ZOOM, 29th of April 2021

Philip Fedosenkov & Dennis van den Brink

Who are we?

- **Founded in 1965 in Liberty, Missouri**
- **Global leader in advanced technologies for rupture disc and low-pressure valve applications**
- **Sales & Engineering offices in USA, Europe and Asia**
- **> 400 employees worldwide**
- **Tinicum (Robert Family Holdings)**

  We diligently avoid imposing artificially short time horizons on the businesses we own. Rather, Tinicum's patient capital allows us to invest—and the managers of our businesses to operate—in ways that build businesses for the long-term

ITCO

Who

Liberty, Kansas-City (Missouri)
USA Headquarters & Factory CDC

Zoeterwoude, Holland
European Headquarters

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Where we do it

Rupture discs non-reclosing pressure relief safety device that, in most uses, protects a pressure vessel, equipment or system from overpressurisation or damaging vacuum conditions.

Process Plants:

Chemical
Pharmaceutical
Nuclear
Food & Beverage
Refining
Pulp & Paper
… and many more

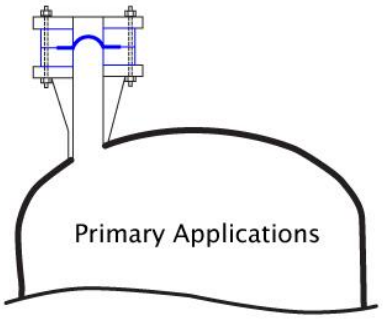
Transportation of intermediates and finished products:

Intermodal
Tankers
Pipelines

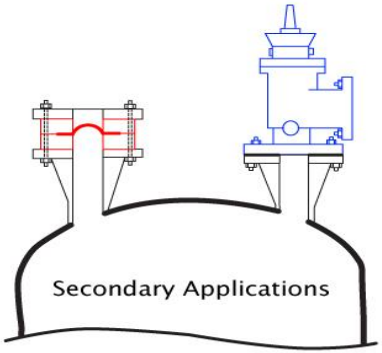
Storage:

Tankfarms
On-site storage etc

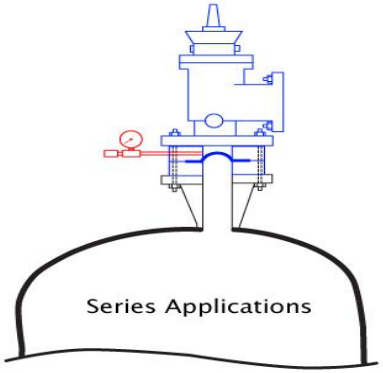
How are they used?



Primary Relief



Secondary Relief



Series Relief

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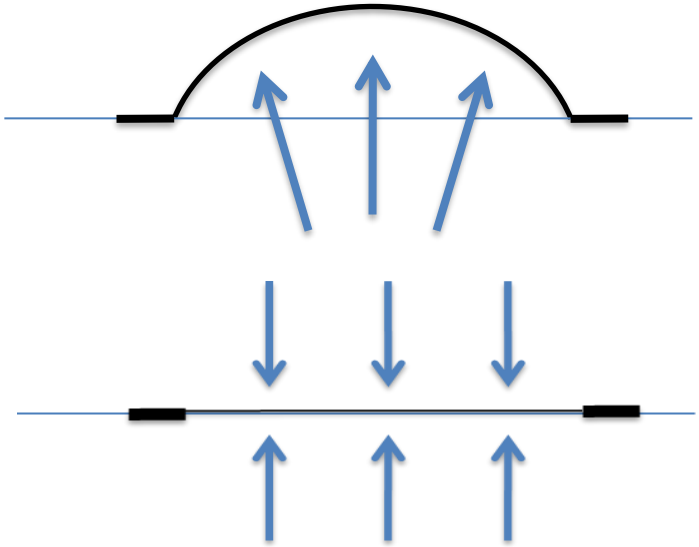
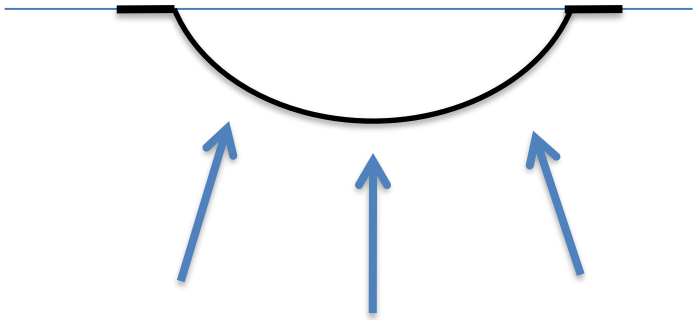
Forward Acting or Reverse Acting



