



# **PRESSURE / / SAFETY DEVICES**

*RUPTURE DISC / EXPLOSION PANEL*

*N2 BLANKETING SYSTEM / EMERGENCY RELIEF HATCH*

*The Leader of Safety Equipment*

# **FEDUC**



[www.finedisc.co.kr](http://www.finedisc.co.kr)



***FDC Small but strong  
enterprise in the world!***

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# CEO MESSAGE

FDC is a leading company that has succeeded in localization of Rupture Discs for the first time in Korea. We are competing against excellent companies of the world on the basis of the know-how accumulated from production of Rupture Discs over the past 25 years. We manufacture the complete Rupture Discs in accordance with KS B ISO 4126/6718, KOSHA, ASME Code Sec. VIII and ISO-9001:2008 quality system.

We constantly research and develop new products to improve the quality so to enable us to protect our customer's cherished properties and lives from hazards such as explosions.

Our business includes Rupture Discs, Explosion Panels, N2 Blanketing System and Emergency Relief Hatch. These products have been applied to pressure safety device in various fields including low pressure storage tank, pressure tank, industrial plants, reactors and ships. We are, in addition, involved in the National Defense Industrial Products development project and recognized the performance and the quality.

We will make it our highest priority that customer's safety and quality assurance, and do our best to be your good partner.

We will keep nation's pride in the pressure safety device field, through Rupture Discs manufactured by FDC.

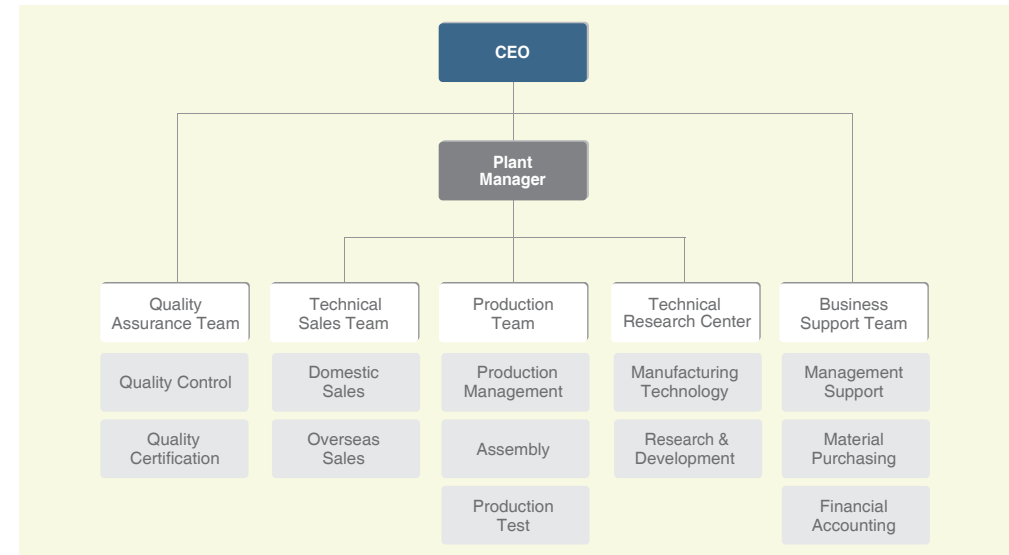
Chief Executive Officer  
**Yune Ha-won**



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# ORGANIZATION CHART





# Building with proud HISTORY

- 2014 Obtained CSEL (Special Equipment License) Certification in China  
Approved vendor for PETRONAS & Saipem  
Obtained CE ATEX & IEC EX certification(DUST)  
Registered Achilles FPAL
- 2013 Registered a patent for KSRBK Model  
Approved vendor for TAKREER & FERTIL & Qatar Petroleum  
Obtained CE ATEX & IEC-Ex Certification(GAS)  
Obtained ISO 14001, OSHAS 18001 Certification  
Received 1 KOSHA Safety Type Certification  
Insured Products/Completed Operations Liability Coverage
- 2012 Obtained CE Mark(PED) Certification - EC Type - Examination(Module B)  
Received 69 KOSHA Safety Type Certification  
Registered as a spare part supplier to KHNP(Korea Hydro & Nuclear Power Co.,LTD.)
- 2011 Obtained CE Mark(PED) Certification - QA System(Module D)  
Obtained Russia 'GOST' Certification  
Received 6 KOSHA Safety Type Certification extra  
Selected as an INNO - BIZ
- 2010 Received 14 KOSHA Safety Type Certification extra  
Renamed to FDC Co.,LTD.  
Established R&D Center  
Won an excellence award from KOSHA Protection Device Quality Award  
Participated in Development Project of 20 Core Parts and Materials National Project of the Ministry of Knowledge Economy  
Selected as a Patent Star Company - Korean Intellectual Property Office/The Korea Chamber of Commerce & Industry  
Appointed as a promising small & medium enterprise for export - Small and Medium Business Administration  
Built up the room temperature test facility
- 2009 Received 45 KOSHA Safety Type Certification  
Developed Rupture Disc Size Calculation Program  
Participated in Development Project of Multi Pulse Rocket Propulsion System - Defense Acquisition Program Administration  
Registered as a protection device manufacturer(KOSHA)  
Product Liability Insurance - 300 million won
- 2008 Transferred to Fine Disc Co.,LTD.
- 2007 Proceeded Innovative Technology Development Project of small & medium business production environment
- 2006 Accomplished a Technical Development Project of building up the production system for Scored Type for industrial - academic cooperation with Inje University
- 2004 Succeeded in localization of Scored Type Rupture Disc
- 2003 Developed the ultra low pressure Rupture Disc  
Consulted on standardization of KS B ISO 6718/4162-2/4162-6
- 2002 Obtained ISO 9001 : 2000 Quality Assurance System  
Self - developed N2 Blanketing System
- 2000 Built up the production system of large size Rupture Disc
- 1999 Disaffiliation of Fine Disc focused on Rupture Disc
- 1995 Developed a Rupture Disc Test Program in cooperation with KIMM(Korea Institute of Machinery & Materials)
- 1991 Established Rupture Disc Unit in KOREA STEEL POWER Co.,Ltd.

"FDC would like to jump into a leading position among the world's companies through providing of high quality products, continuous R&D and management innovation"

## Registration Certificates



## Intellectual Properties



## Type Certification of Rupture Disc



KOSHA

CE-ATEX

IEC-EX

CSEL

CE-PED

GOST

## RUPTURE DISC

# Introduction

### 1. What is a Rupture Disc?

- A Rupture Disc is a non-mechanical safety device to relief when it is occurred that excessive pressure is over the critical pressure in a pressure system

### 2. When is it required a Rupture Disc?

- In case of a rapid rise in pressure as a result of runaway reaction and so on
- In case that there is any concern that fixtures cause other safety device malfunction
- In case that any leakage is not permitted
- In case that it contains strong corrosive fluid
- In case that it requires large relieving capacity in an instant by polymerization and so on
- Severe conditions such as high or low temperature

### 3. Features

- Special material and structure (It is easy to select material and is economical) And there is no size limit
- Constant rupture performance and release all of fluid
- Instantaneous release of maximum capacity
- Extensive service environment (strong corrosive fluid, temperature, liquid, gas, powder, etc.)
- Zero Leakage
- Extension of safety valve life
- Possible to check the Piping of outlet during operating
- Extension of overhaul period
- Easy to handle and cost reduction

### 4. Applicable Code

- ASME Sec. VIII Div.1
- ISO 6718
- ISO 4126-2-6
- API RP520
- KOSHA Safety Certification

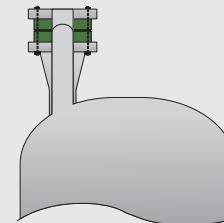
### 5. Materials of Rupture Disc - Holder / Disc / Accessory

- Stainless Steel (304SS, 316SS, 317SS, etc)
- Carbon Steel
- Duplex
- Aluminum
- Nickel, Inconel, Monel, Hastelloy, Titanium, Tantalum
- Graphite
- Teflon
- Maximum usable Temperature

