

7



Differential Pressure Gauges with Compression Spring and Magnetic Piston Piston Series • Model 700.01

Pressure Gauges

- ◆ Differential ranges from 0/6 to 0/160 PSI
- ◆ Sturdy system case made of stainless steel
- ◆ High working pressures (static pressures)
- ◆ Overpressure safe to max. static pressure
- ◆ Modular system with replaceable components
- ◆ Reed alarm contacts can be easily added

Application

For monitoring differential pressures in filter plants, pipeline systems, valves and pumps, particularly in the gas, water and air supply sector and the preparation of such media without any magnetic substances.

Size

3" (80 mm)

Accuracy

±3% of span (on rising pressure)

Scale Ranges

0/6 PSI through 0/160 PSID

Maximum Static Pressure (either side)

1500, 4000, or 6000 PSI

Operating Temperature

Ambient: -4°F (-20°C) to 140°F (60°C)

[-40°F (-40°C) to 140°F (60°C) using SAE grade 20 oil]

Medium: max. + 212°F (+100°C)

Weather Protection

Weather Resistant (IP 54)

Standard Features

Pressure chamber and connections (exposed to pressure medium)

316 stainless steel, 2 x 1/4" NPT female

Pressure element (exposed to pressure medium)

Compression spring: 304 stainless steel

Magnetic piston (exposed to pressure medium)

Piston: 316 stainless steel

Magnet: barium-iron

Dial

White aluminum with black lettering

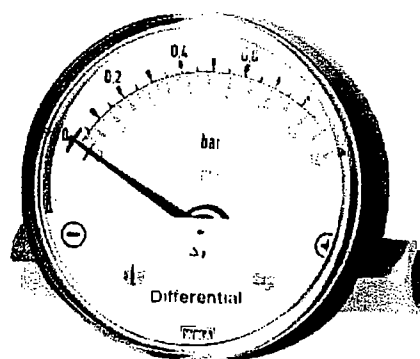
Pointer

Black aluminum

Gauge Case

Die-casted aluminum-zinc, black

Window



Snap-in acrylic

Gauge Mounting

Pressure entries identified ⊕ and ⊖
⊕ high pressure, ⊖ low pressure

Mounting by means of rigid tailpipes, drilled mounting holes, or bracket for surface or pipe mounting (optional)

Order Options

Other threaded connections (limited to wrench flat area)

Higher accuracy

Lower mount or back mount connection

Sintered filter in ⊕ side

Following accessories can be added in the field:

Drag pointer

Reed alarm contacts

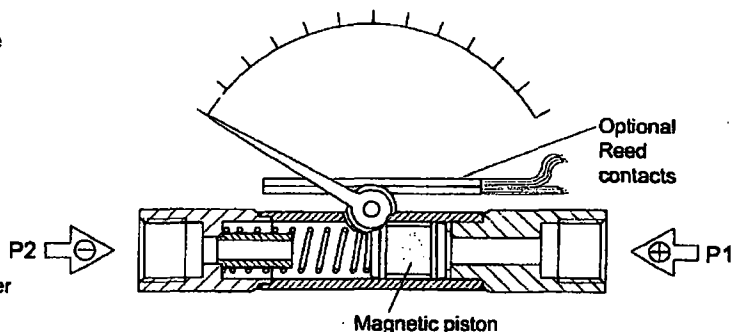
Front flange

Rear flange

Design and operating principle

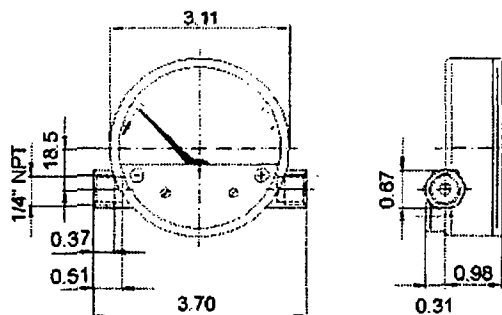
- Pressure p_1 and p_2 are applied to the \oplus and \ominus pressure chambers which are separated by a magnetic piston.
- The piston rests on the measuring range spring. The difference in pressure causes the piston to move.
- A magnetic ring mounted on the instrument pointer follows the magnets built into the piston so that each piston position corresponds to a defined pointer position.
- This design ensures complete mechanical separation of the measuring system and the case and eliminates external leakage.
- The displacement volume from the \oplus measuring chamber to the \ominus measuring chamber is limited by the constructive design and will not interfere with the process.
- An optional microfilter must be used in the \oplus measuring chamber for dirty and heavily contaminated media.

Illustration of operation principle



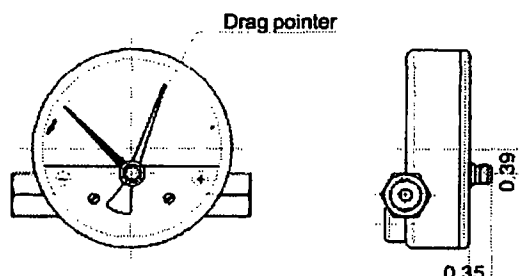
All dimensions in inches unless otherwise noted.

Dimensions Standard version



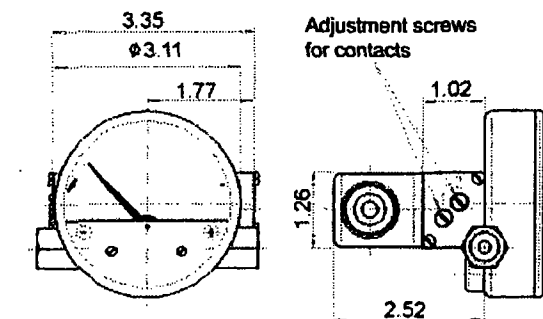
1859 529

Optional version Minimum or maximum drag pointer



1659 545

Optional version Reed contacts (single and/or double change over contact)



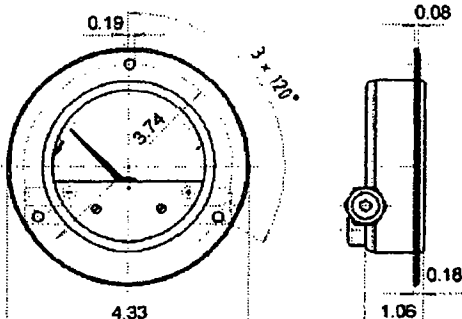
1659 553

Electric wiring diagram and technical data Reed contact:

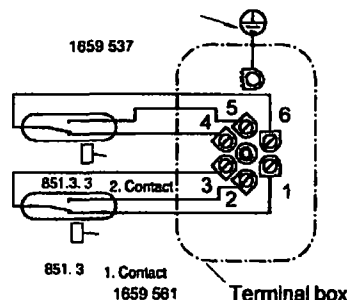
Designed to allow low current circuits to be switched directly, switch point may be set by means of adjusting spindle from the exterior in a range of 10 ... 100 % of full scale value.

Max. switching voltage:	250 VDC / VAC	30 VDC / VAC
Max. load:	30 W	5 W
Max. strength of current:	1 A	0.5 A
Switching hysteresis:	5 % of full scale value	

Optional version Front flange



1659 537



Terminal box

Ordering Information:

State computer part number (if available) / model number / size / range / differential or duplex indication / maximum static pressure / maximum pressure differential / connection size / options required.

WIKA reserves the right to make design changes without prior notice.

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JERGUSON®

A Division Of The Clark-Reliance Corporation

LIQUID LEVEL GAGES

Section: J100
Bulletin: J100.16
Date: 1/1/99
Supersedes: PS

Specialists In Liquid Level Indication

Gage Assemblies for Process Steam Applications to 1500 W.S.P.

- High Safety Factor
- Less Danger of Mechanical Damage
- Constructed for Long Trouble-Free Service

Jerguson Process Steam Gage assemblies are designed for use on heat exchangers, steam traps, condensers and similar pressure vessel applications. They are not intended for use on boilers for ASME Sec. I code applications. See separate sheet for boiler drum water level gages.

On all gages for steam or condensate service over 300 WSP, gage glasses are protected by mica shields. This protects the glass from the corrosive and erosive effects of the boiler water and extends the service life of the glass.

