GPT Industries

Technical Corner
How to Spec an MIJ

31 August 2022

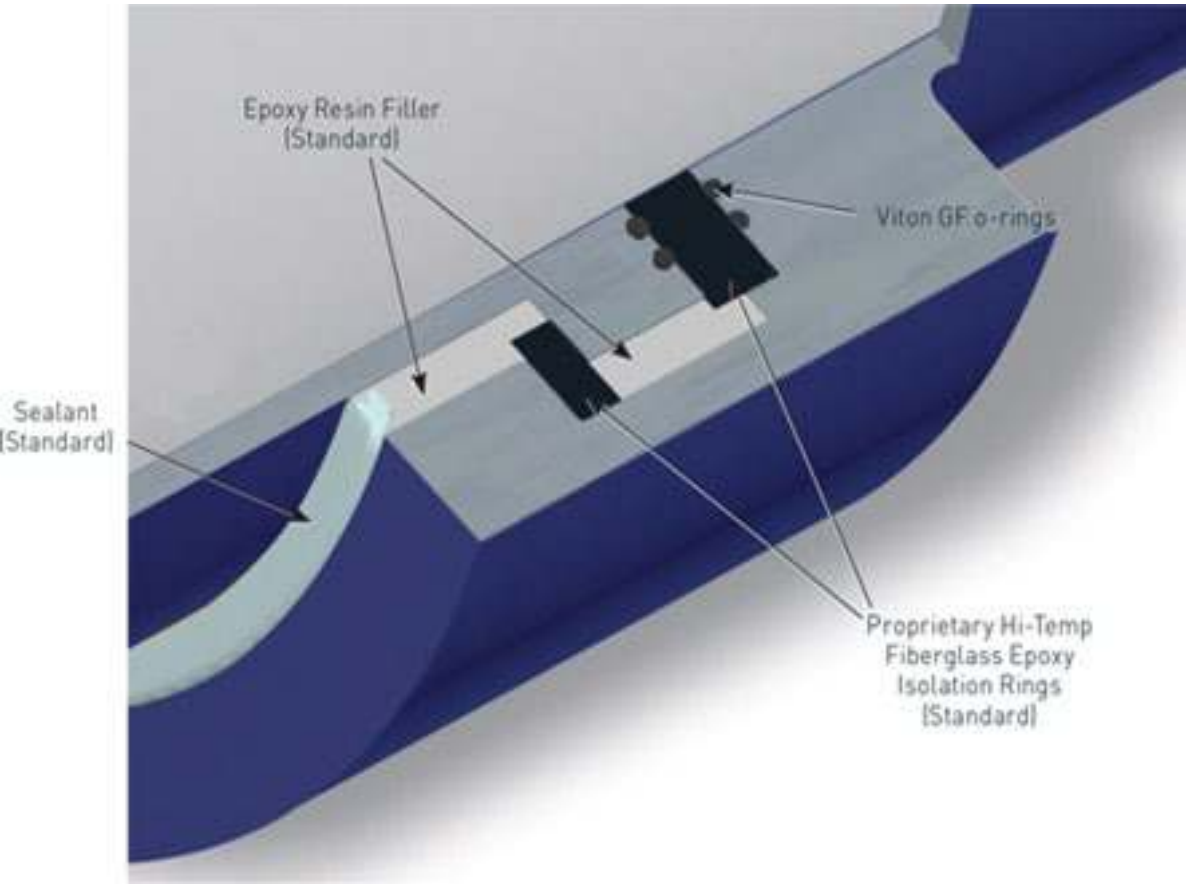
Agenda

- Overview of an MIJ
- Design types and validation testing
- Steel components
- Sealing elements
- Isolating elements
- Coating ID and OD
- Individual MIJ testing
- Commonly referenced codes and standards for acceptance testing

What is an MIJ? Where do I use it?

