KLINGER®

	Material Description	Operating Guidelines	(see note below*)
Klingerit ® (3xA) 	Top quality for general purpose use and especially suitable for all steam conditions, compressed air and other gases, chemicals and organic compounds. Composed of SBR binder with long grade chrysotile asbestos fibre Colour: Red/Brown. For electrical applications, material can be supplied without pigmentation and unprinted, ask for Colourless Klingerit.	**Max. Temperature** **Max. Pressure**	550°C 130 bar
Klingerit Universal ® (3xA) 	Oil resistant material of the highest quality composed of long grade chrysotile asbestos fibre with NBR binder. Particularly suitable for use in the aviation industry and with hot oil and thermal fluids. Colour: Blue, (does not contain "blue" asbestos fibre). Also available with premium quality wire mesh reinforcement, ask for Klingerit Universal with wire.	**Max. Temperature** **Max. Pressure**	550°C 140 bar
Klingerit 1000 ® 	Top grade wire reinforced material for extreme service. Recommended for conditions of fluctuating pressure and temperature. Composed of chrysotile asbestos fibre bonded with SBR and reinforced with close mesh steel wire. Colour: Black graphite finish. Stainless steel wire reinforcement also available, ask for Klingerit 1000 S/S	**Max. Temperature** **Max. Pressure**	550°C 200 bar
Klinger Oilit ® (3xA) 	Top quality oil and petrol resistant material especially suitable for use with refrigerants. Composed of chrysotile asbestos fibre bonded with NBR. Approved by Water Research Council for use with potable water. Colour: Black	**Max. Temperature** **Max Pressure**	500°C 130 bar
Klinger Acidit ®S 	High quality acid resistant material with a special binder. Widely used in the chemical industry. Suitable for ceramic and glass flanges. Colour: White	**Max. Temperature** **Max. Pressure**	150°C 20 bar
Klinger WB1 ® 	Medium quality controlled swell material extensively used by the automotive industry. Particularly suitable for applications where bolt loadings are relatively light or uneven. Composed of chrysotile asbestos fibre bonded with SBR. Colour: Yellow	**Max. Temperature** **Max. Pressure**	350°C 30 bar
Klinger Mark 100 ® 	High quality material for the oil and petro-chemical industries Composed of chrysotile asbestos fibre with SBR. Colour: Grey.	**Max. Temperature** **Max. Pressure**	510°C 100 bar
Klinger 61B ® 	Medium quality for general purpose use. Composed of chrysotile asbestos fibre bonded with SBR. Colour: Grey.	**Max. Temperature** **Max. Pressure**	350°C 35 bar
Klinger 80 ® 	Medium quality for general purpose use. Contains chrysotile asbestos fibre bonded with SBR. Colour: Red/Brown. Also available with medium quality mild steel wire mesh reinforcement and graphite coating.	**Max. Temperature** **Max. Pressure**	250°C 25 bar
Klinger 42 ® 	Medium quality for the water industries. Contains chrysotile asbestos fibre bonded with NBR. Colour: Blue, (does not contain "blue" asbestos fibre). This material is supplied unbranded.	**Max. Temperature** **Max. Pressure**	250°C 25 bar

