

**D-ZERO CRYOSTAT SUPPLEMENTAL
RUPTURE DISC**

G. T. Mulholland

8/3/87

D-Zero Engineering note 3740.000-EN-101

Introduction

The common relief and rupture disc vent line requires a double disc assembly with vented interspace for accurate disc burst pressures. The first disc must take pump and purge vacuum loading, but be set to operate at 110% of the MAWP, 18.3 psig (ASME code). The available solution is 18.3 psig with a burst tolerance of +/- 2 psig. The interspace should be locally vented by a flow limiting vent valve to decouple the vent line backpressure from the vessel rupture disc. The second disc must take the worst case vent line backpressure, the steady state value found in D-Zero engineering note 3740.000-EN-63 with all three cryostats simultaneously venting at the fire condition into the 4"X6" and 6"X8" sections. This value is less than 2 psid.

The maximum rupture value for the second disc must be less than the minimum rupture value for the first disc less 2 psid i.e. $< 16.3 - (+ \text{tolerance, see quotation})$.

Sizing

The minimum disc size required by the fire flow condition is 2" pipe, but 3" is required by the suppliers at these low burst pressures.

Normal manufacturing tolerances are -10% to +20% typically. Special controls narrow the normal manufacturing tolerances by 75%, 50% and 25% at an optional, but not prohibitive, cost. An effort to minimize manufacturing tolerances has been made.

Double Rupture Disc Specification

Assembly (Final)

Number of complete assemblies	4 (3 installed, one spare)
Total number of discs (2 types)	6 each minimum
Pipe Size	3"
Double disc, insert	No bolt holes
Interspace flow limit valve	Vents indoors
Interspace pressure gage	Code required

Operating Pressure

Nominal	1.2 atm. (3 psig)
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Vessel Disc (first disc); 1.1 MAWP

<u>Forward Burst Pressure (psid)</u>		<u>Nom. Set</u>
Maximum		+20.3
Nominal		+18.3
Minimum		+16.3 ¹

Reverse Burst Pressure (psid)

Vacuum Support	>-15
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Flange Sealing Note

Compatible with high vacuum	<10 ⁻⁶ std cc/sec.
Vinyl coating	(0.09 std cc/day)

Vessel Disc (second disc); 10 psid

<u>Forward Burst Pressure (psid)</u>		<u>Nom. Set</u>
Maximum		+11.9
Nominal		+10.0
Minimum		+7.4

Reverse Burst Pressure (psid)

Vacuum Support	>-15
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Flange Sealing Note

Compatible with high vacuum	<10 ⁻⁶ std cc/sec.
	(0.09 std cc/day)

1. Implies a maximum relief valve set pressure < 13.2 psig setting or 16.3 psig minimum setting to assure the relief valve is flowing fully before the rupture disc bursts. The ordered relief has a set pressure of 13 psig.

FIKE

Metal Products Corporation

704 South 10th Street • P.O. Box 610 • Blue Springs, Missouri 64015 • (816) 229-3405 • Telex 42263

QUOTATION

July 15, 1987

c/o The Drager Company
 415 East Golf Road - Suite 114
 Arlington Heights, IL 60005
 Telephone: 312/640-1180

Termi
 P O Box 500
 Batavia, IL 60510

Subject: Our Quote: CH-FMPD-87129

Attention: Mr. George Mulholland, MS 357 x4591

HOLDER SPECIFICATION		Item 1	Item 2	Item 3	Item 4	
1	Nominal Size	3"				1
2	Rating	150				2
3	Assembly Type	Double G				3
4	Drawing Number	Insert Type				4
5	Material	Base	304			5
6		Holddown	304			6
7		3rd. Comp.	304			7
8	Accessories	1/4" gauge tap				8
9		excess flow				9
10		valve, alloy				10
11		steel studs & nuts for				Alternate
12		five flange thicknesses. Downstream				Downstream
RUPTURE DISC SPECIFICATION		Process Disc	Disc	Disc	Disc	
13	Nominal Size	3"	3"	3"	3"	13
14	Type	CPV-BT	CPV-BT	CPV-BT	CPV-BT	14
15	Drawing Number					15
16	Specified Burst Pressure	18 PSIG	10 PSIG	18 PSIG	18 PSIG max.	16
						17
18	Manufacturing Range	zero manf.	8-11 PSIG	zero manf.	zero manf.	18
						19
20	Rupture Tolerance	+/- 2.0 PSIG	+/- 8%	+/- 2.0 PSIG	+/- 2.0 PSIG	20
21	Specified Coincident Temp.	72°F	72°F	72°F	72°F	21
22	Material	Top/Cover/Ring	316 SST	316 SST VIB	316 SST VIB	22
		Seal	Al	Al	Al	23
		Vacuum Support	316 SST VIB	316 SST	316 SST	24
24	ASME Burst Certifications					24
PRICES						
26	2-holders	\$605.10				26
27						27
28	6-discs		\$96.72	\$74.40	\$96.72	28
29						29
30						30
31	Attached conditions of sale applies. Shipping: 5 weeks ARO.					31

NOTE 1: The "Downstream Disc" includes a vinyl coating on both sides of the "top ring" to minimize leakage across the disc's to atmosphere via the excess flow valve located in the center section. Should some leakage be acceptable, these vinyl coatings could be eliminated with Item 3 reduced to \$61.00 each and Item 4

This quotation is not an offer and is subject to our standard terms and conditions. This information which may be made the subject of your purchase order to Fike Metal Products Corporation, and such order must be finally accepted by us at Blue Springs, Missouri, to be binding. Final acceptance and delivery dates are always subject to strikes, acts of God, and other circumstances beyond our control, in the event of which we do not assume liability for delays reasonably due to such occurrences.

Terms of payment: 1% 10 days, net 30 days.

All shipments F.O.B. Blue Springs, Missouri, unless otherwise specified.

FIKE METAL PRODUCTS CORPORATION

c/o The Drager Company

By *J. Wayne Thiels* F. Wayne Thiels