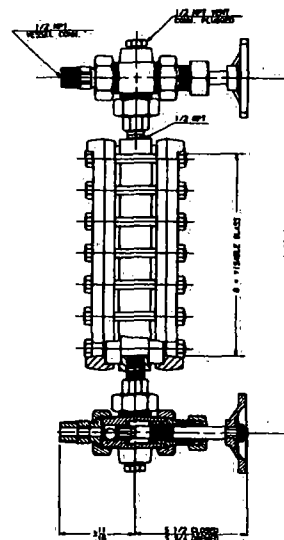
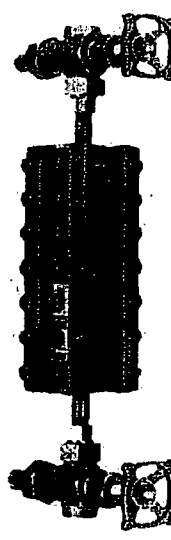
Pressure to 300 WSP
SERIES R-300L Gage
No. 67 P/C Valves



Pressure to 300 WSP
Series R-20 Gage
No. 67 P/C Valves



Pressure to 600 WSP
Series TM-20 Gage
No. 67 P/C Valves



Gage Size	Dim. A	Dim. B	Quan. Per Sec.		Rating
			U-Bolt	Nut	
111-R-12	18	10%	7	(2) PER U-BOLT	300 W.S.P.
112-R-12	19	11%	7		
113-R-12	20	12%	8		
115-R-12	22	14%	9		
118-R-12	25	17%	10		
120-R-12	27	19%	12		

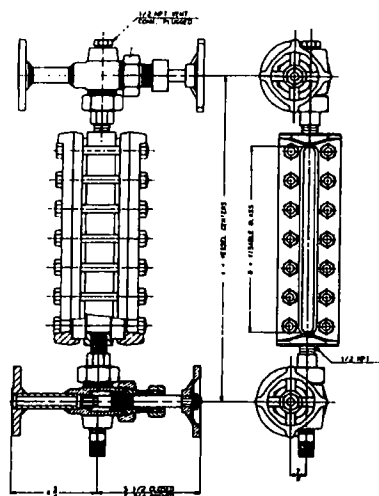
Gage Size	Dim. A	Dim. B	Quan. Per Sec.		Rating
			U-Bolt	Nut	
11-R-20	12	3%	3	(2) PER BOLT	300 W.S.P.
12-R-20	13	4%	3		
13-R-20	14	5%	4		
14-R-20	15	6%	5		
15-R-20	16	7%	5		
16-R-20	17	9%	6		
17-R-20	18	10%	7		
18-R-20	20	11%	8		
19-R-20	20	12%	8		

Gage Size	Dim. A	Dim. B	Quan. Per Sec.		Rating
			Bolt	Nut	
11-TM-20	12	3%	6	(1) PER BOLT	600 W.S.P.
12-TM-20	13	4%	6		600 W.S.P.
13-TM-20	14	5%	8		600 W.S.P.
14-TM-20	15	6%	10		600 W.S.P.
15-TM-20	16	7%	10		550 W.S.P.
16-TM-20	17	9%	12		500 W.S.P.
17-TM-20	18	10%	14		450 W.S.P.
18-TM-20	20	11%	16		400 W.S.P.
19-TM-20	20	12%	16		350 W.S.P.

Liquid Level Gages and Valves for the Power and Process Industries

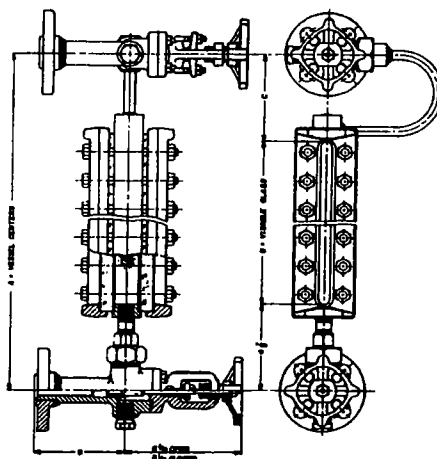
SERIES PS LIQUID LEVEL GAGES

Pressure To 600 W.S.P.



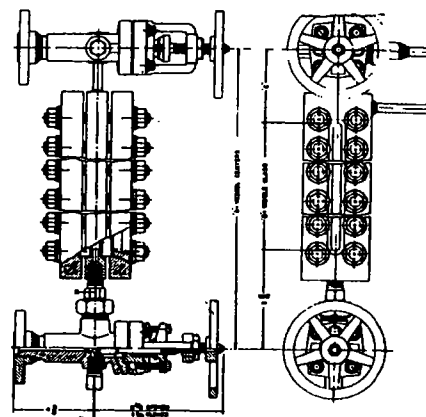
**SERIES TM-32 Gage
No. 67 P/C Valves**

Pressure To 750 W.S.P.



**SERIES TM-32 Gage
No. 74BL Valves**

Pressure To 1500 W.S.P.



**SERIES TM-32 Gage
No. 74H Valves**

Gage Size	Dim. A	Dim. B	Quan. Per Sec.		Rating
			Bolt	Nut	
15-TM-32	16	7 1/4	10	(1) PER U-BOLT	Pressures to 600 W.S.P
16-TM-32	17	9 1/4	12		
17-TM-32	18	10 1/4	14		
18-TM-32	20	11 1/4	16		
19-TM-32	21	12 1/4	16		

For pressures in the 600 WSP range, most operators prefer to see no threaded connection between the flanged vessel connection and the valve seat. The No. 67 valves illustrated have this feature. The vertical rising ballcheck is downstream from the seat providing accessibility without the necessity of disassembling the valve.

When multiple section gages are used, expansion loops are suggested to relieve piping strain.

Gage Size	Dim. A	Dim. B	Dim. C	Quan./Sec.		Rating
				Bolt	Nut	
11-TM-32	12 1/2	3 3/4	3 3/4	6	(1) PER BOLT	Pressures to 750 W.S.P.
11-TM-32	13	3 3/4	4 1/4	6		
12-TM-32	14	4 1/4	4 1/4	6		
13-TM-32	15	5 1/4	4 1/4	8		
14-TM-32	16	6 1/4	4 1/4	10		
15-TM-32	17	7 1/4	4 1/4	10		
16-TM-32	18	9 1/4	4	12		
17-TM-32	19	10 1/4	3 3/4	14		
18-TM-32	21	11 1/4	4 1/4	16		
19-TM-32	22	12 1/4	4 1/4	16		

Thermal stresses caused by temperatures prevalent at operating pressures of 750 WSP are such to make it advisable to furnish a built-in expansion loop. This will take up any differential in expansion rate between the vessel and gage glass eliminating stresses in the assembly.

Gage Size	Dim. A	Dim. B	Dim. C	Quan./Sec.		Rating
				Bolt	Nut	
11-TM-40	14	3 3/4	4 1/4	6	(2) PER BOLT	Pressures to 1500 W.S.P.
11-TM-40	15	4 1/4	4 1/4	8		
11-TM-40	16	5 1/4	4 1/4	8		
11-TM-40	17	6 1/4	4 1/4	10		
11-TM-40	18	7 1/4	4 1/4	10		
11-TM-40	20	9 1/4	5 1/4	12		
11-TM-40	21	10 1/4	5 1/4	14		
11-TM-40	22	11 1/4	4 1/4	16		
11-TM-40	23	12 1/4	4 1/4	16		

For this high pressure series Jerguson recommends a 74-H valve which is specially designed for high pressure steam service. The stem has Acme threads to allow easier opening and stem operation, a loose knob construction for the disc and a stellite seat. The special spring washers used under the gage nuts absorb expansion and contraction and maintain the proper clamping load of the cover without retorquing the nuts.

NOTE: Pressure 600 W.S.P. and above have spiral wound gasketed union gage connections.

STEAM RATINGS

The steam ratings tabulated in the bulletin are based on an operating temperature no higher than 25° F more than the saturation temperature of the steam pressure at which the gage is rated. It has been determined that although operating temperatures in the shell of the vessel may be much higher, the temperature of the steam rarely goes as high as 25° F over saturation temperature at the point of installation of the gage.

INSTALLATION CONSIDERATIONS

When installing multi-section gages on steam service, it is necessary to allow for differential expansion which may occur between the vessel and the gage assembly. Expansion, if not compensated for, can cause severe stresses in the equipment and at connections. The use of expansion loops is recommended. On Jerguson Process Steam Gage assemblies for 750 WSP and higher, expansion loops are furnished integral with the gage chamber.

The 1500 WSP design includes a stack of spring washers under each cover nut to maintain the necessary torque, without regard to operating temperatures or gasket compression.



JERGUSON® GAGE AND VALVE

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16633 Foltz Industrial Parkway • Strongsville, OH 44136 USA
Telephone: (440) 572-1500 Fax: (440) 238-8828

Specialists In Liquid Level Indication For Reflex or Transparent Flat Glass Gages No. 140

Integral bonnet valves, steel bodies, stainless steel trim; wide choice of connections

- **Straight & offset pattern**
- **Numerous options**

Jerguson No. 140 Series Valves provide long trouble-free service at economical cost. Their design incorporates such quality features as stainless steel stems and ballchecks. A comprehensive selection of connections provides the versatility required to conform to most piping requirements. Optional features permit a high degree of customization to meet very specific demands.

NO. 140 SERIES VALVES

The series consists of the following valves:

- No. 143 - straight pattern with non-union gage connection
- No. 144 - straight pattern with union gage connection
- No. 146 - offset pattern with non-union gage connection
- No. 147 - offset pattern with union gage connection

PRESSURE RATINGS

2400 lbs. @ 100°F., 1400 lbs. @ 750°F.