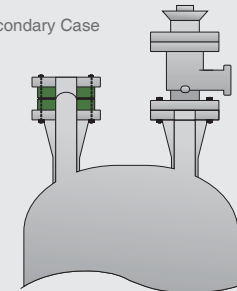
Teflon	200 °C	Monel	483 °C
Aluminum	120 °C	Inconel	592 °C
Stainless Steel	483 °C	Hastelloy	483 °C
Nickel	403 °C	Graphite	371 °C

### 6. Application of Rupture Disc

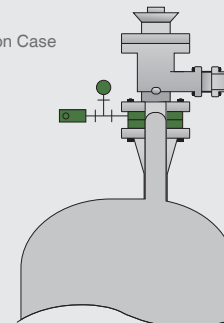
#### 1) Primary Case



#### 2) Secondary Case



#### 3) Combination Case



#### 4) External Fire Case



**RUPTURE DISC**

# KOSHA Obligation Safety Certification

## 1. What is 'Obligation Safety Certification'?

Regarding of manufacture protection devices and protective equipments of hazardous machinery and instrument, it is the system that prevents from industrial accident to produce, distribute and use safe and reliable products by attaching the certification mark to products meet the requirements of safety certification criteria and selling



▶ Korea Obligation Safety Certification Mark

## 2. Scope of Obligation Safety Certification

Scope of Rupture Discs which are used to protect pressure vessels from overpressure or high vacuum by gas or steam  
(However, it is excepted when used for release a pressure of liquid or the setting value of rupture pressure is below 0.1MPag)

## 3. Main contents and Requirements of Obligation Safety Certification

- It shall be conducted a burst test under the same temperature as service condition
- When you apply for certification, it is required a certification of the same type separately if it is different to specification submitted
- It shall be certified, even if it is imported products

## 4. Relevant regulations

- Occupation safety and health acts
- Regulations for Occupation safety and health acts
- Implementing Regulations in Occupation safety and health acts
- Notification of Protection Device Obligation Safety Certification Criteria
- Notification for declaration of Safety Certification and Autonomy Safety Confirmation

## 5. Performance Criteria of Products

Burst test	Set Pressure	below 0.3MPag	0.3MPag and over
	Allowable range of rupture Pressure	±0.015MPag	±5%
Leak test	Division		Soak time
	Nominal diameter of rupture disc(mm)	50 and below	1 min
		above 50&100 and below	2 min
	above 100	5 min	

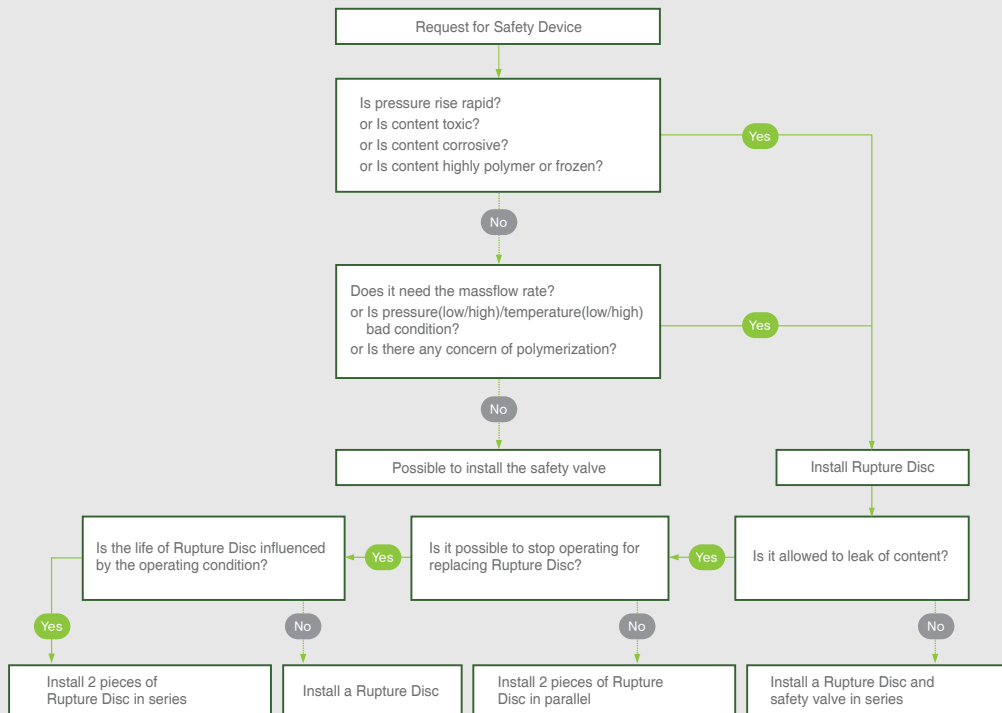
\* It shall be conducted a leak test under 90% of set pressure  
\* In case of Flat/Slotted Type, it shall be conducted a leak test under 50% of set pressure

## 6. Classification and Notation of the KOSHA Certification Type

Division in accordance with structure	Rupture disc of dome type (C)	Single plate type (O) Composite type (C) Carved type or cutout type (S)					
	Rupture disc of inverted dome type(R)	Carved type or shearing type (S) Self-knife type (K)					
	Rupture disc of flat type(F)	Exchanger type graphite rupture disc (R) Monoblock type graphite rupture disc (M) Cutout type rupture disc (S)					
	Other type (X)	Rupture discs produced depend on the manufacturers which are different than above.					
Division in accordance with nominal diameter	Division of nominal diameter	I	II	III	IV	V	
	Range of nominal diameter(mm)	25 and below	above 25 & 50 and below	above 50 & 80 and below	above 80 & 100 and below	above 100	
Division in accordance with nominal pressure	Division of nominal pressure	1	3	5	10	21	22
	Range of rupture pressure(MPag)	1 and below	above 1&3 and below	above 3&5 and below	above 5&10 and below	above 10&21 and below	above 21
Notation of type	$\begin{matrix} & RS & II & 3 & \\ & \text{Structure} & \text{Nominal Diameter} & \text{Nominal pressure} & \end{matrix}$						

## RUPTURE DISC

# SELECTION GUIDE



## RUPTURE DISC

# SELECTION MODEL

### STEP 1. Check the pressure vessel and process operating specification (Process Data)

- Material properties of the fluids used
  - Gas or Vapor : Mol weight, Specific heat ratio, Compressibility coefficient
  - Liquid : Specific gravity, Viscosity
- State of the fluids used : Gas, Vapor, Steam, Liquid, etc.
- Operating condition : Static, Pulsation(Oscillation), Cycle, etc.
- MAWP(Maximum Allowable Working Pressure or Design Pressure) of pressure vessel
- Maximum operating pressure and temperature
- Required Capacity
- Set pressure and set temperature of Rupture Disc for rupture
- Back pressure and Vacuum pressure
- Material (Holder/Disc/Accessory)
- Connection(Flange/Fitting) specification
- Installation type of Rupture Disc : Primary, Secondary, Combination, External Fire
- Calculation of operating ratio :
  - Operating ratio = Maximum operating pressure/Minimum rupture pressure × 100
  - \* Minimum rupture pressure = Set rupture pressure - Negative rupture tolerance

### STEP 2. Model & Accessory (by FDC)

### STEP 3. Calculation of size & rated flow capacity (by FDC)



# RUPTURE DIS SIZING

ASME SECTION VIII DIV 1	
Dry saturated steam	$A = \frac{W_T}{51.5KP}$ <p>note) For pressure up to 1500psig apply the above equation, and for dry saturated steam pressures over 1500psig and up to 3200psig, the value of <math>W_T</math>, calculated by the above equation, shall be corrected by being multiplied by the following factor.</p> $\left( \frac{0.1906P-1000}{0.2292P-1061} \right)$
Gas/Air	$A = \frac{W_T}{CKP\sqrt{\frac{M}{T}}}$ (for air, C=356)
Liquid	$A = \frac{W_T}{2407 \cdot K \cdot \sqrt{(P_1 - P_2) \cdot \omega}}$

