Emissions Reduction Technology Forum

Setting the Standard for Automation™

12th LDAR Symposium
May 15-17, 2011
New Orleans, LA

SETTING THE STANDARDS TO BE LEAK FREE

GASKETS AND PACKINGS DESIGNED FOR A LEAK FREE OPERATION

Standards
Certification
Education & Training
Publishing
Conferences & Exhibits

José Veiga
Technical Director
Teadit Group

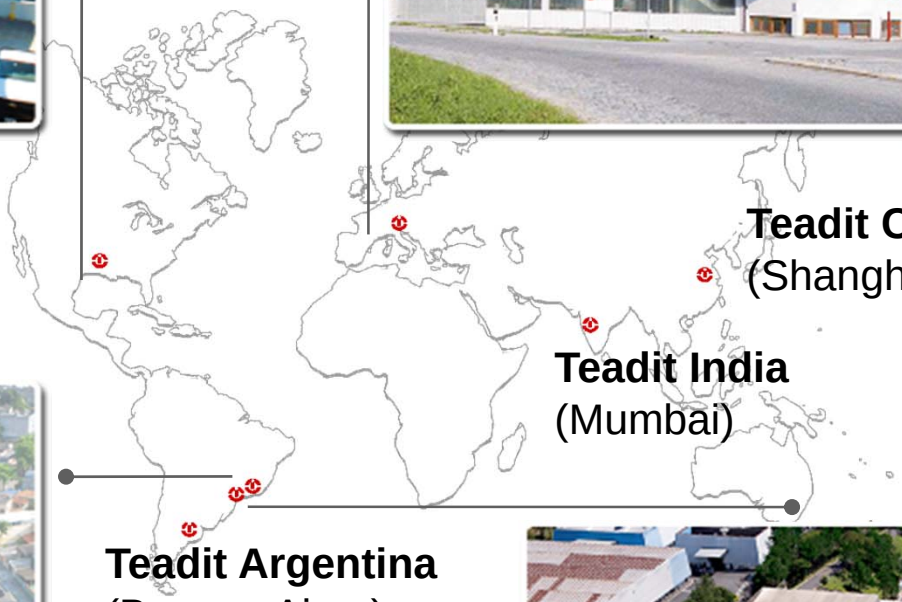
Presentation Summary

- Packing Developments
  - Seating Stress
  - Corrosion Inhibitors
  - Gate Valves
  - Control Valves
- Spiral Wound Gasket Developments
  - Test Flanges
  - Current Technology
  - Test Protocol
  - Controlled Density Gaskets

TEADIT PLANTS

Teadit North America
(Houston / USA)

Teadit International
(Kufstein / Austria)



Teadit China
(Shanghai)

Teadit India
(Mumbai)

Teadit Ind. e Com.
(Rio de Janeiro / Brazil)

Teadit Argentina
(Buenos Aires)

Teadit Juntas
(Campinas / Brazil)

SEALING PRODUCTS

Mechanical Packings

PACKING 2236
Certified Extremely Low Emissions Packing Technology

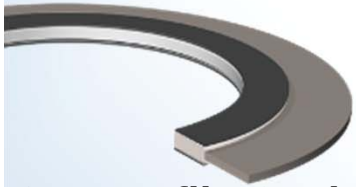
Non-Metallic Gaskets

Expanded PTFE Products

Restructured PTFE Tealon

Compressed Gasket Sheet

Metallic Gaskets



Camprofile Gasket

Jacketed Gaskets

Spiral Wound

Expansion Joints

Flue Duct Expansion Joints

Metallic Bellows Expansion Joints

Teadit R & D Laboratories

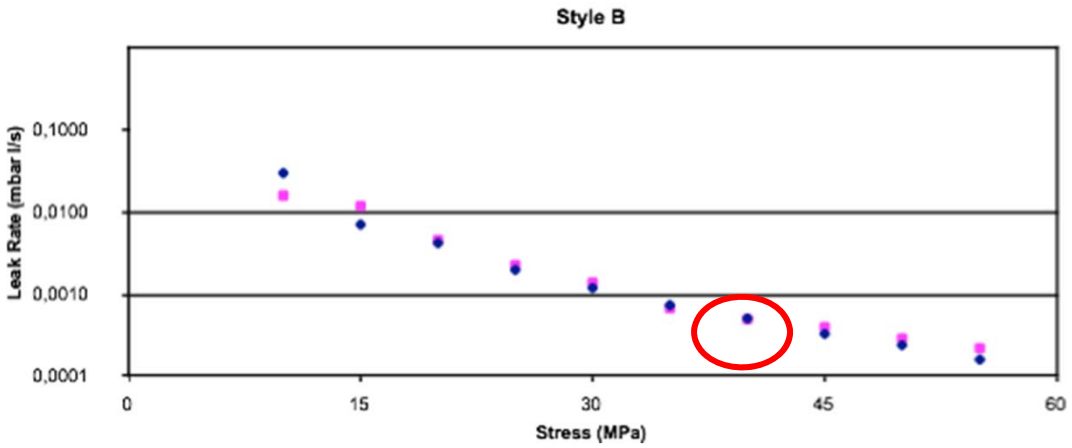
Packing Testing

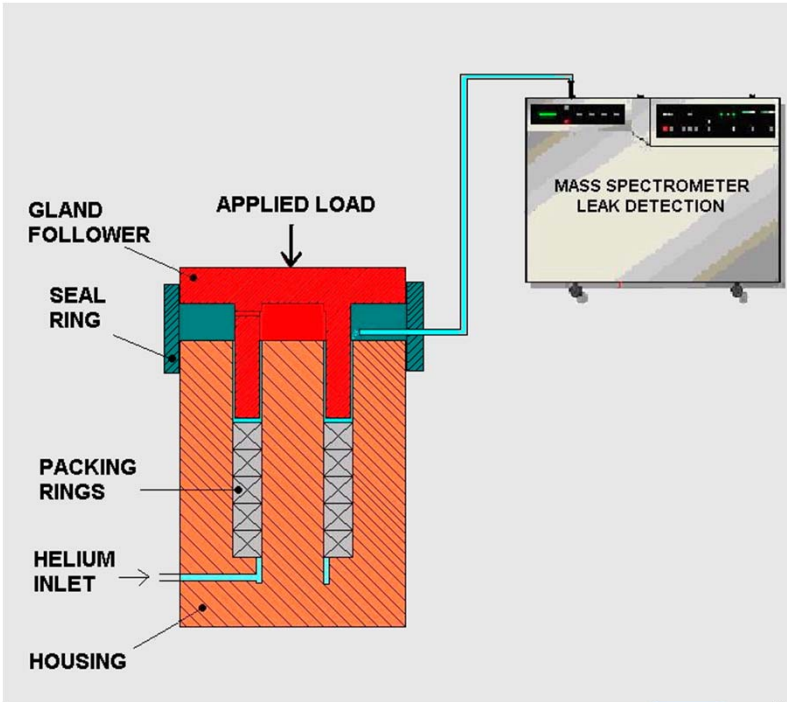
Gasket Testing

Packing Seating Stress Device

Develop an Installation Procedure:

- Similar to flange gaskets
- Minimum Seating Stress
- Calculated Installation Stress



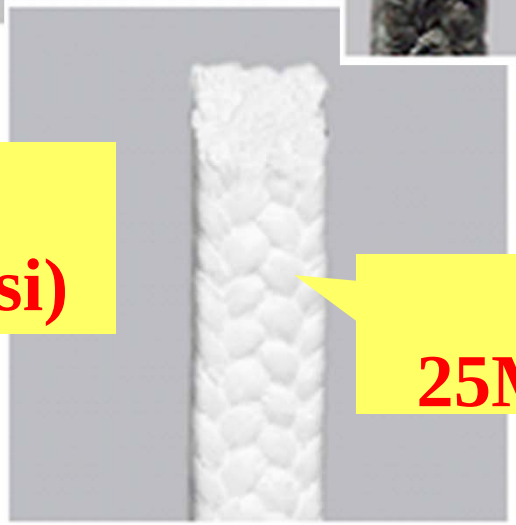


Minimum Seating Stress

Style2236
55MPa (8000 psi)

Style 2237
73MPa (10800 psi)

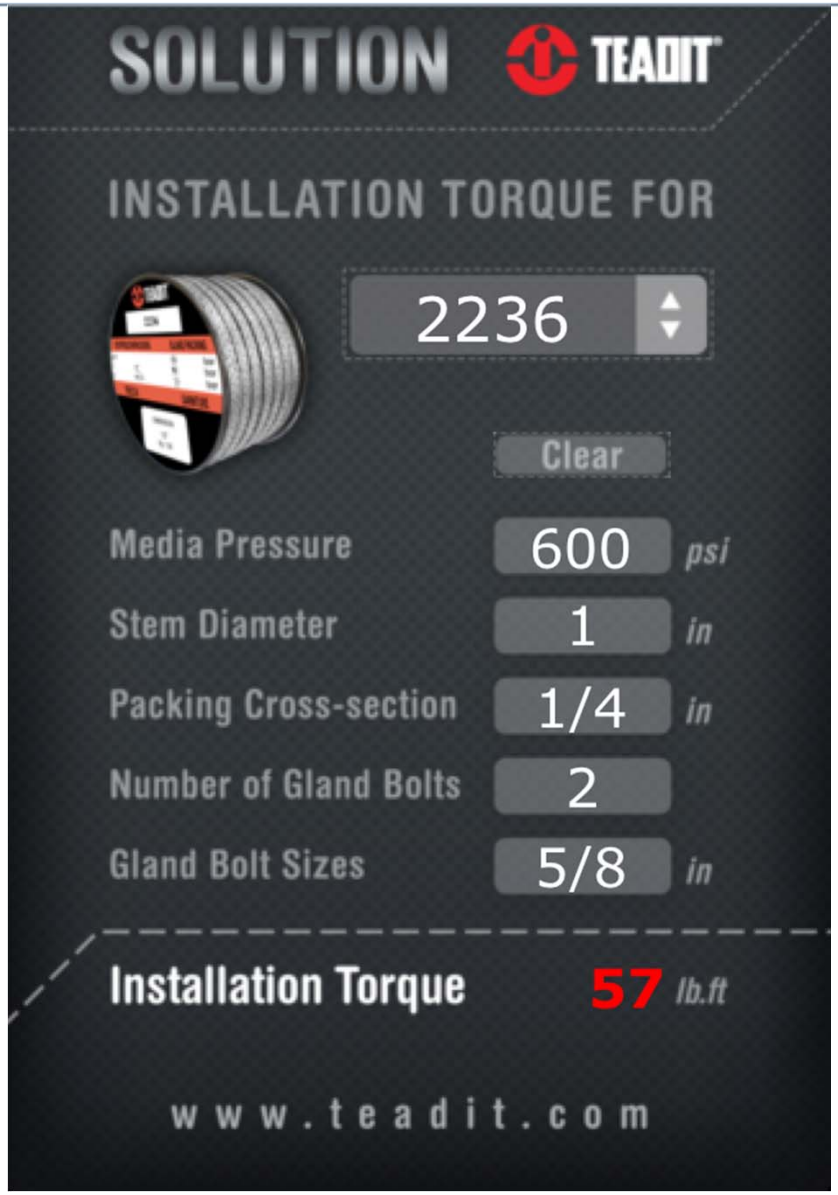
2235
55MPa (8000 psi)

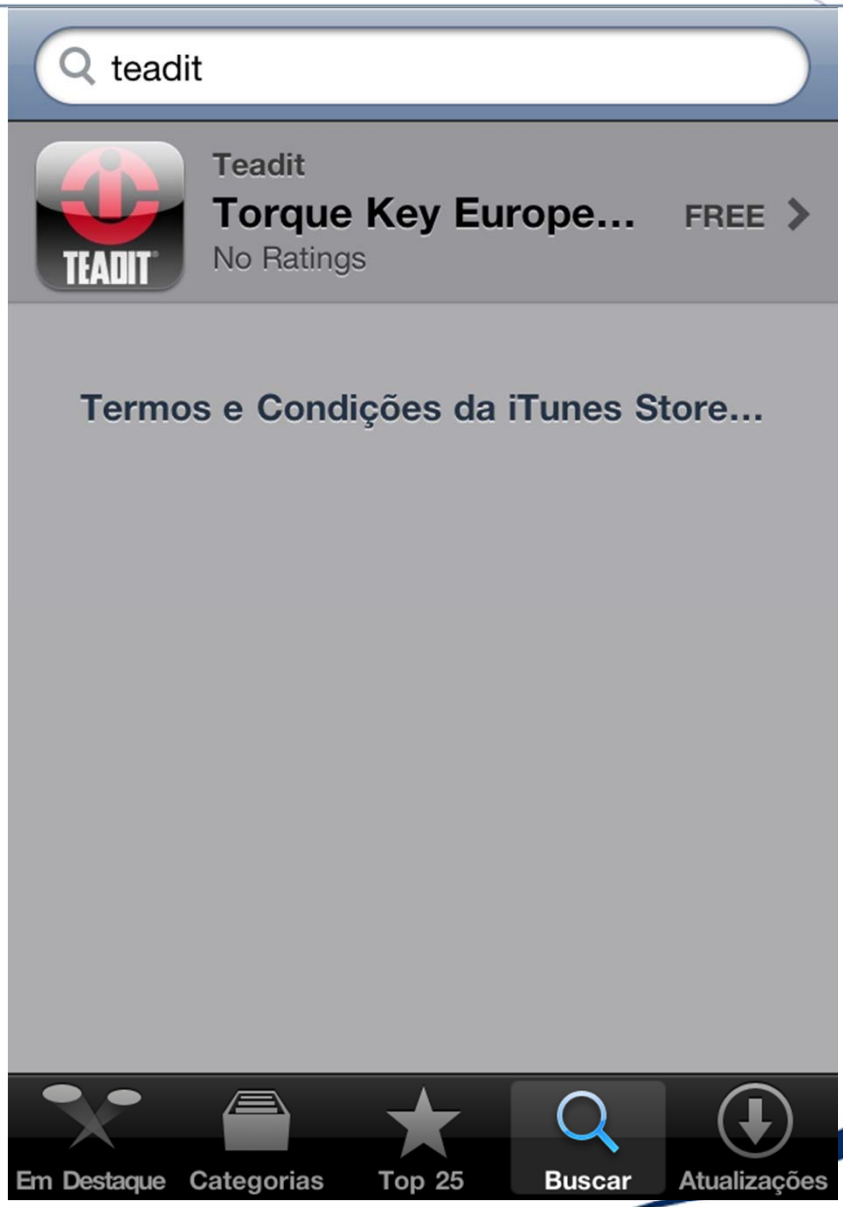


PTFE
25MPa (3600 psi)