STANDARD FEATURES

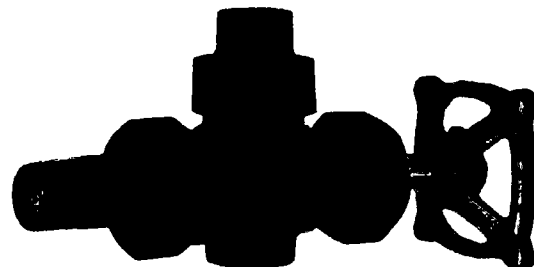
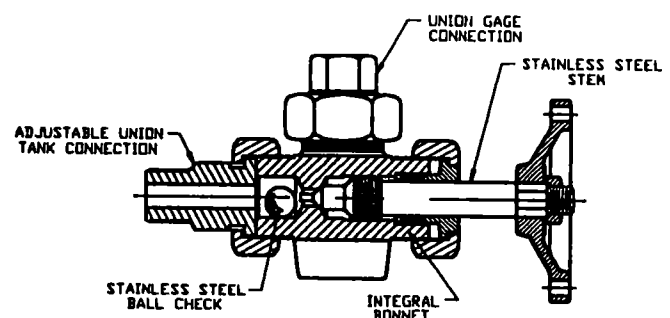
Safety Shut-off: All No. 140 Series Valves are equipped with stainless steel ballchecks upstream from the seats which instantaneously shut off flow of medium being gaged in case of gage glass breakage. The ball may be omitted on request.

Bonnet: The bonnet on all No. 140 Series Valves screws directly onto the outside of the forged body. The inner area bears on the packing gland.

Union Tank Connection: Series 140 Valves are equipped with union tank connections which permit simple installation and easy access to the ballcheck.

Union Gage Connection: No. 147 and No. 144 are furnished with a union gage connection which allows a top and bottom connected gage to be turned to any desired angle for convenient visibility. It also makes possible removal of the gage without removing the valves or draining the liquid from the vessel - a feature which saves time when the gages must be cleaned or maintained.

Offset Pattern: No. 146 and No. 147 valve bodies are designed so that the gage connections are offset $\frac{1}{8}$ " from the ϕ of the vessel connections. By removing the plug, the interior of top and bottom connected gage may also be swabbed without disassembly.

**NO. 143****NO. 144****NO. 146****NO. 147**

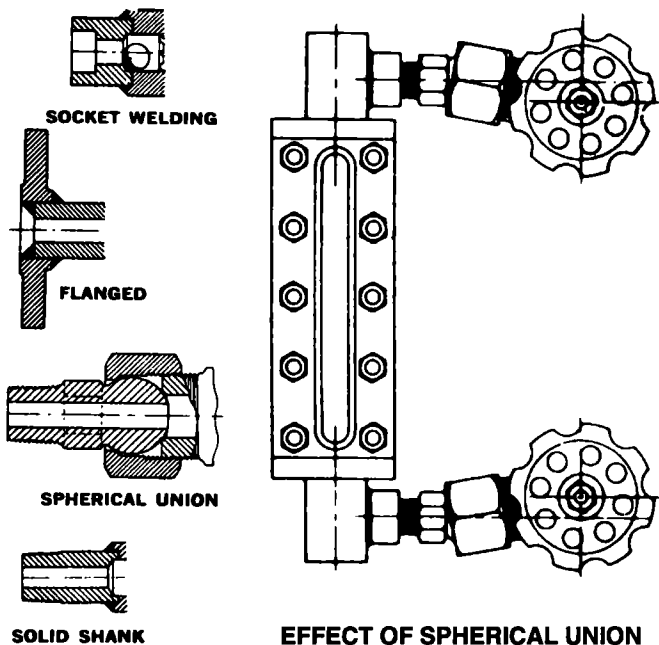
NO. 140 SERIES VALVES

MATERIALS

No. 140 Series Valves have steel bodies and malleable iron handwheels. Long life is assured by the use of stainless steel for the stem, and ballcheck. Materials used to conform to or exceed requirements of A.I.S.I., A.S.T.M. and/or A.P.I. - A.S.M.E. for recommended pressures.

SPECIAL CONNECTIONS (extra charge)

No. 140 Series Valves can be furnished upon request with Flanged, Socket Welding, Solid Shank (non-union) and Spherical Union Connections. The use of Spherical Unions on inlets and outlets with top and bottom connected gages is particularly valuable lest the vessel connections are not perfectly parallel. This construction will compensate for up to 10° misalignment of vessel tapping in any direction from the stem axis and up to plus or minus $\frac{3}{4}$ " variation from mean centers. The same compensation may be had on side connected gages using single spherical tailpieces on the outlet connections.



ROUGHING DIMENSIONS

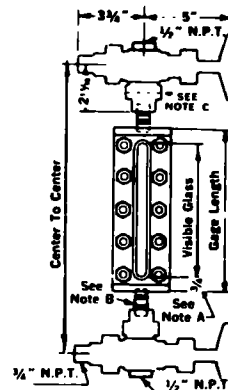
To determine maximum space available for top and bottom connected gage, deduct from center to center dimensions:

$3\frac{1}{2}$ " on Nos. 143 and 146

$5\frac{7}{8}$ " on Nos. 144 and 147

Note A. $\frac{3}{4}$ " dimension applies to all $\frac{1}{2}$ " N.P.T. end connected Reflex and Transparent gages except L-10 which is $1\frac{1}{4}$ ".

Note B. To determine overall length of $\frac{1}{2}$ " I.P.S. nipples add $\frac{7}{8}$ " to distance between gage and valve. For side connected gages: Refer to bulletin on page selected. Using No. 143 or 144 valves the side centers on the gage and the centers are the same. Using No. 146 or No. 147 valves with offsets inside gage centers, deduct $1\frac{3}{4}$ " from side centers. Using No. 146 or No. 147 valves with offsets outside gage centers, add $1\frac{3}{4}$ " from side centers.



NOTE C—Center line to face dimensions on 143 & 146 is $1\frac{1}{2}$ "

STANDARD CONNECTIONS

Vessel: $\frac{3}{4}$ " N.P.T. Male adjustable
Gage: $\frac{1}{2}$ " N.P.T. Female
Vent/Drain: $\frac{1}{2}$ " N.P.T. Female (143, 144, 147); $\frac{3}{4}$ " N.P.T. Female (146)

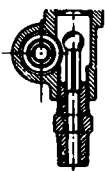
OPTIONAL CONNECTIONS

Vessel: $\frac{1}{2}$ " N.P.T. Male or Female $\frac{3}{4}$ " N.P.T. Female
Gage: $\frac{3}{4}$ " N.P.T. Female $\frac{1}{2}$ " or $\frac{3}{4}$ " N.P.T. Male union on 144 and 147 valves

SPECIAL FEATURES

Vertical Rising Ballcheck: No. 147.

An additional safety feature in the bottom valve of a top and bottom connected assembly is an optional vertical rising ballcheck on the downstream side of the seat. This arrangement shuts off the flow of liquid in case of fracture of the instrument or connecting piping and eliminates the horizontal ball in the bottom fitting. A $\frac{1}{2}$ " male drain is standard. A cap may be furnished on request.



Bleed Fitting: A bleed fitting is available making it possible to bleed pressure from the valve and connected instrument without breaking any threaded connections. The bleed fitting is designed so its stem cannot be withdrawn accidentally. It is tapped for $\frac{1}{8}$ " N.P.T. discharge.



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GLASS LIQUID LEVEL GAGES SERIES 20 MEDIUM PRESSURE

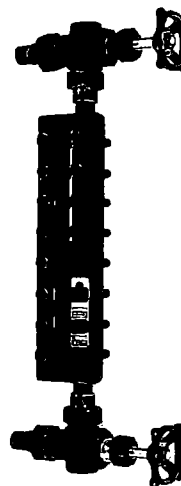
Section: J100
Bulletin: J100.09
Date: 1/1/99
Supersedes: 20

Specialists In Liquid Level Indication

A RUGGED FLAT GLASS GAGE FOR MEDIUM PRESSURE APPLICATIONS

- Tempered Borosilicate Glass conforming to BS3463, JIS B8211, DIN 7080 and DIN 7081
- All Gages are Hydrostatically Tested to 1 ½ times the rated pressure at 100° F (38° C)
- Wetted Parts Conform to NACE MR-01-75
- All Parts are ASTM Grade and listed in ANSI 31.3
- Recessed Gasket Seat in Chamber and Cover
- Covers are Shrouded to Protect the Glass Edges

Standard construction includes a one-piece chamber machined from bar, forged steel covers, tempered glass, alloy steel bolts and nuts. The recessed gasket seats aid in positioning and retaining the gasket. Series 20 gages are available in a wide variety of materials to meet specific applications. Accessories available include: illuminators, non-frosting extensions, support brackets and insulation jackets.



Series R-20, shown with
Jerguson gage valves



Series T-20

PRESSURE / TEMPERATURE RATINGS (PSIG)

Note: Flanged gages are derated to flange rating.