KS B ISO 4126	
Gas/steam at critical flow	$A_0 = 3.469 \frac{Q_m}{C \cdot \alpha} \sqrt{\frac{v_b}{P_0}}$ <p>or</p> $A_0 = \frac{Q_m}{C \cdot \alpha \cdot P_0} \sqrt{\frac{T_0 \cdot Z_0}{M}}$ <p>For the homogenized wet steam of 90% or more dryness</p> $A_0 = 3.469 \frac{Q_m \cdot \sqrt{x}}{C \cdot \alpha} \sqrt{\frac{v_b}{P_0}}$
Gas/steam at subcritical flow	$A_0 = 3.469 \frac{Q_m}{C \cdot K_b \cdot \alpha} \sqrt{\frac{v_b}{P_0}}$ <p>or</p> $A_0 = \frac{Q_m}{C \cdot K_b \cdot \alpha \cdot P_0} \sqrt{\frac{T_0 \cdot Z_0}{M}}$
Liquid	$A_0 = 0.621 \frac{W_T}{K_v \cdot \alpha \sqrt{\Delta P \cdot \rho}}$

- $W_T$  Mass flow rate (lb/hr)
- $A$  Practical outlet area in opening rupture disc (in<sup>2</sup>)
- $P$  Whichever is greater in 'Set pressure x 1.10 + atmospheric pressure' or 'set pressure + 3psia + atmospheric pressure' (psia)
- $P_2$  Back pressure (pressure at outlet) (psia)
- $M$  Mol weight
- $T$  Absolute temperature at valve inlet, °F + 460°F (°R)
- $C$  Constant for gas or steam based on specific heat ratio ( $k=C_p/C_v$ )

k	C	k	C	k	C
1.00	315	1.26	343	1.52	366
1.02	318	1.28	345	1.54	368
1.04	320	1.30	347	1.56	369
1.06	322	1.32	349	1.58	371
1.08	324	1.34	351	1.60	372
1.10	327	1.36	352	1.62	374
1.12	329	1.38	354	1.64	376
1.14	331	1.40	356	1.66	377
1.16	333	1.42	358	1.68	379
1.18	335	1.44	359	1.70	380
1.20	337	1.46	361	2.00	400
1.22	339	1.48	363	2.20	412
1.24	341	1.50	364	...	...

- $K$  Release coefficient (design coefficient, in general apply 0.62 for rupture disc and practical measure x 0.9 in real measurement, but it shall be less than 0.875.)
- $Z$  Compressibility coefficient related to P and T (if there is no available data, Z=1.0)
- $\omega$  Specific weight of liquid under the condition for valve inlet (lb/ft<sup>3</sup>)

- $A_0$  Minimum required flow cross sectional area (mm<sup>2</sup>)
- $Q_m$  Mass Flow rate (kg/h)
- $C$  Function for isentropic exponent k (Refer to table 1. Physical properties of gas)

k	C	k	C	k	C	k	C
0.50	1.81	1.001	2.40	1.26	2.61	1.52	2.78
0.60	1.96	1.02	2.41	1.28	2.62	1.54	2.79
0.70	2.08	1.04	2.43	1.30	2.63	1.56	2.80
0.80	2.20	1.06	2.45	1.32	2.65	1.58	2.82
0.82	2.22	1.08	2.46	1.34	2.66	1.60	2.83
0.84	2.24	1.10	2.48	1.36	2.68	1.62	2.84
0.86	2.26	1.12	2.50	1.38	2.69	1.64	2.85
0.88	2.28	1.14	2.51	1.40	2.70	1.66	2.86
0.90	2.30	1.16	2.53	1.42	2.72	1.68	2.87
0.92	2.32	1.18	2.55	1.44	2.73	1.70	2.89
0.94	2.34	1.20	2.56	1.46	2.74	1.80	2.94
0.96	2.36	1.22	2.58	1.48	2.76	2.00	3.04
0.98	2.38	1.24	2.59	1.50	2.77	2.20	3.13

- $Z_0$  Specific volume at practical release pressure and temperature (m<sup>3</sup>/kg)
- $P_0$  Release pressure (bar)
- $\alpha$  Release coefficient (In general, apply 0.62)
- $T_0$  Release temperature (K)
- $Z$  Compressibility coefficient at practical release pressure and temperature (If there is no available data, Z=1.0)
- $M$  Mol weight
- $x$  Dryness of wet steam
- $K_v$  Viscosity correction factor related to Reynold's number(Re) If the liquid viscosity is less than that of water at 20°C,  $k_v=1.0$  (Refer to Table 2. Capacity correction factor for viscosity)
- $K_v$  Correction factor for reduction in the theoretical capacity as increase of the back pressure in subcritical flow (Refer to table 3. Capacity correction factor for back pressure)
- $R_e$  Reynold's number  $R_e = 0.3134 \frac{Q_m}{\mu \sqrt{A_0}}$
- $\mu$  Viscosity of the liquid
- $\Delta P$  differential pressure released through rupture disc ( $\Delta P = P_0 - P_2$ ) (bar)
- $P_2$  Back pressure (pressure at outlet) (psia)

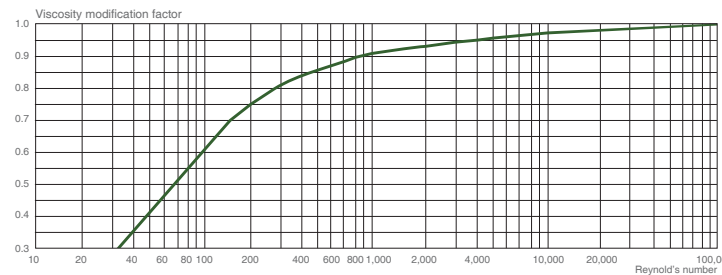
Table 1. Physical properties of gas

Name \ Physical property	Formula	Mol weight(M)	Adiabatic constant(K)	Name \ Physical property	Formula	Mol weight(M)	Adiabatic constant(K)
Acetylene	C <sub>2</sub> H <sub>2</sub>	26.04	1.26	n-Hexane	n-C <sub>6</sub> H <sub>14</sub>	86.18	1.06
Air	-	28.97	1.40	Hydrogen chloride	HCl	36.46	1.41
Ammonia	NH <sub>3</sub>	17.03	1.31	Hydrogen	H <sub>2</sub>	2.02	1.41
Argon	Ar	39.95	1.67	Hydrogen sulfide	H <sub>2</sub> S	34.08	1.32
Butadiene	C <sub>4</sub> H <sub>6</sub>	54.09	1.113	Dichloro difluoro methane	CCl <sub>2</sub> F <sub>2</sub>	120.91	1.139
Benzene	C <sub>6</sub> H <sub>6</sub>	78.12	1.12	Methane	CH <sub>4</sub>	16.04	1.31
iso-Butane	iso-C <sub>4</sub> H <sub>10</sub> or CH <sub>3</sub> (CH <sub>2</sub> ) <sub>3</sub>	58.12	1.10	Ethyl alcohol	C <sub>2</sub> H <sub>5</sub> OH or CH <sub>3</sub> CHO	32.04	1.20
n-Butane	n-C <sub>4</sub> H <sub>10</sub>	58.12	1.09	Methyl chloride	CH <sub>3</sub> OH or CH <sub>3</sub> O	50.49	1.20
Carbon disulfide	CS <sub>2</sub>	76.14	1.21	Nitrogen	N <sub>2</sub>	28.01	1.40
Carbon dioxide	CO <sub>2</sub>	44.01	1.29	Nitrous oxide	N <sub>2</sub> O	44.01	1.30
Carbon monoxide	CO	28.01	1.40	n-Nonane	n-C <sub>9</sub> H <sub>20</sub>	128.26	1.04
Chlorine	Cl <sub>2</sub>	70.91	1.36	Oxygen	O <sub>2</sub>	32.00	1.40
Cyclohexane	C <sub>6</sub> H <sub>12</sub>	84.16	1.09	n-Pentane	n-C <sub>5</sub> H <sub>12</sub>	72.15	1.07
n-Decane	n-C <sub>10</sub> H <sub>22</sub>	142.29	1.03	n-Propane	n-C <sub>3</sub> H <sub>8</sub>	44.10	1.13
Ethane	C <sub>2</sub> H <sub>6</sub>	30.07	1.19	Water	H <sub>2</sub> O	18.02	1.133
Ethyl alcohol	C <sub>2</sub> H <sub>5</sub> OH or C <sub>2</sub> H <sub>6</sub> O	46.07	-	Sulfur dioxide	SO <sub>2</sub> or O <sub>2</sub> S	64.06	1.29
Ethylene	C <sub>2</sub> H <sub>4</sub>	28.05	1.24	Toluene	C <sub>6</sub> H <sub>5</sub> CH <sub>3</sub> or C <sub>7</sub> H <sub>8</sub>	92.15	1.09
Helium	He	4.00	1.66	Propylene	CH <sub>3</sub> CH=CH <sub>2</sub> or C <sub>3</sub> H <sub>6</sub>	42.08	1.15
n-Heptane	n-C <sub>7</sub> H <sub>16</sub>	100.21	1.05	Octane	CH <sub>3</sub> (CH <sub>2</sub> ) <sub>6</sub> CH <sub>3</sub> or C <sub>8</sub> H <sub>18</sub>	114.00	1.05

