

CRYOGENIC

Ball Valves



Company Profile

Inspired By Challenge

- Leading manufacturer of high-end ball valves and pneumatic actuators
- Over 60 years experience with industrial applications
- We develop, manufacture and market our products
- HABONIM tailor-made solutions assist global customers in meeting their challenges



HABONIM Product Lines

Inspired By Challenge



Flanged
Ball Valve



Three Piece
Ball Valve



3,4,5 Way
Ball Valve



TuBore™
Ball Valve



Flush Tank
Ball Valve



DBB
Ball Valve



Cryogenic
Ball Valve



High Pressure
Ball Valve



Metal seated Ball
Valve



Control
Ball Valve



Trunnion Mounted Ball
Valve

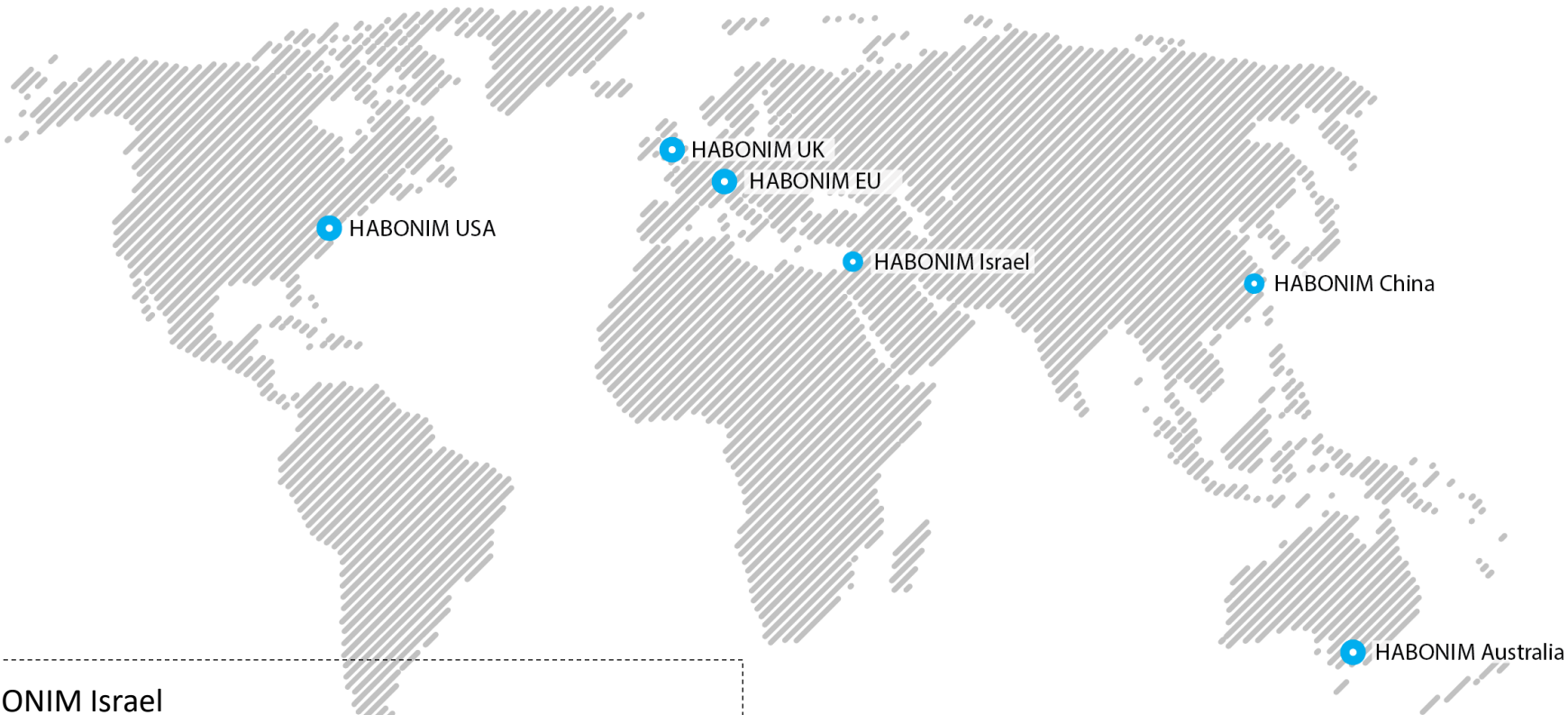


Pneumatic
Actuator



HABONIM global network

Distribution to 52 countries worldwide



HEADQUARTER	HABONIM Israel		
SUBSIDIARIES	HABONIM USA	HABONIM Europe	HABONIM Australia
SALES OFFICES	HABONIM UK	HABONIM China	HABONIM Singapore

Austria | Australia | Belgium | Belarus | Brazil | Canada | Cayman Islands | China | Canada | Colombia | Costa Rica | Croatia | Cyprus | Czech Republic | Germany | Denmark | Estonia | Finland | France | UK | Georgia | Greece | Hungary | Indonesia | Ireland | Israel | India | Italy | Jordan | Japan | Korea | Kazakhstan | Lithuania | Macedonia | Mexico | Malesia | Netherlands | Norway | New Zealand | Peru | Philippines | Poland | Romania | Russia | Sweden | Singapore | Slovenia | Slovak Republic | Spain | Switzerland | Turkey | Taiwan | Thailand | Ukraine | UAE | USA | Vietnam | South Africa

