PTFE Gasket — Comprehensive Property

1) Virgin (unfilled) PTFE gaskets / sheet

A — Properties (typical)

Property	Typical value / notes
Composition	100% PTFE (polytetrafluoroethylene), no fillers.
Appearance	Smooth white sheet (can be pigmented).
Density	2.12 – 2.20 g/cm³.
Continuous service temperature	-200 ° C to +260 ° C (shorter peaks possible above).
Chemical resistance	Outstanding — virtually all acids, bases and solvents (exceptions: molten alkali metals, elemental fluorine).
Tensile strength	~10 – 40 MPa (grade & manufacturing vary).
Elongation at break	~200 – 400%.
Compressive creep / cold flow	High (major design limitation) — PTFE deforms under long static loads; not ideal for high-pressure bolted flanges unless specially supported or structured/filled grade used.
Coefficient of friction	Very low (0.05 - 0.2 typical) — excellent for sliding; not ideal where high static friction for sealing is needed.
Dielectric properties	Dielectric constant ~2.0 - 2.2, very high volume resistivity.
Food / pharma compliance	Many PTFE grades available meeting FDA / USP / pharmacopeia requirements — request certification.
Typical strengths	Chemical inertness, purity, low friction
Key caution	Poor springback & cold-flow — use proper gasket design (backup rings, metal support, thicker cut, PTFE envelope with reinforced core or filled PTFE for static high-pressure joints).

2) Filled PTFE (carbon, glass, graphite, bronze, MoS_2 , glass-fiber etc.)

A — Properties (typical)

Property	Typical value / notes
Composition	PTFE matrix with solid fillers: carbon, graphite, bronze, glass, glass-fiber, MoS_2, or combinations.
Purpose of fillers	Reduce cold flow/creep, increase wear resistance, improve thermal conductivity or mechanical strength; some fillers improve electrical or frictional behaviour.
Density	>2.2 g/cm³ (varies with filler content; bronze-filled higher).
Temperature range	Generally -200 ° C to +260 ° C (some bronze-filled may be slightly lower at high T due to filler behavior).
Tensile strength & modulus	Higher than virgin PTFE (depends on filler type & loading).
Compressive creep	Lower than virgin PTFE — filler reduces cold flow substantially (but still not as rigid as metals).
Chemical resistance	Still excellent, but some fillers (e.g., bronze) reduce absolute chemical purity/resistance — check media compatibility.
Friction & wear	Wear resistance improved (bronze or carbon filled recommended for dynamic seals).
Typical uses	High-load seals, bearing / gland applications, dynamic seals, chemical process gaskets needing reduced creep.
Key caution	Filled PTFE may be conductive (carbon/graphite) or abrasive (bronze) — consider mating surface compatibility and electrical requirements.

3) Expanded PTFE (ePTFE / porous PTFE gaskets, structured PTFE)

A — Properties (typical)

Property	Typical value / notes
Composition	ePTFE — micro-porous, expanded polytetrafluoroethylene (Fibrillated/porous structure).
Key features	Extremely conformable, low creep, excellent chemical purity; microporous structure can be loaded with fillers/binders.
Temperature range	-200 ° C to +260 ° C (continuous).
Compressibility & recovery	Excellent compressibility and recovery relative to virgin PTFE — good for soft sealing at low bolt loads.
Permeability / sealing	Low helium leak rates for certain structured ePTFE gasketing; suitable for vacuum and ultra-pure services when densified/filled.
Mechanical	Lower bulk strength than filled PTFE, but better sealing performance for irregular flange faces.
Typical uses	Sanitary tri-clamp gaskets, pharmaceutical fittings, high-purity chemical systems, vacuum seals, cryogenic seals.
Cautions	Porous nature means ePTFE can absorb liquids superficially — choose densified / filled grades for fluid service where required.

4) PTFE-laminated / PTFE-clad metal (PTFE-faced / PTFE metal-clad gaskets)

A — Properties (typical)

Property	Typical value / notes
Construction	Thin PTFE facing laminated/bonded to a metal carrier (stainless steel foil, aluminium, or steel plate) or to a composite core.
Advantages	Combines chemical inertness of PTFE with strength/stability of metal backing; excellent for bolted flanges where PTFE alone would cold-flow.
Temperature range	-200 ° C to +200 – 260 ° C (backing metal may limit maximum service if adhesive is used).
Pressure / mechanical	Much better compressive stability & blow-out resistance than plain PTFE.
Chemical resistance	PTFE facing ensures excellent chemical resistance on contact surface; metal core protects PTFE from extrusion.
Typical uses	Corrosive process lines where flange faces must be protected and PTFE sealing required (e.g., chlorinated chemistries, acids).
Caution	Check adhesive or mechanical bonding method for T-limit; metal facing may introduce galvanic considerations in some systems.

5) PTFE-filled spiral-wound / PTFE-filler gaskets (PTFE as filler)

A — Properties (typical)

Property	Typical value / notes
Construction	Spiral-wound metal (stainless strip) with PTFE filler (instead of graphite) or PTFE center ring; can include inner/outer rings.
Advantages	Combines mechanical strength & spring effect of spiral wound with chemical inertness of PTFE filler — good for corrosive services under moderate temperatures.
Temperature / pressure	PTFE filler limits high-T use (PTFE max ~260° C continuous) — suitable for low-to-medium temp corrosive services.
Seal performance	Excellent chemical resistance with good pressure capability (with proper metal winding and rings).
Typical uses	Chemical process flanges with aggressive media at ambient to moderate temperatures.

6) PTFE-envelope

A — Properties (typical)

Property	Typical value / notes
Construction	Soft compressible core (compressed fiber, graphite, or metal ring) encapsulated in a PTFE jacket (skived or molded).
Advantages	Combines the sealing adaptability of the core with the chemical barrier & inert surface of PTFE — prevents process contamination and isolates core from media.
Temperature/pressure	Core limits high-T or high-P performance; choose core material for mechanical needs, PTFE jacket protects chemically.
Leak performance	Good sealing even on irregular faces; PTFE jacket reduces permeation & protects core from aggressive fluids.
Typical uses	Chemical & pharmaceutical flanges where PTFE contact surface required but mechanical stability from core is necessary.