Table 2. Capacity correction factor for back pressure














$\frac{P_2}{P_0}$	Isentropic exponent(k)																			
	0.4	0.5	0.6	0.7	0.8	0.9	1.001	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	
	Volume modification factor for back pressure																			
0.45																				
0.50																				
0.55																				
0.60																				
0.65																				
0.70																				
0.75																				
0.80	0.999	1.000	0.995	0.993	0.988	0.983	0.978	0.973	0.968	0.963	0.958	0.953	0.948	0.943	0.938	0.933	0.928	0.923	0.918	
0.82	0.999	0.995	0.995	0.992	0.987	0.982	0.977	0.972	0.967	0.962	0.957	0.952	0.947	0.942	0.937	0.932	0.927	0.922	0.917	
0.84	0.979	0.948	0.917	0.888	0.862	0.839	0.818	0.799	0.782	0.766	0.752	0.739	0.727	0.716	0.706	0.697	0.688	0.680	0.672	
0.86	0.957	0.919	0.884	0.852	0.820	0.789	0.759	0.742	0.727	0.712	0.700	0.688	0.677	0.667	0.658	0.649	0.641	0.634	0.628	
0.88	0.924	0.881	0.842	0.809	0.780	0.753	0.714	0.697	0.682	0.668	0.655	0.644	0.633	0.624	0.615	0.606	0.599	0.592	0.586	
0.90	0.880	0.831	0.791	0.757	0.728	0.703	0.681	0.662	0.645	0.631	0.617	0.605	0.594	0.584	0.575	0.566	0.558	0.551	0.544	
0.92	0.820	0.769	0.727	0.693	0.664	0.640	0.619	0.601	0.585	0.571	0.559	0.547	0.537	0.527	0.519	0.511	0.504	0.497	0.490	
0.94	0.759	0.697	0.647	0.614	0.587	0.565	0.545	0.528	0.514	0.501	0.489	0.479	0.470	0.461	0.453	0.446	0.440	0.434	0.428	
0.96	0.628	0.579	0.542	0.513	0.489	0.469	0.452	0.438	0.425	0.414	0.404	0.395	0.387	0.380	0.373	0.367	0.362	0.357	0.352	
0.98	0.426	0.422	0.393	0.371	0.353	0.337	0.325	0.314	0.305	0.296	0.289	0.282	0.277	0.271	0.266	0.262	0.258	0.254	0.251	
1.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	









Table 3. Capacity correction factor for viscosity





# PRODUCTS LIST

RUPTURE DISC			
Model (Image)	Description	Holder or Connection Type	Drawing
KSRR	Reverse Dome Knife Type	KS Insert Flat Seat Knife Blades Single Type	
		KD Insert Flat Seat Knife Blades Double Type	
		BK Bolted Flat Seat Knife Blades Single Type	
KSRRK	Reverse Dome Shear Type	FS Insert Flat Seat Single Type	
		FD Insert Flat Seat Double Type	
		BF Bolted Flat Seat Single Type	
KSRRKF	Reverse Dome Shear Type for Ferrule	FERRULE Ferrule Connection Type	
KSRRKH	Reverse Dome Buckling Knife Type	BFS Insert Flat Seat Single Type for RBK	
		BBF Bolted Flat Seat Single Type for RBK	
KSRRBK	Reverse Dome Buckling Knife Type for Flange	RF Raised Face Flange Type	
		FF Flat Face Flange Type	
KSRSR	Reverse Dome Scored Type	FS Insert Flat Seat Single Type	
		BF Bolted Flat Seat Single Type	

Size	Set. Pressure	Vacuum Support Required	Available Service Phase		Spark	Fragment	Max Operating Ratio
			Gas or Vapor	Liquid			
							
1/2" ~ 48" (15A ~ 1200A)	0.3 ~ 150 kg/cm <sup>2</sup>	No	Yes	No	Yes	No	90%
1/4" ~ 4" (8A ~ 100A)							
1/2" ~ 24" (15A ~ 600A)	0.35 ~ 30 kg/cm <sup>2</sup>	No	Yes	Yes	No	No	90%
1/4" ~ 4" (8A ~ 100A)							
1S~4S FERRULE	0.35 ~ 30 kg/cm <sup>2</sup>	No	Yes	Yes	No	No	90%
1/2" ~ 36" (15A ~ 900A)	0.1 ~ 100 kg/cm <sup>2</sup>	No	Yes	Yes	No	No	90%
1/4" ~ 4" (8A ~ 100A)							
1/2" ~ 36" (15A ~ 900A)	0.1 ~ 100 kg/cm <sup>2</sup>	No	Yes	Yes	No	No	90%
1/2" ~ 24" (15A ~ 600A)	1.5 ~ 150 kg/cm <sup>2</sup>	No	Yes	No	No	No	90%
1/4" ~ 4" (8A ~ 100A)							

# PRODUCTS LIST

RUPTURE DISC				
	Model (Image)	Description	Holder or Connection Type	Drawing
FORWARD TYPE	KSRSF	Forward Dome Scored Type	FS Insert Flat Seat Single Type	
			BF Bolted Flat Seat Single Type	
	KSRST	Forward Dome Tension Flat Seat Type	FS Insert Flat Seat Single Type	
			SS Insert Sloped Seat Single Type	
	KSRCT	Forward Dome Tension Sloped Seat Type	SD Insert Sloped Seat Double Type	
			SS Insert Sloped Seat Single Type	
COMPOSITE DOME TYPE	KSRC	Composite Dome Sloped Seat Type	SD Insert Sloped Seat Double Type	
	KSRCH	Composite Dome Flat Seat Type	FS Insert Flat Seat Single Type	
			FD Insert Flat Seat Double Type	
			BF Bolted Flat Seat Single Type	
	KSRRC	Composite Dome Flat Seat Type for Flange	RF Raised Face Flange Type	
			FF Flat Face Flange Type	
	KSRRCF	Composite Dome Flat Seat Type for Ferrule	FERRULE Ferrule Connection Type	
	KSRRCFD	Composite Dome Flat Seat Double Acting Type for Ferrule	FERRULE Ferrule Connection Type	


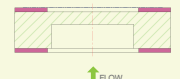
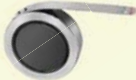
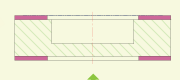