*__Note:__ Maximum temperature and pre

Material Properties

Typical Specifications		Typical Original Properties (1.5mm)			Typical Properties after Fluid Immersion (1.5mm)		
British	BS1832 Grade A and 0	**Minimum tensile strength (cross grain)**	ASTM F152	27.5 N/mm²	**Thickness increase**		
German	DIN 3754 IT 400	**Specific gravity**		1.95	ASTM Oil 3	5 hours 150°C	15-25%
American	ASTM F104-F112451	**Compressibility**	ASTM F36A	8%	ASTM Fuel A	5 hours 20°C	0-10%
French	NFT 48001 Cat. D.	**Recovery**	ASTM F36A	55%	ASTM Fuel B	5 hours 20°C	10-25%
		Stress relaxation	BS 1832	30 N/mm²			
British	BS F125 (types 1 and 3) BS 1832 Grade A and O	**Minimum tensile strength (cross grain)**	ASTM F152	27.5 N/mm²	**Thickness increase**		
German	DIN 3754 IT 400 DIN 3754 IT C DIN 3754 IT Ö	**Specific gravity**		1.95	ASTM Oil 3	5 hours 150°C	0-10%
		Compressibility	ASTM F36A	8%	ASTM Fuel A	5 hours 20°C	0-10%
		Recovery	ASTM F36A	55%	ASTM Fuel B	5 hours 20°C	0-15%
American	ASTM F104-F112121	**Stress relaxation**	BS 1832	32 N/mm²			
French	NFT 48001 Cat. D						
There are no standards to cover wire reinforced materials		**Specific gravity**		2.2	As there are no standards to cover wire reinforced materials, refer to Klingerit 3xA for typical properties		
		Compressibility	ASTM F36A	8%			
		Recovery	ASTM F36A	50%			
British	BS1832 Grade A and 0	**Minimum tensile strength (cross grain)**	ASTM F152	27.5 N/mm²	**Thickness increase**		
German	DIN 3754 IT Ö	**Specific gravity**		1.95	ASTM Oil 3	5 hours 150°C	0-10%
American	ASTM F104-F112130	**Compressibility**	ASTM F36A	8%	ASTM Fuel A	5 hours 20°C	0-10%
French	NFT 48001 Cat. D.	**Recovery**	ASTM F36A	55%	ASTM Fuel B	5 hours 20°C	0-15%
Approved by the Water Research Council for use with potable water		**Stress relaxation**	BS 1832	30 N/mm²			
German	DIN 3754 IT S	**Minimum tensile strength (cross grain)**	ASTM F152	18 N/mm²	**Thickness increase**		
American	ASTM F104-F112000	**Specific gravity**		1.90	96% Sulphuric acid	18 hours 150°C	0-10%
French	NFT 48001 Cat. E	**Compressibility**	ASTM F36A	10%	95% Nitric acid	18 hours 20°C	5-20%
		Recovery	ASTM F36A	45%	50% Nitric acid	1 hour 65°C	5-15%
American	ASTM F104-F112970	**Minimum tensile strength (cross grain)**	ASTM F152	20 N/mm²	**Thickness increase**		
		Specific gravity		1.95	ASTM Oil 3	5 hours 150°C	25-75%
		Compressibility	ASTM F36A	10%	ASTM Fuel A	5 hours 20°C	5-20%
		Recovery	ASTM F36A	46%	ASTM Fuel B	5 hours 20°C	15-40%
		Stress relaxation	BS 1832	17.5 N/mm²			
British	BS 1832 Grade A and O	**Minimum tensile strength (cross grain)**	ASTM F152	27.5 N/mm²	**Thickness increase**		
German	DIN 3754 IT 400	**Specific gravity**		2.00	ASTM Oil 3	5 hours 150°C	15-30%
American	ASTM F104-F112551	**Compressibility**	ASTM F36A	8%	ASTM Fuel A	5 hours 20°C	5-15%
		Recovery	ASTM F36A	55%	ASTM Fuel B	5 hours 20°C	10-20%
		Stress relaxation	BS 1832	29 N/mm²			
British	BS 1832 Grade B	**Minimum tensile strength (cross grain)**	ASTM F152	19.5 N/mm²	**Thickness increase**		
German	DIN 3754 IT 200	**Specific gravity**		1.95	ASTM Oil 3	5 hours 150°C	20-40%
American	ASTM F104-F112740M6	**Compressibility**	ASTM F36A	10%	ASTM Fuel A	5 hours 20°C	5-20%
		Recovery	ASTM F36A	50%	ASTM Fuel B	5 hours 20°C	10-25%
		Stress relaxation	BS 1832	20 N/mm²			
American	ASTM F104-F112700	**Minimum tensile strength (cross grain)**	ASTM F152	16.5 N/mm²	**Thickness increase**		
		Specific gravity		1.90	ASTM Oil 3	5 hours 150°C	20-40%
		Compressibility	ASTM F36A	10%	ASTM Fuel A	5 hours 20°C	5-20%
		Recovery	ASTM F36A	50%	ASTM Fuel B	5 hours 20°C	10-25%
		Stress relaxation	BS 1832	20 N/mm²			
American	ASTM F104-F11 2400	**Minimum tensile strength (cross grain)**	ASTM F152	20 N/mm²	**Thickness increase**		
Approved by the Water Research Council for use with potable water.		**Specific gravity**		1.95	ASTM Oil 3	5 hours 150°C	0-15%
		Compressibility	ASTM F36A	8%	ASTM Fuel A	5 hours 20°C	0-10%
		Recovery	ASTM F36A	min 50%	ASTM Fuel B	5 hours 20°C	0-10%
		Stress relaxation	BS 1832	21 /N/mm²			

ure capabilities do not necessarily operate together for all gasket thicknesses and service conditions.

