



# TAILORED CYLINDRICAL WARP-KNITTED FABRIC FOR INSULATION AND REINFORCEMENT

SHINDO IM COMPANY

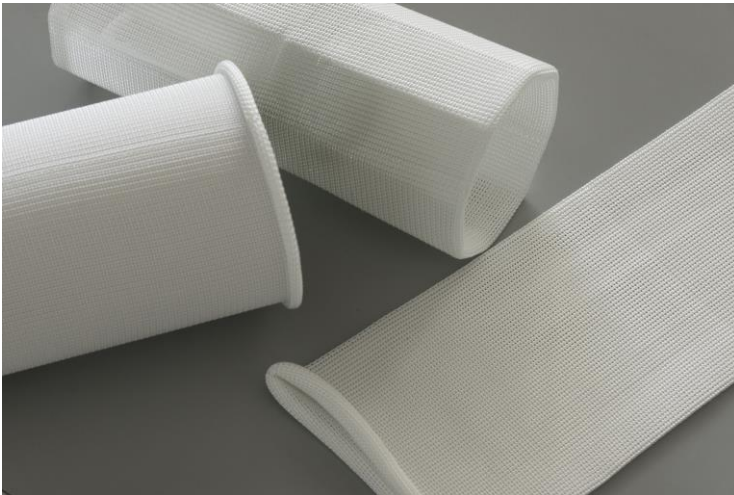


Fig. 1 Tailored cylindrical material by SHINDO IM Company.

## ABSTRACT

Our tailored cylindrical warp-knitted fabric is ideal for insulation and reinforcement applications. Its unique properties such as high amenability to stretching and a seamless configuration enable it to achieve excellent shape-tracking flexibility and robustness, respectively. We achieve high design flexibility in terms of material selection, diameter, warp-knitting configuration, thickness and a separated cylindrical configuration using our customized warp-knitting machine. In addition, our material features complex properties such as heat and electrical insulation, and reinforcement.

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## ABOUT US

Headquartered in Fukui, Japan, SHINDO IM Company is a global company premised on textile manufacturing. Current products of focus include non-crimp fabrics), carbon/glass fibre-reinforced thin prepreg with thermoplastic resins and functional knitting textiles (flame-resistant or 3D fabrics)..

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FEATURES

The main features that underpin SHINDO IM Company’s tailored cylindrical warp-knitted fabrics are “high design flexibility” and “unique properties” (Fig. 2). In terms of design flexibility, end-users have their choice of materials, cylinder diameter, separated cylindrical configuration, customized warp-knitting design and thickness. Our fabrics also exhibit high amenability to stretching and have a seamless configuration (Fig. 3). Our fabrics can be stretched in every direction, which leads to excellent shape-tracking characteristics, even for highly complex shapes. Moreover, a seamless configuration facilitates a highly smooth surface profile. An S–S diagram shows that our fabric’s failure elongation is 3 times higher than conventional woven fabrics of the same fibre areal weight (Fig. 4).

FIGURES



Fig. 2 Distinct features of tailored cylindrical material.



Fig. 3 High amenability to stretching and a seamless configuration are unique properties of our tailored cylindrical materials.

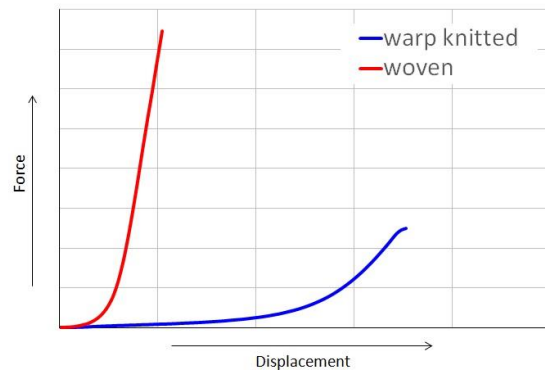


Fig. 4 High flexibility (imparted by a seamless configuration) and excellent stretching properties as per the S–S diagram, compared with woven fabrics.