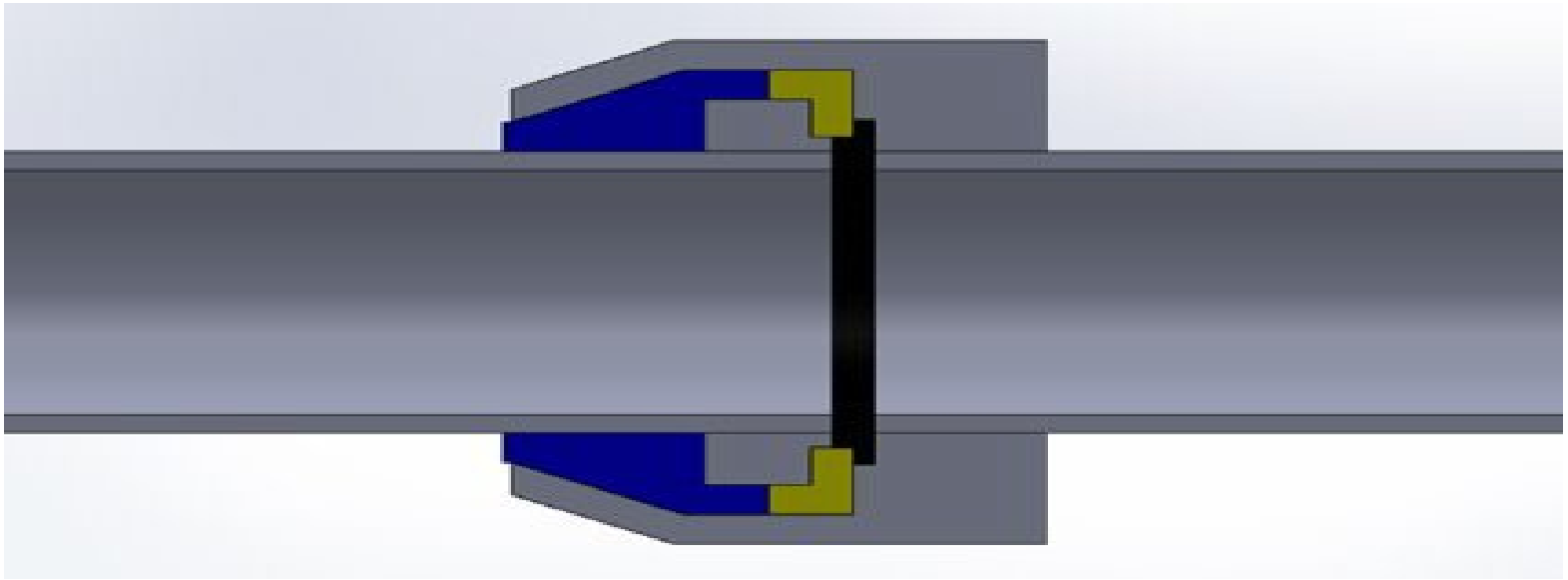
- Monolithic Isolation Joint
- Completely contained Isolation
- Sealed to external elements
- Buried applications
- Transition from below to above ground
- Vulnerable above ground applications (extreme climates)

MIJ Design Options – Double O Seal



- Most used design for MIJs
- Provides the option to select a specific sealing and/or isolating material
- Creates a labyrinth sealing path
- Customizable design usable for all diameters and pressure classes

