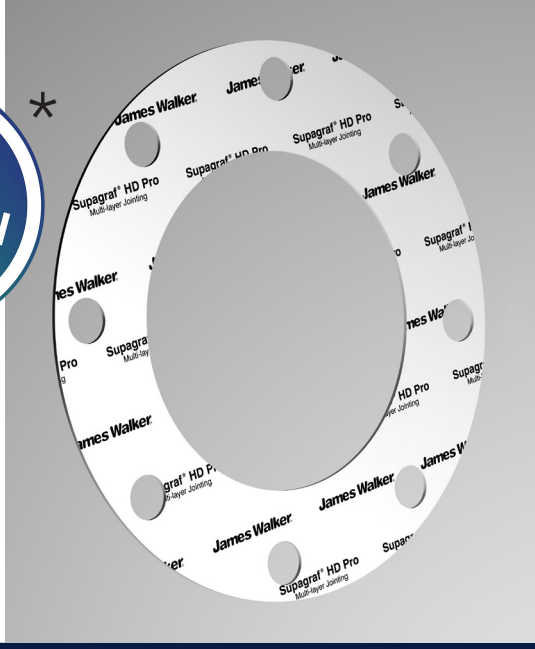
Supagraf®
HD Pro



High temperature / high pressure multi-layer high grade graphite sealing system

Supagraf® HD Pro is a high grade TA-Luft approved gasket sheet made of multi-layer stainless steel and highly oxidation-resistant flexible graphite.

The layers of graphite and stainless steel sheets are laminated with a high strength non-adhesive joining system. The impregnation of the sealing layers reduces leakage and improves handling.

Application guidelines

- Piping flange gaskets, heat exchangers, boilers, reactors, vessels and OEM equipment.
- Compatible with HP steam, hydrocarbons and a wide range of chemicals within HPI and CPI industries.
- High pressures (up to 200 bar).
- Suitable for ASME, EN, JIS, DIN flanges.

Features and benefits

- Ultra pure high grade graphite.
- TA-Luft approved (high-grade sealing system).
- Multi-layer 316L steel reinforcements with no adhesive laminating system.
- Suitable for high gasket stress applications.
- Available thicknesses 1 mm to 4 mm.
- Sheet size of 1500 mm x 1500 mm (gaskets can be produced up to a diameter of 1500 mm in one piece).

Notes:
The operational life span of graphite at high temperatures might be limited due to media or environmental influences. For continuous exposure in oxidising environments above +450°C consult with James Walker.

* 3rd party tested and validated by James Walker for use in hydrogen service

The layers of graphite and stainless steel sheets are laminated with a high strength non-adhesive joining system.

TEMPERATURE

Maximum Temperature:
+550°C (+1022°F)

Minimum Cryogenic Temperature:
-196°C (-321°F)

PRESSURE

Maximum Pressure:
20 MPa/200 bar (2900 psi)

APPROVALS

- TA Luft (complies with the tightness criteria of 10^{-4} mbar.l/m.s of VDI guidelines 2200 and 2440)
- API 6FB fire safe approved
- MESC SPE 85/203 compliant