Teadit iPhone & iPad App

Download Free from App Store

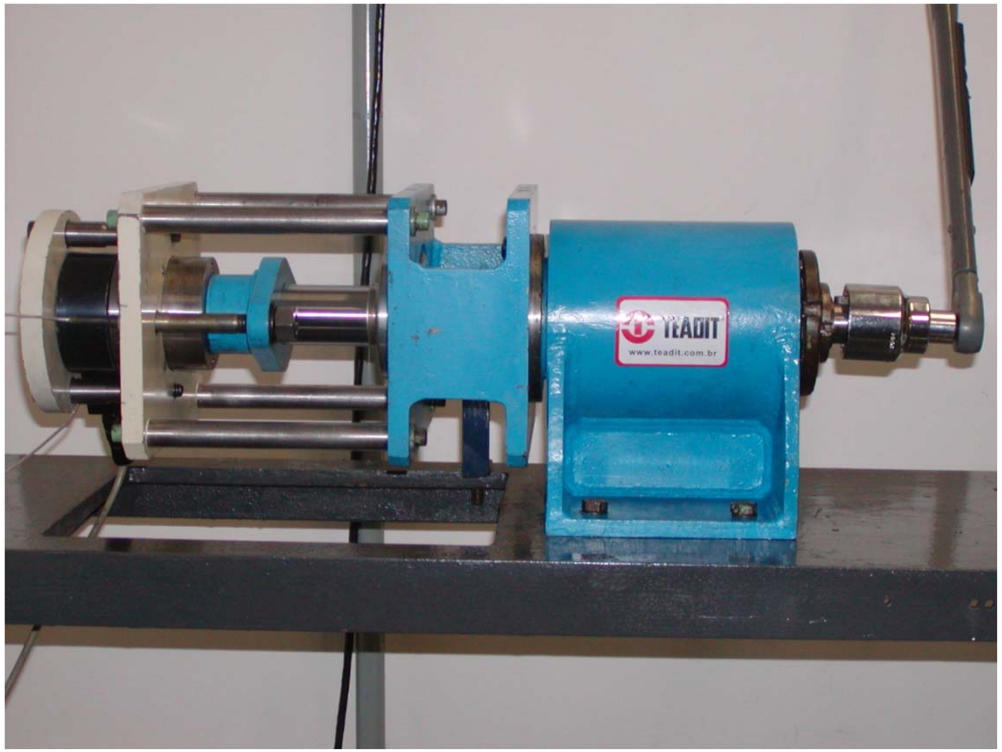


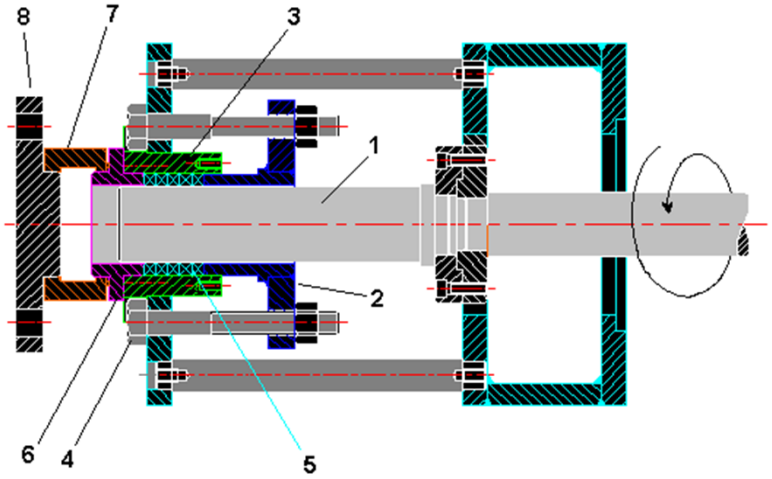


Stem Torque Device

ASME - PVP2009-77467

THE INFLUENCE OF DIFFERENT BRAIDED PACKING MATERIALS AND NUMBER OF RINGS ON STEM TORQUE AND SEALABILITY

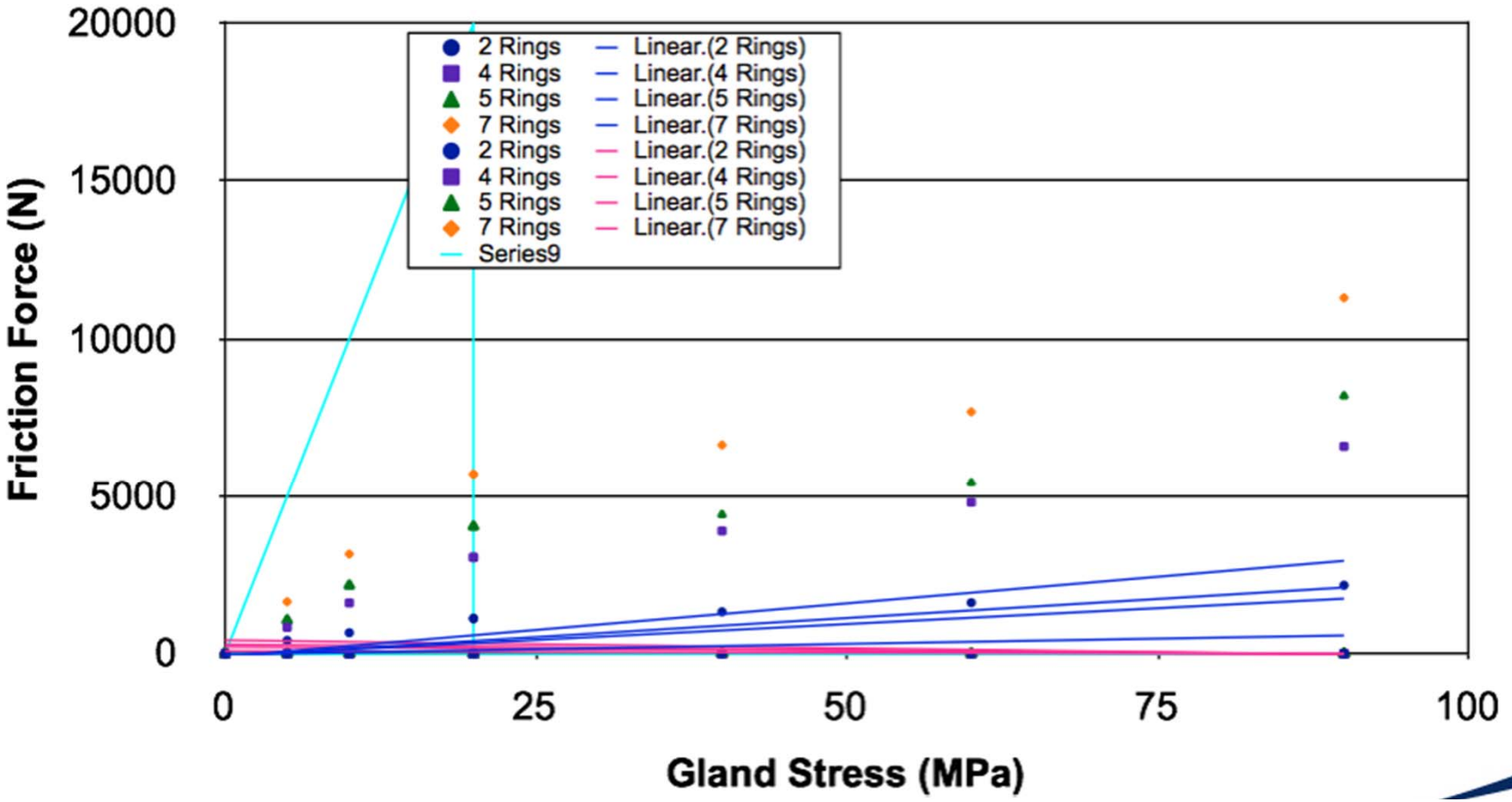




1 - Stem
2 - Gland
3 - Bonnet
4 - Internally Gaged Bolt
5 - Packing
6 - Bushing
7 - Load Cell
8 - Load Cell Base