HABONIM Activities by Industry Segments

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Oil & Gas



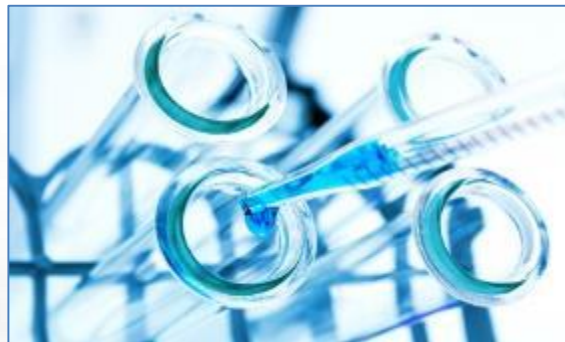
Energy



Petrochemical



Chemical



Pharmaceutical





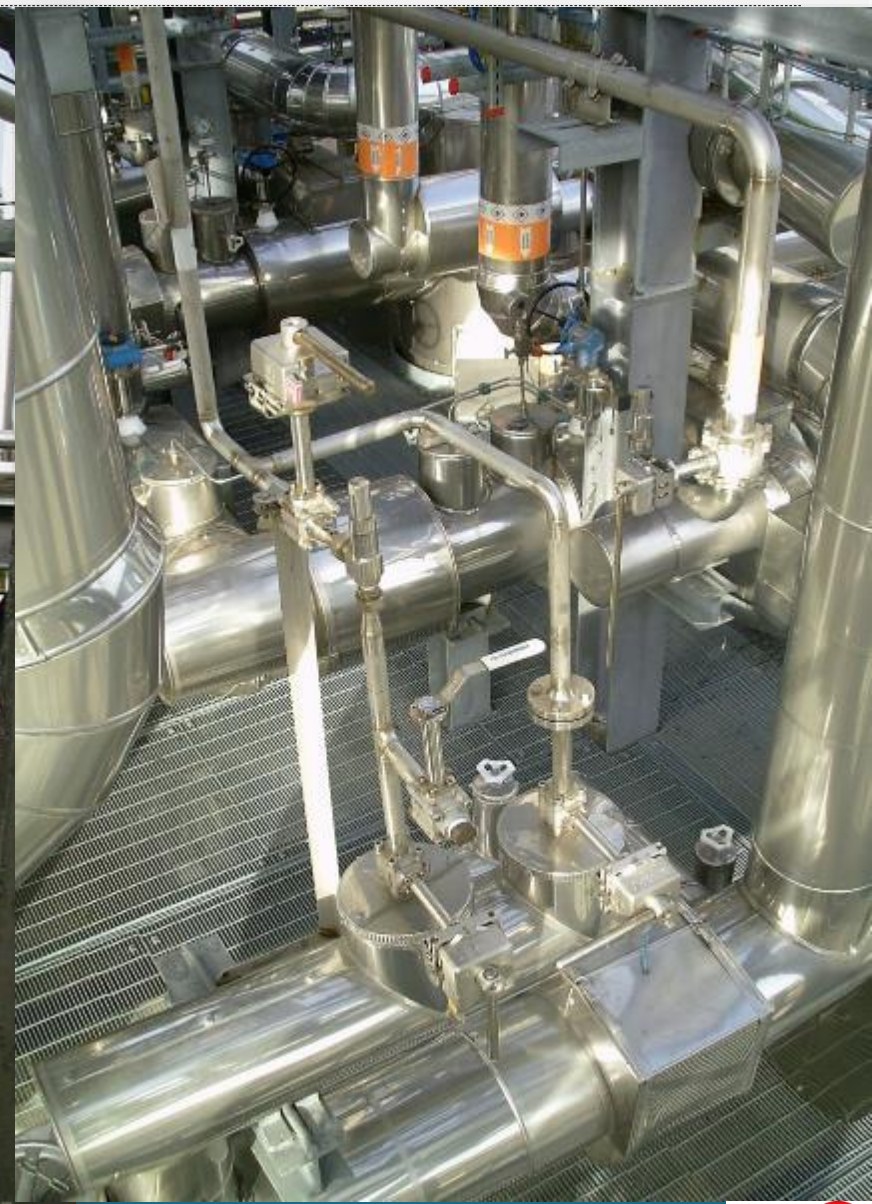
Cryogenic Valves
On The Field –
Exxon CFZ

Cryogenic Valves on the Field

CNOOC Fujian LNG Terminal
High Pressure Cryogenic Class #2500, -196°C degrees



Cryogenic Valves on the Field | LNG Terminal in Sweden



Cryogenic Valves

- Safety in Operation
- Safety During Maintenance
- Safety in Hazardous Environments

SAFETY



Fire safe by design

Inspired By Challenge

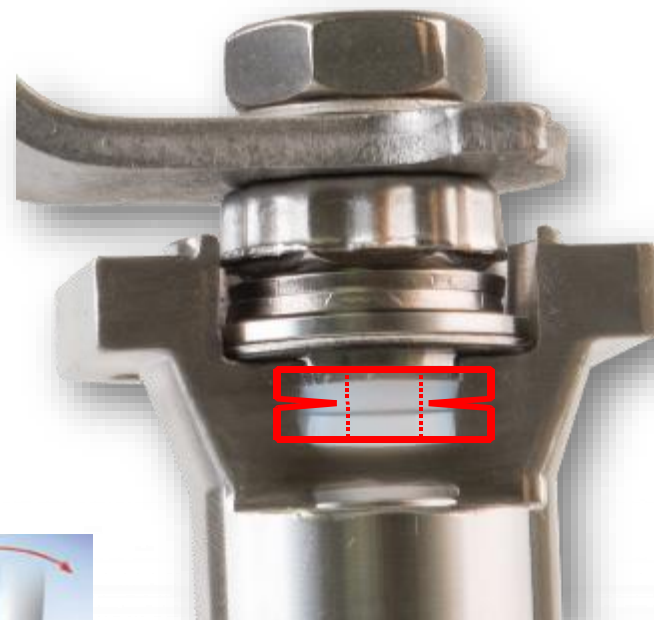
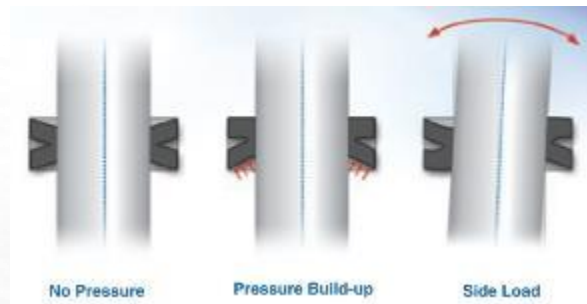
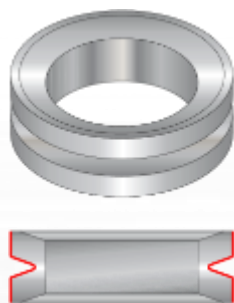


