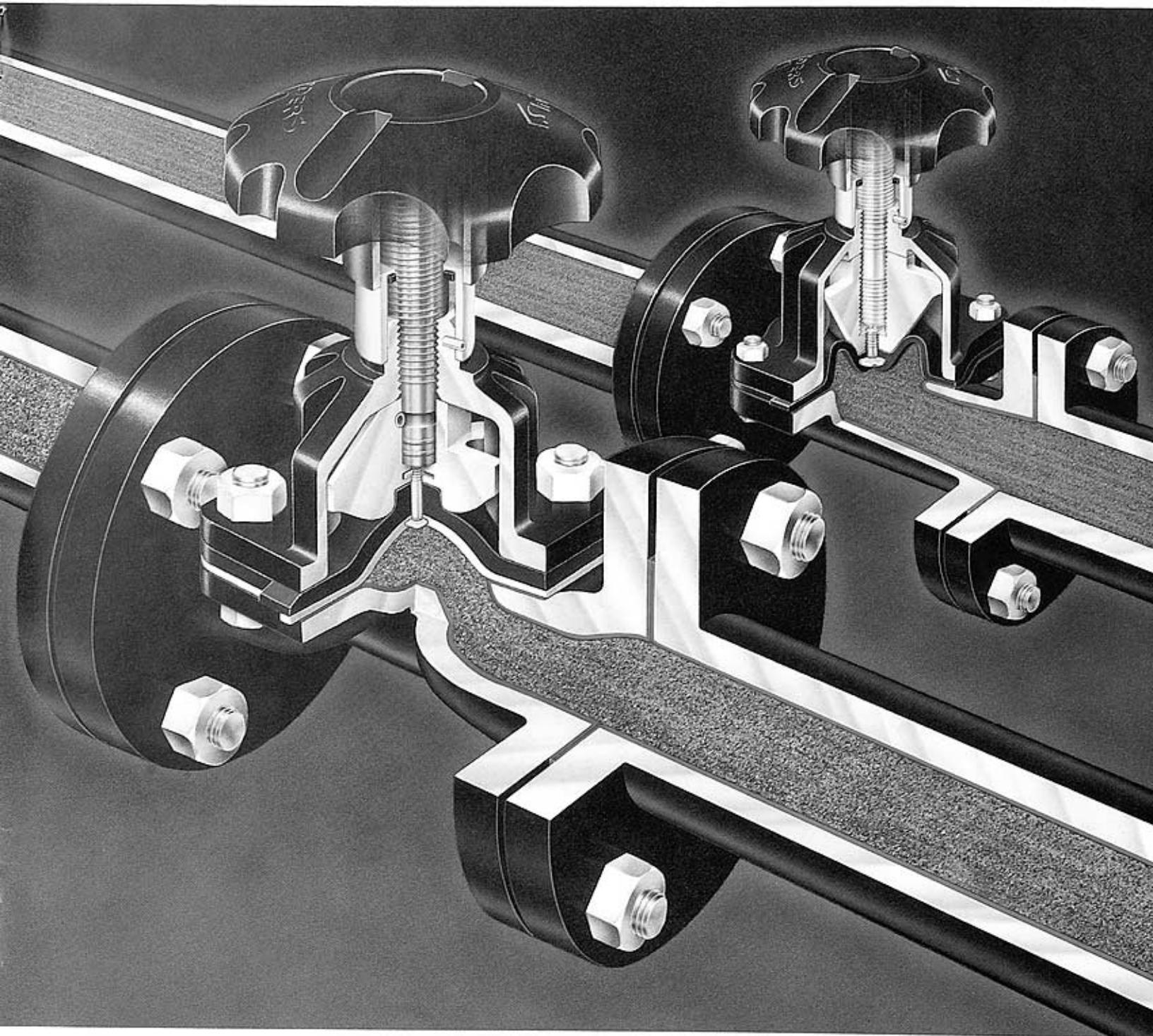


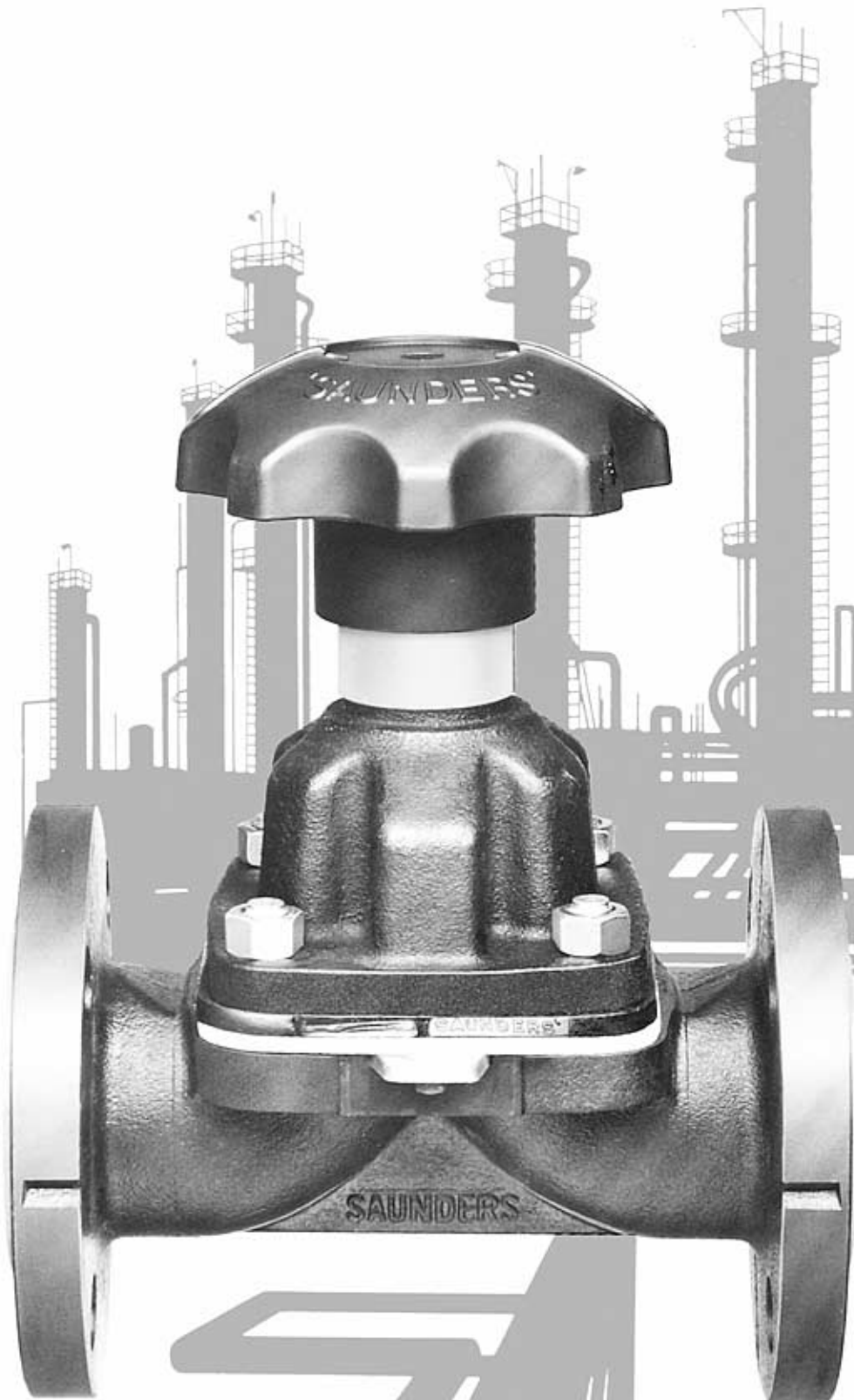
Saunders

DIAPHRAGM VALVES



XOMOX®
Process Valves & Actuators

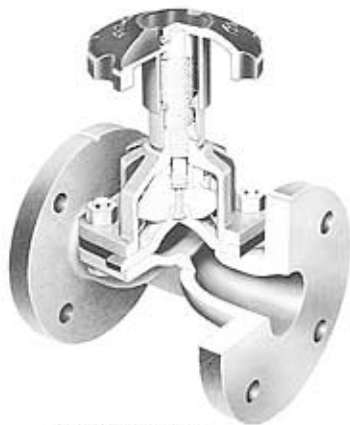
SAUNDERS DIAPHRAGM VALVES



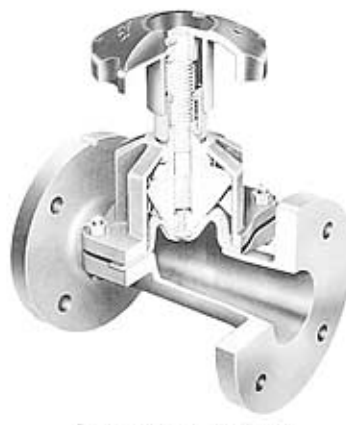
INTRODUCTION TO SAUNDERS

P. K. Saunders invented and patented the Weir Type Diaphragm Valve over sixty years ago. Rapid advances in design and materials quickly proved the diaphragm valve superior in handling abrasive, corrosive, and thick coagulating fluids, slurries, and a wide variety of suspended solid materials.

Today Saunders produces over two and one-half million valves annually, making Saunders the largest manufacturer of diaphragm valves in the world. There's the original Weir Valve for most applications, and the Straight Thru and High Flow Valves for slurry or sludge lines.



WEIR TYPE



STRAIGHT THRU



HIGH FLOW

TABLE OF CONTENTS

Introduction	1	Diaphragm Materials	16
General Information	2-3, 37	Flow Coefficient	17
Weir Type Diaphragm Valves	4-11	Operating Limits	18-19
Design Features	4	High Flow Diaphragm Valves	20-21
Dimensions	5	Design Features	20
Body Materials and Linings	6-8	Dimensions	21
Diaphragm Materials	8	Diaphragm Materials	21
Flow Coefficient	9	Body Materials and Linings	21
Operating Limits	10-11	Flow Coefficient	21
Straight Thru Diaphragm Valves	12-19	Actuators	22
Design Features	12	Ordering Information and Figure Numbers	23
Dimensions	13	Service Recommendations	24-36
Body Materials and Linings	14-16		

Saunders is an ISO 9001 company.

GENERAL INFORMATION

BENEFITS OF SAUNDERS DIAPHRAGM VALVES

- Packless/Glandless design eliminates emission control problems and expensive gland maintenance.
- Positive Closure—even on frequent cycling or on entrained particulates.
- In-line maintenance is simplified and cost effective.
- Isolating diaphragm prevents binding and corrosive or abrasive attack on the operating mechanism by line media.
- Throttling and Control characteristics are enhanced by a streamlined flow path that is cavity free and provide excellent flow control capabilities.
- Required operating force is consistent regardless of service conditions, cycle frequency or duration of service.

SAUNDERS WEIR DIAPHRAGM VALVE

The Weir, a general purpose diaphragm valve, offers smooth flow and simple operation in any position. Its design provides extra-long diaphragm life for throttling and complete shut-off services. Other unique features include a yellow, sleeve-type position indicator and a permanently lubricated handwheel bonnet.

A wide selection of body materials, body linings, diaphragm materials, actuators, and accessories allow Saunders to supply the right valve for any particular operating condition.

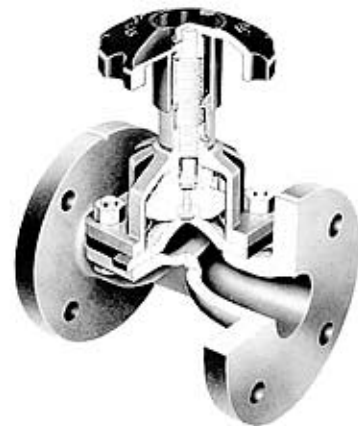
Size Range: ¼" thru 16".

Pressure Range:
Vacuum to 230 psi.

Temperature Range:
-50°F to +350°F.

Body Materials: Cast Iron, Ductile Iron, Aluminum, Bronze, Stainless Steel and Alloy 20.

Body Linings: Hard Rubber, Soft Rubber, Neoprene, Butyl®, Hypalon®, Glass, Polypropylene®, Halar, Tefzel®, PVDF, and PFA.



SAUNDERS STRAIGHT THRU DIAPHRAGM VALVE

Saunders Straight Thru Valves efficiently handle abrasive and corrosive slurries, thick coagulating fluids, and a wide variety of suspended solid materials. The straight, full-open bore design also facilitates the use of brushes, rods, and "pigs" to clean the valve and the line.

The valve incorporates the same major features as the Weir Valve.

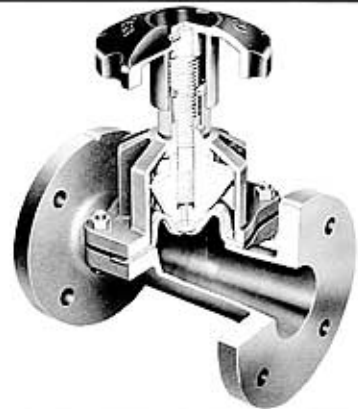
Size Range: ½" thru 14".

Pressure Range: Vacuum to 150 psi.

Temperature Range:
-40°F to +260°F.

Body Materials and Linings:

Cast Iron, Hard Rubber, Soft Rubber, Neoprene, Butyl®, Hypalon®, Glass, Tefzel® and Polypropylene®.



SAUNDERS HIGH FLOW DIAPHRAGM VALVE

When services require high flow capacity, the Saunders High Flow Valve offers higher flow capacity than other valves currently available to industry.

There are no pockets to collect debris and when the valve is in the open position, the diaphragm stays completely out of the flow passage. These unique features result in smooth, unobstructed flow with minimum pressure drop and maximum flow.

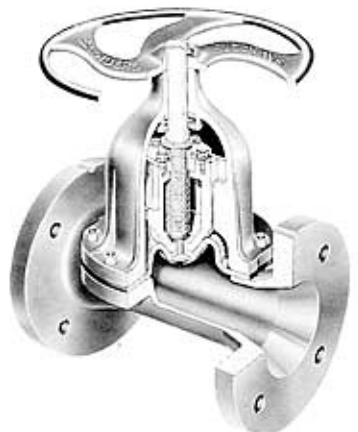
Size Range: 1½" thru 14".

Pressure Range: Vacuum to 150 psi.

Temperature Range:
-40°F to +260°F.

Body Materials and Linings:

Cast Iron, Hard Rubber, Soft Rubber, Neoprene, Butyl®, Hypalon®, Glass, Tefzel® and Polypropylene®.



BODY MATERIALS AND LININGS

Material	Application
Alloy 20	Applicable in a wide range of chemical and water treatment services.
Aluminum	Available in sizes through 2". Recommended for compressed air and instrument air lines.
Bronze	Suitable for marine services, sugar refining, and other areas where external corrosion is a problem.
Butyl Lined	Excellent for hydrochloric, hydrofluoric, and phosphoric acids, acid recovery services, inert and other industrial gases and fertilizer plants.
Glass Lined	Recommended for dye stuffs, pharmaceuticals, and latex. 3431 (green) has superior qualities for latex and paint services. 3432 (blue) glass is excellent for difficult, corrosive services with high temperatures.
HALAR® Ethylene Chlorotrifluoroethylene Lined	Excellent for strong mineral acids, oxidizing acids, and alkalis. Good impact resistance for mining and heavy chemical industries.
Hard Rubber Lined	Ideally suited for acid, effluent, brine services (especially chlorinated brine), and water treatment services (especially boiler feed and de-ionization processes).
Hypalon Lined	Offers good resistance to acid and ozone attack. Suitable for some chlorine services.
Ductile Iron Cast Iron	General industrial services. Sulfuric acid 85% and higher, alkalis, sugar refining, LP gas and vacuum services. Malleable iron bodies are available through 2". Above 2" cast iron is supplied.
Neoprene Lined	Ideally suited for animal and vegetable oils, grease, oily water and fertilizer plants.
Perfluoro Alkoxy Teflon® (PFA) Lined	Exceptional balance of properties. Inert to strong mineral, oxidizing and inorganic acids and is resistant to bases, halogens, metal salt solutions, organic acids and anhydrides. Aromatic and adiphatic hydrocarbons, alcohols, aldehydes, ketones, ethers, amines and esters. Mechanical properties are superior to other liners at elevated temperatures. Available in ductile iron body.
Polypropylene (PPL) Lined	Excellent for water treatment, effluent lines (especially hot effluents from dyestuffs), chemical processing, plating fluids, steelworks pickling lines, food and drinking water. All compounds FDA approved. Available in cast and ductile iron bodies.
Polyvinylidene fluoride (PVDF) Lined	Resistant to most inorganic acids and bases. Highly recommended for sodium hypochlorite, aliphatic and aromatic hydrocarbons, as well as wet and dry chlorine. Exhibits good temperature and general resistance, especially when handling halogens, halogenated solvents, and alcohol services. Available in cast and ductile iron bodies. FDA approved.
PVC	Resistant to a wide variety of chemicals. Provides internal and external resistance.
Soft Rubber Lined	Recommended for extremely abrasive services (sand, cement, etc.) where more expensive metals wear rapidly.
Stainless Steel	Applicable in a wide range of chemical services. Inherent resistance to external corrosion.
Ethylene Tetrafluoroethylene (ETFE) Lined	Outstanding balance of properties and chemical resistance. High resistance to abrasion. Ideal for process lines, filtration, and effluents. Resists strong acids, bases, solvents. Available in cast and ductile iron bodies.