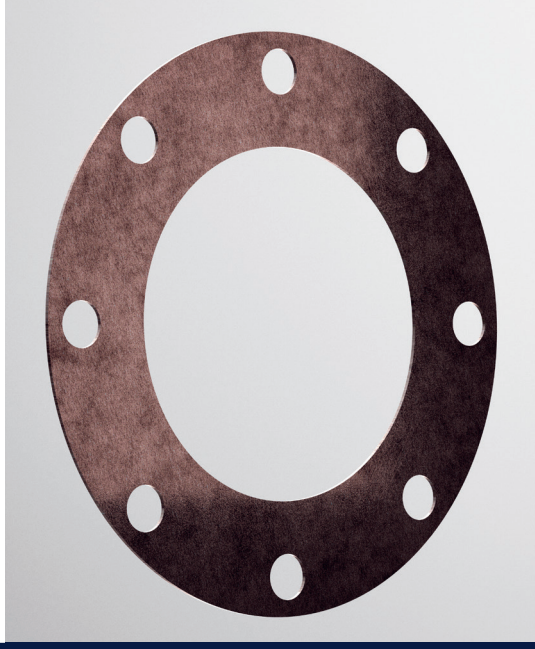
James Walker

Supagraf®
HD Pro

High temperature/high pressure multi-layer high grade graphite sealing system

Typical material properties						
Thickness	mm	1.0	1.5	2.0	3.0	4.0
Bulk density	g/cm^3	1.1	1.1	1.1	1.1	1.1
Steel layer number		2	3	4	6	9
ASTM material number		316L	316L	316L	316L	316L
Steel thickness	mm	0.05	0.05	0.05	0.05	0.05
Carbon content	%	≥ 99	≥ 99	≥ 99	≥ 99	≥ 99
Ash content	%	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1
Total sulphur	ppm	< 300	< 300	< 300	< 300	< 300
Total halogen	ppm	< 310	< 310	< 310	< 310	< 310
Total fluorine	ppm	< 10	< 10	< 10	< 10	< 10
Total chloride	ppm	≤ 25	≤ 25	≤ 25	≤ 25	≤ 25
Compressibility	%	35	35	35	35	35
Recovery at 20°C	%	5	5	5	5	5
Hot creep	%	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3
σ VO	MPa	> 300	> 290	> 280	> 240	> 200
σ BO at 300°C	MPa	> 250	> 230	> 200	> 180	> 160
σ VU/0.1 at 10 bar	MPa	10	10	7	10	14
σ VU/0.1 at 16 bar	MPa	10	12	9	14	18
σ VU/0.1 at 25 bar	MPa	10	14	13	16	22
σ VU/0.1 at 40 bar	MPa	13	16	18	18	28
Oxidation rate in air at 670°C (1238°F) TGA	%/Hr	< 4	< 4	< 4	< 4	< 4
ASME design factor 'm'		2.5	2.5	2.5	2.5	2.5
ASME design factor 'y'	MPa	20.7	20.7	20.7	20.7	20.7

Supagraf®
N7



High purity nickel foil laminated graphite sealing system

Supagraf® Laminated N7 is a sheet jointing of 98% pure exfoliated graphite with a bonded central layer of 13 µm thick nickel foil. Sheets thicker than 2.0 mm have two layers of metal foil and three of graphite.

Application guidelines

- Piping flange gaskets, valve bonnets, boilers, reactors, vessels and OEM equipment.
- Compatible with HP steam, hydrocarbons and a wide range of chemicals within HPI and CPI industries.
- High pressures (up to 50 bar).
- Suitable for ASME, EN, JIS, DIN flanges.

Features and benefits

- Can be easily cut using basic hand tools.
- High grade graphite >98% carbon content.
- 13 µM nickel core reinforcement with adhesive laminating system.
- Suitable up to ASME Class 300 or PN40 piping applications.
- Suitable for high gasket stress applications.
- Available in thicknesses from 1.0 mm to 3.0 mm.
- Sheet size of 1000 x 1000 mm, gaskets can be produced up to a diameter of 1000 mm in one piece.

Notes

The operational life span of graphite at high temperatures might be limited due to media or environmental influences. For continuous exposure in oxidising environments above +450°C consult with James Walker's Technical function.

TEMPERATURE

Maximum Temperature: (see notes section)
+400°C (+752°F)
Minimum Temperature:
-196°C (-321°F)

PRESSURE

Maximum Pressure:
5 MPa/50 bar (750 psi)