Safe Operation

Inspired By Challenge

Fire safe by design

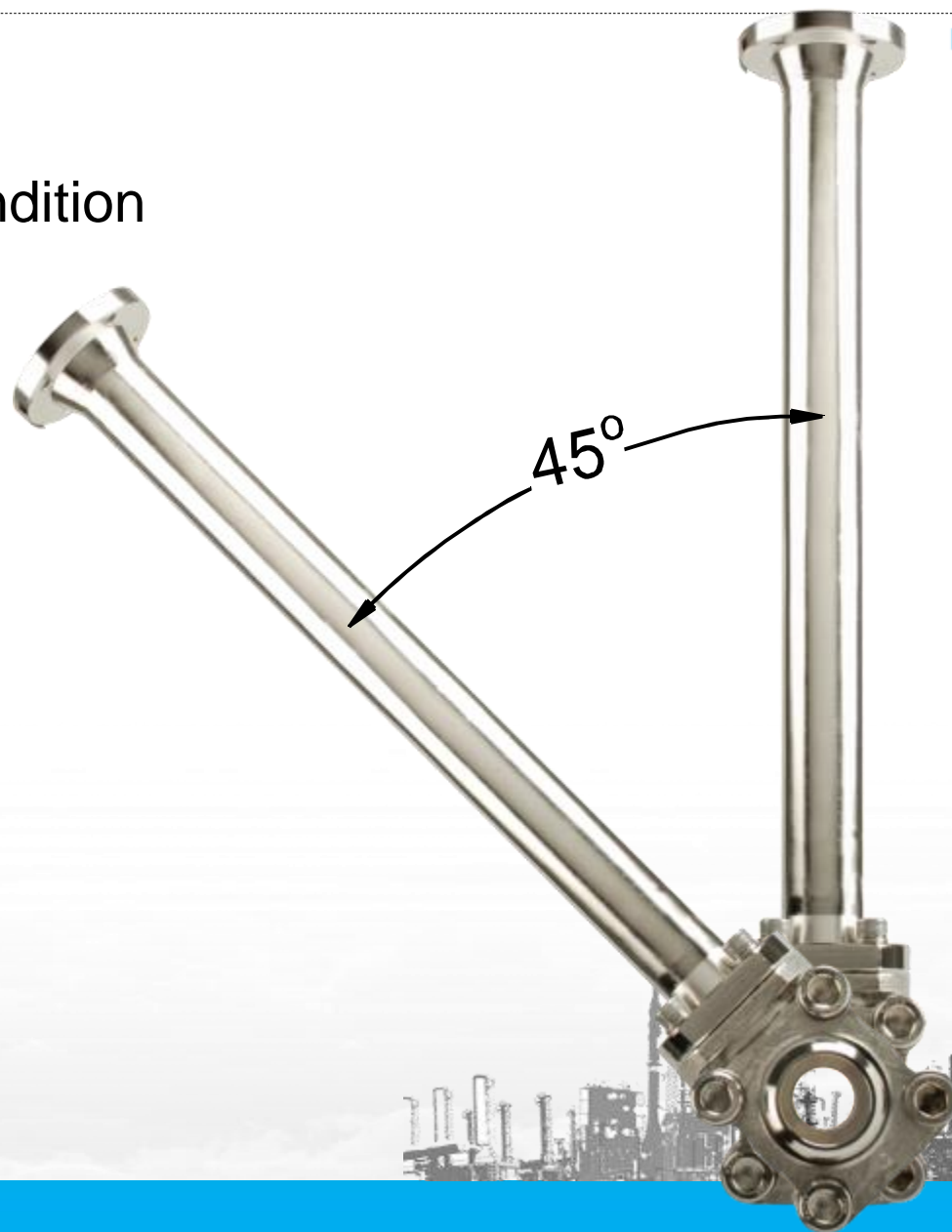
- Graphite free fire safe HermetiX™ stem seal
- 500,000 cycles tested maintenance free
- Certified to ISO 15848-1 for fugitive emission



Safe Operation

- 45° inclination limitation
- Stem seal remains at ambient condition
- Minimize fugitive emission
- One piece bonnet (made without welding)
- Full compliance with BS 6364

Inspired By Challenge



Safe Operation

Inspired By Challenge

Fire safe by design

Burnout of soft seats provide metal to metal sealing against a fire lip



Safe Operation

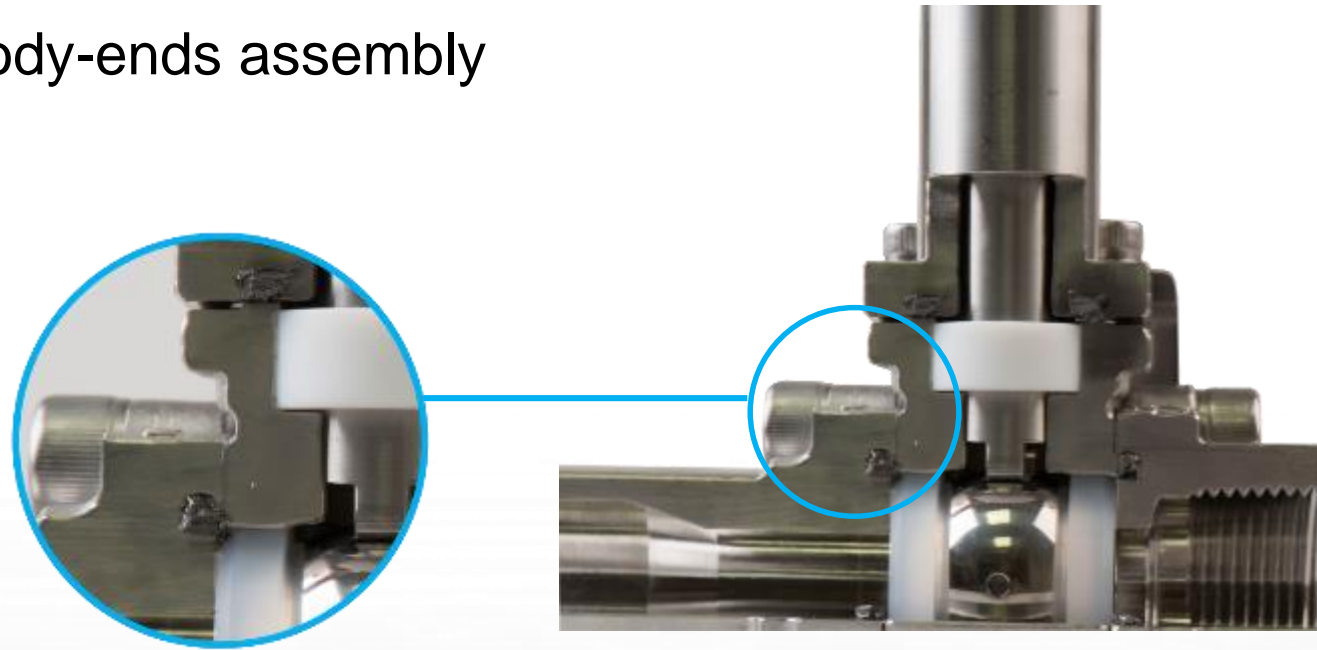
Inspired By Challenge

Fire safe by design

Tongue and groove design

Labyrinth leak path

Aligned and accurate body-ends assembly



Safe Operation

Fire safe by design

Minimum thermal expansion /contraction
When an object is heated or cooled, its length changes by an amount proportional to the original length and the change in temperature

