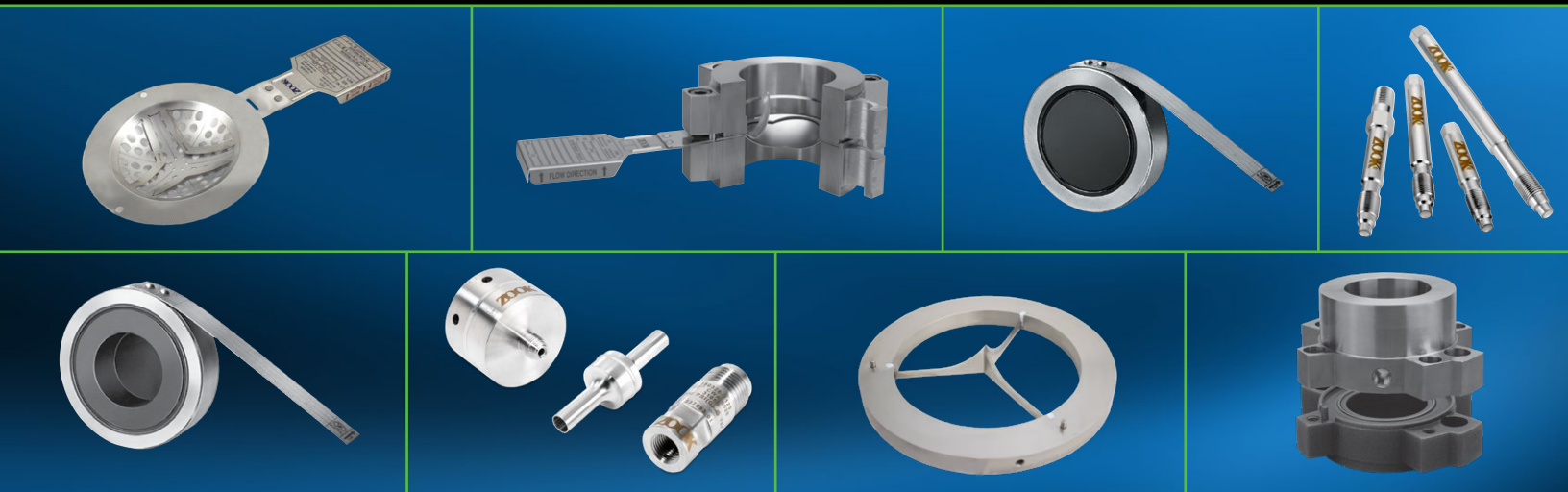


# ZOOK®

## ZOOK Differentiators



**Safety through knowledge and performance.**

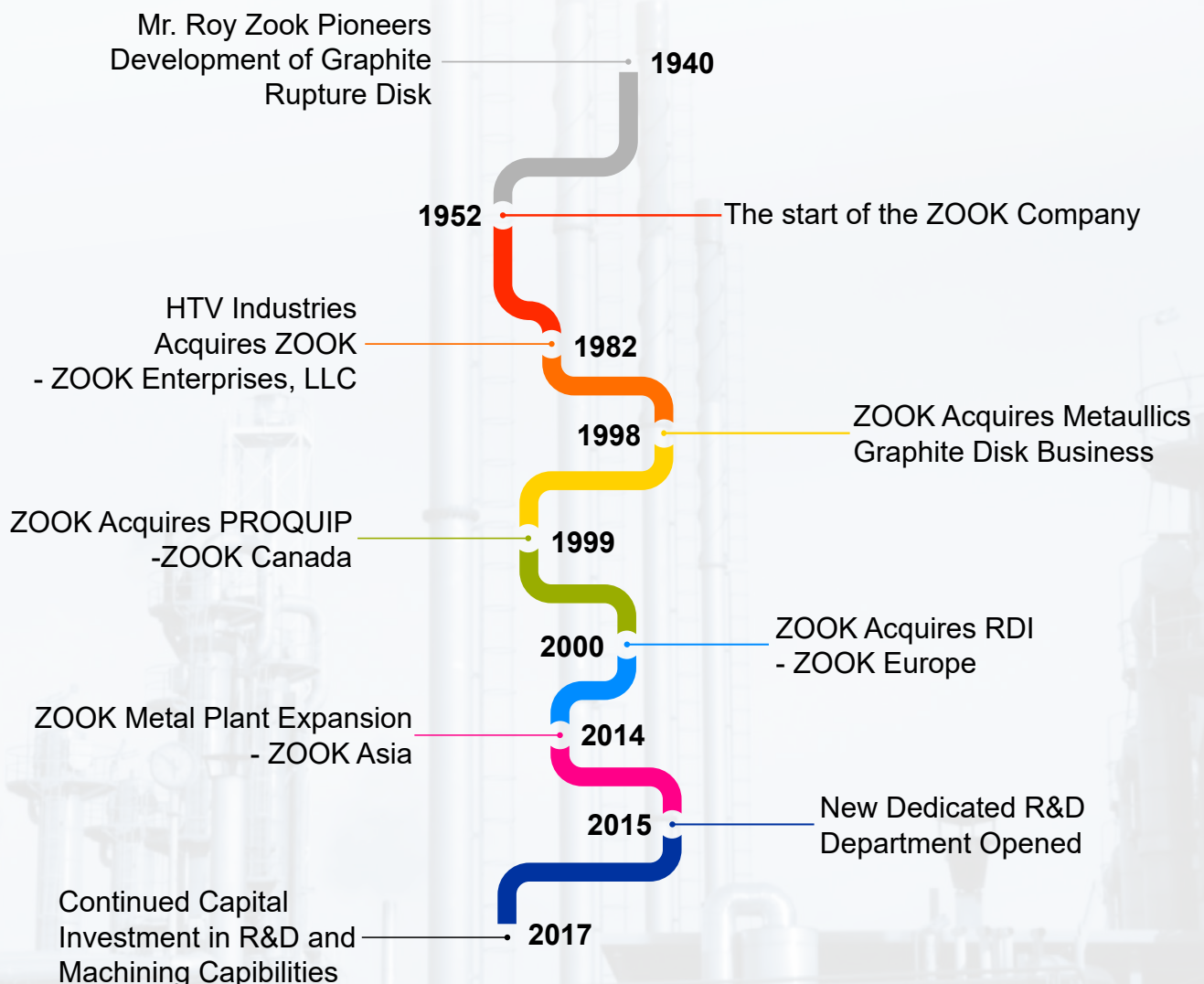
## About Us

ZOOK is a global market leader with over 90 years of manufacturing expertise of high quality metal and graphite rupture disks and other pressure relief products. ZOOK has four office locations – USA, United Kingdom, Canada and Malaysia, with state-of-the-art manufacturing facilities in both Canada and the USA.

Our graphite division is the first and largest graphite company in the world committed to manufacturing quality impervious graphite rupture disks through product innovations and superior service. We were the first graphite rupture disk manufacturer to earn the ASME Code UD symbol stamp and certificate of authorization.

We are dedicated to investing heavily in the latest technology and production to stay competitive in the marketplace, and are able to offer comprehensive solutions to the selection and sizing of products best suited for each customer application.

