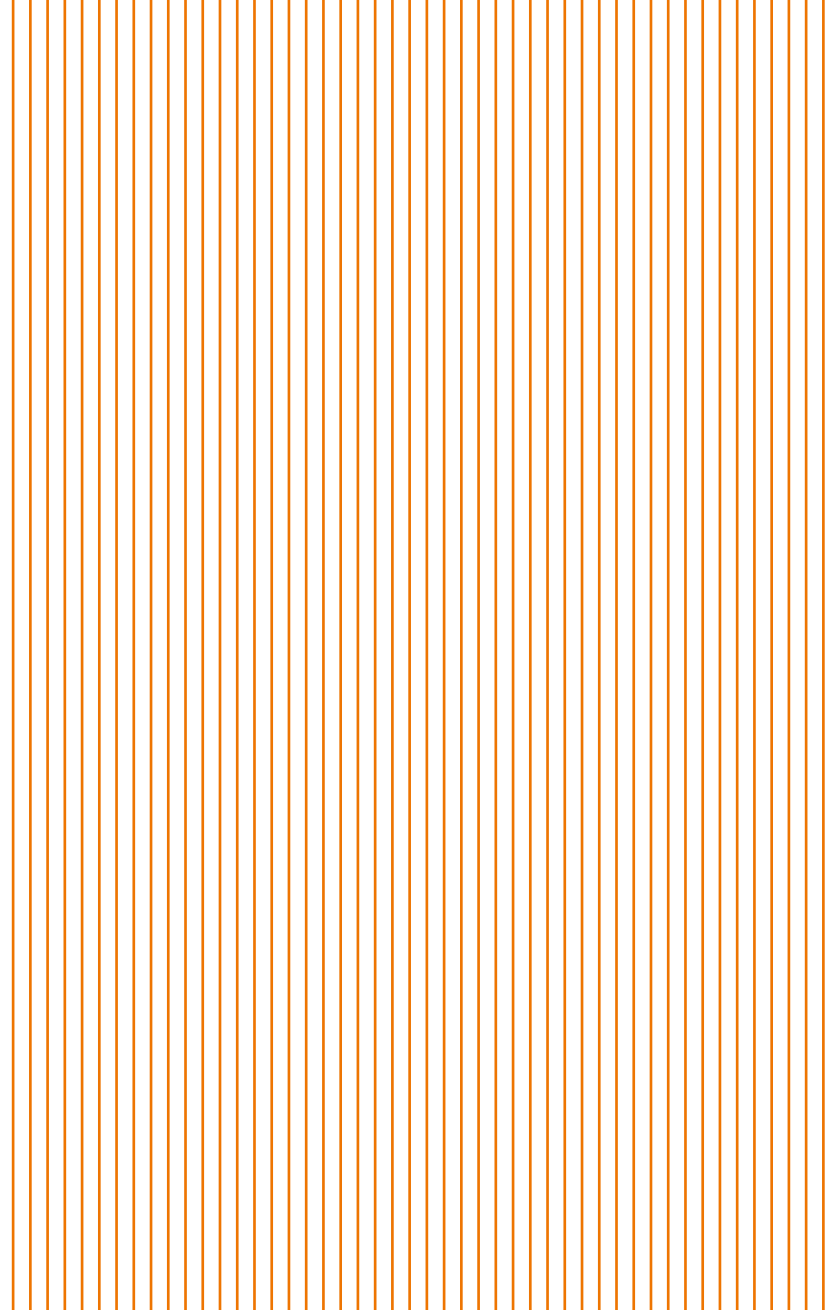


FIBERIZING YOUR IDEAS

BOOKLET 2026







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BOOKLET 2026

Content

1 Vetrotex

| | | |
|------------|--|----------|
| 1.1 | Fiberizing your ideas | p. 4 |
| 1.2 | Sales and Marketing Services | p. 5-7 |
| 1.3 | Latest innovations | |
| | Hybrid yarns | p. 8-11 |
| | Alucoat | p. 12-15 |
| | Fine yarns | p. 16-19 |
| 1.4 | Our global product range | p. 20-21 |
| 1.5 | Textile products: Manufacturing | p. 22-26 |
| 1.6 | Textile products: Recommended end use | p. 27-30 |
| 1.7 | Glass properties and compositions | |
| | E-glass properties | p. 31-32 |
| | C-glass properties | p. 33 |

NEW PRODUCTS

2 Products

| | | |
|------------|--|----------|
| 2.1 | Yarns | |
| | Product description and nomenclature | p. 34-43 |
| | Packaging information | p. 44-45 |
| | Bobbin dimensions | p. 46 |
| 2.2 | Texturized Yarns | |
| | Product description and nomenclature | p. 47 |
| | Product range and packaging information | p. 48-49 |
| 2.3 | Voluminized products (ECO and ECOS) | |
| | Product description and nomenclature | p. 50 |
| | Product range and packaging information | p. 51-53 |
| 2.4 | C-Glass staple fiber products | |
| | Product description and nomenclature | p. 54 |
| | Product range and packaging information | p. 55-56 |
| 2.5 | ZeroTwist® | |
| | Product range and packaging information | p. 57-59 |
| 2.6 | Hybrid yarns | |
| | Product description and nomenclature | p. 60-63 |
| 2.7 | Textile Chopped strands | |
| | Product range and packaging information | p. 64-67 |
| 2.8 | Beam supply | p. 68-69 |
| 2.9 | Returnables | p. 70 |

3 Size systems

Size systems description and recommended applications _____ p. 71-75

4 Application

Application examples _____ p. 76-77

Recommended yarn application _____ p. 78-80

Recommended C-glass Staple Fiber application _____ p. 81

5 Appendix

Technical Data sheets references _____ p. 82

Guide to standardization _____ p. 83

Units: metrics and U.S. systems _____ p. 84-86

The information and technical data included in this booklet are intended as a general guide and are subject to change without notice. This information is not promissory, is not warranted and Saint-Gobain Vetrotex declines all liability for its use. The product characteristics, especially load bearing capability and wear, depend on the application and the environment the product is used in. Therefore the data do not assure specific product characteristics or make reference to the suitability of the products for a definite or fictitious application. In case of new applications users have to test the product under actual application conditions where the application should be discussed with us. We, and all those acting on our behalf, assume no responsibility for the data and details in this booklet.

1.1 Fiberizing your ideas

Saint-Gobain is the world leader in high performance materials and in solutions for sustainable habitat.

Our expertise is to combine the virtues of glass with our innovative know-how and experience to create a wide range of textile glass filament products.

Glass fibers have remarkable properties. Among the primary benefits are:

- Three times higher specific resistance than steel
- Naturally fire resistant
- Dimensional stability
- Electrical insulation
- Low thermal conductivity
- Compatibility with organic matrices

Embedded within the solid foundation of the Saint-Gobain Group, with more than 360 years of experience in glass manufacturing, Vetrotex works in partnership with our customers, continuously investing in research and development for improved technologies and product solutions.

We offer a complete range of service and products tailored and focused on customer needs. Our clients, in conjunction with our technological competence, state of the art technology and an innovative spirit, have allowed us to position ourselves as a market leader servicing building, industrial and a wide spectrum of other applications requiring technical textiles.

With over 80 years of experience, Vetrotex is the historical leader. Our presence and services have become global. Today we have sales offices in Australia, Czech Republic, Germany, India, Japan, Korea, USA and production facilities in Europe as well as in North America.

Our aim is to serve our customers anywhere in the world with our global presence while focusing on local service.

We promise to our customers to be reliable in Quality and in Service, to be an innovative company and to be a true business partner.

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1.3 Latest innovations

Hybrid yarns



HYBRID GLASS /PP AND GLASS /PA YARNS

Our lightweight reinforcement solutions
for thermoplastics



Product description

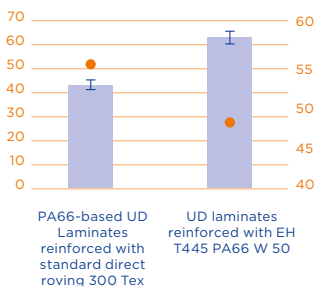
Low Tex hybrid E-glass/thermoplastic yarns offered in count range from 95 to 450 Tex with a glass fibre volume fraction of 50%. These new hybrid yarns are produced from the commingling of polypropylene or polyamide filaments and glass filaments sized with a starch free system exhibiting excellent textile properties.



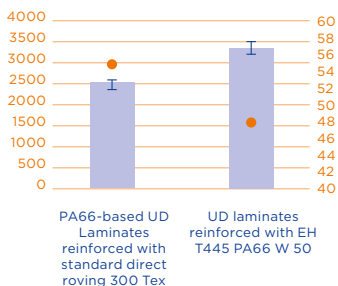
Main advantages

- Excellent textile properties
- Enable production of lightweight & thin prepreg fabrics & laminates
- Superior dry prepreg drapability for complex structure
- Quick & easy wet out of the thermoplastic resin during heating step
- Core impregnation of the TP resin within the glass yarn core
- Reduced cycle process steps & time for laminate production
- Improved fibre/matrix adhesion leading to higher laminate performances

Uniaxial tensile strength in 0 °C of UD laminates (MPa)



Interlaminar shearing strength of UD laminates (MPa)



■ Tensile strength
● FVF%

■ ILSS (MPa)
● FVF%

Packaging Information

80 bobbins per pallet

Nominal weight per pallet

EH T95 or 105: 672 kg (1481.5 lbs)

EH T430 or 445: 536 kg (1181.7 lbs)

Nominal bobbin weight

EH T95 or 105: 8.4 kg (18.52 lbs)

EH T430 or 445: 6.7 kg (14.77 lbs)

Nominal bobbin dimension

Inside 80 mm (3.15")

Outside 245 mm (9.65")

Height 280 mm (11.02")

Yarn cross-section illustration



- Glass reinforcement filament
- Thermoplastic matrix filament

Product Information

| Reference | Unit | EH T95 PP W or B 50* | EH T430 PP W or B 50 | EH T105 PA66 W 50 | EH T445 PA66 W 50 |
|-----------------------|----------------------|-------------------------|-------------------------|----------------------|----------------------|
| Fibre volume fraction | Vol.% | 50 | 50 | 50 | 50 |
| Glass type | | E | E | Ekg | E |
| Final Count | Tex (g/km) Yds/lb | 95 52,2 | 430 11,5 | 105 47,2 | 445 11,1 |
| Glass Fibre diameter | µm | 9 | 13 | 9 | 13 |
| Thermoplastic resin | | PP | PP | PA66 | PA66 |
| Resin color | | White or Black | White or Black | White | White |

*E = Type of Glass / H = Hybrid / T = Texturized / 95 = Linear density (Tex) /
PP = Polypropylene / W = White or B = Black color / 50 = Glass volume content %

Recommended storage & processing conditions

The material should be stored in its original packaging in dry conditions away from direct sunbeam. Storage temperatures of between 10 and 35 °C (50 and 95 °F) and a relative humidity of between 40 and 70 % are recommended. Though there are no known storage limitations under proper conditions, we recommend to use the material within 6 months after delivery date, or within 24 months after date of manufacture. Retesting is advised after 2 years from initial manufacture date to insure optimum performance. Before processing, the material should be conditioned by exposing it unpacked to the processing climate for at least 24 hours.

1.3 Latest innovations

Alucoat



ALUMINUM COATED-GLASS FIBRES

Made in partnership
with patented **FibreCoat** technology

FIBRECOAT



Product description

Bi-component multifilament strands with a glass core and aluminum sheath using FIBRECOAT technology. This innovative fibre is providing high stiffness and tensile strength and combining metal properties for high electrical and thermal conductivity.

These new fibres will be offered as chopped fibres compatible with polymer and nonwoven processing and as roving for textile processing (e.g., weaving, knitting, non-crimp fabrics, narrow fabrics or even braiding).



Main advantages

- Excellent textile properties for providing lightweight & drapable shielding solutions.
- Affordable and impact resistant materials.
- Add electrostatic discharge (ESD), electromagnetic interference (EMI) shielding, resistive heating and thermal management properties in your product.



**EV battery casing -
EMI shielding**



**Electrostatic
discharge flooring**



**Thermal
dissipation**



**Heat reflection -
protective equipments**



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Product Information

Roving

Chopped Strands

| | | |
|---|------------|---------|
| Count (Tex - g/km) | 50 to 1200 | - |
| Glass filament diameter (μm) | 13-16 | 13-16 |
| Length (mm) | - | 3 to 72 |
| Fibre volume ratio (vol. %) | 50 | 50 |
| Sizing | Silane | Silane |
| LOI (%) | < 1 | < 1 |
| MOI (%) | 1 | 1 |

Recommended storage & processing conditions

The material should be stored in its original packaging in dry conditions away from direct sunbeam. Storage temperatures of between 10 and 35 °C (50 and 95 °F) and a relative humidity of between 40 and 70 % are recommended. Though there are no known storage limitations under proper conditions, we recommend to use the material within 6 months after delivery date, or within 24 months after date of manufacture. Retesting is advised after 2 years from initial manufacture date to insure optimum performance. Before processing, the material should be conditioned by exposing it unpacked to the processing climate for at least 24 hours.

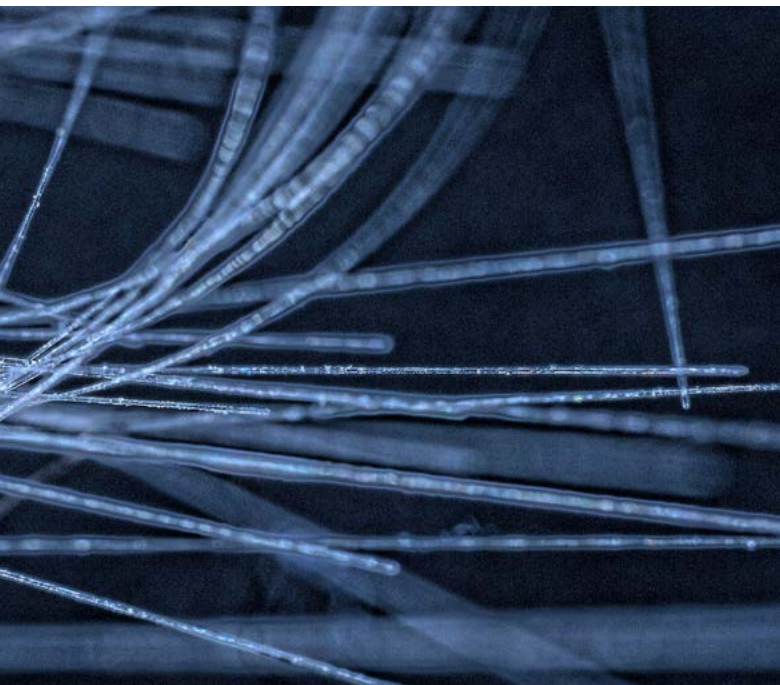
1.3 Latest innovations

Fine yarns



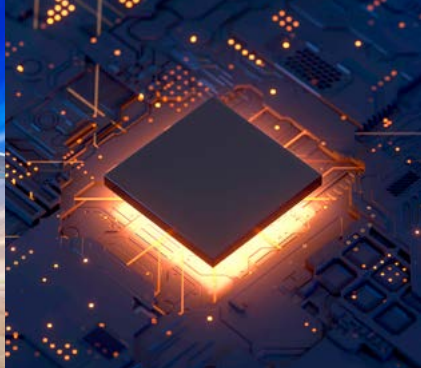
FINE YARNS

Engineered for Advanced Industrial
& High-Performance applications



Product description

5µm E-Glass yarn combines dimensional stability, high-tensile strength, dielectric reliability and superior surface purity for next generation materials, composite and aerospace systems.



Main advantages

- Fine Filaments for maximum surface area and ultra-high uniformity.
- Exceptional tensile strength supporting lightweight structural applications.
- High dielectric insulation for electronics, PCB laminates & cable tapes
- High thermal stability for aerospace & high-temperature environments
- Excellent resin combability
- Ultra-low ΔE for applications requiring visual or optical consistency
- Low frizz, high processability for weaving and filament winding.

Packaging Information

- (1) 120 Bobbins per pallet (Cardboard)
- (2) 168 Bobbins per pallet (Returnable)

Nominal weight per pallet

- (1): 290 kg (640 lbs)
- (2): 407 kg (896 lbs)

Nominal weight per Bobbin

2.42 kg (5.34 lbs)
[min Bobbin weight: 1.0 kg (2.2 lbs)]



Technical Properties – 5µm

| | | |
|-------------------------------|-------------------|-----------|
| TEX / Linear Density (g/1000) | 11.0 +/-6% | ISO 1889 |
| Filament Diameter | 5µ (4.83-5.83) | ASTM D578 |
| Tensile Strength (nom.) | 8.50 N / 1,91 lbf | ISO 3341 |
| Twist number in turns/m | 40 / 1.0 | ISO 1890 |
| Loss of Ignition | 1.40 (1.05-1.75) | ISO 1887 |
| Moisture content (max) | 0.2 % | ISO 3344 |
| Type of Bobbin: H6 | | |

Recommended storage & processing conditions

The material should be storage in its original packaging in dry conditions away from direct sunlight. Storage temperature of 10 to 35 °C and relative humidity of 40 to 70% are recommended. We recommend that material be used within 24 months after the delivery date.

Before processing, the material should be conditioned, i.e. exposed unpacked at the ambient workshop temperature for at least 24 hours.

1.4 Our global product range



Our complete product range of glass products for textile applications are made in various forms in order to make them suitable for a variety of processes and to provide desired thermo-mechanical and electrical properties.

The product range includes E-glass single yarns, voluminized yarns, texturized yarns, beamed yarns, hybrid yarns, ZeroTwist, textile chopped strands and C-glass staple fiber products

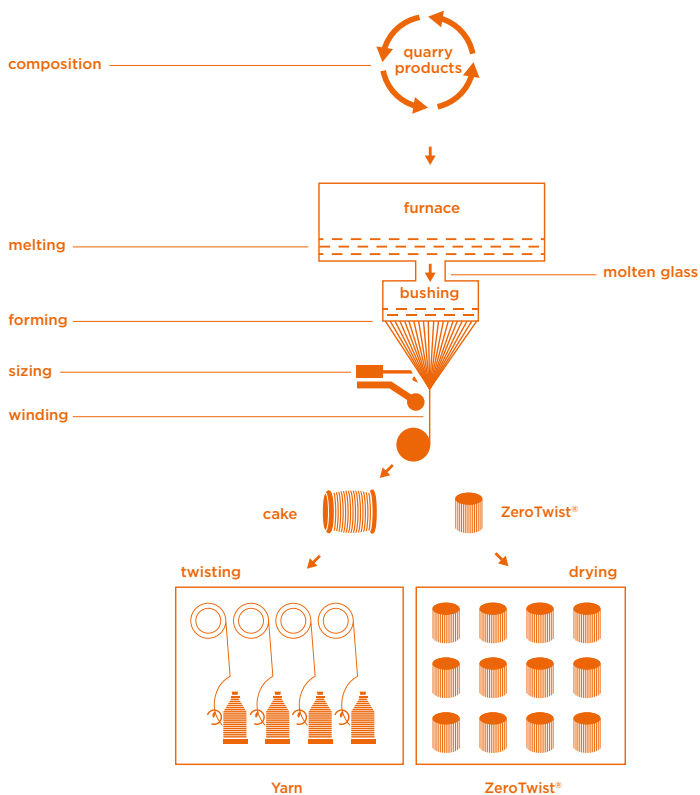


1.5 Textile products

Manufacturing

The production of glass strand calls upon three main technologies:

- glass forming,
- textiles and
- chemicals.



Glass manufacture

The manufacture of glass is carried out in a special furnace at about 1450 °C (E glass using finely ground raw materials from carefully selected quarries).

The glass leaving the furnace at a very high temperature is used to feed bushings (blocks pierced with hundreds of holes) of platinum alloy.

Forming

The basic strand is made by forming. Forming is achieved by drawing the molten glass flowing from the holes of the bushing at high speed. This forms strand to between 200 and 1600 filaments per strand. These filaments are defined by their diameters: from 5 to 16 microns ($1\ \mu\text{m} = 1/1000\ \text{mm}$).

Assembled, they make up the basic strand defined by its linear mass expressed in tex (g/km).

