

DEVELOPMENT OF A SAFER SEAL

The requirements to reduce fugitive emissions, to minimize flange corrosion, to comply to fire safety measures and overcome handling problems during installation has led to the development of a gasket with improved sealing performance.

Fugitive emissions such as volatile organic compound (VOC's) emitted into the atmosphere via pumps, valves, compressors, pipe flanges connections, bolted and rotating equipment are becoming a more corporate concern to many companies as these emissions not only have an impact on the environment, the health & safety of employees but also on the total cost of ownership.

Preventative measures to reduce fugitive emissions using Best Available Techniques (IED 2010/75/EU) has become important and concerns the chemical, petrochemical and refinery industries.

Introduction:

In response to an increased need for above requirements, the aim was to develop a gasket with following characteristics:

- Chemical resistant (pH 0 – 14)
- Fire Safe according to international standards (ISO 10497)
- Low Fugitive emissions complying to the highest standards (German Regulation TA-Luft – VDI2440)
- Low bolt load requirement
- High adaptability to irregular flange facings
- Flange protection against corrosion

Composition:

Corrugated AISI 321 stainless steel ring laminated on both sides, an expanded ePTFE which acts as a primary seal and exfoliated graphite as secondary seal.

Development of a gasket with improved sealing performance:

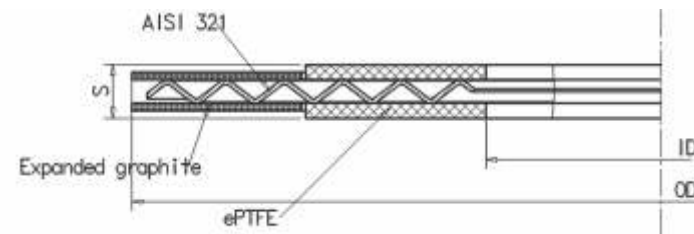


Figure 1. Schematic presentation of SAFESEAL™



Figure 2. SAFESEAL™

SAFESEAL™ compression curve

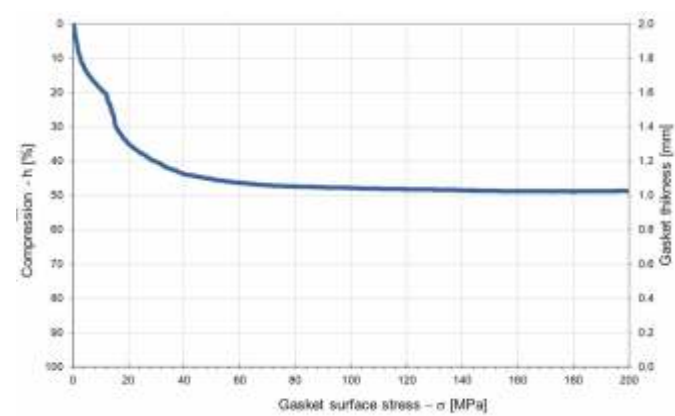


Figure 3. Compression curve at room temperature

In order to accomplish with these requirements a gasket design was required, incorporating a corrugated stainless-steel profile ring (e.g. AISI 321 other materials available on request) with expanded ePTFE primary seal and exfoliated Graphite which acts as a secondary seal laminated on both sides.

To protect the flange faces and to chemically protect the secondary graphite seal from aggressive fluids a ePTFE layer is positioned at the inner diameter on both sides of the gasket.

The combination of a high-quality graphite layer (> 98%) and its flexible insert allows low available bolt loads, enables high adaptability to the flange faces and guarantees Fire Safe approval according to ISO 10497 (incorporates BS6755 and API607).

Complies to Fire Safe Test API 607



The unique combination of these components provides a gasket in compliance with the strongest requirements of the Fugitive Emissions according to German Regulation TA-Luft – VDI2440 with a Helium gas tightness of $1,2 \cdot 10^{-6}$ mbar·l/(s·m).

A gasket is probably one of the most critical component in a flange assembly and therefore it is imperative to choose the correct bolt size and material and respect bolt tightening procedure (recommended by ASME PCC-1-2010 and EN 1591-4 Flanges and their joints, qualification of personnel competency in the assembly of the bolted connections of critical service pressurized), utilizing a cross-pattern sequence which allows uniform load distribution on the gasket.