James Walker

Supagraf®
N7

High purity nickel foil laminated graphite sealing system

Typical material properties					
Thickness	mm	1.0	1.5	2.0	3.0
Bulk density of graphite	g/cm3	1.0	1.0	1.0	1.0
Number of Nickel layers		1	1	1	2
ASTM material number		Ni 200	Ni 200	Ni 200	Ni 200
Nickel thickness	mm	0.013	0.013	0.013	0.013
Carbon content	%	≥ 98	≥ 98	≥ 98	≥ 98
Ash content	%	≤ 2	≤ 2	≤ 2	≤ 2
Compressibility (DIN28090-2)	%	45	45	45	45
Recovery at 20°C (DIN28090-2)	%	5	5	5	5
Hot Creep (DIN28090-2)	%	< 3	< 3	< 3	< 3
Recovery at 300°C (DIN28090-2)	%	4	4	4	4
Total sulphur	ppm	< 300	< 300	< 300	< 300
Total chloride	ppm	≤ 25	≤ 25	≤ 25	≤ 25
Total halogen	ppm	≤ 100	≤ 100	≤ 100	≤ 100
Oxidation rate in air @ 670°C (1238°F) TGA	% / Hr	≤ 5	≤ 5	≤ 5	≤ 5
ASME design factor ‘m’		2.5	2.5	2.5	2.5
ASME design factor ‘y’	MPa	20.7	20.7	20.7	20.7

Supagraf®
Plain

Standard and ultra-pure graphite foil

Supagraf® Plain is a premium quality 98% pure exfoliated graphite foil with an oxidation inhibitor and contains no binders, fillers or elastomers.

Supagraf Plain Ultra-High Purity is a 99.8% pure exfoliated graphite foil with low sulphur, low leachable chlorides and low leachable fluorides which are beneficial features for sealing materials used in nuclear power generation plants.

Application guidelines

- Can be used as filler material for manufacturing spiral wound gaskets.
- Sealing layers for semi-metallic cores like kammprofile gaskets, corrugated metal cores and fillers for metal clad gaskets.
- High-temperature steam, demineralised water, heat transfer media, petroleum products, inorganic and organic acids, alkalis, hot waxes and oils.
- Piping flange gaskets, valve bonnets, and OEM equipment.

Features and benefits

- Compatible with media in the range pH 0-14.
- Sulphur content (typical): ≤300 ppm.
- No loss of volatiles at high temperature.
- Lower limiting temperatures apply when used with oxidising agents, e.g. nitric acid.
- Thermal conductivity, ring of density 1.4 g/cm^3: (SG 1.4): axial: 400 W/mK; radial: 6 W/mK.
- Precision cut gaskets to any shape, size or quantity. In sheets: 1 m x 1 m, 0.5 m x 1 m. Sheet thicknesses: 1.0 mm, 1.5 mm, 2.0 mm, 3.0 mm. Rolls up to 60 m long; width 1.0 m. Roll thickness: 0.5 mm.

Notes

The operational life span of graphite at high temperatures might be limited due to media or environmental influences. For continuous exposure in oxidising environments above +450°C consult with James Walker's Technical function.

TEMPERATURE

Maximum Temperature: (see notes section)
+450°C (+842°F)
Minimum Temperature:
-196°C (-321°F)

PRESSURE

Maximum Pressure:
5 MPa/50 bar (750 psi)