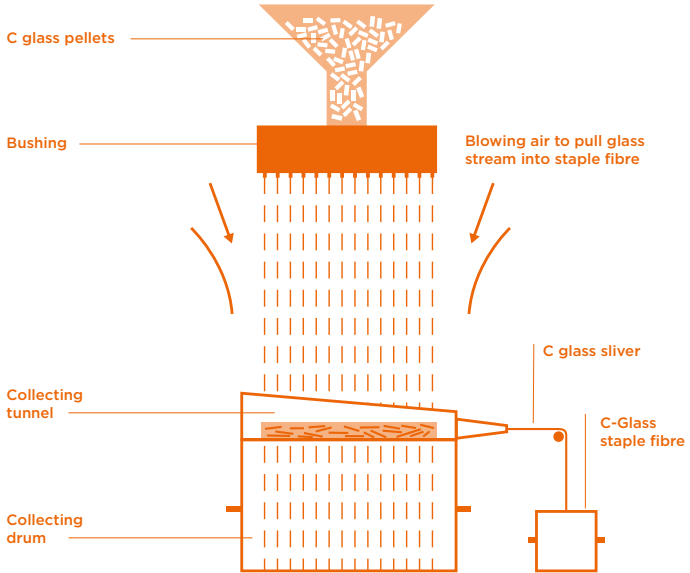
Sizing

The individual filaments of Vetrotex reinforcements receive a size at the forming stage, immediately after they leave the bushing. This size, made up of organic products dispersed in water, is designed to give the glass strand certain characteristics necessary for the end application. For textile applications, sizes are generally starch/oil based. For some applications, special size can usually contain other film formers than starch and a silane type chemical “coupling agent” which contributes to enhancing the mechanical and ageing properties of the end product.

Vetrotex products are either manufactured immediately after they leave the bushing (direct roving) or made up of basic strands subjected to finishing operations which are more or less complicated (twisting, plying, texturizing, voluminizing, chopping and warping).

C-Glass staple fibre manufacturing

C-Glass is a glass with very high alkaline content and low aluminum oxide content.



C-Glass staple fiber products manufacturing

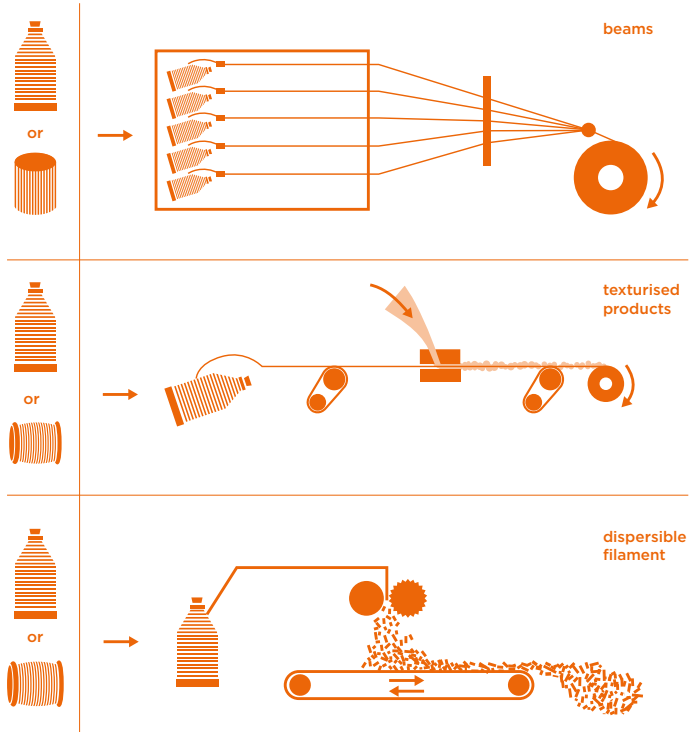
The bushing used for the production of C-Glass staple fiber products is fed with C-Glass pellets. The molten glass (1150 °C) emerges from nozzles on the downside of the bushing. The glass drops are pulled into discontinuous glass filaments with blown air.

The single staple fibres are then collected on a rotating drum. Before passing through a complete revolution about the rotary drum, the fibres are separated of this drum by a device like a doctor blade.

Receiving the support of the air stream of the drum surface, the fibres are inserted in the collecting funnel to build a staple fiber sliver. This is then being inserted into a tube with grooves, adding a slight twist and increasing the packing density. During this process, a size is applied to the fibre in order to improve the sliver's integrity and to allow further textile processing operations.

Finally, the sliver is being wound on a tube by using a standard textile winder. For some applications, it may be directly laid into a cardboard packaging or being wound on a drum.

VETROTEX processes



1.6 Textile products

Recommended end uses

When used on its own in the shape of single, plied or cabled yarn, glass fibre can be woven, braided or sleeved.

Braiding is the operation carried out on suitable machinery which produces a tubular sleeve.

Coating

Various chemical substances can coat either glass filament yarns or fabrics.

Major applications are:

- PVC coated yarns for sun and insect screening.
- PTFE coated fabrics for high end printed wiring boards (low dielectric constant / low losses), architectural and roofing membranes. Specific properties of PTFE fabrics as non-stick and smooth surface, resistance to chemicals, compliance with food regulation, temperature resistance, high tensile strength serve a wide range of applications including food processing, conveyor belts, release sheets, thermal insulation, sealing.

Covering consists of winding the fibre around an electrical conductor to provide it with an insulating sheath.

Desizing - finishing.

The incompatibility of textile sizing with synthetic resins necessitates desizing followed by finishing specific to the fabrics, when they are used as reinforcements or supports.

Knitting

Saint-Gobain Vetrotex yarns can be used on Warp Knitting Machinery to produce knit scrim for self-adhesive joint tape as well elastic casting tape for reinforcement purpose in medical application.

Glass yarns can be also processed on conventional weft knitting machinery but in that case due to high bending strains, the use of plied yarns as well as fine filaments is required.

Laid scrim processing

The weaving process permits by using the leno weave pattern the production of mesh fabrics that are flat structure in which both warp and weft yarns are widely spaced to form a grid. Grinding wheels and fabrics for **External Insulation Facade Systems** (EIFS) use the advantages of this type of fabric.

The **laid scrim machine** is another textile process that allows the manufacture of products called scrims in which the warp and weft are also widely spaced and fixed by chemical means.

Multiaxial

The multiaxial machine is used to produce multi-layer structures for reinforcement applications. Major application for multiaxial products are: composite for boat and shipping industries, rotor blade for power station.

Several layers of unidirectional reinforcement material (yarn, strand, roving) are stacked collectively and oriented by means of a weft insertion system in predetermined directions that can vary within large limits (0° to 90°). Additional stitching yarns applied by a knitting system bind the layers together to prevent slippage. Other reinforcing materials such as chopped strand mat, tissue can be added to the multiaxial structure.

Main advantages of such a structure are:

- reinforcement in predetermined direction,
- high drapeability,
- good filament wet out,
- good impact resistance,
- reduction of lay up time.

Texturizing

Texturized and voluminized products are often used in various end uses for their valuable characteristics like aesthetic aspect, fire resistance, dimensional stability, improving of thermal insulation.

In the texturizing process, the glass yarns or strands are overfed in a nozzle in which a pressurized air stream creates a turbulence that causes the formation of loops and imparts a moderate bulk.

In the voluminizing process, the glass yarns or strands run through the air nozzle without overfeeding which creates a high bulk effect desired in various application.

Narrow Weaving

The glass yarns can be used as well on high speed narrow weaving looms to manufacture woven bands or ribbons.

The warp yarns can be fed by beams or a bobbins creel. The weft is inserted into the shed by a particular device for this type of loom: the glass strand taken up from a package runs through a weft feeder which allows an adjustment of the inserted quantity and the unwinding tension. Then the weft strand is introduced into the shed by a needle that is a bent traveling arm.

Fabrics are characterised by:

- the weave pattern: the way in which the fibres cross each other,
- the “count”: the number of warp and weft threads per centimetre,
- the type of yarn.

1.7 Glass properties and compositions

E-Glass properties

Glass composition (weight %)

| Composition | E glass |
|---|-------------|
| Silica SiO_2 | 52 to 56 |
| Alumina Al_2O_3 | 12 to 16 |
| Calcium Oxide CaO | 16 to 25 |
| Magnesium Oxide MgO | 0 to 5 |
| Boron Oxide B_2O_3 | 5 to 10 |
| Alkali content $\text{Na}_2\text{O} + \text{K}_2\text{O}$ | 0 to 1 |
| Iron Oxide Fe_2O_3 | 0.05 to 0.4 |
| Titan Oxide TiO_2 | 0 to 0.8 |

Physical properties

| Properties | Unit | E glass |
|----------------------------|-----------------|---------|
| Density | g/cm^3 | 2,60 |
| Hardness (Vickers 50g-15s) | - | 5,6 |
| Sound velocity | m/s | 5680 |

Mechanical properties

| Properties | Unit | E-Glass |
|--|--------|---------|
| Virgin filament tensile test | MPa | 3400 |
| | ksi | 493 |
| Impregnated strand tensile test (calculated on fiber cross section) | MPa | 2400 |
| | ksi | 348 |
| Tensile modulus | GPa | 73 |
| | msi | 10.5 |
| Tenacity (sized yarn) | cN/Tex | Min. 50 |
| Elongation at break for sized yarns according to binder system | % | 2.2-2.5 |
| Elastic recovery | % | 100 |

Water resistance determined by the DGG method - DIN 1211

| Fibre Type | E-Glass |
|------------|---------|
| DGG result | 7 mg |

Electrical properties

| Properties | Unit | E-Glass |
|------------------------------|--------|------------------|
| Dielectric constant at 1 MHz | - | 6.4 |
| Dielectric constant at 1 GHz | | 6.13 |
| Loss angle at 1 MHz | - | 0.0018 to 0.0039 |
| Loss angle at 1 GHz | | 0.0039 |
| Volume resistivity | Ohm/cm | 1014 to 1015 |
| Surface resistivity | Ohm/cm | 1013 to 1014 |
| Electrical rigidity | kV/mm | 8-12 |

Thermal properties

| Properties | Unit | E-Glass |
|---|--------|-----------------------------------|
| Softening point (Littleton) | °C | 853 |
| Strain point | °C | 643 |
| Linear coefficient of thermal expansion | m/m/°C | 5,3*10 ⁻⁶ |
| Specific heat | J/g.°K | 0,764 at 20 °C 0,958 at 200 °C |
| Coefficient of thermal conductivity | W/m.°K | 1.0 |

Thermal resistance of E-glass for virgin filaments (after ageing for 24 hours)

| Temperature °C | Residual strength (%) E glass |
|----------------|-------------------------------|
| -200 | 100 |
| 200 | 98 |
| 300 | 82 |
| 400 | 65 |
| 500 | 46 |
| 600 | 14 |
| 700 | — |

C-Glass properties

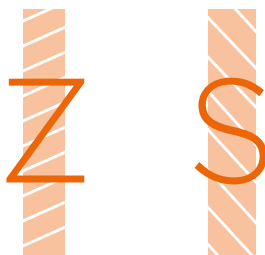
Glass composition (weight %)

| Composition | C-Glass |
|---|----------|
| Silica SiO_2 | 62 to 67 |
| Alumina Al_2O_3 | 1 to 4 |
| Alkaline earth oxides $\text{CaO} + \text{MgO}$ | 9 to 12 |
| Boron Oxide B_2O_3 | 3 to 6 |
| Alkali content $\text{Na}_2\text{O} + \text{K}_2\text{O}$ | 15 to 17 |
| Iron Oxide Fe_2O_3 | 0 to 1 |
| P_2O_5 | 0 to 1 |

2.1 Yarns

Product description and nomenclature

Glass filament yarns consist of a defined number of E-glass filaments of a certain nominal diameter, which are brought together to form a yarn. The structure of the yarn is fixed and protected by a size and a slight twist, generally in Z-direction.



Glass filament yarns

Description: e.g.

EC9 68 Z20 T63C H8 (ECG 75 1/0 0.5Z T63C H8)

| According ISO 2078 | | According ASTM D 578 | |
|--------------------|-------------------------------------|----------------------|---|
| E | Type of glass | E | Type of glass |
| C | Continuous filament | C | Continuous filament |
| 9 | Filaments diameter in μm | G | Filaments diameter US units |
| 68 | Linear density (in tex = g/1000 m) | 75 | Linear density in 100 yards/lbs. |
| | | 1/0 | First digit: number of identical single yarns twisted together. |
| | | | Second digit: number of plied yarns twisted together. |
| Z | Direction of twist | Z | Direction of twist |
| 20 | Twist number in turns/m | 0.5 | Twist number in turns/inch |
| T63C | Size designation | T63C | Size designation |
| H8 | Type of bobbin | H8 | Type of bobbin |

Conversion

Approximate number of filaments

| | | | 200 | 400 | 600 | 800 | 900 | 1200 | 1600 |
|----|----|----------|-------|-----|---------|---------|-----|---------|------|
| µm | 5 | tex | 11 | | | | | | |
| US | D | h.y.p.p. | 450 | | | | | | |
| µm | 6 | tex | 17.5 | 33 | 51 | 66 | | | 134 |
| US | DE | h.y.p.p. | 300 | 150 | 100 | 75 | | | 37 |
| µm | 7 | tex | 22 | | | | | | |
| US | E | h.y.p.p. | 225 | | | | | | |
| µm | 8 | tex | | 55 | | | | | |
| US | F | h.y.p.p. | | 90 | | | | | |
| µm | 9 | tex | 33/34 | 68 | 102/110 | 134/136 | | | |
| US | G | h.y.p.p. | 150 | 75 | 49/45 | 37 | | | |
| µm | 11 | tex | 45 | 102 | | 198/204 | | 340 | |
| US | H | h.y.p.p. | 110 | 50 | | 25 | | 15 | |
| µm | 13 | tex | | 136 | | 272/280 | | 408/410 | 544 |
| US | K | h.y.p.p. | | 37 | | 18 | | 12 | 9 |
| µm | 14 | tex | | | | 300 | | | |
| US | L | h.y.p.p. | | | | 16 | | | |
| µm | 16 | tex | | 200 | | | | | |
| US | M | h.y.p.p. | | 25 | | | | | |

tex = grams per 1000 m

tex = 4961/h.y.p.p.

h.y.p.p. = "hundred yards per pound"

yard (yd) = 0.9144 m

inch (in) = 25.4 mm

pound = 0.4536 kg

Standard Twists

| t/m (twists per meter) | tpi (twists per inch) |
|------------------------|-----------------------|
| 15 | 0.4 |
| 20 | 0.5 |
| 25 | 0.6 |
| 28 | 0.7 |
| 40 | 1 |
| 52 | 1.3 |
| 80 | 2.0 |

1 m = 39.37 inch (in)

tpi = t/m / 39.37

Vetrotex Czech Republic

| S/l units (tex) type & t.p.m | Size system | Inch pounds units type & t.p.i | Bobbin type | Package weight | | Length package | | Loss on ignition (%) | Tensile strength (N) |
|---------------------------------|-------------|--------------------------------------|-------------|----------------|-------|----------------|--------|----------------------|----------------------|
| | | | | kg | lbs | m | yds | | |
| EC6 33 Z40 | T30C | ECDE 150 1/0 1.0Z | H5 | 4,85 | 10.69 | 144000 | 157480 | 1,10 | 22 |
| EC6 66 Z40 | T18C | ECDE 75 1/0 1.0Z | H5 | 4,82 | 10.63 | 72000 | 78740 | 0,45 | 45 |
| EC6 66 Z28 | T30C | ECDE 75 1/0 0.7Z | H5 | 4,85 | 10.69 | 72000 | 78740 | 1,10 | 43 |
| EC6 66 Z28 | T30SC | ECDE 75 1/0 0.7Z | H5 | 4,85 | 10.69 | 72000 | 78740 | 1,10 | 43 |
| EC6 134 Z28 | T18C | ECDE 37 1/0 0.7Z | H5 | 4,89 | 10.78 | 36000 | 39370 | 0,45 | 90 |
| EC6 134 Z28 | T18C | ECDE 37 1/0 0.7Z | H9 | 8,61 | 18.98 | 63000 | 68898 | 0,45 | 90 |
| EC6 134 Z28 | T30C | ECDE 37 1/0 0.7Z | H5 | 4,85 | 10.69 | 36000 | 39370 | 1,10 | 85 |
| EC9 34 Z28 | T30C | ECG 150 1/0 0.7Z | H5 | 4,99 | 11.01 | 144000 | 157480 | 1,00 | 22 |
| EC9 34 S28 | T30C | ECG 150 1/0 0.7S | H5 | 4,99 | 11.01 | 144000 | 157480 | 1,00 | 22 |
| EC9 34 Z20 | T63C | ECG 150 1/0 0.5Z | H5 | 5,01 | 11.05 | 144000 | 157480 | 0,90 | 23 |
| EC9 34 S20 | T63C | ECG 150 1/0 0.5S | H5 | 5,01 | 11.05 | 144000 | 157480 | 0,90 | 23 |
| EC9 34 Z20 | T63C | ECG 150 1/0 0.5Z | H8 | 6,69 | 14.75 | 192000 | 209974 | 0,90 | 23 |
| EC9 34 Z28 | T63C | ECG 150 1/0 0.7Z | H5 | 5,01 | 11.05 | 144000 | 157480 | 0,90 | 23 |
| EC9 34 S28 | T63C | ECG 150 1/0 0.7S | H5 | 5,01 | 11.05 | 144000 | 157480 | 0,90 | 23 |
| EC9 34 Z28 | T63C | ECG 150 1/0 0.7Z | H8 | 6,69 | 14.75 | 192000 | 209974 | 0,90 | 23 |
| EC9 34 Z40 | TD37C | ECG 150 1/0 1.0Z | H5 | 5,00 | 11.02 | 144000 | 157480 | 0,70 | 22,5 |
| EC9 34 Z40 | TD37SC | ECG 150 1/0 1.0Z | H5 | 5,00 | 11.02 | 144000 | 157480 | 0,70 | 22,5 |
| EC9 68 Z15 | T63C | ECG 75 1/0 0.4Z | H8 | 7,52 | 16.58 | 108000 | 118110 | 0,90 | 48 |
| EC9 68 Z20 | T18C | ECG 75 1/0 0.5Z | H8 | 7,49 | 16.52 | 108000 | 118110 | 0,45 | 44 |
| EC9 68 Z20 | T63C | ECG 75 1/0 0.5Z | H8 | 7,52 | 16.58 | 108000 | 118110 | 0,90 | 48 |
| EC9 68 S20 | T63C | ECG 75 1/0 0.5S | H8 | 7,52 | 16.58 | 108000 | 118110 | 0,90 | 48 |
| EC9 68 Z28 | T30C | ECG 75 1/0 0.7Z | H5 | 5,02 | 11.07 | 72000 | 78740 | 1,00 | 44 |
| EC9 68 Z28 | T30C | ECG 75 1/0 0.7Z | H8 | 7,49 | 16.52 | 108000 | 118110 | 1,00 | 44 |
| EC9 68 Z28 | T63C | ECG 75 1/0 0.7Z | H8 | 7,52 | 16.58 | 108000 | 118110 | 0,90 | 48 |
| EC9 68 Z28 | T8C | ECG 75 1/0 0.7Z | H5 | 5,02 | 11.07 | 72000 | 78740 | 1,00 | 38,5 |
| EC9 68 Z28 | T8C | ECG 75 1/0 0.7Z | H8 | 7,49 | 16.52 | 108000 | 118110 | 1,00 | 38,5 |
| EC9 68 Z28 | T34C | ECG 75 1/0 0.7Z | H8 | 7,52 | 16.58 | 108000 | 118110 | 0,90 | 45 |
| EC9 68 Z40 | TD37C | ECG 75 1/0 1.0Z | H5 | 5,00 | 11.02 | 72000 | 78740 | 0,60 | 45 |
| EC9 68 Z40 | TD37SC | ECG 75 1/0 1.0Z | H5 | 5,00 | 11.02 | 72000 | 78740 | 0,60 | 45 |
| EC9 68 Z40 | TD44C | ECG 75 1/0 1.0Z | H8 | 7,50 | 16.52 | 108000 | 118110 | 0,55 | 45 |
| EC9 136 Z20 | T63C | ECG 37 1/0 0.5Z | H8 | 7,52 | 16.58 | 54000 | 59055 | 0,90 | 96 |
| EC9 136 Z28 | T30C | ECG 37 1/0 0.7Z | H5 | 4,99 | 11.01 | 36000 | 39370 | 1,00 | 88 |
| EC9 136 Z28 | T30C | ECG 37 1/0 0.7Z | H8 | 7,49 | 16.52 | 54000 | 59055 | 1,00 | 88 |
| EC9 136 Z28 | T8C | ECG 37 1/0 0.7Z | H8 | 7,53 | 16.60 | 54000 | 59055 | 1,00 | 77 |
| EC9 136 Z28 | TD37C | ECG 37 1/0 0.7Z | H5 | 5,00 | 11.02 | 36000 | 39370 | 0,60 | 95 |

