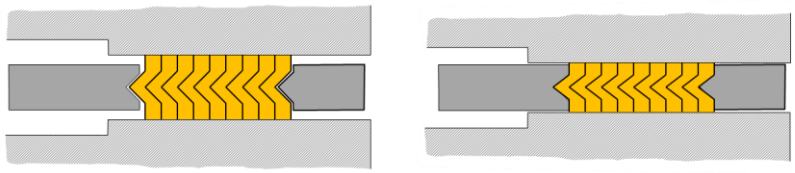
Lamons Inhibitor Gasket

Fire Safe & Corrosion Inert

The aim of this paper is to introduce the features and benefits of the Lamons Inhibitor gasket over a conventional spiral wound gasket having a standard inner ring. We understand from the market that there is a requirement for a standard piping gasket to deliver high integrity sealing, prevent corrosion and act as a fire safe product.



Traditional Piping Gasket Arrangement

The standard ASME B16.20 piping gasket achieves a tight seal by compressing the spiral wound sealing element and 'seating' into the flange face surface. The surface finish on ANSI B16.5 flanges is traditionally a gramophone machined profile to give 3.2µM to 6.4µM CLA roughness. Using a traditional inner ring design, there is no guarantee of a tight seal between the inner ring and the flange faces (due to the crevices on the surface of the flanges) therefore media can penetrate and stagnate in the crevices of the flange surface leading to the risk of crevice corrosion (Fig.1).

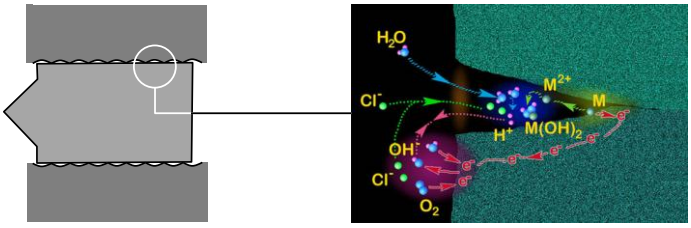


Fig. 1

Fig. 2 shows the gasket installed in the flanges before compression takes place, the inner and outer rings are not in contact with the flanges at this stage. As the bolts are tightened, the gasket will compress until contact is made with the *e*PTFE covering layers on the Kammpro™ inner ring. The *e*PTFE layers are designed to be easily compressed into the flange surface without requiring any additional bolt load other-than that needed to compress the spiral sealing element and make the joint closure tight and leak-free (Fig.3).

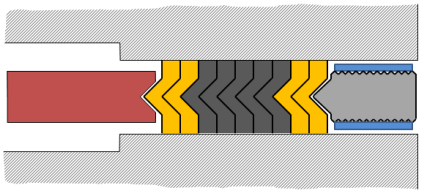


Fig. 2

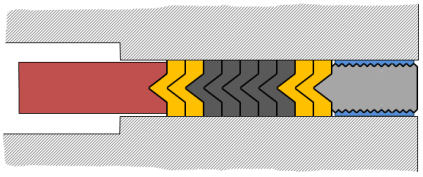


Fig. 3

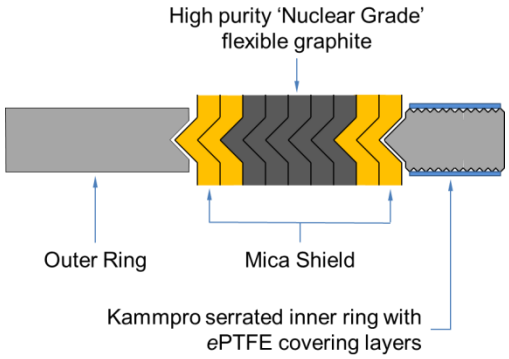
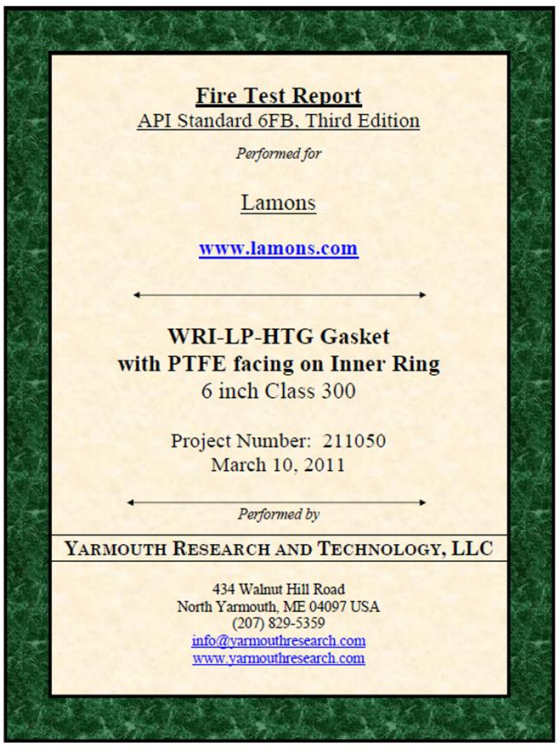


