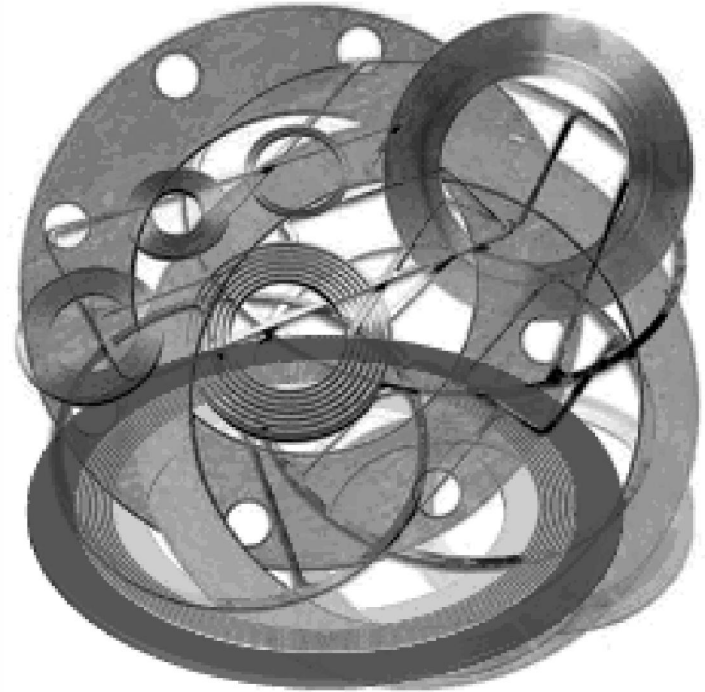


Gaskets



Prepared by:

Syed Fawwad



Definition of gasket



- Flange gaskets are used to create a static seal between two flanges faces, at various operating conditions, with varied pressure and temperature ratings.
- A gaskets fills the microscopic spaces and irregularities of the flange faces, and then it forms a seal that is designed to keep liquids and gases.



Why use gaskets?

- If it would be technically possible, in order to manufacture flanges perfectly flat and smooth, and perfectly compatible with one another under all operating conditions, a gasket would not be necessary.
- But in normal practice it is not possible, because flange connections under ANY circumstances should be made. Small impurities and a small bit of dirt, is in practice not be avoided and therefore it is necessary to use a gasket.



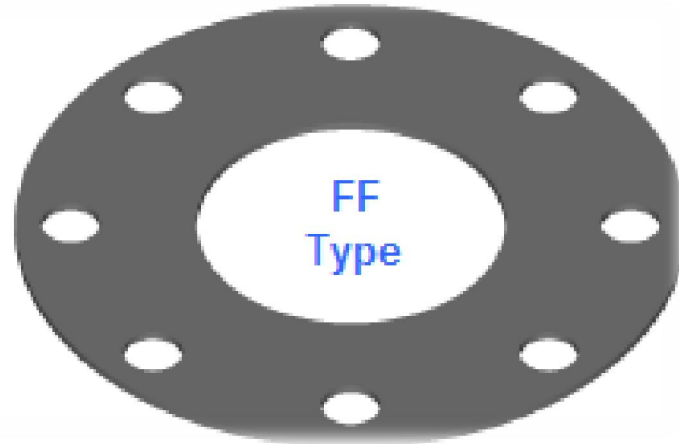
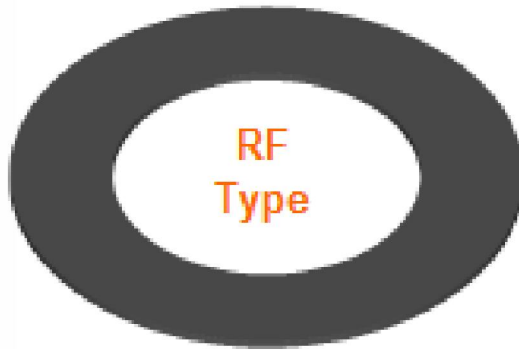
TYPES OF GASKETS