- Forward Acting
- Also known as Tension Type
- Typically limited to static service
- Susceptible to fatigue in cyclic service



- Reverse acting
- Precise performance
- Highly resistant to fatigue in cyclic service
- Superior maximum working pressure ratio

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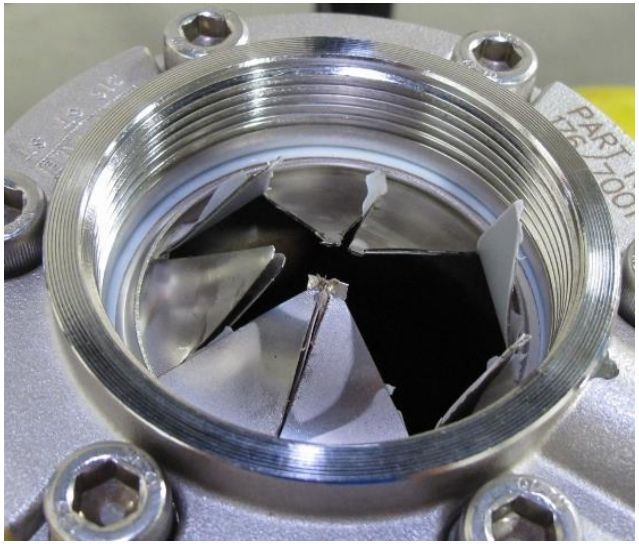
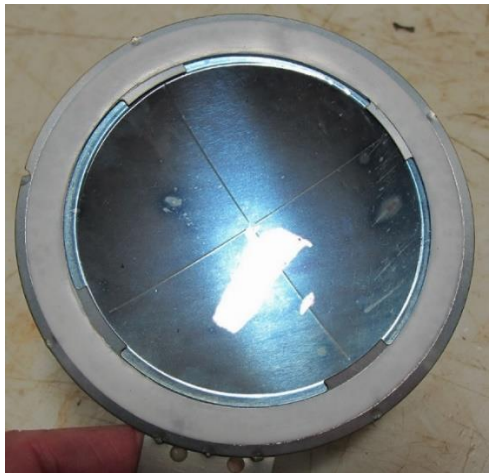
Rupture Disc Design Flat Forward acting

- Oldest disc technology still used sometimes for very low pressure applications
- Prone to fatigue failures due to flexing
- Poor maximum working pressure ratio (typically 40 – 50%)
- Reduced flow characteristics



Rupture Disc Design Domed Forward acting



- Most commonly used design for ITC applications
- Domed to mitigate the affect from flexing
- Superior flow compared to flat designs
- Increased flow capacity designs are available

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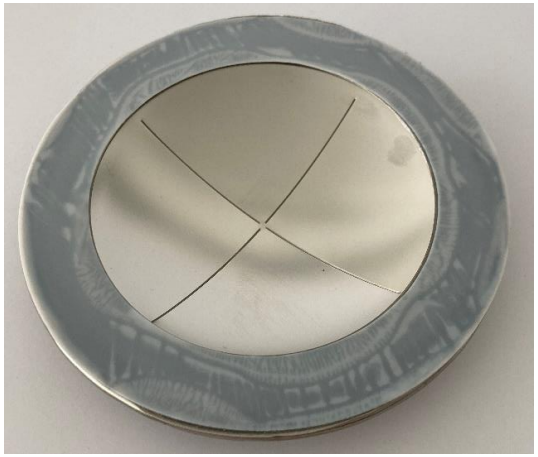
Rupture Disc Design Domed Reverse acting