## Our History

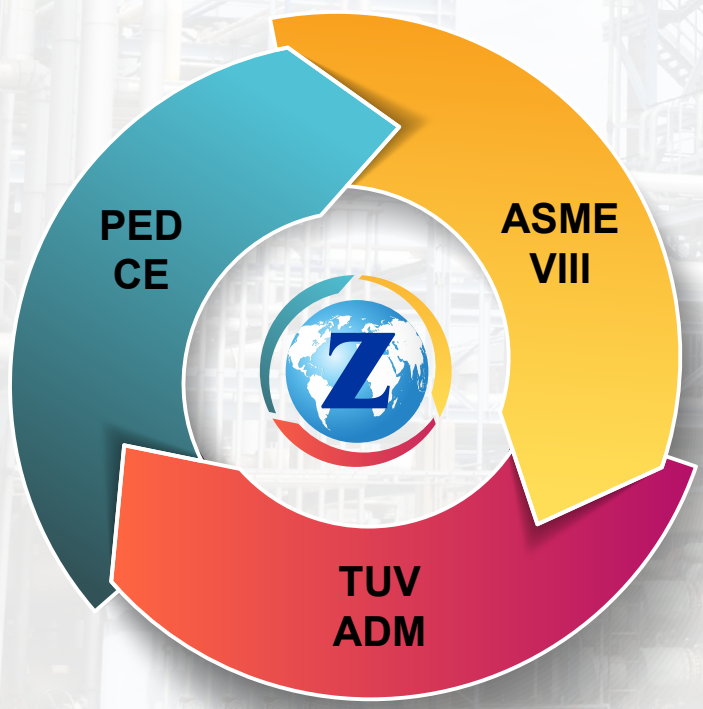


# A Worldwide Reach



- 4 Global Offices
- 70+ Channel Partners Worldwide
- ZOOK Products Sold in 65+ Countries
- Over 5,000 Customers Worldwide and Growing

# Worldwide Approvals and Accreditations



## Quality is Essential to Our Success



### Quality Policy

The ZOOK Quality Policy is to meet our customer's requirements and exceed their expectations every time; whether through on-time delivery, efficient and courteous customer service, or superior quality and reliable products; while maintaining our commitment to continual improvement of the Quality Management System.



## Full Testing on Materials & Products

- Digital pressure gauges
- Temperature testing from -260°F (-162°C) to 1000°F (538°C)
- Internal calibration standards traceable to national standards
- Leak testing
- Surface finish measurement
- PMI testing available
- Digital imaging

## Full Range of Engineering Services to Meet all of our Customers' Requirements

- Consulting & design
- Training seminars
- Factory schools
- Inhouse testing
- Third party inspection services

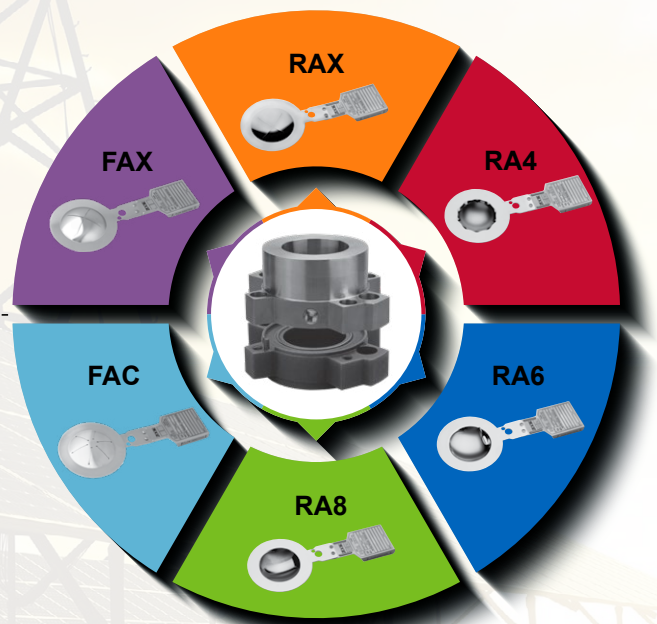
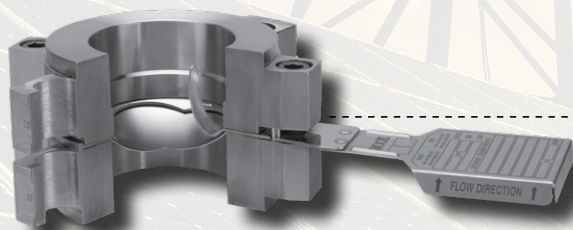
# Key Differentiators are what sets us apart from the competition

## 1. RAH and FAH Holder Series

The holder is the installation interphase between the disk and piping system which is very important to obtain optimum performance. ZOOK has made this selection easy with the RAH & FAH series of pre-torque holders designed to accept all 6 RA/FA series disk designs and clamp between the customer's flanges. This unique holder design ensures proper assembly of the disk and holder that guarantees a successful installation of the device into your piping system.