Materials for gaskets can be divided into three main categories:

- Non-metallic types
- Semi-metallic types
- Metallic types

Non-metallic gaskets

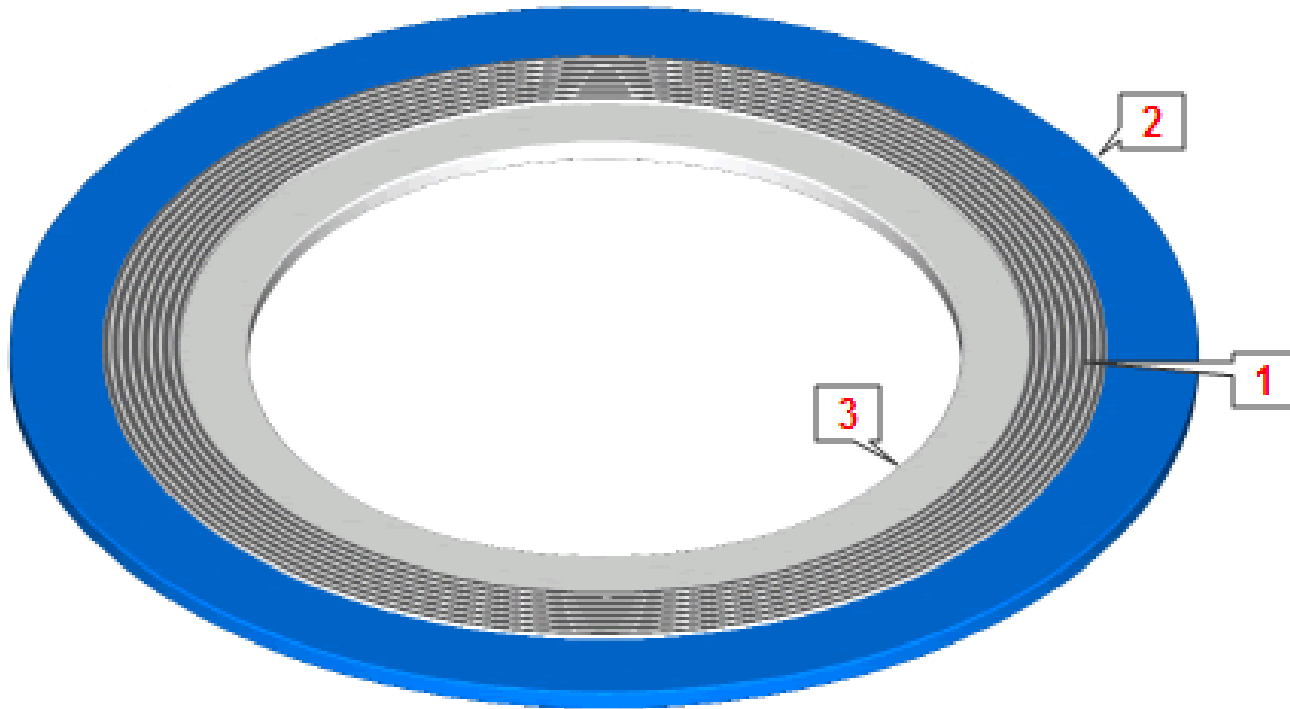




Non-metallic gaskets

- Non-metallic gaskets are usually composite sheet materials are used with flat-face and raised-face flanges in low Pressure Class applications.
- Non-metallic gaskets are manufactured from fiber, glass fiber, elastomer, Teflon (PTFE), graphite etc..
- Full-face gasket types are suitable for use with flat-face flanges. Flat-ring gasket types are suitable for use with raised face flanges