One-size-up, Short bolts

Inspired By Challenge



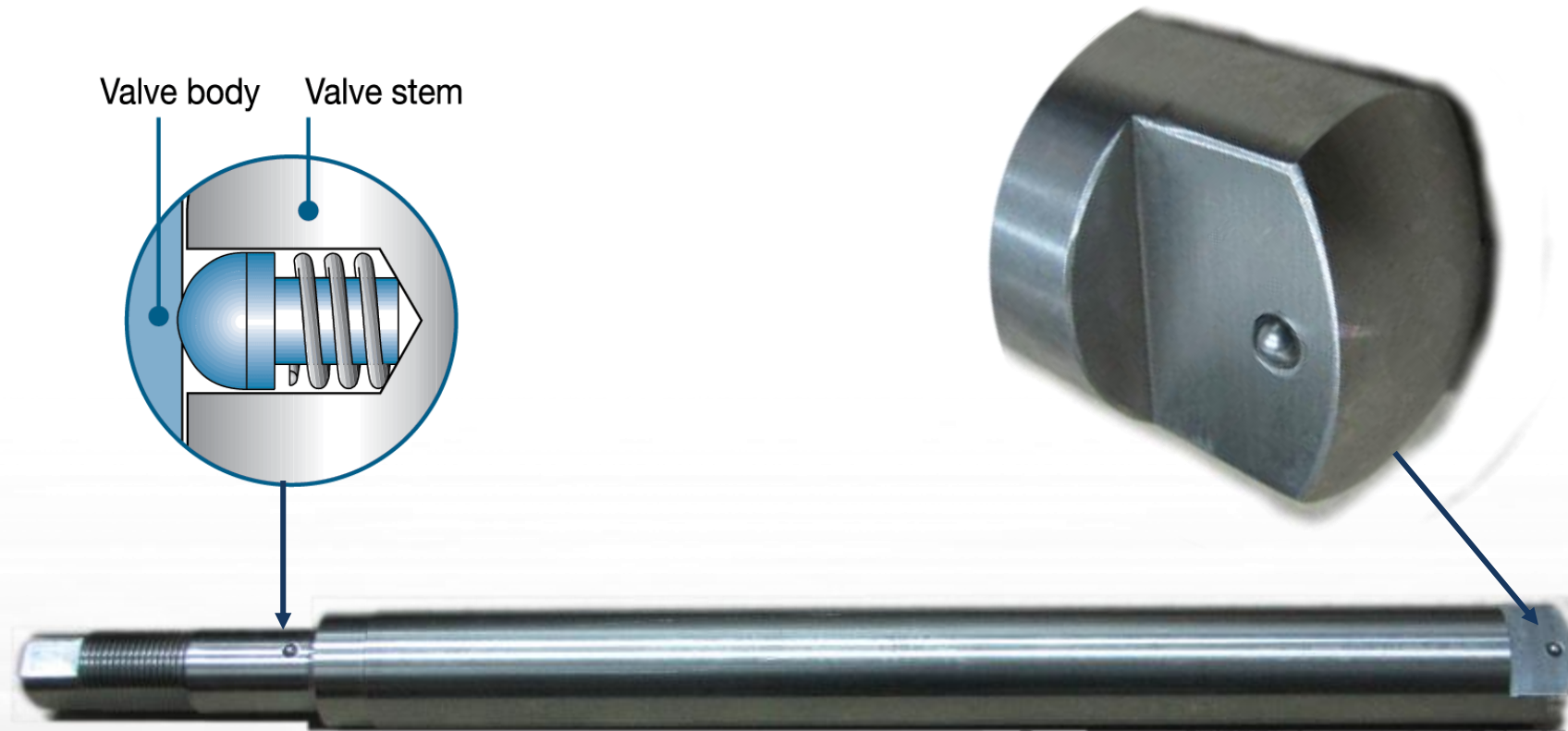
Safe Operation

Inspired By Challenge

Anti-static device - as standard

Spring Loaded Plunger

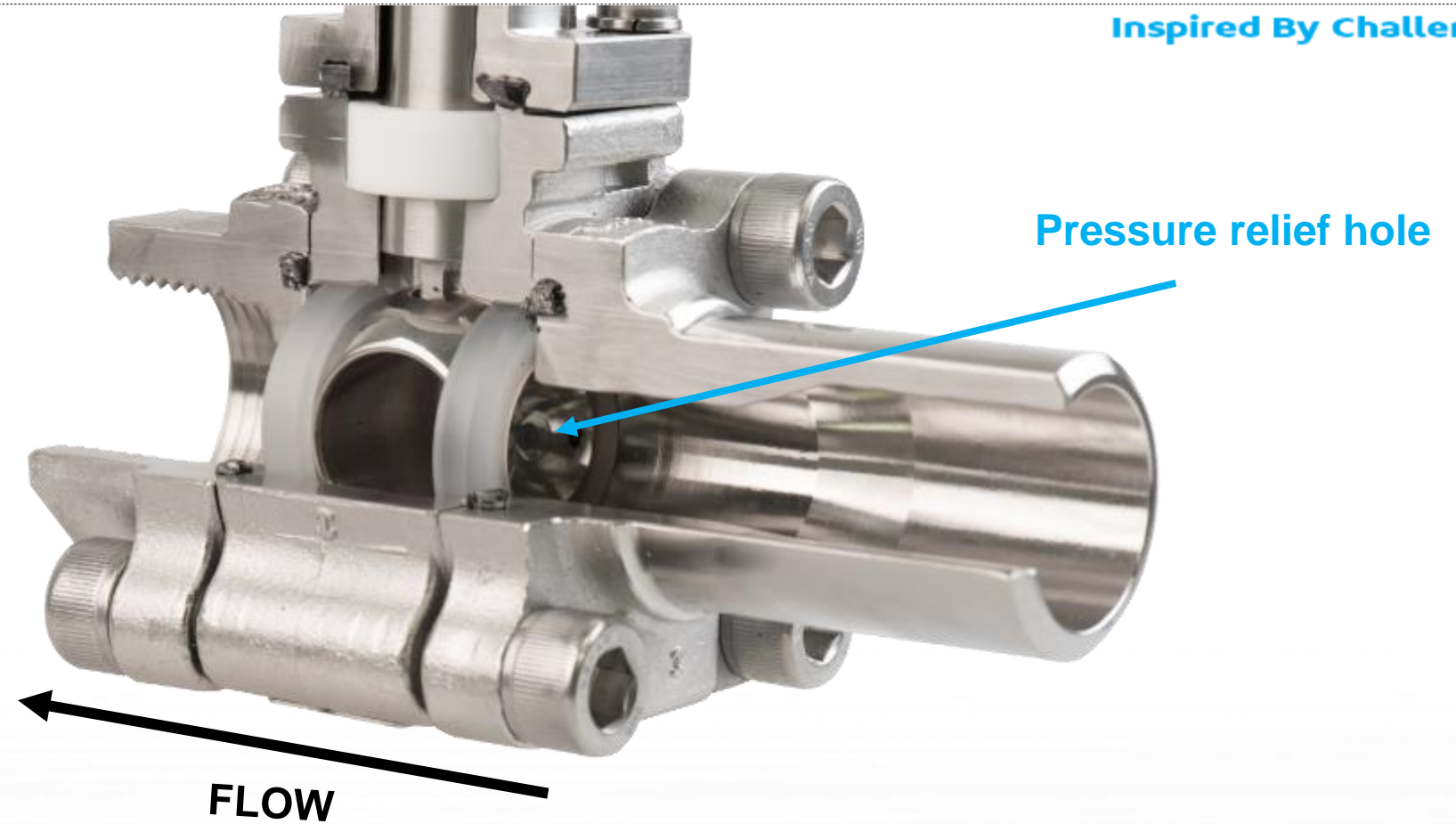
Electro-static discharge - Grounding of valve rotating parts