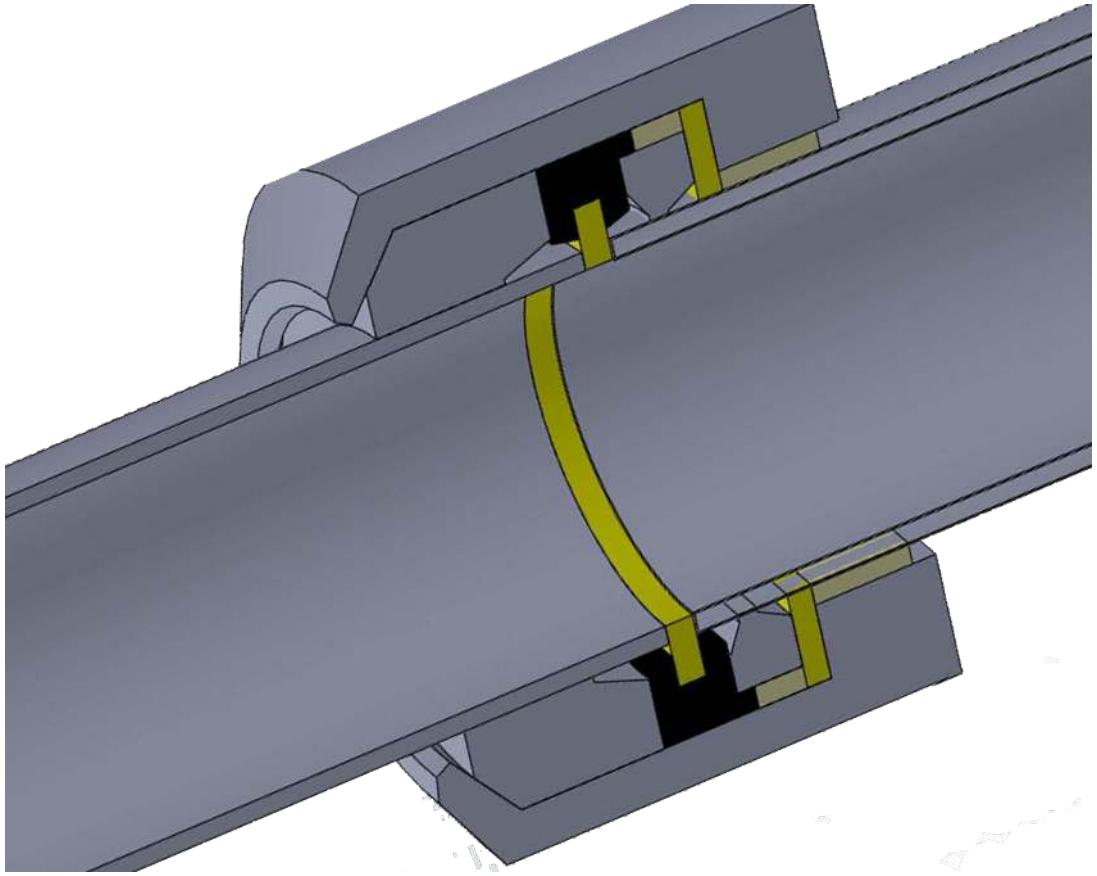
MIJ Design Options – L Seal



- Ideal design for small diameter (8” NPS)
- Pressures 600 ANSI and lower
- Designed for natural gas service lines
- Designed for a mechanical closure instead of a welded closure assembly
- Limited customization

MIJ Design Options – U Seal

- An alternative to the O and L seal with a focus on high pressure
- Completely contains isolation ring within U seal
- Coated internal flange faces
- Challenging to customize sealing material



Steel Components

Raw ingot supply

- NACE MR0175

Final forged or cast rings

- ASTM A105/A694/EN 10210 & 10297 E355
- CE and Material Strength

Pipe pieces

- API 5L PSL1 and PSL2
- Always meet or exceed the metallurgical requirements of the line pipe

PO:	6979	Quantity:	1
MRR Part:	10.500x6.600x5.688-1082N	Customer Part:	COL-6-600-F52 RM
Description:	FINISH - 9.375x7.225x5.250		
Specification:	A-694 (ASTM) F52 (16), NACE MR0175, DOMESTIC, CE = .41		
Wt/Pc:	84	Total Wt:	84
Heat #:	W5919	Melter:	Timken Steel Corporation

See Attached Mill Cert for Chemistry

Heat Treatment

Quantity	HT Charge	HT Cycle	Temp (°F)	Time (Hrs)	Hold / Ramp
1	1129438	Normalize	1650	4.5	Hold

Hardness

Serial #	Hardness (BHN)	Notes
1	146	

Tensile Properties

Test ID	Yield Strength (ksi)	Tensile Strength (ksi)	Elongation (%)	Reduction of Area (%)	Test Section (inches)	Orientation
003103-60	52.0	76.2	33.0	64.0	4.00 x 4.00	Longitudinal

