

# Promat DALFRATEX®

## high temperature fibres & textiles



## Promat DALFRATEX® High Temperature Fibres & Textiles

Pipeline fabrication

Vessel fabrication

Production

### INTRODUCTION

Promat DALFRATEX® is a range of inorganic fibres and textiles manufactured by Promat UK Limited. The materials are capable of operating continuously at 1000°C and at up to 1600°C for limited periods. They will not melt or vapourise until temperature exceeds 1700°C, and have a high resistance to thermal shock.

Promat DALFRATEX® products also provide flexible electrical insulation at temperatures as high as 1000°C. They are composed of continuous filaments of amorphous silica, which combine the flexibility of fibres and textiles, with the refractory properties of silica.

In order to service the needs of a wide range of applications the majority of Promat DALFRATEX® products are available in two basic forms, i.e. standard and pre-shrunk. The standard form shrinks during initial heating and products of this type have letter "U" incorporated into the code number. As their name implies, the pre-shrunk forms have been factory treated to confer better dimensional stability in high temperature use.

In addition to these forms a wide range of sacrificial organic finishes are available which may be applied to particular products where required for specific end uses.

### CHEMICAL COMPOSITION

All Promat DALFRATEX® products have associated adsorbed water, and some products have special organic finishes to impart particular physical properties. The following chemical composition values assume that all water and special coatings have been removed by ignition at 1000°C.

#### Typical Analysis

SiO <sub>2</sub> — 98.57%	Fe <sub>2</sub> O <sub>3</sub> — 0.08%	CaO — 0.05%	Alkalies — 0.13%
TiO <sub>2</sub> — 0.30%	B <sub>2</sub> O <sub>3</sub> — 0.06%	MgO — 0.07%	Chlorides — 100-150ppm
Al <sub>2</sub> O <sub>3</sub> — 0.47%			

#### Special Low Chloride Product

They find application when temperature and humidity conditions conducive to stress corrosion cracking of stainless steel are likely to be encountered.

### HIGH TEMPERATURE PERFORMANCE

#### Maximum Continuous Use Temperature

Progressive denitrication, eventually leading to brittleness, will occur above 1000°C.

#### Maximum Short Term Use Temperature

Promat DALFRATEX® products can be used up to the softening point if the exposure is of limited duration. The actual duration of exposure is a function of temperature and mode of use.

Advice on the suitability of a Promat DALFRATEX® product for a given application may be obtained from Promat UK Limited. Some examples of this type of use are:

- Manufacture of flexible fire barriers and curtains
- Electrical insulation
- Protection of personnel and plant from liquid metal splash
- High temperature insulation with high vibration resistance

#### Softening Point

Approximately 1600°C.

#### Thermal Shock Resistance

Excellent.

### TYPICAL APPLICATIONS

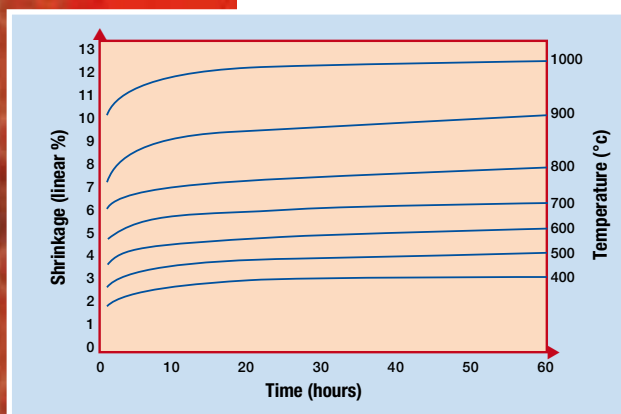
Promat works closely with individual customers to determine the optimum form and type of Promat DALFRATEX® product for specific applications, including the following activities:

- Aerospace (gas turbine and rocket engines)
- Metallurgical/Steel Production
- Glass Manufacture
- Fire Protection
- Electrical Heating
- Pipeline and Vessel Fabrication
- Gas Production
- Nuclear Power
- Electricity Generation
- Petrochemical



## Promat DALFRATEX® High Temperature Fibres & Textiles

### SHRINKAGE/TIME/TEMPERATURE RELATIONSHIP



Standard products have an initial high rate of shrinkage which is irreversible, and occurs when they are first heated.

The graph at right is given for guidance only, and is based on measured values for broadcloth.

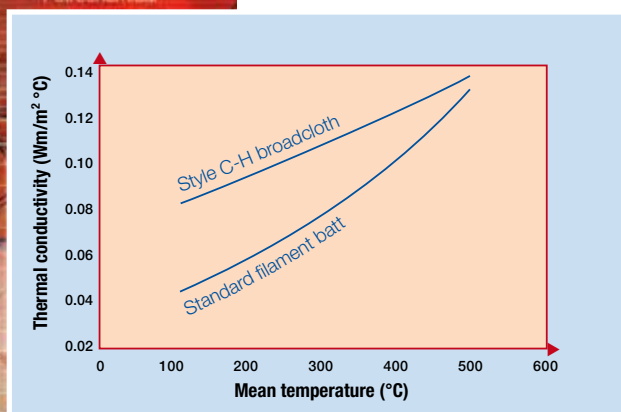
For certain applications, shrinkage of Promat DALFRATEX® in-situ during the first heating may be undesirable. For these applications, most Promat DALFRATEX® products are available in a pre-shrunk form. Further limited shrinkage may still occur in use, depending upon the temperature and time conditions prevailing, but typically will be less than 2% at 1000°C.

