WESTERMANN
BOLTING TECHNOLOGIES

Training Course

Gaskets

Introduction

The mating surfaces of our flanges are never exactly smooth or flat. No matter how well you machine them, they will always have some imperfections. If we bolted them together, they would always leak, and often it could be quite a lot. A simple solution is to put something between them to seal those imperfections. We call this sealing element a gasket, its sole job is to prevent leaking between the flanges. The world of gaskets is quite large though, and gaskets exist for all types of situations. Now we will take a look at the types of gaskets, their characteristics and how we choose a proper one.

In this chapter you will learn about:

Design Authority and Responsibility

Who is responsible for the proper selection and use of a gasket? With fasteners, we have the Fastener Quality Act that defines who is responsible for quality, and what penalties can result from knowingly not meeting quality standards. There is no law for gaskets, responsibility and design guidelines are defined in specifications such as ASME B31.1 and 31.3, ASME B16.1, 16.4 and 16.5 and AWWA C105, C110, C111 and C207.

For ASME B31.1 and 31.3, ultimately the owner is responsible to ensure that B31.1 and 31.3 are met. The engineer is responsible to the owner that their designs meet 31.1 and 31.3 and must exercise good judgment. The contractor, distributor and manufacturer are all responsible to the engineer that the materials used meet the requirements of the code and what is specified by the engineer.

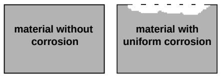
Good judgment means that if a situation arises that is not explicitly covered, the engineer must try to maximize safety and follow best design practices in the specification as closely as possible. All work done must be thoroughly documented (drawings, calculations, etc). Sometimes specifications will give design guidelines in which the use is recommended, not required; however, following those guidelines would constitute good engineering judgment. *Remember, someone is always legally responsible for the gasket.*

Corrosion

Uniform Corrosion

Uniform corrosion is the most common kind of corrosion. It accounts for the highest gross tonnage of materials wasted annually. It takes place consistently across the surface of a material due to multiple corrosion cells on the surface. The uniformity is brought about by the constant changing location of the corrosion cells on the metals surface.

Generally uniform corrosion results from atmospheric exposure. Industrial or marine atmospheres accelerate uniform corrosion due to the high levels of pollution and salinity, respectively, in these environments. Uniform corrosion, from the standpoint of tonnage of materials wasted, is the most common form of corrosion. However, uniform corrosion has a predictable nature; it is easily measured and accounted for, making disastrous failures rare.



Pitting Corrosion

Pitting corrosion is a form of local corrosion that takes place in a smaller surface area than uniform corrosion. Generally the pits formed are small and not visible to the unaided eye. Pits can take on various shapes within the metal. Pitting occurs when the area of a metal's surface is anodic and much smaller in size than the cathode of the corrosion cell.

From a visual standpoint, pitting can often go undetected, while uniform corrosion is obvious. This can lead to the erroneous belief that pitting corrosion is less harmful. In fact the opposite is true. Pitting can lead to a rate of penetration in the metal 10 to 100 times that of uniform corrosion. The figure below illustrates several shapes that pits can take in a material.

Galvanic Corrosion

Galvanic corrosion is the result of dissimilar metals of different electric potentials being in electrical contact with each other in the same electrolyte, which creates the ionic path. The electrical connection is the materials touching each other. In this corrosion, the more noble metal acts as the cathode while the more active one is the anode and corrodes. To understand galvanic corrosion, we must first understand two terms. Measuring the electric potential of a metal is a method of determining how noble the metal is.

Bolted Connection Quality Assurance

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Tag # ____

Date of Installation ____	Job Inspector ____
Job / Project Name ____	Q.A. Inspector ____
Location ____	Installation Foreman ____
Owner ____	Installation Helper ____
Engineer of Record ____	Installation Helper ____
Contractor ____	Installation Helper ____
Size ____	Notes:
Class ____	
Operating Pressure ____	
Test Pressure ____	

Condition Key

A - Clean	E - Protrusions	I - Not Aligned	M - Lubricated	Q - See Attached Notes
B - Dirty	F - Nicks	J - In Tolerance	N - New	
C - Scarred	G - Gouges	K - Out of Tolerance	O - Used	
D - Burrs	H - Aligned	L - Dry	P - Needs Attention	

Flange Information	Specification / Mfg	Condition	Bolting	Specification / Mfg	Condition
Flange #1			Gasket		
Flange #2 (mating)					

Flange Insulation	Specification / Mfg	Condition	Bolting	Specification / Mfg	Condition
Sleeve			Hex Bolt / Stud		
Insulation Washer			Nut		
Backup Washer			Washer		

Installation Instructions

K Factor ____	Target Torque Value at Operating Pressure ____
Bolting Maximum Torque Value Before Yield ____	Tightening Method (circle one)
Gasket Minimum Seating Stress Torque Value ____	Turn of Nut Cross Pattern 324 Method
Target Torque Value at Test Pressure ____	Wrench Type ____

Final Torque Value

Bolt 1	Bolt 11	Bolt 21	Bolt 31	Bolt 41	Bolt 51	Bolt 61
Bolt 2	Bolt 12	Bolt 22	Bolt 32	Bolt 42	Bolt 52	Bolt 62
Bolt 3	Bolt 13	Bolt 23	Bolt 33	Bolt 43	Bolt 53	Bolt 63
Bolt 4	Bolt 14	Bolt 24	Bolt 34	Bolt 44	Bolt 54	Bolt 64
Bolt 5	Bolt 15	Bolt 25	Bolt 35	Bolt 45	Bolt 55	
Bolt 6	Bolt 16	Bolt 26	Bolt 36	Bolt 46	Bolt 56	
Bolt 7	Bolt 17	Bolt 27	Bolt 37	Bolt 47	Bolt 57	
Bolt 8	Bolt 18	Bolt 28	Bolt 38	Bolt 48	Bolt 58	
Bolt 9	Bolt 19	Bolt 29	Bolt 39	Bolt 49	Bolt 59	
Bolt 10	Bolt 20	Bolt 30	Bolt 40	Bolt 50	Bolt 60	

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Certificate of Completion

This is to certify that

Your Name Here

has successfully completed coursework for
Bolting Technology Level 1

Awarded this 7th day of October, 2009

Robert Williams
General Partner
RIEX Co. LP

Roneesh Vashist
Roneesh Vashist
Technical Training and Development Specialist