RAH and FAH Holder	Pre-Torque Benefits
<ol style="list-style-type: none"> <li>1. The disk and outlet fit into a machined counter bore in the inlet for perfect alignment.</li> <li>2. Offset locating pin prevents installing the disk upside down.</li> <li>3. Machined inlet "bite" provides a gas tight seal to the atmosphere.</li> <li>4. Offset shoulder guarantees 360° support to the disk transition radius eliminating unwanted disk movement.</li> </ol>	<ol style="list-style-type: none"> <li>1. Integral high strength preassembly screws assures proper loading of the disk improving burst pressure consistency and eliminating unwanted leaks.</li> <li>2. Can be assembled properly in the maintenance shop using standard hexagon sockets. No special tools required.</li> <li>3. Allows for removal, inspection and replacement of the complete assembly.</li> <li>4. Plastic caps keep the socket head cavity clean.</li> </ol>

The only Rupture Disk Manufacturer to have designed One Holder to fit with all 6 Disk Designs = All in one Solution.



## 2. ISOSTATIC Grade Graphite – Fine Structure Graphite

- Superior grade improves performance and temperature consistency
- Improved impregnation process with isostatic graphite improves level of impermeability
- FS Teflon coating also available



## 3. FS Teflon Sintered Graphite Bursting Disks

- Exclusive to ZOOK
- Enhanced temperature range
- FDA approved
- Non-stick surface
- Enhanced chemical resistance
- Compatible with existing installations
- Non-stick corrosion resistant with extended temperature range and FDA approval
- For ultimate chemical and temperature capability choose FDA approved FS Teflon sintered disks – only available from ZOOK



## 4. Extrusion Burst Plugs

- Each EBP assembly consists of a threaded tubular body with a rupture disk welded onto the process end
- ZOOK has the ability to supply any specific combinations of dimensions, threading, and body configuration
- The EBP assembly is mounted directly into the extruder equipment through a pressure port or thermocouple-well where critical pressures are experienced
- Stocked burst ratings 1,000 psig to 15,000 psig in 500 psi increments
- Customized designs available
- 100% factory leak-tested



### ZOOK's Extrusion Burst Plugs (EBP Series) are Superior to Competitors' Soldered Designs:



- Welded joints are stronger and more resistant to increased temperatures, which eliminates spurious bursts and product contamination
- Joint failure is eliminated due to increased temperature and pressure cycling
- Material creep is removed ensuring burst repeatability
- Superior joint design reduces confusing temperature correction factors
- The additional stability ensures the device will burst within tolerance throughout the specified temperature range
- Improved quality and operational excellence

## 5. Custom Welded Assemblies (CWA)

Many customer applications cannot be met using standard rupture disk designs. ZOOK's CWA department is dedicated to the design and development of customized rupture disk assemblies for specific customer applications.

**CWA are manufactured with the highest quality control:**

- 100% Helium leak testing
- Burst testing
- Weld & body pressure testing
- Digital inspection of threads & body dimensions
- Ultra sonically cleaned
- 100% material traceability

ZOOK offers many other custom welded designs for a wide variety of applications with custom fittings and connections for stringent applications such as ultra-high vacuum, OEM markets, military, aerospace, and many other applications.

### In-House Application Design Engineers to Solve Your Specific Requirements



- Customized welded assemblies
- Customized manufactured solutions
- Customized 3D software producing the latest 3D drawings allow a greater understanding of the proposed solution
- Design guidance, combined with timely, friendly, personal assistance
- Efficient engineering review service as standard
- Both factory and local support, worldwide