REFLEX GAGE										
Glass Size										
°F	°C	1	2	3	4	5	6	7	8	9
100	38	3270	3140	3000	2880	2750	2630	2510	2390	2250
200	93	3090	2970	2860	2740	2620	2500	2380	2260	2150
300	149	2900	2790	2670	2560	2450	2340	2220	2110	2000
400	204	2700	2600	2490	2380	2270	2170	2060	1950	1850
500	260	2510	2410	2305	2205	2100	2000	1900	1800	1700
600	316	2285	2190	2100	2010	1915	1820	1730	1640	1550
SATURATED STEAM RATING 300 WSP										

TRANSPARENT GAGE										
Glass Size										
°F	°C	1	2	3	4	5	6	7	8	9
100	38	2000	1850	1750	1600	1500	1350	1250	1100	1000
200	93	1900	1780	1660	1550	1440	1300	1175	1060	950
300	149	1770	1660	1550	1450	1330	1220	1100	1000	900
400	204	1675	1575	1470	1350	1250	1150	1050	925	850
500	260	1530	1450	1350	1250	1150	1050	950	850	750
600	316	1350	1275	1180	1100	1010	925	850	750	675
SATURATED STEAM RATING WITH MICA										
		600	600	600	600	550	500	450	400	350

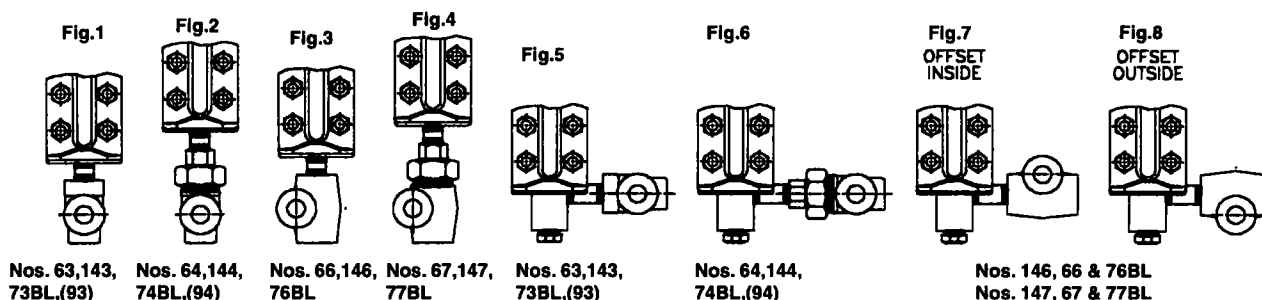
For Temperature above 600° F (316° C) Aluminosilicate Glass *must* be used.

% of Rating	100%	90%	50%
Chamber Material	Carbon Steel, Stainless Steel Series 316 or 316L	Monel	Brass
Gasketing	Bonded Compressed Fibers or Teflon Glass Filled		Pure Teflon Neoflon CTFE (Shields)



APPROVED MODELS
AVAILABLE.

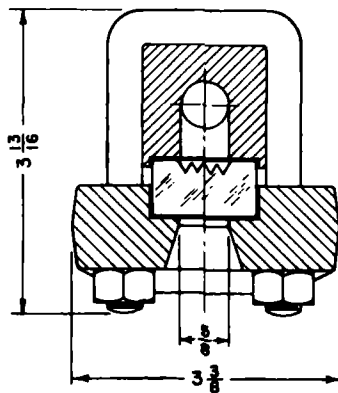
Specify Gage Assemblies by the Figures Below



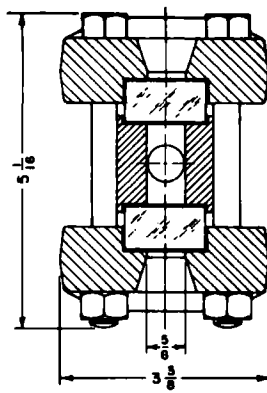
Specify Jerguson - All Gages are *NOT* Created Equal!

Liquid Level Gages and Valves for the Power and Process Industries

Glass Liquid Gages Series 20 Medium Pressure



Series R-20



Series T-20

Sect. X Size	Visible Range		Overall Length		Approximate Weight			
					Reflex, R-20		Transp., T-20	
	in	mm	in	mm	lbs	Kgs	lbs	Kgs
11	3 3/4	95	5 1/4	133	8	3.6	10	4.5
12	4 3/4	121	6 1/4	159	9	4.1	14	6.4
13	5 3/4	146	7 1/4	184	11	5.0	17	7.7
14	6 3/4	171	8 1/4	210	12	5.5	19	8.6
15	7 7/8	200	9 3/8	238	14	6.4	21	9.5
16	9 1/8	232	10 5/8	270	16	7.3	24	10.9
17	10 1/4	260	11 3/4	298	18	8.2	27	12.3
18	11 7/8	302	13 3/8	340	20	9.1	30	13.6
19	12 5/8	321	14 1/8	359	21	9.5	32	14.5
23	13	330	14 1/2	368	22	10.0	33	15.0
24	15	381	16 1/2	419	25	11.4	38	17.3
25	17 1/4	438	18 3/4	476	28	12.7	43	19.5
26	19 3/4	502	21 1/4	540	32	14.5	49	22.3
27	22	559	23 1/2	597	35	15.9	54	24.5
28	25 1/4	641	26 3/4	679	40	18.2	61	27.7
29	26 3/4	679	28 1/4	718	43	19.5	64	29.1
36	30 3/8	772	31 7/8	810	48	21.8	73	33.2
37	33 3/4	857	35 1/4	895	53	24.1	80	36.4
38	38 5/8	981	40 1/8	1019	60	27.3	92	41.8
39	40 7/8	1038	42 3/8	1076	64	29.1	97	44.1
47	45 1/2	1156	47	1194	71	32.3	107	48.6
48	52	1321	53 1/2	1359	80	36.4	122	55.5
49	55	1397	56 1/2	1435	85	38.6	129	58.6
57	57 1/4	1454	58 3/4	1492	88	40.0	134	60.9
58	65 3/8	1661	66 7/8	1699	100	45.5	152	69.1
59	69 1/8	1756	70 5/8	1794	106	48.2	161	73.2
68	78 3/4	2000	80 1/4	2038	120	54.5	187	85.0
69	83 1/4	2115	84 3/4	2153	127	57.7	196	89.1
78	92 1/8	2340	93 5/8	2378	140	63.6	221	100.5
79	97 3/8	2473	98 7/8	2511	148	67.3	230	104.5
88	105 1/2	2680	107	2718	160	72.7	254	115.5
89	111 1/2	2832	113	2870	169	76.8	265	120.5

SERIES 20 SPECIFICATIONS

SECTION LENGTHS:

Gage sections are available in nine standard glass sizes. Longer sizes are constructed with multiple vision slots in a continuous solid bar chamber.

CONNECTIONS:

Standard connections are at top and bottom and are 1/2 or 3/4 NPT female. Optional connections are available, such as socket weld, flanged or close hook-up (side/side).

LIQUID CHAMBER:

Machined from bar stock. The gasket seat is recessed to allow lateral support and facilitate positioning.

COVERS:

Forged carbon steel is standard. Optional materials are available. The cushion gasket seat is recessed.

BOLTS & NUTS

Alloy steel is standard, A193 B7 and A194 2H. Optional materials are available. All steel fasteners are "black oxide" treated to prevent rust.

GLASS:

Tempered Borosilicate is used to 600° F (316°). Aluminosilicate is used to 800° (427° C). Transparent glass may be protected from corrosive media with mica or Neoflon CTFE shields.

GASKETS:

Standard gaskets are precision die cut in proprietary Jerguson dies.

FINISH:

All steel parts are finish coated prior to assembly. Stainless steel is not coated.

VALVES:

Use of Jerguson gage valves is strongly recommended. Standard features include safety ball checks which help prevent loss of product and physical injury in the event of failure.