Semi-metallic gaskets



1. Sealing Element 2. Outer Ring 3. Inner Ring



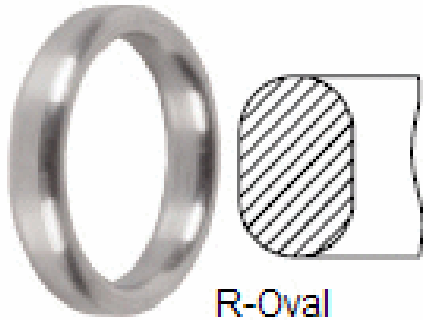
Semi-metallic gaskets



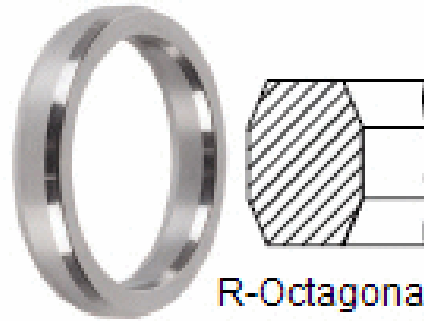
- Semi-metallic gaskets are composites of metal and non-metallic materials
- The metal is intended to offer strength and resiliency, while the non-metallic portion provides conformability and seal ability.
- Commonly used semi metallic gaskets are spiral wound, metal jacketed and a variety of metal-reinforced graphite gaskets
- Semi-metallic are designed for almost all operating conditions and high-temperature and pressure applications, and are used on raised face,



Metallic gaskets



R-Oval



R-Octagonal





Metallic gaskets

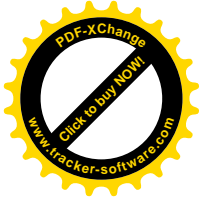
- Metallic gaskets are fabricated from one or a combination of metals to the desired shape and size
- Often used metallic gaskets are ring-type-joint gaskets (RTJ).
- They are always applied to special, accompanying flanges which ensure good, reliable sealing with the correct choice of profiles and material
- Ring Type Joint gaskets are designed to seal by "initial line contact" or wedging action between the mating flange and the gasket. By applying pressure on the seal interface through bolt force, the "softer" metal of the gasket flows into the micro fine structure of the harder flange material, and creating a very tight and efficient seal.