Fig. 4

The HTG design (Fig. 4) incorporates the sealing integrity of a graphite center with protective mica layers on the ID and OD of the gasket. The mica is there to prevent the ingress of the media so that the graphite filler does not come into contact with the pipe media or the external environment which eliminates the chance of corrosion at or around the sealing faces of the flanges.

The HTG design has been tested to withstand the API 6FB fire test which is an essential feature for off-shore environments.



Fire Test Report
API Standard 6FB, Third Edition

Performed for

Lamons

www.lamons.com

WRI-LP-HTG Gasket
with PTFE facing on Inner Ring
6 inch Class 300

Project Number: 211050
March 10, 2011

Performed by

YARMOUTH RESEARCH AND TECHNOLOGY, LLC

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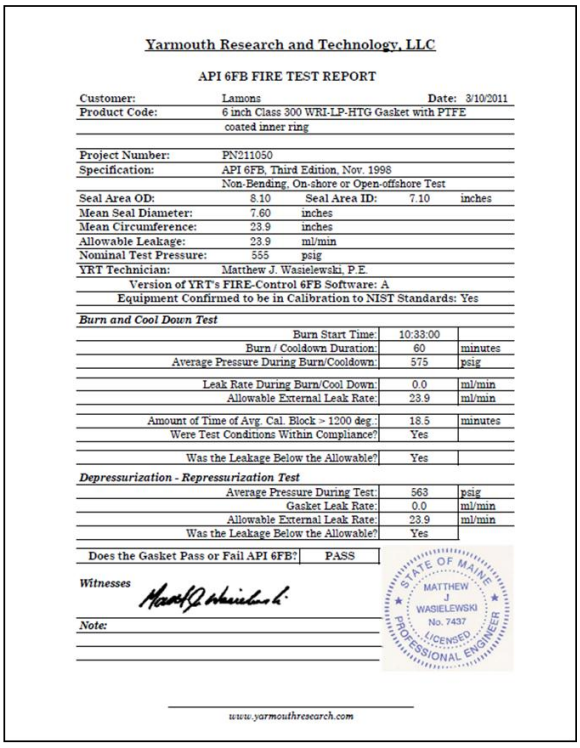

Yarmouth Research and Technology, LLC

API 6FB FIRE TEST REPORT

Customer:	Lamons		Date: 3/10/2011	
Product Code:	6 inch Class 300 WRI-LP-HTG Gasket with PTFE coated inner ring			
Project Number:	PN211050			
Specification:	API 6FB, Third Edition, Nov. 1998 Non-Bending, On-shore or Open-offshore Test			
Seal Area OD:	8.10	Seal Area ID:	7.10	inches
Mean Seal Diameter:	7.60	inches		
Mean Circumference:	23.9	inches		
Allowable Leakage:	23.9	ml/min		
Nominal Test Pressure:	555	psig		
YRT Technician:	Matthew J. Wasielewski, P.E.			
Version of YRT's FIRE-Control 6FB Software: A				
Equipment Confirmed to be in Calibration to NIST Standards: Yes				
Burn and Cool Down Test				
Burn Start Time:		10:33:00		
Burn / Cooldown Duration:		60	minutes	
Average Pressure During Burn/Cooldown:		575	psig	
Leak Rate During Burn/Cool Down:		0.0	ml/min	
Allowable External Leak Rate:		23.9	ml/min	
Amount of Time of Avg. Cal. Block > 1200 deg.:		18.5	minutes	
Were Test Conditions Within Compliance?		Yes		
Was the Leakage Below the Allowable?		Yes		
Depressurization - Repressurization Test				
Average Pressure During Test:		563	psig	
Gasket Leak Rate:		0.0	ml/min	
Allowable External Leak Rate:		23.9	ml/min	
Was the Leakage Below the Allowable?		Yes		
Does the Gasket Pass or Fail API 6FB?		PASS		