## 6. Z-VAC and Z-POS Dual Acting Ultra Low Positive and Negative Pressure Vessel Protection Disks

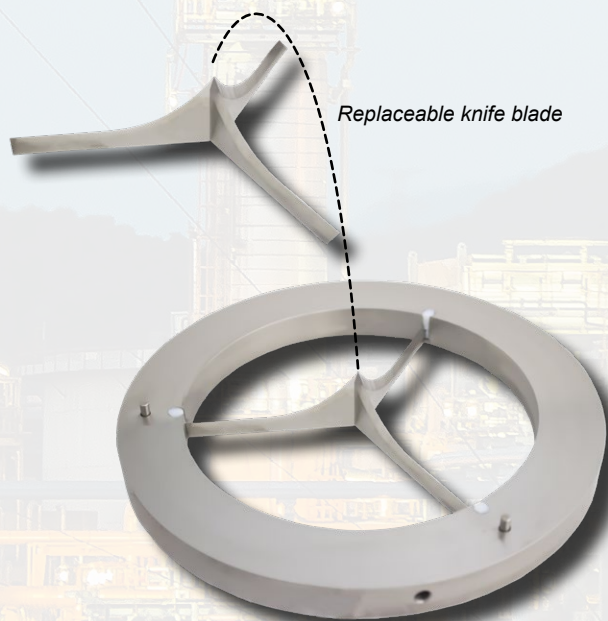
The ZOOK Z-VAC and Z-POS Series are a range of bi-directional rupture disk and holder assemblies designed to relieve between 1-30" WC in one direction and 2-150 psi in the other direction uniquely protecting processing, fermentation, storage tanks and low strength vessels from vacuum implosion or over-pressure failure in a single device.

Both designs relieve ultra-low pressure settings. The Z-VAC allows ultra-low pressure relief in the vacuum direction starting at 1" (25 mm) of water column differential and features user friendly replaceable knife blades to ensure optimum performance. The Z-POS allows ultra-low pressure relief in the positive direction starting at 1" (25mm) of water column differential.

### ZOOK'S Unique Replaceable Knife Blade Design



- Dull blades can result in collapsed tanks
- Allows higher level of safety maintenance
- Availability of spare blades on site leads to quick changeovers and greater operational safety
- Provides lower cost inventory compared to other designs
- Lower costs, less downtime, enhanced safety
- Replacement blades - easy to change



# 7. Skid-Safe Unit

The Skid-Safe system is the ultimate pressure relief protection on infrastructures used for the extraction of Coal Seam Gas, Liquid Natural Gas by way of fracking and other industry methods.

- Dual certification to ASME UD and PED CE available
- Fully assembled and ready for immediate installation between flanges, substantially reduces installation time and assembly difficulties
- Reverse acting disk has full dome membrane protection from the RAH holder
- Skid-Safe unit can be easily installed using integral flange bolt holes
- Self-centralization of the Skid-Safe unit within the pipework
- Specific integral flange guide holes ensure the Skid-Safe unit cannot be installed into non-compatible flange ratings

## The Components

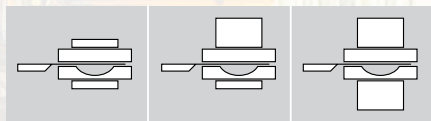
Z-Detect is the most current technology of rupture disk detection. It is situated remote of the disk allowing maintenance and inspection without interfering with the disk assembly.

RA reverse acting disk has full dome membrane protection from the holder.