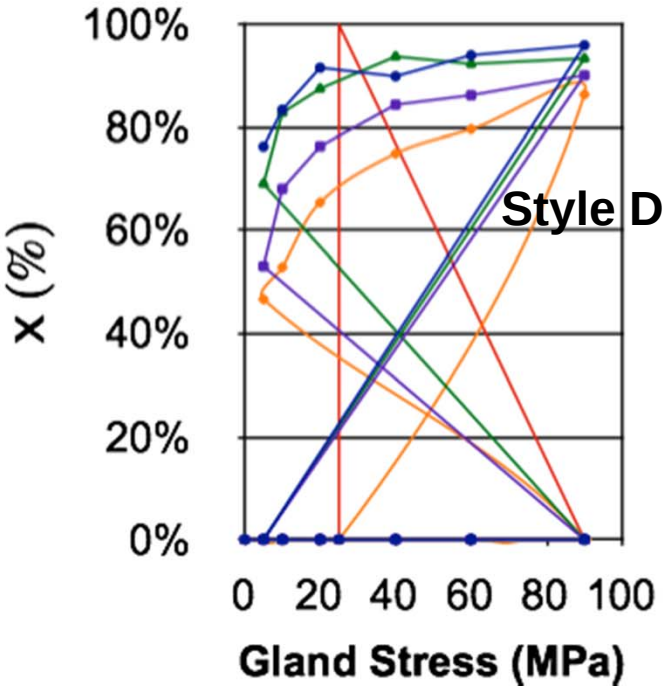
Stem Torque

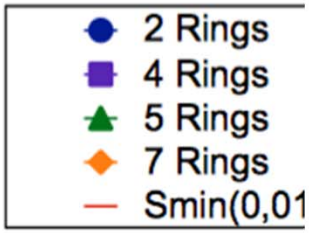
Friction Force Analysis

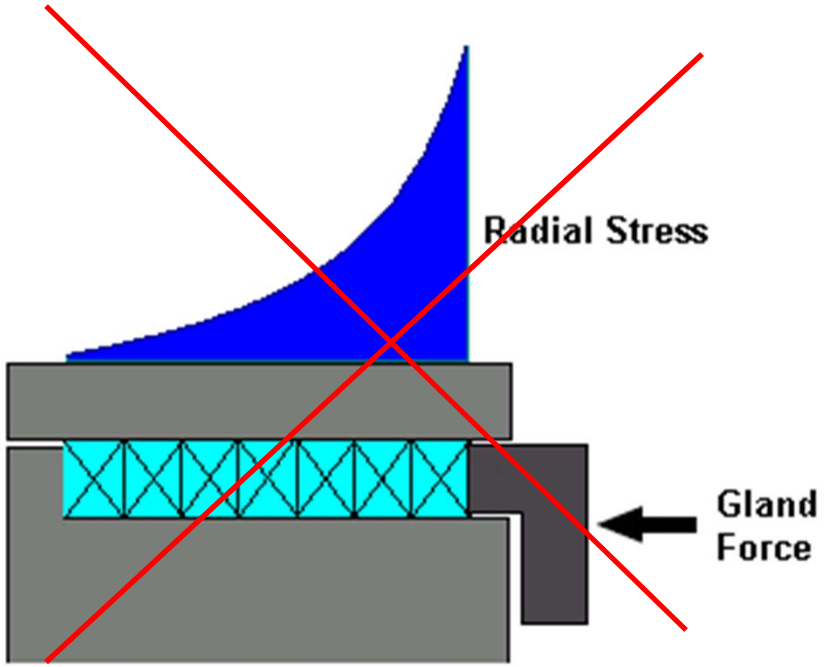


Stem Torque

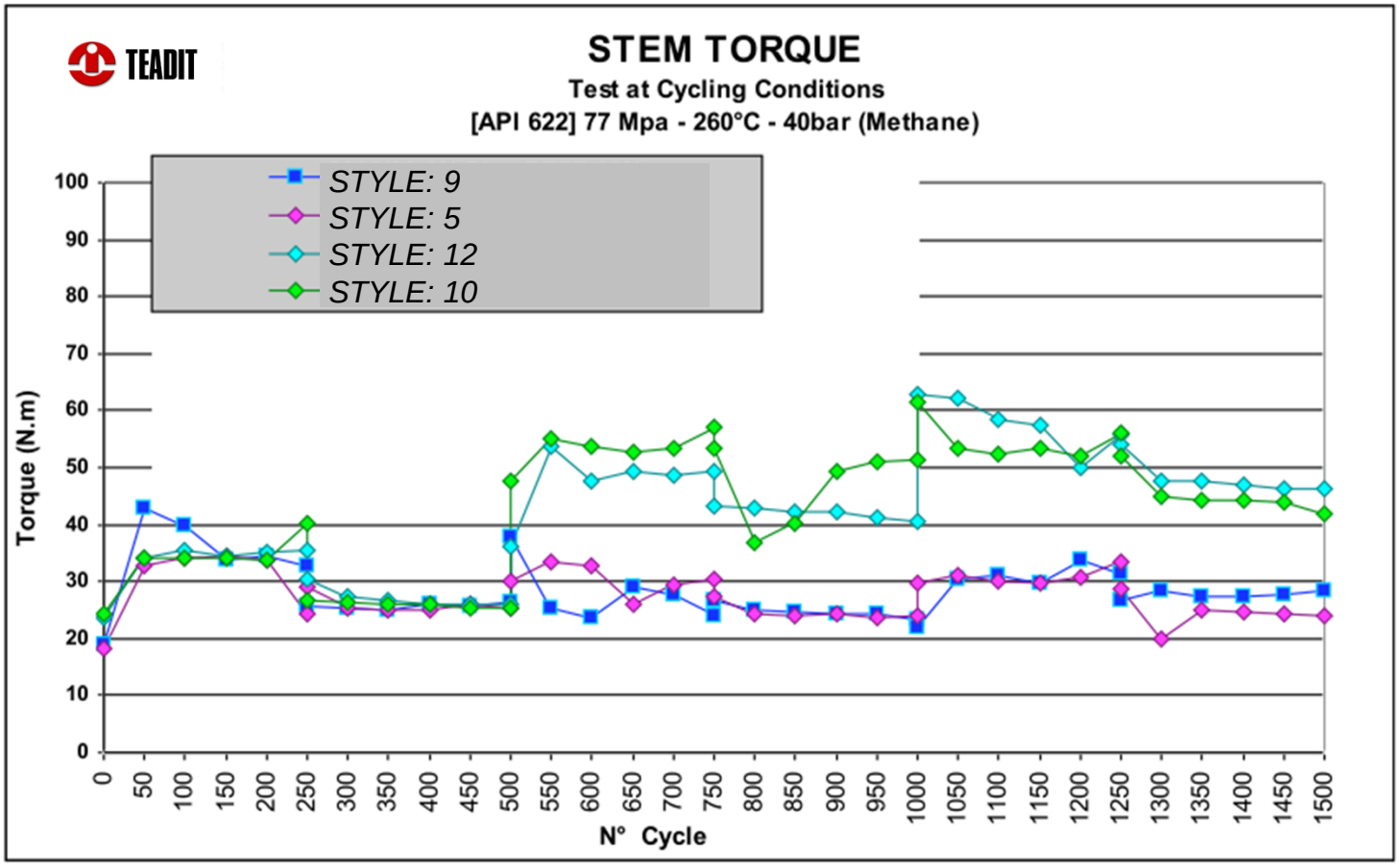
Bottom Ring Residual Axial Stress







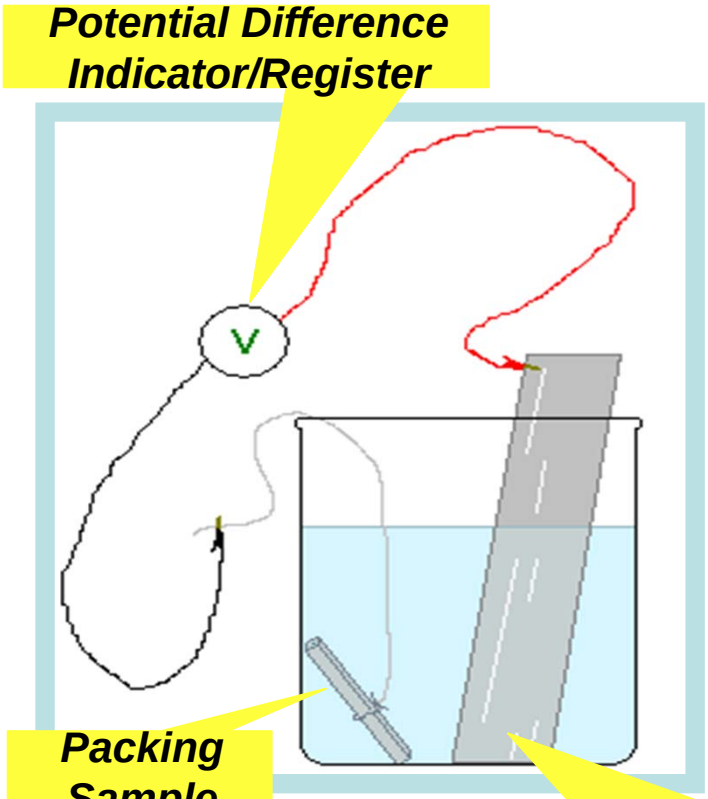
Blocking Agent

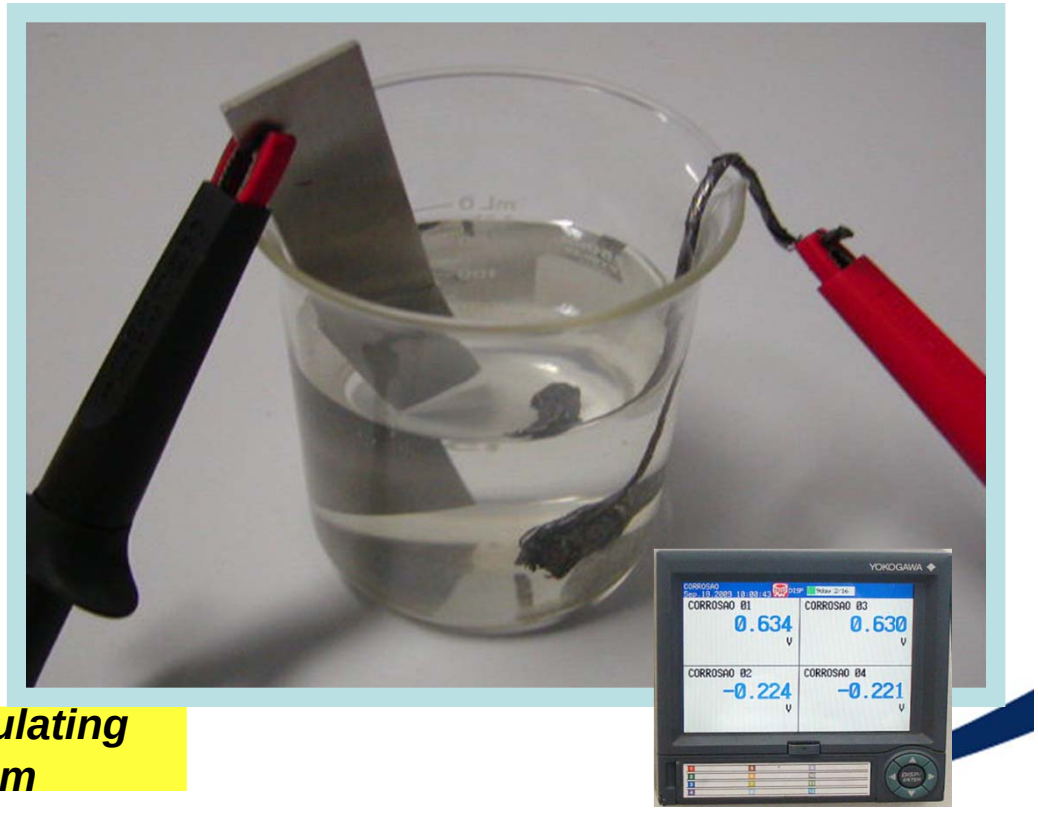


- ***STYLE 10 and 12 = High Torque***
- ***STYLE 5 and 9 = Torque OK!***

Corrosion Inhibitors

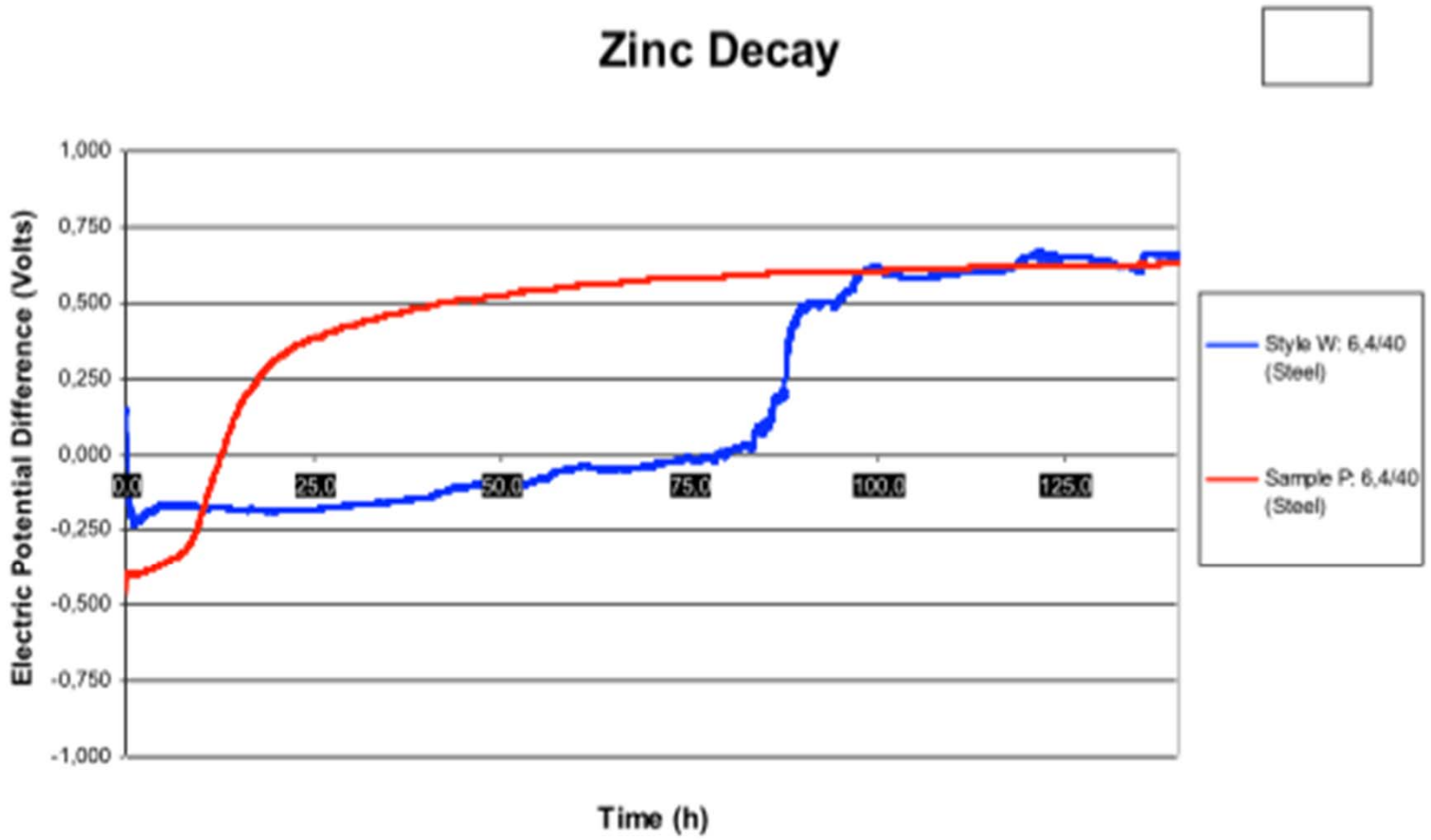
TEST METHOD TO ANALISE THE EFFICIENCY OF GALVANIC CORROSION INHIBITORS





Corrosion Inhibitors

- **Packing SampleP**: with **Zinc Powder**.
- **Packing SampleW**: with **Zinc Wires** in the core.



Style 2236 for Gate Valves

Specifications:

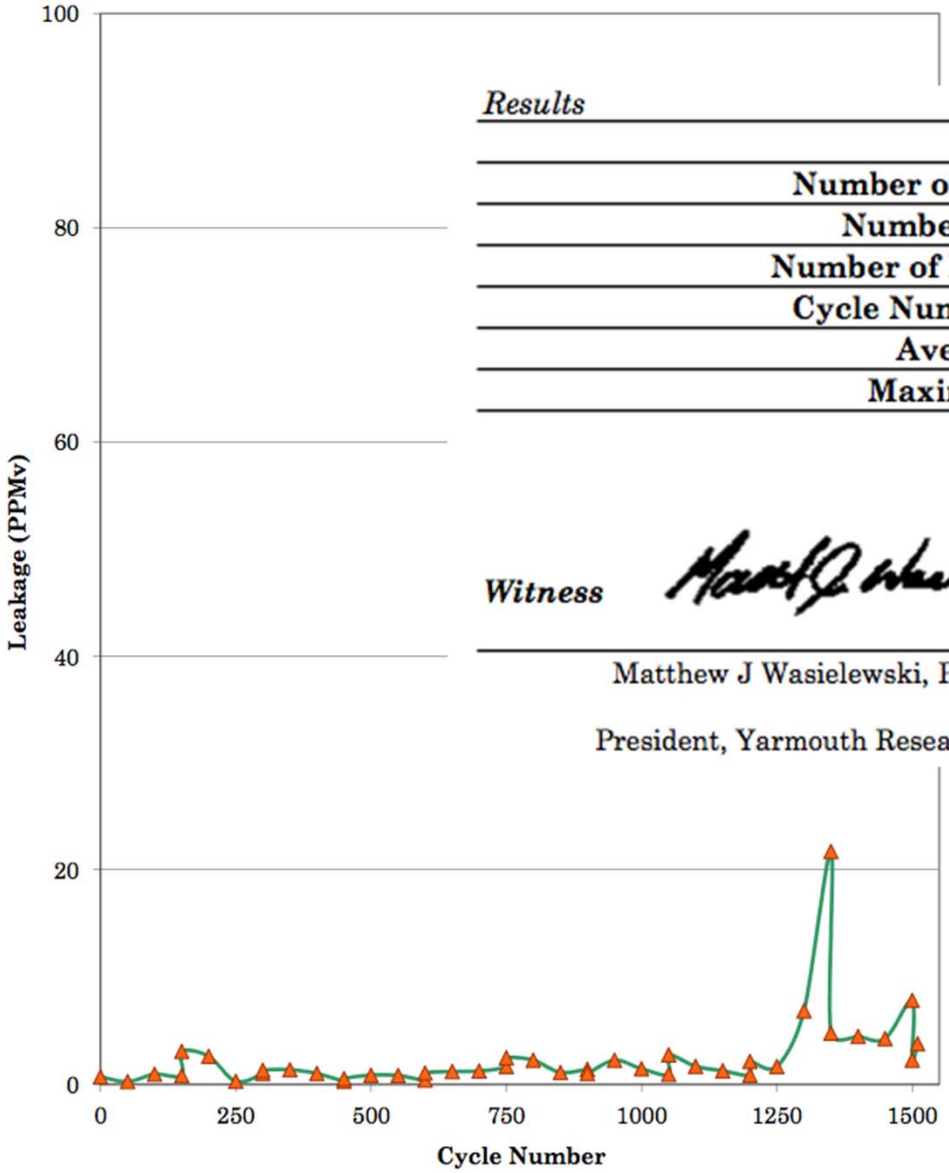
Minimum Temperature : - 240 C (-400 F)
Maximum Temperature : 455 C (850 F)
Maximum Pressure : 450 bar (6500 psi)
pH : 0 - 14