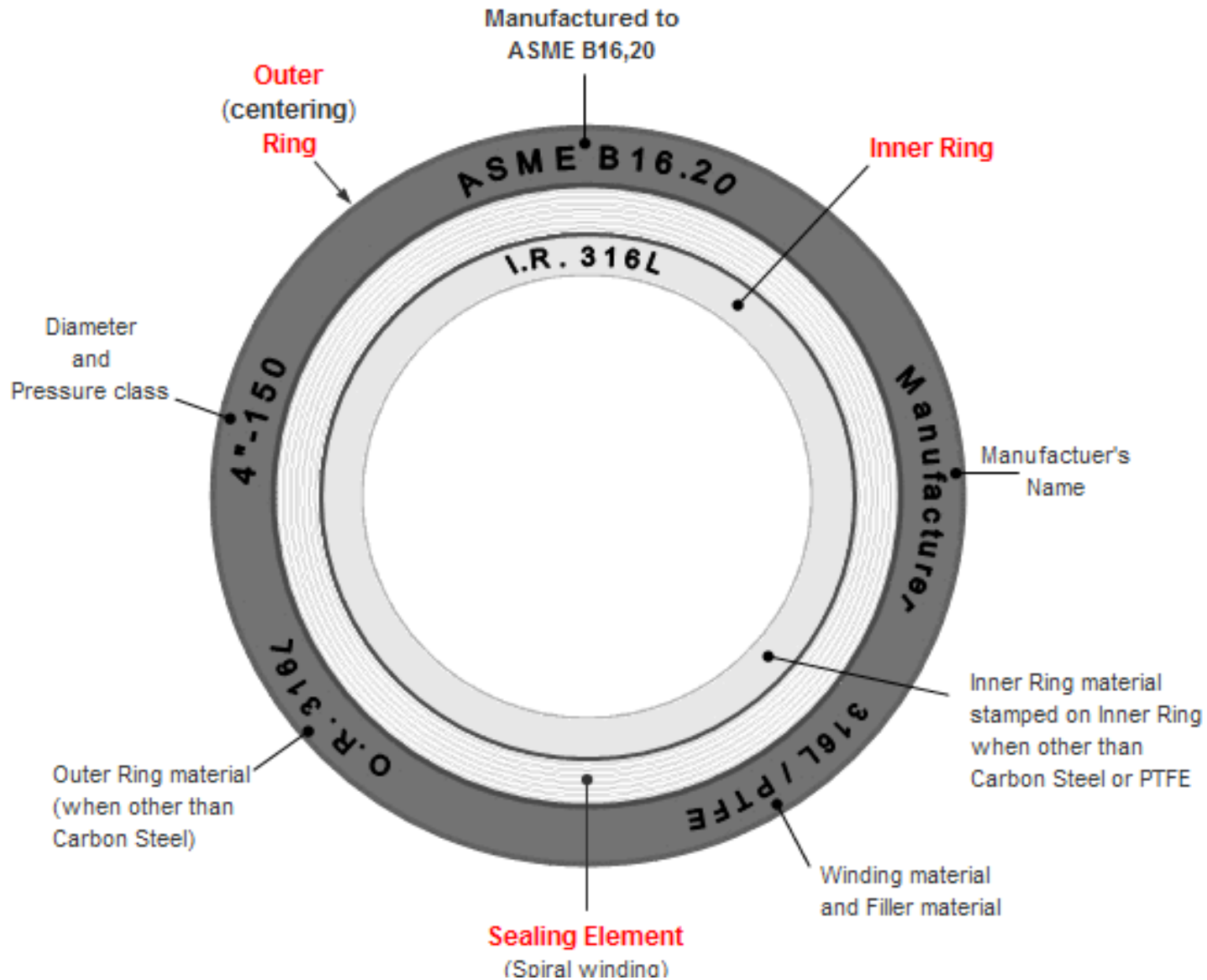
Types of semi metallic gaskets



- Spiral wound gaskets
- Camprofile gaskets