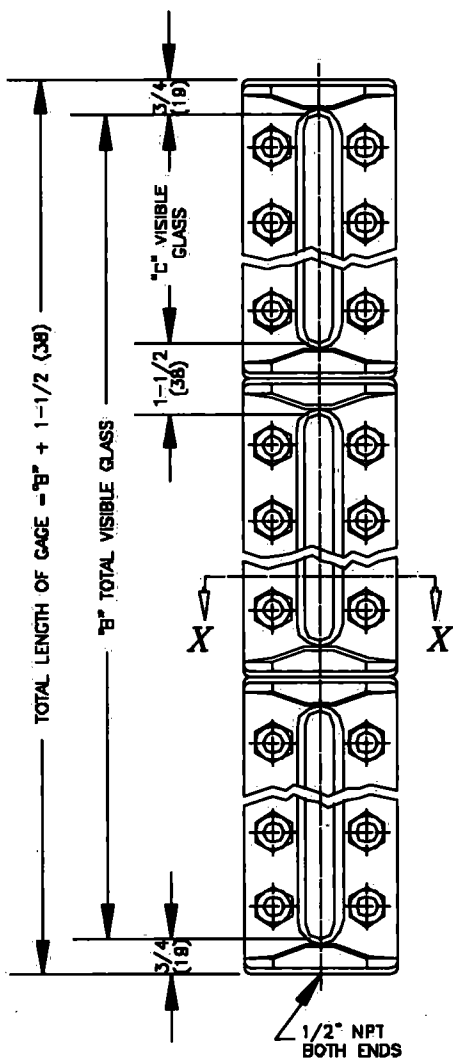
JERGUSON® GAGE AND VALVE

A Division of The Clark • Reliance® Corporation
13200 North Promenade • Stafford, TX 77477 USA
Telephone: (281) 240-4243 Fax: (281) 240-7299

JERGUSON® GAGE AND VALVE

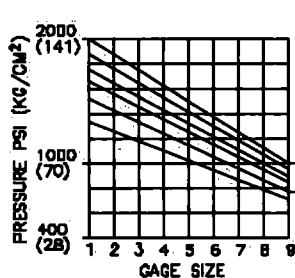
A Division of The Clark • Reliance® Corporation
16633 Foltz Industrial Parkway • Strongsville, OH 44136 USA
Telephone: (440) 572-1500 Fax: (440) 238-8828

- NOTES:
 1. FOR 3/4" NPT END CONN.
 SEE DWG. NO. 20-60.
 2. DIMENSIONS IN INCHES WITH mm
 EQUIVALENTS IN PARENTHESES.

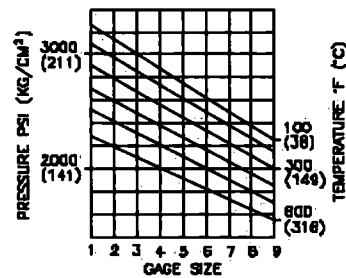


BILL OF MATERIAL						
PIECE NO.	NAME OF PART		QTY.	MATERIAL	PART NO.	REMARKS
1	CHAMBER	TRANS REFLEX	1	STEEL	V-787- -A44	ASTM A696
2	GASKET		1	IFG5500	V-18980-	ASTM A696
3	GLASS	TRANS REFLEX	1	TEMPERED GLASS	V-16756-	
4	CUSHION		1	IFG5500	V-18980-	
5	COVER		2	STEEL	V-2- -A4	ASTM A193
6	BOLT		1	ALLOY STL	P-263-B71	ASTM A193
7	U-BOLT		1	ALLOY STL	P-256-B71	ASTM A193
8	NUT		1	STEEL	V-11062-2HA	ASTM A194
9	RATING TAG		1	SS	V-16340-	
	RATING TAG		1	SS	V-16341-	

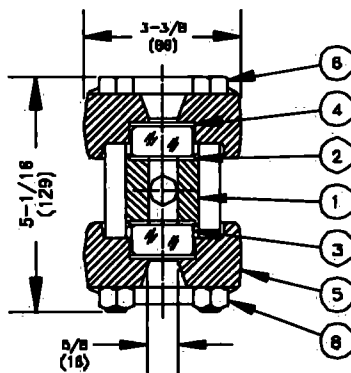
MAX. STEAM RATING FOR SERIES 20 REFLEX GAGES IS 300 W.S.P.



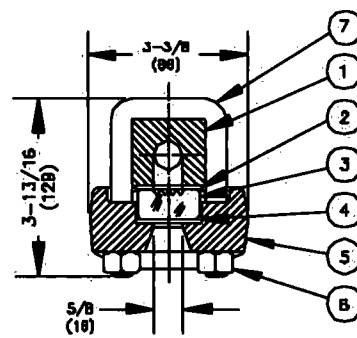
T-20



R-20



SECTION X-X
 SERIES T-20



SECTION X-X
 SERIES R-20

SIZE NO.	QTY. PER SECT.			DIM. "C" IN INCHES	NUMBER OF SECTIONS									
	L/108	C/108	L/108		DIMENSION "B" IN INCHES									
					1	2	3	4	5	6	7	8	9	
1	6	3	6	3 3/4 (95)	3 3/4 (85)	9 (229)	14 1/4 (362)	19 1/2 (495)	24 3/4 (629)	30 (762)	35 1/4 (895)	40 1/2 (1029)	45 3/4 (1162)	
2	6	3	6	4 3/4 (121)	4 3/4 (121)	11 (279)	17 1/4 (438)	23 1/2 (597)	28 3/4 (756)	36 (914)	42 1/4 (1073)	48 1/2 (1232)	54 3/4 (1391)	
3	8	4	8	5 3/4 (146)	5 3/4 (146)	13 (330)	20 1/4 (514)	27 1/2 (699)	34 3/4 (883)	42 (1067)	49 1/4 (1251)	56 1/2 (1435)	63 3/4 (1619)	
4	10	5	10	6 3/4 (171)	6 3/4 (171)	15 (381)	23 1/4 (591)	31 1/2 (800)	39 3/4 (1010)	48 (1218)	56 1/4 (1429)	64 1/2 (1638)	72 3/4 (1848)	
5	10	5	10	7 7/8 (200)	7 7/8 (200)	17 1/4 (438)	26 5/8 (676)	36 (914)	45 3/8 (1153)	54 3/4 (1391)	64 1/8 (1629)	73 1/2 (1867)	82 7/8 (2105)	
6	12	6	12	9 1/8 (232)	9 1/8 (232)	19 3/4 (502)	30 3/8 (772)	41 (1041)	51 5/8 (1311)	62 1/4 (1581)	72 7/8 (1851)	83 1/2 (2121)	94 1/8 (2381)	
7	14	7	14	10 1/4 (260)	10 1/4 (260)	22 (559)	33 3/4 (857)	44 1/2 (1156)	55 1/4 (1454)	66 (1753)	77 (2051)	87 1/2 (2350)	98 1/4 (2648)	
8	18	9	18	11 7/8 (302)	11 7/8 (302)	25 1/4 (641)	38 5/8 (981)	52 (1321)	65 3/8 (1681)	78 3/4 (2000)	91 (2340)	104 1/2 (2680)	118 1/2 (3019)	
9	18	9	18	12 5/8 (321)	12 5/8 (321)	26 3/4 (678)	40 7/8 (1039)	55 (1397)	69 1/8 (1756)	83 1/4 (2115)	97 1/2 (2473)	111 1/2 (2832)	125 5/8 (3181)	

8	ADDED SHROUDED COVER	10/15/98	
7	UPDATED & ADDED METRICS	5/29/96	
6	REDRAWN & UPDATED, IFG5500	1/18/96	
5	REDRAWN & UPDATED	6/29/92	
SYM	REVISION	DATE	APP

SERIES 20 GAGES
 1/2" NPT END CONN.

JERGUSON
GAGE & VALVE CO.
 STRONGSVILLE, OHIO, U.S.A.
 SCALE NONE DATE 10/15/98

DRAWN TAP	FILE NO.
CHECKED MJK	DRAWING NO.
APPROVED	20-40
	REV. B



Material Safety Data Sheet

LA1233
Norkool (TM) Dilute SLH 225D

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Id: LA1233
Product Name: Norkool (TM) Dilute SLH 225D
Synonyms: None
Chemical Family: Glycols
Application: Intended as a heat transfer fluid for closed-loop systems.

Distributed By:
Univar Canada Ltd.
9800 Van Home Way
Richmond, BC
V6X 1W5

Prepared By: The Safety, Health and Environment Department of Univar Canada Ltd.
Preparation date of MSDS: 01/08/2004
Telephone number of preparer: 1-866-686-4827

24-Hour Emergency Telephone Number (CHEMTREC): (800) 424-9300

2. COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS COMPONENTS

Ingredients	Percentage	LD50s and LC50s Route & Species:
Ethylene Glycol 107-21-1	45-55	Oral LD50 (Rat) 4700 mg/kg Oral LD50 (Mouse) 5500 mg/kg Dermal LD50 (Rabbit) 9530 µL/kg
Sodium Nitrite 7632-00-0	0.1-1	Oral LD50 (Mouse) 175 mg/kg Oral LD50 (Rat) 180 mg/kg Inhalation LC50 (Rat) 5600 µg/m³
1,4-dioxane 123-91-1	0.01	Inhalation LC50 (Mouse) 37 g/m³ Inhalation LC50 (Rat) 46 g/m³ Oral LD50 (Mouse) 5300 mg/kg Oral LD50 (Rat) 7120 mg/kg Dermal LD50 (Rabbit) 7600 µL/kg
Propylene Oxide 75-56-9	0.01	Dermal LD50 (Rabbit) 1500 µL/kg Inhalation LC50 (Mouse) 1740 mg/kg Oral LD50 (Rat) 380 mg/kg Inhalation LC50 (Rat) 4000 mg/kg Oral LD50 (Mouse) 440 mg/kg
Ethylene Oxide 75-21-8	0.01	Oral LD50 (Rat) 72 mg/kg Inhalation LC50 (Rat) 800 mg/kg Inhalation LC50 (Mouse) 836 mg/kg

NON-HAZARDOUS COMPONENTS

Ingredients	Percentage	LD50s and LC50s Route & Species:
Dipotassium phosphate 7758-11-4	1-3	Not available.
Water 7732-18-5	45-55	Not available.