Certifications:

- **API 622 2nd Edition: average: 2 ppm, max: 22 ppm**
- **Chevron Test: <20 ppm after 10 Thermal and 5000 Mechanical Cycles**
- **Fire Tested to API 607 Specifications**
- **TA-Luft Approval = 1,5 x 10-3 mbar.l/s.m (2,7 x 10-4 mg/s.m)**

(T = 300º C [572 °F], 40 bar [580 PSI] and 5000 cycles)

Style 2236 for Gate Valves
API 622 Emissions Certification



Results

Average Test Pressure:	600	psig
Number of Mechanical Cycles Completed:	1510	
Number of Thermal Cycles Completed:	5	
Number of Packing Adjustments Required:	0	
Cycle Number(s) of Packing Adjustments:	~~n/a~~	
Average Leakage Throughout Test:	2	PPMv
Maximum Leakage Throughout Test:	22	PPMv

Witness

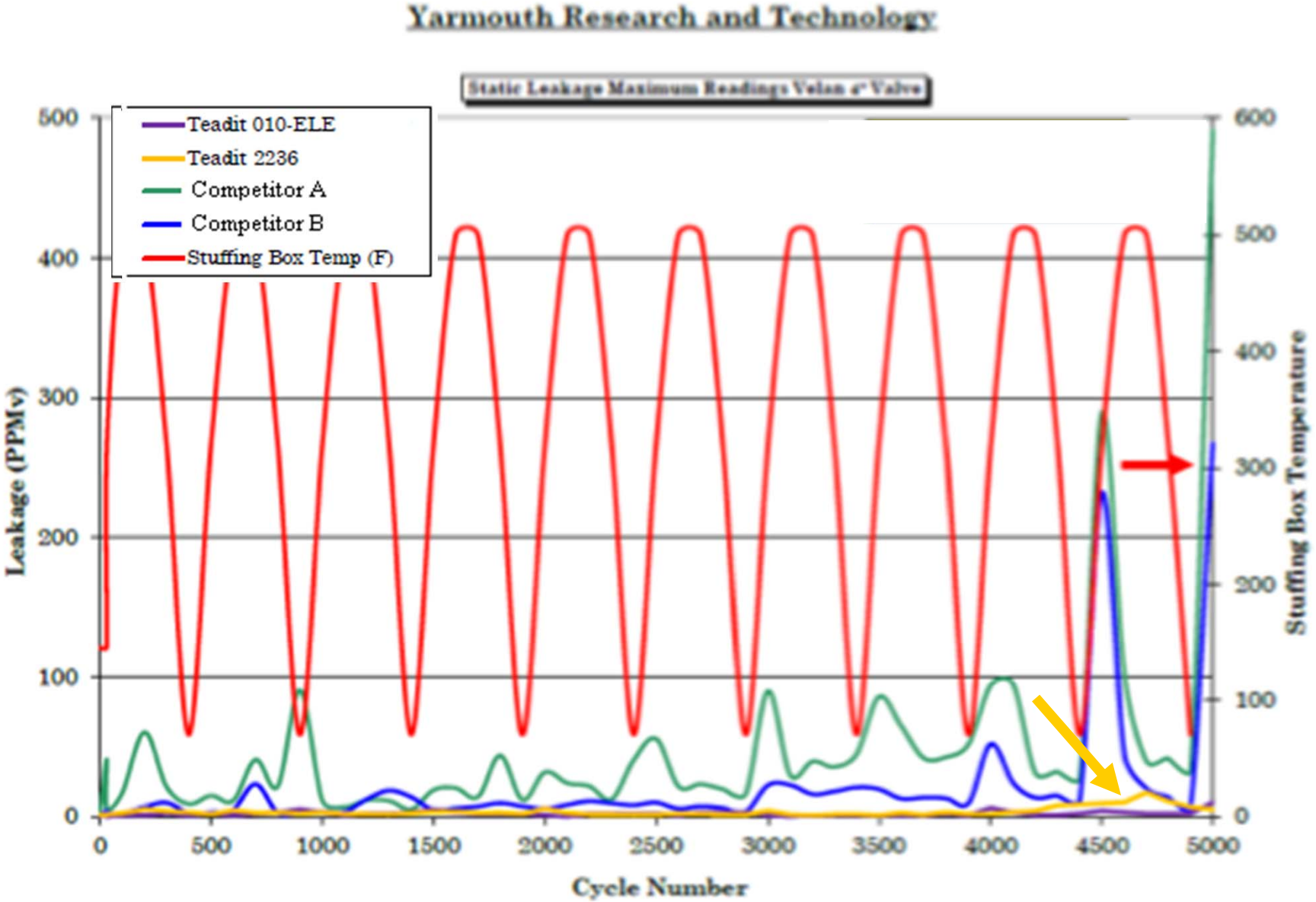
Matthew J Wasielewski, PE

President, Yarmouth Research

STATE OF MAINE
MATTHEW
J
WASIELEWSKI
No. 7437
LICENSED
PROFESSIONAL ENGINEER

Chevron Data

Courtesy of Mr. David Reeves.



Control Valve Packing Test

Test Protocol

Lower valve position: 40%

Upper valve position: 60%

10 000 cycles of 40 sec

1000 cycles by day:

500 cycles at room temp.

500 cycles at 260C (500F)

Methane at 40 bar(580 psi)

Test Valve courtesy of Q-Plus

Style 2237 for Control Valves

Specifications:

Minimum Temperature : - 240 C (-400 F)
Maximum Temperature : 455 C (850 F)
Maximum Pressure : 450 bar (6500 psi)
pH : 0 - 14

Certification:

- **Fire Tested to API 607 Specifications**

Spiral Wound Test Gaskets

Test Summary

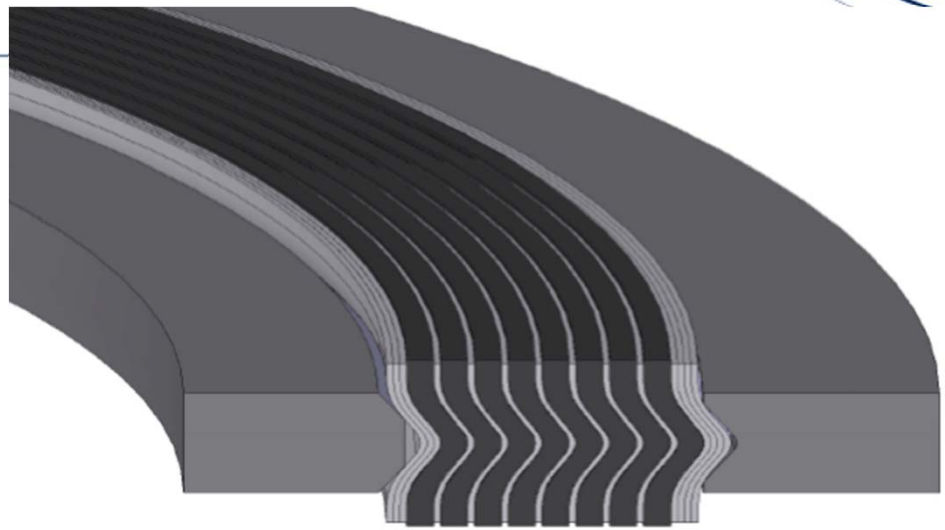
-304 Stainless Steel

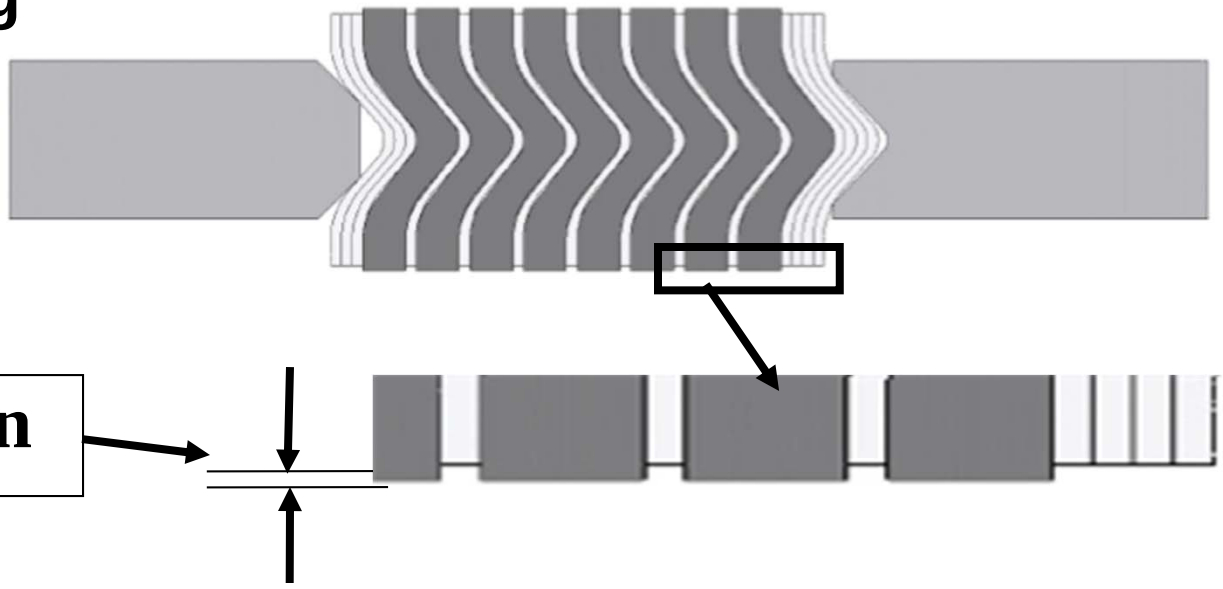
- Flexible Graphite Filler

-With Outer / Inner Rings

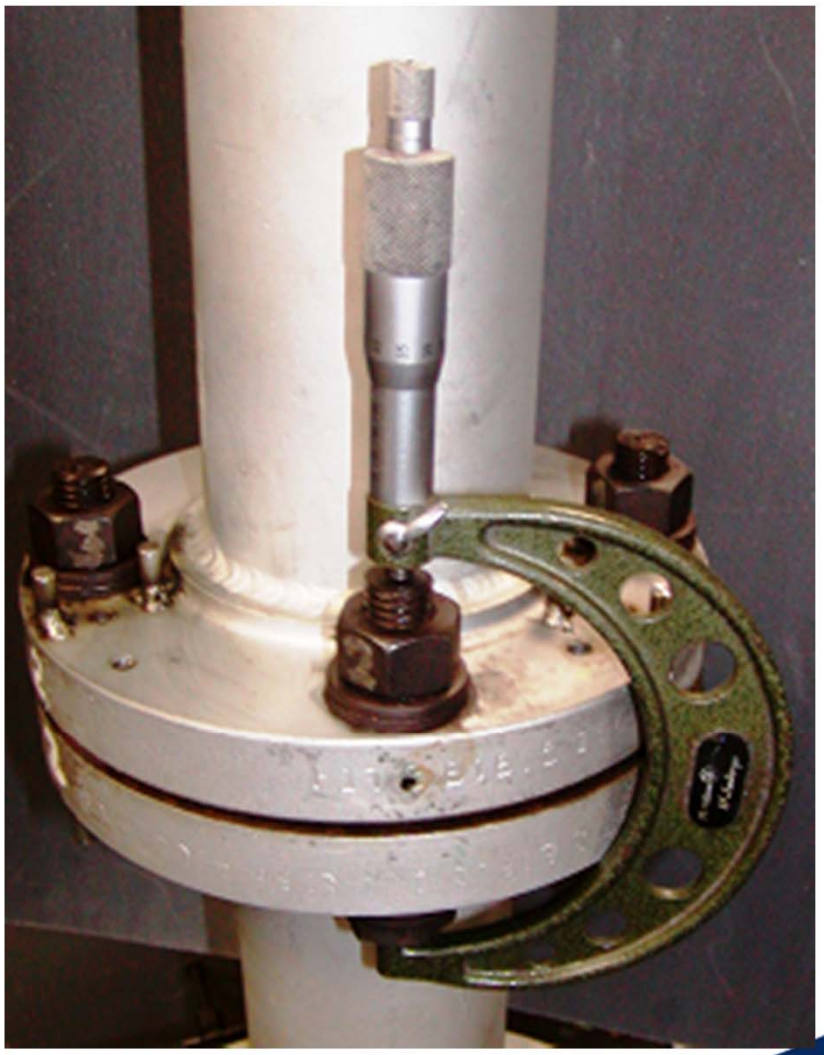
- Over 300 leak tests

- 1600 hours of testing

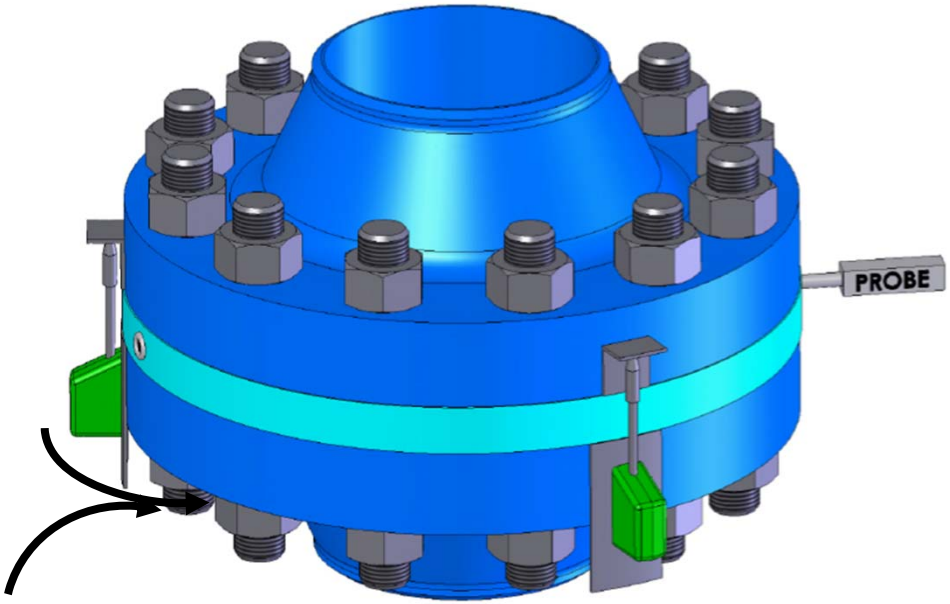




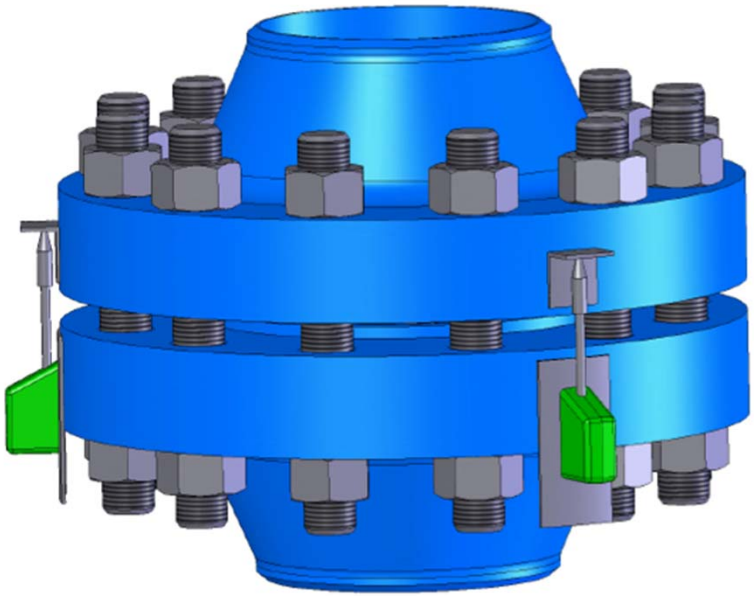
Test Rigs:
Flanges: 6”- 900; 3”- 150 and 2 - 300
Material: ASTM A105 cast steel
ASTM A193 B7 Bolts with Machined Ends



Measurements



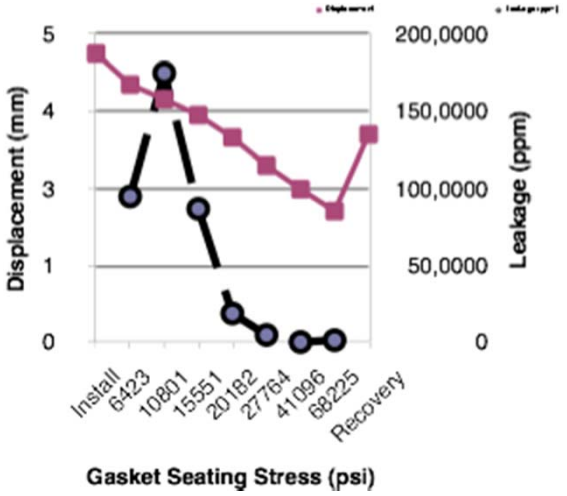
Leak Detection

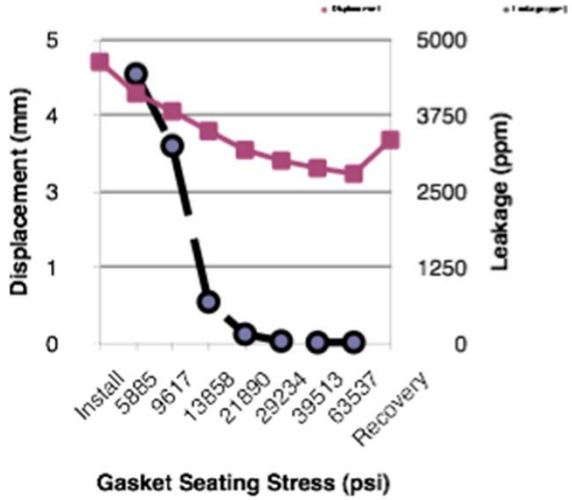


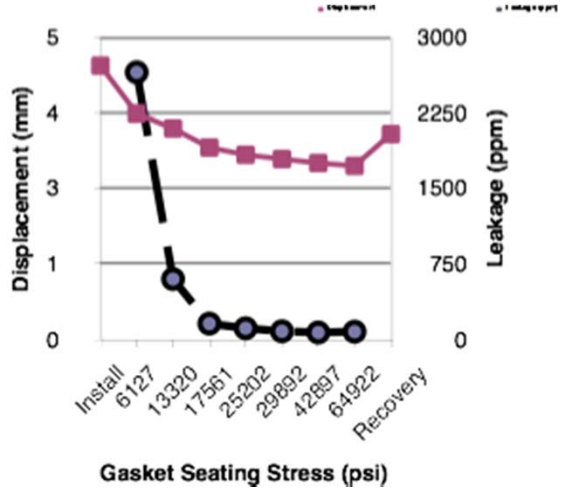
Gasket Displacement

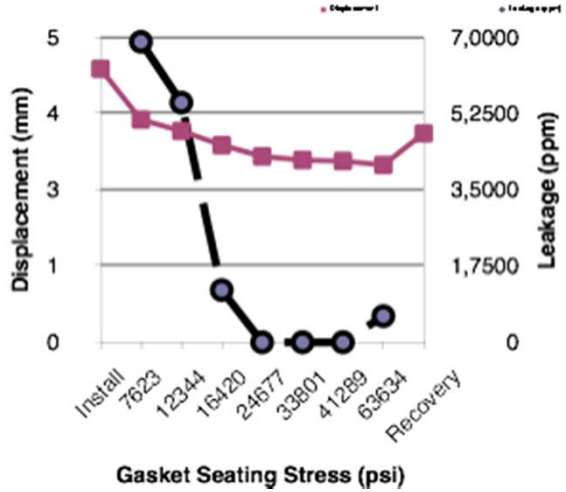
Methane at Room temperature
Pressure: 20 bar (290 psi)
Leak Detection: Thermo TVA 1000 VOC Analyzer

Current Standard Gaskets in the Market
Flange 6 in – Class 900









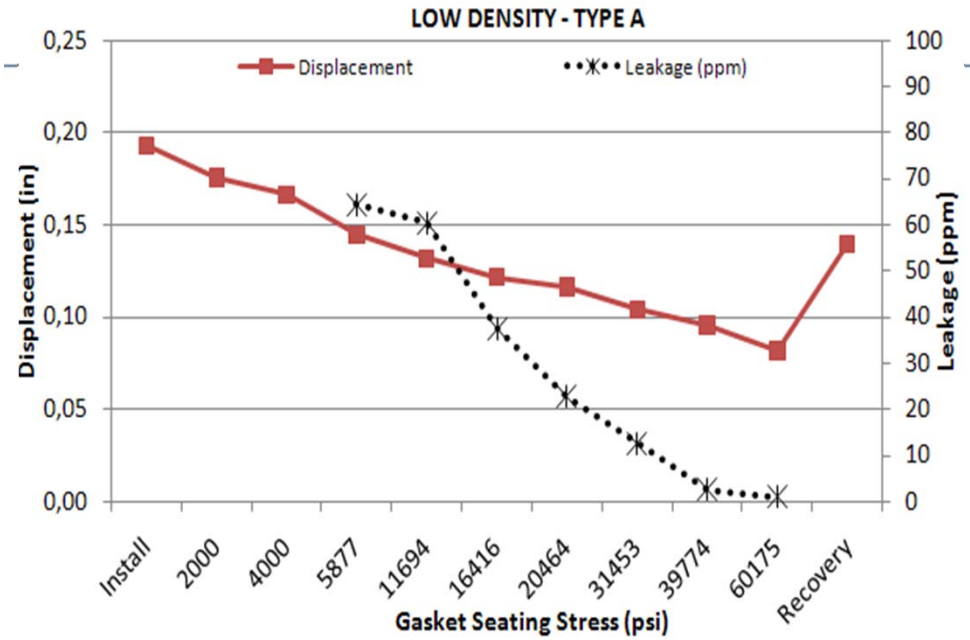
Gaskets Densities Evaluation

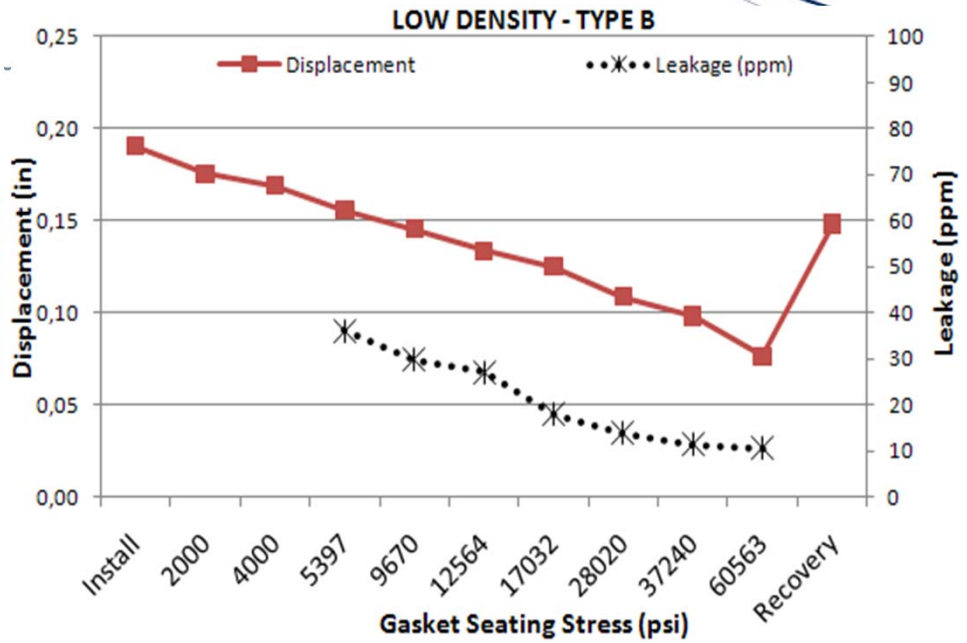
Test Protocol Summary

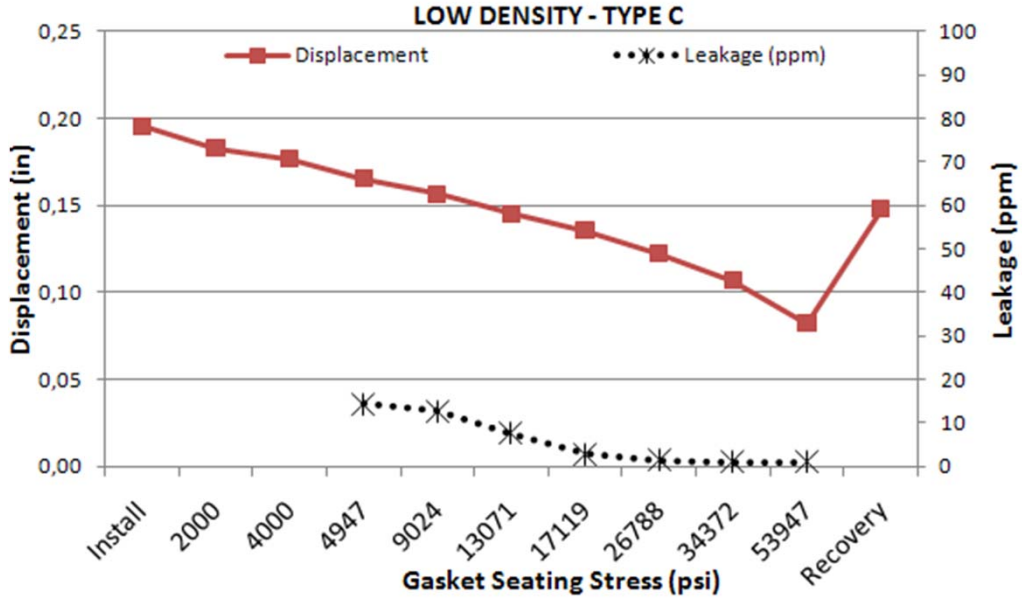
Methane at Room temp.
Pressure: 20 bar (290 psi)
Install Gasket
Increase Bolt Load in steps
Wait 60 minutes
Read TVA 1000 ppm leak
Measure Gasket Strain
Plot Chart