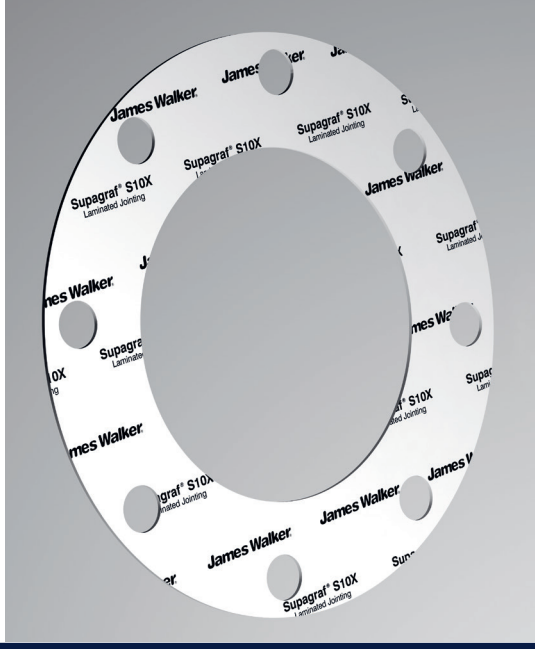
James Walker

Supagraf®
Plain

Standard and ultra-pure graphite foil

Typical material properties	Units	Supagraf® Plain	Supagraf® Ultra-High Purity
Maximum Temperature	°C	450	500
Minimum Temperature	°C	-196	-196
Available Thickness	mm	1.0, 1.5, 2.0, 3.0	1.0, 1.5, 2.0, 3.0
Bulk density of graphite	g/cm³	1.0	1.0
Carbon content	%	≥ 98	≥ 98.85
Ash content	%	≤ 2	≤ 0.15
Compressibility (DIN28090-2)	%	45	45
Recovery at 20°C (DIN28090-2)	%	5	5
Hot Creep (DIN28090-2)	%	< 3	< 3
Recovery at 300°C (DIN28090-2)	%	4	4
Total sulphur	ppm	< 300	< 300
Total chloride	ppm	≤ 25	≤ 10
Total halogen	ppm	≤ 100	≤ 40
Oxidation rate in air @ 670°C (1238°F) TGA	% / Hr	≤ 5	≤ 4
ASME design factor 'm'		2.5	2.5
ASME design factor 'y'	MPa	20.7	20.7

Supagraf®
S10X



High temperature / high pressure laminated graphite high grade sealing system

Supagraf® S10X is a highly oxidation resistant multipurpose high strength graphite laminate combining high quality flexible graphite with stainless steel reinforcement.

Application guidelines

- Piping flange gaskets, heat exchangers, boilers, reactors, vessels and OEM equipment.
- Compatible with HP steam, hydrocarbons and a wide range of chemicals within HPI and CPI industries.
- High pressures (up to 50 bar).
- Suitable for ASME, EN, JIS, DIN flanges.

Features and benefits

- High grade graphite ≥ 98% carbon content.
- 316L stainless steel core with adhesive laminating system.
- Suitable up to ASME Class 300 or PN40 piping applications.
- Suitable for high gasket stress applications.
- Available in thicknesses from 0.55 mm to 3.0 mm.
- Sheet size of 1500 x 1500 mm. sGaskets can be produced up to a diameter of 1500 mm in one piece.

Notes

The operational life span of graphite at high temperatures might be limited due to media or environmental influences. For continuous exposure in oxidising environments above +450°C consult with James Walker's Technical function.

TEMPERATURE

Maximum Temperature: (see notes section)
+500°C (+932°F)
Minimum Temperature:
-196°C (-321°F)

PRESSURE

Maximum Pressure:
5 MPa/50 bar (750 psi)