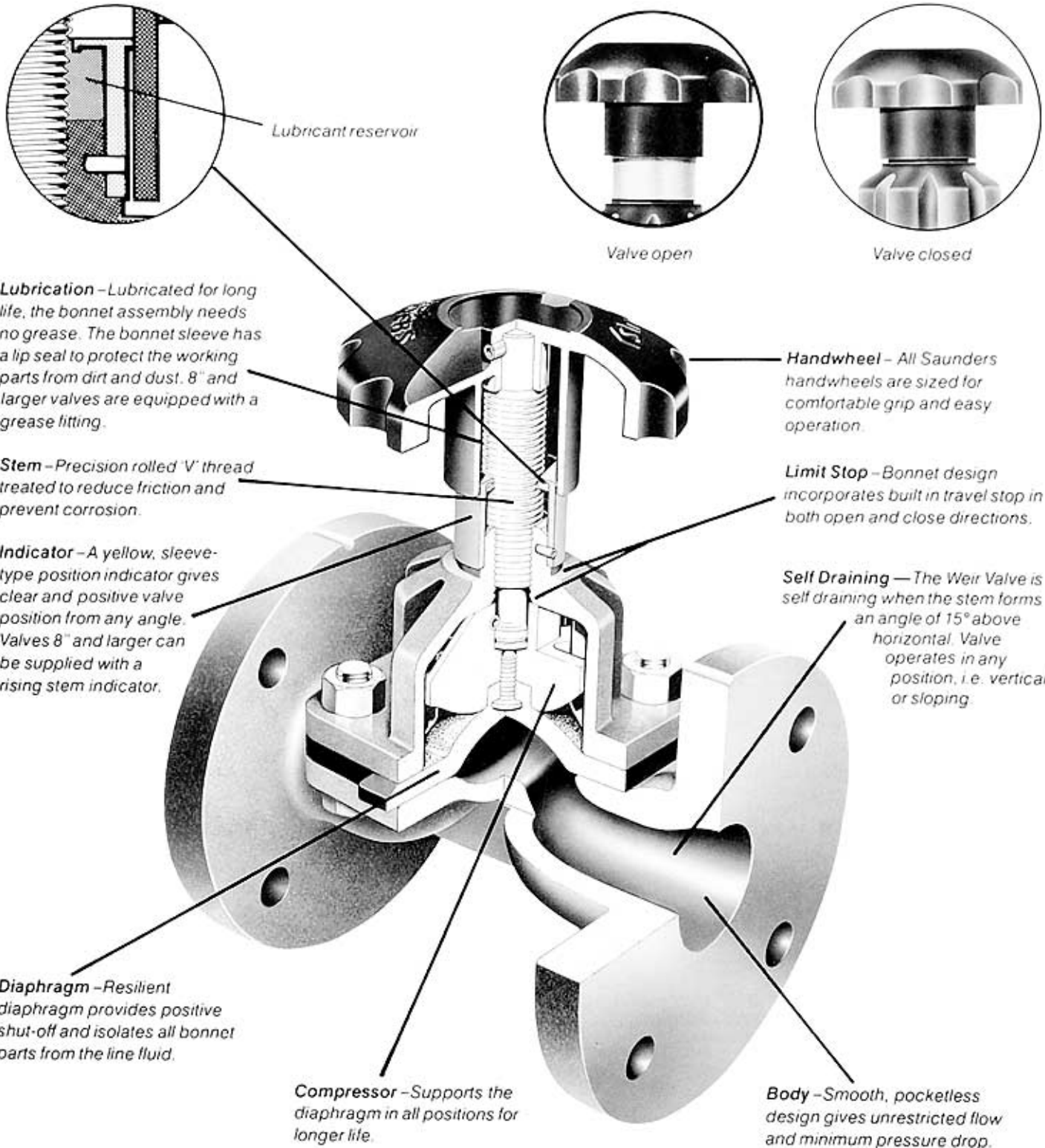
DIAPHRAGM MATERIALS

Grade	Material	Application
AA	Natural Rubber	Highest resistance against abrasive media, fly ash slurry, coal slurry, cement, limestone, gravel.
B	Butyl Rubber	Acid and alkalis. Up to 85% sulphuric acid at ambient temperature. Hydrochloric, hydrofluoric, phosphoric acids, caustic alkalis and many esters. Very low vapor and gas permeability. Inert gases and many industrial gases.
C	Nitrile Rubber	Animal, vegetable and mineral oils and fats. Paraffins, kerosene, fatty acids and fuel oils.
D	Butyl Rubber	For hot water services and applications involving steam sterilization therefore ideally suited for brewing and pharmaceutical applications. For services involving continuous high temperature/pressure combinations consult Saunders Valve, Inc.
E	Ethylene Propylene	A good general purpose diaphragm recommended for hot water, oxygenated water, intermittent steam sterilization, also good abrasion and chemical resistance.
HT	Neoprene	General purpose. Many animal, vegetable and fatty oils and greases. Compressed air, general work services. Many gases, e.g., natural gas, coal gas, hydrogen, nitrogen, and radioactive fluids.
P1	TFE/Butyl backed	Highest chemical resistance. Resistant to all fluids except alkali metals although permeable to some, especially chlorine. Alternative backing diaphragms available to deal with this and other applications. Note: TFE diaphragms have a bayonet fitting in all sizes except ¼" and ⅜" requiring a corresponding slotted compressor. See page 8 for service applications.
P2	TFE/Hypalon backed	
P3	TFE/Viton® backed	
P4	TFE/EP backed	
P5	TFE/PVDF membrane/ Viton backed	
Q	Natural/Synthetic Rubber	Abrasives, water purification, brewing, inorganic salts, dilute mineral acids.
U	Hypalon	Good acid and ozone resistance, certain chlorine services.
V	Viton	Paraffinic and aromatic hydrocarbons, acids, particularly concentrated sulphuric and chlorine applications. Not recommended for ammonia and its derivatives or for polar solvents, e.g., acetone.
W	White Natural Rubber	Chemical resistance similar to Q grade. For use where a white diaphragm is preferred. Acetone, alcohol and methylated spirit. Not for mineral acids.
W1	White Butyl	Natural color for foodstuffs, plasticizers and pharmaceuticals. May be sterilized with intermittent low pressure steam. Not suitable for chlorine based sterilants.

WEIR TYPE GENERAL INFORMATION

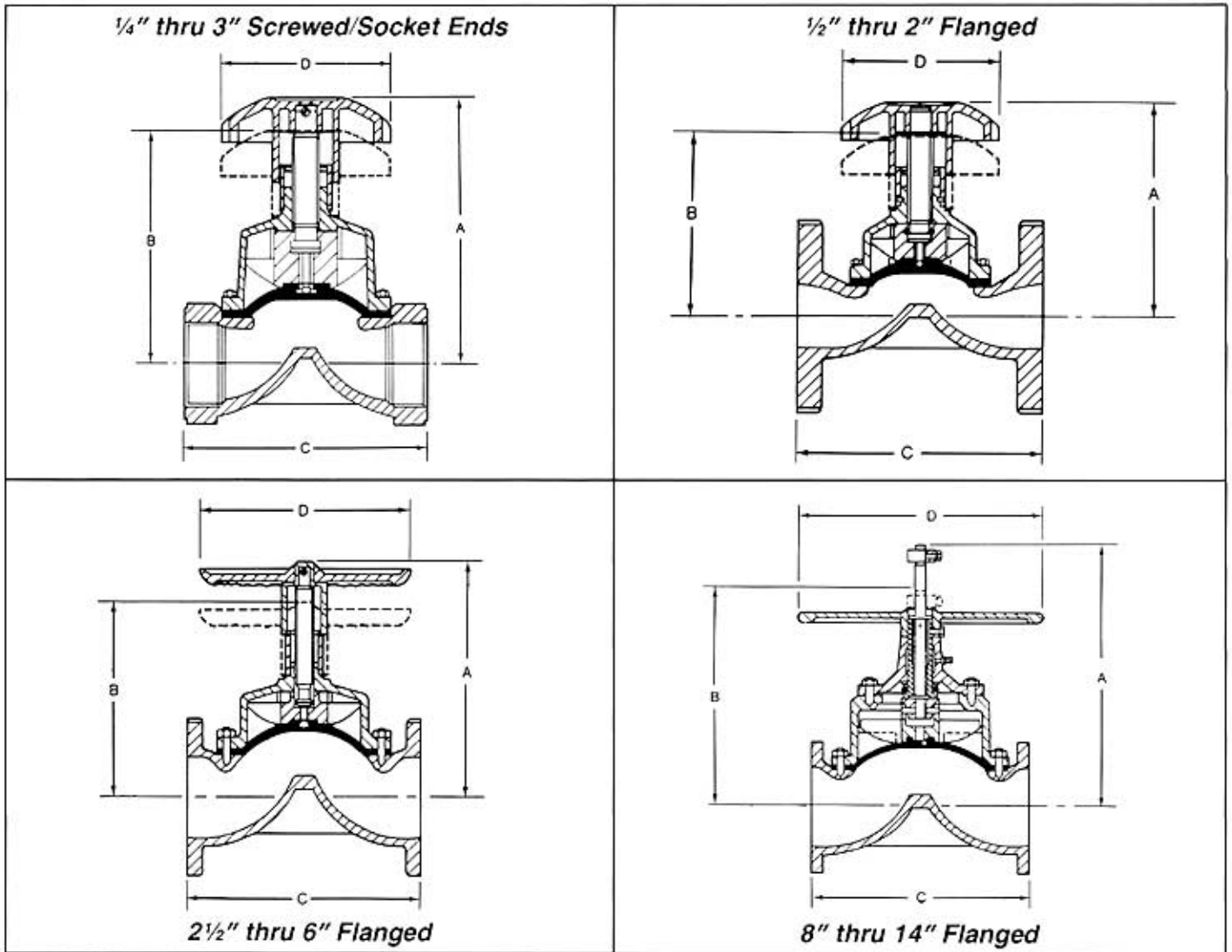
The Weir is a versatile valve with a wide range of body and diaphragm materials for chemical and abrasive service. Saunders body linings often replace the need for more expensive alloy bodies. Saunders also offers a wide

variety of Weir Valve bonnets designed to meet specific applications. These are the quick-acting lever operated, sealed, padlocked, extended stem, sliding stem, and chainwheel operated.