Density		Sealing Windings per mm (in)
Low	A	0.818 (20.77)
	B	0.994 (25.25)
	C	1.132 (28.75)
High	A	1.509 (38.33)
	B	1.698 (43.13)
	C	1.824 (46.33)

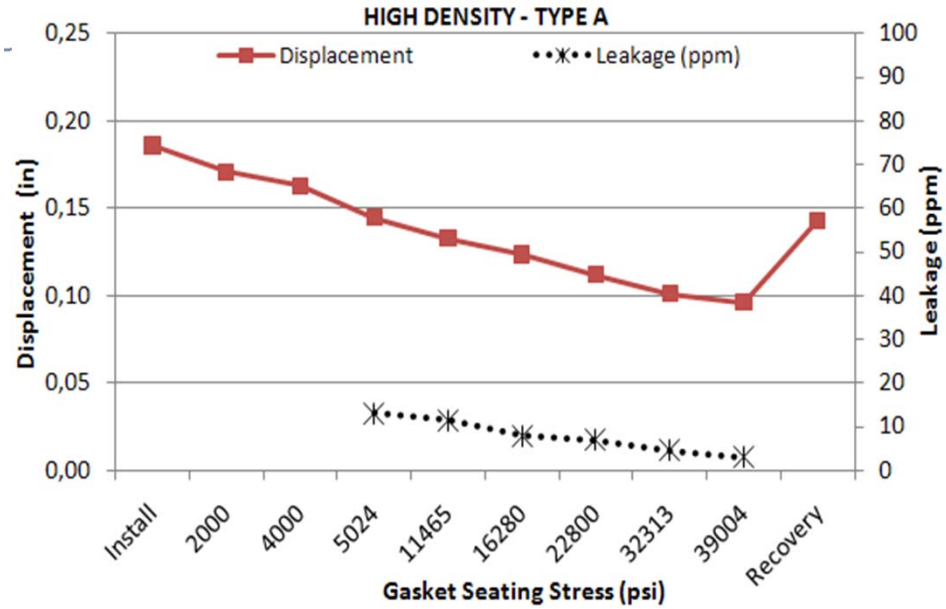
Test Results SW - 6" 900# - Low Density

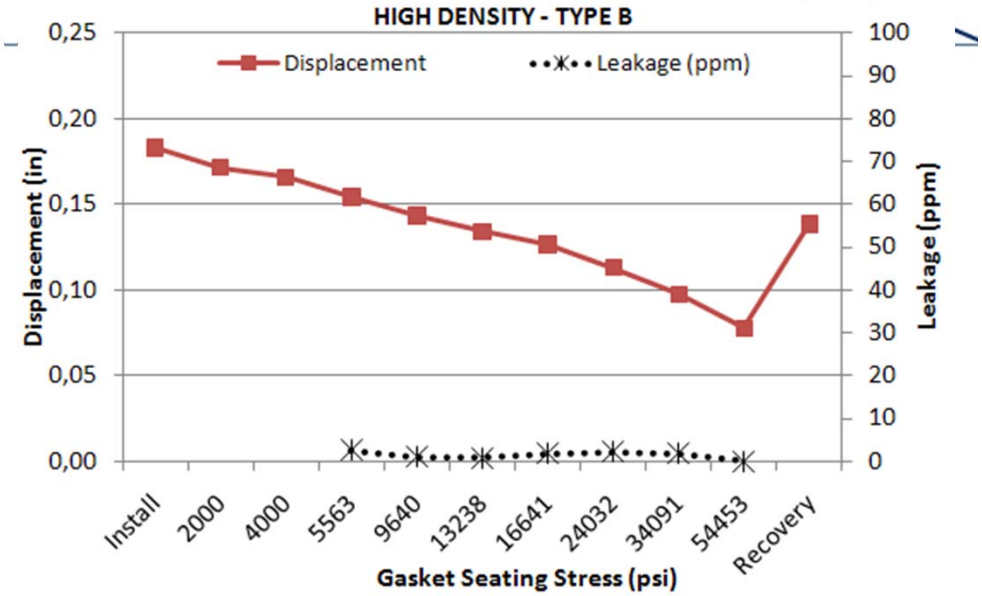


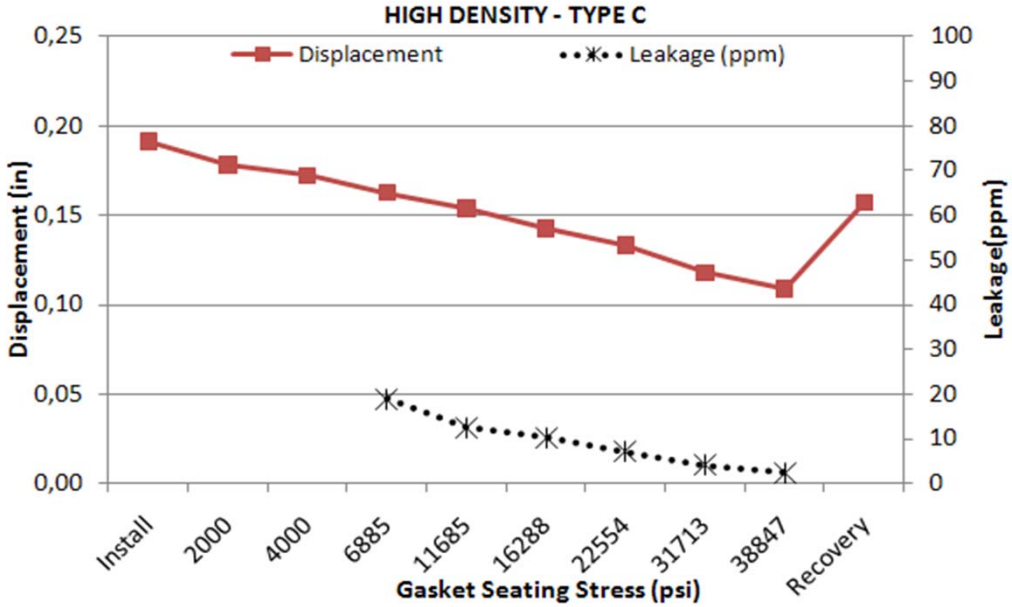




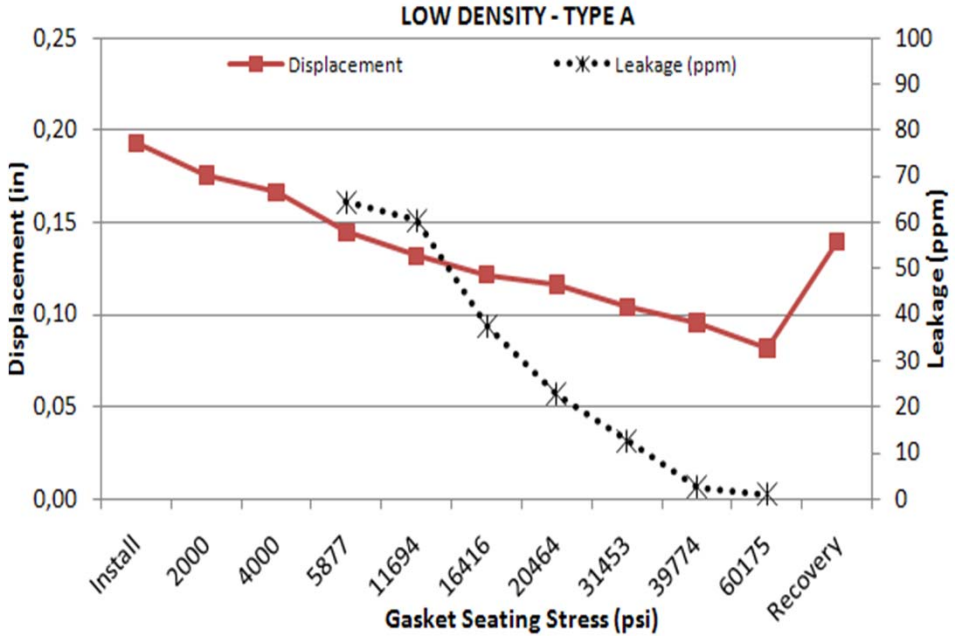
Test Results SW - 6" 900# - High Density

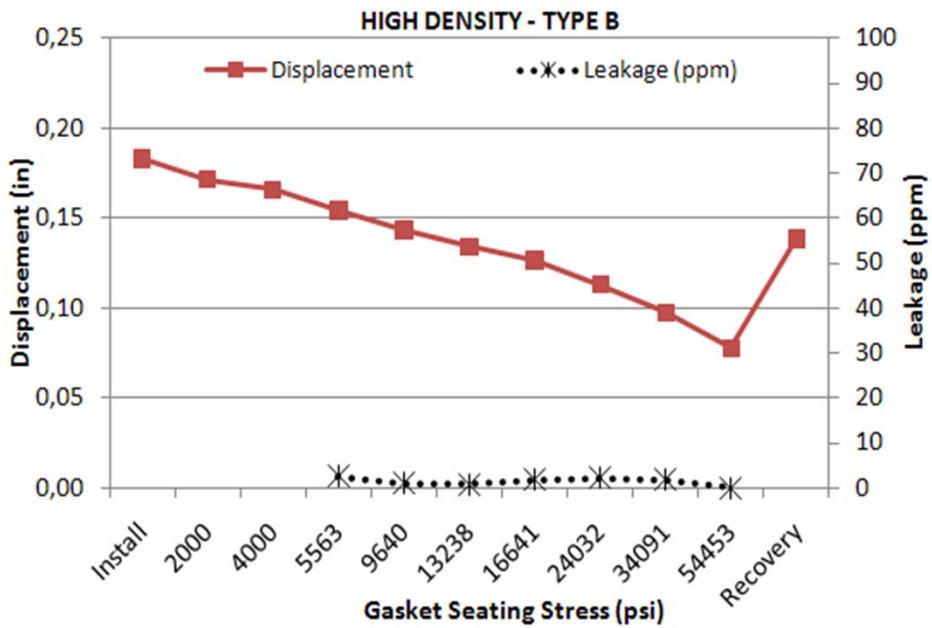




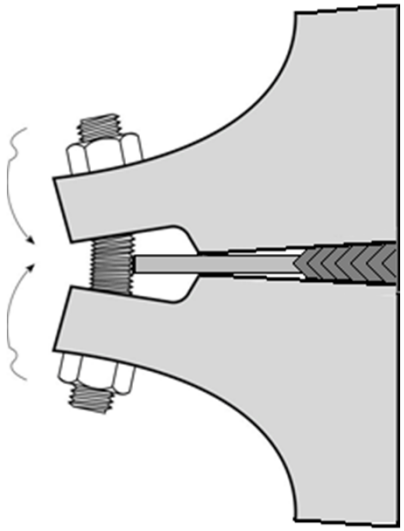


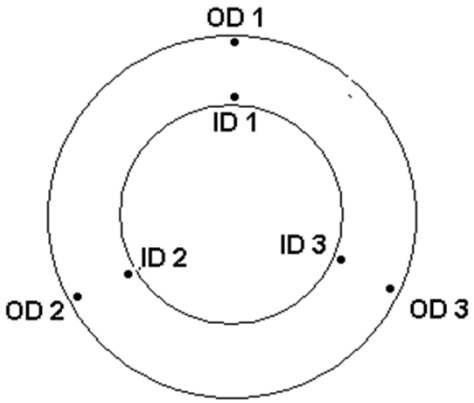
6" 900# - Low Density x High Density





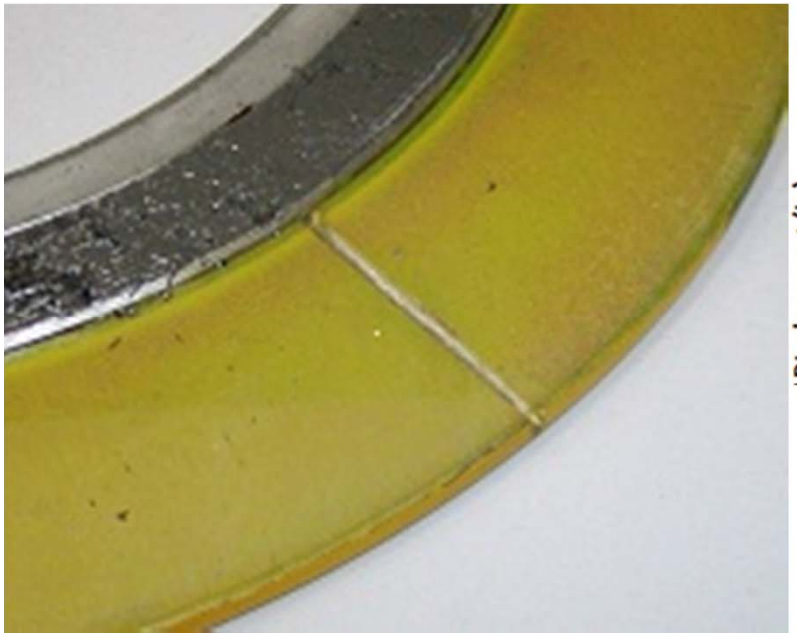
6“ - 900# - Guide Ring x Flange Raised Face contact