- **Mostly used for Gas tank containers**
- **Excellent fatigue resistance**
- **Leak-tight design**

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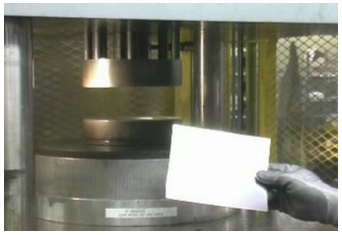
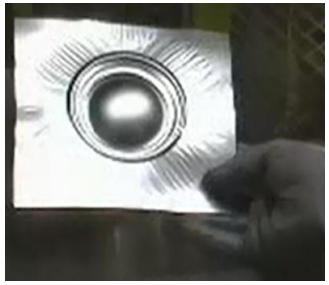
Manufacturing

The customer's perspective ……

Manufacturing (it's all about "Finding" the burst pressure)





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The importance of lot sizes

- The overhead of the set up costs, finding the burst pressure, then the final burst tests and producing the actual discs for delivery are spread across the LOT

- If this total cost $1,500
  - 1 disc for delivery will cost $1,500.00
  - 3 discs for delivery will cost $500.00 each
  - 5 discs for delivery will cost $300.00 each

Testing (Lot Qualification)

- Dye penetrant test *(non destructive test, each disc)*
- Fragmentation burst test (1)
- Safety ratio burst test (1)
- Liquid burst test (2)
- Qualification burst test (no less than 2)
- Cycle test (1)
- Proof pressure test *(n/d test for all remaining discs)*

Installation

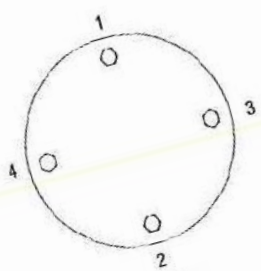
GEP-6088
Ref. I.D.: 101413

Continental Disc® Corporation

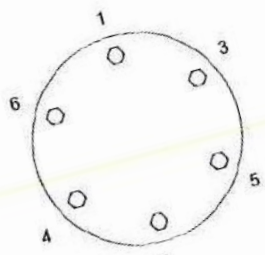
Preparation and Installation of the 65mm (SC16127) ICON XL (FS) Rupture Discs

Repeat 20% increments and cross torquing pattern until final torque value is achieved. Recheck all bolts in rotational sequence at final torque value.

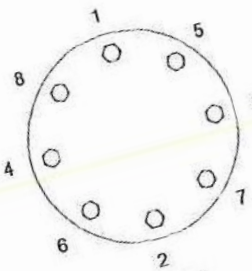
Figure 'B'
EXAMPLE OF
BOLT TORQUE SEQUENCE



4 BOLTS



6 BOLTS



8 BOLTS

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Bolt Diameter	Number of Bolts	Torque (Ft•Lbs)	Torque (N•m)
10mm (.39")	6	15	20
16mm (.63")	8	18	24
16mm (.63")	4	35	47

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Cause of Rupture

- Rupture discs are FAIL SAFE and REPEATABLE
- Rupture discs have ONE FUNCTION – They BURST
- The most frequent causes of rupture discs failing early or bursting below their stamped pressure are:
  - Damage during handling, storage or INSTALLATION
  - Damage caused by CLEANING-JET PRESSURE
  - The WRONG Material being used or specified