WEIR TYPE DIMENSIONAL DATA

OVERALL DIMENSIONS



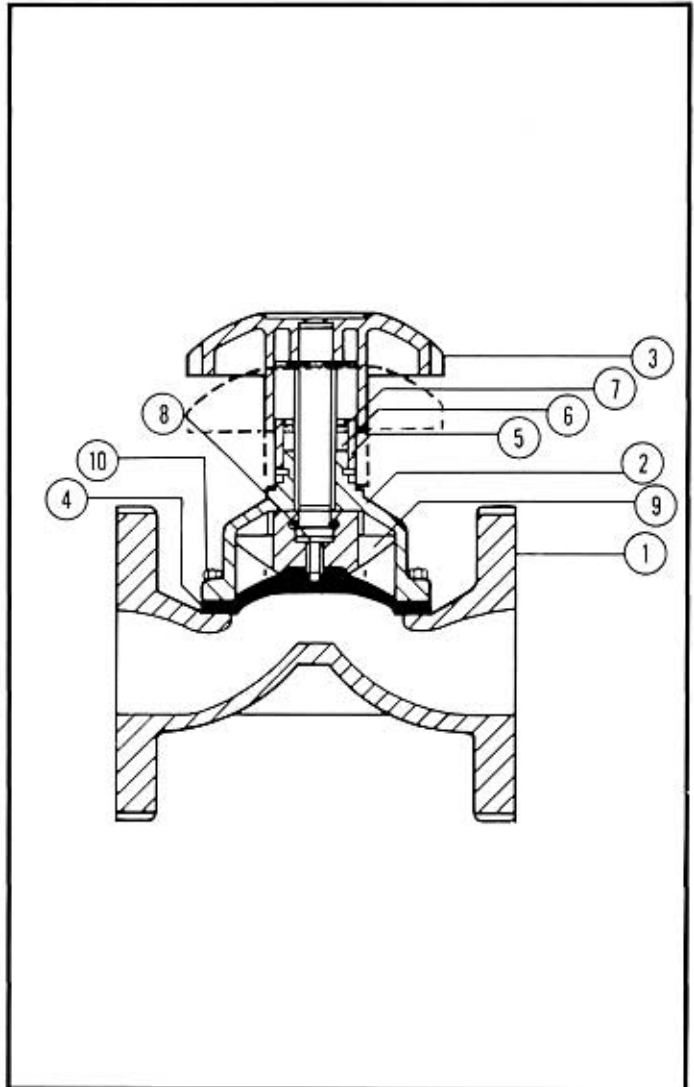
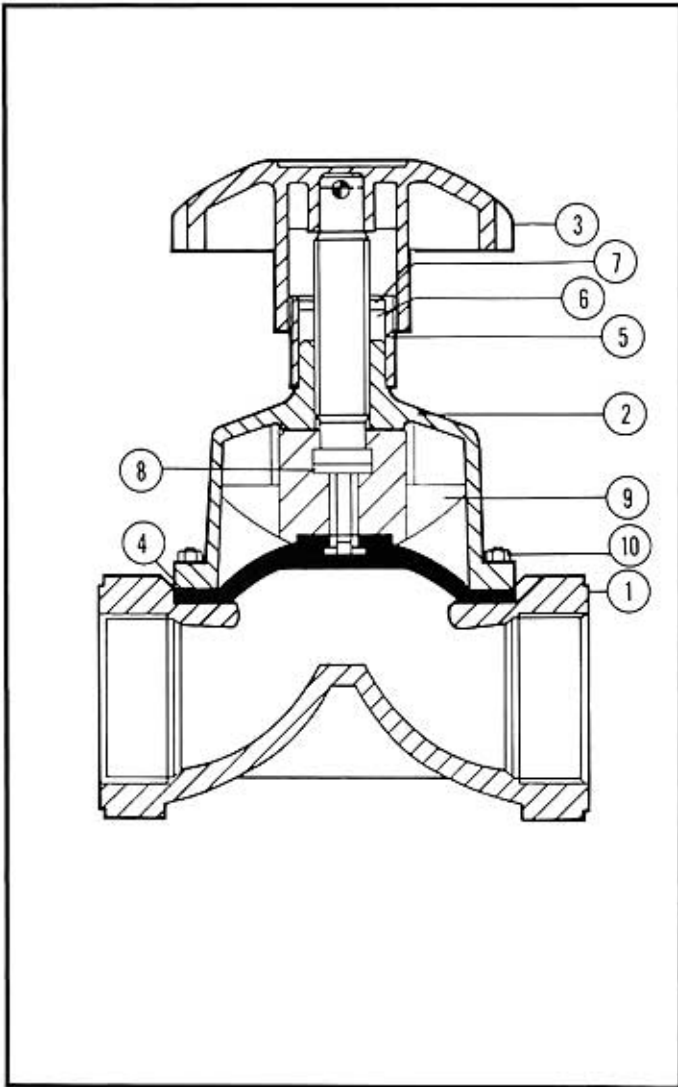
Body Type	Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	6	8	10	12	14
Screwed/Socket Ends																	
A		2 ⁵ / ₈	2 ⁵ / ₈	3 ¹ / ₂	3 ⁵ / ₈	3 ⁵ / ₈	6	6 ¹ / ₄	7 ¹ / ₈	10 ³ / ₂	11 ³ / ₈	—	—	—	—	—	—
B		2 ¹ / ₄	2 ¹ / ₁₆	3 ¹ / ₄	2 ¹¹ / ₁₆	2 ³ / ₁₆	5 ⁷ / ₁₆	5 ¹ / ₂	6	9 ⁷ / ₁₆	9 ³ / ₈	—	—	—	—	—	—
C		2 ¹ / ₂	2 ¹ / ₂	2 ¹ / ₂	3 ¹ / ₄	4 ¹ / ₄	4 ⁷ / ₈	5 ³ / ₄	6 ¹ / ₂	8 ³ / ₈	10 ¹ / ₈	—	—	—	—	—	—
Weight lbs.		1/4	1/3	1	2	2 ¹ / ₂	4	6	11	22	33	—	—	—	—	—	—
Flanged Unlined																	
A		—	—	3 ⁷ / ₈	3 ¹ / ₂	4 ¹ / ₄	5 ⁵ / ₈	6	6 ³ / ₄	10	10 ³ / ₄	13 ⁵ / ₈	16 ³ / ₄	26	30 ³ / ₄	35	36 ³ / ₄
B		—	—	3 ⁵ / ₈	3 ³ / ₁₆	3 ¹¹ / ₁₆	5 ¹ / ₁₆	5 ¹ / ₄	5 ⁵ / ₈	8 ⁷ / ₁₆	9 ¹ / ₈	11 ¹ / ₂	13 ³ / ₁₆	21 ¹ / ₁₆	25	28 ⁷ / ₁₆	27 ³ / ₄
C		—	—	4	4 ⁵ / ₈	5	5 ⁵ / ₈	6 ¹ / ₄	7 ¹ / ₂	10	12 ¹ / ₂	16	20 ¹ / ₂	26	29 ¹ / ₂	36 ¹ / ₄	36 ¹ / ₄
Weight lbs.		—	—	4	4	6	9	11	17	31	42	70	137	310	508	778	890
Flanged Rubber Lined																	
A		—	—	—	3 ¹ / ₂	4 ¹ / ₄	5 ⁵ / ₈	6	6 ³ / ₄	10	10 ³ / ₄	13 ⁵ / ₈	16 ³ / ₄	26	30 ³ / ₄	35	36 ³ / ₄
B		—	—	—	3 ³ / ₁₆	3 ³ / ₁₆	5 ¹ / ₁₆	5 ¹ / ₄	5 ⁵ / ₈	8 ⁷ / ₁₆	9 ¹ / ₈	11 ¹ / ₂	13 ³ / ₁₆	21 ¹ / ₁₆	25	28 ⁷ / ₁₆	27 ³ / ₄
C		—	—	—	4 ⁷ / ₈	5 ¹ / ₄	6	6 ¹ / ₂	7 ³ / ₄	10 ¹ / ₄	12 ¹ / ₂	16 ¹ / ₄	20 ¹ / ₂	25 ³ / ₈	29 ¹ / ₂	36 ¹ / ₄	36 ³ / ₄
Weight lbs.		—	—	—	5	7	10	12	18	33	45	73	139	313	512	782	894
Flanged Glass Lined																	
A		—	—	3 ⁷ / ₈	3 ¹ / ₂	4 ¹ / ₄	5 ⁵ / ₈	6	6 ³ / ₄	10	10 ³ / ₄	13 ⁵ / ₈	16 ³ / ₄	26	30 ³ / ₄	—	—
B		—	—	3 ⁵ / ₈	3 ³ / ₁₆	3 ¹¹ / ₁₆	5 ¹ / ₁₆	5 ¹ / ₄	5 ⁵ / ₈	8 ⁷ / ₁₆	9 ¹ / ₈	11 ¹ / ₂	13 ³ / ₁₆	21 ¹ / ₁₆	25	—	—
C		—	—	4 ¹ / ₈	4 ⁵ / ₈	5 ¹ / ₈	5 ⁵ / ₈	6 ¹ / ₄	7 ³ / ₄	10 ¹ / ₄	12 ¹ / ₂	16 ¹ / ₄	20 ¹ / ₂	25 ³ / ₈	—	—	—
Weight lbs.		—	—	4	4	7	10	12	18	32	43	71	138	312	510	—	—
Fanged																	
A		—	—	—	3 ¹ / ₂	4 ¹ / ₄	5 ⁵ / ₈	6	6 ³ / ₄	10	10 ³ / ₄	13 ⁵ / ₈	16 ³ / ₄	26	—	—	—
B		—	—	—	3 ³ / ₁₆	3 ³ / ₁₆	5 ¹ / ₁₆	5 ¹ / ₄	5 ⁵ / ₈	8 ⁷ / ₁₆	9 ¹ / ₈	11 ¹ / ₂	13 ³ / ₁₆	21 ¹ / ₁₆	—	—	—
C		—	—	—	5 ⁵ / ₈	5 ³ / ₄	6 ¹ / ₄	6 ¹ / ₄	7 ³ / ₄	10 ¹ / ₄	12 ¹ / ₂	16 ¹ / ₄	20 ³ / ₄	—	—	—	—
Weight lbs.		—	—	—	5	7	10	12	18	33	45	73	139	313	—	—	—
Handwheel Dimension	D	1 ¹ / ₂	1 ³ / ₄	2 ¹ / ₂	2 ¹ / ₂	3 ¹ / ₈	4	4	4 ³ / ₄	6 ³ / ₈	9 ⁷ / ₈	12 ¹ / ₂	14 ¹ / ₂	23	27 ¹ / ₂	27 ¹ / ₂	27 ¹ / ₂

All Dimensions + or - 1/16"

All Dimensions given in inches

Subject to change without notice.

WEIR TYPE MATERIALS OF CONSTRUCTION

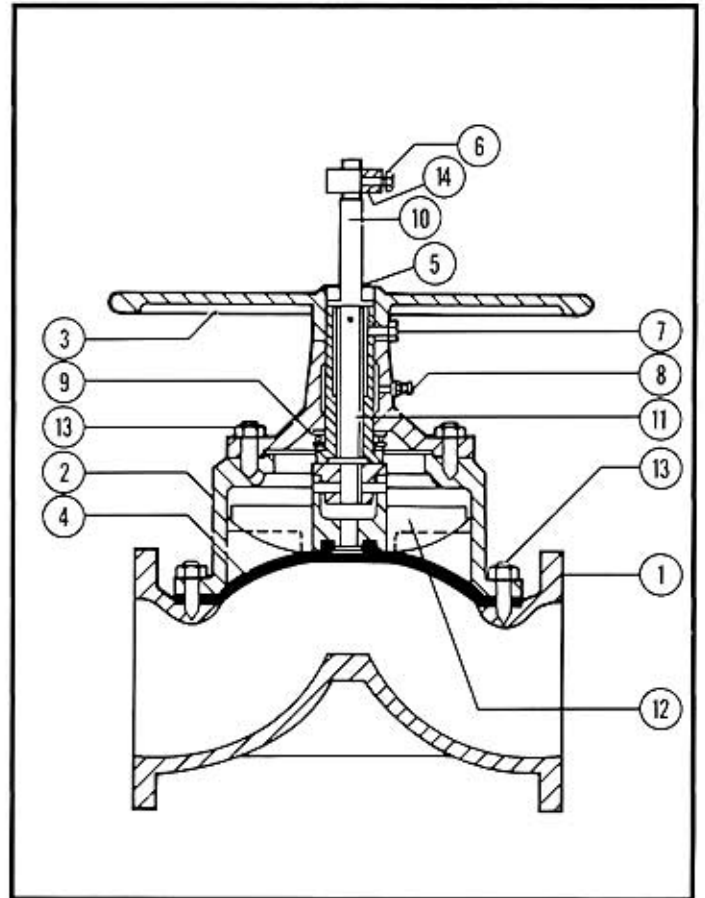
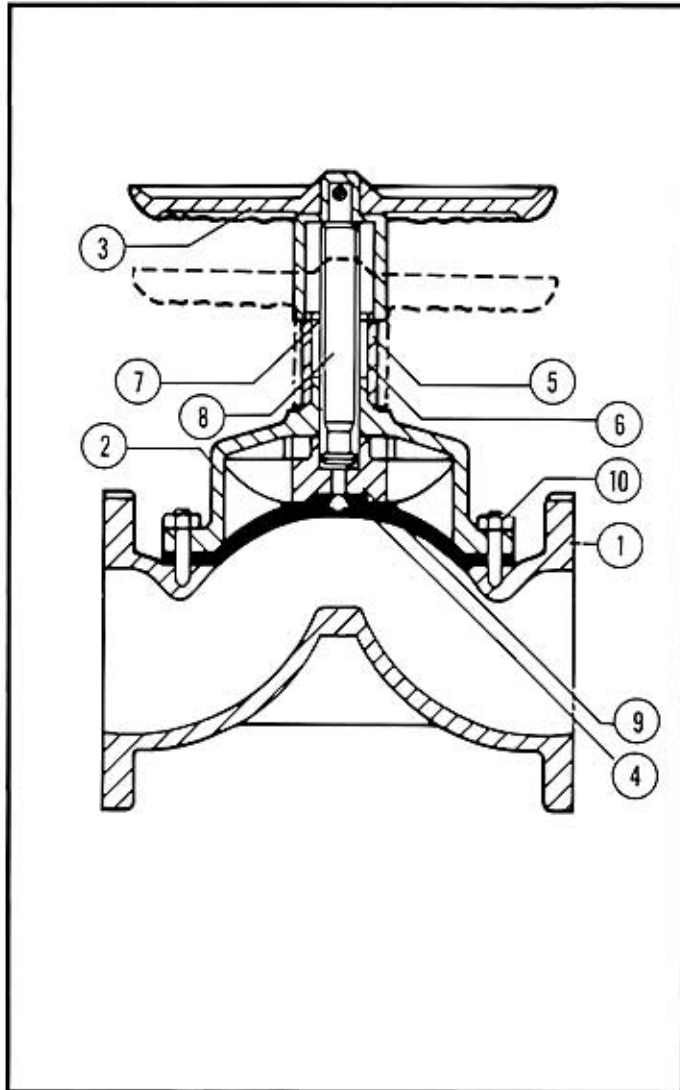


1/4" THRU 3" SCREWED/SOCKET ENDS		
Item	Part	Material
1	Body	as Specified
2	Bonnet	Cast Iron or as Specified
3	Handwheel	ABS Plastic or as Specified
4	Diaphragm	as Specified
5	Indicator Sleeve	Yellow Polypropylene
6	Reservoir	Lubricant (Cosmolube)
7	Retainer	Fiber Washer
8	Stem	Carbon Steel
9	Compressor	Cast Iron
10	Body/Bonnet Studs & Nuts	Carbon Steel

1/2" THRU 2" FLANGED		
Item	Part	Material
1	Body	as Specified
2	Bonnet	Cast Iron or as Specified
3	Handwheel	ABS Plastic or as Specified
4	Diaphragm	as Specified
5	Indicator Sleeve	Yellow Polypropylene
6	Reservoir	Lubricant (Cosmolube)
7	Retainer	Fiber Washer
8	Stem	Carbon Steel
9	Compressor	Cast Iron
10	Body/Bonnet Studs & Nuts	Carbon Steel

Subject to change without notice.

WEIR TYPE MATERIALS OF CONSTRUCTION



2 1/2" THRU 6" FLANGED		
Item	Part	Material
1	Body	as Specified
2	Bonnet	Cast Iron
3	Handwheel	Carbon Steel
4	Diaphragm	as Specified
5	Indicator Sleeve	Yellow Polypropylene
6	Reservoir	Lubricant (Cosmolube)
7	Retainer	Fiber Washer
8	Stem	Carbon Steel
9	Compressor	Cast Iron
10	Body/Bonnet Studs & Nuts	Carbon Steel

8" THRU 14" FLANGED		
Item	Part	Material
1	Body	as Specified
2	Bonnet	Cast Iron
3	Handwheel	Cast Iron
4	Diaphragm	as Specified
5	Handwheel Cap	Carbon Steel
6	Closure Stop Screw	Carbon Steel
7	Handwheel Screw	Carbon Steel
8	Grease Nipple	Carbon Steel
9	Thrust Race	Carbon Steel
10	Indicator Stem	Brass
11	Stem	Carbon Steel
12	Compressor	Cast Iron
13	Body/Bonnet Studs & Nuts	Carbon Steel
14	Closure Stop	Carbon Steel

Subject to change without notice.

WEIR TYPE BODY, LININGS AND DIAPHRAGM MATERIALS

DIAPHRAGM MATERIALS

Saunders diaphragms other than TFE diaphragms have positive attachment to compressor by screw or button.

All Saunders Diaphragms are suitable for vacuum service to the highest vacuum. For sizes over 3" specify 'vacuum reinforced diaphragms'.

Vacuum reinforced diaphragms (other than C(V)) have steel studs—can be used with ammonia or acetylene.

TFE Diaphragms

If operating line conditions demand a high temperature and chemical resistance, Saunders TFE diaphragm should be specified. When used with glass lined valves assembly torque should be controlled.

Diaphragm Features:

- TFE face on resilient rubber backing.
- Diaphragm is attached to compressor positively but not rigidly by 90° turn on a bayonet pin. Lack of rigidity allows uniform diaphragm pressure on weir without any load on diaphragm pin.
- Superior performance under vacuum conditions —balancing connection is not required.
- The rubber backing corrects for any creep in the TFE.
- 5 backings are available:
Butyl P1 — Normal general purpose. Supplied as standard.
Hypalon P2 — General Chlorine service.
Viton P3 — High temperature or severe Chlorine service.
Ethylene Propylene P4 — For general purpose high temperature services.
Kynar Membrane/Viton P5 — High temperature and severe services where permeation is a concern.

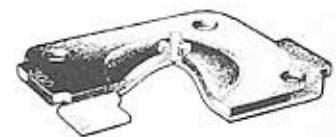
Grade	Material	Size	Temperature
AA	Natural Rubber	1/2" to 14"	-50°F to 212°F
B	Butyl Rubber	1/2" to 14"	-40°F to 212°F
C	Nitrile Rubber	1/4" to 14"	-5°F to 212°F
D (300)	Butyl Rubber (Hi Temp)	1/4" to 14"	-20°F to 265°F
E (325)	Ethylene Propylene	1/2" to 8"	-40°F to 302°F
HT	Neoprene	1/4" to 14"	-20°F to 212°F
P1 (214/300)	TFE/Butyl Backed	1/4" to 10"	-5°F to 350°F
P2 (214/237)	TFE/Hypalon Backed	1/4" to 10"	0°F to 250°F
P3 (214/226)	TFE/Viton Backed	1/4" to 10"	0°F to 350°F
P4 (214/325)	TFE/Ethylene Propylene	1/4" to 10"	-5°F to 350°F
P5 (214/K)	TFE/PVDF Viton Backed	3/4" to 6"	0°F to 350°F
Q	Natural/Synthetic Rubber	1/4" to 14"	-50°F to 212°F
U (237)	Hypalon	1/2" to 14"	0°F to 212°F
V (226)	Viton	1/4" to 14"	0°F to 300°F
W	White Natural Rubber	3/4" to 6"	-50°F to 212°F
W1 (215)	White Butyl	1/2" to 6"	-15°F to 230°F

In sizes larger than 3". Weir Type Diaphragms are specifically reinforced for vacuum service and are identified by suffix (V), e.g., Q(V). All (V) diaphragms have ferrous studs (except C(V) grade) and are specified for applications requiring all iron and steel construction. C(V) diaphragms have special bronze studs for shipboard use and are available in sizes 1" - 14". Vacuum reinforcement does not affect temperature range. B(V) diaphragms are available in sizes 1" to 14" to complete a full range of diaphragms with ferrous studs.