| S/I units (tex) type & t.p.m | Size system | Inch pounds units type & t.p.i | Bobbin type | Package weight | | Length package | | Loss on ignition (%) | Tensile strength (N) |
|---------------------------------|-------------|--------------------------------------|-------------|-------------------|-------|-------------------|-------|----------------------|----------------------|
| | | | | kg | lbs | m | yds | | |
| EC9 136 Z28 | TD375C | ECG 37 1/0 0.7Z | H5 | 5,00 | 11.02 | 36000 | 39370 | 0.60 | 95 |
| EC9 136 Z28 | TD37C | ECG 37 1/0 0.7Z | H8 | 7,50 | 16.53 | 54000 | 59055 | 0.60 | 95 |
| EC11 102 Z28 | T63C | ECH 49 1/0 0.7Z | H8 | 7,52 | 16.58 | 72000 | 78740 | 0.90 | 66 |
| EC11 102 S28 | T63C | ECH 49 1/0 0.7S | H8 | 7,52 | 16.58 | 72000 | 78740 | 0.90 | 66 |
| EC11 204 Z28 | T63C | ECH 25 1/0 0.7Z | H8 | 7,52 | 16.58 | 36000 | 39370 | 0.90 | 144 |
| EC11 204 S28 | T63C | ECH 25 1/0 0.7S | H8 | 7,52 | 16.58 | 36000 | 39370 | 0.90 | 144 |
| EC11 340 Z28 | T63C | ECH 15 1/0 0.7Z | H8 | 7,66 | 16.89 | 22000 | 24059 | 0,90 | 230 |
| EC11 340 S28 | T63C | ECH 15 1/0 0.7S | H8 | 7,66 | 16.89 | 22000 | 24059 | 0,90 | 230 |
| EC13 136 Z20 | T63C | ECK 37 1/0 0.5Z | H8 | 7,52 | 16.58 | 54000 | 59055 | 0,90 | 92 |
| EC13 136 S20 | T63C | ECK 37 1/0 0.5S | H8 | 7,52 | 16.58 | 54000 | 59055 | 0,90 | 92 |
| EC13 272 Z20 | T63C | ECK 18 1/0 0.5Z | H8 | 7,52 | 16.58 | 27000 | 29528 | 0,90 | 180 |
| EC13 272 S20 | T63C | ECK 18 1/0 0.5S | H8 | 7,52 | 16.58 | 27000 | 29528 | 0,90 | 180 |
| EC13 300 Z20 | TD37C | ECK 16 1/0 0.5Z | H8 | 8,26 | 18.22 | 27000 | 29528 | 0,50 | 180 |
| EC13 408 Z28 | T63C | ECK 12 1/0 0.7Z | H8 | 7,52 | 16.58 | 18000 | 19685 | 0,90 | 276 |
| EC13 408 S28 | T63C | ECK 12 1/0 0.7S | H8 | 7,52 | 16.58 | 18000 | 19685 | 0,90 | 276 |
| EC13 544 Z25 | T63C | ECK 9 1/0 0.6Z | H8 | 7,52 | 16.58 | 13500 | 14764 | 0,90 | 350 |
| EC13 544 S25 | T63C | ECK 9 1/0 0.6S | H8 | 7,52 | 16.58 | 13500 | 14764 | 0,90 | 350 |
| EC13 544 Z40 | T63C | ECK 9 1/0 1.0Z | H8 | 7,52 | 16.58 | 13500 | 14764 | 0,90 | 350 |
| EC13 544 S40 | T63C | ECK 9 1/0 1.0Z | H8 | 7,52 | 16.58 | 13500 | 14764 | 0,90 | 350 |

Vetrotex Czech Republic

| S/l units (tex) type & t.p.m | Size system | Inch pounds units type & t.p.i | Bobbin type | Pallet approx. net weight cardboard | | Cardboard packaging type |
|---------------------------------|-------------|--------------------------------------|-------------|---|------|-----------------------------|
| | | | | kg | lbs | |
| EC6 33 Z40 | T30C | ECDE 150 1/0 1.0Z | H5 | 446 | 984 | 3 |
| EC6 66 Z40 | T18C | ECDE 75 1/0 1.0Z | H5 | 443 | 977 | 3 |
| EC6 66 Z28 | T30C | ECDE 75 1/0 0.7Z | H5 | 446 | 984 | 3 |
| EC6 66 Z28 | T30SC | ECDE 75 1/0 0.7Z | H5 | 446 | 984 | 3 |
| EC6 134 Z28 | T18C | ECDE 37 1/0 0.7Z | H5 | 450 | 990 | 3 |
| EC6 134 Z28 | T18C | ECDE 37 1/0 0.7Z | H9 | 465 | 1025 | 9 |
| EC6 134 Z28 | T30C | ECDE 37 1/0 0.7Z | H5 | 446 | 984 | 3 |
| EC9 34 Z28 | T30C | ECG 150 1/0 0.7Z | H5 | 459 | 1012 | 3 |
| EC9 34 S28 | T30C | ECG 150 1/0 0.7S | H5 | 459 | 1012 | 3 |
| EC9 34 Z20 | T63C | ECG 150 1/0 0.5Z | H5 | 461 | 1016 | 3 |
| EC9 34 S20 | T63C | ECG 150 1/0 0.5S | H5 | 461 | 1016 | 3 |
| EC9 34 Z20 | T63C | ECG 150 1/0 0.5Z | H8 | 401 | 884 | 6 |
| EC9 34 Z28 | T63C | ECG 150 1/0 0.7Z | H5 | 461 | 1016 | 3 |
| EC9 34 S28 | T63C | ECG 150 1/0 0.7S | H5 | 461 | 1016 | 3 |
| EC9 34 Z28 | T63C | ECG 150 1/0 0.7Z | H8 | 401 | 884 | 6 |
| EC9 34 Z40 | TD37C | ECG 150 1/0 1.0Z | H5 | 460 | 1014 | 3 |
| EC9 34 Z40 | TD37SC | ECG 150 1/0 1.0Z | H5 | 460 | 1014 | 3 |
| EC9 68 Z15 | T63C | ECG 75 1/0 0.4Z | H8 | 451 | 995 | 6 |
| EC9 68 Z20 | T18C | ECG 75 1/0 0.5Z | H8 | 450 | 992 | 6 |
| EC9 68 Z20 | T63C | ECG 75 1/0 0.5Z | H8 | 451 | 995 | 6 |
| EC9 68 S20 | T63C | ECG 75 1/0 0.5S | H8 | 451 | 995 | 6 |
| EC9 68 Z28 | T30C | ECG 75 1/0 0.7Z | H5 | 462 | 1018 | 3 |
| EC9 68 Z28 | T30C | ECG 75 1/0 0.7Z | H8 | 449 | 991 | 6 |
| EC9 68 Z28 | T63C | ECG 75 1/0 0.7Z | H8 | 451 | 994 | 6 |
| EC9 68 Z28 | T8C | ECG 75 1/0 0.7Z | H5 | 462 | 1018 | 3 |
| EC9 68 Z28 | T8C | ECG 75 1/0 0.7Z | H8 | 449 | 991 | 6 |
| EC9 68 Z28 | T34C | ECG 75 1/0 0.7Z | H8 | 451 | 994 | 6 |
| EC9 68 Z40 | TD37C | ECG 75 1/0 1.0Z | H5 | 460 | 1014 | 3 |
| EC9 68 Z40 | TD37SC | ECG 75 1/0 1.0Z | H5 | 460 | 1014 | 3 |
| EC9 68 Z40 | TD44C | ECG 75 1/0 1.0Z | H8 | 450 | 992 | 6 |
| EC9 136 Z20 | T63C | ECG 37 1/0 0.5Z | H8 | 451 | 995 | 6 |
| EC9 136 Z28 | T30C | ECG 37 1/0 0.7Z | H5 | 459 | 1012 | 3 |
| EC9 136 Z28 | T30C | ECG 37 1/0 0.7Z | H8 | 449 | 991 | 6 |
| EC9 136 Z28 | T8C | ECG 37 1/0 0.7Z | H8 | 452 | 996 | 6 |
| EC9 136 Z28 | TD37C | ECG 37 1/0 0.7Z | H5 | 460 | 1014 | 3 |

| S/I units (tex) type & t.p.m | Size system | Inch pounds units type & t.p.i | Bobbin type | Pallet approx. net weight cardboard | | Cardboard packaging type |
|---------------------------------|-------------|--------------------------------------|-------------|---|------|-----------------------------|
| | | | | kg | lbs | |
| EC9 136 Z28 | TD37SC | ECG 37 1/0 0.7Z | H5 | 460 | 1014 | 3 |
| EC9 136 Z28 | TD37C | ECG 37 1/0 0.7Z | H8 | 450 | 992 | 6 |
| EC11 102 Z28 | T63C | ECH 49 1/0 0.7Z | H8 | 451 | 995 | 6 |
| EC11 102 S28 | T63C | ECH 49 1/0 0.7S | H8 | 451 | 995 | 6 |
| EC11 204 Z28 | T63C | ECH 25 1/0 0.7Z | H8 | 451 | 995 | 6 |
| EC11 204 S28 | T63C | ECH 25 1/0 0.7S | H8 | 451 | 995 | 6 |
| EC11 340 Z28 | T63C | ECH 15 1/0 0.7Z | H8 | 460 | 1013 | 6 |
| EC11 340 S28 | T63C | ECH 15 1/0 0.7S | H8 | 460 | 1013 | 6 |
| EC13 136 Z20 | T63C | ECK 37 1/0 0.5Z | H8 | 451 | 995 | 6 |
| EC13 136 S20 | T63C | ECK 37 1/0 0.5S | H8 | 451 | 995 | 6 |
| EC13 272 Z20 | T63C | ECK 18 1/0 0.5Z | H8 | 451 | 995 | 6 |
| EC13 272 S20 | T63C | ECK 18 1/0 0.5S | H8 | 451 | 995 | 6 |
| EC13 300 Z20 | TD37C | ECK 16 1/0 0.5Z | H8 | 496 | 1093 | 6 |
| EC13 408 Z28 | T63C | ECK 12 1/0 0.7Z | H8 | 451 | 995 | 6 |
| EC13 408 S28 | T63C | ECK 12 1/0 0.7S | H8 | 451 | 995 | 6 |
| EC13 544 Z25 | T63C | ECK 9 1/0 0.6Z | H8 | 451 | 995 | 6 |
| EC13 544 S25 | T63C | ECK 9 1/0 0.6S | H8 | 451 | 995 | 6 |
| EC13 544 Z40 | T63C | ECK 9 1/0 1.0Z | H8 | 451 | 995 | 6 |
| EC13 544 S40 | T63C | ECK 9 1/0 1.0Z | H8 | 451 | 995 | 6 |

Vetrotex America

| S/I units (tex) type & t.p.m | Size system | Inch pounds units type & t.p.i | Bobbin type | Package weight | | Length package | | Loss on ignition (%) | Tensile strength (N) |
|---------------------------------|-------------|--------------------------------------|-------------|-------------------|-------|-------------------|--------|----------------------|----------------------|
| | | | | kg | lbs | m | yds | | |
| EC5 11 Z40 | S312M | ECD 450 1/0 1.0Z | H6 | 2,42 | 5.34 | 215000 | 235127 | 1,40 | 8,5 |
| EC6 33 Z40 | T30M | ECDE 150 1/0 1.0Z | H6 | 4,11 | 9.06 | 122000 | 133421 | 1,10 | 22 |
| EC6 66 Z28 | T30M | ECDE 75 1/0 0.7Z | H6 | 4,04 | 8.91 | 60000 | 65617 | 1,10 | 38 |
| EC6 134 Z28 | T18M | ECDE 37 1/0 0.7Z | H6 | 3,94 | 8.69 | 29000 | 31715 | 0,45 | 90 |
| EC6 134 Z28 | T30M | ECDE 37 1/0 0.7Z | H6 | 3,90 | 8.60 | 28500 | 31168 | 1,20 | 76 |
| EC7 22 Z40 | T32M | ECE 225 1/0 1.0Z | H6 | 3,71 | 8.18 | 165000 | 180446 | 1,10 | 13 |
| EC7 22 Z40 | TD57M | ECE 225 1/0 1.0Z | H6 | 3,70 | 8,16 | 165000 | 180446 | 0,90 | 16 |
| EC7 22 Z52 | TD55M | ECE 225 1/0 1.3Z | H6 | 3,70 | 8.16 | 165000 | 180446 | 0,90 | 16 |
| EC8 55 Z52 | TD57M | ECF 90 1/0 1.3Z | H6 | 4,18 | 9.22 | 74500 | 81474 | 1,00 | 38 |
| EC8 55 Z80 | TD55M | ECF 90 1/0 2.0Z | H6 | 4,18 | 9.22 | 74500 | 81474 | 1,00 | 38 |
| EC9 33 Z28 | T30M | ECG 150 1/0 0.7Z | H6 | 4,44 | 9.79 | 132000 | 144357 | 0,95 | 17 |
| EC9 33 Z20 | T63M | ECG 150 1/0 0.5Z | H6 | 4,24 | 9.35 | 126000 | 137795 | 0,90 | 23 |
| EC9 33 Z28 | T63M | ECG 150 1/0 0.7Z | H6 | 4,24 | 9.35 | 126000 | 137795 | 0,90 | 23 |
| EC9 33 S28 | T63M | ECG 150 1/0 0.7S | H6 | 4,24 | 9.35 | 126000 | 137795 | 0,90 | 23 |
| EC9 33 Z40 | TD57M | ECG 150 1/0 1.0Z | H6 | 4,31 | 9,51 | 128000 | 139982 | 0,85 | 23 |
| EC9 33 S40 | TD57M | ECG 150 1/0 1.0S | H6 | 4,31 | 9,51 | 128000 | 139982 | 0,85 | 23 |
| EC9 33 Z52 | TD55M | ECG 150 1/0 1.3Z | H6 | 4,31 | 9,51 | 128000 | 139982 | 0,85 | 23 |
| EC9 33 S52 | TD55M | ECG 150 1/0 1.3S | H6 | 4,31 | 9,51 | 128000 | 139982 | 0,85 | 23 |
| EC9 68 Z20 | T63M | ECG 75 1/0 0.5Z | H6 | 4,16 | 9.17 | 60000 | 65617 | 0,90 | 48 |
| EC9 68 Z28 | T63M | ECG 75 1/0 0.7Z | H6 | 4,16 | 9.17 | 60000 | 65617 | 0,90 | 48 |
| EC9 68 S28 | T63M | ECG 75 1/0 0.7S | H6 | 4,16 | 9.17 | 60000 | 65617 | 0,90 | 48 |
| EC9 68 Z20 | T63M | ECG 75 1/0 0.5Z | H9 | 8,74 | 19,26 | 126000 | 137795 | 0,95 | 48 |
| EC9 68 Z20 | T18M | ECG 75 1/0 0.5Z | H9 | 8,73 | 19,25 | 126000 | 137795 | 0,40 | 45 |
| EC9 68 Z28 | T63M | ECG 75 1/0 0.7Z | H9 | 8,74 | 19,26 | 126000 | 137795 | 0,95 | 48 |
| EC9 68 Z28 | T30M | ECG 75 1/0 0.7Z | H6 | 4,37 | 9.63 | 63000 | 68898 | 1,00 | 44 |
| EC9 68 Z28 | T30M | ECG 75 1/0 0.7Z | H9 | 8,74 | 19,27 | 126000 | 137795 | 1,00 | 44 |
| EC9 68 Z28 | TD57M | ECG 75 1/0 0.7Z | H9 | 8,74 | 19,27 | 126000 | 137795 | 1,00 | 46 |
| EC9 68 Z40 | TD57M | ECG 75 1/0 1.0Z | H9 | 8,74 | 19,27 | 126000 | 137795 | 1,00 | 46 |
| EC9 68 S40 | TD57M | ECG 75 1/0 1.0S | H9 | 8,74 | 19,27 | 126000 | 137795 | 1,00 | 46 |
| EC9 68 Z40 | TD55M | ECG 75 1/0 1.0Z | H9 | 8,74 | 19,27 | 126000 | 137795 | 1,00 | 46 |
| EC9 68 Z52 | TD55M | ECG 75 1/0 1.3Z | H9 | 8,74 | 19,27 | 126000 | 137795 | 1,00 | 46 |
| EC9 68 S52 | TD55M | ECG 75 1/0 1.3S | H9 | 8,74 | 19,27 | 126000 | 137795 | 1,00 | 46 |
| EC9 99 Z28 | T30M | ECG 50 1/0 0.7Z | H6 | 4,20 | 9,26 | 41500 | 45385 | 1,00 | 65 |
| EC9 110 Z20 | T63M | ECG 45 1/0 0.5Z | H9 | 8,79 | 19,38 | 78000 | 85302 | 0,90 | 78 |
| EC9 110 S20 | T63M | ECG 45 1/0 0.5S | H9 | 8,79 | 19,38 | 78000 | 85302 | 0,90 | 78 |
| EC9 134 Z20 | T18M | ECG 37 1/0 0.5Z | H9 | 8,56 | 18,87 | 63000 | 68898 | 0,40 | 90 |

| S/l units (tex) type & t.p.m | Size system | Inch pounds units type & t.p.i | Bobbin type | Package weight | | Length package | | Loss on ignition (%) | Tensile strength (N) |
|---------------------------------|-------------|--------------------------------------|-------------|-------------------|-------|-------------------|--------|----------------------|----------------------|
| | | | | kg | lbs | m | yds | | |
| EC9 134 Z20 | T63M | ECG 37 1/0 0.5Z | H9 | 8,65 | 19.07 | 63000 | 68898 | 0,90 | 94 |
| EC9 134 Z20 | T30M | ECG 37 1/0 0.5Z | H9 | 8,61 | 18.98 | 63000 | 68898 | 1,00 | 88 |
| EC9 134 Z28 | T30M | ECG 37 1/0 0.7Z | H6 | 4,17 | 9.19 | 30500 | 33355 | 1,00 | 88 |
| EC9 134 Z28 | T30M | ECG 37 1/0 0.7Z | H9 | 8,61 | 18.98 | 63000 | 68898 | 1,00 | 88 |
| EC9 134 Z28 | T64M | ECG 37 1/0 0.7Z | H6 | 3,45 | 7,61 | 25300 | 27668 | 0,85 | 88 |
| EC9 136 Z28 | T30M | ECG 37 1/0 0.7Z | H9 | 8,74 | 19.27 | 63000 | 68898 | 1,00 | 88 |
| EC9 134 Z28 | TD57M | ECG 37 1/0 0.7Z | H9 | 8,63 | 19,03 | 63000 | 68898 | 1,00 | 89 |
| EC9 134 Z40 | TD55M | ECG 37 1/0 1.0Z | H9 | 8,63 | 19,03 | 63000 | 68898 | 1,00 | 89 |
| EC11 45 Z20 | T63M | ECH 110 1/0 0.5Z | H6 | 4,26 | 9,39 | 93000 | 101706 | 0,90 | 30 |
| EC11 45 Z28 | T30M | ECH 110 1/0 0.7Z | H6 | 4,50 | 9,92 | 98000 | 107174 | 0,85 | 30 |
| EC11 198 Z28 | T63M | ECH 25 1/0 0.7Z | H6 | 4,28 | 9.44 | 21200 | 23185 | 0,90 | 130 |
| EC11 198 S28 | T63M | ECH 25 1/0 0.7S | H6 | 4,28 | 9.44 | 21200 | 23185 | 0,90 | 130 |
| EC13 272 Z20 | T63M | ECK 18 1/0 0.5Z | H9 | 8,77 | 19.33 | 31500 | 34449 | 0,90 | 180 |