Conclusion:

This innovative gasket design complies to the strongest Fire Safe as well as Low Fugitive Emission standards. It offers high chemical resistance against aggressive media even under low available bolt loads.

References:

1. ASME PCC-1-2010 Guidelines for Pressure Boundary Bolted Flange Joint Assembly.
2. Industrial Emissions Directive (IED 2010/75/EU)
3. TA-Luft VDI2440
4. Fire Safe requirements according to ISO 10497

SAFESEAL™ is a high-quality gasket with excellent sealing properties. SAFESEAL™ gasket with its unique combination of material properties makes it suitable where excellent chemical resistance and Fire Safe are required. SAFESEAL™ is highly recommended for applications where only limited bolt loads are available and complies to the most stringent fugitive emission requirements.

PROPERTIES

SUPERIOR	SEALABILITY PERFORMANCE		CHEMICAL RESISTANCE
EXCELLENT	MECHANICAL RESISTANCE	THERMAL RESISTANCE	
VERY GOOD			
GOOD			
MODERATE			

APPROPRIATE INDUSTRIES & APPLICATIONS

- GENERAL PURPOSE
- WATER SUPPLY
- POTABLE WATER SUPPLY
- GAS SUPPLY
- FOOD INDUSTRY
- PETROCHEMICAL INDUSTRY
- CHEMICAL INDUSTRY
- PHARMACEUTICAL
- TANK STORAGE

Dimensions of gaskets	Standard sizes according to ASME B16.20 and EN1514-1 Other dimensions are available on request.	
Color	Black and white	
Approvals	Fire safe approval ISO10497	TA-Luft (VDI 2440)

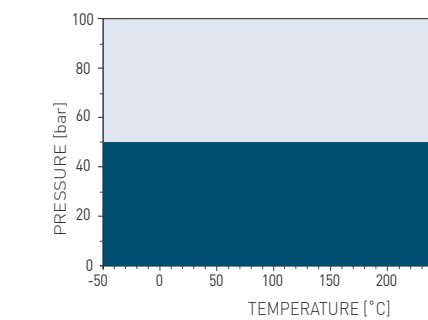
TECHNICAL DATA

Chemical resistance		pH	0 - 14
Specific leak rate	DIN 3535-6	mg/(s·m)	< 0.01
Maintenance factor – m	For 0.01 mg/(s·m) of N2	/	1
Minimum seating stress – y	For 0.01 mg/(s·m) of N2	MPa	20
Fugitive Emission – TA-Luft	VDI 2440	mbar·l/(s·m)	$1,2 \cdot 10^{-6}$
Max. operating conditions			
Temperature range		°C	- 200 up to + 260
Pressure		bar	50 [*]

[*] depending on available bolt load

P-T DIAGRAM

EN 1514-1, Type IBC, PN 40, DIN 28091-2 / 3.8, 1.5 mm

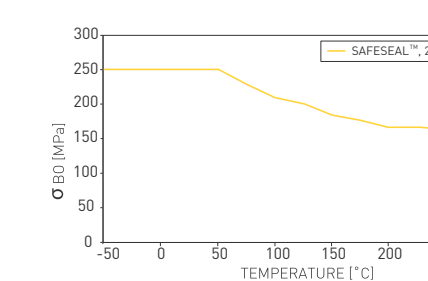


- General suitability - Appropriate measures ensure maximum performance for joint design and gasket installation.
- Limited suitability - Technical consultation is mandatory.

P-T diagrams indicate the maximum allowed combination of internal pressure and service temperature which can be applied simultaneously for a given gasket depending on its material type, thickness, size and tightness class. Given the variety of gasket applications and service conditions, these values should only be regarded as guidance for the proper gasket assembly. In general, thinner gaskets exhibit better P-T properties.