Weir Type Diaphragms



Rubber



TFE/Rubber Backed

BODY MATERIALS AND LININGS

Material	Screwed	Flanged
Ductile Iron	1/4" - 2"	3/4" - 8"
Cast Iron Unlined	2 1/2" - 3"	1/2" - 14"
Aluminum	1/4" - 2"	1/2" - 4"
Bronze	1/4" - 3"	1/2" - 6"
Stainless Steel ATSM A296 CF8M (Cast equivalent of AISI 316)	1/4" - 2"	1/2" - 10"
Alloy 20	1/2" - 2"	—

Butt weld and socket weld ends are available in ST, ST, and Alloy 20 body materials.

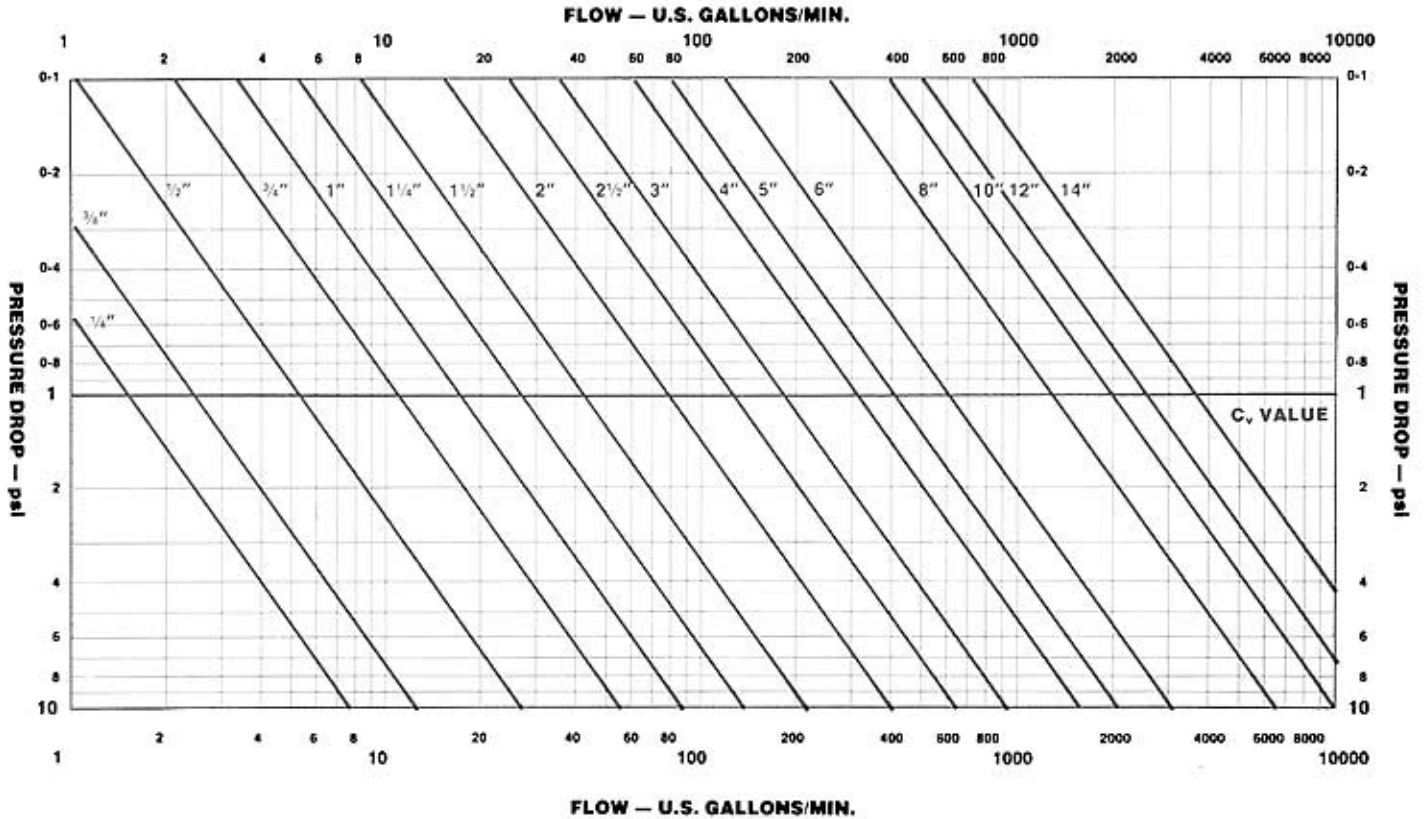
Material	Flanged
Cast Iron or Ductile Lined with:	
Hard Rubber	3/4" - 14"
Soft Rubber	3/4" - 14"
Neoprene	3/4" - 14"
Butyl	3/4" - 14"
Hypalon	3/4" - 14"
Glass	1/2" - 10"
Halar (ECTFE)	1/2" - 12"
ETFE	3/4" - 8"
PFA	3/4" - 4"
Polypropylene	3/4" - 8"
PVDF	3/4" - 8"

All screwed and flanged end connections conform to U.S. standards (API/NPT and ANSI 125 & 150). Valves with other national and international standards can be supplied.

WEIR TYPE PERFORMANCE DATA

FLOW COEFFICIENT — C_v — OF WEIR TYPE DIAPHRAGM VALVE

By definition the valve flow coefficient C_v is "the number of gallons per minute of water which will pass through a given flow restriction with a pressure drop of 1 psi".



This graph applies to water and to unlined valves. Liquid Flow Formula $Q = C_v \sqrt{\frac{\Delta P}{G}}$

Where Q = Flow (US gallons/minute)
 C_v = Flow coefficient from graph.

ΔP = Pressure drop.
G = Specific Gravity

Gas Flow Formula $Q = 1360 C_v \sqrt{\frac{\Delta P}{GT} \frac{P_1 + P_2}{2}}$

$\Delta P = (P_1 - P_2)$ Pressure Drop — psi.
 C_v = Flow in GPM (water) at 1 psi Pressure Drop.
Q = Volumetric Flow (SCFH).

G = Specific Gravity of Gas (Air @ 14.7 and 60°F = 1.0)
T = Absolute Temperature of Flowing Medium (°F + 460).

P_1 = Inlet pressure — psia.
 P_2 = Outlet pressure — psia.

Screwed/Socket Metal/PVC											
% Open	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	6"	8"
10	0.1	0.3	0.5	1.1	1.7	2.8	4	8.8	10	18	
20	0.3	0.6	1.2	2.7	4.1	6.8	10	22	26	45	
30	0.5	1	2	4.5	6.8	11.3	17	36	43	75	
40	0.7	1.4	2.6	6.0	9	15	22	48	57	100	
50	0.8	1.7	3.2	7.3	11	18.3	27	58	69	122	
60	0.9	1.9	3.7	8.3	12.5	20.8	31	66	79	139	
70	1	2.1	4	9.1	13.7	22.8	34	73	86	152	
80	1.1	2.2	4.2	9.6	14.4	24	35.5	77	91	160	
90	1.1	2.3	4.3	9.8	14.7	24.5	36.3	78	93	164	
100	1.1	2.3	4.4	10	15	25	37	80	95	167	

Flanged End—Rubber Lined													
% Open	1/2"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	6"	8"	10"	14"	
10	1	1.5	2.4	3.9	7	11	16	28	53	114	174	225	326
20	2.5	3.8	5.9	9.5	17	26	40	68	131	281	428	552	799
30	4.1	6.3	9.9	16	29	46	67	113	218	468	713	920	1332
40	5.5	8.4	13.2	21	38	61	89	151	290	624	950	1226	1776
50	6.7	10.2	16.1	26	47	74	108	184	353	759	1156	1492	2161
60	7.7	11.6	18.3	29	53	85	123	209	402	863	1315	1697	2457
70	8.4	12.7	20	32	58	93	135	229	440	946	1441	1860	2694
80	8.8	13.4	21	33.6	61	98	142	242	465	998	1521	1962	2842
90	9	13.7	21.6	34	63	100	145	247	474	1019	1552	2003	2901
100	9.2	14	22	35	64	102	148	252	484	1040	1584	2044	2960

Flanged End—Plastic Lined										
% Open	1/2"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	6"	8"
10	0.9	1.4	2.4	4.2	7.8	11	19.8	34	78	112
20	2.1	3.5	5.9	10.3	19.2	27	49	82	193	275
30	3.5	5.8	9.9	17.1	32	45	81	137	321	459
40	4.7	7.8	13.2	22.8	43	60	106	183	428	612
50	5.7	9.5	16.1	27.7	52	73	131	223	520	745
60	6.5	10.8	18.3	31.5	59	83	149	253	592	847
70	7.1	11.8	20	34.6	65	91	164	275	649	928
80	7.5	12.5	21.1	36.5	68	96	173	293	684	979
90	7.6	12.7	21.6	37	70	98	176	299	699	1000
100	7.8	13	22	38	71	100	180	305	713	1020

Flanged End—Unlined														
% Open	1/2"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	6"	8"	10"	12"	14"	
10	0.6	1.3	1.9	3	4.8	9	14	20	35	67	143	218	407	
20	1.5	3.1	4.7	7.4	12	22	34	50	85	163	351	535	999	
30	2.5	5.2	7.9	12.4	19	36	57	83	142	272	585	891	1150	1665
40	3.3	6.9	10.5	16.5	26	48	76	111	189	363	780	1188	1533	2220
50	4	8.4	12.8	20	32	58	93	135	230	442	949	1445	1865	2701
60	4.6	9.5	14.5	22.8	36	66	105	154	261	502	1079	1643	2121	3071
70	5	10.5	16	25	39	73	116	168	287	551	1183	1802	2325	3367
80	5.3	11	16.9	26.4	41	77	122	178	302	581	1248	1901	2453	3552
90	5.4	11.3	17.2	26.9	42	78	124	181	309	593	1274	1940	2504	3626
100	5.5	11.5	17.5	27.5	43.2	80	127	185	315	605	1300	1980	2555	3700

Flanged End—Glass/Halar-Lined														
% Open	1/2"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	6"	8"	10"	12"	14"	
10	0.6	1.3	2	3.2	5	9.2	14.6	21	36	70	150	229	295	427
20	1.6	3.2	5	7.8	12.3	22.7	36	52	89	171	367	561	724	1049
30	2.6	5.4	8.3	13.1	20.4	38	60	87	149	286	612	936	1207	1748
40	3.5	7.2	11.1	17.4	27.2	50	80	116	199	381	816	1247	1610	2331
50	4.2	8.8	13.5	21.2	33.1	61	97	142	242	464	993	1518	1959	2836
60	4.8	10	15.4	24.1	37.7	70	110	161	275	527	1129	1726	2227	3225
70	5.3	10.9	16.8	26.4	41.3	76	121	177	301	578	1238	1892	2442	3535
80	5.6	11.5	17.8	27.8	43.6	81	128	186	318	610	1306	1996	2576	3730
90	5.7	11.8	18.1	28.4	44.5	82	130	190	324	622	1333	2037	2629	3807
100	5.8	12	18.5	29	45.4	84	133	194	331	635	1360	2079	2683	3885

WEIR TYPE PERFORMANCE DATA

OPERATING LIMITS

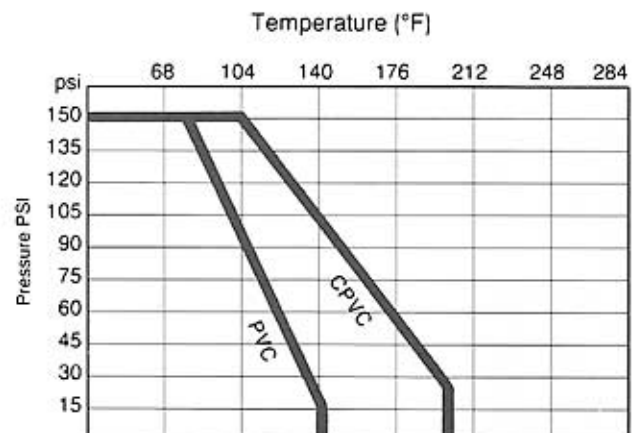
1. The table below shows the maximum permissible working pressure, within a temperature range of -50°F and +120°F, for the entire size range of Saunders Weir Diaphragm Valves.
2. For operating temperatures above 120°F, the permissible working pressure decreases as shown by the chart on the facing page. To find the maximum working pressure at the higher temperatures, select the pressure from the table below for the desired size and valve material. Then, find the corresponding

pressure line on the chart and plot that line until it intersects with the anticipated temperature. From the point of intersection, proceed horizontally to the edge of the chart and read the allowable working pressure at the anticipated temperature.

3. Refer to the diaphragm temperature limitation bar graphs to determine if the anticipated temperature is within the recommended operating range of the desired diaphragm and body material.

VALVE MAXIMUM WORKING PRESSURE, psi (at temperatures up to 120°F)															
Body Material	Valve Size/Maximum Pressure														
	1/4"	3/8"	1/2"	3/4"	1"	1 1/2"	2"	2 1/2"	3"	4"	6"	8"	10"	12"	14"
Metallic Screwed	230	230	230	230	230	230	230	150	150						
Metals other than Cast Iron			230	230	230	230	230	150	150	150	150	100	70	60	50
Cast Iron Flanged			175	175	175	175	175	150	150	150	150	100	70	60	50
Rubber Lined				175	175	175	175	150	150	150	150	100	70	60	50
Plastic Lined				175	175	175	175	150	150	150	150	100	70	60	50
Glass and Halar Lined			150	150	150	125	100	100	100	75	75	75	70	60	50

VALVE MAXIMUM WORKING PRESSURE, psi (at temperatures up to 68°F)					
Body Material	Valve Size/Maximum Pressure				
	1/2"	3/4"	1"	1 1/2"	2"
PVC	150	150	150	150	150
CPVC	150	150	150	150	150



PVC 140°F

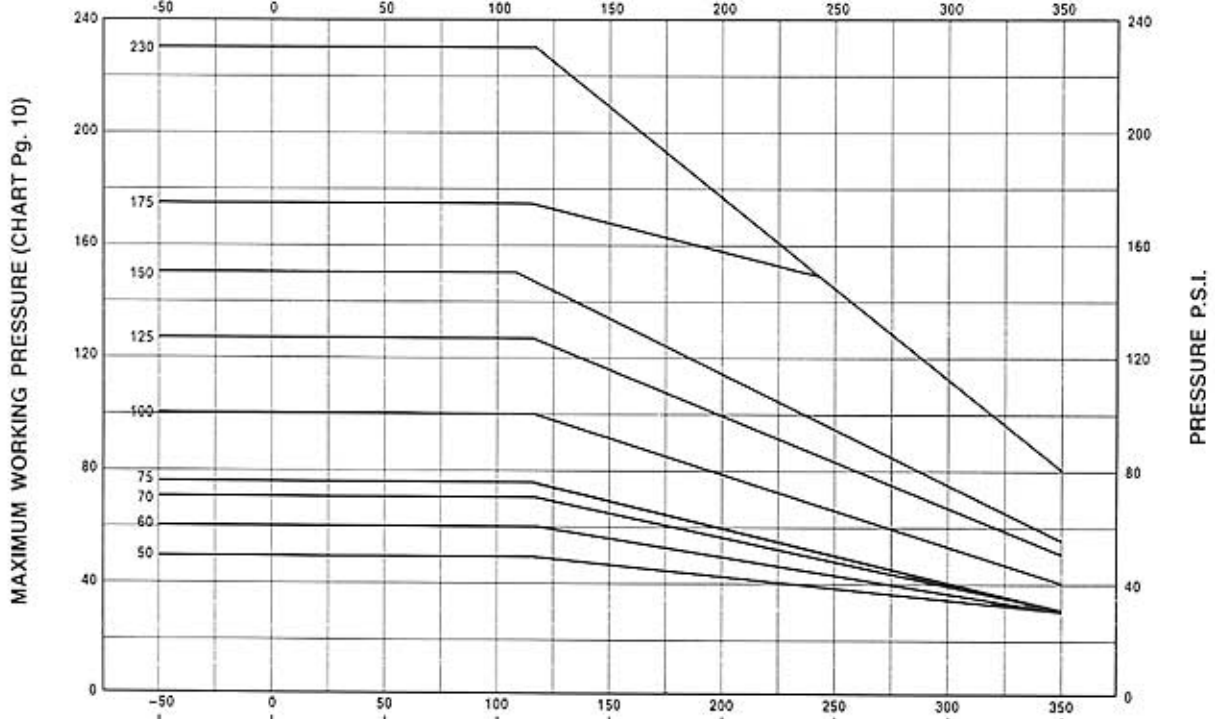
CPVC 200°F

WEIR TYPE PERFORMANCE DATA

DIAPHRAGM TEMPERATURE LIMITATIONS

GRADE P5	TFE/PVDF/VITON	350°F
GRADE P3	TFE/VITON	350°F
GRADE P1	TFE/BUTYL	350°F
GRADE V	VITON	300°F
GRADE E	ETHYLENE PROPYLENE	300°F
GRADE D	BUTYL	265°F
GRADE P2	TFE/HYPALON	250°F
GRADE W1	WHITE BUTYL	230°F
GRADE U	HYPALON	212°F
GRADE Q	NATURAL	212°F
GRADE HT	NEOPRENE	212°F
GRADE W	WHITE NATURAL	212°F
GRADE C	NITRILE	212°F
GRADE B	BUTYL	212°F
GRADE AA	NATURAL	212°F