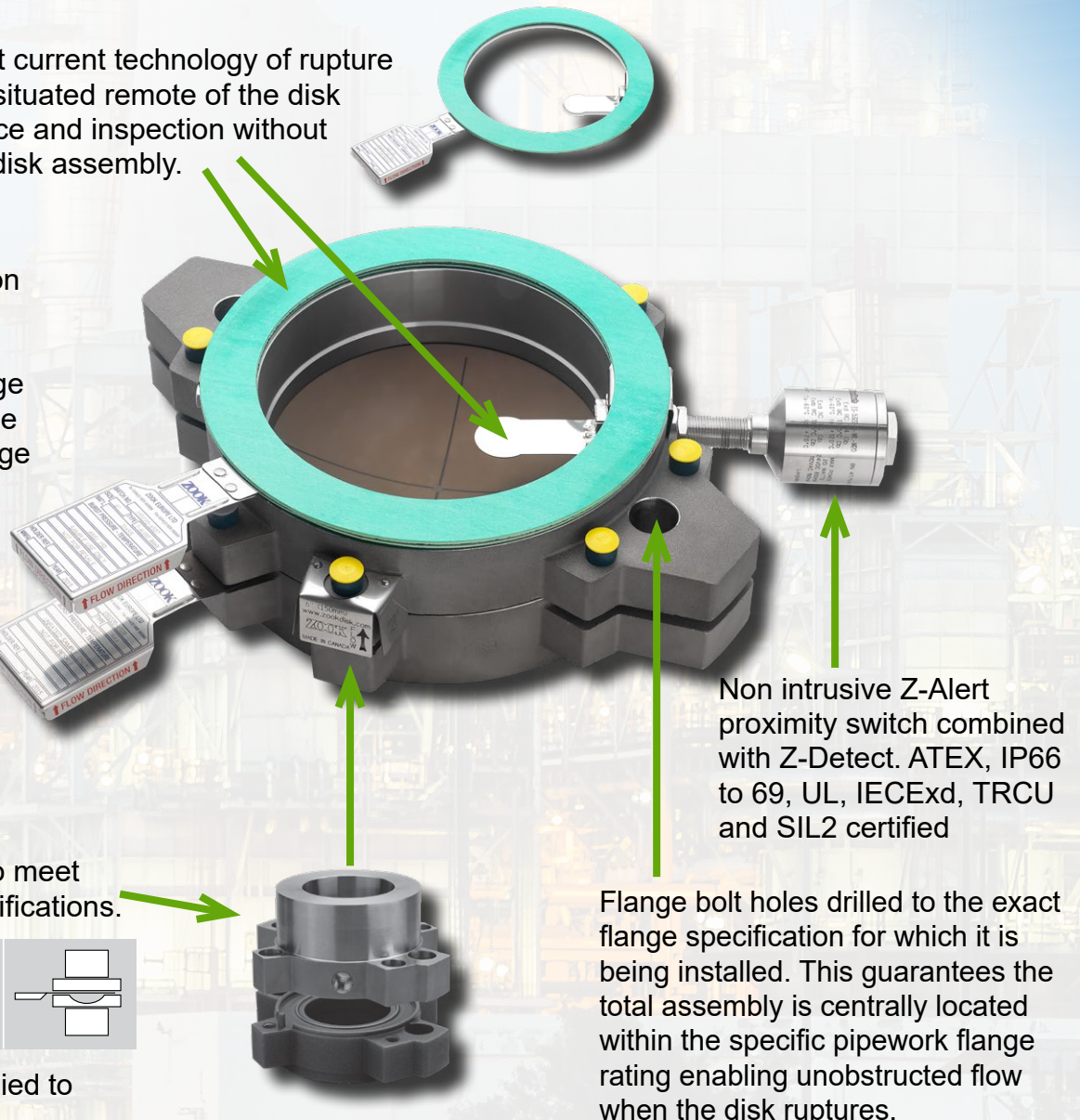
Available in:

- Low pressure range
- Mid pressure range
- High pressure range

Can be machined to meet existing piping specifications.



Holder can be supplied to Norsok certified super-duplex and duplex material



Non intrusive Z-Alert proximity switch combined with Z-Detect. ATEX, IP66 to 69, UL, IECExd, TRCU and SIL2 certified

Flange bolt holes drilled to the exact flange specification for which it is being installed. This guarantees the total assembly is centrally located within the specific pipework flange rating enabling unobstructed flow when the disk ruptures.

# 8. Z-Size - New Web Based Rupture Disk Sizing Program

With Z-Size we hope to broaden our visibility throughout the marketplace and be able to provide much needed engineering support to our customers around the world.



## Z-Size has Limitless Options Available:

- Calculations to ASME, API520 and ISO 4126-6
- Purpose for calculations... primary, secondary or supplemental
- Relieving case... blocked discharge, fire contingency or other
- List of standard mediums available including the ability to create a bespoke medium
- Wide selection of units of measurement... SI, imperial and metric all available
- Printable output available
- Ability to report any issue directly to ZOOK