- Metal jacketed gaskets

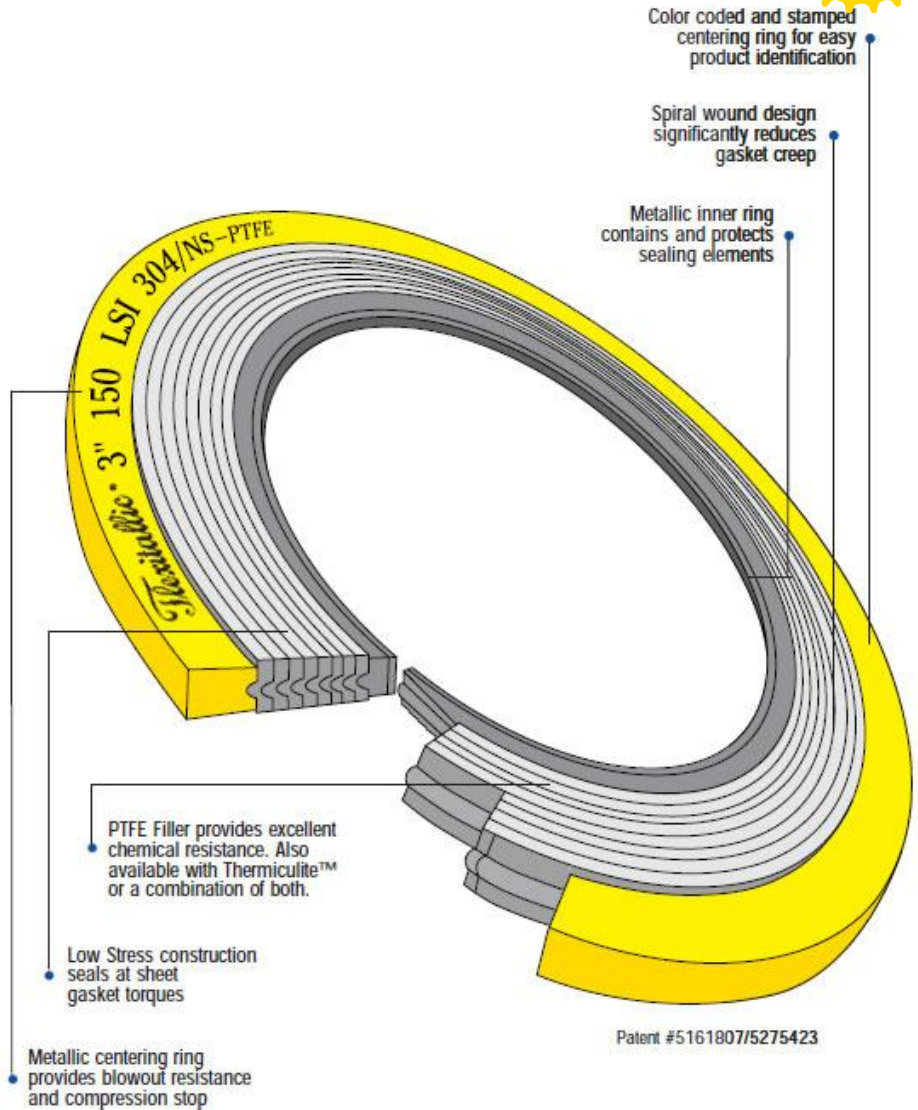
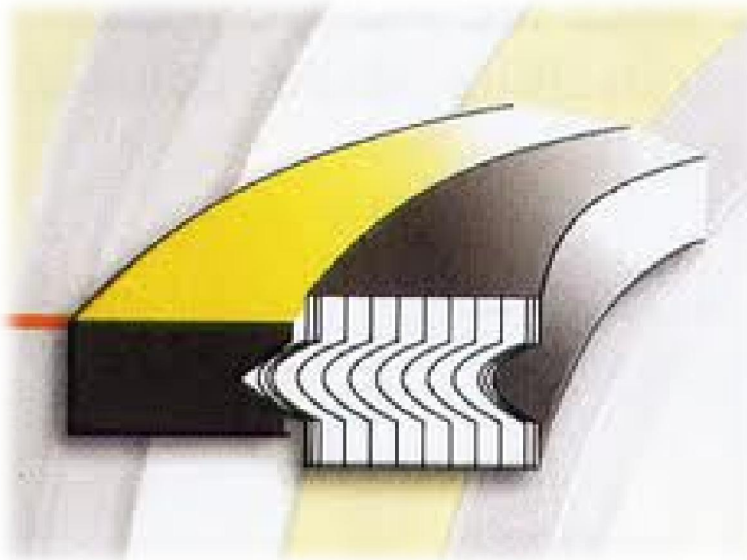