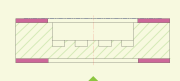
























Size	Set. Pressure	Vacuum Support Required	Available Service Phase		Spark	Fragment	Max Operating Ratio	
			Gas or Vapor	Liquid				
1/2" ~ 12" (15A ~ 300A)	5 ~ 700 kg/cm <sup>2</sup>	No	Yes	Yes	No	No	80%	
1/4" ~ 4" (8A ~ 100A)								
1/2" ~ 48" (15A ~ 1200A)	15 ~ 1,500 kg/cm <sup>2</sup>	No	Yes	Yes	No	Yes	70%	
1/2" ~ 40" (15A ~ 1000A)	15 ~ 1,500 kg/cm <sup>2</sup>	Yes or No	Yes	Yes	No	Yes	70%	
1/2" ~ 40" (15A ~ 1000A)	Teflon Seal	Yes	Yes	Yes	No	No	80%	
	Metal Seal							
1/2" ~ 48" (15A ~ 1200A)	0.1 ~ 30 kg/cm <sup>2</sup>	1.0 ~ 560 kg/cm <sup>2</sup>	Yes	Yes	Yes	No	No	80%
1/4" ~ 4" (8A ~ 100A)	0.05 ~ 50 kg/cm <sup>2</sup>	Yes	Yes	Yes	No	No	80%	
1/2" ~ 52" (15A ~ 1300A)	0.05 ~ 50 kg/cm <sup>2</sup>	Yes	Yes	Yes	No	No	80%	
1S~4S FERRULE	0.3 ~ 15 kg/cm <sup>2</sup>	Yes	Yes	Yes	No	No	80%	
1S~4S FERRULE	0.3 ~ 15 kg/cm <sup>2</sup>	Yes	Yes	Yes	No	No	80%	









# PRODUCTS LIST

RUPTURE DISC				
	Model (Image)	Description	Holder or Connection Type	Drawing
COMPOSITE FLAT TYPE	KSROH	Composite Flat Type	H Insert Flat Seat Single Type for RO	
			B Bolted Flat Seat Single Type for RO	
	KSRO	Composite Flat Type for Flange	RF Raised Face Flange Type	
			FF Flat Face Flange Type	
	KSROF	Composite Flat Type for Ferrule	FERRULE Ferrule Connection Type	
	KSROHD	Composite Flat Double Acting Type	H Insert Flat Seat Single Type for RO	
B Bolted Flat Seat Single Type for RO				
KSROFD	Composite Flat Double Acting Type for Ferrule	FERRULE Ferrule Connection Type		
ULTRA LOW PRESSURE TYPE	KSRRLL	Reverse Dome Knife Type - LP	LS Insert Flat Seat Single Type for RRL & RRLD	
			LVS Insert Flat Seat Single Type for RRL & RRLD(Vacuum)	
	KSRRLD	Reverse Dome Knife Double Acting Type - LP	LS Insert Flat Seat Single Type for RRL & RRLD	
			LVS Insert Flat Seat Single Type for RRL & RRLD(Vacuum)	
	KSROL	Composite Flat Type for Flange - LP	RF Raised Face Flange Type	
			FF Flat Face Flange Type	







Size	Set. Pressure	Vacuum Support Required	Available Service Phase		Spark	Fragment	Max Operating Ratio
			Gas or Vapor	Liquid			
							%
1/2" ~ 48" (15A ~ 1200A)	0.05 ~ 35 kg/cm <sup>2</sup>	Yes	Yes	Yes	No	No	50%
1/4" ~ 4" (8A ~ 100A)							
1/2" ~ 72" (15A ~ 1800A)	0.05 ~ 35 kg/cm <sup>2</sup>	Yes	Yes	Yes	No	No	50%
1S-4S FREEULE	0.05 ~ 15 kg/cm <sup>2</sup>	Yes	Yes	Yes	No	No	50%
1/2" ~ 48" (15A ~ 1200A)	0.05 ~ 15 kg/cm <sup>2</sup>	Yes	Yes	Yes	No	No	50%
1/4" ~ 4" (8A ~ 100A)							
1S-4S FREEULE	0.05 ~ 15 kg/cm <sup>2</sup>	Yes	Yes	Yes	No	No	50%
1/2" ~ 10" (15A ~ 250A)	0.01 ~ 1.0 kg/cm <sup>2</sup> (100 ~ 10,000 mmAq)	Yes	Yes	No	No	No	50%
1/2" ~ 10" (15A ~ 250A)	0.01 ~ 1.0 kg/cm <sup>2</sup> (100 ~ 10,000 mmAq)	Yes	Yes	No	No	No	50%
4" ~ 32" (100A ~ 800A)	0.01 ~ 0.15 kg/cm <sup>2</sup> (100 ~ 1,500 mmAq)	Yes	Yes	No	No	No	50%


# PRODUCTS LIST

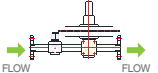

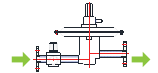

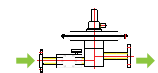
RUPTURE DISC													
Model			Description	Connection Type									
GRAPHITE DISC	KSRGM		Drawing	Mono Type	Inserted between Flange								
													
	KSRGI		Drawing	Inverted Type	Inserted between Flange								
													
	KSRGD		Drawing	Double Acting Type	Inserted between Flange								
													
FITTING CONNECTION TYPE				Reverse Dome Shear Type	VCR	PLUG	UNION						
	Image												
	Drawing												
					Forward Dome Scored Type	Standard VCR Connector	MFR Standard Screwed Connector	MFR Standard Union Connector					
	Image												
	Drawing												
									Forward Dome Tension Type	In/Outlet Standard Connector	Inlet Screwed Male or Female	Outlet Screwed Male or Female	
	Image												
	Drawing												
					Composite Dome Flat Seat Type								
Image													
Drawing													








Model	Size	Set. Pressure	Vacuum Support Required	Available Service Phase		Spark	Fragment	Max Operating Ratio
				Gas or Vapor	Liquid			
								
KSRGM	1/2" ~ 24"	0.017 ~ 10 kg/cm <sup>2</sup>	Yes	Yes	Yes	No	Yes	90%
KSRGI	1/2" ~ 24"	0.017 ~ above 70 kg/cm <sup>2</sup>	Yes	Yes	Yes	No	Yes	90%
KSRGD	1-1/2" ~ 24"	0.017 ~ 0.49 kg/cm <sup>2</sup>	Yes	Yes	Yes	No	Yes	90%
KSRRKV	1/4" ~ 1" (8A ~ 25A)	4 ~ 50 kg/cm <sup>2</sup>	No	Yes	Yes	No	No	90%
KSRRKP KSRRKU	1/4" ~ 2" (8A ~ 50A)		No	Yes	Yes	No	No	90%
KSRSFV	1/4" ~ 1" (8A ~ 25A)	15 ~ 3,500 kg/cm <sup>2</sup>	No	Yes	Yes	No	No	90%
KSRSFP KSRSFU	1/4" ~ 2" (8A ~ 50A)		No	Yes	Yes	No	No	90%
KSRSTV	1/4" ~ 1" (8A ~ 25A)	15 ~ 3,500 kg/cm <sup>2</sup>	No	Yes	Yes	No	Yes	70%
KSRSTP KSRSTU	1/4" ~ 2" (8A ~ 50A)		No	Yes	Yes	No	Yes	70%
KSRRCV	1/4" ~ 1" (8A ~ 25A)	1.5 ~ 50 kg/cm <sup>2</sup>	Yes	Yes	Yes	No	No	80%
KSRRCP KSRRCU	1/4" ~ 2" (8A ~ 50A)		Yes	Yes	Yes	No	No	80%








# PRODUCTS LIST








EXPLOSION PANEL	Model (Image)	Description	Connection Type	Drawing
	KSRPR	<ul style="list-style-type: none"> <li>Round Flat Type</li> <li>Round Dome Type</li> </ul>	RF	
			FF	
	KSRPS	<ul style="list-style-type: none"> <li>Rectangular Flat Type</li> <li>Rectangular Dome Type</li> </ul>	FF	
	Flat Face Flange Type			

EMERGENCY RELIEF HATCH	Model (Image)	Description	Connection Type	Drawing
	KSRH	Rupture Rod & Seal Type	Standard Flange	