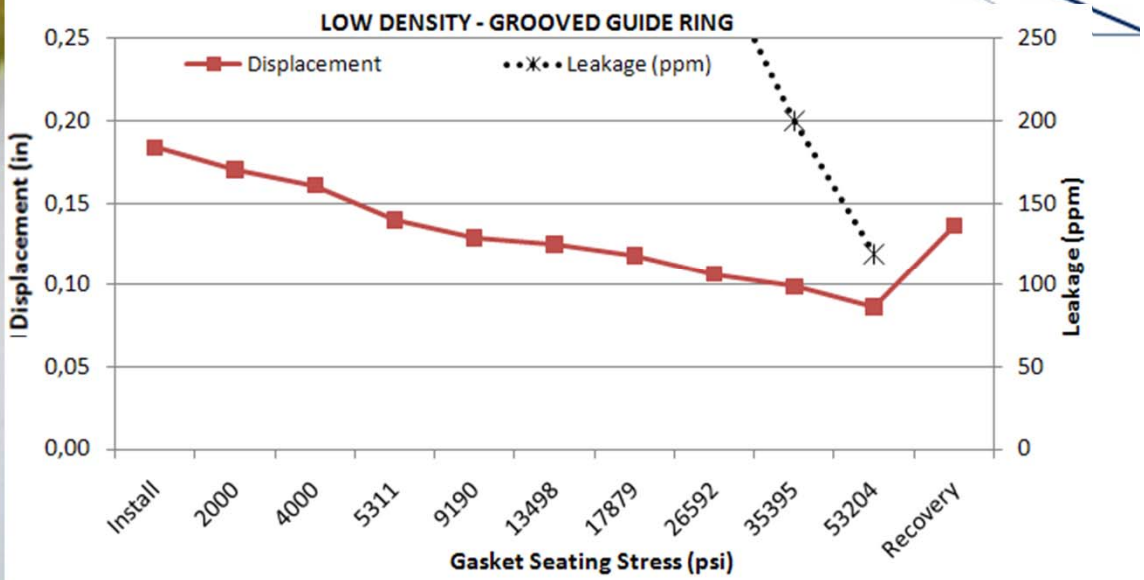


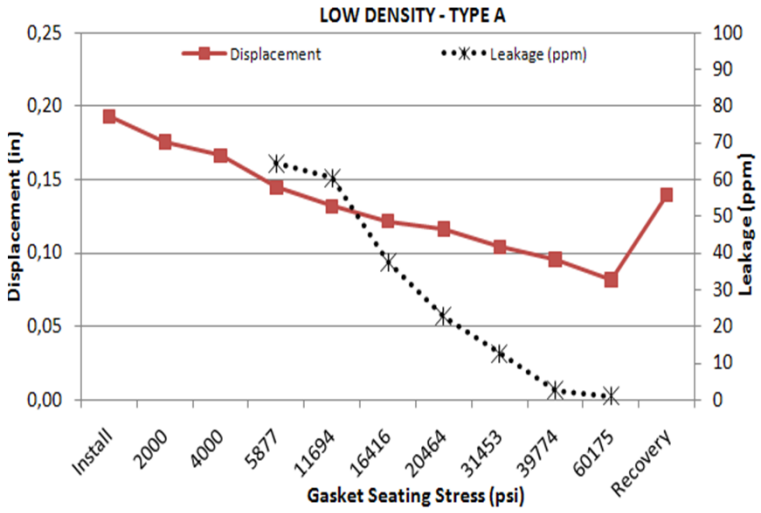


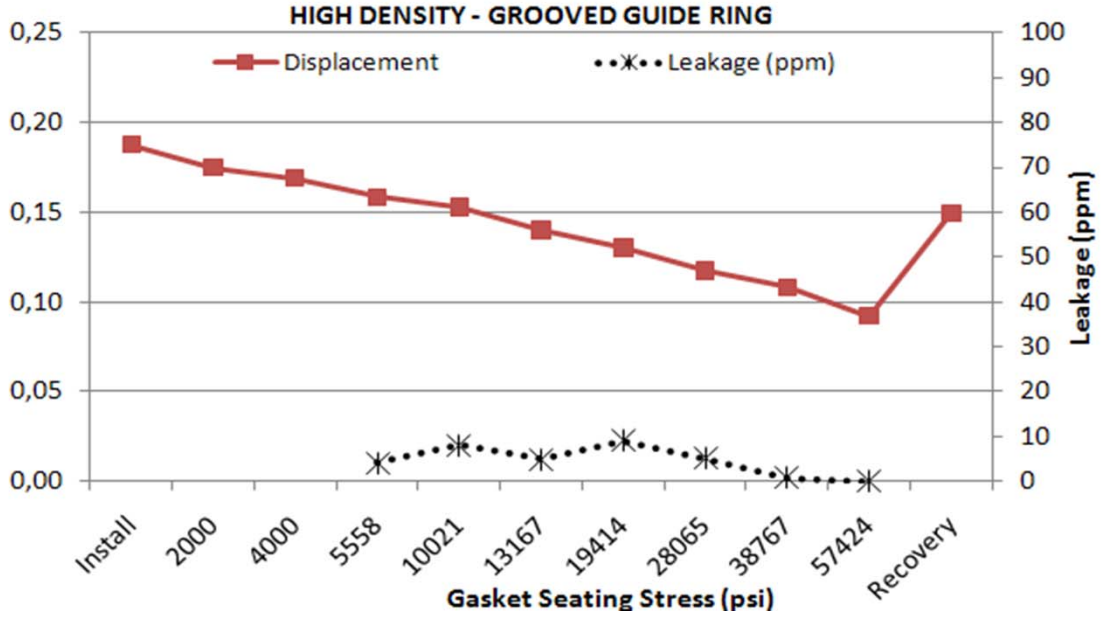
Gasket Thickness (mm)			
Initial			
	ID	OD	Δ(ID-OD)
1	4.688	4.767	-0.079
2	4.709	4.805	-0.096
3	4.721	4.785	-0.064
AFTER TEST			
1	3.930	3.795	0.135
2	3.930	3.736	0.194
3	3.810	3.610	0.200
Gasket Thickness (In)			
Initial			
	ID	OD	Δ(ID-OD)
1	0.185	0.188	-0.003
2	0.185	0.189	-0.004
3	0.186	0.188	-0.003
AFTER TEST			
1	0.155	0.149	0.005
2	0.155	0.147	0.008
3	0.150	0.142	0.008