Customer Information		Value / Reference	Symbol	Conversion to Required Units
1	Revision Number / Date	0		July 05, 2017
2	Prepared By			
3	Customer Name			
4	Project ID	Example		
5	Tag Number	PSE-123		
User Input		Value / Reference	Symbol	Conversion to Required Units
6	Sizing Method	Coefficient of Discharge		
7	Design Code	API 520		
8				
9	Purpose	Primary,Blocked Discharge		
10	Overpressure Allowance	Greater of 10% or 3 psi		14.22 psi
11	Fluid State	Gas / Vapor		
12	Required Relieving Capacity	200.00 kg/min	W	26,455.49 lbs/hr
13	Gas Medium	Chlorine		
14	Molecular Weight	70.9060	M	70.906
15	Specific Gravity	2.4480	G	2.4480
16	Ratio of Specific Heats	1.3200	k	1.3200
17	Density	0.1841 lbs/cubic ft.	w	0.1841 lbs/cubic ft.
18	Compressibility Factor	1.000	Z	1.000
19	Coefficient of Discharge	0.62	K <sub>d</sub>	0.62
20	Burst Pressure	10.00 kg/cm <sup>2</sup>	P	156.93 psi (a)
21	Burst Temperature	293.0°K	T	527.4°R
22	Back Pressure	0.00kg/cm <sup>2</sup>	P <sub>2</sub>	14.70 psi (a)
23	Disk Size	2"		
24	Disk Model Number	RA8		
25	Selected Device MNFA	3.000 in <sup>2</sup>	MNFA	3.000 in <sup>2</sup>
26	Sizing Formula 3	API 520 Equation 3.2		$A = \frac{W}{CK_d P_1} \sqrt{\frac{ZT}{M}}$
Calculated Results		Results (Input Units)	Symbol	Results (Working Units)
27	Gas Constant		C	348.843
28	Adjusted Rupture Pressure		P <sub>1</sub>	171.152 psi (a)
29				
30				
31	Flow Conditions			Critical
32	Minimum Required Net Flow Area	1.949 in <sup>2</sup>	A	1.949 in <sup>2</sup>
33	Calculated Relieving Capacity	307.83 kg/min (based on 3.000 in <sup>2</sup> )		40,718.89lbs/hr
Notes				

ZOOK ACCEPTS NO RESPONSIBILITY OR LIABILITY FOR THE ACCURACY OF THE CALCULATIONS CONTAINED HEREIN. ALL CALCULATIONS SHOULD BE VERIFIED AND ACCEPTED PRIOR TO USE BY THE USER OR HIS REPRESENTATIVE.

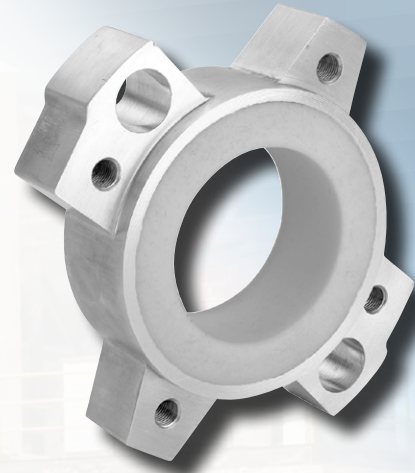
This calculation is valid only when the rupture disk device discharges directly to atmosphere under the following conditions:  
 A. The rupture disk device is installed within 8 pipe diameters from the vessel nozzle.  
 B. The length of discharge pipe from the rupture disk device to atmosphere is not greater than 5 pipe diameters.  
 C. The normal diameter of the inlet and discharge piping are equal or greater than the normal size of the rupture disk device.  
 D. The minimum net flow area (MNFA) for the rupture disk device selected equals or exceeds the required flow area.