Vetrotex America

| S/I units (tex) type & t.p.m | Size system | Inch pounds units type & t.p.i | Bobbin type | Pallet approx. net weight cardboard | | Cardboard packaging type | Pallet approx. net weight returnable | | Returnable packaging type |
|---------------------------------|-------------|--------------------------------------|-------------|---|-------|-----------------------------|--|------|------------------------------|
| | | | | kg | lbs | | kg | lbs | |
| EC5 11 Z40 | 5312M | ECD 450 1/0 1.0Z | H6 | 290 | 640 | 5 | 407 | 896 | 4 |
| EC6 33 Z40 | T30M | ECDE 150 1/0 1.0Z | H6 | 493 | 1087 | 5 | 690 | 1522 | 4 |
| EC6 66 Z28 | T30M | ECDE 75 1/0 0.7Z | H6 | 485 | 1069 | 5 | 679 | 1496 | 4 |
| EC6 134 Z28 | T18M | ECDE 37 1/0 0.7Z | H6 | 473 | 1042 | 5 | 662 | 1459 | 4 |
| EC6 134 Z28 | T30M | ECDE 37 1/0 0.7Z | H6 | 468 | 1032 | 5 | 655 | 1444 | 4 |
| EC7 22 Z40 | T32M | ECE 225 1/0 1.0Z | H6 | 445 | 981 | 5 | 623 | 1374 | 4 |
| EC7 22 Z40 | TD57M | ECE 225 1/0 1.0Z | H6 | 444 | 978,8 | 5 | 622 | 1370 | 4 |
| EC7 22 Z52 | TD55M | ECE 225 1/0 1.3Z | H6 | 444 | 979 | 5 | 622 | 1370 | 4 |
| EC8 55 Z52 | TD57M | ECF 90 1/0 1.3Z | H6 | 502 | 1106 | 5 | 702 | 1548 | 4 |
| EC8 55 Z80 | TD55M | ECF 90 1/0 2.0Z | H6 | 502 | 1106 | 5 | 702 | 1548 | 4 |
| EC9 33 Z28 | T30M | ECG 150 1/0 0.7Z | H6 | 533 | 1175 | 5 | 746 | 1644 | 4 |
| EC9 33 Z20 | T63M | ECG 150 1/0 0.5Z | H6 | 509 | 1122 | 5 | 712 | 1570 | 4 |
| EC9 33 Z28 | T63M | ECG 150 1/0 0.7Z | H6 | 509 | 1122 | 5 | 712 | 1570 | 4 |
| EC9 33 S28 | T63M | ECG 150 1/0 0.7S | H6 | 509 | 1122 | 5 | 712 | 1570 | 4 |
| EC9 33 Z40 | TD57M | ECG 150 1/0 1.0Z | H6 | 517 | 1140 | 5 | 724 | 1596 | 4 |
| EC9 33 S40 | TD57M | ECG 150 1/0 1.0S | H6 | 517 | 1140 | 5 | 724 | 1596 | 4 |
| EC9 33 Z52 | TD55M | ECG 150 1/0 1.3Z | H6 | 517 | 1140 | 5 | 724 | 1596 | 4 |
| EC9 33 S52 | TD55M | ECG 150 1/0 1.3S | H6 | 517 | 1140 | 5 | 724 | 1596 | 4 |
| EC9 68 Z20 | T63M | ECG 75 1/0 0.5Z | H6 | 499 | 1101 | 5 | 699 | 1541 | 4 |
| EC9 68 Z28 | T63M | ECG 75 1/0 0.7Z | H6 | 499 | 1101 | 5 | 699 | 1541 | 4 |
| EC9 68 S28 | T63M | ECG 75 1/0 0.7S | H6 | 499 | 1101 | 5 | 699 | 1541 | 4 |
| EC9 68 Z20 | T63M | ECG 75 1/0 0.5Z | H9 | 402 | 886 | 8 | 524 | 1156 | 7 |
| EC9 68 Z20 | T18M | ECG 75 1/0 0.5Z | H9 | 402 | 885 | 8 | 524 | 1155 | 7 |
| EC9 68 Z28 | T63M | ECG 75 1/0 0.7Z | H9 | 402 | 886 | 8 | 524 | 1156 | 7 |
| EC9 68 Z28 | T30M | ECG 75 1/0 0.7Z | H6 | 524 | 1156 | 5 | 734 | 1619 | 4 |
| EC9 68 Z28 | T30M | ECG 75 1/0 0.7Z | H9 | 402 | 886 | 8 | 524 | 1156 | 7 |
| EC9 68 Z28 | TD57M | ECG 75 1/0 0.7Z | H9 | 402 | 886 | 8 | 524 | 1156 | 7 |
| EC9 68 Z40 | TD57M | ECG 75 1/0 1.0Z | H9 | 402 | 886 | 8 | 524 | 1156 | 7 |
| EC9 68 S40 | TD57M | ECG 75 1/0 1.0S | H9 | 402 | 886 | 8 | 524 | 1156 | 7 |
| EC9 68 Z40 | TD55M | ECG 75 1/0 1.0Z | H9 | 402 | 886 | 8 | 524 | 1156 | 7 |
| EC9 68 Z52 | TD55M | ECG 75 1/0 1.3Z | H9 | 402 | 886 | 8 | 524 | 1156 | 7 |
| EC9 68 S52 | TD55M | ECG 75 1/0 1.3S | H9 | 402 | 886 | 8 | 524 | 1156 | 7 |
| EC9 99 Z28 | T30M | ECG 50 1/0 0.7Z | H6 | 504 | 1111 | 5 | 706 | 1556 | 4 |
| EC9 110 Z20 | T63M | ECG 45 1/0 0.5Z | H9 | 404 | 891 | 8 | - | - | - |
| EC9 110 S20 | T63M | ECG 45 1/0 0.5S | H9 | 404 | 891 | 8 | - | - | - |
| EC9 134 Z20 | T18M | ECG 37 1/0 0.5Z | H9 | 394 | 868 | 8 | 514 | 1132 | 7 |

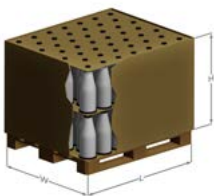
| S/I units (tex) type & t.p.m | Size system | Inch pounds units type & t.p.i | Bobbin type | Pallet approx. net weight cardboard | | Cardboard packaging type | Pallet approx. net weight returnable | | Returnable packaging type |
|---------------------------------|-------------|--------------------------------------|-------------|---|------|-----------------------------|--|------|------------------------------|
| | | | | kg | lbs | | kg | lbs | |
| EC9 134 Z20 | T63M | ECG 37 1/0 0.5Z | H9 | 398 | 877 | 8 | 519 | 1144 | 7 |
| EC9 134 Z20 | T30M | ECG 37 1/0 0.5Z | H9 | 396 | 873 | 8 | 517 | 1139 | 7 |
| EC9 134 Z28 | T64M | ECG 37 1/0 0.7Z | H6 | 414 | 913 | 5 | 580 | 1278 | 4 |
| EC9 134 Z28 | T30M | ECG 37 1/0 0.7Z | H6 | 500 | 1103 | 5 | 701 | 1544 | 4 |
| EC9 134 Z28 | T30M | ECG 37 1/0 0.7Z | H9 | 396 | 873 | 8 | 517 | 1139 | 7 |
| EC9 136 Z28 | T30M | ECG 37 1/0 0.7Z | H9 | 402 | 886 | 8 | 524 | 1156 | 7 |
| EC9 134 Z28 | TD57M | ECG 37 1/0 0.7Z | H9 | 397 | 875 | 8 | 518 | 1142 | 7 |
| EC9 134 Z40 | TD55M | ECG 37 1/0 1.0Z | H9 | 397 | 875 | 8 | 518 | 1142 | 7 |
| EC11 45 Z20 | T63M | ECH 110 1/0 0.5Z | H6 | 511 | 1127 | 5 | 716 | 1578 | 4 |
| EC11 45 Z28 | T30M | ECH 110 1/0 0.7Z | H6 | 540 | 1190 | 5 | 756 | 1667 | 4 |
| EC11 198 Z28 | T63M | ECH 25 1/0 0.7Z | H6 | 514 | 1132 | 5 | 719 | 1585 | 4 |
| EC11 198 S28 | T63M | ECH 25 1/0 0.7S | H6 | 514 | 1132 | 5 | 719 | 1585 | 4 |
| EC13 272 Z20 | T63M | ECK 18 1/0 0.5Z | H9 | 403 | 889 | 8 | 526 | 1160 | 7 |

2.1 Yarns

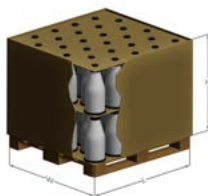
Packaging information

| Packaging reference | Type of bobbin | Packages per carton | Cartons per pallet | Packages per pallet | Approx. dimension in mm (L × W × H) | Approx. dimension in inches (L × W × H) |
|----------------------------|------------------------------------|---------------------|--------------------|---------------------|-------------------------------------|---|
| Cardboard Packaging | | | | | | |
| 3 | H5 | 92 | 1 | 92 | 1200 × 1000 × 947 | 47.24 × 39.37 × 37.28 |
| 5 | H6 | 60 | 2 | 120 | 1200 × 1000 × 1130 | 47.24 × 39.37 × 44.49 |
| 6 | H8 | 60 | 1 | 60 | 1200 × 1150 × 1025 | 47.24 × 45.28 × 40.35 |
| 8 | H9 | 46 | 1 | 46 | 1200 × 1000 × 1010 | 47.24 × 39.37 × 39.76 |
| 9 | H9 | 54 | 1 | 54 | 1200 × 1150 × 1025 | 47.24 × 45.28 × 40.35 |
| 9 | H9 – packaging shipped from Europe | | | | | |

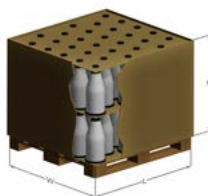
Packaging reference 3 for H5 bobbins



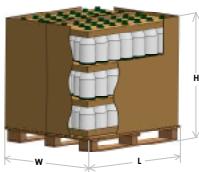
Packaging reference 9-bis for H9 in Europe



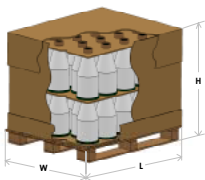
Packaging reference 6 for H8 bobbins



Packaging reference 5 for H6 bobbins

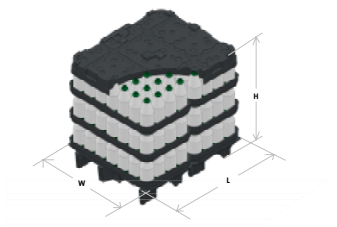


Packaging reference 8 for H9

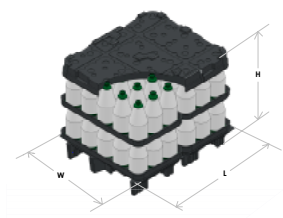


| Packaging reference | Type of bobbin | Packages per carton | Cartons per pallet | Packages per pallet | Approx. dimension in mm (L × W × H) | Approx. dimension in inches (L × W × H) |
|-----------------------------|----------------|---------------------|--------------------|---------------------|-------------------------------------|---|
| Returnable Packaging | | | | | | |
| 4 | H6 | 56 | 3 | 168 | 1327 × 1137 × 1140 | 52.24 × 44.76 × 44.88 |
| 7 | H9 | 30 | 2 | 60 | 1327 × 1137 × 1003 | 52.24 × 44.76 × 39.49 |

Packaging reference 4
for H6 bobbins



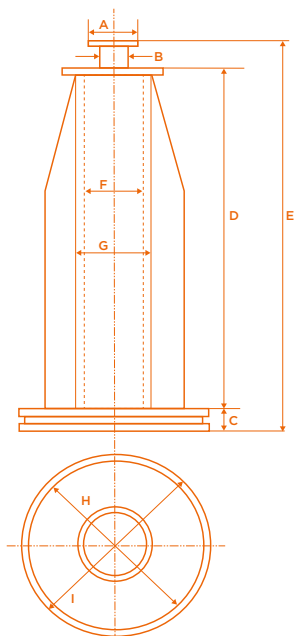
Packaging reference 7
for H9 bobbins



2.1 Bobbin dimensions

Product available dimensions
in mm and inches

| Bobbin | | A | B | C | D | E | F | G | H | I |
|--------|--------|------|------|------|-------|-------|-------|------|--------|-------|
| H5 | mm | 46,1 | 37,6 | 14,8 | 345,0 | 395,0 | 60,15 | 64,7 | 146,0 | 150,0 |
| | inches | 1.81 | 1.48 | 0.58 | 13.58 | 15.55 | 2.37 | 2.55 | 5.75 | 5.91 |
| H6 | mm | 46,1 | 37,6 | 14,8 | 290,0 | 336,5 | 60,15 | 64,7 | 148,0 | 152,0 |
| | inches | 1.81 | 1.48 | 0.58 | 11.42 | 13.25 | 2.37 | 2.55 | 5.83 | 5.98 |
| H8 | mm | 63,0 | 44,0 | 18,5 | 375,0 | 446,0 | 82,8 | 89,2 | 186,00 | 190,0 |
| | inches | 2.48 | 1.73 | 0.73 | 14.76 | 17.56 | 3.26 | 3.5 | 7.32 | 7.48 |
| H9 | mm | 63,0 | 44,0 | 18,5 | 375,0 | 446,0 | 82,9 | 89,2 | 200,0 | 203,0 |
| | inches | 2.48 | 1.73 | 0.73 | 14.76 | 17.56 | 3.26 | 3.5 | 7.87 | 7.99 |

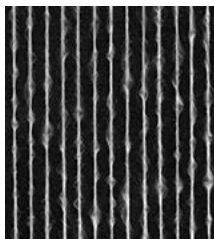


2.2 Texturized yarns

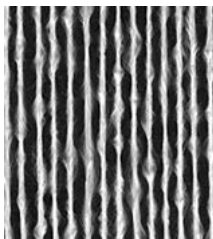
Product description and nomenclature

Texturized products are produced by air jet texturizing of E-glass continuous filament.

In the texturizing process, the air stream creates a turbulence that causes the formation of loops in overfed individual continuous filament and imparts bulk.



ECT9 T140
K252C



ECT9 T434
T10C

Description of the ETC9 T140 K252C product

| | |
|-------|---|
| E | Type of glass |
| C | Continuous filament |
| T | Texturized strand |
| 9 | Filaments diameter in μm |
| T140 | Linear density after texturizing (in $\text{tex}=\text{g}/1000 \text{ m}$) |
| K252C | Size designation |

Product range

| S/I units (tex) type & t.p.m | Inch pounds units type & t.p.i | Package weight | | Length package | | Loss on ignition (%) | Nominal breaking strength (N) | Packaging |
|---------------------------------------|---|-------------------|-------|-------------------|-------|-------------------------|-------------------------------------|-----------|
| | | kg | lbs | m | yds | | | |
| ECT9 T140 K252C | ETG 45 K252C | 6,02 | 13.27 | 42000 | 45932 | 0,40 | 47 | OJ |
| ECT9 T140 T10C | ETG 35.5 T10C | 7,60 | 16.98 | - | - | 0,25 | 41 | OY |
| ECT9 T210 T10C | ETG 23.6 T10C | 5,80 | 12.79 | - | - | 0,25 | 53 | OY |
| ECT9 T280 T10C | ETG 17.7 T10C | 7,70 | 16.98 | - | - | 0,25 | 67 | OY |
| ECT9 T370 T10C | ETG 13.4 T10C | 4,50 | 9.92 | - | - | 0,25 | 41 | OY |
| ECT9 T434 T10C | ETG 11.5 T10C | 7,50 | 16.53 | - | - | 0,25 | 93 | OY |
| ECT9 T485 T10C | ETG 10.2 T10C | 6,90 | 15.21 | - | - | 0,25 | 128 | OY |
| ECT9 T570 T10C | ETG 8.9 T10C | 8,90 | 19.62 | - | - | 0,25 | 148 | OY |
| ECT9 T630 T10C | ETG 7.9 T10C | 6,70 | 14.78 | - | - | 0,25 | 156 | OY |
| ECT9 T826 T10C | ETG 6.0 T10C | 8,50 | 18.74 | - | - | 0,25 | 253 | OY |
| ECT9 T990 T10C | ETG 5.0 T10C | 6,70 | 14.77 | - | - | 0,25 | 230 | OY |
| ECT9 T1120 T10C | ETG 4.4 T10C | 7,40 | 16.31 | - | - | 0,25 | 202 | OY |
| ECT9 T1250 T10C | ETG 4.0 T10C | 9,50 | 20.94 | - | - | 0,25 | 308 | OY |
| ECT9 T1285 T10C | ETG 3.9 T10C | 7,90 | 17.42 | - | - | 0,25 | 220 | OY |
| ECT9 T1440 T10C | ETG 3.5 T10C | 8,00 | 17.64 | - | - | 0,25 | 254 | OY |
| ECT9 T1653 T10C | ETG 3.0 T10C | 9,50 | 20.94 | - | - | 0,25 | 397 | OY |
| ECT9 T1851 T10C | ETG 2.7 T10C | 7,60 | 16.76 | - | - | 0,25 | 329 | OY |
| ECT9 T2857 T10C | ETG 1.7 T10C | 7,00 | 15.43 | - | - | 0,25 | 531 | OY |

Product dimensions

| | Height | Ext. diameter | Int. diameter | mm/ inches |
|-------------------------|--------|------------------|------------------|---------------|
| Tube ECT / ECTE | 280 | 92 | 80 | mm |
| | 11.02 | 3.62 | 3.15 | inches |
| Bobbin ECT / ECTE OY | 260 | max. 250 | 92 | mm |
| | 10.24 | max. 9.84 | 3.62 | inches |
| Bobbin ECT / ECTE OJ | 260 | max. 210 | 92 | mm |
| | 10.24 | max. 8.27 | 3.62 | inches |

Packaging information

| Packaging | Levels per pallet | Packages per level | Packages per pallet | Net weight | Approx. dimensions W × L × H |
|-----------|----------------------|-----------------------|------------------------|--|---|
| OJ | 3 | 30 | 90 | 405 up to 540 kg | 1200 × 1150 × 1000 mm 47.28 × 45.31 × 39.37 inch |
| OY | 4 | 20 | 80 | 479 up to 739 kg 1056 up to 739 lbs | 1200 × 1150 × 1285 mm 47.28 × 45.31 × 50.63 inch |

Packaging information:



Texturized yarn

Packaging type OJ

Stackable



Texturized yarn

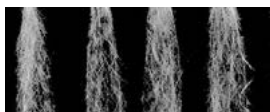
Packaging type OY

Stackable

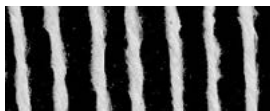
2.3 E-glass voluminized yarn ECO and twisted ECOS

Product description and nomenclature ECO and twisted ECOS

The glass voluminized yarn ECO is made of a glass fibre strand, or several strands, bulked with pressurized air.



The glass voluminized yarn twisted ECOS is glass fibre voluminized yarn ECO modified with a twist. The yarn is manufactured either single or plied.