N <sub>2</sub> BLANKETING SYSTEM	Model (Image)	Description	Connection Type	Drawing
	KSBKL	Single Operating Type	Standard Flange or Screwed Piping	
		Pilot Operating Type	Standard Flange or Screwed Piping	
	KSBKT			
	Pilot Operating Type	Standard Flange or Screwed Piping		

Size	Set. Pressure	Vacuum Support Required	Available Service Phase		Spark	Fragment	Max Operating Ratio
			Gas or Vapor	Liquid			
							%
Max. Ø3600	0.01 ~ 0.5 kg/cm <sup>2</sup> (100 ~ 5,000 mmAq)	Yes	Yes	No	No	No	50%
1400 X 2000 mm	0.01 ~ 0.5 kg/cm <sup>2</sup> (100 ~ 5,000 mmAq)	Yes	Yes	No	No	No	50%

Size	Set. Pressure	Vacuum Support Required	Available Service Phase		Spark	Fragment	Max Operating Ratio
			Gas or Vapor	Liquid			
							%
18" ~ 36" (450A ~ 900A)	150 ~ 5,000 mmAq	Yes	Yes	N/A	No	No	80%

Size	Set. Pressure	Vacuum Support Required	Available Service Phase		Spark	Fragment	Max Operating Ratio
			Gas or Vapor	Liquid			
							%
1/2" ~ 2"	12.5 ~ 8,000 mmAq	N/A	Yes	No	N/A	N/A	N/A
1/2" ~ 2"	20 ~ 8,000 mmAq	N/A	Yes	No	N/A	N/A	N/A
1" ~ 2"	20 ~ 8,000 mmAq	N/A	Yes	No	N/A	N/A	N/A



# REVERSE TYPE



KSRR



KSRR

## KSRR (Reverse Dome Knife Type)

- Reversal structure ruptured by knife blade attached upper holder while dome is inverted
- It is used with installation on FDC standard holder
- Favorable for counterpressure, vacuum and pulsation conditions
- Vacuum Support is needless

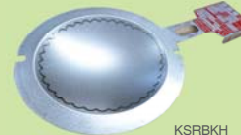


KSRR

KSRR



KSRBKH



KSRBKH

## KSRBKH (Reverse Dome Buckling Knife Type)

- Ruptured while dome is sheared by Knife of Control Disc
- It is used with installation on FDC standard holder
- It consists of Control Disc and Seal Disc
- Easy to handle with strong impact resistance
- Precise rupture performance and excellent reliability
- Favorable for counterpressure, vacuum and pulsation conditions
- Vacuum Support is needless

## KSRBK (Reverse Dome Buckling Knife Type for Flange)

- Same as KSRBKH, but used with installation on Flange without holder



KSRBK

KSRBK



KSRRK



KSRRK

## KSRRK (Reverse Dome Shear Type)

- Shearing structure ruptured by knife ring attached to disc while dome is inverted
- It is used with installation on FDC standard holder
- It is integrated with Disc and Knife
- Easier to handle than KSRR
- Favorable for counterpressure, vacuum and pulsation conditions
- Vacuum Support is needless

## KSRRKF (Reverse Dome Shear Type for Ferrule)

- Same as KSRRK, but used with installation on Ferrule Connection without holder



KSRRK

KSRRK



KSRSR



KSRSR

## KSRSR (Reverse Dome Scored Type)

- Carved structure ruptured while inverted along with Scored Line processed precisely
- It is used with installation on FDC standard holder
- It is applied to medium/high pressure mainly
- Favorable for counterpressure, vacuum and pulsation conditions
- Vacuum Support is needless



KSRSR

KSRSR



## FORWARD TYPE



KRSRF



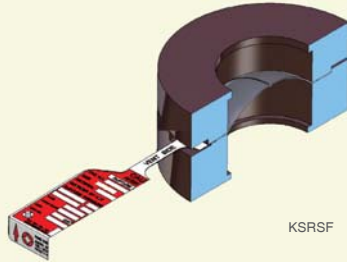
KRSRF

### KRSRF (Forward Dome Scored Type)

- Carved structure with Scored Damage processed precisely ruptured by tension
- It is used with installation on FDC standard holder
- It is applied to high pressure mainly
- Favorable for counterpressure, vacuum and pulsation conditions
- Vacuum Support is needless



KRSRF



KRSRF

## COMPOSITE DOME TYPE



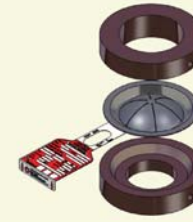
KSRC



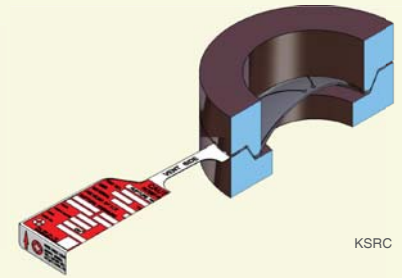
KSRC

### KSRC (Composite Dome Sloped Seat Type)

- Composite/Dome structure ruptured by slit processed on Top disc
- It is used with installation on FDC standard holder
- It consists of Top disc, Seal disc and Vacuum disc
- Suitable for liquid or steam media environments
- Vulnerability to high temperature in case that material of Seal disc is Teflon
- Favorable for counterpressure, vacuum and pulsation conditions
- If any, Vacuum Support is available



KSRC



KSRC



KRSRT



KRSRT



KSRCT



KSRCT

### KRSRT (Forward Dome Tension Flat Seat Type)

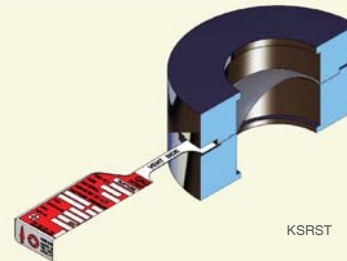
- Structure with disc ruptured by tension pressure
- It is used with installation on FDC standard holder
- Precise rupture performance and excellent reliability
- It is applied to high/ultra high pressure mainly

### KSRCT (Forward Dome Tension Sloped Seat Type)

- Same as KRSRT, but structure of Disc Seat is Sloped type
- It consists of Top disc, Support disc and Guide ring
- Favorable for counterpressure and pulsation conditions



KRSRT



KRSRT



KSRRCH



KSRRC



KSRRCF



KSRRCFD

### KSRRCH (Composite Dome Flat Seat Type)

- Composite/Dome structure ruptured by slit processed on Top disc
- It is used with installation on FDC standard holder
- It consists of Top disc, Seal disc and Vacuum disc
- Suitable for liquid or steam media environments
- Vulnerability to high temperature in case that material of Seal disc is Teflon
- Favorable for counterpressure, vacuum and pulsation conditions
- If any, Vacuum Support is available



KSRRCH



KSRRCH

### KSRRC (Composite Dome Flat Seat Type for Flange)

- Same as KSRRCH, but used with installation on Flange without holder

### KSRRCF (Composite Dome Flat Seat Type for Ferrule)

- Same as KSRRCH, but used with installation on Ferrule Connection without holder

### KSRRCFD (Composite Dome Flat Seat Double Acting Type for Ferrule)

- Same as KSRRCF, but possible to set differently rupture pressure to each direction



KSRRCFD

## COMPOSITE FLAT TYPE

### KSROH (Composite Flat Type)

- Composite/Flat structure ruptured by slit processed on Top disc
- It is used with installation on FDC standard holder
- It consists of Top disc, Seal disc and Vacuum disc
- Vulnerability to high temperature in case that material of Seal disc is Teflon
- Vulnerability to pulsation conditions
- If any, Vacuum Support is available

### KSRO (Composite Flat Type for Flange)

- Same as KSROH, but used with installation on Flange without holder

### KSROF (Composite Flat Type for Ferrule)

- Same as KSROH, but used with installation on Ferrule Connection without holder

### KSROHD (Composite Flat Double Acting Type)

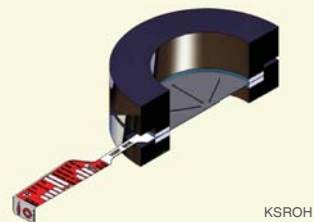
- Same as KSROH, but possible to set differently rupture pressure to each direction