TEMPERATURE °F



TEMPERATURE °F

CAST IRON	350°F
METALLIC OTHER THAN CAST IRON	350°F
GLASS LINED	350°F
PFA	350°F
ETFE (TEFZEL) LINED	300°F
PVDF LINED	275°F
HALAR LINED	250°F
POLYPROPYLENE LINED	200°F
BUTYL LINED	250°F
NEOPRENE LINED	220°F
HYPALON LINED	200°F
HARD RUBBER LINED	185°F
SOFT RUBBER LINED	185°F

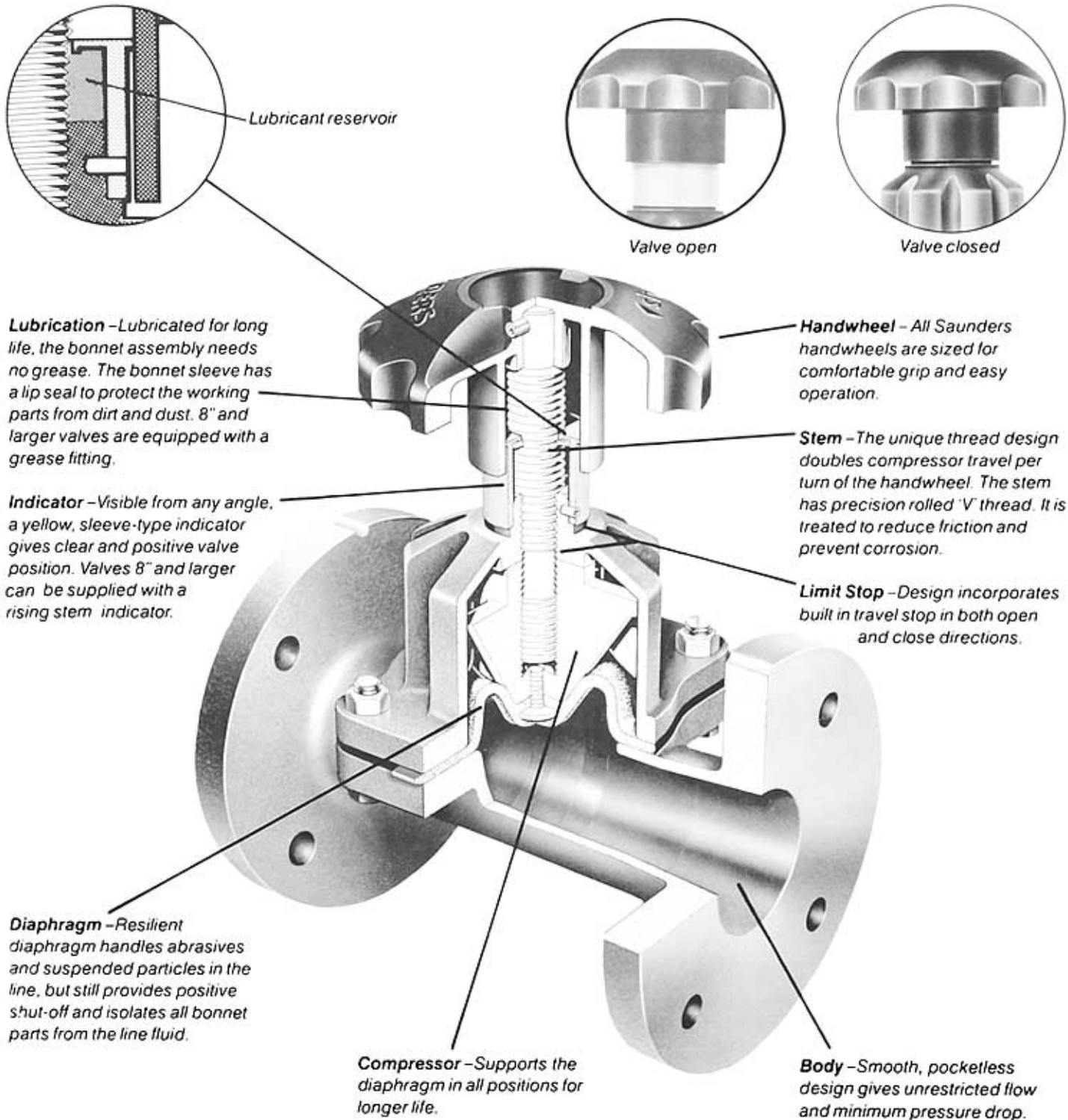
BODY TEMPERATURE LIMITATIONS

STRAIGHT THRU GENERAL INFORMATION

The Saunders Straight Thru Valve is available in a wide range of body and diaphragm materials for efficiently handling abrasive and corrosive slurries, thick coagulating fluids, and a wide variety of suspended solid materials. Saunders body linings often replace the need

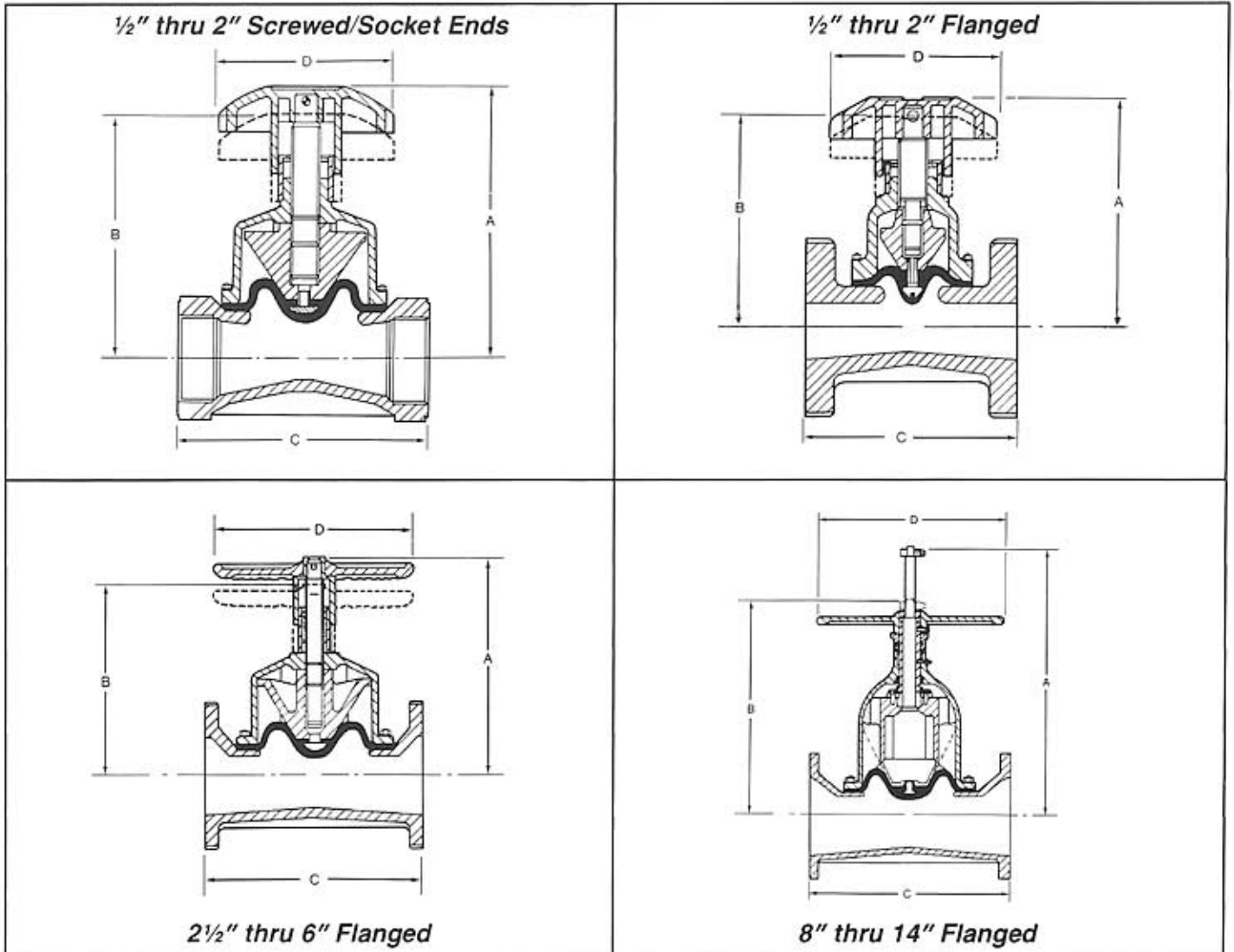
for more expensive valve body materials.

Saunders also offers a wide variety of Straight Thru bonnets designed to meet given applications. These are the sealed, padlocked, extended stem, sliding stem, and chainwheel operated.



STRAIGHT THRU DIMENSIONAL DATA

OVERALL DIMENSIONS

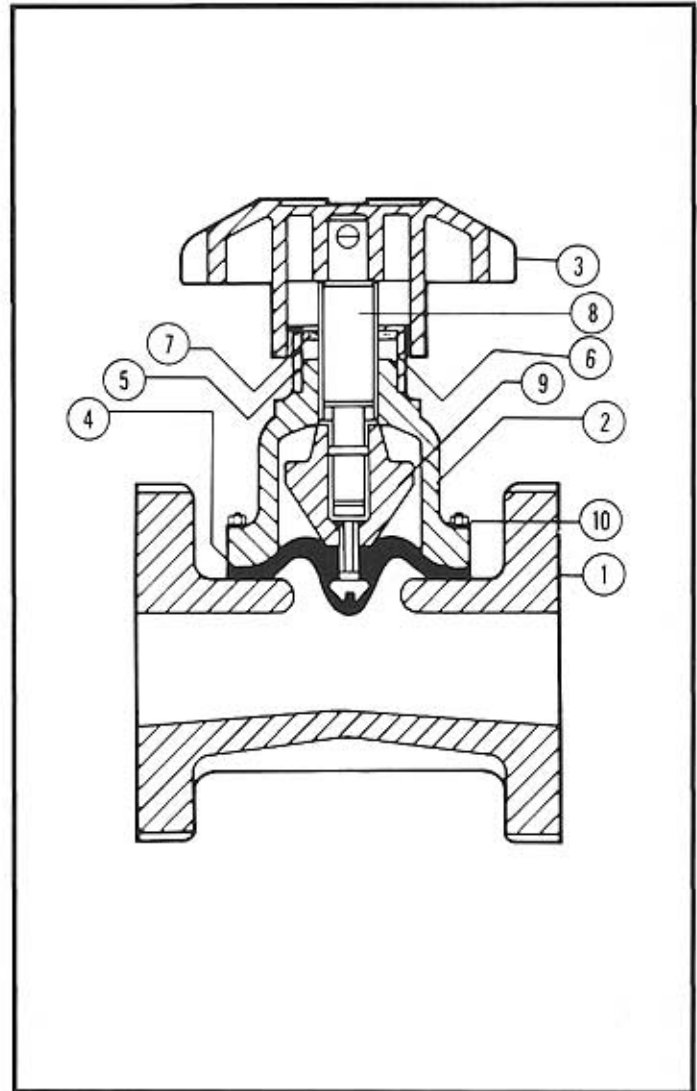
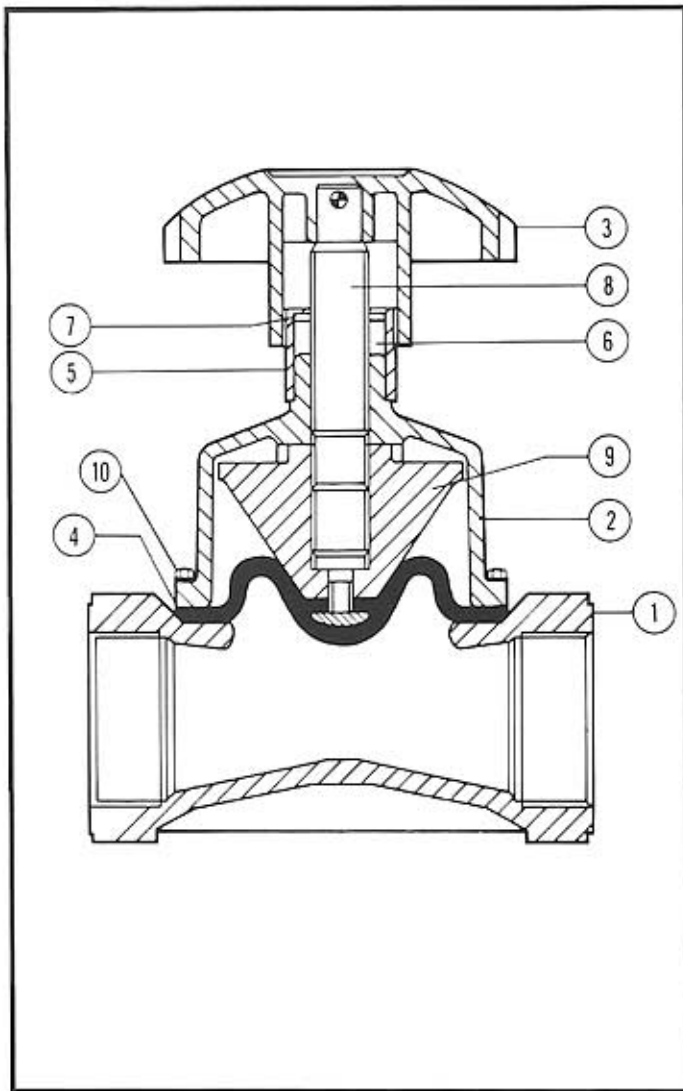


Body Type	Size	1/2	1	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14
Screwed/Socket Ends														
A		4	5 ⁵ / ₁₆	5 ³ / ₄	7 ⁷ / ₁₆	—	—	—	—	—	—	—	—	—
B		3 ¹ / ₈	5 ¹ / ₁₆	4 ¹⁵ / ₁₆	6 ⁹ / ₁₆	—	—	—	—	—	—	—	—	—
C		2 ¹ / ₂	4 ¹ / ₄	5 ¹ / ₂	6 ¹ / ₂	—	—	—	—	—	—	—	—	—
Weight lbs.		2	5	6	11	—	—	—	—	—	—	—	—	—
Flanged Unlined														
A		4 ¹ / ₄	5 ³ / ₄	5 ³ / ₄	7 ¹ / ₈	10 ¹ / ₄	11 ⁵ / ₈	13 ⁷ / ₈	16 ³ / ₈	16 ⁵ / ₈	24	33 ³ / ₄	25	29
B		4	5 ¹ / ₄	5 ¹ / ₄	6 ³ / ₈	8 ³ / ₈	10 ³ / ₈	12 ² / ₈	13 ⁵ / ₁₆	14 ² / ₈	19 ³ / ₁₆	26	25	29
C		4	5	6 ¹ / ₄	7 ¹ / ₂	8 ¹ / ₂	10	12 ¹ / ₂	14	16	20 ¹ / ₂	25	29 ¹ / ₂	36 ¹ / ₄
Weight lbs.		5	8	12	19	33	49	65	142	142	248	430	654	980
Flanged Rubber Lined														
A		—	5 ³ / ₄	5 ³ / ₄	7 ¹ / ₈	10 ¹ / ₄	11 ⁵ / ₈	13 ⁷ / ₈	16 ³ / ₈	16 ⁵ / ₈	24	33 ³ / ₄	25	29
B		—	5 ¹ / ₄	5 ¹ / ₄	6 ³ / ₈	8 ³ / ₈	10 ³ / ₈	12 ² / ₈	13 ⁵ / ₁₆	14 ² / ₈	19 ³ / ₁₆	26	25	29
C		—	5 ¹ / ₄	6 ¹ / ₂	7 ³ / ₄	8 ³ / ₄	10 ¹ / ₄	12 ¹ / ₄	14 ¹ / ₄	16 ³ / ₈	20 ¹ / ₈	25 ³ / ₈	29 ⁷ / ₈	36 ⁵ / ₈
Weight lbs.		—	8	13	20	33	50	67	142	144	251	433	658	984
Flanged Glass/Plastic Lined														
A		4 ¹ / ₄	5 ³ / ₄	5 ³ / ₄	7 ¹ / ₈	10 ¹ / ₄	11 ⁵ / ₈	13 ⁷ / ₈	16 ³ / ₈	16 ⁵ / ₈	24	33 ³ / ₄	—	—
B		4	5 ¹ / ₄	5 ¹ / ₄	6 ³ / ₈	8 ³ / ₈	10 ³ / ₈	12 ² / ₈	13 ⁵ / ₁₆	14 ² / ₈	19 ³ / ₁₆	26	—	—
C		4 ¹ / ₈	5 ¹ / ₈	6 ¹ / ₈	7 ¹ / ₈	8 ¹ / ₈	10 ¹ / ₈	12 ¹ / ₈	14 ¹ / ₈	16 ¹ / ₈	20 ¹ / ₈	25 ¹ / ₈	—	—
Weight lbs.		5	8	12	19	33	49	66	142	143	250	432	—	—
Handwheel Dimension														
D		3 ¹ / ₈	4	4	4 ³ / ₄	9 ⁷ / ₈	9 ⁷ / ₈	12 ³ / ₈	12 ³ / ₈	14 ¹ / ₂	19	23	27 ¹ / ₂	27 ¹ / ₂

All Dimensions - or - 1/8" All Dimensions given in inches

Subject to change without notice.