    Often driven by lack of understanding or cost

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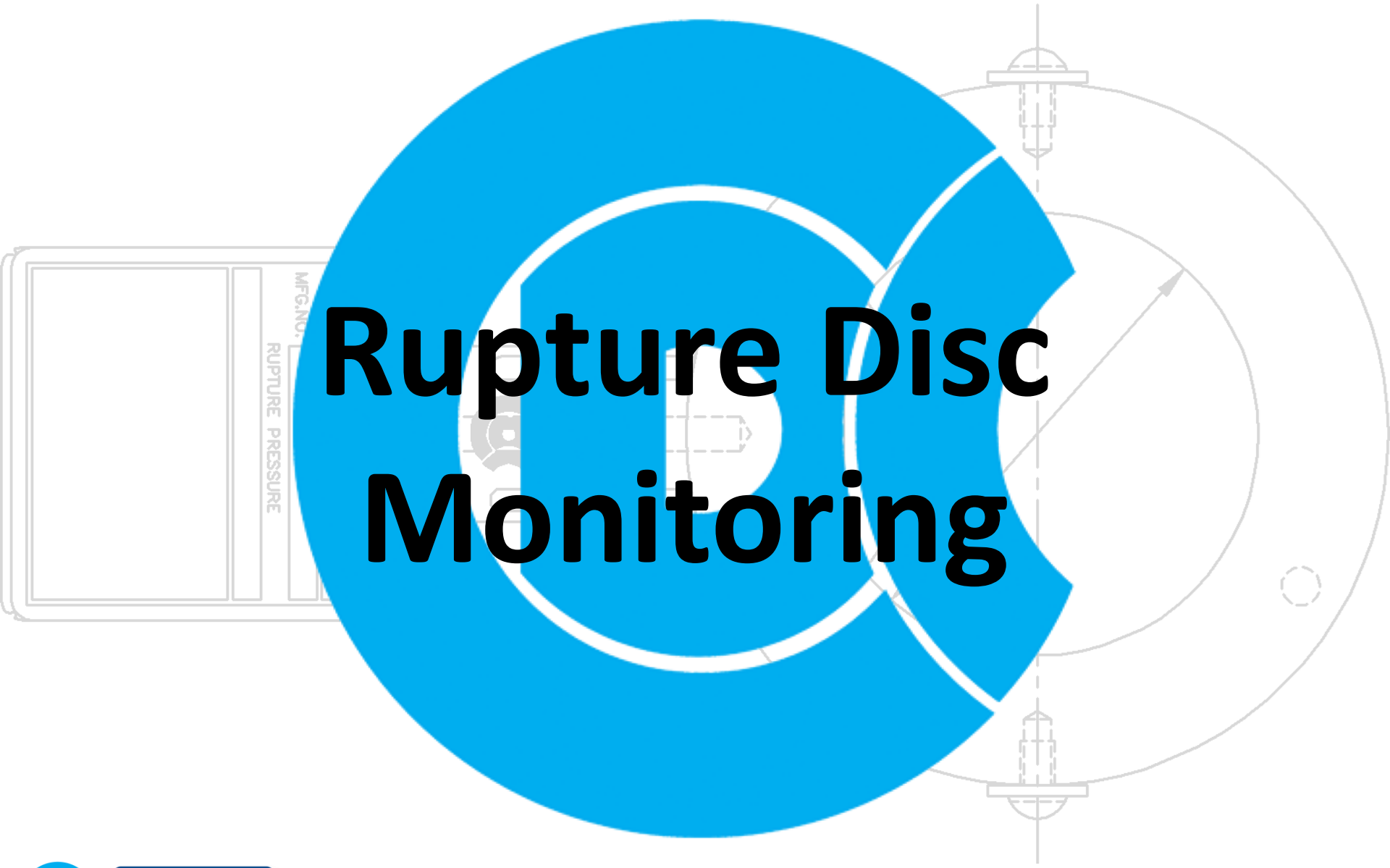
Damage during handling, storage or INSTALLATION

Rupture Disc Monitoring



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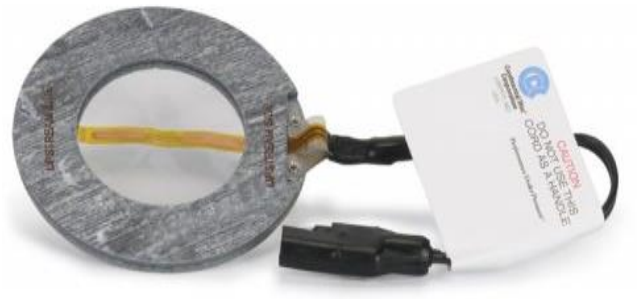
Rupture disc burst detection

- Integral BDI

- Separate BDI



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Q&A

CONTINENTAL
DISC CORPORATION
LIBERTY, MO USA www.contdisc.com 1-816-792-1500
TYPE
MAT'L
MFG.NO.
RUPTURE PRESSURE
Thank you

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