Safe Operation

- Cryogenic valve are unidirectional
- No trapped cavities are allowed (BS6364)

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Safe Operation

Inspired By Challenge

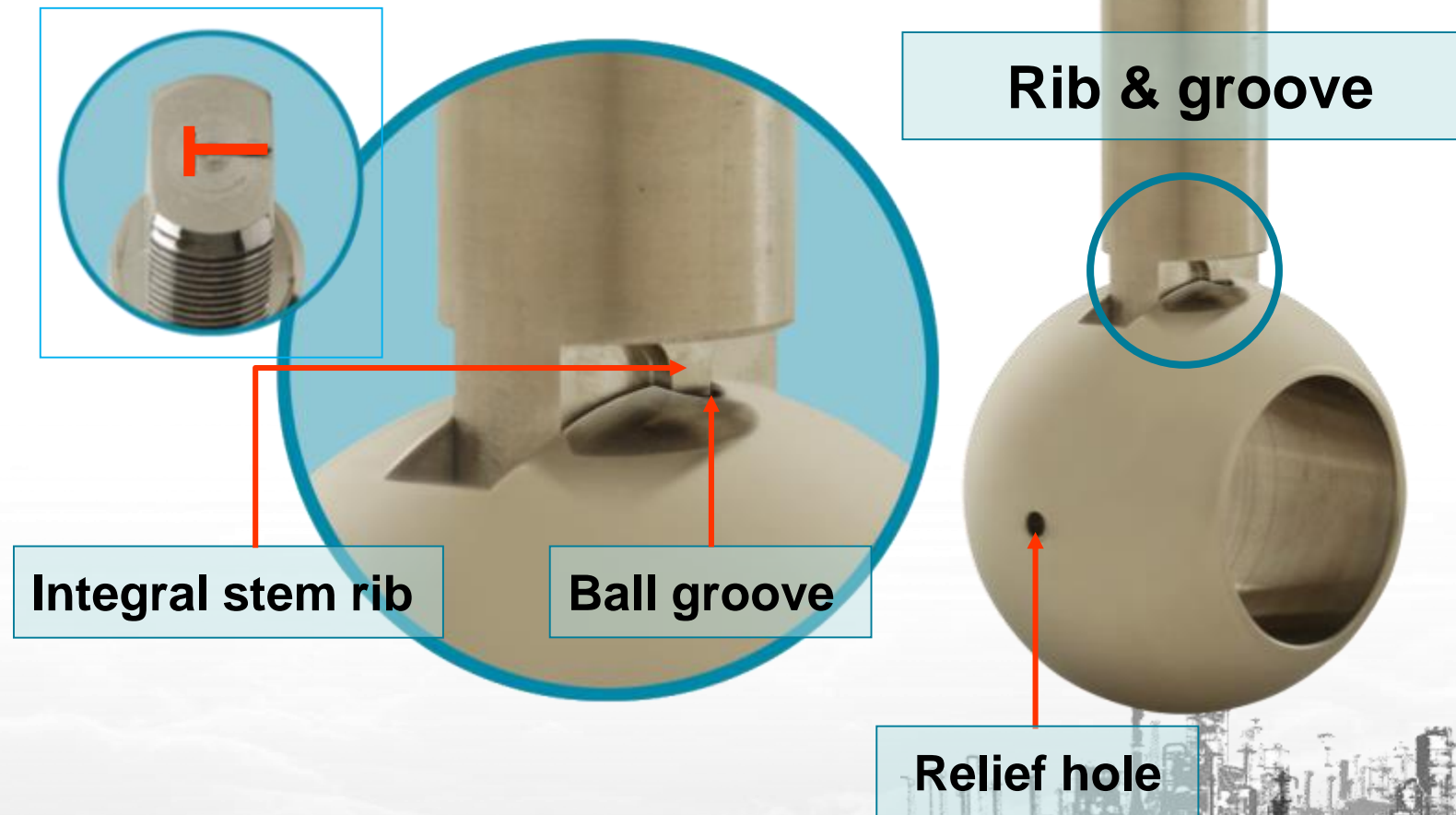
- Efficient heat transfer
- Thin layer between stem OD and bonnet ID
- Stem seal at ambient condition
- Minimize fugitive emission