Email ZOOK at zsize@zookdisk.com for more information. (Z-Size Revision 2017.04.14)

## 9. PTFE Sleeved Holder Inlet



View of the disk face of the holder inlet  
This shows PTFE Lined Inlet, and O-Ring seal



View of the flange face of the holder inlet  
This shows the PTFE Sleeve across the flange  
sealing face of the holder

### Features:



- Ideal for corrosive applications and reducing the effect of product build up
- A good cost effective alternative to exotic materials
- PTFE sleeve on all wetted surfaces of the rupture disk holder inlet
- The ZOOK PTFE Sleeved holder utilises a Teflon Encapsulated Viton O-Ring as standard. The O-Ring seal prevents the process media getting into contact with the bite-ring outer seal prolonging the life of the holder. ZOOK's unique double seal prolongs the life expectancy of the holder
- The PTFE Sleeve is available for ZOOK flat seat series disk holders in sizes from 1" (25 mm) through to 8" (200 mm)
- Teflon liners are available for the rupture disks to minimize product build up and corrosion
- The PTFE sleeve option can be used for most burst pressure ranges as shown on the data sheets for ZOOK rupture disks
- The operating temperature range for the PTFE Sleeve is -20°F to 450°F (-29°C to 232°C)
- PTFE Sleeve option is not available for the holder outlet
- Consult ZOOK for further application information



# 10. Our Disks are Interchangeable with the Competition

Interchangeable

ZOOK Rupture Disk Cross Reference List									
Product Description	ZOOK	OSECO	BS&B	FIKE	CONTINENTAL	DONADON	ELFAB	MARSTON	LE-CARBONE
Pre-Bulged Disk (With Angled Seal)	PB Series	STD Series	B Series	P Series	STD Series	-	-	-	-
Pre-Bulged Disk (With Flat Seal)	F-PB Series	FSTD				STD Series	SM Series	NT/NR	-
Composite Disk (With Angled Seal)	D Series	CO Series	D Series	HO Series	CDC Series	-	-	-	-
Composite Disk (With Flat Seal)	FD / FDV / FAC / FACV	FCO / FCOV				DCD	SC	CS	-
Scored Forward Acting Disks	SFAZ / FAX	FAS	GFN	POLY-SD	MICRO-X	SCD	GM	NTG / NRG	-
Cross Scored Reverse Acting Disks	SRA / RAX	PCR	S-90	SRX	RCS	SCR	MR	-	-
Other Reverse Acting Disks	RA4/ RA6/ RA8/ URA / RLP	PLR / PRO+	ECR / JRS / RLS / CSR	SRL	ULTRX MINTRX	Y90	GR / SOLO/ OPTIGUARD	LRBH	-
Reverse Buckling with Knife Blades	SB-90	-	RB-90	RKB	KBA & ZAP	-	RK	-	-
Flat Composite Type Disk (To fit directly between flanges)	ARD / ARD-V	FLCO / FLCOV	AV / AVV	AD / ADV	ENVIROSEAL	DIF	FC	-	-
Sanitary Tri-Clamp Fitting Disks	RLPS/ RAUS	PRO-S/ FAS-S	GCR-S / GFR-S	SRH / SHX	SANITRX	-	Bio-Gard	-	-
Ultra Low Pressure Dual Acting Disks	Z-POS Z-VAC	POSI-PRO VAPRO	DKB	-	POSI-SET CAL-VAC	-	Posi-Guard Vac-Guar		
Rail / Tank Car Rupture Disks	TCP Series	CRC	TC	TANKSERT	TANKSERT	-	-	-	-
Intermodal Taker Disks	ICP	ICD	ITC	-	ICON	TCD	Tank-Safe	Tank-A-Vent	-
One Time Use, Throw-a-Way Assemblies	TA	OUT	STA KUL	S½10	TITSEAL	SU-IE SU-M	OEM	-	-
Soldered & Welded Assemblies	Manufactured to be fully interchangeable after dimensional data is furnished by representative or client								
Extruder Protection Assembly	Manufactured to be fully interchangeable after dimensional data is furnished by representative or client								
Rupture / Vent Panel	Manufactured to be fully interchangeable after dimensional data is furnished by representative or client								
Graphite Monobloc Disk	MONO	-	MB	GD	GRAFSEAL	GM	G3 / GBA	Monobloc	Series 3
Graphite Replacement Dement Disk	RT2	-	RE	-	-	GR	G2	GR	Series 2

## The ZOOK Difference

We take pride in creating innovative solutions for custom and standard, high performance over-pressure protection devices.

We achieve success in customers' application challenges and deliver beyond our customers' expectations.

We are committed to finding solutions for our customers that maximize our customers' productivity and performance.



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