Description of the ECO14 T665 T10C glass voluminized yarn product

| | |
|-------|---|
| E | Type of glass |
| C | Continuous filament |
| O | Voluminized strand |
| 9 | Filaments diameter in μm |
| T1290 | Linear density after voluminizing (in $\text{tex}=\text{g}/1000\text{ m}$) |
| T10C | Size designation |

Description of the ECOS9 T1290 S45 T10C H8 glass voluminized yarn twisted ECOS product

| | |
|-------|---|
| E | Type of glass |
| C | Continuous filament |
| O | Voluminized strand |
| S | Twisted |
| 9 | Filaments diameter in μm |
| T1290 | Linear density after voluminizing (in $\text{tex}=\text{g}/1000\text{ m}$) |
| S45 | Direction and Twist number |
| T10C | Size designation |
| H8 | Type of bobbin |

2.3 Volumized products (ECO and ECOS)

Products range and packaging information

| S/l units (tex) type & t.p.m | Inch pounds units type & t.p.i | Package unit weight | | Loss on ignition (%) | Nominal breaking strength (N) | Packaging reference |
|---------------------------------------|---|---------------------------|-------|-------------------------|-------------------------------------|------------------------|
| | | kg | lbs | | | |
| ECO9 T142 T10C | ETG 34.9 T10C | 6,7 | 14.77 | 0,25 | 30 | OZ |
| ECO9 T220 T10C | ETG 22.6 T10C | 10,5 | 23.15 | 0,25 | 16 | OR |
| ECO9 T250 T10C | ETG 19.8 T10C | 10,7 | 23.59 | 0,25 | 24 | OR |
| ECO9 T280 T10C | ETG 17.7 T10C | 11,5 | 25.35 | 0,25 | 70 | OR |
| ECO9 T340 T10C | ETG 14.6 T10C | 7,9 | 17.42 | 0,25 | 36 | OR |
| ECO9 T515 T10C | ETG 9.7 T10C | 4,4 | 9.7 | 0,25 | 65 | OZ |
| ECO9 T650 T10C | ETG 7.7 T10C | 4,4 | 9.7 | 0,25 | 100 | OZ |
| ECO9 T1030 T10C | ETG 4.8 T10C | 4 | 8.82 | 0,25 | 140 | OZ |
| ECO9 T1290 T10C | ETG 3.9 T10C | 5 | 11.02 | 0,25 | 230 | OZ |
| ECO9 T1440 T10C | ETG 3.5 T10C | 4,9 | 10.8 | 0,25 | 230 | OZ |
| ECO11 T220 T10C | ETH 22.6 T10C | 4,4 | 9.7 | 0,25 | 12 | OZ |
| ECO11 T220 T10C | ETH 22.6 T10C | 9,9 | 21.83 | 0,25 | 12 | OR |
| ECO11 T330 T10C | ETH 15.1 T10C | 4,4 | 9.7 | 0,25 | 25 | OZ |
| ECO11 T330 T10C | ETH 15.1 T10C | 10 | 22.05 | 0,25 | 25 | OR |
| ECO11 T440 T10C | ETH 11.3 T10C | 4,4 | 9.7 | 0,25 | 35 | OZ |
| ECO11 T440 T10C | ETH 11.3 T10C | 9,6 | 21.17 | 0,25 | 35 | OR |
| ECO11 T550 T10C | ETH 9.0 T10C | 4,9 | 10.8 | 0,25 | 45 | OZ |
| ECO11 T665 T10C | ETH 7.5 T10C | 4,1 | 9.04 | 0,25 | 48 | OZ |
| ECO11 T880 T10C | ETH 5.7 T10C | 4,5 | 9.92 | 0,25 | 85 | OZ |
| ECO13 T1300 T10C | ETK 3.8 T10C | 4,7 | 10.36 | 0,25 | 160 | OZ |
| ECO13 T2500 T10C | ETK 2.0 T10C | 6,5 | 14.33 | 0,25 | 420 | OZ |
| ECO14 T665 T10C | ETL 7.5 T10C | 10,6 | 23.37 | 0,25 | 33 | OR |
| ECO14 T5000 T10C | ETL 1.0 T10C | 7,9 | 17.42 | 0,25 | 1000 | OZ |

| Package dimensions | Height | Ext. diameter | Int. diameter | mm/ inches |
|--------------------|-------------|------------------|------------------|---------------|
| Tube ECO | 280/430 | 92/164 | 80/152 | mm |
| | 11.02/16.93 | 3.62/6.46 | 3.15/5.98 | inches |
| Bobbin ECO | 260 | max. 250 | 92 | mm |
| | 10.24 | max. 9.84 | 3.62 | inches |
| Bobbin ECO | 430 | max. 380 | 152 | mm |
| | 16.93 | max. 14.96 | 5.98 | inches |

| Packaging information | Levels per pallet | Packages per level | Packages per pallet | Net weight | Approx. dimensions W × L × H |
|-----------------------|-------------------|--------------------|---------------------|----------------------------------|---|
| Product | | | | | |
| Packaging OZ | 4 | 16 | 64 | 239 to 819 kg 527 to 1807 lbs | 1200 × 1150 × 1285 mm 47.28 × 45.31 × 50.59 inch |
| Packaging OR | 3 | 9 | 27 | 247 to 277 kg 544 to 610 lbs | 1200 × 1150 × 1500 mm 47.28 × 45.31 × 59.10 inch |
| Packaging Ref. 6 | 2 | 30 | 60 | 115 to 228 kg 253 to 503 lbs | 1200 × 1150 × 1025 mm 47.28 × 39.40 × 40.35 inch |

| S/I units (tex) type & t.p.m | Inch pounds units type & t.p.i | Pack- age unit weight | | Loss on ignition (%) | Nominal breaking strength (N) | Packaging reference |
|---------------------------------------|---|--------------------------------|------|-------------------------|-------------------------------------|------------------------|
| | | kg | lbs | | | |
| ECOS9 T650 S45 T10C H8 | ETG 7.7.1.12S T10C H8 | 3,8 | 8.38 | 0,25 | 115 | 6 |
| ECOS9 T650 x2 S45 T10C H8 | ETG 7.7.1/2.1.12S T10C H8 | 3,9 | 8.6 | 0,25 | 246 | 6 |
| ECOS9 T1030 S45 T10C H8 | ETG 4.8.1.12S T10C H8 | 3,75 | 8.27 | 0,25 | 146 | 6 |
| ECOS9 T1290 S45 T10C H8 | ETG 3.9.1.12S T10C H8 | 3,8 | 8.38 | 0,25 | 235 | 6 |
| ECOS9 T1290 x2 S45 T10C H8 | ETG 3.9.1/2.1.12S T10C H8 | 3,9 | 8.6 | 0,25 | 452 | 6 |
| ECOS9 T1290 x2 Z45 T10C H8 | ETG 3.9.1/2.1.12Z T10C H8 | 3,9 | 8.6 | 0,25 | 475 | 6 |
| ECOS9 T1290 x4 Z45 T10C H8 | ETG 3.9.1/4.1.12Z T10C H8 | 3,85 | 8.49 | 0,25 | 750 | 6 |
| ECOS9 T1290 x4 S45 T10C H8 | ETG 3.9.1/4.1.12S T10C H8 | 3,85 | 8.49 | 0,25 | 750 | 6 |
| ECOS9 T650 S45 T10C H8 | ETG 7.7.1.12S T10C H8 | 3,8 | 8.38 | 0,25 | 115 | 6 |
| ECOS9 T650 x2 S45 T10C H8 | ETG 7.7.1/2.1.12S T10C H8 | 3,9 | 8.6 | 0,25 | 246 | 6 |
| ECOS9 T1030 S45 T10C H8 | ETG 4.8.1.12S T10C H8 | 3,75 | 8.27 | 0,25 | 146 | 6 |
| ECOS9 T1290 S45 T10C H8 | ETG 3.9.1.12S T10C H8 | 3,8 | 8.38 | 0,25 | 235 | 6 |
| ECOS11 T1420 S45 T10C H8 | ETH 3.5.1.12S T10C H8 | 3,5 | 7.72 | 0,25 | 195 | 6 |
| ECOS11 T1420 S30 T10C H8 | ETH 3.5.0.75S T10C H8 | 3,5 | 7.72 | 0,25 | 198 | 6 |
| ECOS13 T2500 S30 T10C H8 | ETK 2.0.0.75S T10C H8 | 3,95 | 8.71 | 0,25 | 440 | 6 |

| Packaging information | Levels per pallet | Packages per level | Packages per pallet | Net weight | Approx. dimensions W × L × H |
|-----------------------|-------------------|--------------------|---------------------|----------------|---------------------------------|
| Product | | | | | |
| Packaging Ref. 6 | 2 | 30 | 60 | 115 to 228 kg | 1200 × 1150 × 1025 mm |
| | | | | 253 to 503 lbs | 47.28 × 39.40 × 40.35 inch |

Packaging overview:



Voluminized yarn - small bobbin

Packaging type OZ

Stackable



Voluminized yarn - big bobbin

Packaging type OR

Stackable



ECOS (Twisted voluminized yarn)

Packaging type 6

Stackable



2.4 C-Glass staple fiber products

Product description and nomenclature

Staple fiber products consist of discontinuous C glass filaments, which are brought together to form a sliver. The structure of the sliver is fixed by the application of a size that allows further textile transformation.

According to the tex value and application, package units are available:



Sliver wound on a cardboard tube
(presentation A)



Sliver wound on drum with flanges
(presentation B)



Sliver laid in a cardboard box
(presentation C)



Sliver wound on the small cartoon tube with added twist (AT)
(presentation D)



Chopped staple fiber
(presentation E)



Sliver wound on long cartoon tube
(presentation F)

Description of the product CD 11.5 200 L01P A1

| | |
|------|-------------------------------------|
| C | Type of glass |
| D | Discontinuous filaments |
| 11.5 | Filaments diameter in μm |
| 200 | Linear density (in tex = g/1000 m) |
| L01P | Size type |
| A1 | Type of packaging |

Product range and packaging information

| Product name | 4961 | Inch pounds units type | Loss on ignition | Package unit weight | | Max outside diameter mm | Presentation type | Packaging type | Package units per pallet | Pallet nominal weight (kg) |
|--------------------------|------|------------------------|------------------|---------------------|------|-------------------------|-------------------|----------------|--------------------------|----------------------------|
| | | | | kg | lbs | | | | | |
| CD 7.5 49 MM LO2P A10 | | CDE 1.96IN LO2P A10 | 0,60 | 100 | 220 | Big bag | E | A10 | 2 | 200 |
| CD 7.5 660 LO2P A1 | 7,5 | CDE 7.5 LO2P A1 | 0,60 | 7,5 | 17 | 360 | A | A1 | 42 | 315 |
| CD 8 4000 LO2P A6 | 1,2 | CDF 1.2 LO2P A6 | 0,60 | 8,5 | 19 | 360 | F | A6 | 24 | 204 |
| CD 8 35000 LO2P A11 | 0,14 | CDT0.14 LO2P A11 | 0,50 | 24 | 53 | cartoon | C | A11 | 6 | 144 |
| CD 10 710 LO3P A12 | 7,0 | CDH 7.0 LO3P A12 | 1,8 | 13 | 29 | 360 | F | A12 | 30 | 390 |
| CD 10 1430 LO2P AT A8 | 3,5 | CDH 3.5 LO2P AT A8 | 1,8 | 3,9 | 9 | 230 | D | A8 | 90 | 350 |
| CD 10 2000 LO1P A6 | 2,5 | CDH 2.5 LO1P A6 | 0,8 | 10 | 22 | 300 | F | A6 | 24 | 240 |
| CD 10 35000 LO2P A11 | 0,1 | CDH 0.14 LO2P A11 | 0,50 | 24 | 53 | cartoon | C | A11 | 6 | 144 |
| CD 11.5 125 LO1P A1 | 39,7 | CDJ 39.7 LO1P A1 | 1.4 | 11 | 24 | 360 | A | A1 | 42 | 462 |
| CD 11.5 200 LO1P A1 | 24,8 | CDJ 24.8 LO1P A1 | 1.4 | 10 | 22 | 360 | A | A1 | 42 | 420 |
| CD 11.5 220 LO3P A1 | 22,6 | CDJ 22.6 LO3P A1 | 1.8 | 12 | 26 | 360 | A | A1 | 36 | 432 |
| CD 11.5 250 LO1P A2 | 19,8 | CDJ 19.8 LO1P A2 | 1.8 | 5 | 11 | 360 | A | A2 | 36 | 180 |
| CD 11.5 330 LO1P A1 | 15,0 | CDJ 15.0 LO1P A1 | 1.4 | 9 | 19,8 | 360 | A | A1 | 42 | 360 |
| CD 11.5 380 LO1P A1 | 13,1 | CDJ 13.1 LO1P A1 | 1.4 | 9 | 19,8 | 360 | A | A1 | 42 | 360 |
| CD 11.5 430 LO1P A1 | 11,5 | CDJ 11.5 LO1P A1 | 1.4 | 8,5 | 18,7 | 360 | A | A1 | 42 | 350 |
| CD 11.5 550 LO1P A1 | 9,0 | CDJ 9.0 LO1P A1 | 1.4 | 8,5 | 18,7 | 360 | A | A1 | 42 | 350 |
| CD 11.5 625 LO1P A6 | 7,9 | CDJ 7.9 LO1P A6 | 1 | 12 | 26,4 | 300 | F | A6 | 24 | 300 |
| CD 11.5 625 LO1P A9 | 7,9 | CDJ 7.9 LO1P A9 | 1 | 4 | 8,8 | 360 | F | A9 | 90 | 360 |
| CD 11.5 660 LO1P A1 | 7,5 | CDJ 7.5 LO1P A1 | 1.4 | 8,5 | 18,7 | 360 | A | A1 | 42 | 360 |
| CD 11.5 720 LO1P A6 | 6,9 | CDJ 6.9 LO1P A6 | 1,20 | 14 | 31 | 300 | F | A6 | 24 | 336 |
| CD 11.5 1000 LO1P A6 | 5,0 | CDJ 5.0 LO1P A6 | 1 | 12 | 26,4 | 300 | F | A6 | 24 | 300 |
| CD 11.5 1000 LO1P A9 | 5,0 | CDJ 5.0 LO1P A9 | 1 | 4 | 8,8 | 360 | A | A9 | 90 | 360 |
| CD 11.5 1000 LO1P A17 | 5,0 | CDJ 5.0 LO1P A17 | 1.4 | 8 | 18 | 360 | A | A17 | 42 | 360 |
| CD 11.5 1250 LO1P A1 | 4,0 | CDJ 4.0 LO1P A1 | 1.4 | 8 | 17,6 | 360 | A | A1 | 42 | 360 |
| CD 11.5 1430 LO2P AT A8 | 3,5 | CDJ 3.5 LO2P AT A8 | 1.8 | 3,7 | 8 | 230 | D | A8 | 90 | 333 |
| CD 11.5 1430 LO1P A14 | 3,5 | CDJ 3.5 LO1P A14 | 1.4 | 8 | 17,6 | 360 | D | A14 | 42 | 357 |
| CD 11.5 1700 LO1P A1 | 2,9 | CDJ 2.9 LO1P A1 | 1.4 | 8 | 17,6 | 360 | A | A1 | 42 | 336 |
| CD 11.5 2000 LO1P A1 | 2,5 | CDJ 2.5 LO1 A1 | 1.4 | 8 | 17,6 | 360 | A | A1 | 42 | 360 |
| CD 11.5 2000 LO1P A4 | 2,5 | CDJ 2.5 LO1 A4 | 1.8 | 17 | 37,4 | 360 | C | A4 | 6 | 100 |
| CD 11.5 2000 LO1P A6 | 2,5 | CDJ 2.5 LO1P A6 | 1.4 | 10 | 22 | 360 | F | A6 | 24 | 250 |
| CD 11.5 2000 LO1P A8 | 2,5 | CDJ 2.5 LO1P A8 | 1.4 | 4 | 8,8 | 300 | D | A8 | 90 | 360 |
| CD 11.5 2000 LO2P AT A16 | 2,5 | CDJ 2.5 LO2P AT A16 | 1.8 | 4 | 8,8 | 300 | D | A16 | 105 | 390 |
| CD 11.5 2000 LO2P AT A8 | 2,5 | CDJ 2.5 LO2P AT A8 | 1.4 | 3,7 | 8,2 | 300 | D | A16 | 90 | 333 |
| CD 11.5 5000 LO1P A3 | 1,0 | CDJ 1.0 LO1P A3 | 1.4 | 17 | 37,4 | 600 | B | A3 | 12 | 200 |
| CD 11.5 5000 LO1P A13 | 1,0 | CDJ 1.0 LO1P A13 | 1.4 | 20 | 44 | cartoon | C | A13 | 6 | 120 |

| Product name | 4961 | Inch pounds units type | Loss on ignition | Package unit weight | | Max outside diameter mm | Presentation type | Packaging type | Package units per pallet | Pallet nominal weight (kg) |
|-----------------------|------|------------------------|------------------|---------------------|------|-------------------------|-------------------|----------------|--------------------------|----------------------------|
| | | | | kg | lbs | | | | | |
| CD 11.5 10000 L01P A4 | 0,5 | CDJ 0.5 L01P A4 | 1.4 | 17 | 37,4 | cartoon | C | A4 | 6 | 100 |
| CD 11.5 15000 L01P A4 | 0,3 | CDJ 0.3 L01P A4 | 1.4 | 17 | 37,4 | cartoon | C | A4 | 6 | 100 |
| CD 11.5 20000 L01P A3 | 0,2 | CDJ 0.2 L01P A3 | 1.4 | 25 | 55 | 600 | B | A3 | 12 | 300 |
| CD 11.5 20000 L01P A4 | 0,2 | CDJ 0.2 L01P A4 | 1.4 | 17 | 37,4 | cartoon | C | A4 | 6 | 100 |
| CD 11.5 30000 L01P A3 | 0,2 | CDJ 0.2 L01P A3 | 1.4 | 25 | 55 | 600 | B | A3 | 12 | 300 |
| CD 11.5 35000 L01P A3 | 0,14 | CDJ 0.14 L01P A3 | 1.4 | 25 | 55 | 600 | B | A3 | 12 | 300 |
| CD 11.5 35000 L01P A4 | 0,14 | CDJ 0.14 L01P A4 | 1.4 | 17 | 37,4 | cartoon | C | A4 | 6 | 100 |
| CD 11.5 40000 L01P A3 | 0,12 | CDJ 0.12 L01P A3 | 1.4 | 25 | 55 | 600 | B | A3 | 12 | 300 |
| CD 11.5 60000 L01P A3 | 0,08 | CDJ 0.08 L01P A3 | 1.4 | 25 | 55 | 600 | B | A3 | 12 | 300 |
| CD 11.5 60000 L01P A4 | 0,08 | CDJ 0.08 L01P A4 | 1.4 | 17 | 37,4 | cartoon | C | A4 | 6 | 100 |
| CD 11.5 5000 L01P A6 | 0,99 | CDJ 0.99 L01P A6 | 1.4 | 10,5 | 23 | 300 | F | A6 | 24 | 252 |
| CD 13 35000 L02P A11 | 0,14 | CDJ 0.14 L02P A11 | 0,50 | 24 | 52,8 | cartoon | C | A11 | 6 | 144 |
| CD 25 35000 L02P A11 | 0,14 | CDJ 0.14 L02P A11 | 0,50 | 24 | 52,8 | cartoon | C | A11 | 6 | 144 |
| CD 8 35000 L02P A19 | 0,14 | CDT0.14 L02P A19 | 0,50 | 15 | 33 | 500 | B | A19 | 12 | 180 |

| Packaging type | Level of packages unit per pallet | Packages unit per level | Number of Packages unit per pallet | Approx. dimensions |
|----------------|-----------------------------------|-------------------------|------------------------------------|---|
| | | | | W × L × H |
| A1 | 7 | 6 | 42 | 1200 × 800 × 2300 mm 47.24 × 31.50 × 90.55 inch |
| A3 | 3 | 4 | 12 | 1200 × 1200 × 2200 mm 47.24 × 47.24 × 86.61 inch |
| A4 | 3 | 2 | 6 | 1200 × 800 × 2200 mm 47.24 × 31.50 × 86.61 inch |
| A6 | 4 | 6 | 24 | 1200 × 800 × 2200 mm 47.24 × 31.50 × 86.61 inch |
| A8 | 3 | 30 | 90 | 1200 × 700 × 2100 mm 47.24 × 27.56 × 82.68 inch |
| A9 | 3 | 30 | 90 | 1200 × 700 × 2100 mm 47.24 × 27.56 × 82.68 inch |
| A10 | 2 | 1 | 2 | 1200 × 100 × 2200 mm 47.24 × 3.94 × 86.61 inch |
| A11 | 3 | 2 | 6 | 1200 × 800 × 2400 mm 47.24 × 31.50 × 94.49 inch |
| A12 | 5 | 6 | 30 | 1200 × 800 × 2200 mm 47.24 × 31.50 × 86.61 inch |
| A16 | 3,5 | 30 | 105 | 700 × 1150 × 2300 27.56 × 45.28 × 90.55 |
| A17 | 6 | 6 | 36 | 800 × 1150 × 2300 31.50 × 45.28 × 90.55 |
| A19 | 3 | 4 | 12 | 1150 × 1150 × 2200 45.28 × 45.28 × 86.61 |

2.5 ZeroTwist®



Product range and packaging information

The Vetrotex ZeroTwist® are strands without twist that can be employed in diverse textile processing. Main properties are:

- Splice free single end roving, free of catenary, the integrity is given by the size.
- Good warping and weaving properties in both warp (machine) and fill (crosswise) directions even with leno woven fabrics.
- Easy to impregnate due to the lack of twist.
- TD22C and TD44C has excellent compatibility with epoxy, polyester, vinyl ester and phenolic resins.
- T99C has excellent alkaline resistance. The ZeroTwist® product is well and easily impregnated by the alkali- and water-resistant resins used for reinforcing wall systems (like acrylic, styrene acrylate polymers and copolymers).
- T10C has very good properties for texturizing processes. The size is compatible with water based polymer systems, all types of resins and bitumen.
- TP10C is new size special developed for high compatibility with polyolefin resins: polypropylene (PP), polyethylene (PE), ethylene vinyl acetate (EVA). Zerotwist and Roving with TP10C has very good properties for texturizing process.
- TP20C is new size special developed for high compatibility with polyamide (PA), polyethylene terephthalate (PET), Polybutylene Terephthalate (PBT) and Polycarbonate (PC) resins. Zerotwist and Roving with TP20C has also very good properties for texturizing process.