### KSROFD (Composite Flat Double Acting Type for Ferrule)

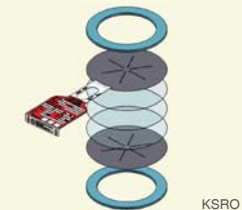
- Same as KSROF, but possible to set differently rupture pressure to each direction



KSROH



KSROH



KSRO



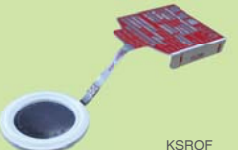
KSROF



KSROH



KSRO



KSROF



KSROHD



KSROFD

## ULTRA LOW PRESSURE TYPE

### KSRRL (Reverse Dome Knife Type - LP)

- It is used for ultra low pressure with minimum 100mmAq of set pressure
- Reversal structure ruptured by knife blade attached upper holder while dome is inverted
- It is used with installation on FDC standard holder
- it consists of Support disc, Disc seal and Vacuum support

### KSRRLD (Reverse Dome Knife Double Acting Type - LP)

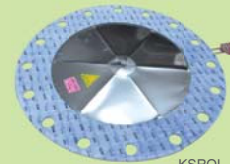
- Same as KSRRL, but possible to set differently rupture pressure to each direction

### KSROL (Composite Flat Type for Flange - LP)

- It is used for ultra low pressure with minimum 100mmAq of set pressure
- Composite/Flat structure ruptured by slit processed on Setting disc
- It consists of Top disc, Setting disc and Vacuum disc
- Vulnerability to high temperature in case that material of Seal disc is Teflon



KSRRL



KSROL

## FITTING CONNECTION TYPE

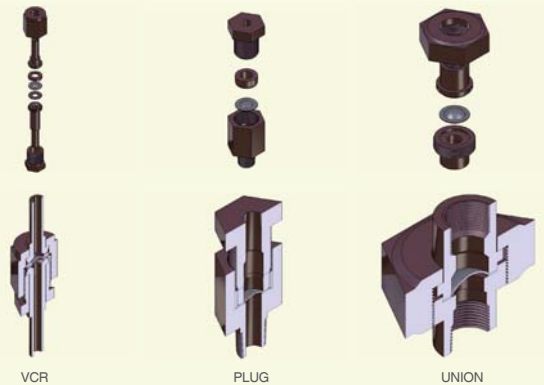
- KSRRKV / KSRRKP / KSRRKU** (Reverse Dome Shear Type for VCR/PLUG/UNION)
  - It uses KSRRK at fitting connection
- KSRSFV / KSRSFP / KSRSFU** (Forward Dome Scored Type for VCR/PLUG/UNION)
  - It uses KSRSF at Fitting Connection
- KSRSRV / KSRSRP / KSRSRU** (Forward Dome Tension Type for VCR/PLUG/UNION)
  - It uses KSRSR at Fitting Connection
- KSRRCV / KSRRCP / KSRRCU** (Composite Dome Shear Type for VCR/PLUG/UNION)
  - It uses KSRRC at Fitting Connection



VCR

PLUG

UNION



VCR

PLUG

UNION



# GRAPHITE DISC

## GRAPHITE DISC

### GRAPHITE DISC Features

- Made from a single piece of graphite which is impregnated with phenolic resin
- Easy to install and maintain
- Install directly between standard flange without holders
- Excellent corrosion resistance

### KSRGM

- Favourable for low and intermediate burst ratings
- Counterboard side of the disc contacts the process media
- In case of vacuum condition, vacuum supports are available for ratings below 25 psig
- Insulated Units are supplied armored with required insulation and gaskets for service above 221°C to 371°C
- Armor is required for temperatures above 170°C

### KSRGI

- Favourable for higher burst ratings
- Flat surface of the disc contacts the process media
- Armor is required for temperatures above 170°C
- TFE liner is available to extend corrosion resistance

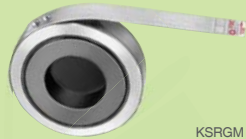
### KSRGD

- Setting two different pressures in the opposite directions (Double Acting Type)
- Optional liner is available to extend corrosion resistance
- Armor is required for temperatures above 170°C

### Specification

Division	KSRGM	KSRGI	KSRGD
Standard	ASME Code sec VIII KS B ISO 4126, API RP520, KOSHA CODE, FDC standard		
Size	1/2" - 24"		1-1/2" - 24"
Set. Pressure	0.017 - 10 kg/cm <sup>2</sup>	0.017 - above 70 kg/cm <sup>2</sup>	0.017 - 0.49 kg/cm <sup>2</sup>
Temperature	-179 - 371 °C		-179 - 221°C
Material	Graphite		
Fragment	Yes		
Process Media	Gas, Vapor, Liquid		
Max. Operating Ratio	90%		
Spark	NO		
Option	Flouropolymer sintered, Vacuum Support, Insulation, Armor, Gasket,	Flouropolymer sintered, Armor, Liner, External Type Vacuum Support, Gasket	Flouropolymer sintered, Armor, Liner, Gasket

- Contact FDC for set. Pressure details corresponding to each size



KSRGM



KSRGI



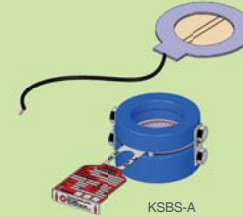
KSRGD

# BURST SENSOR

### KSBS-A

- Burst sensor [KSBS-A] is a rupture detection sensor for a Rupture Disc. It is installed on top of the Rupture Disc Holder and maintains signals when it is on. When it becomes off with sensor film broken when the pressure in a Tank or a pipe exceeds the rated pressure, separate monitoring device or DCS can detect the rupture.
- Electrical Specifications (Material with 1.5 meter extension cable)

Ui	Ii	Pi	Ci	Li
25,5 V	90 mA	0,63 W	0,01 nF	1,66 μH



- GAS II 2G EX ib IIC T6 Gb
- DUST II 2D EX ib IIIC T135°C Db

### KSBS-B

- Burst sensor [KSBS-B] is attached to Rupture Disc as a built in sensor. It maintains on signal in normal status but when pressure in the tank or the pipe exceeds the rated pressure, the sensor film is broken when the rupture disc is ruptured so that separate monitoring device or DCS device can detect the abnormality
- Electrical Specifications (Material with 1.5 meter extension cable)

Ui	Ii	Pi	Ci	Li
25,5 V	90 mA	0,63 W	0,01 nF	1,66 μH

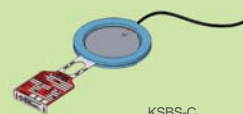


- GAS II 2G EX ib IIC T6 Gb
- DUST II 2D EX ib IIIC T135°C Db

### KSBS-C

- Burst sensor [KSBS-C] is a cable type sensor installed in a rupture disc as a built-in sensor. It maintains on signal in normal status but when pressure in the tank or the pipe exceeds the rated pressure, random short point in the cable is broken when the rupture disc is ruptured so that separate monitoring device or DCS device can detect the abnormality.
- Electrical Specifications (Material with 1.5 meter extension cable)

Ui	Ii	Pi	Ci	Li
25,5 V	90 mA	0,63 W	0,02 nF	1,24 μH



- GAS II 2G EX ib IIC T6 Gb
- DUST II 2D EX ib IIIC T135°C Db

## ACCESSORY

<b>Pressure Gauge(P/G)</b>	Pressure gauge
<b>Pressure Switch(P/S)</b>	Pressure switch
<b>Excess Flow Valve(E.F.V)</b>	A kind of check valve to keep the atmospheric condition between Rupture Disc and safety valve of outlet
<b>Nipple, Tee, Plug, Reducer</b>	Fitting for installation P/G, P/S and E.F.V.
<b>Stud Bolt &amp; Nut</b>	Tightening bolt & nut for In/Out Flange
<b>Eye Bolt</b>	It is installed at upper Holder has 8 in. of nominal diameter for handling a heavy weight
<b>Gasket</b>	Sealing of In/Out Flange mating surface
<b>J-Hook</b>	J-shaped hooks installed at lower Holder
<b>Jack Screw</b>	It acquires an installation space for the Rupture Disc by welding on In/Out Flange (for maintenance)
<b>Burst Sensor</b>	Sensing disc for check whether Rupture Disc is ruptured or not. Provided with Shield cable (Type - Integrated, Separated)
<b>Junction Box</b>	Terminal box for connecting shield cable of sensor disc
<b>Rain Hood</b>	It protects Rupture Disc against foreign objects or rain inflow by installed at upper of the Rupture Disc exposed to the atmosphere
<b>Heat Shield</b>	It functions to reduce the high temperature of 300~400°C by installed heat insulator such as Cerak Wool or Aerogel in front of the Rupture Disc