APPROVALS

MESC SPE 85/203 compliant

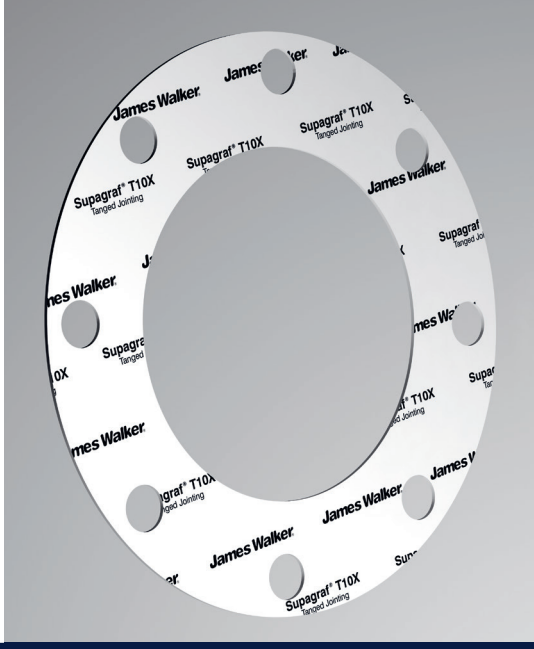
James Walker

Supagraf®
S10X

High temperature / high pressure laminated graphite high grade sealing system

Typical material properties							
Thickness	mm	0.55	0.75	1.0	1.5	2.0	3.0
Bulk density	g/cm³	1.0	1.0	1.0	1.0	1.0	1.0
Number of steel layers		1	1	1	1	1	1
ASTM material number		316L	316L	316L	316L	316L	316L
Steel thickness	mm	0.05	0.05	0.05	0.05	0.05	0.05
Carbon content	%	≥ 98	≥ 98	≥ 98	≥ 98	≥ 98	≥ 98
Ash content	%	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2
Compressibility (ASTM F36)	%	40	40	40	40	40	40
Recovery at 20°C (ASTM F36)	%	12	12	12	12	12	12
Hot Creep at 300°C	%	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5
Total sulphur	ppm	< 750	< 750	< 750	< 750	< 750	< 750
Total chloride	ppm	≤ 50	≤ 50	≤ 50	≤ 50	≤ 50	≤ 50
Total halogen	ppm	≤ 310	≤ 310	≤ 310	≤ 310	≤ 310	≤ 310
Total fluorine	ppm	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10
Oxidation rate in air @ 670°C (1238°F) TGA	% / Hr	≤ 4.0	≤ 4.0	≤ 4.0	≤ 4.0	≤ 4.0	≤ 4.0
ASME design factor 'm'		2.0	2.0	2.0	2.0	2.0	2.0
ASME design factor 'y'	MPa	10.34	10.34	10.34	10.34	10.34	10.34

Supagraf®
T10X



High temperature / high pressure high grade sealing system with tanged core

Supagraf® T10X is a highly oxidation resistant, tanged stainless steel reinforced flexible graphite gasket combining high quality flexible graphite with stainless steel reinforcement.

Supagraf T10X is made of high oxidation resistant graphite foils which are mechanically attached to the stainless steel without using adhesives.

Application guidelines

- Piping flange gaskets, heat exchangers, boilers, reactors, vessels and OEM equipment.
- Compatible with HP steam, hydrocarbons and a wide range of chemicals within HPI and CPI industries.
- High pressures (up to 102 bar).
- Suitable for ASME, EN, JIS, DIN flanges.

Features and benefits

- High grade graphite >98% carbon content.
- 316L stainless steel core with mechanical tanged laminating system.
- Suitable up to ASME Class 600 or PN100 piping applications.
- Suitable for high gasket stress applications.
- Available in thicknesses from 1.0 mm to 3.0 mm.
- Sheet size of 1500 x 1500 mm gaskets can be produced up to a diameter of 1500 mm in one piece.

Notes

The operational life span of graphite at high temperatures might be limited due to media or environmental influences. For continuous exposure in oxidising environments above +450°C consult with James Walker's Technical function.

TEMPERATURE

Maximum Temperature: (see notes section)
+500°C (+932°F)
Minimum Temperature:
-196°C (-321°F)

PRESSURE

Maximum Pressure:
10.2 MPa/102 bar (1480 psi)