Safe Maintenance

Inspired By Challenge

Orientation determination for safe field service



Safe Maintenance

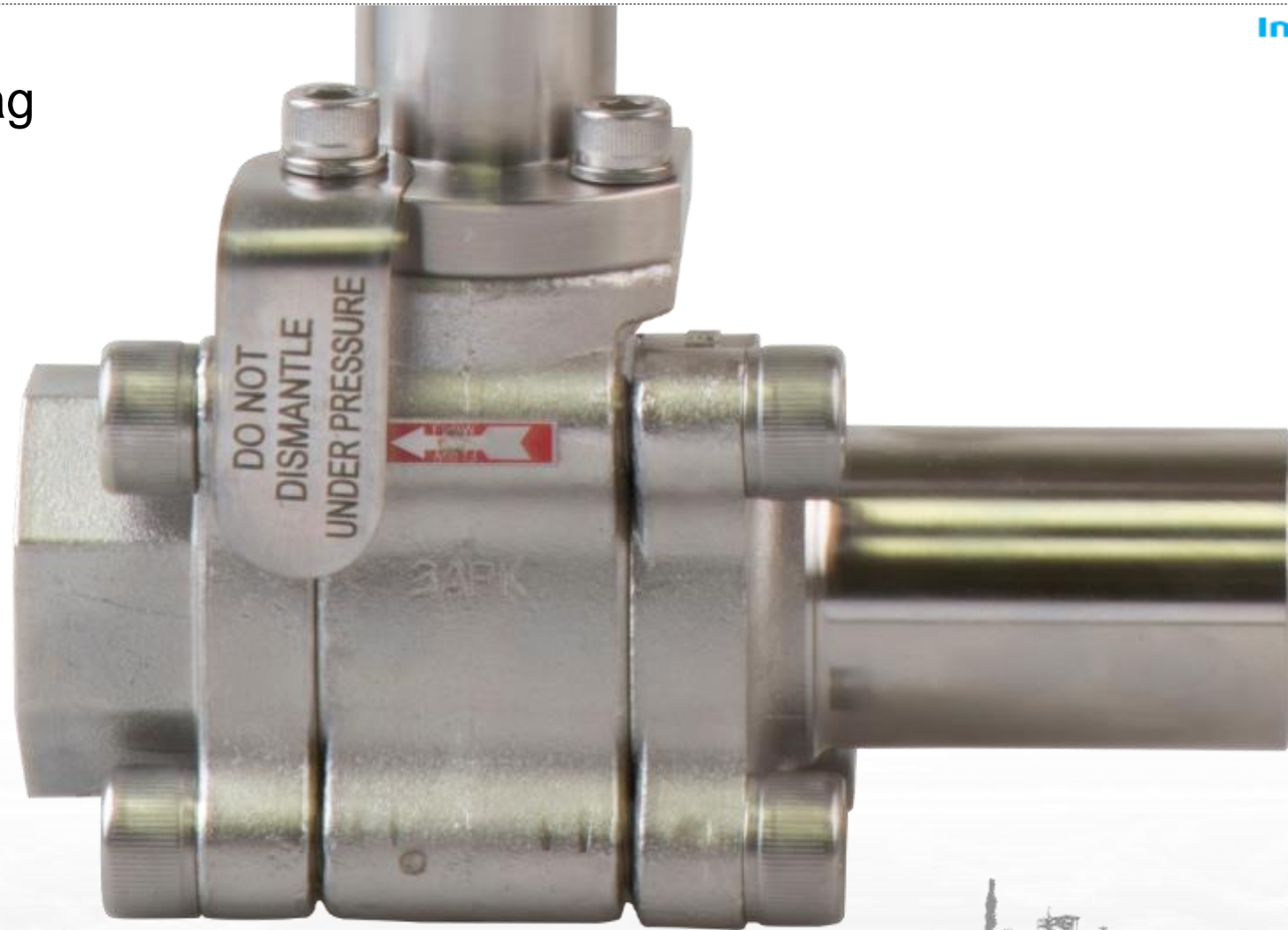
Flow direction indication



Safe Maintenance

Inspired By Challenge

Do not dismantle Tag



Safe Maintenance

Flexible Choice of Bonnets

12" Standard BS6364 bonnet
(10" between welding)
6" Bonnet

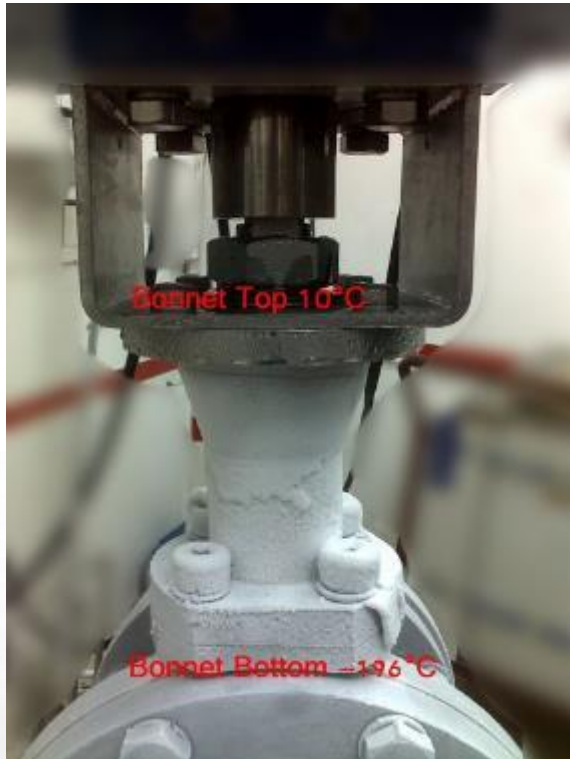
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6" Bonnet Benefits (none BS6364 standard)

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- Suitable for confined space applications
- Needless for radiographic test
- Cost effective



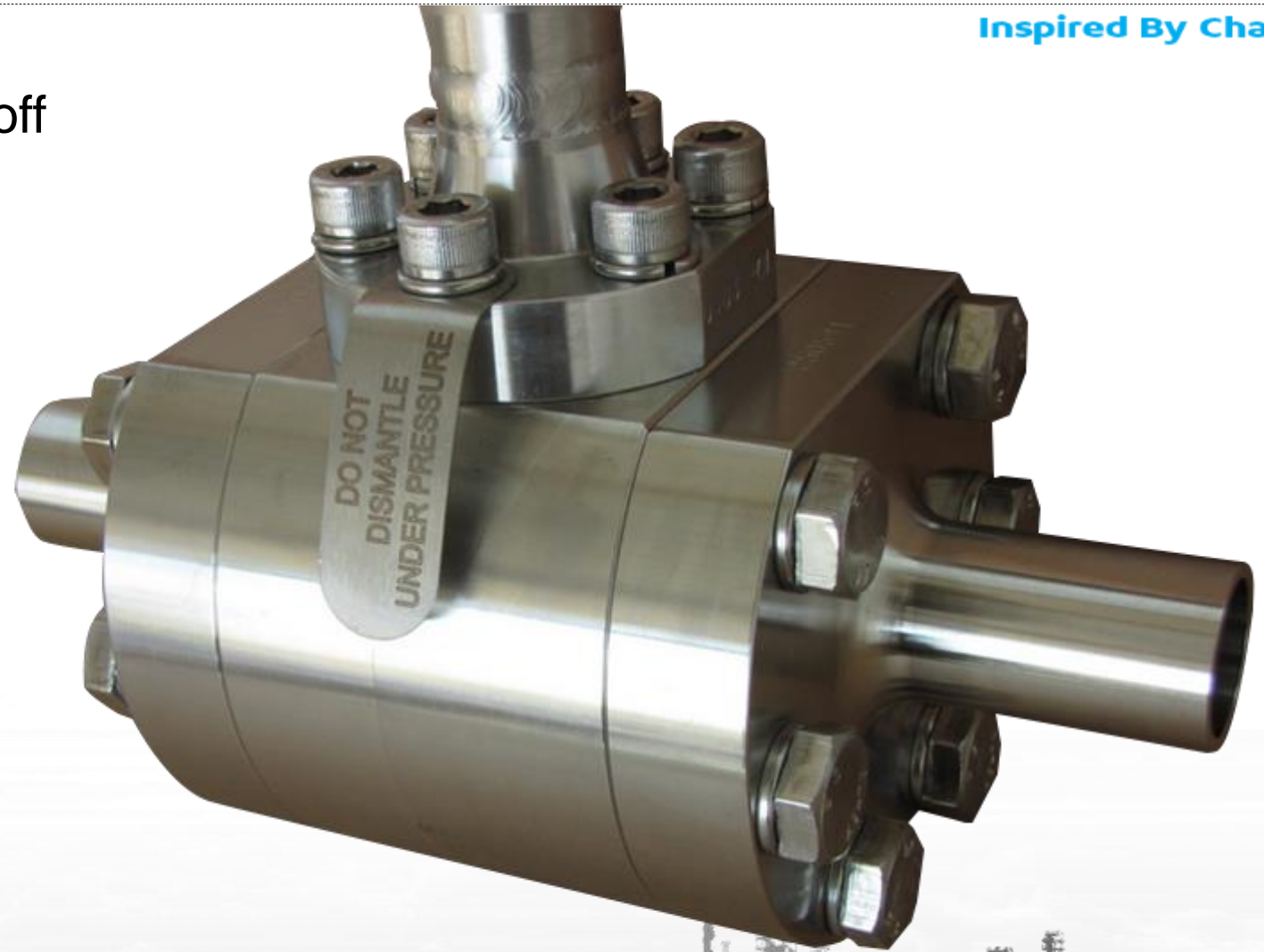
6" bonnet cryogenic test
After 4 hours immerse in LN_2 (cryogenic condition)
bonnet top temperature
measured at $+10^{\circ}C$