Notes: Remainder of the ingredients are non-hazardous.

HAZARDOUS INFORMATION**Potential Acute Health Effects:**

Eye Contact: Liquid, vapor, or mist causes irritation, experienced as stinging, excess blinking and tear production, with excess redness of the conjunctiva.

Skin Contact: No evidence of harmful effects from available information.

Inhalation: Mist may irritate nose and throat. High vapor concentrations caused, for example, by heating the material in an enclosed and poorly ventilated workplace, may produce nausea, vomiting, headache, dizziness, and irregular eye movements.

Ingestion: Swallowing May cause abdominal discomfort or pain, nausea, vomiting, dizziness, drowsiness, malaise, blurring of vision, irritability, lumbar pain, oliguria, uremia, and central nervous system effects, including irregular eye movements, convulsions and coma. Cardiac failure, pulmonary edema, and severe kidney damage may develop. May be fatal. A few reports have been published describing the development of weakness of the facial muscles, diminished hearing, and difficulty with swallowing, during the late stages of severe poisoning.

FIRST AID MEASURES

Eye Contact: In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Skin Contact: Wash with soap and water. Remove contaminated clothing and launder before reuse. Get medical attention if irritation persists.

Inhalation: Remove person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, get immediate medical attention.

Ingestion: Do NOT induce vomiting. Never give anything by mouth to an unconscious or convulsing person. Seek immediate medical attention. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into the lungs.

Notes To Physician: It is estimated that the oral dose to adults is of the order of 1.0 ml/kg. Ethylene glycol is metabolized by alcohol dehydrogenase to various metabolites including glyceraldehydes, glycolic acid and oxalic acid which cause an elevated anion-gap metabolic acidosis and renal tubular injury. The signs and symptoms in ethylene glycol poisoning are those of metabolic acidosis, CNS depression and kidney injury. Urinalysis may show albuminuria, hematuria and oxaluria. Clinical chemistry may reveal anion-gap metabolic acidosis and uremia. The currently recommended medical management of ethylene glycol poisoning includes elimination of ethylene glycol and metabolites, correction of metabolic acidosis and prevention of kidney injury. It is essential to have immediate and follow up urinalysis and clinical chemistry. There should be particular emphasis on acid-base balance and renal function tests. A continuous infusion of 5% sodium bicarbonate with frequent monitoring of electrolytes and fluid balance is used to achieve correction of metabolic acidosis and forced diuresis. As a competitive substrate for alcohol dehydrogenase, ethanol is antidotal. Given in the early stages of intoxication, it blocks the formulation of nephrotoxic metabolites. A therapeutically effective blood concentration of ethanol is in the range 100 - 150 mg/dl and should be achieved by a rapid loading dose and maintained by intravenous infusion. For severe and/or deteriorating cases, hemodialysis may be required. Dialysis should be considered for patients who are symptomatic, have severe metabolic acidosis, a blood ethylene glycol concentration greater than 25 mg/dl, or compromise of renal functions.

A more effective intravenous antidote for physician use is 4-methylpyrazole, a potent inhibitor of alcohol dehydrogenases which effectively blocks the formation of toxic metabolites of ethylene glycol. It has been used to decrease the metabolic consequences of ethylene glycol poisoning before metabolic acidosis, coma, seizures and renal failure have occurred. A generally recommended protocol is a loading dose of 15 mg/kg followed by 10 mg/kg every 12 hours for 4 doses and the 15 mg/kg every 12 hours until the ethylene glycol concentrations are below 20 mg/100ml. Slow intravenous infusion is required. Since 4-methylpyrazole is dialyzable, increased dosage may be necessary during hemodialysis. Additional therapeutic measures may include the administration of cofactors involved in the metabolism of ethylene glycol. Thiamine (100 mg) and pyridoxine (50 mg) should be given every six hours.

Pulmonary edema with hypoxemia has been described in a number of patients following poisoning with ethylene glycol. The mechanism of production has not been elucidated, but it appears to be non-cardiogenic in origin in several cases. Respiratory support with mechanical ventilation and positive end expiratory pressure may be required. There may be cranial nerve involvement in the late stages of toxicity from swallowed ethylene glycol. In particular, effects have been reported involving the seventh, eighth and ninth cranial nerves, presenting with bilateral facial paralysis, diminished hearing, and dysphagia.

FIREFIGHTING MEASURES

Flash Point: 93 °C / 199.4 °F

Flash Point Method: Pensky-Martens Closed Cup

Autoignition Temperature: Not Available.

Flammable Limits in Air (%): Not Available.

Extinguishing Media: Apply alcohol-type or all-purpose-type foams by manufacturers' recommended techniques for large fires. Use carbon dioxide or dry chemical media for small fires.

Special Exposure Hazards: During a fire, ammonia and nitrogen-containing compounds may be produced.

Special Protective Equipment: Fire fighters should wear full protective clothing, including self-contained breathing equipment.

NFPA RATINGS FOR THIS PRODUCT ARE: HEALTH 1, FLAMMABILITY 1, REACTIVITY 0

HMIS RATINGS FOR THIS PRODUCT ARE: HEALTH 1, FLAMMABILITY 1, REACTIVITY 0

ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures: Wear appropriate protective equipment.

LA1233

Norkool (TM) Dilute SLH 225D

Page 3 of 9

Environmental Precautionary Measures: Prevent entry into sewers or streams, dike if needed. Consult local authorities.

Procedure for Clean Up: Isolate hazard area and restrict access. Absorb with an inert dry material and place in an appropriate waste disposal container. Avoid direct contact with material.

9. HANDLING AND STORAGE

Handling: Do not swallow. Avoid contact with eyes, skin and clothing. Avoid breathing aerosols. Avoid breathing vapor. Keep the containers closed when not in use. Use with adequate ventilation. Wash thoroughly after handling. For industrial use only.

Storage: Store in a cool, dry, well ventilated area, away from heat and ignition sources. Store in accordance with good industrial practices. Place away from incompatible materials.

10. EXPOSURE CONTROL/PERSONAL PROTECTION

Engineering Controls: General (mechanical) room ventilation may be adequate, if handled at ambient temperatures or in covered equipment. If ambient temperatures are exceeded or operations exist which may produce mist, aerosol or vapor, local exhaust ventilation or other engineering controls may be required.

Respiratory Protection: If exposure exceeds occupational exposure limits, use an appropriate NIOSH-approved respirator. NIOSH-approved atmosphere-supplying respirator or a NIOSH-approved air-purifying respirator with organic vapor cartridge and dust/mist pre-filter is recommended.

Gloves: Natural rubber gloves. Neoprene gloves. Nitrile gloves. Polyvinylchloride gloves.

Skin Protection: Skin contact should be prevented through the use of suitable protective clothing, gloves and footwear, selected for conditions of use and exposure potential. Consideration must be given both to durability as well as permeation resistance.

Eyes: Chemical goggles; also wear a face shield if splashing hazard exists.

Other Personal Protection Data: Ensure that eyewash stations and safety showers are proximal to the work-station location.

Ingredients	Percentage	Exposure Limit - ACGIH	Exposure Limit - OSHA
Ethylene Glycol	45-55	100mg/m ³ Ceiling	Not available.
Sodium Nitrite	0.1-1	Not available.	Not available.
1,4-dioxane	0.01	20 ppm TLV-TWA	Not available.
Propylene Oxide	0.01	2 ppm TLV-TWA	Not available.
Ethylene Oxide	0.01	1 ppm TLV-TWA	Not available.
Dipotassium phosphate	1-3	Not available.	Not available.
Water	45-55	Not available.	Not available.

11. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Liquid

Color: Green.

Odor: Mild.

pH: Not Available.

Specific Gravity: 1.079

Boiling Point: 107 °C / 224.6 °F

Freezing/Melting Point: -38 °C / -36 °F

Vapor Pressure: 13 mmHg

Vapor Density: 1

% Volatile by Volume: 98 Wt%

Evaporation Rate: 0.79

Solubility: 100%

VOCs (lbs/gallon): Not Available.

Viscosity: Not Available.

Molecular Weight: Not Available.

12. STABILITY AND REACTIVITY

Chemical Stability: Stable.

Hazardous Polymerization: Will not occur.

Conditions to Avoid: WARNING: Do not mix this product with nitrites or other nitrosating agents because a nitrosamine may be formed. Nitrosamines may cause cancer.

Materials to Avoid: Strong acids and bases. Explosive decomposition may occur if combined with strong acids or strong bases and subjected to elevated temperatures. Materials reactive with hydroxyl compounds.

Hazardous Decomposition Products: Carbon monoxide. Carbon dioxide. Ammonia and nitrogen-containing compounds.