Spiral wound gasket





Spiral wound gasket





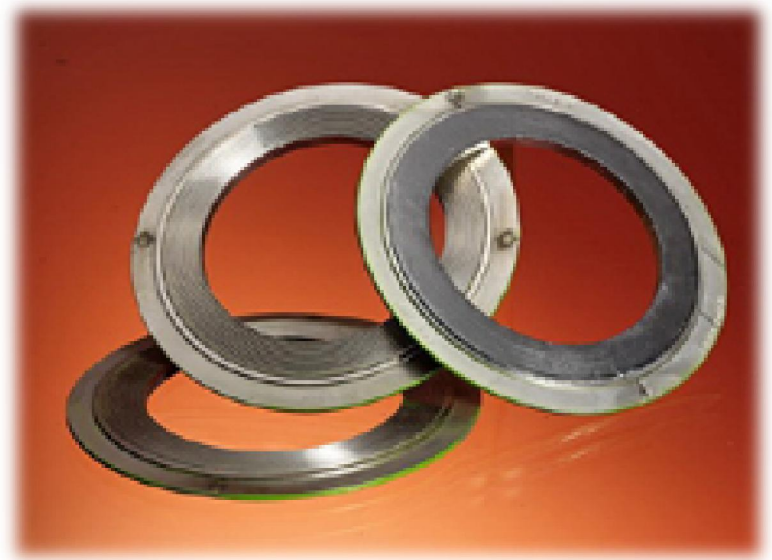
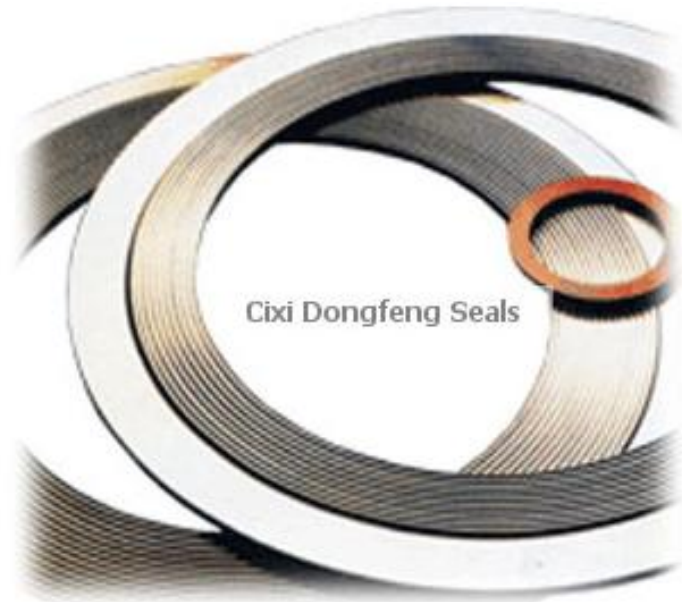
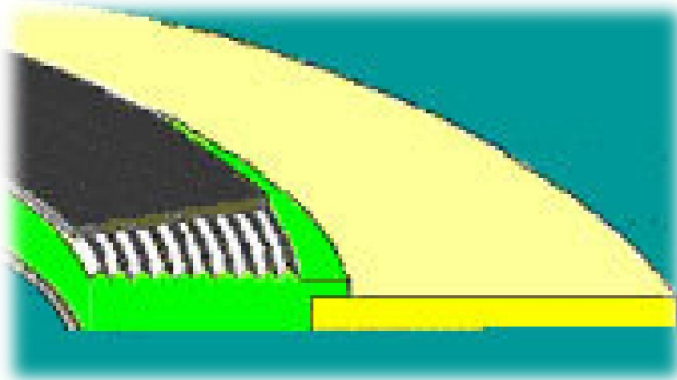
Spiral wound gasket



- The spiral wound gasket meets the most exacting conditions of both temperature and pressure in flanged joints and similar assemblies and against every known corrosive and toxic media.
- The spiral wound gasket depends upon the mechanical characteristics of a formed metal spiral strip, rather than the compressive virtues of more traditional gasket materials.
- The sealing strips, or fillers, are usually graphite, although other materials such as Teflon may be used, the windings are always stainless steel
- The completed gasket is fitted into a steel ring of specific thickness. When the gasket is fitted into a flange and the bolt load is applied, flange closure is governed by the outer steel ring of the gasket.