Chemical Resistance Chart

The information in this chart should only be used as a general guide to the selection of a suitable material.

Solid materials shown are to be understood as aqueous solutions or suspensions.

Klingerit 1000, Klinger WB1, Klinger 80 and Klinger 42
Due to their special formulation it is only possible to predict performance for these materials when all operating conditions are known. They have therefore been omitted from this chart. Please refer to the technical data pages on these products or consult our Technical Services who will be pleased to advise on the most suitable grade for media not included in this chart.

	MEDIUM	KLINGERIT	KLINGERIT UNIVERSAL	KLINGER MARK 100	KLINGER ACIDIT S	KLINGER OILIT	KLINGER 61B
A	Acetaldehyde CH_3 CHO	A	B	A	A	C	A
	Acetamide CH_3 CO NH_2	A	A	A	A	A	A
	Acetic acid 10% CH_3 COOH	A	A	A	A	A	A
	Acetic acid 100% CH_2 COOH	A	A	A	A	A	A
	Acetic Ether CH_3 COO C_2H_5	A	A	A	B	A	B
	Acetone CH_3 CO CH_3	A	B	A	C	B	A
	Acetylene C_2H_2	A	A	A	B	A	A
	Adipic acid COOH $(CH_2)_4$ COOH	A	A	A	A	A	A
	Air	A	A	A	A	A	A
	Alum KAl $(SO_4)_2$	A	A	A	A	A	A
	Aluminium acetate Al $(CH_3COO)_3$	A	A	A	A	A	A
	Aluminium chlorate Al $(ClO_3)_3$	A	A	A	A	A	A
	Aluminium chloride $AlCl_3$	A	A	A	A	A	A
	Ammonia NH_3	A	A	A	A	A	A
	Ammoniumbicarbonate NH_4 HCO_3	A	A	A	A	A	A
	Ammonium chloride NH_4 Cl	A	A	A	A	A	A
	Ammonium hydroxide NH_4OH	A	A	A	A	A	A
	Amyl acetate $CH_3COOC_5H_{11}$	A	A	A	B	B	B
	Aniline $C_6H_5NH_2$	A	C	A	B	C	A
	Arcton 12 (Freon 12, Frigen 12)	B	A	C	C	A	C
	Arcton 22 (Freon 22, Frigen 22)	C	B	C	C	B	C
	Asphalt (Tar)	A	A	A	A	A	B
	ASTM Oil No. 1	A	A	A	A	A	A
	ASTM Oil No. 3	B	A	B	A	A	B
	Aviation fuel (Kerosene)	B	A	B	B	A	C
B	Barium chloride $BaCl_2$	A	A	A	A	A	A
	Benzene (Benzol) C_6H_6	B	A	B	B	A	C
	Benzoic acid C_6H_5 COOH	A	A	A	A	A	A
	Blast furnace gas	A	A	A	A	A	A
	Bleach liquor Ca $(OCl)_2$	A	A	A	A	A	A
	Boiler feed water (alkaline)	A	A	A	B	A	B
	Borax $Na_2B_4O_7(H_2O)_{10}$	A	A	A	A	A	A
	Boric acid H_3BO_3	A	A	A	A	A	A
	Brine NaCl	A	A	A	A	A	A
	Butane C_4H_{10}	B	A	B	A	A	C
	Butanone (M.E.K.)	A	B	A	C	B	B
	Butyl acetate CH_3 COO C_4H_9	A	A	A	B	B	B
	Butyl alcohol (butanol) C_4H_9OH	A	A	A	A	A	A
	Butyric acid C_3H_7COOH	A	A	A	A	A	A
C	Calcium chloride $CaCl_2$	A	A	A	A	A	A
	Calcium hydroxide (lime water)$Ca(OH)_2$	A	A	A	A	A	A
