

# Tenax™ DRY REINFORCEMENTS

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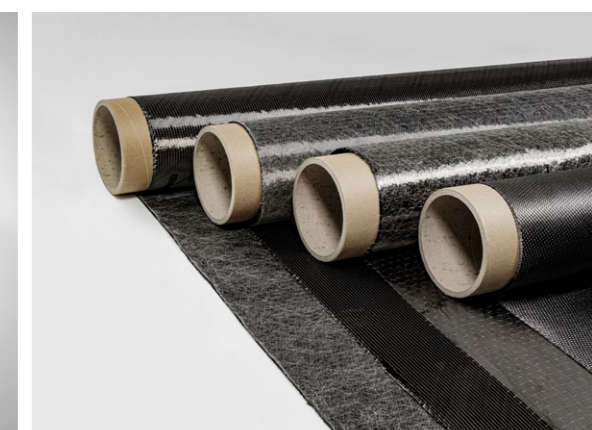
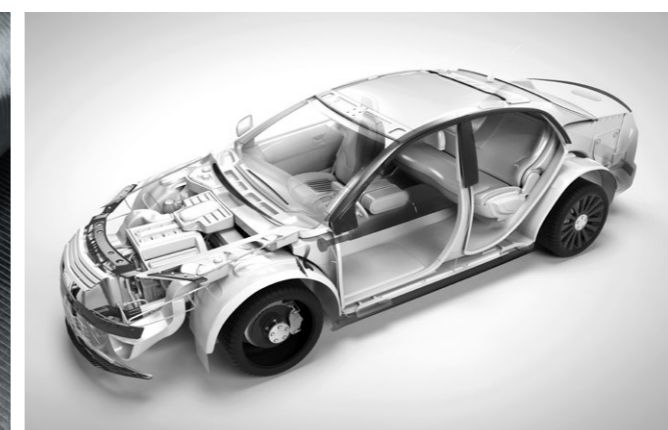
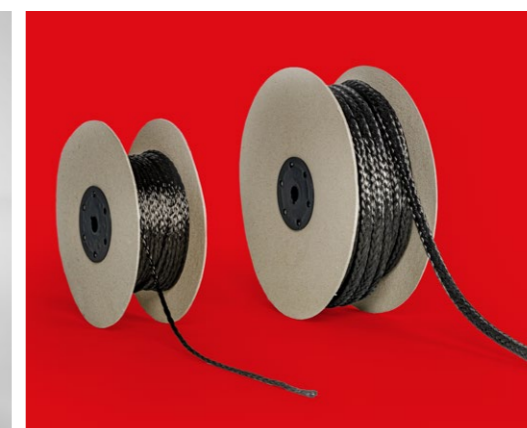
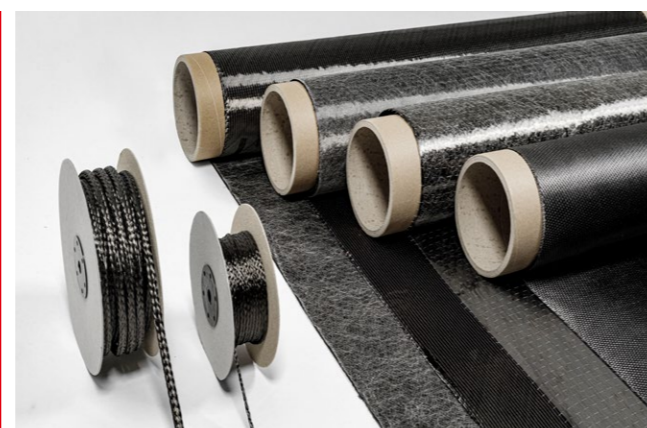
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# Tenax™ DRY REINFORCEMENTS

Combining textile technologies with resin infusion processes provides excellent potential for high production rates, integral structures, complex shapes and flexibility in part design. With Teijin's Tenax™ Dry Reinforcements (DR) we offer dry reinforcing textile materials serving as the ideal base for the manufacturing of high quality carbon fiber-reinforced components. Teijin's DR family consists of

- Tenax™ Dry Reinforcement Non-Crimp Fabric (DRNF)
- Tenax™ Dry Reinforcement Woven Fabric (DRWF)
- Tenax™ Dry Reinforcement Braided Fabrics (DRBF)

The products from each product type can be used stand-alone or can be combined with one another across the different product types resulting in package solutions to optimally meet customer needs.

Tenax™ Dry Reinforcements feature a range of products providing highest performance and flexibility as well as high lay down rates for increased production efficiency. Our product range geared towards aerospace and industry applications provides a cost-competitive solution and meets current market standards while allowing tailoring to customer-specific requests such as class A surface requirements.

Tenax™ Dry Reinforcement materials are dry carbon fiber textiles which can be used with common infusion technologies. Our products are compatible with epoxy resins available on the market, BMI as well as cyanate esters resins. Tenax™ Dry Reinforcements can be combined as a package solution with Teijin's thermos-set resins (RTM and rapid cure).