Witnesses

Note:

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

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The design (in terms of dimensions and functionality) complies with ASME B16.20 and can be considered a 'standard' piping gasket. The inner ring bore can be matched to the pipe/flange schedule to further reduce the stagnation zone for potential corrosion if required.

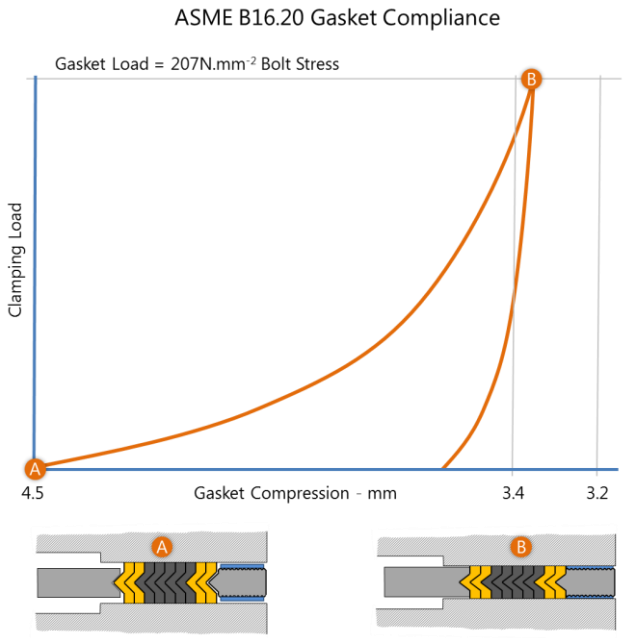
The design of the Inhibitor gasket ensures that the Kammpro™ inner ring provides the primary sealing interface and is matched on its inside diameter to that of the flange piping schedule. This ensures there is no void where crevice or galvanic corrosion can propagate also; the inner ring material and its covering layer are inert in terms of corrosion through contact with dissimilar materials.

To prevent galvanic corrosion occurring between the outer guide ring and the flange faces, all outer rings are coated in a thin PTFE polymer and color coded Blue for carbon steel and Red for stainless steel.

The Inhibitor can be produced in a variety of materials to suit the operating conditions.

Features & Benefits

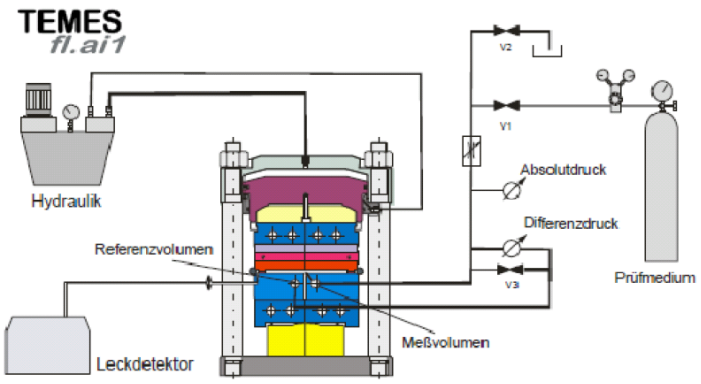
Feature	Benefit
Fire Safe API 6FB	Holds tightness integrity from an external fire.
Track record	Talisman Energy UK Limited ConocoPhillips ExxonMobil Total Neste Chemicals Velero Tesoro Citgo Montana Refining Cenex Coffeeville Resources
Corrosion resistance	Reduces crevice corrosion attack on flange bore. Inert materials reducing galvanic corrosion attack. Monel winding materials offer a wide range of resistance to corrosion attack and might be considered as a universal winding material across the different piping classes.
Standard Sizing	Standard dimensions according to ASME B16.20.
Kammprofile Inner Seal	Creates 'duel sealing' primarily on the inner ring and secondary sealing on the SWG. Machined profile creates 'point contact' loading for improved primary sealing. Geometry of machined face in conjunction with facing materials promotes *recovery and resilience* (more so than solid flat metal).