	Calcium hypochlorite $Ca(OCl)_2$	A	A	A	A	A	A
	Calcium sulphate $CaSO_4$	A	A	A	A	A	A
	Carbolic acid 100% (Phenol)C_6H_5OH	A	B	B	A	B	C
	Carbon dioxide CO_2	A	A	A	A	A	A
	Carbon disulfide CS_2	C	A	C	C	A	C
	Carbon tetrachloride CCl_4	B	A	B	B	B	C
	Castor oil	A	A	A	A	A	B
	Chlorine (dry) Cl_2	A	A	A	A	A	B
	Chlorine (wet) Cl_2	B	B	B	B	B	C
	Chlorine water (ca. 0.5%)	A	A	A	A	A	A
	Chloroform $CHCl_3$	B	B	B	B	B	C
	Chloromethane (Methylchloride)CH_3Cl	C	B	C	C	B	C
	Chromic acid, H_2CrO_4	C	B	C	A	B	C
	Citric acid $(CH_2COOH)_2$ C(OH)COOH	A	A	A	A	A	A
	Clophen T 64	C	A	C	B	A	C
	Copper acetate Cu $(CH_3COO)_2$	A	A	A	A	A	A
	Copper Sulphate $CuSO_4$	A	A	A	A	A	A
	Creosote	B	B	B	C	C	B
	Cresol $C_6H_4(OH)CH_3$	A	B	A	A	B	B
	Cyclohexanol $C_6H_{11}OH$	A	A	A	C	A	B
	Cyclohexanone $C_5H_{10}O$	C	C	C	C	C	C
D	Decalin $C_{10}H_{18}$	B	A	B	B	A	C
	Di-ammonium phosphate $(NH_4)_2HPO_4$	A	A	A	A	A	A
	Di-benzyl ether $(C_6H_5CH_2)_2O$	A	B	A	B	C	C
	Di-butyl phthalate $C_6H_4(COO\ C_4H_9)_2$	A	A	A	B	A	C
	Diesel oil	B	A	B	B	A	C
	Dimethyl formamide $HCON(CH_3)_2$	A	C	A	C	C	B
	Diphyl (Dowtherm A)	C	A	C	C	A	C
	Dye liquor (alkaline, neutral, acidic)	A	A	A	A	A	A
E	Ethane C_2H_6	A	A	A	A	A	A
	Ethyl acetate $CH_3COO\ C_2H_5$	A	A	A	B	B	B
	Ethyl alcohol (ethanol) C_2H_5OH	A	A	A	A	A	A
	Ethyl chloride C_2H_5Cl	C	B	C	C	B	C
	Ethylene chloride $(CH_2\ Cl)_2$	A	B	A	C	C	B
	Ethylene glycol $(CH_2OH)_2$	A	A	A	A	A	A
	Ethyl ether $C_2H_5O\ C_2H_5$	A	A	A	A	A	A
F	Fluosilicic acid H_2SiF_6	A	A	A	A	A	A
	Formaldehyde HCHO	A	A	A	A	A	A
	Formamide H CO NH_2	A	A	A	A	A	A
	Formic acid 10% HCOOH	A	A	A	A	A	A
	Formic acid 85% HCOOH	A	A	A	A	B	B
	Freon 12 Frigen 12 $CCl_2\ F_2$	B	A	B	C	A	C
	Freon 22 Frigen 22	C	B	C	C	B	C
G	Glacial acetic acid CH_3 COOH	A	A	A	A	A	B
	Glycerine (CH_2OH_2) CHOH	A	A	A	A	A	A
H	Heating oil	B	A	B	B	A	C
	Heptane C_7H_{16}	B	A	B	A	A	C
	Hydraulic oil (Glycol based)	A	A	A	A	A	A
	Hydraulic oil (mineral)	B	A	B	B	A	C
	Hydraulic oil (phosphate ester)	A	B	A	C	B	B
	Hydrazine hydrate $(NH_2)_2H_2O$	A	A	A	A	A	B
	Hydrochloric acid 20% HCl	B	B	B	A	B	C
	Hydrochloric acid 37% HCl	B	B	B	A	C	C
	Hydrofluoric acid 10% HFl	C	C	C	B	C	C
	Hydrogen H_2	A	A	A	A	A	A
	Hydrogen chloride (dry) HCl	A	A	A	A	A	A
	Hydrogen peroxide (up to 6% W.W.)	A	A	A	A	A	A
I	Iso-octane $(CH_3)_3C\ CH_2\ (CH_3)_2$	A	A	A	A	A	B
	Iso-propyl alcohol $(CH_3)_2CHOH$	A	A	A	A	A	A