ZeroTwist®

| Strand type S/l units (tex) | Strand type Inch - pound units | Size system | Weight (kg) | Weight (lbs) | Loss on ignition (%) | Tensile strength (N) | Package type |
|-----------------------------|--------------------------------|-------------|-------------|--------------|----------------------|----------------------|--------------|
| EC9 68 | ECG 75 | TD22C | 10,0 | 22.05 | 0,70 | 45 | 1 |
| EC9 68 | ECG 75 | TP10C | 10,0 | 22.05 | 0,45 | 40 | 1 |
| EC9 68 | ECG 75 | TP20C | 10,0 | 22.05 | 0,45 | 30 | 1 |
| EC13 136 | ECK 37 | TD22C | 10,0 | 22.05 | 0,60 | 75 | 1 |
| EC16 200 | ECM 25 | TD22C | 10,0 | 22.05 | 0,55 | 95 | 1 |

Direct roving

| Strand type S/units (tex) | Strand type inch - pound units | Size system | Weight (kg) | Weight (lbs) | Loss on ignition (%) | Tensile strength (N) | Package type |
|---------------------------|--------------------------------|-------------|-------------|--------------|----------------------|----------------------|--------------|
| EC9 136 | ECG 37 | T10C | 12,0 | 26,46 | 0,23 | 60 | 4 |
| EC13 280 | ECK 18 | T99C | 12,0 | 26,46 | 1,10 | 170 | 2 |
| EC14 300 | ECL 16 | T99C | 12,0 | 26,46 | 1,10 | 180 | 2 |
| EC14 300 | ECL 16 | TD44C | 12,0 | 26,46 | 0,65 | 180 | 2 |
| EC14 300 | ECL 16 | TD44C | 20,0 | 44,09 | 0,65 | 180 | 3 |
| EC14 300 | ECL 16 | TP10C | 12,0 | 26,46 | 0,50 | 170 | 2 |
| EC14 300 | ECL 16 | TP10C | 20,0 | 44,09 | 0,50 | 170 | 3 |
| EC14 300 | ECL 16 | TP20C | 12,0 | 26,46 | 0,50 | 95 | 2 |
| EC14 300 | ECL 16 | TP20C | 20,0 | 44,09 | 0,50 | 95 | 3 |

Packaging

| Packaging type | Approx. dimensions W × L × H | Levels per pallet | Packages per level | Packages per pallet | Weight per package | Net weight |
|----------------|---|-------------------|--------------------|---------------------|----------------------|--------------------|
| 1 | 1300 × 1000 × 1250 mm 51.18 × 39.37 × 49.21 inch | 8 | 11 | 88 | 10,0 kg 22,05 lbs | 880 kg 1940 lbs |
| 2 | 1150 × 1150 × 1500 mm 45.28 × 45.28 × 59.06 inch | 5 | 16 | 80 | 12,0 kg 26,46 lbs | 960 kg 2116 lbs |
| 3 | 1300 × 1000 × 1300 mm 51.18 × 39.37 × 51.18 inch | 4 | 12 | 48 | 20,0 kg 44,09 lbs | 960 kg 2116 lbs |
| 4 | 1150 × 1150 × 1200 mm 45.28 × 45.28 × 47.24 inch | 4 | 16 | 64 | 12,0 kg 26,46 lbs | 768 kg 1693 lbs |

Product range and packaging information

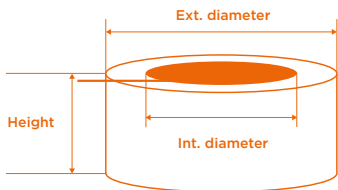
ZeroTwist Description: e.g.

EC9 - 68 TD22C (ECK 75 TD22C)

| | | | |
|-------|--|-------|----------------------------------|
| E | Type of glass | E | Type of glass |
| C | Continuous filament | C | Continuous filament |
| 9 | Diameter of the filaments in μm | G | Filament diameter US units |
| 68 | Nominal yarn count (in tex = g/1000 m) | 75 | Linear density in 100 yards/lbs. |
| TD22C | Size designation | TD22C | Size designation |

Available product dimensions:

| Packaging type | Height | Ext. diameter | Int.diameter |
|----------------|----------------------|----------------------|---------------------|
| 1 | 125 mm 4.92 inch | 325 mm 12.8 inch | 207 mm 8.15 inch |
| 2 | 258 mm 10.16 inch | 278 mm 10.95 inch | 203 mm 7.99 inch |
| 3 | 258 mm 10.16 inch | 310 mm 12.20 inch | 203 mm 7.99 inch |



Packaging overview:



Zerotwist - 10 kg

Packaging type 1 (not stackable)



Direct Roving - 12 kg

Packaging type 2 (not stackable)



Direct Roving - 12 kg

Packaging type 4 (not stackable)



Direct Roving - 20 kg

Packaging type 3 (not stackable)

2.6 Hybrid yarns

Product description and nomenclature

Low Tex hybrid E-glass/thermoplastic yarns offered in count range from 95 to 450 Tex with a glass fiber volume fraction of 50%. These new hybrid yarns are produced from the commingling of polypropylene or polyamide filaments and glass filaments sized with a starch free system exhibiting excellent textile properties.



Hybrid yarn

Description of EH T95 PP B 50 product

| | |
|----|-------------------------|
| E | Type of glass |
| H | Hybrid |
| T | Texturized |
| 95 | Linear density (TEX) |
| PP | Polypropylene resin |
| B | Black color of PP resin |
| 50 | Glass content in vol. % |

Main advantages

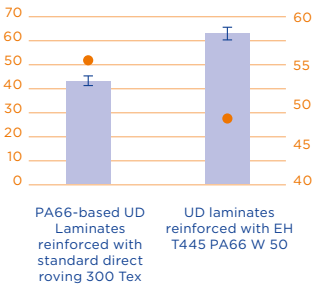
- Excellent textile properties
- Enable production of lightweight & thin prepreg fabrics & laminates
- Superior dry prepreg drapability for complex structure
- Quick & easy wet out of the thermoplastic resin during heating step
- Core impregnation of the TP resin within the glass yarn core
- Reduced cycle process steps & time for laminate production
- Improved fiber/matrix adhesion leading to higher laminate performances

Yarn cross-section illustration

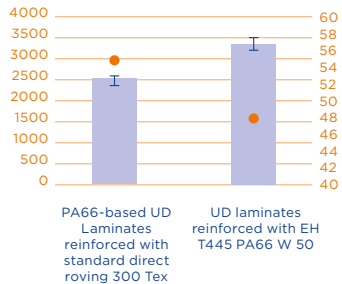
- Glass reinforcement filament
- Thermoplastic matrix filament



Uniaxial tensile strength in 0 °C of UD laminates (MPa)



Interlaminar shearing strength of UD laminates (MPa)



- Tensile strength
- FVF%

- ILSS (MPa)
- FVF%

Product range and packaging information

| S/I units (tex) | Inch-pound units (tex) | Size system | Weight (Kg) | Weight (lbs) | Glass content vol. (%) | Tensile Strength (N) | Package type |
|-------------------|------------------------|-------------|-------------|--------------|------------------------|----------------------|--------------|
| EH T95 PP B 50 | EH T52,2 PP B 50 | TP10C | 8,4 | 18.52 | 50 | 25 | OY |
| EH T105 PA66 W 50 | EH T47,2 PA66 W 50 | TP20C | 8,4 | 18.52 | 50 | 21 | OY |
| EH T430 PP B 50 | EH T11,5 PP B 50 | TP10C | 6,7 | 14.77 | 50 | 110 | OY |
| EH T445 PA66 W 50 | EH T11,1 PA66 W 50 | TP20C | 6,7 | 14.77 | 50 | 90 | OY |

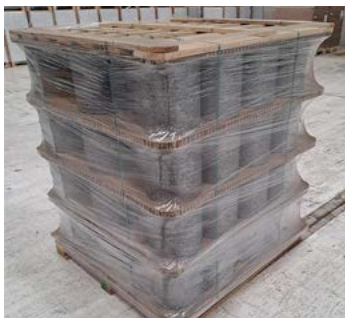
Package dimensions

| | Height | Ext. diameter | Int. diameter | mm/ inches |
|------------------|--------|---------------|---------------|---------------|
| Tube ETH | 280 | 92 | 80 | mm |
| | 11.02 | 3.62 | 3.15 | inches |
| Bobbin ETH OY | 260 | max. 250 | 92 | mm |
| | 10.24 | max. 9.84 | 3.62 | inches |

Packaging

| | Levels per pallet | Packages per level | Packages per pallet | Net weight | Approx. dimensions W × L × H |
|----|-------------------|--------------------|---------------------|---------------------|---------------------------------|
| OY | 4 | 20 | 80 | 479 up to 739 Kg | 1200 × 1150 × 1285 mm |
| | | | | 1056 up to 1629 lbs | 47.28 × 45.31 × 50.63 inch |

Packaging overview:



Hybrid yarn

Packaging type OY

Stackable

2.7 Textile Chopped Strands

Product range and packaging information

Product description and nomenclature

Textile Chopped Strands are produced from continuous E-glass filaments that are treated with textile sizing (starch-oil-basis). The filament strands are chopped in determined length from 3mm to 24mm.

Product labelling

With reference to ISO-Norm 2078 the Textile Chopped Strands are labelled like the following: Example: EC6 4.5 MM T30C B2

Description of EC6 4.5 MM T30C B2

| | |
|--------|--|
| E | Type of glass |
| C | Continuous filament |
| 6 | Diameter of the filaments in μm |
| 4.5 MM | Chopped strand length (nominal) |
| T30C | Size designation |
| B2 | packaging code |

Product properties

Saint-Gobain Vetrotex Textile Chopped Strands are subject to an evidenced, internal process and product specification. It is guaranteed that only E-glass for the production of these filaments are used and treatment with textile sizing will be effected. The material has to be free from soiled fibers and any foreign articles of all kinds.

Vetrotex America

| S/l units (tex) type & t.p.m | Size system | Inch pounds units type & t.p.i | Length/ package | | Loss on ignition (%) | Moisture (%) | Packaging type |
|---------------------------------|----------------|--------------------------------------|--------------------|--------|-------------------------|--------------|-------------------|
| | | | mm | inches | | | |
| EC6 6 mm | TC03M | ECDE 1/4 in. | 6 | 0,24 | 0,60 | 8 | M2, M3, M4 |
| EC6 12mm | TC03M | ECDE 1/2 in. | 12 | 0,47 | 0,60 | 8 | M1, M2 |
| EC6 3 mm | TC05M | ECDE 1/8 in. | 3 | 0,12 | 0,13 | 9 | M1, M2 |

| S/l units (tex) type & t.p.m | Size system | Inch pounds units type & t.p.i | Length / package | | Loss on ignition (%) | Moisture (%) | Packaging type |
|---------------------------------|----------------|--------------------------------------|---------------------|--------|-------------------------|--------------|-------------------|
| | | | mm | inches | | | |
| EC6 6 mm | TC05M | ECDE 1/4 in. | 6 | 0.24 | 0,13 | 9 | M1, M2 |
| EC6 12 mm | TC05M | ECDE 1/4 in. | 12 | 0.47 | 0,13 | 9 | M1, M2 |
| EC7 3 mm | TC05M | ECE 1/8 in. | 3 | 0.12 | 0,13 | 9 | M1 |
| EC7 6 mm | TC05M | ECE 1/4 in. | 6 | 0.24 | 0,13 | 9 | M1 |

Vetrotex Czech Republic

| S/l units (tex) type & t.p.m | Size system | Inch pounds units type & t.p.i | Length / package | | Loss on ignition (%) | Moisture (%) | Packaging type |
|---------------------------------|----------------|--------------------------------------|---------------------|--------|-------------------------|--------------|-----------------------------|
| | | | mm | inches | | | |
| EC6 3 mm | T30C | ECDE 0.12 in. | 3 | 0.12 | 1,00 | < 0,2 | B1, H2 |
| EC6 4.5 mm | T30C | ECDE 0.18 in. | 4,5 | 0.18 | 1,00 | < 0,2 | K1, B4, B5, K6, H1 |
| EC6 6 mm | T30C | ECDE 0.24 in. | 6 | 0.24 | 1,00 | < 0,2 | B1, B2, K1, BV6, K3, H2, H5 |
| EC 4.5 mm | Textile | EC 0.18 in. | 4,5 | 0.18 | 1,00 | < 0,2 | K1 |
| EC 6 mm | Textile | EC 0.24 in. | 6 | 0.24 | 1,00 | < 0,2 | B3, B6, B7, K1, K3 |
| EC 12 mm | Textile | EC 0.47 in. | 12 | 0.47 | 1,00 | < 0,2 | B7, K1 |
| EC 6 mm | TD22C | EC 0.24 in. | 6 | 0.24 | 0,70 | < 0,2 | B7 |
| EC 12 mm | TD22C | EC 0.47 in. | 12 | 0.47 | 0,70 | < 0,2 | B7 |
| EC 24 mm | TD22C | EC 0.96 in. | 24 | 0.96 | 0,70 | < 0,2 | B7 |

Product packaging

The Textile Chopped Strands are filled into plastic bags and packed either into carton boxes on wooden pallets or into Bigbags on wooden pallets or into metal transport boxes (property of Saint-Gobain Vetrotex). The weight per plastics or cartons can be adapted to the customer's requirements.

On each carton box or plastic bag a label is fixed in order to show the following data:

- product designation,
- chopping length,
- weight,
- date of production.

| Packaging type | Weight per unit | Weight per pallet | Number of units/pallet | Pallet size L × W × H | Recommended pallet storage | Production plant |
|----------------|----------------------|----------------------|------------------------|--|----------------------------|------------------|
| M1 | 900 kg 1984.2 lbs | 900 kg 1984 lbs | 1 | 1070 × 860 × 1140 mm 42.1 × 33.9 × 44.9 inch | max. 2 levels | Mexico |
| M2 | 25 kg 55.1 lbs | 1050 kg 2315 lbs | 21 × 2 | 1200 × 1000 × 1100 mm 47.2 × 39.4 × 43.3 inch | max. 2 levels | Mexico |
| M3 | 24,5 kg 54.0 lbs | 1029 kg 2269 lbs | 21 × 2 | 1200 × 1000 × 1100 mm 47.2 × 39.4 × 43.3 inch | max. 2 levels | Mexico |
| M4 | 918.0 kg 2024 lbs | 918.0 kg 2024 lbs | 1 | 1200 × 1000 × 1000 mm 47.2 × 39.4 × 39.4 inch | 1 level | Mexico |
| BV6 | 850 kg 1874 lbs | 850 kg 1874 lbs | 1 | 1150 × 1150 × 1000 mm 45.3 × 45.3 × 39.4 inch | 1 level | Czech Republic |
| K1 | 36,0 kg 79,4 lbs | 432 kg 952 lbs | 12 | 1200 × 800 × 1830 mm 47.2 × 31.5 × 72.0 inch | 1 level | Czech Republic |
| K3 | 13,3 kg 29,3 lbs | 479 kg 1056 lbs | 12 × 3 | 1200 × 800 × 1830 mm 47.2 × 31.5 × 72.0 inch | 1 level | Czech Republic |
| K6 | 40,0 kg 88,2 lbs | 720 kg 1587 lbs | 18 | 1150 × 1150 × 2000 mm 45.3 × 45.3 × 78.7 inch | 1 level | Czech Republic |
| H1 | 18,8 kg 41,4 lbs | 677 kg 1492 lbs | 36 | 1150 × 1150 × 1100 mm 45,3 × 45,3 × 43,7 inch | max. 3 levels | Czech Republic |
| H2 | 22,7 kg 50,0 lbs | 681 kg 1501 lbs | 30 | 1150 × 1150 × 1100 mm 45,3 × 45,3 × 43,7 inch | max. 3 levels | Czech Republic |
| H5 | 20,0 kg 44,1 lbs | 680 kg 1499 lbs | 34 | 1150 × 1150 × 1100 mm 45,3 × 45,3 × 43,7 inch | max. 3 levels | Czech Republic |
| B1 | 22,7 kg 50,0 lbs | 454 kg 1001 lbs | 20 | 1160 × 870 × 1000 mm 45,7 × 34,3 × 39,4 inch | max. 3 levels | Czech Republic |
| B2 | 22,7 kg 50,0 lbs | 545 kg 1201 lbs | 24 | 1200 × 1000 × 1000 mm 47,2 × 39,3 × 39,4 inch | max. 3 levels | Czech Republic |
| B3 | 25,0 kg 55,1 lbs | 300 kg 661 lbs | 12 | 1200 × 1000 × 1000 mm 47,1 × 39,4 × 39,4 inch | max. 3 levels | Czech Republic |
| B4 | 28,2 kg 62,2 lbs | 536 kg 1181 lbs | 19 | 1200 × 1000 × 1000 mm 47,2 × 39,4 × 39,4 inch | max. 3 levels | Czech Republic |
| B5 | 25,0 kg 55,1 lbs | 500 kg 1102 lbs | 20 | 1200 × 1000 × 1000 mm 47,2 × 39,4 × 39,4 inch | max. 3 levels | Czech Republic |
| B6 | 13,3 kg 29,3 lbs | 293 kg 645 lbs | 22 | 1200 × 1000 × 1000 mm 47,2 × 39,4 × 39,4 inch | max. 3 levels | Czech Republic |
| B7 | 20,0 kg 44,1 lbs | 300 kg 661 lbs | 15 | 1200 × 1000 × 1000 mm 47,2 × 39,4 × 39,4 inch | max. 3 levels | Czech Republic |

Packaging overview:



Bigbag

Packaging type M4, BV1 - BV8

Not stackable



Small plastic bags in cartons

Packaging type K1 - K8

Not stackable



Small plastic bags in reinforced cartons

Packaging type H1 - H5, M2 - M3

Stackable



Small plastic bags in metal boxes

Packaging type B1 - B10

Stackable

2.8 Beam supply

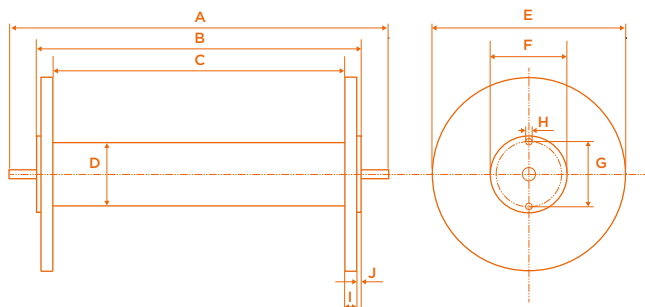
Continuous filament yarns can also be provided as beamed yarns. Beaming is an operation in which a defined number of parallel ends on single yarns from a creel are combined and wound with tension on a section beam or on a warp beam.