STRAIGHT THRU MATERIALS OF CONSTRUCTION



1/2" THRU 2" SCREWED/SOCKET ENDS

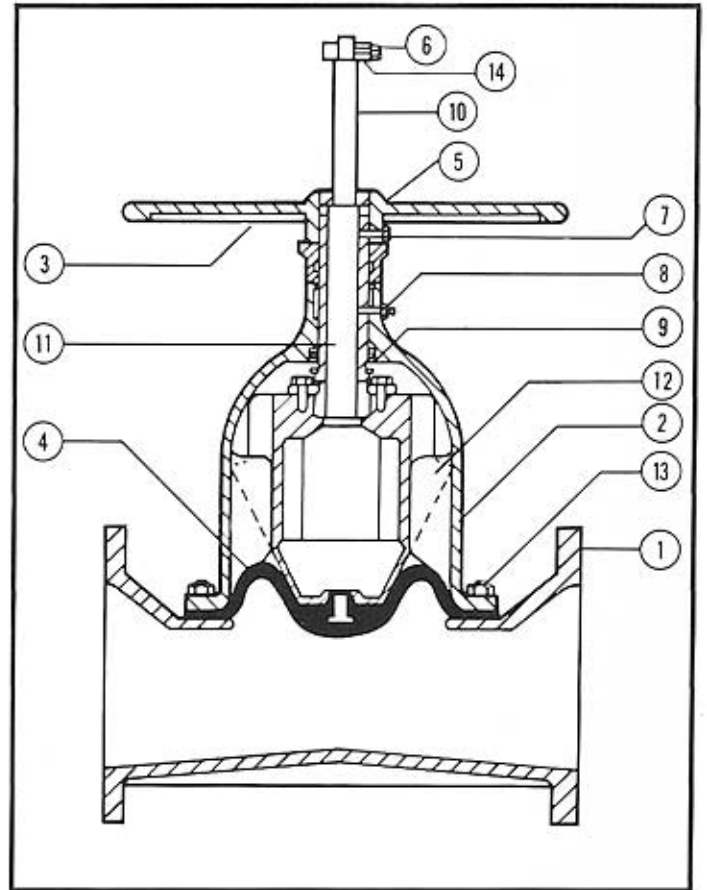
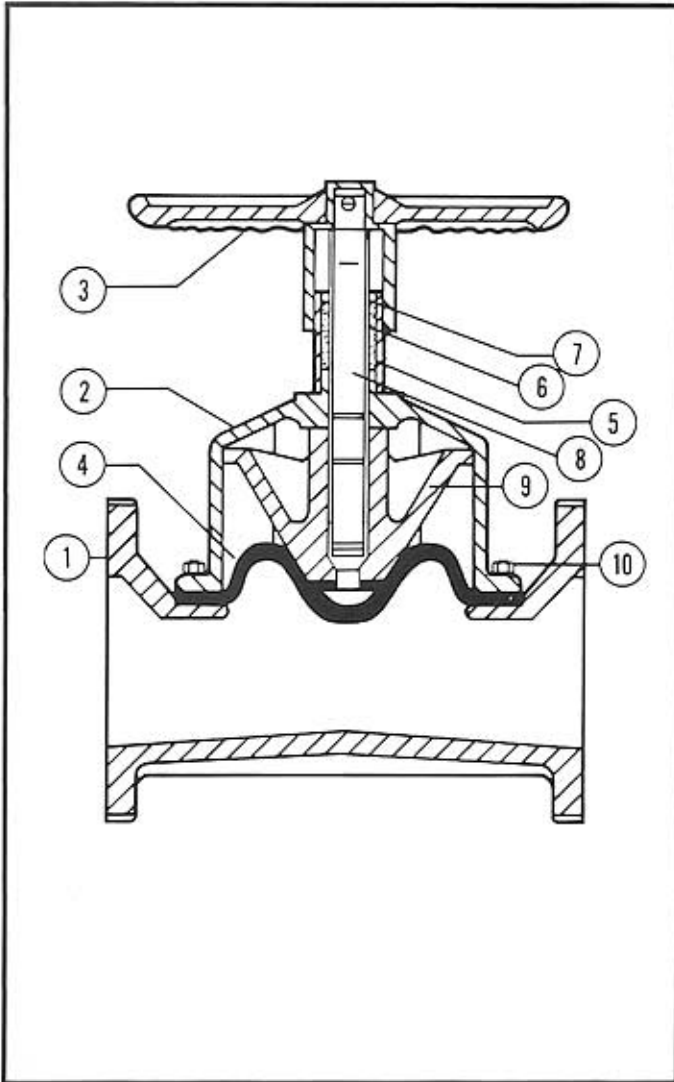
Item	Part	Material
1	Body	as Specified
2	Bonnet	Cast Iron
3	Handwheel	ABS Plastic or as Specified
4	Diaphragm	as Specified
5	Indicator Sleeve	Yellow Polypropylene
6	Reservoir	Lubricant (Cosmolube)
7	Retainer	Fiber Washer
8	Stem	Carbon Steel
9	Compressor	Cast Iron
10	Body/Bonnet Studs & Nuts	Carbon Steel

1/2" THRU 2" FLANGED

Item	Part	Material
1	Body	as Specified
2	Bonnet	Cast Iron
3	Handwheel	ABS Plastic or as Specified
4	Diaphragm	as Specified
5	Indicator Sleeve	Yellow Polypropylene
6	Reservoir	Lubricant (Cosmolube)
7	Retainer	Fiber Washer
8	Stem	Carbon Steel
9	Compressor	Cast Iron
10	Body/Bonnet Studs & Nuts	Carbon Steel

Subject to change without notice.

STRAIGHT THRU MATERIALS OF CONSTRUCTION



2 1/2" THRU 6" FLANGED		
Item	Part	Material
1	Body	as Specified
2	Bonnet	Cast Iron
3	Handwheel	Carbon Steel
4	Diaphragm	as Specified
5	Indicator Sleeve	Yellow Polypropylene
6	Reservoir	Lubricant (Cosmolube)
7	Retainer	Fiber Washer
8	Stem	Carbon Steel
9	Compressor	Cast Iron
10	Body/Bonnet Studs & Nuts	Carbon Steel

8" THRU 14" FLANGED		
Item	Part	Material
1	Body	as Specified
2	Bonnet	Cast Iron
3	Handwheel	Cast Iron
4	Diaphragm	as Specified
5	Handwheel Cap	Carbon Steel
6	Closure Stop Screw	Carbon Steel
7	Handwheel Screw	Carbon Steel
8	Grease Nipple	Carbon Steel
9	Thrust Race	Carbon Steel
10	Indicator Stem	Brass
11	Stem	Carbon Steel
12	Compressor	Cast Iron
13	Body/Bonnet Studs & Nuts	Carbon Steel
14	Closure Stop	Carbon Steel

Subject to change without notice.

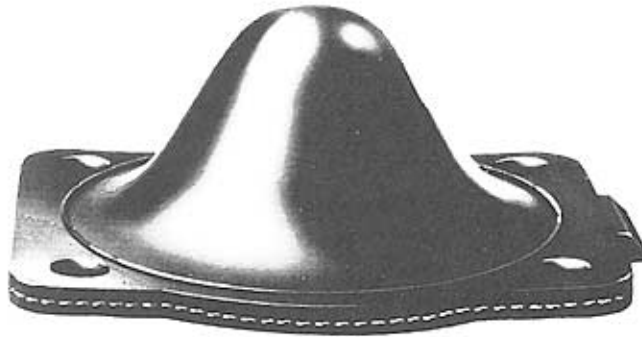
STRAIGHT THRU BODY, LININGS AND DIAPHRAGM MATERIALS

DIAPHRAGM MATERIALS

Grade	Material	Size	Temperature
KA	Natural Rubber	1/2" to 14"	-40°F to 195°F
KB	Butyl Rubber	1/2" to 14"	-20°F to 195°F
KC	Nitrile Rubber	1/2" to 12"	10°F to 195°F
KD (300)	Butyl Rubber (Hi Temp)	1/2" to 12"	0°F to 212°F
KE	Ethylene Propylene	1/2" to 12"	-40°F to 225°F
KHT	Neoprene	1/2" to 14"	- 5°F to 195°F
KQ	Natural/Synthetic Rubber	1/2" to 14"	-40°F to 195°F
KU (237)	Hypalon	1/2" to 14"	0°F to 195°F
KV (226)	Viton	1/2" to 10"	40°F to 250°F
KW	White Natural Rubber	1/2" to 5"	-30°F to 195°F
KW1 (215)	White Butyl	1/2" to 6"	- 5°F to 195°F

All diaphragms are reinforced to handle industrial vacuum.

Saunders Standard Diaphragms are fully interchangeable with many competitive diaphragm valves. For full details of the Interchangeability Specification please contact your local distributor.



Straight Thru Diaphragm

BODY MATERIALS AND LININGS

Material	Screwed	Flanged
Cast Iron Unlined	1/2" - 2"	1/2" - 14"
Bronze	1/2" - 2"	1" - 6"
Stainless Steel ASTM A296 CF8M	1/2" - 2"	1" - 6"

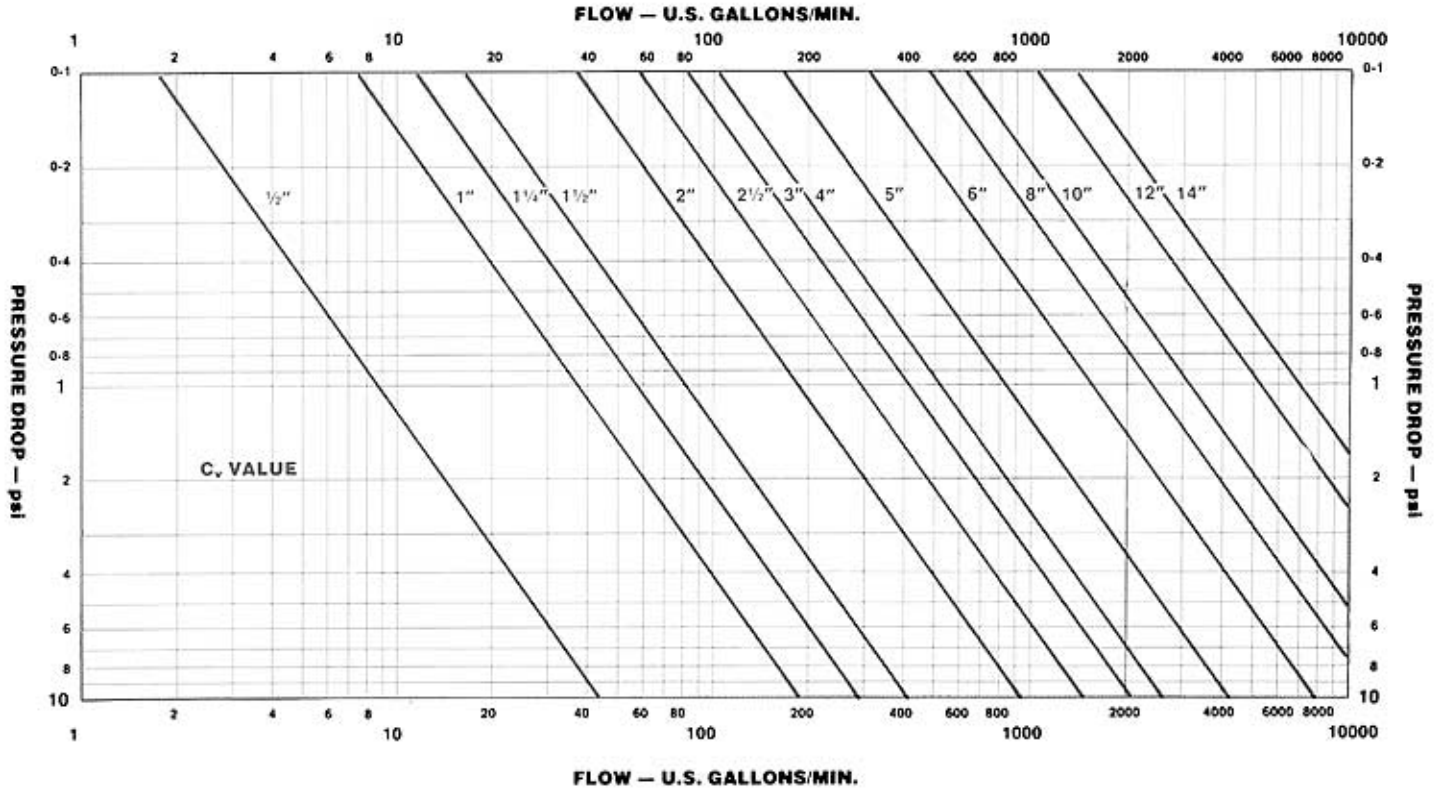
All screwed and flanged end connections conform to U.S. standards (API NPT and ANSI 125 & 150). Valves with other national and international standards can be supplied.

Material	Screwed	Flanged
Cast Iron Lined With:		
Hard Rubber	—	1" - 14"
Soft Rubber	—	1" - 14"
Butyl Rubber	—	1" - 14"
Neoprene	—	1" - 14"
Hypalon	—	1" - 14"
Halar	—	1/2" - 14"
Glass	—	1/2" - 10"
ETFE	—	1" - 14"
Polypropylene	—	1" - 14"

STRAIGHT THRU PERFORMANCE DATA

FLOW COEFFICIENT — C_v — OF STRAIGHT THRU DIAPHRAGM VALVE

By definition the valve flow coefficient C_v is "the number of gallons per minute of water which will pass through a given flow restriction with a pressure drop of 1 psi".



This graph applies to water and to unlined valves. **Liquid Flow Formula** $Q = C_v \sqrt{\frac{\Delta P}{G}}$

Where Q = Flow (US gallons/minute) ΔP = Pressure drop.
 C_v = Flow coefficient from graph. G = Specific Gravity

Gas Flow Formula $Q = 1360 C_v \sqrt{\frac{\Delta P}{GT} \frac{P_1 + P_2}{2}}$

$\Delta P = (P_1 - P_2)$ Pressure Drop — psi.
 C_v = Flow in GPM (water) at 1 psi Pressure Drop.
 Q = Volumetric Flow (SCFH).

G = Specific Gravity of Gas (Air @ 14.7 and 60°F = 1.0)
 T = Absolute Temperature of Flowing Medium (°F + 460).

P_1 = Inlet pressure — psia.
 P_2 = Outlet pressure — psia.