The symbols used as follows: ***A:*** *Suitable for application,* ***B:*** *Suitability depends on operating conditions,* ***C:*** *Not suitable*

Chemical Resistance Chart

(continued)

MEDIUM		KLINGER 61B	KLINGER OILIT	KLINGER ACIDIT S	KLINGER MARK 100	KLINGERIT UNIVERSAL	KLINGERIT
K	Kerosene	B	A	B	A	A	C
L	Lactic acid 50% CH_3 CHOH COOH	A	A	A	A	A	A
	Lead acetate Pb $(CH_3COO)_2$	A	A	A	A	A	A
	Lead arsenate Pb_3 $(AsO_4)_2$	A	A	A	A	A	A
	Lime water $Ca(OH)_2$	A	A	A	A	A	A
	Linseed oil	A	A	A	A	A	A
M	Magnesium sulphate $MgSO_4$	A	A	A	A	A	A
	Malic acid HOOC CH_2CHOH COOH	A	A	A	A	A	A
	Methane CH_4	A	A	A	A	A	A
	Methyl alcohol CH_3OH	A	A	A	A	A	A
	Methylated spirits	A	A	A	A	A	A
	Methyl chloride CH_3Cl	C	B	C	C	B	C
	Methylene chloride CH_2Cl_2	B	B	B	C	C	C
	Methyl ethyl ketone (M.E.K)CH_3CO C_2H_5	A	B	A	C	B	B
	Mineral oil – ASTM No. 1	A	A	A	A	A	A
	Mineral oil – ASTM No. 3	B	A	B	A	A	C
N	Naptha	B	A	B	B	A	C
	Natural gas (Methane) CH_4	A	A	A	A	A	A
	Nitric acid 20% HNO_3	B	B	B	A	C	C
	Nitric acid 40% HNO_3	C	B	C	A	C	C
	Nitric acid 96% HNO_3	C	C	C	A	C	C
	Nitrobenzene $C_6H_5NO_2$	C	C	C	C	C	C
	Nitrogen N_2	A	A	A	A	A	A
O	Octane C_8H_{18}	B	A	B	A	A	C
	Oleic acid $C_{17}H_{33}COOH$	A	A	A	A	A	B
	Oleum (Fuming Sulphuric Acid)	C	C	C	B	C	C
	Oxalic acid $(COOH)_2$	B	B	B	A	B	C
	Oxygen O_2 (check local regulations for use)	A	A	A	A	A	B
P	Palmitic acid $C_{15}H_{31}COOH$	A	A	A	A	A	B
	Paraffin (Kerosene)	B	A	B	A	A	C
	Pentane C_5H_{12}	B	A	B	A	A	C
	Perchoroethylene C_2Cl_4	B	B	B	B	B	C
	Petrol	B	A	B	A	A	C
	Petroleum ether	A	A	A	A	A	B
	Phenol C_6H_5OH	A	B	A	A	B	B
	Phosphoric acid (all concs)H_3PO_4	A	A	A	A	A	B
	Phthalic acid $(C_6H_4$ $(COOH)_2$	A	A	A	B	A	A
	Potassium acetate CH_3COOK	A	A	A	A	A	A
	Potassium carbonate K_2CO_3	A	A	A	A	A	A
	Potassium chlorate $KClO_3$	A	A	A	A	A	A
	Potassium chloride KCl	A	A	A	A	A	A
	Potassium chromium sulphate (K $Cr(SO_4)_2 12H_2O$)	A	A	A	A	A	A
	Potassium cyanide KCN	A	A	A	A	A	A
	Potassium dichromate $K_2Cr_2O_7$	A	A	A	A	A	A
	Potassium hydroxide KOH	A	A	A	A	A	B
	Potassium hypochlorite KClO	A	A	A	A	A	A
	Potassium iodide KI	A	A	A	A	A	A
	Potassium nitrate (saltpetre) KNO_3	A	A	A	A	A	A
	Potassium permanganate $KMnO_4$	A	A	A	A	A	A