The beaming process avoids the need for creeling of many individual yarn bobbins. Beams are used in weaving or similar processing operations like laid scrim, knitting, tapes, ...

Generally Vetrotex uses its own section beams (with inside width of 138 cm) to process their single yarns. Empty beams may be supplied also by the customer, if different dimensions are requested.

Beams are delivered based on specific customer needs; e.g. yarn type, number of ends, beam length and number of beams per set. The range of end counts is from 150 to 800 for section beams and up to 1350 for warp beams. Nominal length per type of beams depending of the maximum weight for beams and the nominal length of the input yarn.





Different beam supply dimensions in mm and inches

| | | A | B | C Barrel Length | D Barrel diameter | E Flange diameter | G | Max. number of ends |
|----------------|--------|----------------|----------------|-----------------------|-------------------------|-------------------------|-------|---------------------------|
| Standard beam | mm | 1785 | 1530 | 1378 | 298.5 | 914,5 | 318 | 800 |
| | inches | 70.28 | 60.24 | 54.25 | 11.75 | 36 | 12.52 | |
| "Jumbo" beam | mm | 1785 | 1530 | 1378 | 298,5 | 1016 | 318 | 800 |
| | inches | 70.28 | 60.24 | 54.25 | 11.75 | 40 | 12.52 | |
| Standard beam | mm | 2065 | 1742 | 1625 | 298,5 | 914,5 | 318 | 1000 |
| | inches | 81.3 | 68.56 | 64.00 | 11.75 | 36 | 12.52 | |
| Standard beam | mm | 2303 | 2132,9 | 1828,8 | 299,4 | 914,5 | 318 | 972 |
| | inches | 90.66 | 77.66 | 72.00 | 11.77 | 36 | 12.52 | |
| Standard beam* | mm | max. 3200 | max. 3000 | max. 2800 | max. 300 | max. 1000 | 318 | 1350 |
| | inches | max. 125.98 | max. 118.11 | max. 110.24 | max. 11.81 | max. 39.37 | | |

* = Information concerns supply to the European market.

2.9 Return of empty packaging material

Empty bobbins, beams and other packaging are the property of Vetrotex. They can be used several times and must be returned after use as soon as possible to the plant of origin.

To follow up the returnables flow, our computer system will record the outgoing and incoming number of following packaging material:

| Product | Packaging material | | | | Tie-down |
|-------------------------|--------------------|----------------|------------------------|----------------|---------------|
| | | | | | |
| Yarns/ECOS | All types of cops | Wooden pallets | Inner layers with caps | Cardbord belts | Wooden frames |
| | | Plastic base | Plastic inner layers | Plastic tops | |
| ECT/ECTE/ECO products | Papertubes | Wooden pallets | Inner layers with caps | Cardbord belts | Wooden frames |
| Waste (by-products) | | Wooden pallets | | | Wooden frames |
| ZeroTwist* | | Wooden pallets | Plastic layers | | Wooden frames |
| Direct roving | | Wooden pallets | | | Wooden frames |
| Beamed yarn | Beams | Racks | | | |
| Textile chopped strands | Metal boxes | Wooden pallets | | | |

The returnable packaging must be packed according to related packaging specifications which will be distributed by the sales department in charge.

Your local Saint-Gobain Vetrotex sales department will be pleased to help if you should require any further information or have any suggestions.

3 Size systems description and recommended applications

| Description | Yarn properties | Observations | |
|--|--|---|--------------|
| T8 is a starch/oil based size system. | Yarns sized with T8 are suitable for all textile processes such as: beaming, slashing (good compatibility with starch polyvinyl alcohol), weaving on air jet, rapier and projectile looms, braiding and heat cleaning treatment. | Can be thermally heat cleaned with conventional procedures. | T8 |
| T10 is a glue/surfactant/oil based size system developed for air-jet texturizing and volumizing processes. The strand is uniformly opened and this results in very quick wetting properties. The yarns are very well compatible with water based polymer systems, various types of resins and bitumen. | T10 products have a proper tensile strength and they are suitable for weaving and rope braiding. | T10 sized yarns are used for: Civil engineering like: – fabrics for roofing – wall coverings Industrial applications like: – thermal insulation fabrics – ropes (asbestos replacement) – woven tapes (narrow fabric) | T10 |
| T18 is a starch/oil based size system, especially designed for the texturizing process. | T18 size provides the yarn with an optimum protection required for the texturizing process. The size applies to the yarn a high tensile strength. | Can be thermally heat cleaned by using conventional procedures. | T18 |
| T30, T32 and 5312 are starch/oil based size systems, especially designed for high speed air jet weaving machines and applications for which heat cleaning properties are required. | Sizing system T30, T32 and 5312 provide the yarns with the optimum mechanical protection required for high speed air jet weaving machines in both directions. The main advantages of the product are: Low level of breaks during beaming and slashing, excellent compatibility with starch polyvinyl alcohol slashing agent, regular yarn impregnation and excellent machine efficiency. | The yarns can be thermally heat cleaned with the usual heat cleaning equipment's (one or two steps processes). The fabrics produced with this binder system meet the most stringent quality requirements for high quality fabrics produced for PTFE applications and aircraft, especially for the quality of the surface. | T30/T32/5312 |

| | Description | Yarn properties | Observations |
|-----|---|--|--|
| T63 | T63 is a starch/silane/oil based size system. Due to its special composition, all glass filament yarns which are sized with T63 have a high tensile strength. The size abrasion is reduced to a minimum and the electric static build up is very low, even in demanding applications. | T63 textile glass filament yarns are exceptionally well suitable for all textile machine processes such as: warping, weaving on rapier and projectile looms, plying, laid scrim machines, winding and/or braiding, production of meshes for ETICS and cement board applications. | Due to its composition, T63 is not suitable to the complete heat cleaning process (thermal heat cleaning). |
| T64 | T64 is a starch/silane/oil based size system. Due to its special composition, all glass filament yarns which are sized with T64 have a high tensile strength. The size abrasion is reduced to a minimum and the electric static build up is very low, even in demanding applications. | T64 textile glass filament yarns are exceptionally well suitable for all textile machine processes such as: warping, weaving on rapier and projectile looms, plying, laid scrim machines, winding and/or braiding, production of meshes. It provides excellent alkali resistance for ETICS and cement board applications. The T64 is especially designed for the coating usually employed in ETICS like Styrene Butadiene Rubber latex, acrylic, styrene acrylate polymers and copolymers dispersions. | Due to its composition, T64 is not suitable to the complete heat cleaning process (thermal heat cleaning). |
| T34 | T34 is new starch/oil sizing system especially designed for excellent heat-cleaning and high speed air jet weaving. | T34 yarn is showing optimal integrity and low fuzz (or broken filaments) during processing. Excellent textile properties of this yarn enabling braiding, beaming, knitting, playing and weaving. Suitable also for PTFE application. | T34 is very easy to heat-clean even with lower temperatures or shorter time compared other products. Due to the low friction in plastic tubes/pipes this size is suitable for longitudinal reinforcement of glass veil/nonwoven. |
| T99 | T99 is a starch/specific resin film formers / silane based size system, designed for applications requiring a good alkaline resistance. In addition, T99 is compatible with phenolic resins. | Glass filament strands impregnated with T99 have excellent textile properties allowing the production of different types of textile structures. | The T99 strands are well and easily impregnated by the alkali and water-resistant resins used for EIFS (like Styrene Butadiene Rubber latex, acrylic, styrene acrylate polymers and copolymers dispersions). |

| Description | Yarn properties | Observations | |
|---|--|---|------|
| <p>K252 products are produced by blowing a stream of air into continuous filament strands, while it is being delivered at a higher rate than being taken by the winding process. The texturizing effect is optimal fixed in order to allow beaming, weaving and finishing treatments.</p> | <p>K252 products have:</p> <ul style="list-style-type: none"> – excellent weaving properties on rapier and air jet loom in both, warp and weft direction, – a maximum texturizing effect uniformity, – no wavy effect of filling: the texturizing effect has been adjusted and fixed in order to avoid any weft displacement after weaving, – no protruding loops, – a smooth woven surface, – excellent compatibility with finishing agents, – 100% metered packages for wall covering applications. | <p>K252 products are mainly used for high quality wall covering fabrics. They are also suitable for conventional texturized yarn applications like thermal insulation.</p> | K252 |
| <p>TC05 is a starch free size, especially designed to produce 6μ Wet Used Chopped Strands (WUCS).</p> | <p>The TC05 6μ WUCS can be easily and uniformly dispersed in water for the production of glass mat according to the wet process.</p> | <p>The TC05 6μ chopped fibers can be used for the production of specialty papers like filter medias for liquid and air filtration purposes. They can be processed as well in acid white water.</p> | TC05 |
| <p>TP10 is new size special developed for high compatibility with polyolefin resins: polypropylene (PP), polyethylene (PE), ethylene vinyl acetate (EVA).</p> | <p>Glass filament strands impregnated with TP10 have excellent textile properties, enabling the production of different types of textile structures (glass fabrics, tape fabrics, multi-axial fabrics, warp knitted fabrics, etc.) and processes (winding, commingling, weaving, etc.) for use in thermoplastic composites.</p> | <p>TP10 is also suitable for texturizing/commingling process</p> | TP10 |
| <p>TP20 is new size special developed for high compatibility with polyamide (PA), polyethylene terephthalate (PET), Polybutylene Terephthalate (PBT) and Polycarbonate (PC) resins.</p> | <p>Glass filament strands impregnated with TP20 have excellent textile properties, enabling the production of different types of textile structures (glass fabrics, tape fabrics, multi-axial fabrics, warp knitted fabrics, etc.) and processes (winding, commingling, weaving, etc.) for use in thermoplastic composites.</p> | <p>TP20 is also suitable for texturizing/commingling process</p> | TP20 |

| | Description | Yarn properties | Observations |
|---------------|--|---|--|
| TD22 and TD37 | TD22 and TD37 are starch-free plastic size systems containing silane bonding agents guaranteeing an excellent compatibility with the different resin systems (epoxy, phenol, vinyl ester and unsaturated polyester). | Glass filament yarns and ZeroTwist® impregnated with TD22 and TD37 sizes have excellent textile properties, enabling the production of different types of textile structures (glass fabrics, tape fabrics, braided sleeves and multi-axial fabrics, warp knitted fabrics, etc.) for use in composites without the need for any thermal heat cleaning. | Weaver's beams made with direct sizing systems don't need to be slashed. |
| TD44 | TD44 is a starch-free plastic size system containing silane bonding agents guaranteeing an excellent compatibility with the different resin systems (epoxy, phenol, vinyl ester and unsaturated polyester). | The TD44C size is especially designed for the production of ZeroTwist® strands. Glass filament strands impregnated with TD44 have excellent textile properties, enabling the production of different types of textile structures (glass fabrics, tape fabrics, multi-axial fabrics, warp knitted fabrics, etc.) for use in composites without the need for any thermal heat cleaning. | |
| TD55 | TD55 size system is especially designed to provide excellent compatibility with PVC plastisols. | High tensile strength, very low fuzz generation during the unwinding process through the die used to form a round cross section and calibrating the PVC coating. The TD55 size allows an easy and uniform wetting by the plastisol and promotes the adhesion PVC plastisol / glass filaments. The TD55 yarns coated with PVC plastisol have an excellent alkali resistance. | Mainly employed to produce Vinyl Coated Yarns (VCY) according to the single end coating process. End applications are: <ul style="list-style-type: none"> — Insect, pool and patio screens — Sun screens for solar protection — Mesh for cement board produced according to the woven cement board and laid scrims processes. |
| L01P | L01P is an oil finish specially designed for various textile processes and final applications | L01P strands are suitable for textile processes like weaving, braiding, filling and carding. | The products are available as slivers wound on cardboard tubes, drums and loose in boxes. |

| Description | Yarn properties | Observations | |
|--|---|---|-------------|
| <p>TD57 size system is an evolution of TD55 with improved adhesion of PVC to allow us to reduce number of twist.</p> | <p>High tensile strength and low fuzz generation during unwinding and PVC coating process remain at the same level as TD55. Additionally the increased PVC adhesion to glass fiber surface allows to reduce number of twists keeping the expected quality of coated threads. The TD57 provides lower friction for even smoother unwinding and PVC plastisol coating in the die.</p> | <p>"Mainly employed to produce Vinyl Coated Yarns (VCY) according to the single end coating process. End applications are:</p> <ul style="list-style-type: none"> – Insect, pool and patio screens – Sun screens for solar protection – Mesh for cement board produced according to the woven cement board and laid scrims processes." | <p>TD57</p> |

4 Applications examples



Aircraft



Wind Energy



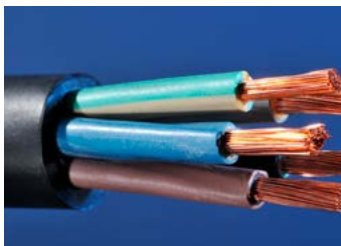
Sports and leisure



Medical casting



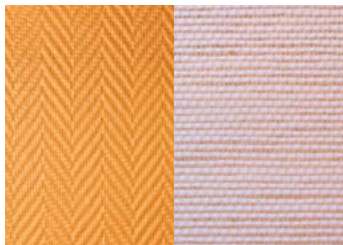
Thermal Insulation / Fire Protection



Electrical Insulation



ETICS/EIFS mesh



Wall-covering fabrics



Vehicles



Trains



Filtration



Insect/Sun screen

4 Recommended yarn by application

| Product line | Single Yarn | | | | | | | | | | | | | | | | | | | | |
|--|-------------|-----|----|-----|-------|----|---------|----|-----|-----|-------|----|-----|---------|----|-----|-----|-----|-----|-----|---|
| | Size | T30 | | | | | T32 | T8 | T63 | | | | | | | | | | | | |
| | Fil. ø | 6 | | 9 | | | 7 | 9 | 9 | | | 11 | | | | | | | | | |
| Tex range/Length (mm) | 11 | 33 | 66 | 134 | 33/34 | 68 | 134/136 | 22 | 68 | 136 | 33/34 | 68 | 110 | 134/136 | 45 | 102 | 198 | 204 | 276 | 340 | |
| Construction | | | | | | | | | | | | | | | | | | | | | |
| Veil reinforcement | | | | | | | | | | | • | • | | | | | | | | | |
| Dry wall tapes | | | | | • | • | • | | | | • | • | • | | | | | | | | |
| Roofing, membrane reinf., facing | | | | | • | • | • | | | | • | • | • | | | • | | | | | |
| Facade cladding (EIFS) | | | | | | | | | | | | • | | • | | | | | • | • | |
| Flooring | | | | | • | • | | | | | • | • | • | | | | | | | | |
| Cement Board | | | | | | | | | | | | • | | • | | | | | | | |
| Insect & Sun Screen | | | | | | | | | | | | | | | | | | | | | |
| Architectural fabrics | • | • | • | • | • | • | • | | | | | | | | | | | | | | |
| Ducting (scrim, mesh, ...) | | | | | | | | | | | • | • | | | | | | | | | |
| Decorative fabrics | | • | • | • | • | • | • | | | | • | • | | | | | | | | | |
| Medical, Consumer, Sports and Leisure goods | | | | | | | | | | | | | | | | | | | | | |
| Medical Casting | | • | • | • | • | • | | | | | | | | | | | | | | | |
| Sports/Leisure (direct size fabrics) | | | | | | | | | | | | | | | | | | | | | |
| Sports/Leisure (heat cleanable fabrics) | | | • | • | • | • | • | | | | | | | | | | | | | | |
| Sail cloth reinforcement | | | | | | | | | | | • | | | | | | | | | | |
| Personal Protection (Gloves, ...) | • | | | | | | | | • | | | | | | | | | | | | |
| Consumer Goods (white goods, ...) | | | | | | | | | | | | | | | | | | | | | |
| Industrial & Infrastructure | | | | | | | | | | | | | | | | | | | | | |
| Thermal industrial insulation | | | • | • | • | • | • | | | • | • | | • | • | | | | | • | | |
| Air filtration | | • | • | • | | | | | | • | • | | | | | | | | | | |
| Aluminium filtration | | | | | • | • | • | | | • | • | | | | | | | | | | |
| Liquid filtration | | | | | | | | | | | | | | | | | | | | | |
| PTFE & Silicon Rubber coated fabrics | • | • | • | • | • | • | • | • | | | | | | | | | | | | | |
| Grinding and cutting wheels | | | | | | | | | | | | • | | • | | | | | • | | • |
| Anti corrosion | | | | | | | | | | | | | | | | | | | | | |
| Paper reinforcement | | | | | • | • | | | | | • | • | | • | • | | | | | | |
| Adhesive tapes | | | | | • | • | | | | | • | • | | | • | | | | | | |
| Other composites | • | • | • | • | • | • | • | • | • | • | • | | | | | | | | | | |
| Wind Energy | | | | | | | | | | | | | | | | | | | | | |
| Transportation | | | | | | | | | | | | | | | | | | | | | |
| Aircraft | • | • | • | • | • | • | • | • | • | • | | | | | | | | | | | |
| Transportation (Vehicles, Trains) | | | | | | | | | | | | | | | | | | | | | |
| Rubber reinforcement | | | | | | | | | | | | | • | • | • | | | | | | • |
| Clutch discs, brake linings | | | | | | | | | | • | • | | | • | | | | | | | |
| Marine (LNGC, composites, ...) | | | | | | | • | | | | | | | | | | | | | | |
| Electrica | | | | | | | | | | | | | | | | | | | | | |
| Electrical insulation (Braiding, Knitting) | • | • | • | • | • | • | • | • | • | • | • | • | | | | | • | | | | |
| Electrical insulation (Sleeving) | • | • | • | • | • | | | | | | | | | | | | | | | | |
| Electrical insulation (Mica backing) | • | | | | • | | | | • | | | | | | | | | | | | |
| Electrical insulation (Tape fabrics) | • | • | • | • | • | • | • | • | • | • | | • | • | | | | | | | | |
| Cable reinforcement | | | | | | | • | | | • | | | | | | | | | | | |
| Electronic | | | | | | | | | | | | | | | | | | | | | |
| PCB's | • | | | | • | • | • | • | • | • | | | | | | | | | | | |

| Single Yarn | | | | | | | | | | | | | | Product line | | | | |
|-------------|-----|-----|-----|-----|-----|-----|----|-----|------|----|-----|------|----|--------------|----|--------|-----|---|
| T63 | | | | T64 | T18 | | | | TD37 | | | TD55 | | | | Size | | |
| 13 | | | | 9 | 6 | | 9 | | 9 | | | 13 | 7 | 8 | 9 | Fil. ø | | |
| 136 | 272 | 408 | 544 | 68 | 66 | 134 | 68 | 134 | 34 | 68 | 136 | 300 | 22 | 55 | 33 | 68 | 134 | |
| | | | | | | | | | | | | | | | | | | Tex range/Length (mm) |
| | | | | | | | | | | | | | | | | | | Construction |
| | | | | | | | | | | | | | | | | | | Veil reinforcement |
| | | | | | | | | | | | | | | | | | | Dry wall tapes |
| | | | | | | | | | | | | | | | | | | Roofing, membrane reinf., facing |
| • | • | • | • | • | | | | | | | | | | | | • | • | Facade cladding (EIFS) |
| | | | | | | | | | | | | | | | | | | Flooring |
| | | | | | • | | | | | | | | | | | • | • | Cement Board |
| | | | | | | | | | | | | | | • | • | • | • | Insect & Sun Screen |
| | | | | | | | | | | | | | | | | | | Architectural fabrics |
| | | | | | | | | | | | | | | | | | | Ducting (scrim, mesh, ...) |
| | | | | | • | • | | | | | | | | | | | | Decorative fabrics |
| | | | | | | | | | | | | | | | | | | Medical, Consumer, Sports and Leisure goods |
| | | | | | • | | | | | | | | | | | | | Medical Casting |
| | | | | | | | | | | | • | • | | | | | | Sports/Leisure (direct size fabrics) |
| | | | | | | | | | | | | | | | | | | Sports/Leisure (heat cleanable fabrics) |
| | | | | | | | | | | | | | | | | | | Sail cloth reinforcement |
| | | | | | | | | | | | | | | | | | | Personal Protection (Gloves, ...) |
| | | | | | | | | | | | | | | | | | | Consumer Goods (white goods, ...) |
| | | | | | | | | | | | | | | | | | | Industrial & Infrastructure |
| | | | | | • | • | • | • | | | | | | | | | | Thermal industrial insulation |
| | | | | | • | • | | | | | | | | | | | | Air filtration |
| | | | | | | | | | | | | | | | | | | Aluminium filtration |
| | | | | | | | | | | | | | | | | | | Liquid filtration |
| | | | | | | | | | | | | | | | | | | PTFE & Silicon Rubber coated fabrics |
| • | • | • | • | | | | | | | | | | | | | | | Grinding and cutting wheels |
| | | | | | | | | | • | • | | | | | | | | Anti corrosion |
| | | | | | | | | | | | | | | | | | | Paper reinforcement |
| | | | | | | | | | | | | | | | | | | Adhesive tapes |
| | | | | | • | • | • | • | • | • | • | • | | | | | | Other composites |
| | | | | | | | | | • | • | • | | | | | | | Wind Energy |
| | | | | | | | | | | | | | | | | | | Transportation |
| | | | | | | | | | • | • | • | | | | | | | Aircraft |
| | | | | | | | | | • | • | • | | | | | | | Transportation (Vehicles, Trains) |
| • | | | | | | | | | | | | | | | | | | Rubber reinforcement |
| | | | | | | | | | | | | | | | | | | Clutch discs, brake linings |
| | | | | | | | | | • | • | • | • | | | | | | Marine (LNGC, composites, ...) |
| | | | | | | | | | | | | | | | | | | Electrica |
| | | | | | | | | | | • | • | | | | | | | Electrical insulation (Braiding, Knitting) |
| | | | | | | | | | | | | | | | | | | Electrical insulation (Sleeving) |
| | | | | | | | | | | | | | | | | | | Electrical insulation (Mica backing) |
| | | | | | | | | | | • | | | | | | | | Electrical insulation (Tape fabrics) |
| | | | | | | | | | | | | | | | | | | Cable reinforcement |
| | | | | | | | | | | | | | | | | | | Electronic |
| | | | | | | | | | | | | | | | | | | PCB's |