Screwed End Metal				
% Open	1/2"	1"	1 1/2"	2"
10	1.4	3	9.4	14.8
20	2.8	6	18.7	30
30	4.3	9.3	28.9	46
40	5.8	12.5	39	62
50	7	15	47	74
60	8.2	17.5	55	86
70	9	19.3	60	95
80	9.9	21.3	66	105
90	10.9	23.3	73	114
100	11.7	25	78	123

Flanged End—Unlined													
% Open	1/2"	1"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	14"	
10	1	4.5	9	15	29	40	71	111	202	310	482	727	1236
20	2.1	9.1	18	31	57	79	141	222	403	619	965	1454	2472
30	3.2	14	28	47	88	122	216	342	622	955	1487	2242	3811
40	4.3	18.9	38	64	119	165	294	462	840	1290	2010	3030	5150
50	5.2	22.7	45	77	143	198	353	554	1008	1548	2412	3636	6180
60	6	26.5	52	90	167	231	412	647	1176	1806	2814	4242	7210
70	6.6	29.1	58	99	183	254	453	711	1294	1987	3095	4666	7931
80	7.3	32.1	64	109	202	281	500	785	1428	2193	3417	5151	8755
90	8	35.1	70	119	221	307	547	859	1562	2399	3739	5636	9579
100	8.6	37.8	75	128	238	330	588	924	1680	2580	4020	6060	10300

Flanged End—Rubber Lined												
% Open	1"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"		
10	3.7	7.9	12.8	23	32	58	86	151	264	410	586	1194
20	7.3	15.8	26	47	63	115	173	302	527	821	1172	2388
30	11.3	24.4	40	72	98	178	266	466	813	1265	1807	3681
40	15.3	33	53	97	132	240	360	630	1098	1710	2442	4975
50	18.4	40	64	117	158	288	432	756	1318	2052	2930	5970
60	21.4	46	75	136	185	336	504	882	1537	2394	3419	6965
70	23.6	51	82	150	203	370	554	970	1691	2633	3761	7661
80	26	56	91	166	224	408	612	1071	1867	2907	4151	8457
90	28.4	61	99	181	246	446	670	1172	2042	3161	4542	9253
100	30.6	66	107	195	264	480	720	1260	2196	3420	4884	9950

Flanged End—Glass/Plastic Lined											
% Open	1/2"	1"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	
10	1.1	4.7	9.5	16.6	30	41	74	115	216	327	516
20	2.2	9.4	18.9	33	61	82	148	230	432	653	1031
30	3.3	14.4	29.2	51	94	127	229	355	666	1008	1590
40	4.5	19.5	40	69	127	171	309	480	900	1362	2148
50	5.4	23.4	47	83	152	205	371	576	1080	1634	2578
60	6.3	27.3	55	97	178	239	433	672	1260	1907	3007
70	6.9	30	61	106	196	263	476	739	1386	2097	3308
80	7.7	33	67	117	216	291	525	816	1530	2315	3652
90	8.4	36	73	128	236	318	575	893	1674	2533	3995
100	9	39	79	138	254	342	618	960	1800	2724	4296

STRAIGHT THRU PERFORMANCE DATA

OPERATING LIMITS

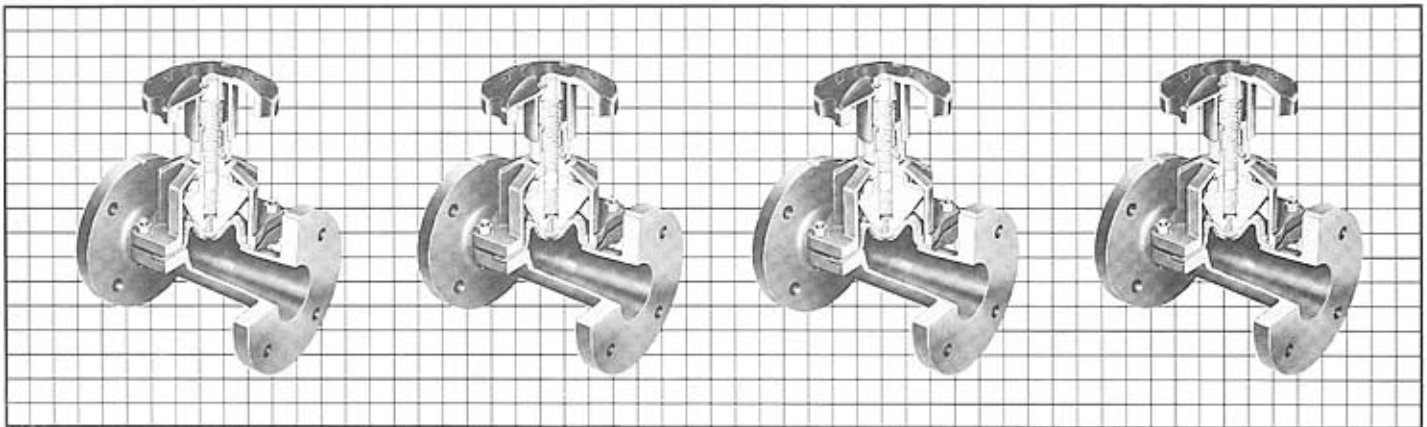
1. The table below shows the maximum permissible working pressure, within a temperature range of -50°F and +120°F, for the entire size range of Saunders Straight Thru Diaphragm Valves.
2. For operating temperatures above 120°F, the permissible working pressure decreases as shown by the chart on the facing page. To find the maximum working pressure at the higher temperatures, select the pressure from the table below for the desired size and valve material. Then, find the corresponding

pressure line on the chart and plot that line until it intersects with the anticipated temperature. From the point of intersection, proceed horizontally to the edge of the chart and read the allowable working pressure at the anticipated temperature.

3. Refer to the diaphragm temperature limitation bar graphs to determine if the anticipated temperature is within the recommended operating range of the desired diaphragm and body material.

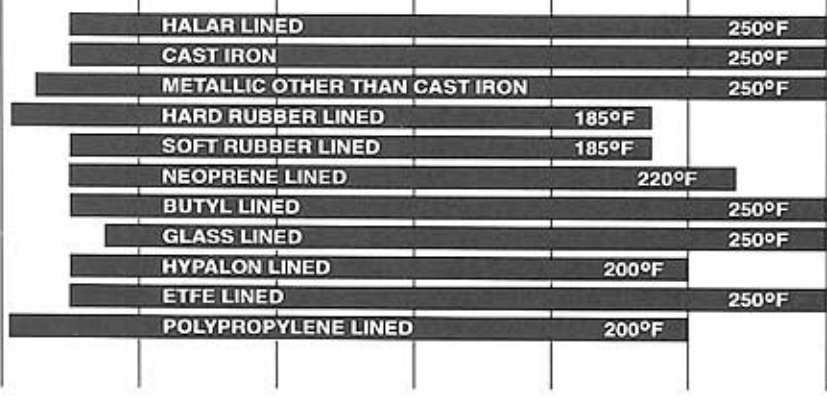
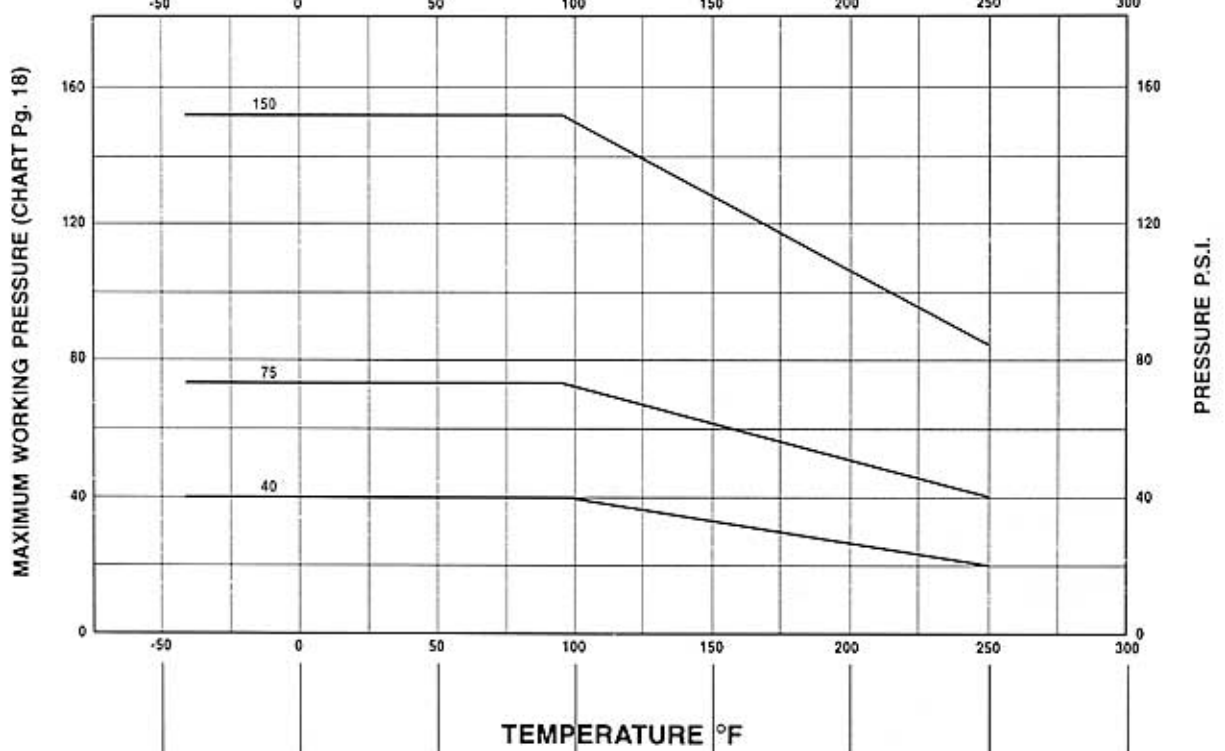
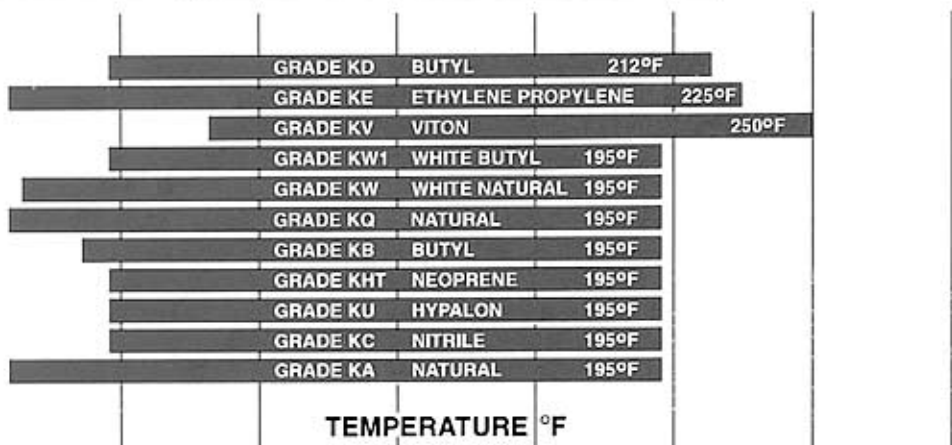
VALVE MAXIMUM WORKING PRESSURE, psi
(at temperatures up to 120°F)

Body Material	Valve Size/Maximum Pressure										
	½"	1"	1½"	2"	3"	4"	6"	8"	10"	12"	14"
All Metallic	150	150	150	150	150	150	75	75	75	75	40
Glass and Plastic Lined	150	150	150	150	150	150	75	75	75	75	40
Rubber Lined	—	150	150	150	150	150	75	75	75	75	40
Plastic Lined	—	150	150	150	150	150	75	75	75	75	40



STRAIGHT THRU PERFORMANCE DATA

DIAPHRAGM TEMPERATURE LIMITATIONS



BODY TEMPERATURE LIMITATIONS

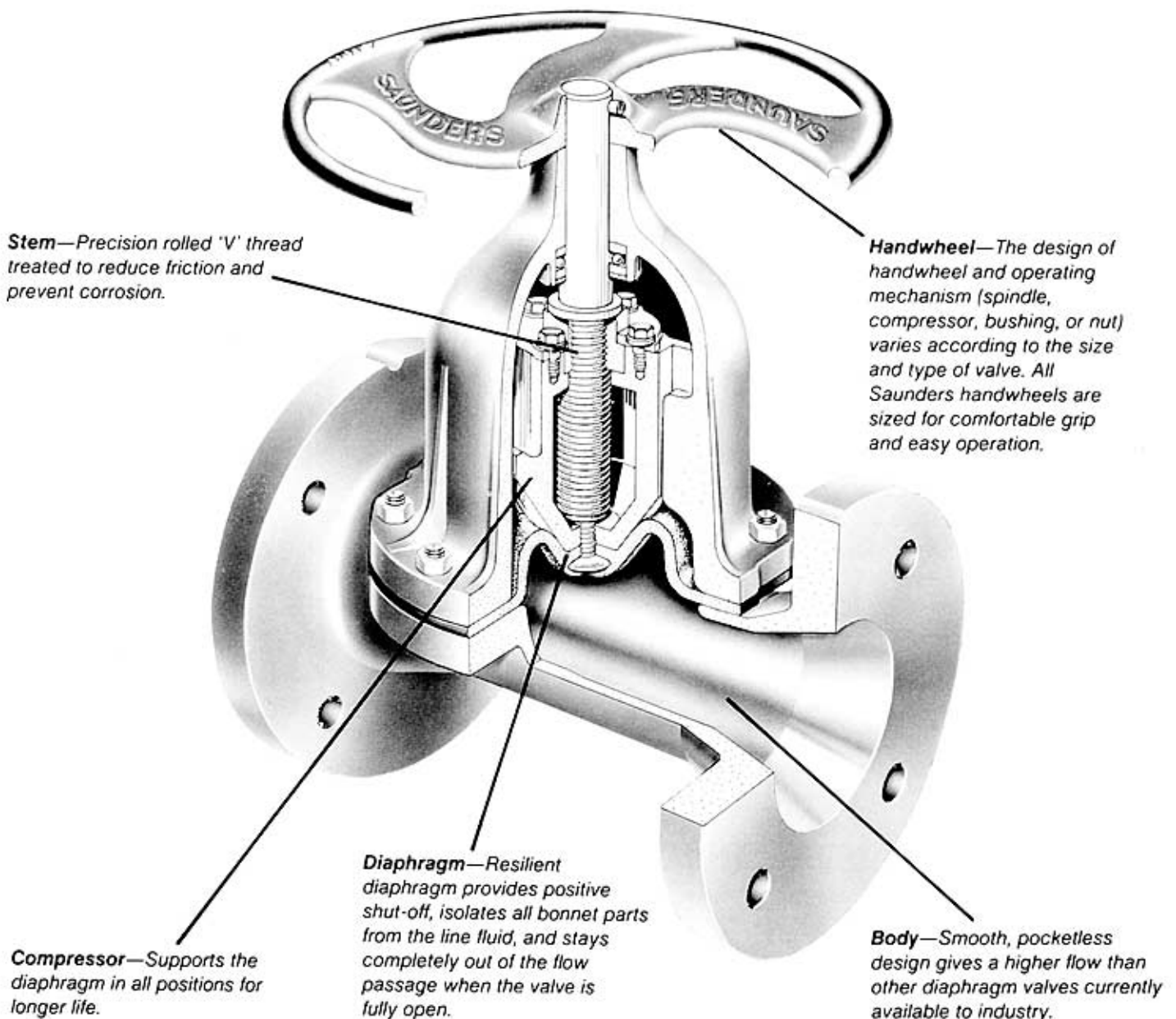
HIGH FLOW GENERAL INFORMATION

The Saunders High Flow Valve is available in a wide range of body and diaphragm materials for high flow services. Saunders body linings often replace the need for more costly and exotic valve materials.

