Exhaust Gaskets — Complete Properties

1) Multi-Layer Steel (MLS) — exhaust flange rings / multi-layer steels with coatings

A — Properties (typical)

Property	Typical / notes
Construction	Multiple formed stainless/steel layers with embossed sealing beads; often coated with MoS_2 or dry-film lubricants.
Temperature capability	Good up to typical exhaust temps; depends on steel grade and coating — used on severe services. Victor Reinz lists manifold gaskets for peaks up to ~1400 ° F (≈760 ° C).
Typical thickness	0.5 – 2.0 mm (common ring/flake thicknesses for flange gaskets).
Sealing mechanism	Metal spring action + surface conformity; embossed beads concentrate contact pressure.
Advantages	High mechanical strength, excellent springback, good for cyclic thermal loads and flange misalignment; reliable for bolted flanges.
Disadvantages	Less forgiving when flange faces are severely warped; requires correct bolt torque and flange finish.
Typical uses	Exhaust flange gaskets (2-bolt, 3-bolt, 4-bolt), turbocharger flanges, performance exhaust flanges.

2) Flexible / Impregnated Graphite (graphite laminate / graphite steel-reinforced)

A — Properties (typical)

Property	Typical / notes
Construction	Expanded/impregnated graphite sheet, often bonded to thin metal inner ring or steel backing (reinforced).
Temperature capability	Graphite itself is stable at very high T in non-oxidizing atmospheres; impregnated/reinforced grades are engineered for exhaust temperatures used in manifolds & downpipes.
Typical thickness	0.3 – 3.0 mm (thin foils up to thicker sheet stock).
Sealing mechanism	Soft compressible graphite conforms to flange imperfections; metal ring gives mechanical support.
Advantages	Excellent conformability, chemical resistance to exhaust species, very good high-T sealing when reinforced/impregnated.
Disadvantages	Pure graphite oxidizes in air at very high T (use impregnated grades or metal-clad where needed).
Typical uses	Exhaust manifold gaskets, turbocharger gaskets, heat-exchanger ports where conformability and high-T resistance are required.

3) Metal-Graphite Sandwich / Composite (metal faces + graphite core)

A — Properties (typical)

Property	Typical / notes
Construction	Thin metal facings (stainless / aluminum) laminated to a graphite core or soft filler (sandwich types).
Temperature capability	Excellent for exhaust temps (graphite core handles heat; metal faces prevent oxidation/pickup).
Typical thickness	0.5 – 3 mm overall.
Advantages	Combines metal rigidity with graphite sealing — good for cyclic load, improved leak tightness.
Disadvantages	More costly; selection needs to match thermal expansion and flange stiffness.
Typical uses	Turbocharger gaskets, high-temp manifold to downpipe joints, heavy duty truck exhaust flanges.

4) Single-Layer Steel / Solid Metal Rings (copper, stainless or mild steel corrugated)

A — Properties (typical)

Property	Typical / notes
Construction	Single formed metal ring (pressed steel, corrugated stainless) sometimes with a soft coating or graphite ringed inner seal. Copper rings are also used for high-temperature bolted joints.
Temperature capability	Very high — metal temperature limits exceed typical exhaust temps; copper tolerates high T but can creep.
Typical thickness	0.6 – 3.0 mm depending on corrugation / ring design.
Advantages	Very durable, simple, good for high-pressure / heavy-duty service.
Disadvantages	Poor conformability to badly warped faces; may require very flat surfaces and correct torque.
Typical uses	Heavy-duty truck exhaust flanges, industrial stacks, some performance setups (copper crush rings).

5) Compressed Fiber / Composite (non-asbestos fiber + binder) — “high-temperature composite”

A — Properties (typical)

Property	Typical / notes
Construction	Compressed mineral/aramid/ceramic fiber with high-temperature binder; may be elastomeric or phenolic binder depending on grade.
Temperature capability	Many grades rated to ~400–600 °C (check grade), some specialty high-temp ceramic fiber papers rated higher.
Typical thickness	0.5 – 6.0 mm (sheet stock).
Advantages	Cost-effective, good sealing on moderate-T exhaust applications (aftermarket replacements).
Disadvantages	Less durable than metal/graphite in extreme thermal cycles; some grades can degrade in aggressive exhaust chemistries.
Typical uses	Exhaust flange gaskets for passenger cars, motorcycles, some OEM replacement rings.

6) Ceramic-coated & high-temperature specialty coatings

A — Properties (typical)

Property	Typical / notes
Construction	Base gasket (metal or composite) with ceramic coating or ceramic composite layer to resist road splash, corrosion and improve longevity.
Temperature capability	Coating protects at typical exhaust temps; used when external corrosion or road-salt damage is a concern.
Typical uses	External-facing flanges (underbody), road/rail vehicles subject to salt/corrosion.