### THERMAL PROPERTIES

#### Thermal Conductivity

The following values of thermal conductivity, shown on the figures below, were determined using the water calorimeter procedure described in BS874: 1973, paragraph 4.2.5.

The thermal conductivity values of batt in a slightly compressed condition (density 96kg/m<sup>3</sup>) are reported, being the most common application form. In the fully relaxed, as supplied, condition the thermal conductivity is 10% to 15% higher at elevated temperatures.



#### Specific Heat

250°C — 0.80J/g °C	500°C — 0.88J/g °C
750°C — 0.96J/g °C	1000°C — 1.09J/g °C

### ELECTRICAL PROPERTIES

Promat DALFRATEX® fibre is a good electrical insulator, with high electric strength and low electrical conductivity.

For most design purposes it may be assumed that the electrical breakdown strength of a region filled with Promat DALFRATEX®, is essentially that of atmospheric air.

The dielectric properties of Promat DALFRATEX® at room temperature are adversely affected by the presence of associated water. This can substantially be removed by heating the material to 100°C to 200°C, when the losses are significantly reduced.

### CHEMICAL PROPERTIES

The chemical properties of Promat DALFRATEX® are similar to those of vitreous silica (silica glass).

In general, Promat DALFRATEX® is compatible with mineral acids except phosphoric and hydrofluoric and is also compatible with a wide range of substances including air, chloride, carbon monoxide, ammonia, sulphur dioxide.

Promat DALFRATEX® products are compatible with silica refractories at high temperatures. As there is no possibility of forming a SiO<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub> eutectic, Promat DALFRATEX® can safely be used in conjunction with silica refractories in coke ovens, glass melt tanks etc.

Promat DALFRATEX® products are not recommended for use in contact with bases such as sodium and calcium hydroxides or substances giving the reaction of these, e.g. sodium silicate.

## BATT DATA

Minimum length: 1m

Maximum length: 2.7m

Code	Thickness as stated density (mm)	Nominal surface density (g/m <sup>2</sup> )	Nominal length (m)	Nominal width (mm)	Nominal bulk (kg/m <sup>3</sup> )
B-1	3.8	300	2.2	915	80
B-2	6.3	600	2.2	915	96
B-3	9.4	825	2.2	915	88
B-4	12.5	1000	2.2	915	80
B-8	25	2000	2.2	915	80

## CLOTH DATA

Nominal roll length, unfired: 48m

Nominal roll length, fired: 45m

Code	Nominal thickness (mm)	Nominal width (mm)	Nominal weight (g/m <sup>2</sup> )	Yarn type	Type of weave
C-H	0.9	825	630	Plain	Satin
C-19	1.6	825	1250	Plain	Satin
UC-H/D	0.9	910	640	Plain	Satin
UC-19/D	1.6	910	1260	Plain	Satin
UC-19/AR	1.7	910	1300	Plain	Satin

## ROPE DATA

The 'B' series ropes are supplied in pre-shrunk condition and have a light coating applied to assist manufacture. The 'C' series ropes are supplied pre-shrunk and without coating.

Code	Nominal diameter (mm)	Nominal weight (g/m)
R-B3	9	70
R-B4	12	110
R-B6	19	230
R-B8	25	385
R-C10	10	40
R-C13	13	60
R-C25	20-25	60
R-C40	40	260

## CORDAGE DATA

All cord can be supplied in pre-shrunk or in natural condition and are coated.

Code	Nominal diameter (mm)	Nominal weight (g/km)	Nominal package* (m)
D-T3	2	4000	100
D-T4	3	6200	50

Code	Nominal diameter (mm)	Nominal weight (g/km)	Indicative yield (m/kg)
D-T1	0.7	430	2320
D-T2	1.2	1200	840
D-T20	0.9	740	1360

## TAPE DATA

Code	Nominal thickness (mm)	Nominal width (mm)	Nominal weight (g/m)	Nominal package* (g/m)
T-3	0.4	20	6	30
T-5	0.4	30	9	30
T-85	4.0	22	37	—
T-86	4.0	45	75	—
T-105	4.5	70	127	—
UT-124/50	3.5	50	—	—
T-H/25*	1.0	25	16	—
T-H/50*	1.0	50	32	—
T-H/75*	1.0	75	48	—
T-19/25*	1.6	25	32	—
T-19/75*	1.6	75	94	—

## SLEEVING DATA

All sleeveings can be supplied in pre-shrunk or in natural condition; with or without a coating.

Code	Nominal bore (mm)	Nominal wall thickness (mm)	Nominal package* (m)
S-R4	3.2	0.5	30
S-R6	4.8	0.5	30
S-R8	6.4	0.6	20
S-R25	20	1.0	15
S-R32	25	1.0	15
S-F16	10	0.4	30
S-F20	13	0.5	30
S-F25	20	0.5	20
S-F30	25	0.5	20
S-8	30	1.0	—

Code	Nominal bore (mm)	Indicative yield at stated diameter (m/kg at mm)	Nominal package*
S-43	50	9 at 50	—
S-44	65-75	9 at 65	—
S-46	75-85	7 at 75	—

\* All package sizes are nominal, to obtain an exact package or material length a surcharge will be added.