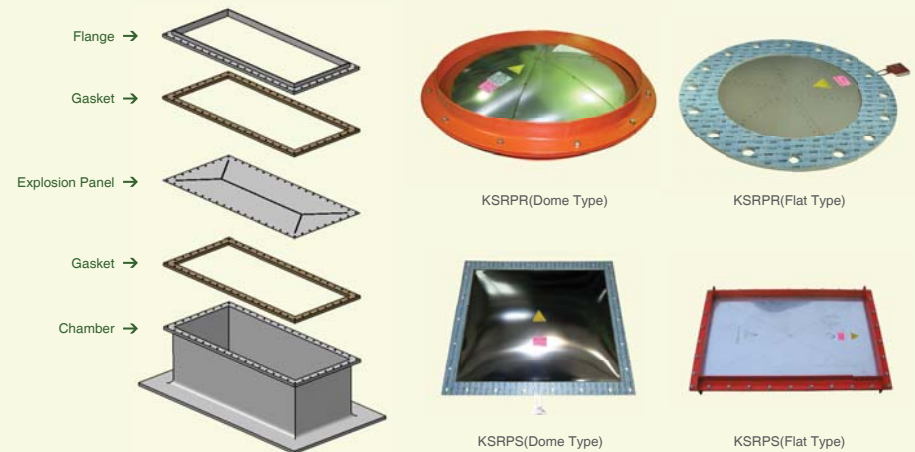
## EXPLOSION PANEL

### Explosion Panel Introduction

- Safety device for preventing equipments from damage by instantaneous release of pressure and flame which were increased in the process of deflagration before gas, powder, dust and other mixtures are progressed into detonation by ignition

### Explosion Panel Features

- **Applicable equipment** : Silo, Bag Filter, RTO, Bucket Elevator, Duct, Hopper, etc
- **Fluids** : Dust, Gas, Powder, Mixture
- **Code** : NFPA 68, KOSHA CODE
- **Advantages**
  - Prompt operating in low pressure and reduction of pressure
  - Fast release to minimize the damage caused by expansion gas
  - Design for prevention of leakage and fragments
  - Easy to replace and low maintenance cost
  - Possible to select any quantity and installation location depending on the vessel size and the type of contents





## N2 BLANKETING SYSTEM



KSBKL



KSBKT



KSBKS

### What is the N2 Blanketing System?

- Control device to maintain a constant pressure state by injecting N2 gas, that is, inert gas to upper room of the tank

### Functions of N2 gas

- It reduces evaporation loss of the products to minimize the formation of vapor in the tank
- It removes explosive factors by controlling hazardous gas ingredients such as oxygen from vapor space in the tank
- It prevents products from damage by inflow of unnecessary moisture and air
- It prevents explosion by controlling electrostatic spark
- It promotes delivery rate of product by decreasing of discharging time of product
- It prevents the modification of tank by controlling vacuum in the tank

### Type

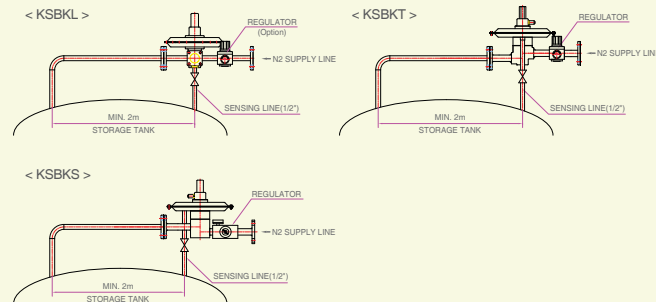
- KSBKL (Low capacity)
- KSBKT (High capacity)
- KSBKS (Ultra high capacity)

### Flow Capacity (Rated Flow)

[Measure : Nm<sup>3</sup>/h]

Model	Inlet Pressure						
	1 barg	2 barg	3 barg	4 barg	5 barg	6 barg	7 barg
KSBKL	64.7	105.2	145.2	184.7	223.6	262	299.8
KSBKT	240.6	367.4	493.6	625.3	744.6	869.4	993.9
KSBKS	871.3	1316.9	1650.9	1891.8	2058	2168	2240.3

### Installation- Layout



## EMERGENCY RELIEF HATCH - KSRH

### EMERGENCY RELIEF HATCH - KSRH

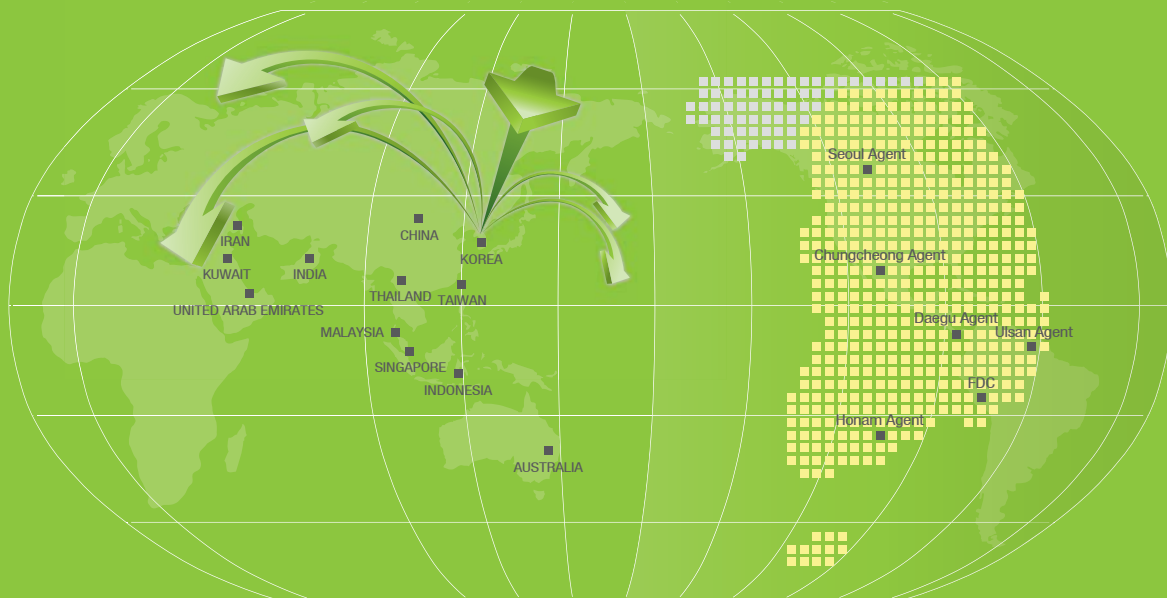
- A device for release the internal pressure with opening the cover by rupturing of tension rod when overpressure reaches more than allowable operating pressure by increasing of internal pressure of vessel
- Unlike general emergency venting device, it sets the required pressure by tension rod, and because it uses sealing diaphragm, it has excellent sealing capacity compared with the existing weight type, oil seal type and spring type
- Also, in case of oil seal type it has somewhat lower reliability because its setting pressure is not uniform by the difference of oil viscosity depending on temperature

### Features

- Excellent sealing capacity and any leakage is not permitted
- Diaphragm is built in for sealing
- Available on LNG ship and ground tank mainly
- Possible to lower set pressure
- Maintenance cost is low because it is possible to reset by replacing some parts after rupturing



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