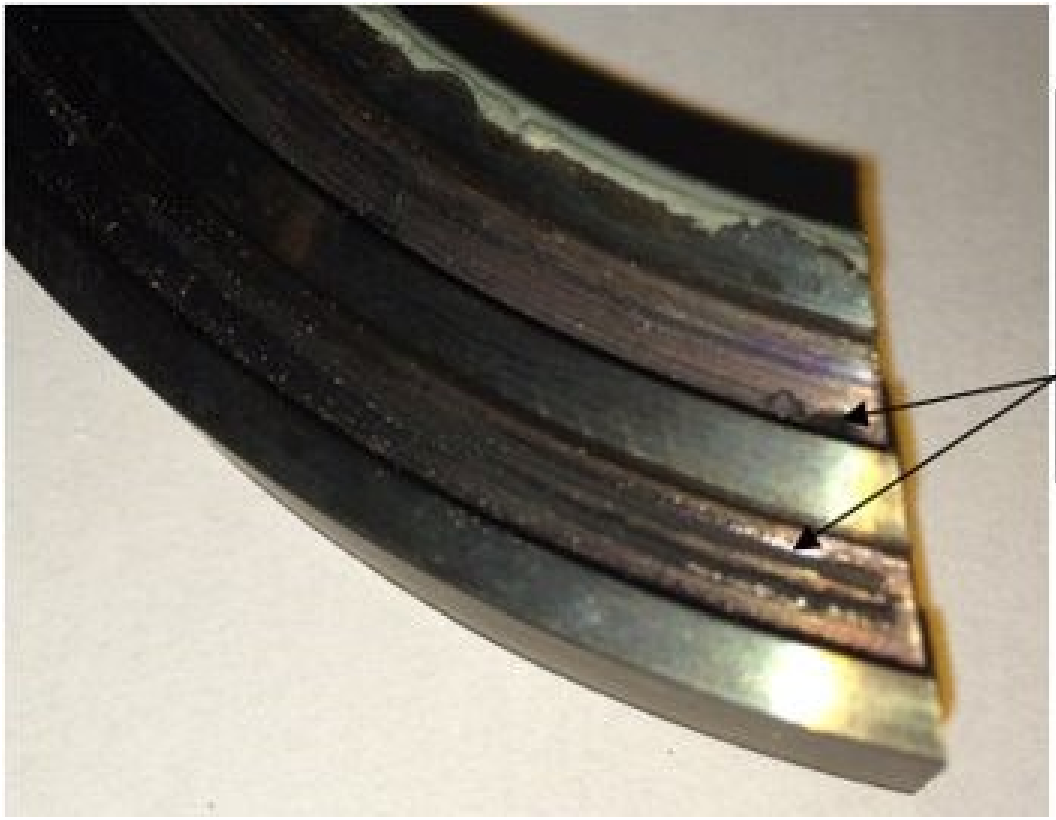
Impact Properties

Test ID	Test Temp (°F)	CVN (Ft-Lb)			CVN Ave (Ft-Lb)	Lateral Expansion (Inches)			Shear (%)			Test Section (Inches)	Orientation
003103-60	-50.0	83.0	48.0	46.0	59.0	0.0600	0.0320	0.0260	40.0	10.0	10.0	4.00 x 4.00	Longitudinal

Notes

JOB# 9967-03 (1)