Camprofile gaskets

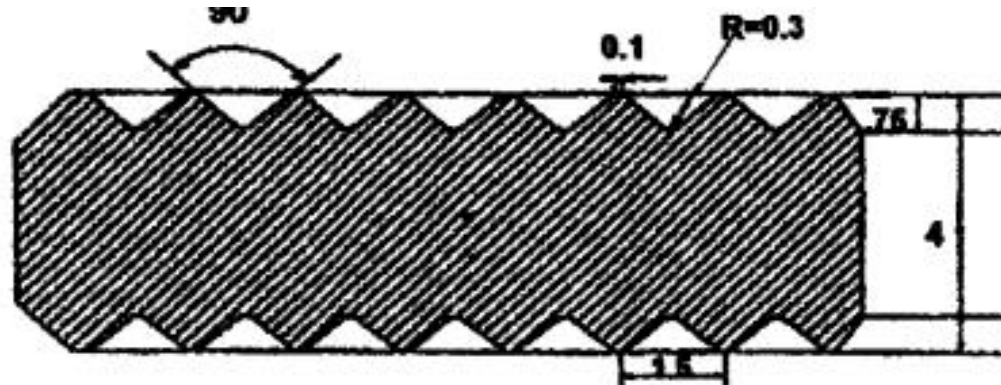




Camprofile gaskets



- Camprofile or "Grooved" gaskets have proven themselves in all industrial applications.
- Camprofile gaskets are found in industrial power plants and in the primary circuits in nuclear installations
- Camprofile gaskets are made from a solid serrated metal core faced on each side with a soft nonmetallic material
- The term camprofile (or kammprofile) comes from the groove profile found on each face of the metal core (groove profile shown in figure)





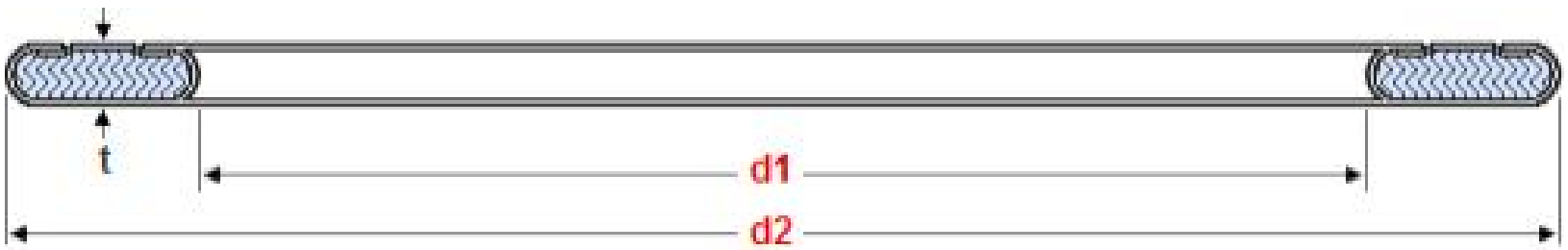
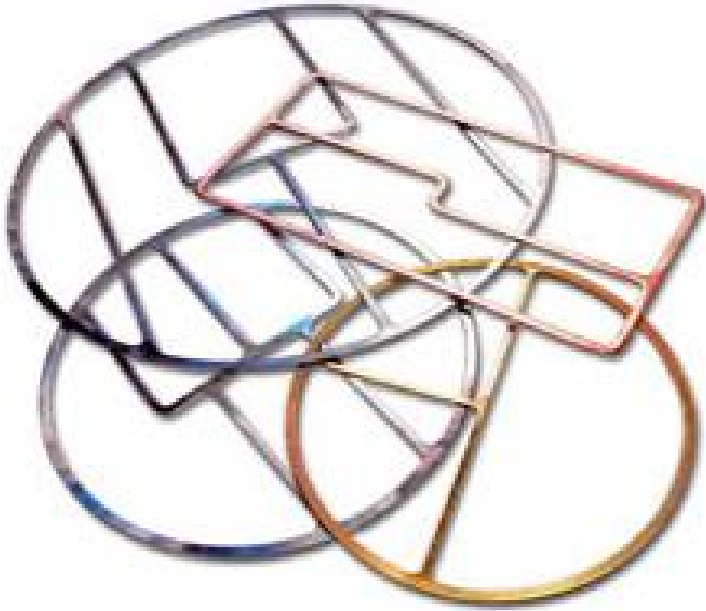
Camprofile gaskets



- Camprofile gaskets consist of a metal core (generally Stainless Steel) with concentric grooves on either side with sealing materials. The sealing layers (depending on the service duty) can be Graphite, Teflon, or Metal (e.g. Aluminium or Silver).
- Camprofile's can be used without sealing layers to provide an excellent seal but there is a risk of flange surface damage
- The camprofile gasket combines the strength, blowout, and creep resistance of a metal core with a soft sealing material that conforms to the flange faces providing a seal.