6“ - 900# - Guide Ring with Grooves

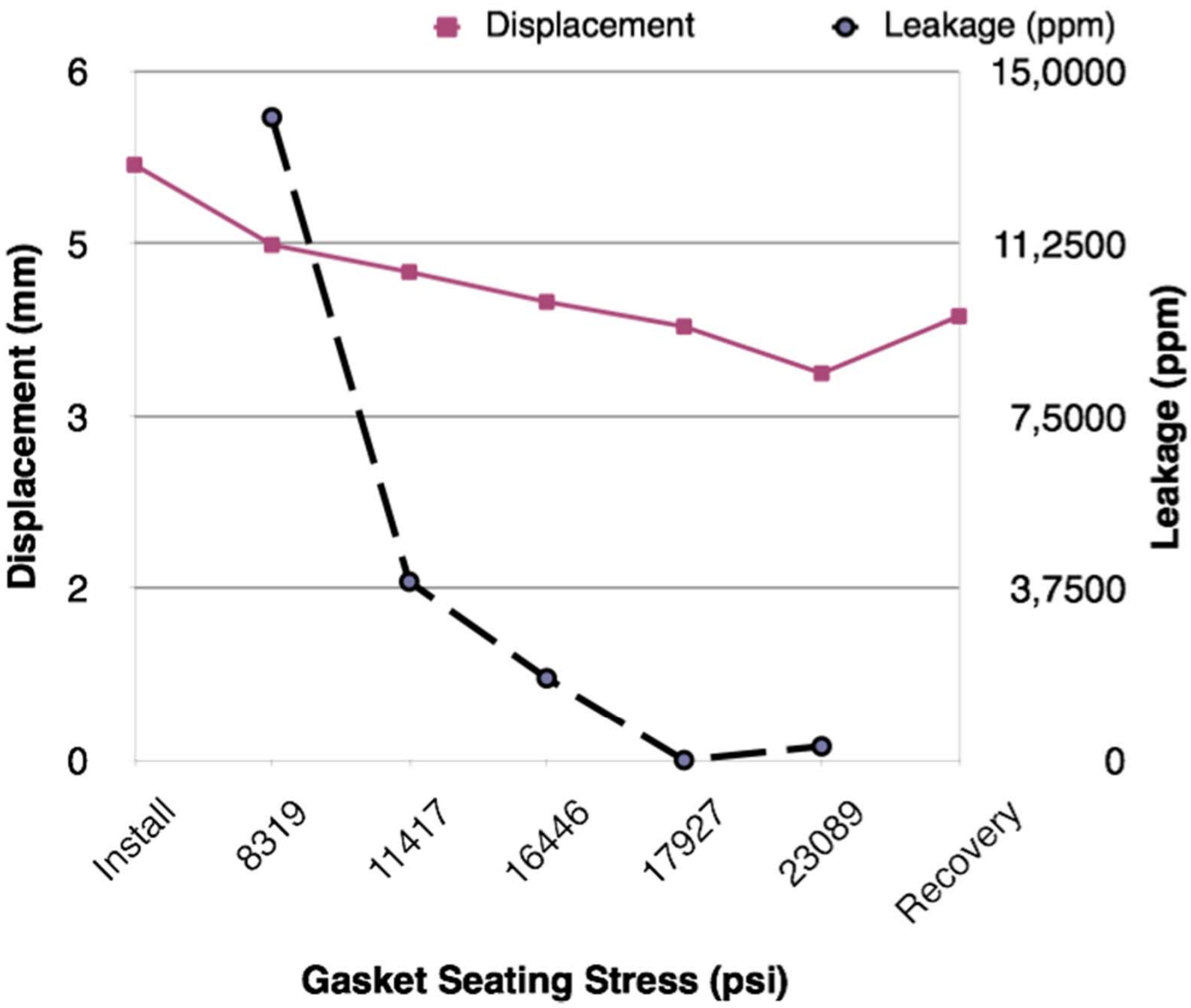




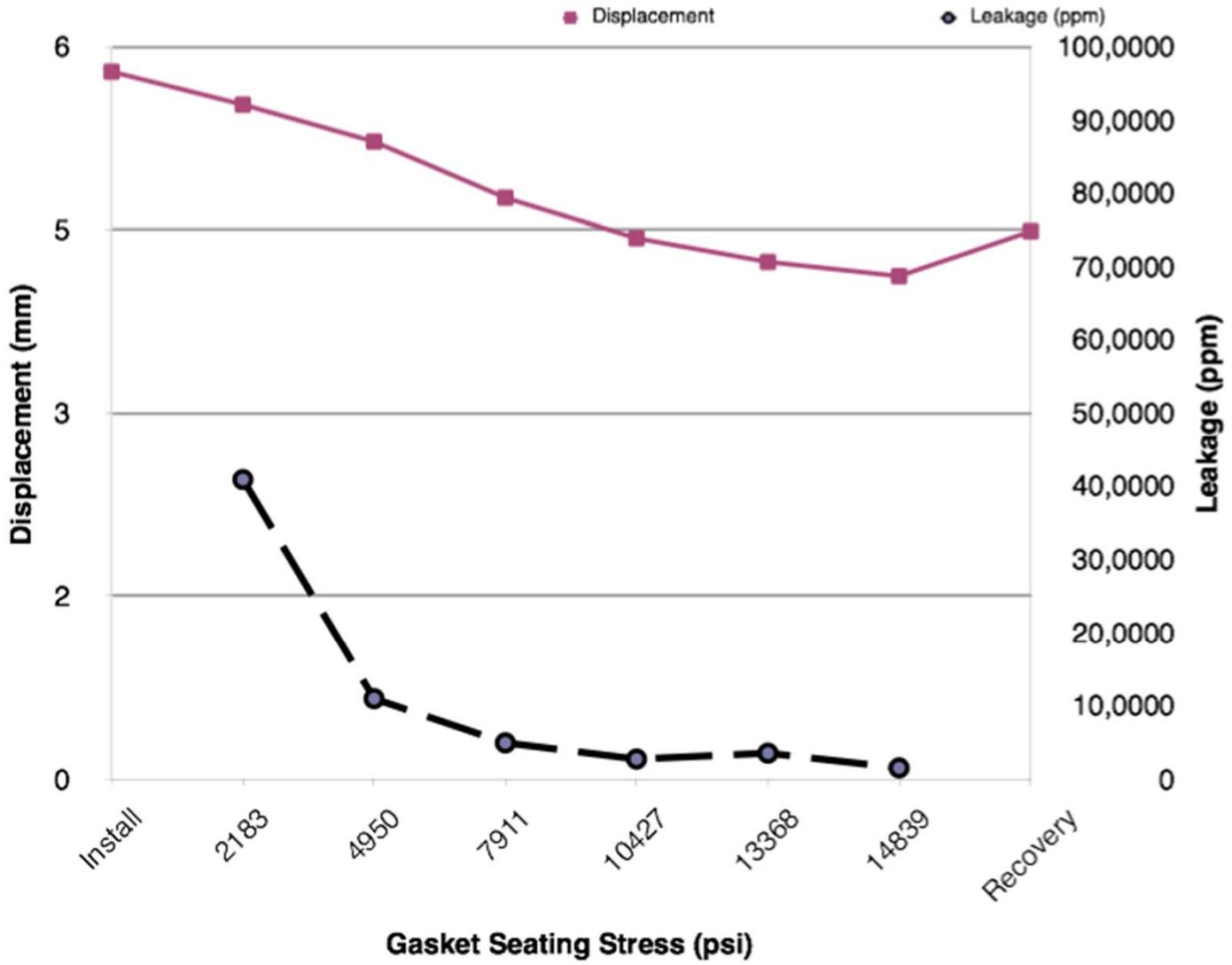




SW - 2" 300# - Controlled Density



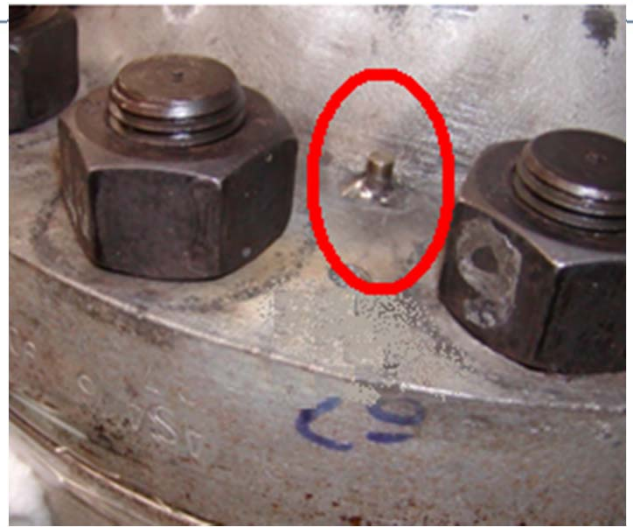
SW - 3" 150# - Controlled Density

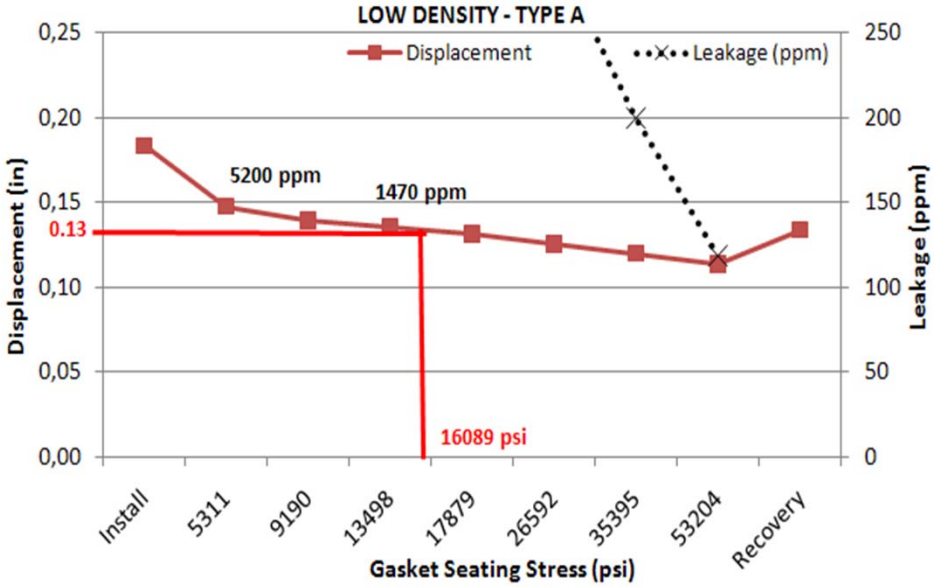


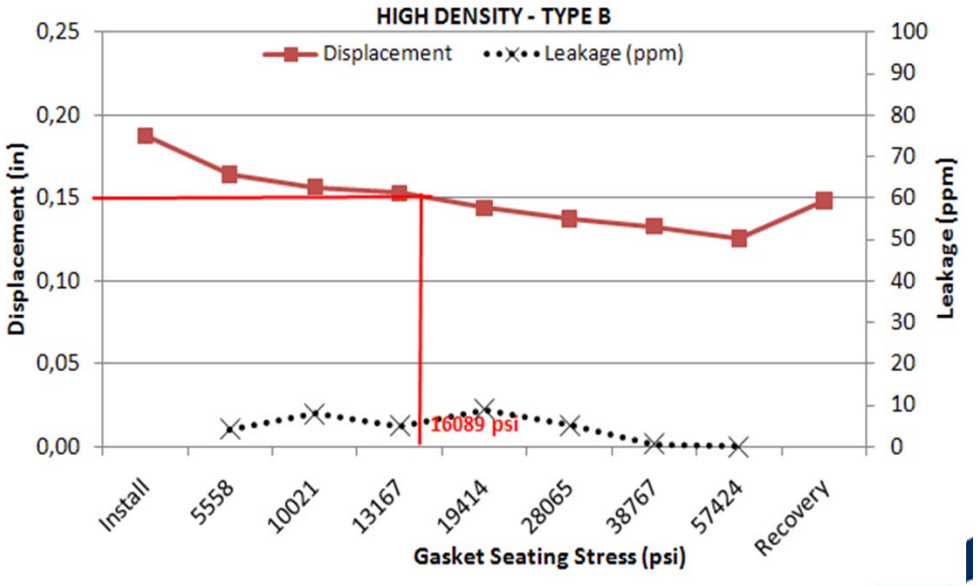
6“ - 900# - ASME B16.20 - compression

- **bolt stress of 30,000 psi**

- **compress gasket to 0.130 in ± 0.005 in (3.3 mm ± 0,127 mm)**

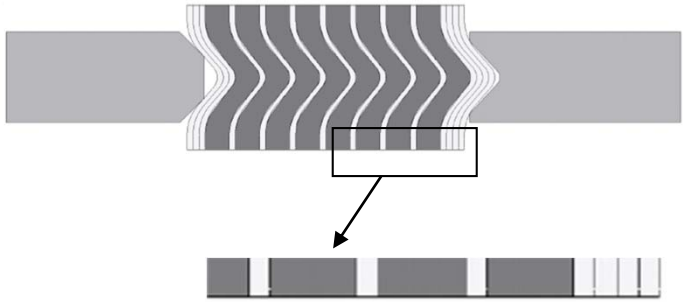


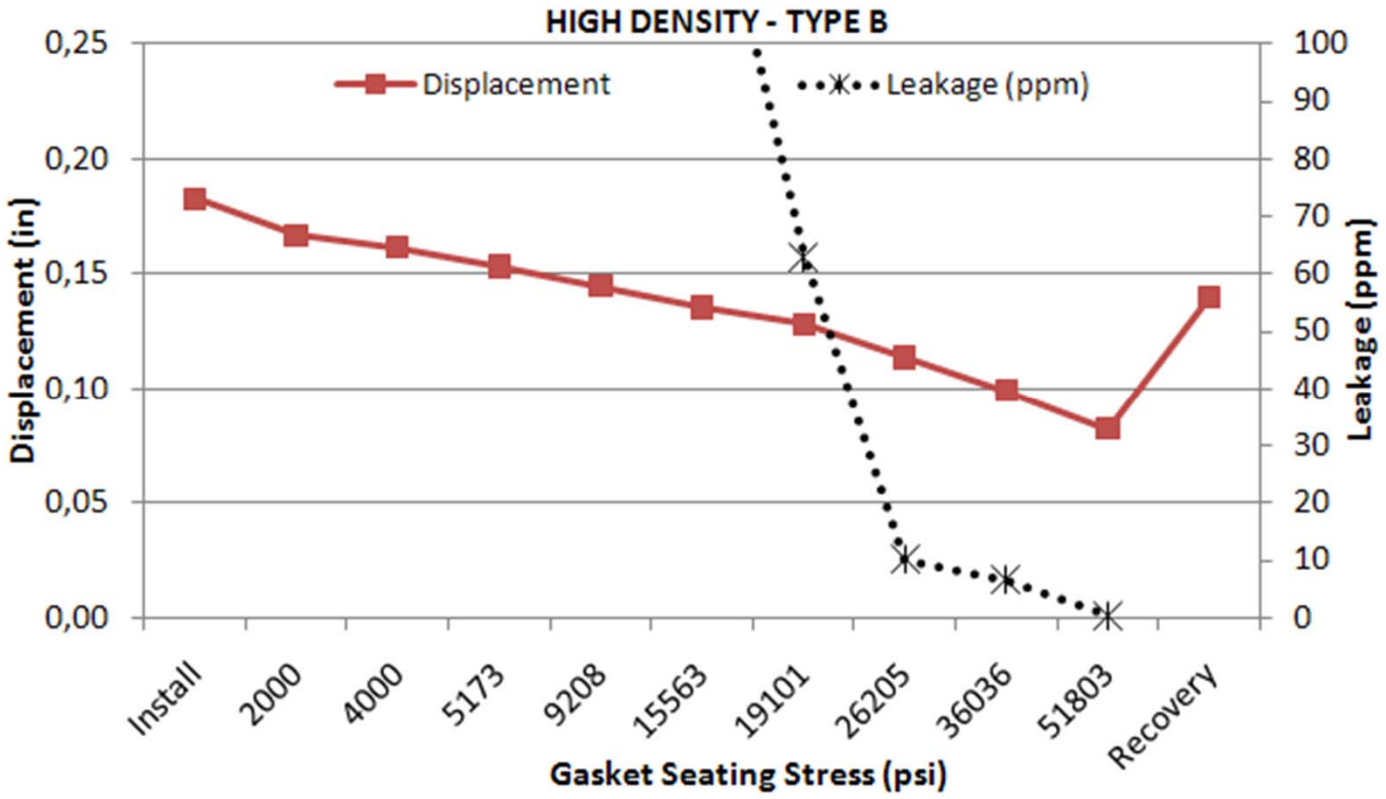




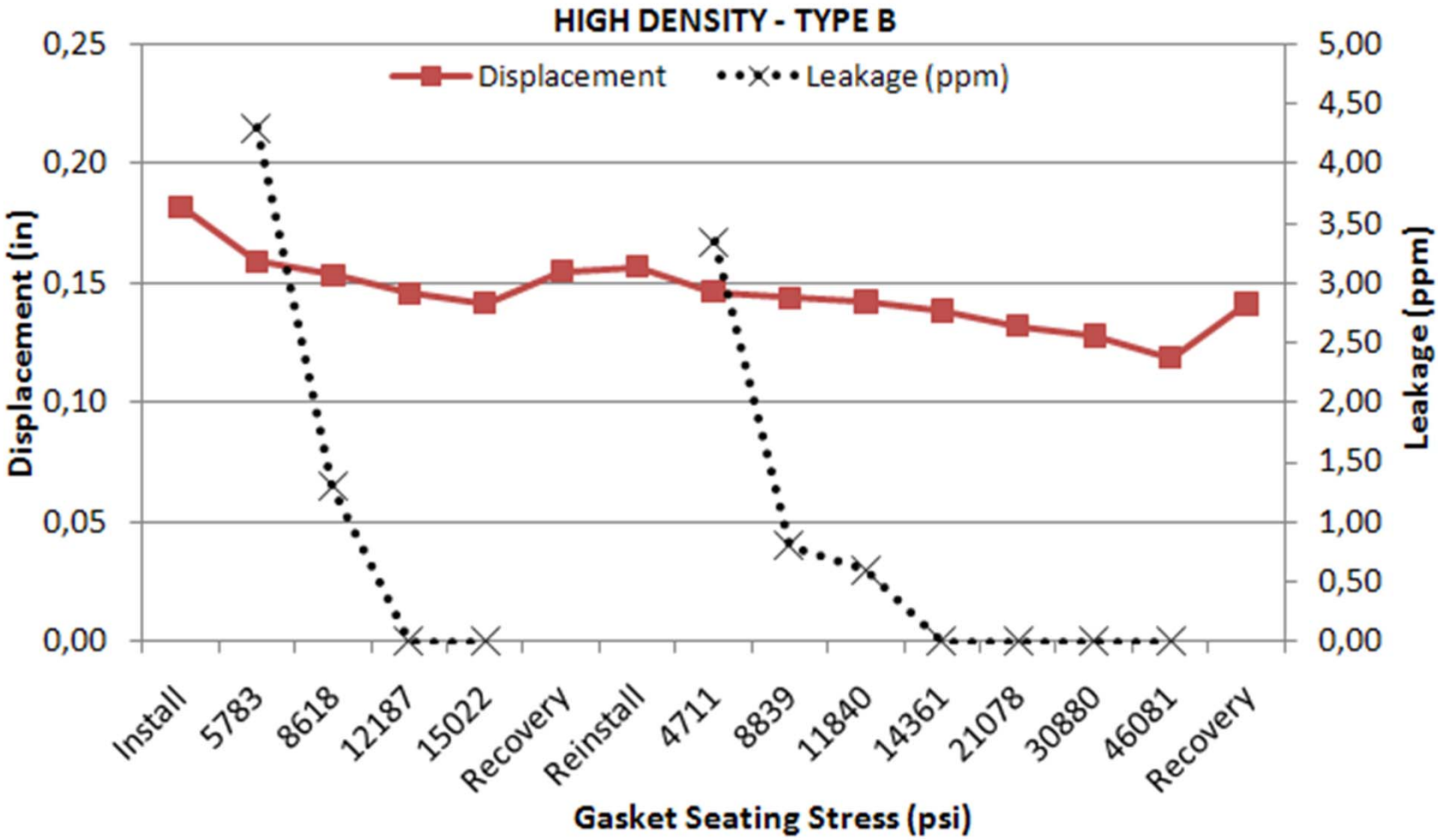
6“ - 900# - ASME B16.20 – Filler Flush

The filler shall be essentially flush with, but not below, the metal winding





SW Gasket Sealability after Reinstallation



Low Emissions Spiral Wound Gaskets

- **SW gaskets built to current B16.20 requirements do not meet stricter Fugitive Emissions requirements**
- **Based upon this research changes have been proposed to ASME B16 Committee to address sealability issues**
- **To assure sealability:**
- **Windings must remain loaded to optimize sealability so winding density must be controlled**
- **Minimum graphite height above the winding**
- **Certification tests to assure Low Emissions**
- **Teadit CD: less than 20 ppm at 18 000 psi seating stress**
- **Controlled Density SWGs are available from TEADIT**

Emissions Reduction Technology Forum

Setting the Standard for Automation™

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Thank You!