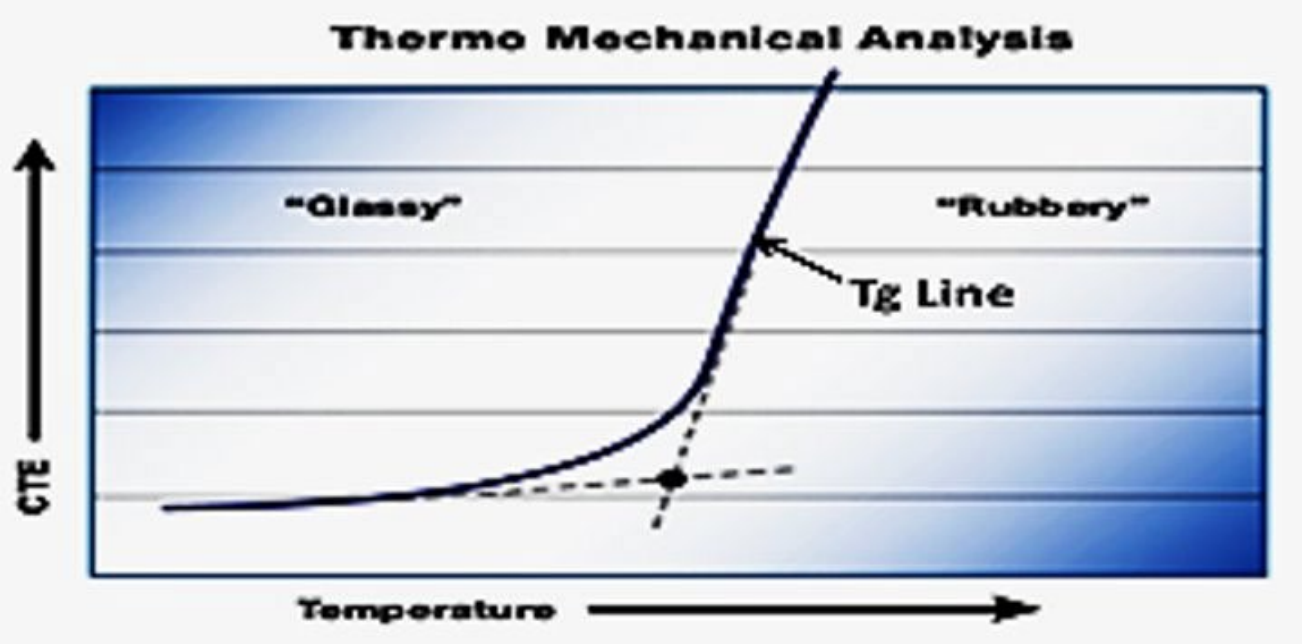
Sealing Elements



Signs of elastomeric O-rings melted to the steel groove. This would indicate that the O-rings experienced temperatures above the melting point - most likely during welding or coating cure process.

Chemical compatibility Temperature compatibility Placement/Effectiveness

Isolating Elements



Material NEMA LI-1	Glass Transition Temperature (tg) °c (°F)
G10	115 (239)
G11	180 (356)
FR4	130 (266)
G400	210 (410)

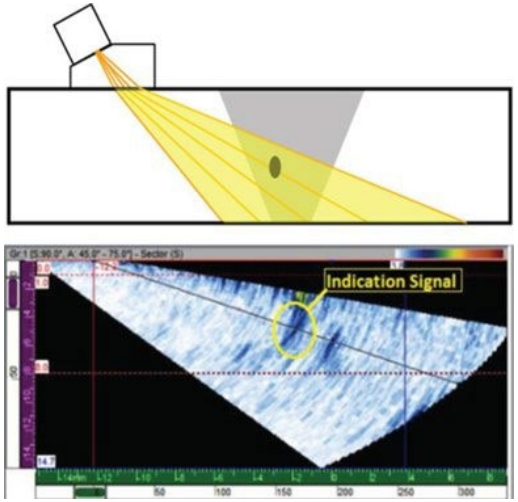
Chemical compatibility Temperature compatibility Placement/Effectiveness

Coating ID and OD

- Importance of OD coating
- Importance of ID coating
- OD Coating selection above and below ground
- ID Coating selection

FAT (Individual MIJ Testing) and Design Validation

- Hydro/Hydro fatigue/Hydro bend
- Pneumatic (low pressure leak test)
- Torsional testing
- Electrical testing
- Coating inspection
- Weld NDT
- Dimensional and Cosmetic



Commonly referenced codes and standards

- ASME – Design factors, pressure testing guidance, welding and NDT governance
- API – Pipe spec, welding and NDT governance
- DOT – Design factors, category rank by location
- ANSI – Pressure tables/Pressure class associated with pressure testing
- ASTM – Material testing for steel, isolating material and sealing material
- EN – European material testing standard for steel components

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QUESTIONS

Thank you for your time and attention

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Our Next Webinar

Pipeline & Gas Journal **LIVE WEBCAST**

Wednesday, October 12, 2022 | 10 a.m. CDT / 3 p.m. UTC

Preventing Pipeline Corrosion: Monolithic Isolation Joints Vs Flange Isolation Kits

Protecting your pipeline from corrosion isn't easy. There are numerous methods and solutions available, and each application has its unique challenges. In this webinar, we intend to navigate you through one such dilemma, Flange Isolation Kits or Monolithic isolation joints?

Guiding you through the process of the correct solution selection right up through to post installation, using real world examples and insight from the industry experts on Isolation solutions.

In this webinar you will learn:

- Selection Criteria – How do I decide what will work best?
- Pros and Cons of FIKs vs. MIJs
- Current Trends in Isolation techniques and solutions
- Pre and Post installation practices for MIJ and FIK

Speaker:
Nick Bander -
Director, Product,
Engineering, and Technology,
GPT Industries

Speaker:
Alex Grimmer,
Product Manager,
GPT Industries

Moderator:
Jeff Awalt,
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