Metal jacketed gaskets





Metal jacketed gaskets



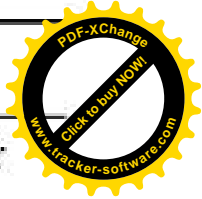
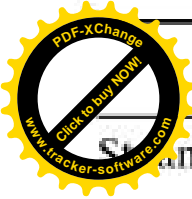
- Jacketed gaskets are made from a nonmetallic gasket material enveloped in a metallic sheath
- This inexpensive gasket arrangement is used occasionally on standard flange assemblies, valves, and pumps.
- Jacketed gaskets are easily fabricated in a variety of sizes and shapes and are an inexpensive
- Metal Jacketed gaskets require smooth flange surface finishes, high bolt loads and flange flatness in order to seal effectively.



Gasket's Material & Application (V. Important for exams)



- See charts on next slides



Fluid

Application

Gasket material*

Steam (high pressure)

Temp up to 1000°F (538°C)

Spiral-wound comp. asbestos or graphite

Temp up to 1000°F (538°C)

Steel, corrugated, or plain

Temp up to 1000°F (538°C)

Monel, corrugated, or plain

Temp up to 1000°F (538°C)

Hydrogen-annealed furniture iron

Temp up to 1000°F (538°C)

Stainless steel 12 to 14 percent chromium, corrugated

Temp up to 1000°F (538°C)

Ingot iron, special ring-type joint

Temp up to 750°F (399°C)

Comp. asbestos, spiral-wound

Temp up to 600°F (316°C)

Woven asbestos, metal asbestos

Temp up to 600°F (316°C)

Copper, corrugated or plain

Steam (low pressure)

Temp up to 220°F (105°C)

Red rubber, wire inserted

Water

Hot, medium, and high pressures

Black rubber, red rubber, wire inserted

Hot, low pressures

Brown rubber, cloth inserted

Hot

Comp. asbestos

Water

Cold

Red rubber, wire inserted

Cold

Black rubber

Cold

Soft rubber

Cold

Asbestos

Cold

Brown rubber, cloth inserted

Oils (hot)

Temp up to 750°F (399°C)

Comp. asbestos

Temp up to 1000°F (538°C)

Ingot iron, special ring-type joint

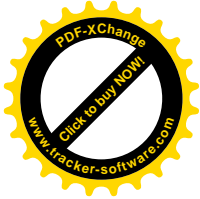
Oils (cold)

Temp up to 212°F (100°C)

Cork or vegetable fiber

Temp up to 300°F (149°C)

Neoprene comp. asbestos



Air	Temp up to 750°F (399°C) Temp up to 220°F (105°C) Temp up to 1000°F (538°C)	Comp. asbestos Red rubber Spiral-wound comp. asbestos
Gas	Temp up to 1000°F (538°C) Temp up to 750°F (399°C) Temp up to 600°F (316°C) Temp up to 220°F (105°C)	Asbestos, metallic Comp. asbestos Woven asbestos Red rubber
Acids	(Varies; see section on corrosion) Hot or cold mineral acids	Sheet lead or alloy steel Comp. blue asbestos Woven blue asbestos
Ammonia	Temp up to 1000°F (538°C) Temp up to 700°F (371°C) Weak solutions Hot Cold	Asbestos, metallic Comp. asbestos Red rubber Thin asbestos Sheet lead