σ_{B0} DIAGRAM

DIN 28090-1



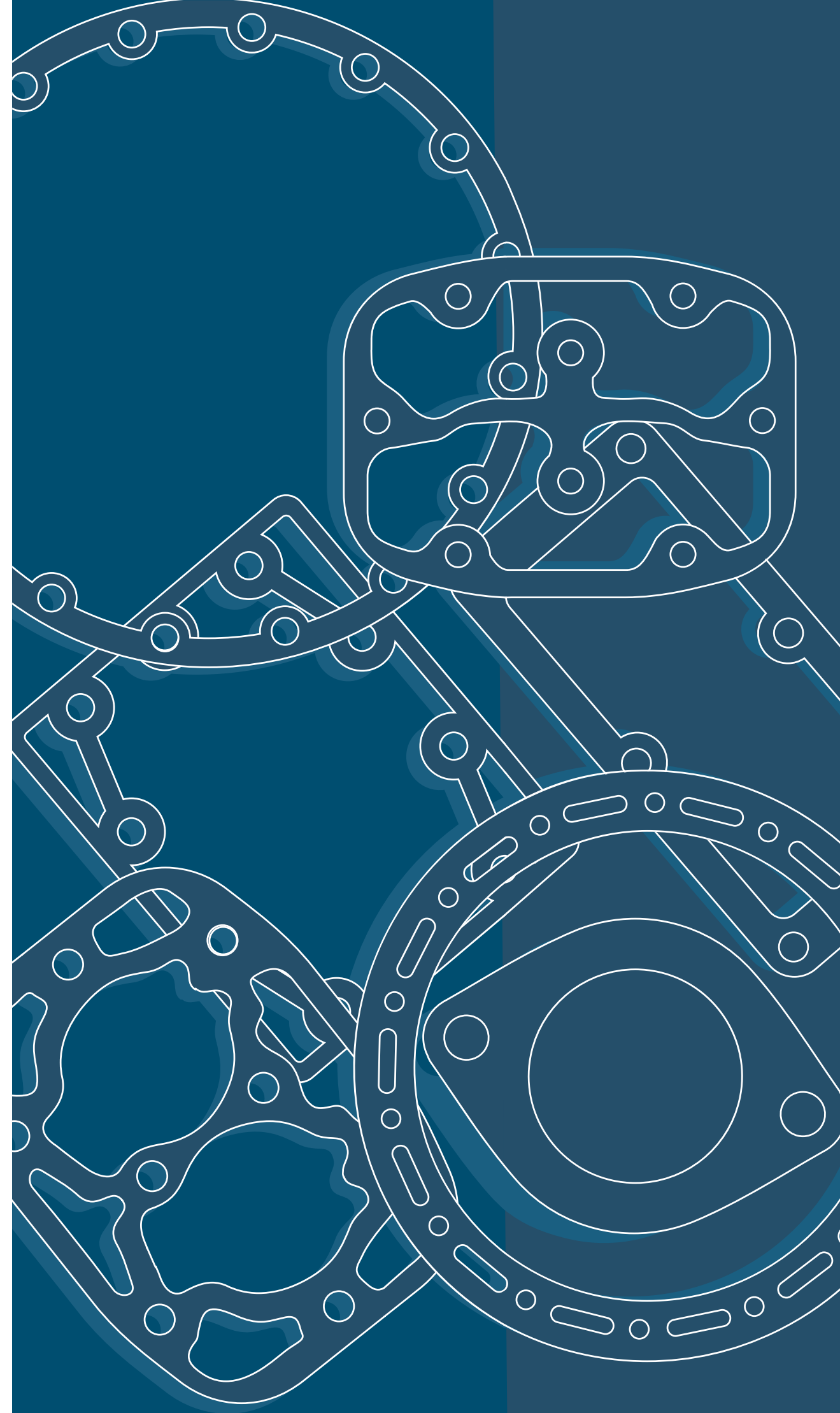
σ_{B0} diagrams represent σ_{B0} values for different gasket material thicknesses. These values indicate the maximum in-service compressive pressures which can be applied on the gasket area involved without destructing or damaging the gasket material.



A perfect fit
of **TRUST**
COMMITMENT
POSSIBILITIES
Customer and challenge
driven innovation
High level of flexibility
Adapt to new changes
Broad portfolio of gasket materials and products
BEST PRACTICE
SOLUTIONS



A CLEVER
CHOICE
SAFESEAL™



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Date of issue: 05.2018 / TDS-SAFESEAL-05-2018

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