4 Recommended Texturized, Voluminized, Zerotwist / Direct Roving and Chopped Strands by application

| Product line | Tex. | | Vol. | | | | ZT | | | | DR | | | CS | | | | | | | | |
|--|------------|-------------|----------|---------|------------|-----------|-----|------|-----|-----|------|-----|-----|------|--------|------|-------|------|------|------|------|---|
| | Size | T10 k252 | T10 | | | | T10 | TD22 | T99 | | TD44 | T30 | | | TC05 | | | | | | | |
| File # | 9 | 9 | 9 | 11 | 13 | 14 | 9 | 9 | 13 | 16 | 13 | 14 | 14 | 6 | | | 6 | 7 | | | | |
| Tex range/Length (mm) | T140-T2857 | T140-T420 | 142-1440 | 220-880 | 1300, 2500 | 665, 5000 | 136 | 68 | 136 | 200 | 280 | 300 | 300 | 3 mm | 4,5 mm | 6 mm | 12 mm | 3 mm | 6 mm | 3 mm | 6 mm | |
| Construction | | | | | | | | | | | | | | | | | | | | | | |
| Veil reinforcement | | | | | | | | | | | | | | | | | | | | | | |
| Dry wall tapes | | | | | | | | | | | | | | | | | | | | | | |
| Roofing, membrane reinf., facing | | | | • | | | | | | | | | | | | | | | | | | |
| Facade cladding (EIFS) | | | | | | | | | | | • | • | • | | | | | | | | | |
| Flooring | | | | | | | | | | | | | | | | | | | | | | |
| Cement Board | | | | | | | | | | | | | | | | | | | | | | |
| Insect & Sun Screen | | | | | | | | | | | | | | | | | | | | | | |
| Architectural fabrics | | | | | | | | | | | | | | | | | | | | | | |
| Ducting (scrim, mesh, ...) | | | | | | | | | | | | | | | | | | | | | | |
| Decorative fabrics | | • | • | • | | | | | | | | | | | | | | | | | | |
| Medical, Consumer, Sports and Leisure goods | | | | | | | | | | | | | | | | | | | | | | |
| Medical Casting | | | | | | | | | | | | | | | | | | | | | | |
| Sports/Leisure (direct size fabrics) | | | | | | | | • | • | • | | | | | | | | | | | | |
| Sports/Leisure (heat cleanable fabrics) | | | | | | | | • | | | | | | | | | | | | | | |
| Sail cloth reinforcement | | | | | | | | • | | | | | | | | | | | | | | |
| Personal Protection (Gloves, ...) | | | | | | | | | | | | | | | | | | | | | | |
| Consumer Goods (white goods, ...) | | | | | | | | | | | | | | | | | | | | | | |
| Industrial & Infrastructure | | | | | | | | | | | | | | | | | | | | | | |
| Thermal industrial insulation | • | | • | • | • | • | • | | | | | | | | | | | | | | | |
| Air filtration | | | | | | | | | | | | | | | • | • | • | • | • | • | • | • |
| Aluminium filtration | | | | | | | | | | | | | | | | | | | | | | |
| Liquid filtration | | | | | | | | | | | | | | | • | • | • | • | • | • | • | • |
| PTFE & Silicon Rubber coated fabrics | | | | | | | | | | | | | | | | | | | | | | |
| Grinding and cutting wheels | | | | | | | | | | | | | | | | | | | | | | |
| Anti corrosion | | | | | | | | | | | | | | | | | | | | | | |
| Paper reinforcement | | | | | | | | | | | | | | | | | | | | | | |
| Adhesive tapes | | | | | | | | | | | | | | | | | | | | | | |
| Other composites | | | | | | | | • | • | • | | | • | | | | | | | | | |
| Wind Energy | | | | | | | | • | • | • | | | • | | | | | | | | | |
| Transportation | | | | | | | | | | | | | | | | | | | | | | |
| Aircraft | | | | | | | | | | | | | | | | | | | | | | |
| Transportation (Vehicles, Trains) | | | | | | | | • | • | • | | | • | | • | • | | | | | | |
| Rubber reinforcement | | | | | | | | | | | | | | | | | | | | | | |
| Clutch discs, brake linings | | | • | • | • | • | | | | | | | | | | | | | | | | |
| Marine (LNGC, composites, ...) | | | | | | | | • | • | • | | | • | | | | | | | | | |
| Electrica | | | | | | | | | | | | | | | | | | | | | | |
| Electrical insulation (Braiding, Knitting) | | | | | | | | | | | | | | | | | | | | | | |
| Electrical insulation (Sleeving) | | | | | | | | | | | | | | | | | | | | | | |
| Electrical insulation (Mica backing) | | | | | | | | | | | | | | | | | | | | | | |
| Electrical insulation (Tape fabrics) | | | | | | | | | | | | | | | | | | | | | | |
| Cable reinforcement | | | | | | | | | | | | | | | | | | | | | | |
| Electronic | | | | | | | | | | | | | | | | | | | | | | |
| PCB's | | | | | | | | | | | | | | | | | | | | | | |

4 Recommended C-Glass Staple Fiber by application

Applications

- Wall covering
- Roofing
- Thermal insulation
- Liquid filtration
- Mist elimination

5 Technical Data sheets references

Available from your sales force

Single yarns

Product description – Product properties and applications

Packaging information – Standard product range

Texturized products

Product description – Product properties and applications

Packaging information – Standard product range

Voluminized products

Product description – Product properties and applications

Packaging information – Standard product range

ZeroTwist® / Direct Roving

Product description – Product properties and applications

Packaging information – Standard product range

Textile Chopped Strands

Product description – Product properties and applications

Packaging information – Standard product range

C-Glass Staple Fiber

Product description – Product properties and applications

Packaging information – Standard product range

Safe Use Instruction Sheet (SUIS) for E-glass and C-glass
Vetrotex products

5 Guide to standardization

(glass reinforcements)

| Reference | ISO |
|---|-------|
| General | |
| Basic concepts – Terminology | 472 |
| Sampling method | 1886 |
| Textiles, Standard atmospheres for conditioning + testing Yarns | 139 |
| Designation Textile Glass | 2078 |
| Basis for a specification | 3598 |
| Basis for a textile strand specification | 12654 |
| Basis for texturised strand specification | 8516 |
| Determination of linear density | 1889 |
| Determination of combustible matter content | 1887 |
| Determination of moisture content | 3344 |
| Determination of twist | 1890 |
| Determination of twist balance index | 3343 |
| Determination of breaking force + breaking elongation | 3341 |
| Determination of filament diameter | 1888 |

5 Glass strand products

Units: metric and U.S. systems

Filament diameter

| Metric system | Microns | U.S. system symbols | Inches |
|------------------------|---------|---------------------|---------|
| 1µm = 1/1000 mm | 5 µm | D | 0.00021 |
| (0.001 mm = .00004 in. | 6 µm | DE | 0.00025 |
| | 7 µm | E | 0.00029 |
| | 8 µm | F | 0.00032 |
| | 9 µm | G | 0.00036 |
| | 10 µm | H | 0.00042 |
| | 12 µm | J | 0.00048 |
| | 13 µm | K | 0.00051 |
| | 14 µm | L | 0.00056 |
| | 17 µm | N | 0.00068 |
| | 24 µm | T | 0.00096 |

Twist of textile yarns - 1 TPI (turn per inch) = 40 t/m (turns per meter)

Linear densities of yarns and rovings

| Metric tex (g/km) | Yardage h.y.p.p. (100 yds/1lb) | Metric tex | Yardage y.p.p. (yds/1lb) |
|-------------------|--------------------------------|------------|--------------------------|
| 2.8 tex | ≈ 1800 h.y.p.p. | 160 tex | 3100 y.p.p. |
| 5.5 | 900 | 660 | 750 |
| 11 | 450 | 1100 | 450 |
| 22 | 225 | 1200 | 416 |
| 34 | 150 | 2400 | 207 |
| 68 | 75 | 4800 | 104 |

$$\text{tex} = \frac{4961}{\text{h.y.p.p. (hundreds of yards per pound)}}$$

$$\text{tex} = \frac{500\,000^*}{\text{y.p.p. (yards per pound)}}$$

$$\text{h.y.p.p.} = \frac{4961}{\text{tex}}$$

$$\text{y.p.p.} = \frac{500\,000^*}{\text{tex}}$$

* exact value :
496.052

Surface densities of mats and fabrics

| Mats | Fabrics |
|---|------------------------------------|
| 1 oz.sq.ft = 300 g/m ² | 1 oz.sq.ft = 34 g/m ² |
| 1.5 oz.sq.ft = 450 g/m ² | 3 oz.sq.ft = 100 g/m ² |
| 2 oz.sq.ft = 600 g/m ² | 24 oz.sq.ft = 800 g/m ² |
| 1 g/m ² = 0.00328 oz.sq.ft = 0.0295 oz.sq.yd | |

5 Measurement Units

Metric and U.S. systems Standard

Mass oz : ounce, lb : pound

| | |
|-----------------|-----------------|
| 1 oz = 28,35 g | 1 g = 0.035 oz |
| 1 lb = 0.454 kg | 1 kg = 2.205 lb |

Force N : Newton, daN : decaNewton

| | |
|--------------------------------|-------------------------------|
| 1 N = 0,102 kgf ≈ 0,1 kgf | 1 daN = 1,02 kgf = 1 kgf |
| 1 kgf = 9,81 N = 10 N or 1 daN | 1 kgf = 2.2046 lbf |
| 1 N = 0,225 lbf : pound force | 1 lbf = 4,4482 N = 0,4536 kgf |

Strength Pa : Pascal, MPa : (megaPascal) = 1 N/mm²

| |
|--|
| 1 MPa = 10 bars = 0.1 hbar = 10 kgf/cm ² or 0.1 kgf/mm ² |
| 1 bar = 0,1 MPa = 105 Pa = 1 daN/cm ² = 1 kgf/cm ² |
| 1 hbar = 10 MPa = 107 Pa = 1 kgf/mm ² |
| 100 p.s.i. (lbf/in ²) = 0,69 MPa |
| 1 MPa = 145 p.s.i. |
| 1 p.s.i. (lbf/in ²) = 6 894,76 Pa = 0,0703 kgf/cm ² |

Length yd : yard, ft : foot, in : inch

| | |
|-----------------------------------|------------------|
| UK Mile : 1 mile = 1,609 km | 1 km = 0.62 mile |
| Nautical Mile : 1 mile = 1,852 km | 1 km = 0.54 mile |
| 1 yd = 0,9144 m | 1 m = 1.09 yd |
| 1 ft (1/3 yd) = 0,3048 m | 1 m = 3.281 ft |
| 1 in (1/12 ft) = 2,54 cm | 1 cm = 0.39 in |

Surface 1 square inch = 6,45 cm² 1 cm² = 0.15 sq.in

| | |
|--------------------------------------|----------------------------------|
| 1 square yard = 0,83 mv | 1 m ² = 1.19 sq.yd |
| 1 square foot = 0,093 m ² | 1 m ² = 10.76 sq.ft |
| 1 square mile = 2,59 km ² | 1 km ² = 0.39 sq.mile |
| 1 acre = 0,40 ha | 1 ha = 2.47 acre |

Volume 1 cubic inch = 16,39 cm³ 1 cm³ = 0.06 cub.in

| | |
|--------------------------------------|----------------------------------|
| 1 cubic yard = 0,76 m ³ | 1 m ³ = 1.31 cub.yd |
| 1 cubic foot = 28,31 dm ³ | 1 dm ³ = 0.035 cub.ft |

Density 1 lb/in³ = 27,68 g/cm³ 1 g/cm³ = 0.036 lb/in³

| | |
|--|---|
| 1 lb/ft ³ = 0,016 g/cm ³ | 1 g/cm ³ = 62 lb/ft ³ |
|--|---|

| | | |
|----------|------------------------------|----------------|
| Capacity | (US) Gallon : 1 gal = 3,78 l | 1 l = 0.26 gal |
| | (UK) Gallon : 1 gal = 4,54 l | 1 l = 0.21 gal |

| | | |
|-------------|------------------------------------|------------------------------|
| Consumption | (US) 10 miles/gal = 23,5 l/100 km | 10 l/100 km = 23.8 miles/gal |
| | (UK) 10 miles/gal = 28,21 l/100 km | 10 l/100 km = 29.5 miles/gal |

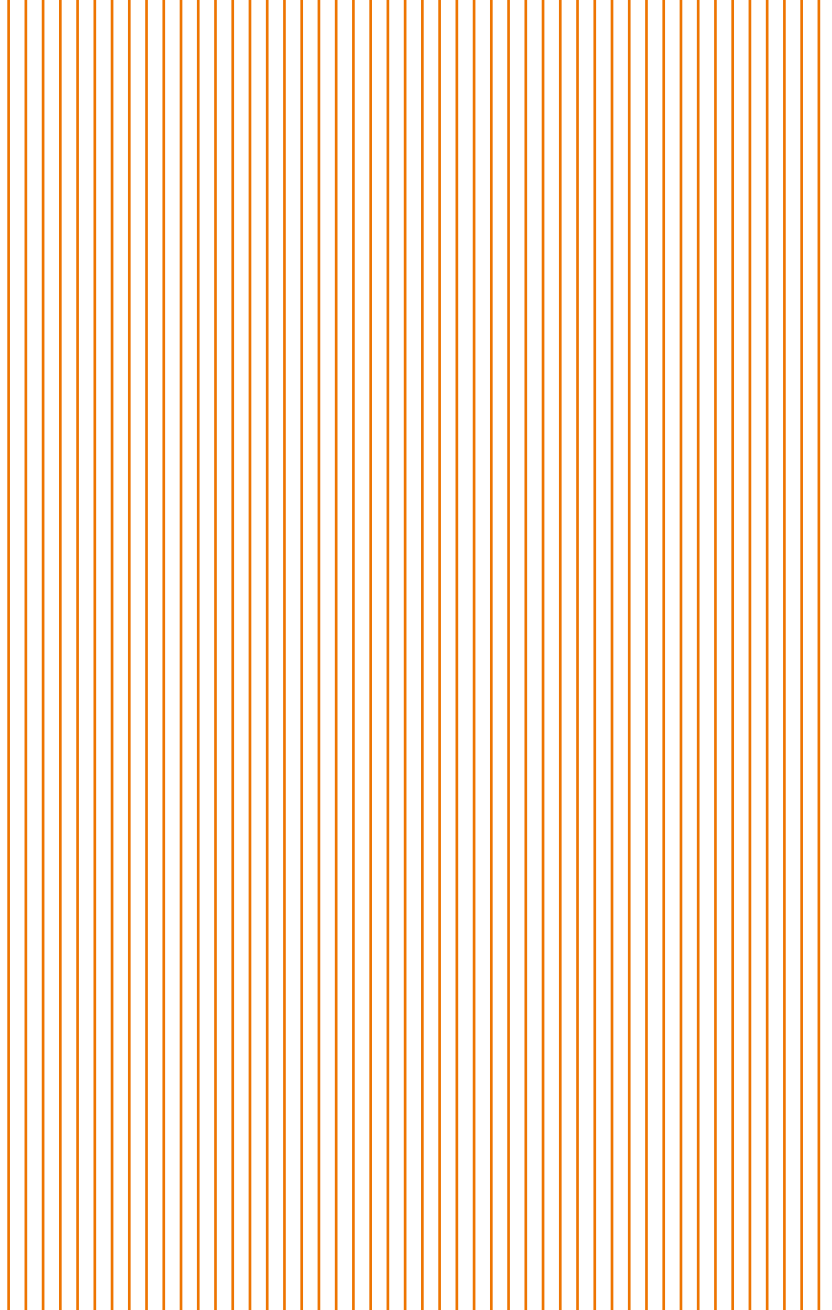
| | |
|----------|---------------------------------|
| Velocity | 1 km/h = 0,2778 m/s |
| | 1 mph = 1,609 km/h = 0,4470 m/s |

| | | |
|------------------------|---|--------------------------------|
| Energy = Heat Power | J : Joule, cal : calorie, th : thermal unit | |
| | W : Watt = 1 J/s | |
| | 1 Wh = 3 600 J = 0,860 kcal | 1 kcal = 4 185,5 J = 1,1626 Wh |
| | 1 kJ = 0,2389 kcal | 1 cal = 4,185 J |
| | 1 J = 0,2389 cal | 1 th = 1 000 kcal |

tep : ton (metric) equivalent fuel oil
tec : tonne (metric) equivalent coal

| |
|---|
| 1 tep = 10000 th = 11626 kWh = 11,6 MWh = 1.5 tec = 1100 Nm ³ natural gas |
| Specific heat : kJ/kg.K : kilojoule per kilogramme × Kelvin |
| Thermal conductivity l : 1 W/m.K or W/m.°C = 0,860 kcal/m.h.°C |
| 1 kcal/m.h.°C = 1.1626 W/m.K |
| Coefficient of thermal transmission : 1 W/m ² .K or W/m ² .°C = 0,860 kcal/m ² .°C |
| Coefficient of thermal loss : 1 W/m ³ .K or W/m ³ .°C = 0,860 kcal/m ³ .h°Cw |

| | | |
|-------------|--|-----------------|
| Temperature | K : Kelvin , °C : degree Celsius, °F : degree Fahrenheit | |
| | Interval of temperature : 1° kelvin = 1° Celsius | |
| | TK = q °C + 273.15 | |
| | TK = q °C + 273.15 | 100 °C = 212 °F |
| | °F = 1,8 °C + 32 = 9/5 °C + 32 | |
| | rough calculation °F = (°C × 2) – 10 % + 32 | |
| | °C = 5/9 × (°F – 32) = 0.55 × (°F – 32) | |
| | rough calculation °C = (°F – 32) × 1/2 + 1/20 + 1/200 + 1/2 000 +... | |





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