ALTERNATIVE SPIRAL WOUND GASKET FILLER MATERIAL TO REDUCE FLANGE FACE CORROSION

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>300 PLATFORMS

>8,000 KM OF PIPELINES

>1 MILLION GASKETED FLANGE CONNECTIONS
“Every flange connection in a plant is an essential built-in weakness that allows the overall plant to be stronger in the long-term by giving it the power to be maintained safely and upgraded with relative ease.

All it takes is one of these weak links to not be strong enough for the whole system to fall apart.”

- Some Smart Pipeline Engineer
CONTENT

• Corrosion – the hidden enemy
  Corrosion: challenges & mechanisms
• Current products on the market
  Where are we at?
• The New Solution
• Testing
• Summary
Bolted flange joints can be vulnerable to gasket degradation and flange face corrosion.
CORROSION – challenges & mechanisms

Detection  Waste  HSE  Shutdown (Unscheduled)  Cost
Traditional Sealing Materials

- **Graphite** is widely used for spiral wound gaskets. An electrical conductor and highly “noble” so promotes corrosion.

- **Mica** is sometimes chosen in place of graphite however it exhibits very poor sealing characteristics.

- **PTFE** is not fire safe. Associated with increasing crevice corrosion in certain applications.
Seawater is an electrolyte with well-known effects on different materials.

Graphite is the most noble, causing corrosion of common stainless steels.

Relative position in the table, distance apart, contact area, temperature, flow rate all affect corrosion.
CORROSION – challenges & mechanisms

1. Flange and gasket material remain important criteria to avoid corrosion

2. Choosing the right gasket can have significant impact on galvanic corrosion prevention

3. The selection of traditional gasket materials leads to problems
Market need for new materials

combining optimum sealing properties and corrosion resistance
New Material (CORRICULITE) Development

• Formulation optimised for corrosion applications
• Inert, non-conductive filler material prevents the onset of galvanic corrosion
• Improved sealing performance compared to graphite-filled spiral wound gaskets
• Fire safe to API 6FB
PRODUCT PERFORMANCE VALIDATION

AMTEC sealing test
Measures leakage rates against a gasket stress with internal pressure at different temperatures

Corrosion testing
Evaluates gasket materials resistance to seawater induced corrosion

Electrochemical evaluation
Records the electrochemical potential of sealing materials

Submerged testing
Evaluates gasket sealing capacity under "real world" conditions in a flanged connection
AMTEC SEALING TEST

- A flatter line is better as it indicates resilience to unloading in service.
- New Material significantly tighter than both graphite and mica.
CORROSION TESTING

PTFE Isolator
PTFE Isolator
PTFE Isolator
PTFE Isolator
PTFE Isolator

THERMICULITE
NEW MATERIAL
NEW MATERIAL

GRAPHITE

Control sample
No visible corrosion
No visible corrosion
Corrosion due to presence of graphite
ELECTROCHEMICAL EVALUATION

- The graphite gasket initiates corrosion at a level around half that of the New Material sample.
SUBMERGED TESTING

• https://vimeo.com/210782491
• VIDEO
SUBMERGED TESTING

• Flange assemblies submerged in seawater and pressurized with Nitrogen.
• New Material (4%)
• Graphite (17%)
• Mica (20% in 1 hr)
FIRE SAFETY – API 6FB

• Pass achieved
• Zero leak rate measured
SUMMARY

• Addresses shortcomings of current materials on the market.
• Extends equipment life by preventing corrosion
• Eliminates safety & environmental risks
• Reduces downtime & production losses
• Reduces costs associated with maintenance
• Maintains seal integrity even in an external fire situation
THANK YOU
ANY QUESTIONS?

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