Additional Information: No additional remark.

TOXICOLOGICAL INFORMATION

Principle Routes of Exposure

Ingestion: Swallowing May cause abdominal discomfort or pain, nausea, vomiting, dizziness, drowsiness, malaise, blurring of vision, irritability, lumbar pain, oliguria, uremia, and central nervous system effects, including irregular eye movements, convulsions and coma. Cardiac failure, pulmonary edema, and severe kidney damage may develop. May be fatal. A few reports have been published describing the development of weakness of the facial muscles, diminished hearing, and difficulty with swallowing, during the late stages of severe poisoning.

Skin Contact: No evidence of harmful effects from available information.

Inhalation: Mist may irritate nose and throat. High vapor concentrations caused, for example, by heating the material in an enclosed and poorly ventilated workplace, may produce nausea, vomiting, headache, dizziness, and irregular eye movements.

Eye Contact: Liquid, vapor, or mist causes irritation, experienced as stinging, excess blinking and tear production, with excess redness of the conjunctiva.

Additional Information:

Repeated skin contact with ethylene glycol may, in a very small proportion of cases, cause sensitization with the development of allergic contact dermatitis. The incidence is significantly less than 1% with the undiluted material. Repeated inhalation of ethylene glycol mist may produce signs of central nervous system involvement, particularly dizziness and nystagmus. May aggravate an existing kidney disease.

Acute Test of Product:

Acute Oral LD50: Not Available.

Acute Dermal LD50: Not Available.

Acute Inhalation LC50: Not Available.

Carcinogenicity:

Ingredients	IARC - Carcinogens	ACGIH - Carcinogens
Ethylene Glycol	Not listed.	A4 - Not Classifiable as a Human Carcinogen (aerosol)
Sodium Nitrite	Not listed.	Not listed.
1,4-dioxane	Group 2B	A3 - Animal Carcinogen
Propylene Oxide	Group 2B	A3 - Animal Carcinogen
Ethylene Oxide	Group 1	A2 - Suspected Human Carcinogen
Dipotassium phosphate	Not listed.	Not listed.
Water	Not listed.	Not listed.

Carcinogenicity Comment: Contains nitrites which may react with amines to form nitrosamines. Some nitrosamines have been shown to be carcinogenic in laboratory animals.

Genotoxicity: Not Available.

Reproductive/Developmental Toxicity: Not Available.

Teratogenicity: Ethylene glycol has been shown to produce dose-related teratogenic effects in rats and mice when given by gavage or in drinking water at high concentrations or doses. The no-effect doses for developmental toxicity for ethylene glycol given by gavage over the period of organogenesis has been shown to be 150 mg/kg/day for the mouse and 500 mg/kg/day for the rat. Also, in a preliminary study to assess the effects of exposure of pregnant rats and mice to aerosols at concentrations of 150, 1000 and 2500 mg/m³ for 6 hours a day throughout the period of organogenesis, teratogenic effects were produced at the highest concentration, but only in mice. The conditions of these latter experiments did not allow a conclusion as to whether the developmental toxicity was mediated by inhalation of aerosol, percutaneous absorption of ethylene glycol from contaminated skin, or swallowing of ethylene glycol as a result of grooming the wetted coat. In a further study, comparing effects from high aerosol concentration by whole-body or nose-only exposure, it was shown that nose-only exposure resulted in maternal toxicity (1000 and 2500 mg/m³) and developmental toxicity with minimal evidence of teratogenicity (2500 mg/m³). The no-effects concentration (based on maternal toxicity) was 500 mg/m³. In a further study in mice, no teratogenic effects could be produced when ethylene glycol was applied to the skin of pregnant mice over the period of organogenesis. The above observations suggest that ethylene glycol is to be regarded as an animal teratogen. There is currently no available information to suggest that ethylene glycol has caused birth defects in humans. Cutaneous application of ethylene glycol is ineffective in producing developmental toxicity. Exposure to high aerosol concentrations is only minimally effective in producing developmental toxicity.

Embryotoxicity: Not Available.

Mutagenicity: Not Available.

13. ECOTOXICOLOGICAL INFORMATION

Ecotoxicological Information:

Ingredients	Ecotoxicity - Fish Species Data	Acute Crustaceans Toxicity:	Ecotoxicity - Freshwater Algae Data
Ethylene Glycol	LC50 (bluegill) 27500 mg/L LC50 (goldfish) 27500 mg/L LC50 (rainbow trout) 41000 mg/L	Not Available.	Not Available.
Sodium Nitrite	LC50 (rainbow trout (juvenile)) 0.19 mg/L	Not Available.	Not Available.
1,4-dioxane	LC50 (fathead minnow) 9850 mg/L LC50 (bluegill sunfish) 10,000 mg/L	Not Available.	Not Available.
Propylene Oxide	LC50 (goldfish) 170 mg/L	Not Available.	Not Available.
Ethylene Oxide	LC50 (goldfish) 90 mg/L	Not Available.	Not Available.
Dipotassium phosphate	Not Available.	Not Available.	Not Available.
Water	Not Available.	Not Available.	Not Available.

Other Information: No additional remark.

14. DISPOSAL CONSIDERATIONS

Disposal of Waste Method: Disposal of all wastes must be done in accordance with municipal, provincial and federal regulations.

Contaminated Packaging: Empty containers should be recycled or disposed of through an approved waste management facility.

15. TRANSPORT INFORMATION

DOT (U.S.):

DOT Shipping Name: Not Regulated.

DOT Hazardous Class: Not Applicable.

DOT UN Number: Not Applicable.

DOT Packing Group: Not Applicable.

DOT Reportable Quantity (lbs): Not Applicable.

Marine Pollutant: No.

ICAO/IATA:

IATA Proper Shipping Name: Not Regulated.

IATA Hazard Class: Not Applicable.

UN Number: Not Applicable.

Packing Group: Not Applicable.

IATA Label: Not Applicable.

Remarks: No additional remark.

IMDG:

IMDG Proper Shipping Name: Not Regulated.

Hazard Class: Not Applicable.

UN Number: Not Applicable.

Packing Group: Not Applicable.

Marine Pollutant: No.

IMDG Label: Not Applicable.

Remarks: No additional remark.

TDG (Canada):

TDG Proper Shipping Name: Not Regulated.

Hazard Class: Not Applicable.

UN Number: Not Applicable.

Packing Group: Not Applicable.

Note: No additional remark.

Marine Pollutant: No.

15 REGULATORY INFORMATION

U.S. TSCA Inventory Status: All components of this product are either on the Toxic Substances Control Act (TSCA) Inventory List or exempt.

Canadian DSL Inventory Status: All components of this product are either on the Domestic Substances List (DSL) or the Non-Domestic Substances List (NDSL) or exempt.

U.S. Regulatory Rules

Ingredients	CERCLA/SARA - Section 302:	SARA (311, 312) Hazard Class:	CERCLA/SARA - Section 313:
Ethylene Glycol	Not Listed.	LISTED	LISTED
Sodium Nitrite	Not Listed.	LISTED	LISTED
1,4-dioxane	Not Listed.	LISTED	LISTED
Propylene Oxide	LISTED	LISTED	LISTED
Ethylene Oxide	LISTED	LISTED	LISTED
Dipotassium phosphate	Not Listed.	Not Listed.	Not Listed.
Water	Not Listed.	Not Listed.	Not Listed.

California Proposition 65: Listed.

MA Right to Know List: Not Listed.

New Jersey Right-to-Know List: Not Listed.

Pennsylvania Right to Know List: Not Listed.

WHMIS Hazardous Class:

D2A VERY TOXIC MATERIALS

D2B TOXIC MATERIALS



Additional Information:

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

Disclaimer:

NOTICE TO READER:

Univar, expressly disclaims all express or implied warranties of merchantability and fitness for a particular purpose, with respect to the product or information provided herein, and shall under no circumstances be liable for incidental or consequential damages.

Do not use Ingredient Information and/or Ingredient percentages in this MSDS as a product specification. For product specification information refer to a Product Specification Sheet and/or a Certificate of Analysis. These can be obtained from your local Univar Sales Office.

All information appearing herein is based upon data obtained from the manufacturer and/or recognized technical sources. While the information is believed to be accurate, Univar makes no representations as to its accuracy or sufficiency. Conditions of use are beyond Univar's control and therefore users are responsible to verify this data under their own operating conditions to determine whether the product is suitable for their particular purposes and they assume all risks of their use, handling, and disposal of the product, or from the publication or use of, or reliance upon, information contained herein. This information relates only to the product designated herein, and does not relate to its use in combination with any other material or in any other process.