APPROVALS

API 6FB fire safe approved
MESC SPE 85/203 compliant

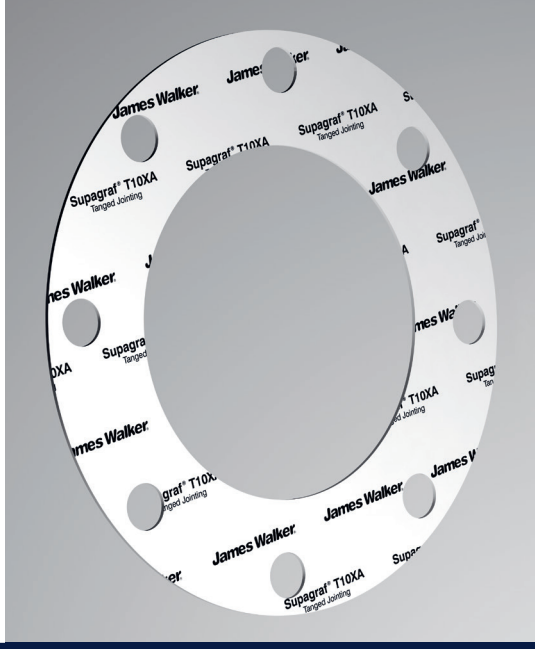
James Walker

Supagraf®
T10X

High temperature / high pressure
high grade sealing system with tanged core

Typical material properties					
Thickness	mm	1.0	1.5	2.0	3.0
Bulk density of graphite	g/cm³	1.0	1.0	1.0	1.0
Number of steel layers		1	1	1	1
ASTM material number		316L	316L	316L	316L
Steel thickness	mm	0.1	0.1	0.1	0.1
Carbon content	%	≥ 98	≥ 98	≥ 98	≥ 98
Ash content	%	≤ 2	≤ 2	≤ 2	≤ 2
Compressibility (ASTM F36)	%	35	40	40	40
Recovery at 20°C (ASTM F36)	%	5	5	5	5
Hot Creep at 300°C	%	≤ 4	≤ 4	≤ 4	≤ 4
Total sulphur	ppm	< 750	< 750	< 750	< 750
Total chloride	ppm	≤ 50	≤ 50	≤ 50	≤ 50
Total halogen	ppm	≤ 310	≤ 310	≤ 310	≤ 310
Total fluorine	ppm	≤ 10	≤ 10	≤ 10	≤ 10
Oxidation rate in air @ 670°C (1238°F) TGA	% / Hr	≤ 4.0	≤ 4.0	≤ 4.0	≤ 4.0
ASME design factor 'm'		2.5	2.5	2.5	2.5
ASME design factor 'y'	MPa	20.7	20.7	20.7	20.7

Supagraf®
T10XA



High temperature / high pressure tanged core high grade sealing system with an anti-stick surface treatment

Supagraf® T10XA is a highly oxidation resistant, tanged stainless steel reinforced flexible graphite gasket combining high quality flexible graphite with stainless steel reinforcement.

Supagraf T10XA is made of high oxidation resistant graphite foils which are mechanically attached to the stainless steel without using adhesives.

Application guidelines

- Flange gaskets, heat exchangers, boilers, reactors, vessels and OEM equipment.
- Compatible with HP steam, hydrocarbons and a wide range of chemicals within HPI and CPI industries.
- High pressures (up to 102 bar).
- Suitable for ASME, EN, JIS, DIN flanges.

Features and benefits

- High grade graphite >98% carbon content.
- 316L stainless steel core with mechanical tanged laminating system.
- Anti-stick surface treatment.
- Suitable up to ASME Class 600 or PN100 piping applications.
- Suitable for high gasket stress applications.
- Available in thicknesses from 1.0 mm to 3.0 mm.
- Sheet size of 1500 x 1500 mm gaskets can be produced up to a diameter of 1500 mm in one piece.

Notes

The operational life span of graphite at high temperatures might be limited due to media or environmental influences. For continuous exposure in oxidising environments above +450°C consult with James Walker's Technical function.

TEMPERATURE

Maximum Temperature: (see notes section)
+500°C (+932°F)
Minimum Temperature:
-196°C (-321°F)

PRESSURE

Maximum Pressure:
10.2 MPa/102 bar (1480 psi)

APPROVALS

API 6FB fire safe approved
MESC SPE 85/203 compliant

James Walker

Supagraf®
T10XA

High temperature / high pressure tanged core high grade sealing system with an anti-stick surface treatment

Typical material properties					
Thickness	mm	1.0	1.5	2.0	3.0
Bulk density of graphite	g/cm³	1.0	1.0	1.0	1.0
Number of steel layers		1	1	1	1
ASTM material number		316L	316L	316L	316L
Steel thickness	mm	0.1	0.1	0.1	0.1
Carbon content	%	≥ 98	≥ 98	≥ 98	≥ 98
Ash content	%	≤ 2	≤ 2	≤ 2	≤ 2
Compressibility (ASTM F36)	%	35	40	40	40
Recovery at 20°C (ASTM F36)	%	5	5	5	5
Hot Creep at 300°C	%	≤ 4	≤ 4	≤ 4	≤ 4
Total sulphur	ppm	< 750	< 750	< 750	< 750
Total chloride	ppm	≤ 50	≤ 50	≤ 50	≤ 50
Total halogen	ppm	≤ 310	≤ 310	≤ 310	≤ 310
Total fluorine	ppm	≤ 10	≤ 10	≤ 10	≤ 10
Oxidation rate in air @ 670°C (1238°F) TGA	% / Hr	≤ 4.0	≤ 4.0	≤ 4.0	≤ 4.0
ASME design factor 'm'		2.5	2.5	2.5	2.5
ASME design factor 'y'	MPa	20.7	20.7	20.7	20.7

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