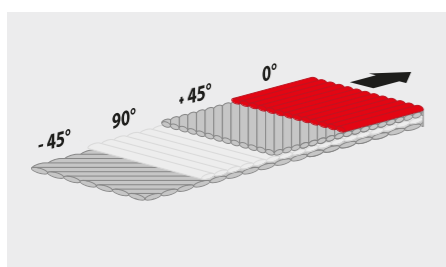


## Tenax™ DRY REINFORCEMENT NON-CRIMP FABRICS

Tenax™ Dry Reinforcement Non-Crimp Fabrics (DRNF) consist of multiple carbon layers of different orientations knitted together. Multiaxial fabrics combine excellent yarn alignment with a low level of undulation allowing the customer to manufacture parts with enhanced mechanical properties and a smooth and even material surface.

### Benefits of Non-Crimp Fabric materials

- Excellent strength, stiffness and fatigue life
- Enables high lay-down rates
- Complex lay-ups possible with optimized weight distribution across plies
- Optimized drapeability and infusion behavior tailored to customer requests
- Low level of material bulk for preforming
- Improved preforming and toughness behavior possible
- High fiber volume content (>55%) even with toughened and powder-bindered material in infusion technology (e.g. via pure vacuum process) demonstrated
- Room temperature storage and transport



### CAPABILITIES

Tenax™ Carbon Fiber	Tenax™- E HTS45 E23 12K 800tex Tenax™- E IMS65 E23 24K 830tex Tenax™- E ITS55 E23 24K 1600tex Tenax™ STS40 F13 24K 1600tex S
Number of CF-layers	Up to 4 layers
Layer orientation	0°, from -30° to +30°
Additions	<ul style="list-style-type: none"> <li>■ Powder Binder (PB)</li> <li>■ Toughening Veil (V)</li> <li>■ Lightning Strike Protection</li> <li>■ Tracer Yarns</li> </ul>
Constructions	<ul style="list-style-type: none"> <li>■ BD (bidiagonal), BA (biaxial)</li> <li>■ TA (triaxial)</li> <li>■ QA (quadraxial)</li> </ul>
Standard fiber areal weight per layer	97 g/m <sup>2</sup> up to 360 g/m <sup>2</sup>
Width	Up to 100" (2540 mm), customer specific upon request

### SELECTION FROM OUR PRODUCT PORTFOLIO

Product key	Product class	Construction	Fiber areal weight [g/m <sup>2</sup> ]	Total areal weight [g/m <sup>2</sup> ]
710089	DRNF IM BD 0380	PB/+45°V/-45°V	380	402
710090	DRNF IM BD 0380	PB/-45°V/+45°V	380	402
710091	DRNF IM BA 0380	V/0°V/90°/PB	380	402
710092	DRNF IM BA 0380	V/90°V/0°/PB	380	402
710117	DRNF ST BD 0400	+45°/-45°	400	404
710118	DRNF ST BD 0600	+45°/-45°	600	604
710120	DRNF ST QA 0800	-45°/90°/+45°/0°	800	804

PB = Powder Binder  
V = Veil

## Tenax™ DRY REINFORCEMENT WOVEN FABRICS

Tenax™ Dry Reinforcement Woven Fabrics (DRWF) range from classic woven fabrics offering reinforcement in both 0° and 90° orientation and excellent drapeability to unidirectionally reinforced (UD) woven fabrics. Our UD-woven materials mechanically perform on a near prepreg-level due to optimized fiber alignment and minimalized undulation. Our woven capabilities include:

- Available in various fiber types (12K and 24K specifically for UD woven materials matching our DRNF product range)
- Improved preforming and toughness behavior possible
- Optimized drapeability and infusion behavior tailored to customer requests
- Customer-specific material width and roll lengths possible

### SELECTION FROM OUR PRODUCT PORTFOLIO

Product key	Product class	Construction	Weave pattern	Fiber areal weight [g/m <sup>2</sup> ]	Total areal weight [g/m <sup>2</sup> ]
720009	DRWF HT UD 0194	0°/PB	Plain Weave	194	203.5
720007	DRWF HT UD 0194	0°	Plain Weave	194	196
720008	DRWF IM UD 0268	PB/0°/PB	Plain Weave	268	276
720027	DRWF HT HS 0370	0°+ 90°	Harnish Satin	370	370

PB = Powder Binder

## Tenax™ DRY REINFORCEMENT BRAIDED FABRICS

Dry Reinforcement Braided Fabrics (DRBF) are a popular solution for filler structures in composite parts offering a continuous structure with an even weight distribution and flexibility in diameter. Manufactured out of virgin carbon fiber, our braided structures come with a high level of mechanical performance exceeding alternative filler solutions in strength and stiffness.

- Available in various fiber types (12K and 24K matching DR textile materials)
- High flexibility in diameters and density

### SELECTION FROM OUR PRODUCT PORTFOLIO

Product key	Product class	Construction	Total areal weight [g/m <sup>2</sup> ]
		Number of braid yarns	Number of core yarns
730003	DRBF HT 06 05.30	4	2
730005	DRBF HT 12 10.10	8	4
730007	DRBF HT 56 67.00	56	-