MEDIUM		KLINGER 61B	KLINGER OILIT	KLINGER ACIDIT S	KLINGER MARK 100	KLINGERIT UNIVERSAL	KLINGERIT
	Producer gas (generator gas)	A	A	A	A	A	A
	Propane C_3H_8	A	A	A	A	A	B
	Pydrol	C	A	C	C	A	C
	Pyridine C_5H_5N	A	C	A	B	C	B
R	Rapeseed oil	A	A	A	A	A	B
S	Salicylic acid $C_6H_4(OH)$ COOH	A	A	A	A	A	B
	Sea Water	A	A	A	A	A	A
	Silicone oil	A	A	A	A	A	A
	Skydrol 500	C	C	C	C	C	C
	Soap	A	A	A	A	A	A
	Soda (sodium carbonate) Na_2CO_3	A	A	A	A	A	A
	Sodium aluminate Na_3AlO_3	A	A	A	A	A	A
	Sodium bicarbonate $NaHCO_3$	A	A	A	A	A	A
	Sodium bisulphite $NaHSO_3$	A	A	A	A	A	A
	Sodium chloride (Salt) NaCl	A	A	A	A	A	A
	Sodium cyanide NaCN	A	A	A	A	A	A
	Sodium hydroxide NaOH	A	A	A	A	A	B
	Sodium silicate (water glass)	A	A	A	A	A	A
	Sodium sulphate Na_2SO_4	A	A	A	A	A	A
	Sodium sulphide Na_2S	A	A	A	A	A	A
	Spinning baths (up to 10%)H_2SO_4	B	B	B	A	B	C
	Starch $(C_6H_{10}O_5)x$	A	A	A	A	A	A
	Steam H_2O	A	A	A	B	A	A
	Steam condensate H_2O	A	A	A	B	A	A
	Stearic acid $C_{17}H_{35}COOH$	A	A	A	A	A	B
	Sugar	A	A	A	A	A	A
	Sulphur dioxide SO_2	B	B	B	A	B	C
	Sulphuric acid 30% H_2SO_4	B	B	B	A	C	C
	Sulphuric acid 50% H_2SO_4	B	B	B	A	C	C
	Sulphuric acid 96% H_2SO_4	B	B	B	A	C	C
	Sulphurous acid H_2SO_3	B	B	B	A	B	C
T	Tannic acid $C_{76}H_{52}O_{46}$	A	A	A	A	A	A
	Tar (asphalt)	A	A	A	A	A	A
	Tartaric acid (CHOH $COOH)_2$	A	A	A	A	A	A
	Tetrachloroethane $C_2H_2Cl_4$	B	B	B	C	B	C
	Tetralin $C_{10}H_{12}$	B	A	B	A	A	C
	Toluene $C_6H_5CH_3$	B	A	B	B	A	C
	Town's gas	A	A	A	A	A	B
	Transformer oil	A	A	A	A	A	B
	Trichloroethylene C_2HCl_3	B	B	B	B	B	C
	Triethanolamine $N(CH_2CH_2OH)_3$	A	A	A	A	A	A
	Turpentine	B	A	B	A	A	C
U	Urea $(NH_2)_2CO$	A	A	A	A	A	B
V	Vinyl acetate CH_3COO C_2H_3	B	A	B	C	A	C
W	Water H_2O	A	A	A	A	A	A
	Water glass $Na_2SiO_3K_2SiO_3$	A	A	A	A	A	A
	White Spirit	B	A	B	A	A	C
X	Xylol C_6H_4 $(CH_3)_2$	B	A	B	B	A	C

The symbols used as follows: ***A:*** *Suitable for application,* ***B:*** *Suitability depends on operating conditions,* ***C:*** *Not suitable*