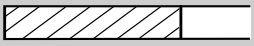
Metal profile gaskets

Solid **metal flat gaskets** are used in areas where, due to the medium, temperature, pressure and/or permitted leakage rate, soft-material or metal/soft-material gaskets are not particularly suitable. They have proven reliable at low temperatures of -200°C as well as at high temperatures of over 600°C. They are used at pressures ranging from relatively low to extremely high.

The thickness of the seal and the sealing material are generally dependent on the flange surface and the operating conditions. The better the flange surface in terms of surface quality and evenness, the thinner the gasket that can be used, e.g. 0.5 – 1 mm as a gasket in spinning nozzle fittings or 2 – 3 mm for aluminium gaskets in heat exchangers.

It should be noted that soft metals (such as aluminium or silver) need only relatively low surface pressures to become deformed, harder materials on the other hand, particularly steel, require high sealing pressure.

Gasket profiles

Profile	Cross-section
A1	

To reduce the sealing surfaces of gaskets with rectangular cross-section such as Profile A1, choose a convex cross-section shape. Information on this can be found in DIN 7603 at Form D.

The absolute level of the sealing press capacity can be reduced by using narrow gaskets instead of wide gaskets or harder metals galvanised with thin overlays of soft metal.

Coatings of copper, nickel, silver or tin up to a maximum of 100 µm will give significantly better sealing properties and significantly lower deformation surface pressure σ_V. For the stated flange surface roughnesses a coating thickness of 35 to 50 µm is sufficient.

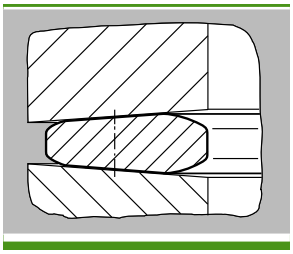
In metal profile gaskets, a line contact arises first. The bolt loads are clearly lower compared to metal flat gaskets (Profile A1). With the rectangular profile A1, even a slight flange twist can lead to sealing problems. The sealing diameter in the middle of the gasket jumps to the size of the external diameter, causing the leverage to be adversely affected. The greater internal pressure also has a negative effect.

In **convex gaskets** on the other hand, the contact geometry is such that it is self-sealing at high internal pressures. The sealing diameter is retained and edge pressure is avoided.

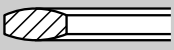
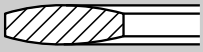
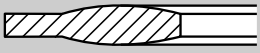
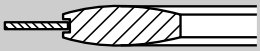
Narrow gaskets are more heavily loaded at the same bolt force and can flow when insufficiently stable, leading to a loss of bolt load and leakages.

To avoid flowing when loaded or even a destruction of the entire gasket, narrow flat gaskets should be chambered if necessary, as is the case with flanges with tongue and groove faces. Even with a chambered specimen there can be damage to the gasket, particularly if the sealing material is sensitive to crevice corrosion. In this case, fitting in a groove can actually be disadvantageous. In order to prevent damage to the gasket, ensure that the maximum permitted surface pressure σ_ϑ is not exceeded under any operating conditions.

Profiles A7 and H7 are centred by the corresponding shape of the flange e.g. male and female face joint. Gaskets of the type Profile H9 and H15 can also be used as high-pressure, high-temperature gaskets with flanges with raised or flat face flanges. The gaskets are then centred on the bolts. Profile H15, with a loose centring ring, is ideal for use with gaseous media and/or centring ring with widths greater than 15 mm. Profiles H7, H9 and H15 have an osculating radius R which is determined by the prevailing surface pressure.



Gasket profiles

Profile	Cross-section
A7	
H7	
H9	
H15	

Metal profile gaskets

Flat ring gaskets and other special shapes produced using special tools are also available. To protect from corrosion, galvanised overlays are possible. In copper gaskets with corrosion protection layers of hard nickel, the covering layer is only a few µm, so that the sealing properties are affected as little as possible by the harder protective layer.

We produce gaskets in all commonly used metals. See also **"Materials commonly used"**.

Convex gaskets made from metal are dimensioned as follows:

Oval flanges

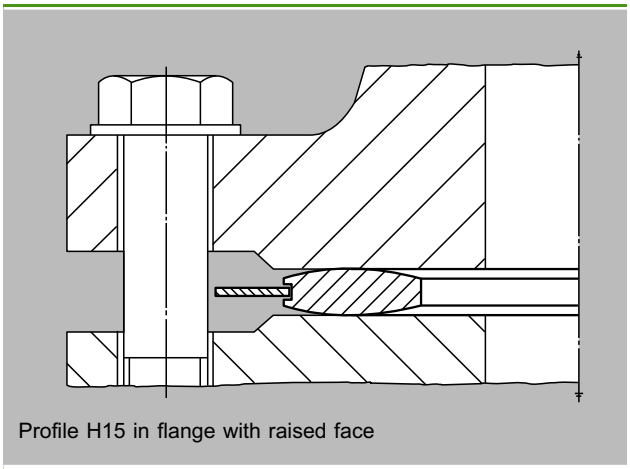
- in accordance with DIN 71511

Sealing discs for connections to pressure gauges and associated valves

- in accordance with DIN 837

Union fittings

- in accordance with DIN 7603



Profile H15 in flange with raised face

For measurements see section **"General Dimension Tables for DIN, ASME/ANSI, BS for flat gaskets"**

Gasket limiting values

Profile			A1									
Materials			Iron (1.1003) RSt 28 (1.0326)	St 35 (1.0308) St 38.8 (1.0305)	12CrMo195 (1.7362)	13CrMo44 (1.7335)	X6CrNiTi 18 10 (1.4541)	X15CrNiSi20 12 (1.4828)	Nickel Ni 99.6 (2.4060) Ni 99.2 (2.4066)	Copper	aluminium	Fine silver 99.98 Ag
Recommended max. roughness of the flange	µm	from	1,6	1,6	1,6	1,6	1,6	1,6	1,6	3,2	12,5	6,3
		to	3,2	3,2	3,2	3,2	3,2	3,2	3,2	6,3	25	12,5
Surfaces pressure limits for 20 °C	N/mm²	σ_v	235	265	400	300	335	400	190	135	70	50
		σ_ϑ	525	600	900	675	750	900	510	300	140	160
Surface pressure limits for 300 °C	N/mm²	σ_v	235	265	400	300	335	400	190	135	-	50
		σ_ϑ	315	390	730	585	630	750	480	150	-	135

Gasket characteristic values

Profiles			A7, H7, H9, H15								
Materials			Iron 1.1003	Heat-resistant mild steel 1.5415	Heat-resistant mild steel 1.7362	Stainless steel 1.4541	Stainless steel 1.4828	Steel St 35 copper-plated	Stainless steel 1.4541 silver-plated	Copper 2.0090	Monel 2.4360
Recommended max. roughness of the flange	µm	from	3,2	3,2	3,2	1,6	1,6	3,2	6,3	3,2	3,2
		to	6,3	6,3	6,3	3,2	3,2	6,3	12,5	6,3	6,3
Surface pressure limits for 20 °C	N/mm²	σ_v	235	300	400	335	400	135	100	135	260
	N/mm²	σ_ϑ	525	675	900	750	900	600	750	300	660
E modulus at 20 °C	kN/mm²		210	210	210	200	200	210	200	128	178
Surface pressure limits for 300 °C	N/mm²	σ_v	235	300	400	335	400	135	100	135	260
	N/mm²	σ_ϑ	315	585	730	630	750	390	630	150	650
E modulus at 300 °C	kN/mm²		185	185	190	186	186	185	186	114	175

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