ASME B16.20 states that the spiral wound gasket shall be constructed such that when a load equal to a bolt stress of 207N.mm^{-2} is applied, the gasket will compress between 3.4mm and 3.2mm thick. The Lamons Inhibitor gasket is designed to accommodate this requirement with the addition of the *e*PTFE layered inner ring.

AMTEC Testing

Equipment Test rig

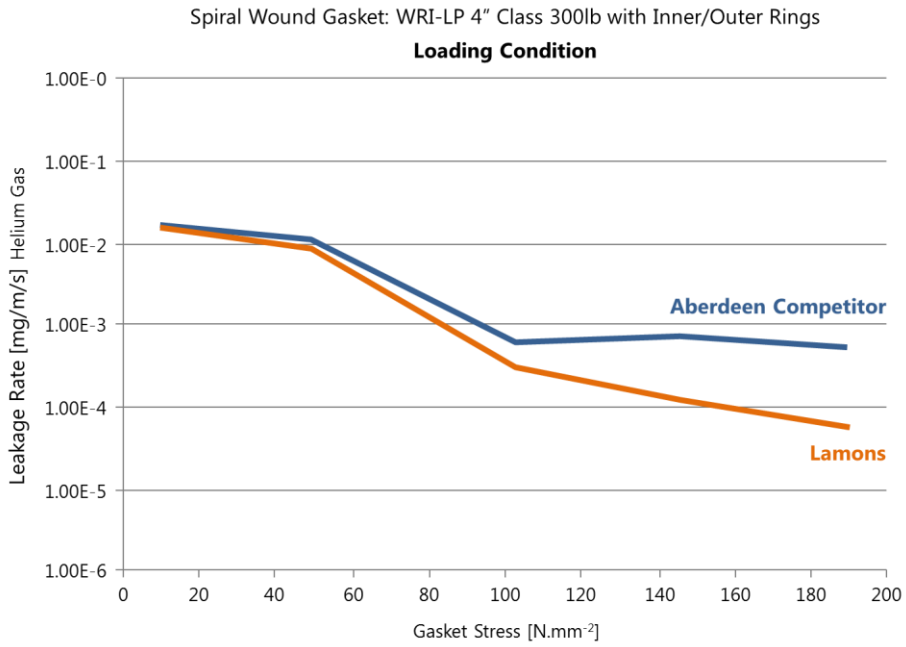


Prüfstand TEMES$_{fl.ai1}$ (1000 kN)

The following graph shows the leakage rate (low leakage means high gasket tightness) comparing a standard 'Aberdeen competitor' graphite filled spiral wound gasket (with a normal inner ring) to a Lamons Inhibitor with the Kammpro inner ring. The purpose of this test is to illustrate the additional benefits of using the Kammpro inner ring for additional tightness and sealing.

In this example, the Lamons gasket is 10x tighter than the competitor gasket under a compressive stress of 185MPa.

The addition of the Kammpro inner ring has a beneficial impact when making a tight seal on the inner ring and improves the tightness of the gasket.



One important feture to recognise here is that as the applied load increases, the leak rate should become smaller. The gasket from Lamons competitor has clearly compressed to the guide ring under a load of 100N.mm^{-2} (14,500psi) and further loading does not achieve a lower leak rate. This is

because the guide ring prevents the gasket sealing element been loaded any further, the clamp load is increased but the tightness effectively remains unchanged.

The Lamons gasket has the Kammpro™ inner ring which increases that gasket stiffness meaning that the sealing element remains in contact with the flange for a longer period. The gasket can then be loaded to a higher stress level which results in a higher tighness and lower leak rate. These factors are significant attributes when considering the performance of a gasketted joint.