High Pressure Cryogenic Valves

Inspired By Challenge

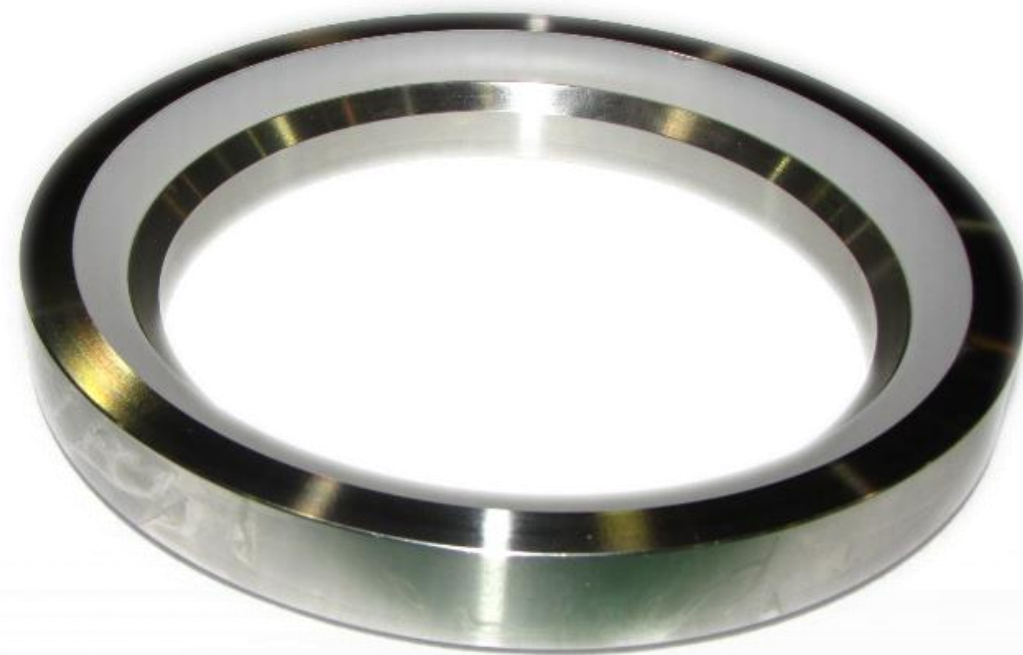
- High Pressure Cryogenic Shutoff
- Up to 414 Bar / -269°C
- Hybrid PCTFE (KEL-F) Seats



High Pressure Cryogenic Valves

Inspired By Challenge

- Hybrid Seats
- Metal housing and PCTFE inserts
- Safe operation under Class 2500 differential pressure
- Lower torque than metal seated valve
- EN12266-1 Rate A bubble tight shut-off



High Pressure Cryogenic Valves

Inspired By Challenge



Cryogenic #900
Metal Seat Valve



Cryogenic #900 Metal
Seat Control Valve



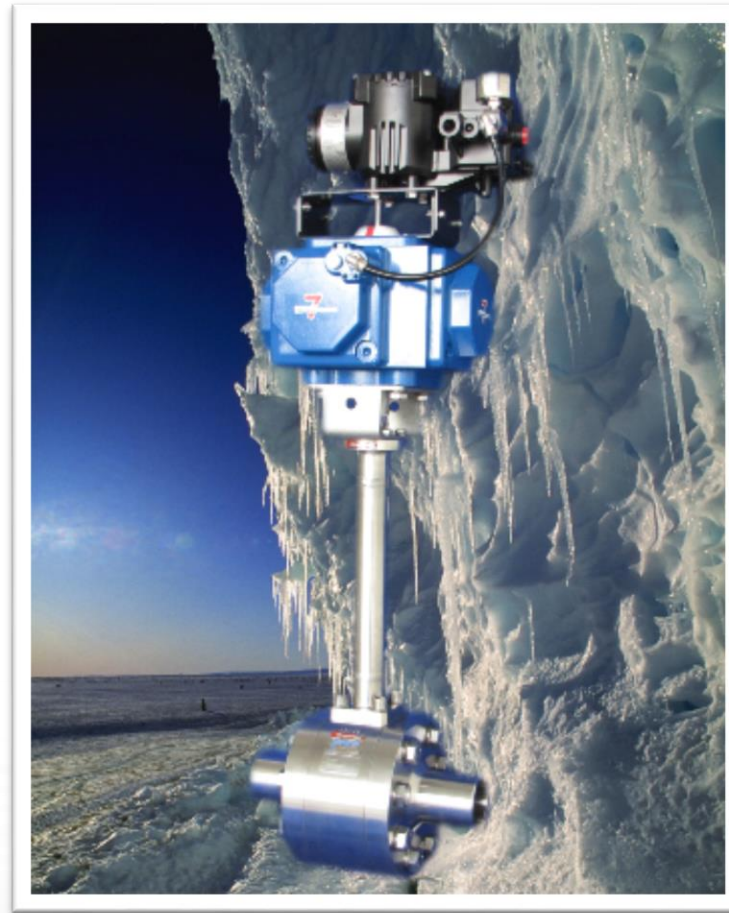
C28z



High Pressure Cryogenic Valves

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- High Pressure Cryogenic Metal Seated Control Valve
- Class 900 / -260 C
- Superior Performance
- Trouble Free Operation
- Full DP open \ Close



High Pressure Cryogenic Valves

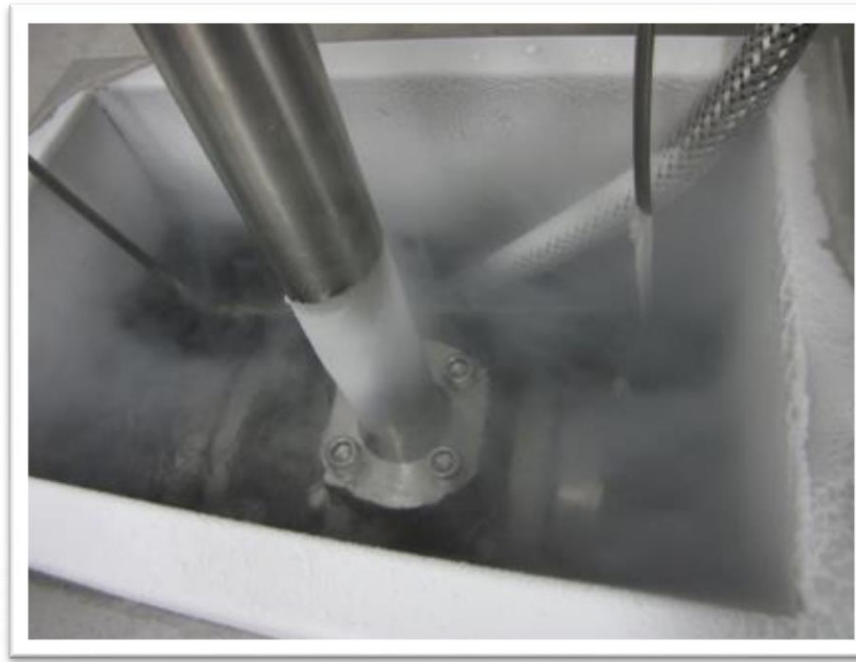
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Quality Control