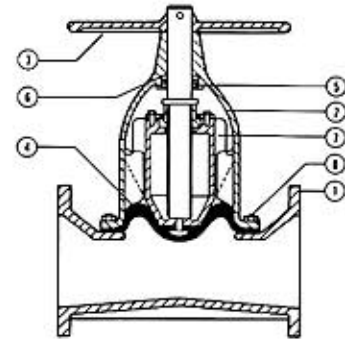
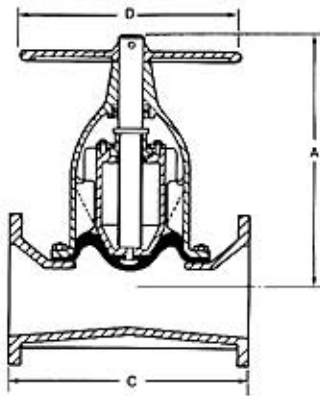
Saunders also offers a wide variety of High Flow bonnets designed for specific applications. These are

the sealed, padlocked, extended stem, sliding stem, and chainwheel operated.

All High Flow valves are supplied with non-indicating bonnet assemblies as standard. Indicating bonnets are available on request.



OVERALL SPECIFICATIONS



HIGH FLOW DIMENSIONS

Size	1½"	2"	2½"	3"	4"	5"	6"	8"	10"	12"	14"
Body Type											
Flanged Unlined											
A	6½	7½	9½	10½	11	14½	16½	22½	25½	26½	26½
C	6½	7½	8½	10	12½	14	16	20½	25	29½	36½
Weight lbs.	13	19	33	49	65	142	158	300	460	670	1000
Flanged Rubber Lined											
A	6½	7½	9½	10½	11	14½	16½	22½	25½	26½	26½
C	6½	7½	8½	10½	12½	14½	16½	20½	25½	29½	36½
Weight lbs.	14	20	33	50	67	142	160	303	463	674	1004
Flanged Glass/Plastic Lined											
A	6½	7½	9½	10½	11	14½	16½	22½	25½	—	—
C	6½	7½	8½	10½	12½	14½	16½	22½	25½	—	—
Weight lbs.	13	19	33	49	65	142	159	302	462	—	—
Handwheel Dimension											
D	4½	6½	11	11	12½	14	14	19	23	27½	27½

All Dimensions - or - 1/4" All Dimensions given in inches

FLOW COEFFICIENT — C_v

Flanged End — Unlined											
% Open	1½"	2"	2½"	3"	4"	5"	6"	8"	10"	12"	14"
10	16.6	33	54	64	91	163	283	530	906	1212	1236
20	33	66	108	127	181	326	566	1061	1812	2424	2472
30	51	102	167	196	279	503	873	1635	2794	3737	3811
40	69	138	225	265	378	680	1180	2210	3775	5050	5150
50	83	165	270	318	453	816	1416	2652	4530	6060	6180
60	97	193	315	371	529	952	1652	3094	5285	7070	7210
70	106	212	347	408	581	1047	1817	3403	5813	7777	7931
80	117	234	383	451	642	1156	2006	3757	6418	8585	8755
90	128	256	419	493	702	1265	2195	4111	7021	9393	9579
100	138	275	450	530	755	1360	2360	4420	7550	10100	10300
Flanged End — Rubber Lined											
% Open	1½"	2"	2½"	3"	4"	5"	6"	8"	10"	12"	14"
10	15.6	31	50	58	86	156	270	510	870	1176	1194
20	31	62	101	115	173	312	540	1020	1740	2352	2388
30	48	95	155	178	266	481	833	1573	2683	3626	3682
40	65	130	210	240	350	650	1125	2125	3625	4900	4975
50	78	156	252	288	432	780	1350	2550	4350	5880	5970
60	91	182	294	336	504	910	1575	2975	5075	6860	6965
70	100	200	323	370	554	1001	1733	3273	5583	7546	7662
80	111	221	357	408	612	1105	1913	3613	6163	8330	8458
90	121	242	391	446	670	1209	2093	3953	6743	9114	9254
100	130	260	420	480	720	1300	2250	4250	7250	9800	9950
Flanged End — Glass/Plastic Lined											
% Open	1½"	2"	2½"	3"	4"	5"	6"	8"	10"		
10	17.5	35	56	65	95	173	298	552	942		
20	35	70	112	130	190	346	595	1104	1884		
30	54	107	172	200	292	533	918	1702	2905		
40	73	145	233	270	395	720	1240	2300	3925		
50	88	174	279	324	474	864	1488	2760	4710		
60	102	203	326	378	553	1008	1736	3220	5495		
70	112	223	358	416	608	1109	1910	3542	6045		
80	124	247	395	459	672	1224	2108	3910	6673		
90	136	270	432	502	735	1339	2306	4278	7300		
100	146	290	465	540	790	1440	2480	4600	7850		

By definition, the valve flow coefficient, C_v, is "the number of gallons per minute of water which will pass through a given flow restriction with a pressure drop of 1 psi."

MATERIALS OF CONSTRUCTION

1½" thru 14" Flanged

Item	Part Name	Material
1	Body	as Specified
2	Bonnet	Cast Iron
3	Handwheel	Cast Iron
4	Diaphragm	as Specified
5	Thrust Race	Carbon Steel
6	Stem	Carbon Steel
7	Compressor	Cast Iron
8	Body/Bonnet Studs & Nuts	Carbon Steel

BODY MATERIALS AND LININGS

Material	Flanged
Cast Iron Unlined	1½"-14"
Cast Iron Lined:	
Hard Rubber	1½"-14"
Soft Rubber	1½"-14"
Butyl	1½"-14"
Hypalon	1½"-14"
Neoprene	1½"-14"
Glass	1½"-10"
Polypropylene	1½"-14"
ETFE	1½"-14"

DIAPHRAGM MATERIALS

Grade	Material	Size	Temperature
KA	Natural Rubber	1½"-14"	-40°F to 195°F
KB	Butyl Rubber	1½"-14"	- 5°F to 195°F
KC	Nitrile Rubber	1½"-14"	- 5°F to 195°F
KD(300)	Butyl Rubber	1½"-14"	- 5°F to 250°F
KE	Ethylene Propylene	1½"-10"	-50°F to 280°F
KHT	Neoprene	1½"-14"	-32°F to 195°F
KQ	Natural Rubber	1½"-14"	-30°F to 195°F
KU(237)	Hypalon	1½"-14"	- 0°F to 195°F
KV(226)	Viton	1½"-10"	40°F to 250°F
KW	White Natural Rubber	1½"- 6"	-40°F to 195°F
KW1 (215)	White Butyl	1½"-14"	- 5°F to 212°F

SAUNDERS ACTUATORS

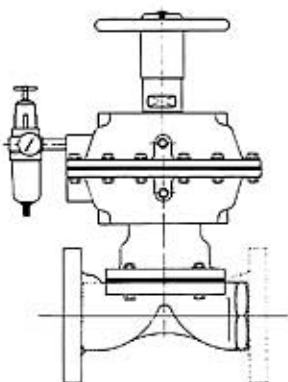
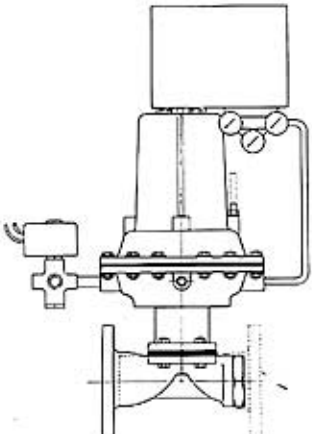
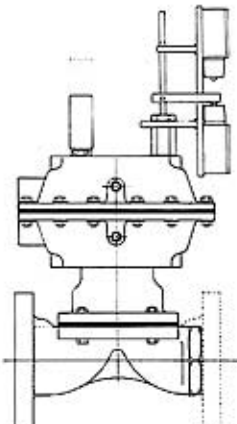
Saunders Actuators are available in three types — spring to close/air to open, spring to open/air to close, and double acting air to open/air to close. All three types are diaphragm operated and may be actuated by air, water, or oil.

Many factors determine which actuator best suits a particular process or plant. If the process determines that the valve should close on air failure, *normally closed*, then the spring to close/air to open type should be used. If the valve must open, *normally open*, then the spring to open/air to close design should be selected. For simple

ON/OFF services where no intermediate control over the flow is needed, nor the "failed position" important, then the double acting air to open/air to close operator should be used.

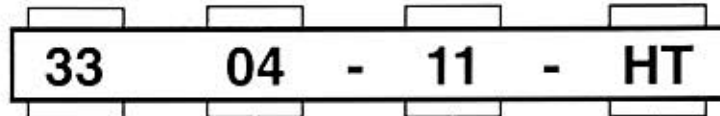
Saunders operators are available with a wide variety of accessories which include position indicators, adjustable travel stops, manual handwheel overrides, positioners, micro switches, and solenoid valves.

All actuators are finished with a tough epoxy coating which gives maximum durability even in exposed locations.

400 SERIES	500 SERIES	600 SERIES
		
<p align="center">400 SERIES</p> <p align="center">Double Acting Air To Open/Air To Close</p> <p>Sizes: ½" thru 8"</p> <p>Line Pressure: Vacuum to 230 psi</p> <p>Head Sizes: 11 sq. inches to 314 sq. inches</p> <p>Max. Supply Pressure: 110 psi</p>	<p align="center">500 SERIES</p> <p align="center">Spring To Close/Air To Open</p> <p>Sizes: ½" thru 8"</p> <p>Line Pressure: Vacuum to 230 psi</p> <p>Head Sizes: 11 sq. inches to 314 sq. inches</p> <p>Max. Supply Pressure: 110 psi</p>	<p align="center">600 SERIES</p> <p align="center">Spring To Open/Air To Close</p> <p>Sizes: ½" thru 8"</p> <p>Line Pressure: Vacuum to 230 psi</p> <p>Head Sizes: 11 sq. inches to 314 sq. inches</p> <p>Max. Supply Pressure: 110 psi</p>

SAUNDERS FIGURE NUMBERS AND ORDERING INFORMATION

EXAMPLE: 2"



BODY TYPE	BODY MATERIAL/LINING	BONNET	DIAPHRAGM
<p>WEIR TYPE VALVE</p> <p>22 Screwed Ends</p> <p>23 Socket Weld Ends</p> <p>33 Flanged-Unlined</p> <p>34 Flanged-Lined</p> <p>STRAIGHT-THRU</p> <p>44 Screwed Ends</p> <p>55 Flanged-Unlined</p> <p>56 Flanged-Lined</p> <p>HIGH FLOW</p> <p>58 Flanged-Unlined</p> <p>59 Flanged-Lined</p> <p>CHECK VALVE</p> <p>66* Flanged-Unlined</p> <p>67* Flanged-Lined</p> <p>*Priced upon request</p>	<p>02 Aluminum</p> <p>03 Bronze</p> <p>04 Cast Iron</p> <p>05 Ductile Iron</p> <p>06 Stainless Steel CF8M (316)</p> <p>07 Cast Steel</p> <p>08 Alloy 20 CN7M</p> <p>09 PVC</p> <p>10 CPVC</p> <p>21 Soft Rubber Lined</p> <p>22 Hard Rubber Lined</p> <p>23 Neoprene Lined</p> <p>24 Butyl Lined</p> <p>25 Hypalon Lined</p> <p>32 Glass Lined</p> <p>43 Polypropylene Lined</p> <p>46 ETFE Lined</p> <p>47 PVDF Lined</p> <p>48 Polypropylene Lined Ductile Iron Body</p> <p>49 ETFE Lined Ductile Iron Body</p> <p>50 PVDF Lined Ductile Iron Body</p> <p>52 PFA Lined</p>	<p>10 Handwheel- Non-Indicating</p> <p>11 Handwheel-Indicating</p> <p>13 Sealed Bonnet</p> <p>22 Chainwheel Operated</p> <p>27 Bonnet Locking Device</p> <p>28 IXEF Nylon</p> <p>31 Sliding Stem</p> <p>36 Stainless Steel Bonnet</p> <p>451-457 Double Acting Actuator</p> <p>551-557 Spring to Close Actuator</p> <p>651-657 Spring to Open Actuator</p> <p>EC4 Double Acting EC</p> <p>EC5 Spring to Close EC</p> <p>EC6 Spring to Open EC</p> <p>324 Double Acting EC w/ Switches</p> <p>325 Spring to Close EC w/ Switches</p> <p>326 Spring to Open EC w/ Switches</p>	<p>STANDARD DIAPHRAGM</p> <p>Weir <small>Straight-Thru High Flow</small></p> <p>AA KA Natural Gum Rubber</p> <p>B KB Butyl (Max. Chem. Resist)</p> <p>C KC Nitrile Rubber</p> <p>D KD Butyl (High Temp 300)</p> <p>E KE Ethylene Propylene (325)</p> <p>HT KHT Neoprene</p> <p>Q KQ Natural/Synthetic</p> <p>NON-STANDARD DIAPHRAGM</p> <p>Weir <small>Straight-Thru High Flow</small></p> <p>CF — White BUNA-N, FDA</p> <p>EB — Black Ethylene Propylene, FDA (328)</p> <p>EW — White Ethylene Propylene, FDA (326)</p> <p>U KU Hypalon (237)</p> <p>W KW White Natural Rubber</p> <p>W1 KW1 White Butyl (215)</p> <p>V KV Viton® (226)</p> <p>P1 — Teflon/Butyl® Backing (214/300)</p> <p>P2 — Teflon/Hypalon Backing (214/237)</p> <p>P3 — Teflon/Viton® Backing (214/226)</p> <p>P4 — Teflon/EP Backing (214/325)</p> <p>PE — TFE/EPDM Backed (400) EC Actuator Only</p>

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In sizes larger than 3", Weir Type diaphragms are specially reinforced for vacuum duties, and are identified by a suffix (V), e.g., q(V), C(V) diaphragms have special bronze studs for shipboard use and are available in sizes 1/2" to 14".

All other (V) diaphragms have ferrous studs and are specified for applications requiring all iron and steel construction, e.g., ammonia, acetylene. B(V) diaphragms are available in sizes 1/2" to 14" to complete a full range of diaphragms with ferrous studs.

DIAPHRAGM VALVE PERFORMANCE DATA

GENERAL INFORMATION

CLOSURE TORQUES							HANDWHEEL TURNS REQUIRED				NOMINAL VALVE TRAVELS			
Size	Weir Type (A)		Straight Thru (KB)		High Flow (K)		Valve Size	No. of Turns Between Open and Closed Positions			Valve Size	Weir Type (A)	Straight Thru (KB)	High Flow (K)
	Max. Cold Working Press. psi	Torque in.-lbs.	Max. Cold Working Press. psi	Torque in.-lbs.	Max. Cold Working Press. psi	Torque in.-lbs.		Weir Type (A)	Straight Thru (KB)	High Flow (K)				
1/2"	232	27	100	36	—	—	1/2"	2	—	—	1/4"	1/8"	—	—
3/4"	232	35	—	—	—	—	3/8"	2 1/4	—	—	3/8"	3/16"	—	—
1"	232	37	100	75	—	—	1/2"	1 3/4	5 1/2	—	1/2"	1/4"	5/8"	—
1 1/4"	232	130	—	—	—	—	3/4"	1 1/2	—	—	3/4"	5/16"	—	—
1 1/2"	232	130	100	75	100	155	1"	2 3/4	6 1/2	—	1"	7/16"	1 1/16"	—
2"	232	160	100	155	100	450	1 1/4"	3	—	—	1 1/4"	9/16"	—	—
2 1/2"	145	300	100	450	100	540	1 1/2"	3 1/2	6 1/2	8	1 1/2"	3/4"	1 1/16"	1 9/16"
3"	145	390	100	540	100	720	2"	5 1/4	7 3/4	10	2"	1 1/8"	1 9/16"	1 15/16"
4"	145	624	100	720	100	880	2 1/2"	7 1/4	9 3/4	12 1/2	2 1/2"	1 7/16"	1 15/16"	2 7/16"
5"	145	990	50	880	50	960	3"	8 1/4	13	14	3"	1 5/8"	2 7/16"	2 13/16"
6"	145	1550	50	960	50	1500	4"	10 1/2	14 1/4	17	4"	2 1/8"	2 13/16"	3 5/16"
							5"	14	17	22	5"	2 13/16"	3 5/16"	4 7/16"
							6"	16 3/4	18 1/2	19 1/2	6"	3 3/16"	4 7/16"	4 13/16"
							8"	23	19 1/4	29	8"	4 9/16"	4 13/16"	7 1/4"
							10"	28 3/4	29	32	10"	5 3/4"	7 1/4"	8"
							12"	33	32	48	12"	6 9/16"	8"	12"
							14"	36	48	48	14"	9"	12"	12"

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To the nearest 1/4 turn.

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