*****END OF MSDS*****



RINGFEDER
RINGFEDER CORP.
WESTWOOD, NJ 07675
TEL. (201) 666-3320

TITLE *ARCUSAFLEX™ - FLYWHEEL COUPLING*
Assembly and Alignment Instructions

DWG NO: 43-91:1050

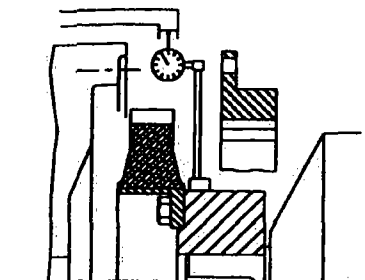
This drawing and the information contained on it are confidential and proprietary, and any reproduction, distribution or disclosure of this drawing or information or any manufacturing of the products or parts depicted on it are expressly prohibited without the written consent of Ringfeder Corporation.
All function values, dimensions and technical data stated in our design proposals are based on proven methods of calculation, tested by our empirical values and therefore, apply to original RINGFEDER® products only.

DRAWN: MN DATE: 11-27-00
Emc 12/8/00

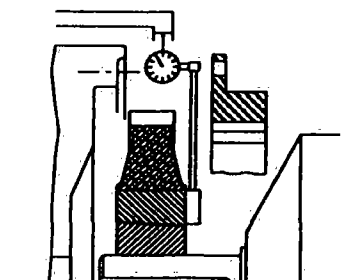
PG. 2 OF 2

It is essential to align the shaft of the driven machine with the diesel engine hub prior to positioning and securing the flywheel flange for the ARCUSAFLEX™ coupling to function correctly and to achieve the maximum rubber element life expectancy.

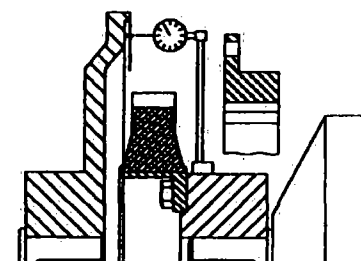
The simplest procedure is to use a dial indicator on the hub of the coupling and check radial and angular misalignment against the machined surfaces of the diesel engine housing with the aluminum flange withdrawn to one side or between the coupling halves for shaft couplings.



ARCUSAFLEX™ flywheel coupling
Design AC..F2



ARCUSAFLEX™ flywheel coupling
Design AC-T..F2



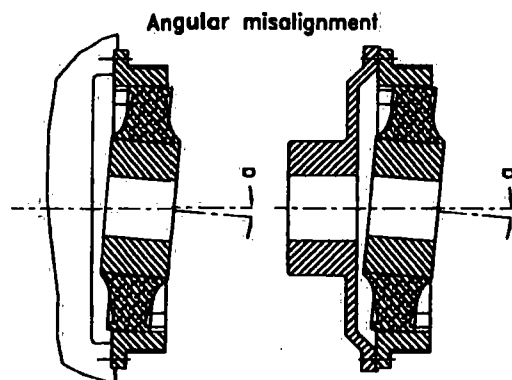
ARCUSAFLEX™ shaft coupling
Design AC..T

Permissible Misalignment

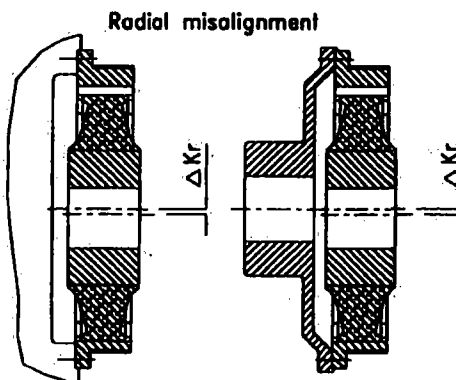
The permissible, continuous running misalignment, is dependent on a number of factors such as coupling size, rubber element Shore hardness, engine speed and applied torque.

As a general rule the maximum permissible radial and angular misalignment of the coupling range at 1500 rpm is given in the following table.

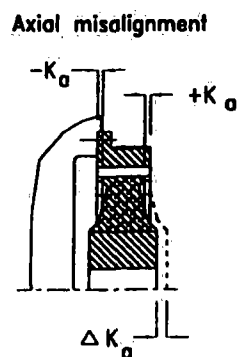
Keep alignment as low as possible - better than below values - to ensure a long coupling life.



Angular misalignment



Radial misalignment



Axial misalignment

ARCUSAFLEX™ size	2	2.3	2.6	3	4	5	6	7	8/80	9/90	10/100	11/110	12/120
Permissible radial displacement K_r mm	0.75-0.5	1.2-1.0	1.2-1.0	1.2-1.0	1.2-1.0	1.2-1.0	1.3-1.0	1.3-1.0	1.3-1.0	1.5-1.0	1.5-1.0	1.5-1.0	1.5-1.0
inch	0.03-0.02	0.05-0.04			0.05-0.04			0.06-0.04			0.06-0.04		
Permissible angular displacement degree		0.5°			0.4°			0.3°					
Permissible axial displacement ΔK_a mm	±3	±3	±4	±7	±6	±5	±7	±10	±7	±4	±3	±4	±3
inch	±0.118	±0.118	±0.157	±0.275	±0.236	±0.197	±0.275	±0.393	±0.275	±0.157	±0.118	±0.157	±0.118

Safety Precautions

Re-check all screws for proper seating normally after a test run.

It is the customer's and user's responsibility to provide proper guards over rotating machinery and to observe the national and international safety rules and laws.



RINGFEDER
RINGFEDER CORP.
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TITLE *ARCUSAFLEX™- FLYWHEEL COUPLING*
Assembly and Alignment Instructions

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All function values, dimensions and technical data stated in our design proposals are based on proven methods of calculation, backed by our empirical values and therefore, apply to original RINGFEDER® products only.

DWG NO: 43-91.1050

DRAWN: MN DATE: 11-27-00

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PG. 1 of 2

Correct torque settings for flywheel flange couplings type AC-T, AC-F2 and AC-F2K.

It is important to assure that cast aluminum flange is bolted to the diesel engine flywheel with the correct tightening torque and to check again before start-up that all bolts have been properly tightened. Similarly the taper bushing bolts must also be correctly tightened.

Note: Detailed assembly instructions are available for each coupling upon request.

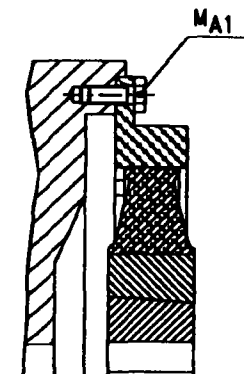


Table 1
Tightening torques for flywheel flange bolts
(bolt grade: 8.8)

SAE Flywheel flange	6½	7½	8	10	11½	14	16	18	21	24
Bolt Size (metric)	M8		M10			M12		M16		M20
Tightening Torque M _{A1}	Nm lb-in		25 221			50 442		85 752		210 1860
Bolt Size (Inch)	5/16-18		3/8-16			1/2-13		5/8-11		3/4-10
Tightening Torque M _{A1}	Nm lb-in		24 212			42 372		102 903		203 1800
										340 3010

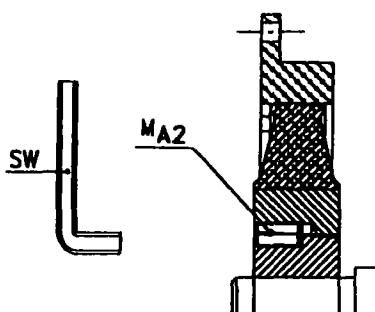


Table 2
Tightening torques for taper bushing screws

Coupling size	AC-T2 AC-T2.3	AC-T2.6 AC-T3	AC-T4	AC-T5	AC-T6	AC-T7
Taper Bushing Size	2012	2517	3030	3535	4040	4545
Bolt size	7/16"	1/2"	5/8"	1/2"	5/8"	3/4"
Bolt qty	2	2	2	3	3	3
M _{A2} UNC	31	49	92	115	172	195
tightening torque lb-in	274	434	814	1020	1520	1725
Key Size SW (inch)	7/32"	1/4"	5/16"	1/4"	5/16"	3/8"

Please note that bolts are to be lightly greased or oiled.
Refer to detailed assembly instructions

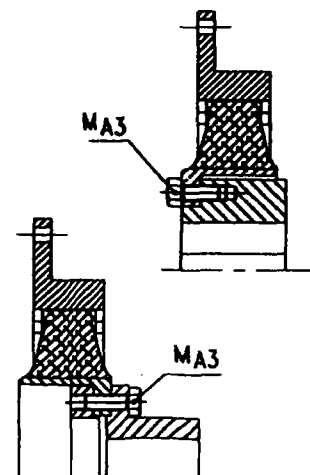


Table 3
Tightening torques for hub bolts (grade: 8.8) of coupling design AC...F2 and AC...F2K

Coupling Size	AC-2 AC-2.3	AC-2.6 AC-3 AC-4	AC-5 AC-6	AC-7 AC-8/8D AC-9/9D	AC10/10D AC11/11D AC 12	AC 12D
Bolt Size	M8	M12	M16	M16 M20	M20 M24	M24 (10.9)
Tightening Torque M _{A3}	Nm lb-in	25 221	85 752	210 1860	210 1860	420 3720
						420 3720
						710 6280
						1000 8850