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In house cryogenic test



Quality Control

- NDT Testing – On request
- PMI-XRF tests
- Cryogenic Impact tests on foundry and bar stock materials



Inspired By Challenge

Report No. B/000876
Page 2 out of 2
Work No. 28340



תלם המחקר והפיתוח במ"מ
THE RESEARCH AND DEVELOPMENT FOUNDATION LTD.
מכון המטאלורגיה
ISRAEL INSTITUTE OF METALS

1 Introduction

The client provided the Metallurgical Lab of the Israel Institute of Metals, with 2 impact specimens without notch, Part No. B32-100, Heat No. 248182. According to the client the specimens were prepared from ASTM A479 S31600/S31603 round bars. We were asked to perform impact test at -196°C according to EN 10045-1.

2 Impact test

The test was performed according to EN 10045-1 Standard "Charpy impact test on metallic materials –Part 1: Test method (V- and U-notches)". The impact test was carried out using a Wolpert impact testing machine (available energy 300J). The specimens were cooled in liquid nitrogen (-196°C) at least 10 minutes and were tested within 5 seconds of the time of removal from the liquid medium. The test results are presented in Table 1.

Table 1. Impact test results.

Part No. / Heat No.	Impact energy, Joule		
	1	2	average
B32-100 / 248182	164	163	163



Quality Control

Inspired By Challenge

NDT testing – Cryogenic Charpy test **on request**

Cryogenic Impact tests on
Bar stock materials



Success Criteria
EN 10045-1
 $K_v > 60J$
Lateral Expansion
 $> 0.381 \text{ mm}$

Same Test can be done on foundry,
where 24 week lead time is required



Series in Range

- Three piece C47
- ANSI standard port flanged 150/300 C31 & C32
- ANSI full port flanged 150/300 C73 & C74
- DIN EN1092 full port flanged C77 & C78
- High Pressure C28 #2500

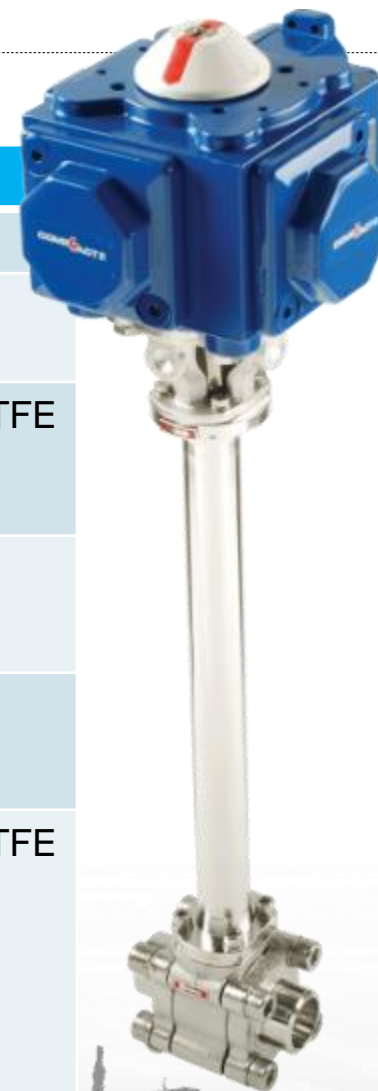
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Choice of Materials

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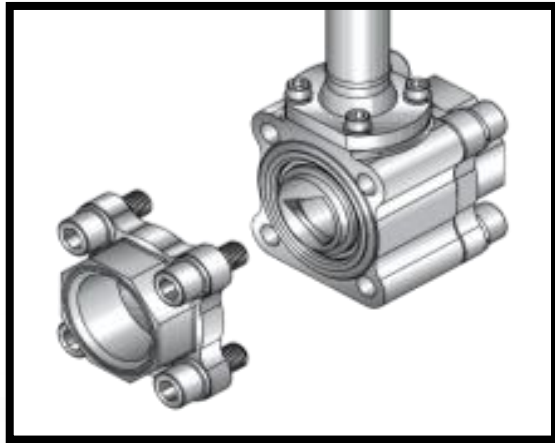
	Body	Ends	Seat	Seal
Cast Valves	CF8M	CF3M		
Bar Stock Valves	A479 S316/316L	A479 S316/316L		
Technical Air Gases			CF PTFE \ TFM \ PCTFE	Graphite \ PTFE
Fire Safe Execution (LNG)			CF PTFE \ TFM \ PCTFE	Graphite
LOX & Foodstuff Execution			TFM \ PCTFE	PTFE
Ultra Low Leak, Extreme Low Temperatures $T < -200\text{ }^{\circ}\text{C}$			PCTFE	Graphite \ PTFE



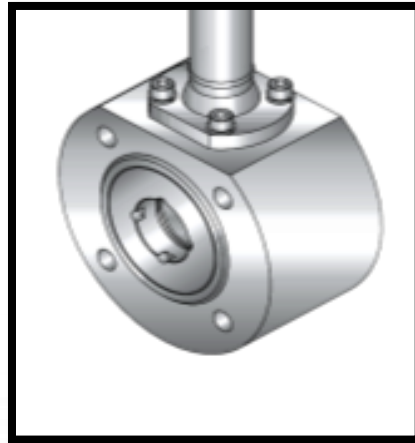
Cryogenic Valves Series

Special Cryogenic Valves

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Control



Wafer Style



Emission
Control



Cryogenic Valves Series

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Multiport and diverter cryogenic lines are extremely flexible and space saving valves. Enable the piping and machine designer to save valves, space, flow elements, while enhancing safety and simplicity.



Cryogenic Valves - Special Developments

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Cryogenic #600 6"
Full Port Valve



Cryogenic Valves - Special Developments

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- Cryogenic Double Block And Bleed
- Allows Safe Furnace use of Liquid Oxygen and Fuels
- Thermal Relief of Body Cavity – Optional

**Cryogenic #150
DBB Valve**



HABONIM Cryogenic Valves – Key Clients

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SPACEX

ORMAT®



AIR
PRODUCTS



Blue Origin USA

HEROSE

WÄRTSILÄ

EXON
Mobil

THE LINDE GROUP



CHART
Innovation. Experience. Performance.™

BOC



Thank You

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