

Non-Asbestos Gaskets — Comprehensive Properties

1) Compressed Aramid Fiber (Aramid + Elastomer binder / CNAF)

A. Properties (typical)

Property	Typical / notes
Composition	Aramid (Kevlar®/aramid) fibres + mineral fillers + elastomer binder (NBR/SBR/EPDM).
Appearance / color	Blue / grey / black depending on binder and brand.
Temperature range (continuous)	approx. -40° C to +150° C; some oil-resistant grades up to ~200° C (grade dependent).
Chemical / oil resistance	Good to water, steam and many oils (oil-resistant grades available); check binder for aromatic/fuel service.
Mechanical	Good compressibility, recovery and tensile strength for sheet gaskets; good cut-edge stability.
Advantages	Cost-effective, good sealing for many liquid/gas services, easy to cut & die-cut.
Limitations	Not suitable for extreme high-temperature (>200 - 250° C) or highly oxidizing high-T atmospheres.

2) Flexible Graphite (Expanded / Impregnated Graphite Sheets & Laminates)

A. Properties (typical)

Property	Typical / notes
Composition	Expanded (exfoliated) natural graphite foil — available plain or impregnated/coated; can be reinforced or metal-laminated.
Appearance	Soft, dark gray/black foil or sheet; low dust for impregnated grades.
Temperature range	-200° C to +450° C (graphite itself); effective service up to ~500 - 550° C for many grades; in oxidizing atmospheres oxidation risk increases — use oxidation-inhibited or metal-clad grades for high-T air service.
Chemical resistance	Excellent to most chemicals; widely used in refinery & chemical process services.
Mechanical / sealing	High compressibility and excellent conformability to flange irregularities; good for thermal cycling when properly selected.
Advantages	Very good high-T sealing, low leakage (impregnated grades), good for steam and hydrocarbons.
Limitations	Oxidizes at elevated temperature in air unless protected; tensile strength lower than metals — reinforced laminates available for strength.

Notes / sources: SIGRAFLEX / GRAFOIL datasheets and specialty graphite product literature.

3) [PTFE](#) / [ePTFE](#) (Virgin PTFE, Structured PTFE, Expanded PTFE)

A. Properties (typical)

Property	Typical / notes
Composition	Solid PTFE sheets (virgin or filled), or expanded (ePTFE) microporous gasketing materials; structured PTFE (filled / fibrillated) improves creep and mechanical stability.
Temperature range	-200° C to +260° C (continuous for most PTFE grades).
Chemical resistance	Outstanding — resistant to nearly all chemicals (excellent for highly corrosive or ultra-pure services).
Mechanical / sealing	Very low friction, excellent chemical inertness; ePTFE is conformable with low leakage. Filled/structured PTFE reduces cold flow/creep.
Advantages	Best choice for aggressive chemical services, food/pharma, ultrapure processes; FDA grades available.
Limitations	Lower springback than graphite or MLS for very high-pressure steam; select structured/filled grades for reduced creep.

4) Spiral-Wound Gaskets (metal + filler - graphite / PTFE / ceramic technology)

A. Properties (typical)

Property	Typical / notes
Construction	Wound metal strip (stainless or soft metal) with continuous filler (flexible graphite, PTFE, ceramic fiber, Thermiculite® etc.); centering ring and inner/outer rings optional.
Temperature / pressure	Wide range - depends on filler & metal: flexible graphite spiral wound: up to ~450 - 550° C in protected atmospheres; PTFE filler for corrosive low-T services; high-T ceramic fillers for >600° C.
Sealing mechanism	Metal spring + filler conforms to flange surface and fills irregularities — excellent for high-pressure, high-T flanges.
Advantages	Very high mechanical strength, blowout resistance (with ring), suitable for ASME flange classes (150 - 2500).
Limitations	Requires correct winding and installation torque; selection must match flange class & media.

5) Kammprofile / Metallic (metallic corrugated plate with soft facing — e.g., Flexpro / Kammprofile)

A. Properties (typical)

Property	Typical / notes
Construction	Machined/corrugated metal core (stainless) with a soft sealing facing (graphite, PTFE, or ceramic fiber) adhesively bonded or mechanically fixed.
Temperature / pressure	Designed for high pressure and high temperature; temperature depends on facing material (graphite facings for high-T).
Advantages	Combines metal strength & rigidity with soft facing conformability; excellent sealing on irregular surfaces with higher bolt loads.
Typical uses	Heat exchangers, reactor flanges, high-pressure steam systems, critical petrochemical flanges.

6) Metal-Clad / Metal-Facing (graphite/PTFE bonded to metal foil)

A. Properties (typical)

Property	Typical / notes
Construction	Soft filler (graphite or PTFE) clad/laminated to thin metal foil (SS 304/316 or alloy).
Advantages	Metal barrier prevents corrosion pickup & protects filler from oxidation; improves handling and compressive load distribution.
Typical uses	Corrosive process lines requiring graphite sealing but metal barrier to protect flange or filler.

7) Soft Elastomeric / Cork & Cork-NBR / Rubber Gaskets (non-asbestos soft gaskets)

A. Properties (typical)

Property	Typical / notes
Types	Cork-NBR composites, pure rubber sheets (NBR, EPDM, FKM, Silicone), neoprene, polyurethane
Temperature range	Varies widely: Cork/NBR $\sim -30^{\circ}\text{C}$ to $+100^{\circ}\text{C}$; NBR up to $\sim 120^{\circ}\text{C}$; FKM (Viton) up to $\sim 200 - 250^{\circ}\text{C}$; Silicone up to $\sim 200 - 230^{\circ}\text{C}$.
Advantages	Good vibration damping, low cost, excellent sealing at low bolt loads; easy to cut & fit.
Limitations	Not suitable for high-T steam, strong oxidizers (unless specialty elastomer), or very high pressures.
Typical uses	Oil pan gaskets, HVAC, low-pressure pipe covers, pumps, compressors (low temp).