DESIGN FLEXIBILITY

One can select a wide range of materials that comprise fibres such as glass, aramid, silica and stainless are all applicable. End-users can select materials in accordance with their requirements and applications (Fig. 5). The underlying configuration is also flexible. The cylinder diameter and thickness can range from 5 to 1000 mm and 0.5 to 3.0 mm, respectively (Fig. 6). The warp-knitting design can be also customized at the user’s request (Fig. 7). Design flexibility facilitates optimization of the meshing configuration to effectively balance the needs of shape tracking and insulation. Separated cylindrical configuration can be designed and also used for various branched structures.

FIGURES

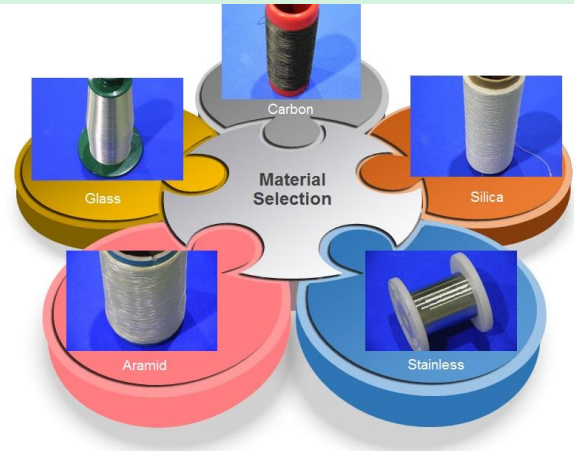


Fig. 5 Our tailored cylindrical materials comprise a wide range of substances.

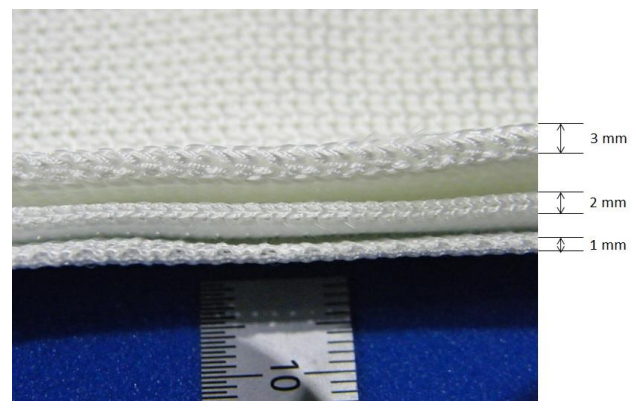


Fig. 6 Diameter and thickness design flexibility.

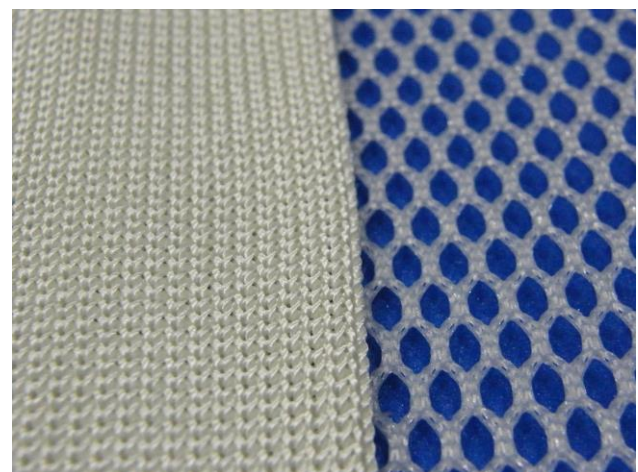


Fig. 7 Warp-knitting design flexibility.

APPLICATIONS

Applications of our tailored cylindrical fabrics include insulation and reinforcement (Fig. 8). Glass fibres are representative examples. For heat insulation, we have produced roller cover materials for high-temperature product conveyance or heated pipes (Fig. 9). Pipe renovation is a representative application of a reinforcement function (Fig. 10). This renovation method can be applied to repair the inside of a sewer pipeline while avoiding the problems such as multiple steps, joint misalignment and cracks without replacing existing pipes. Once the fabrics are applied inside pipelines, one ultraviolet-sensitive matrix resins can be impregnated and cured with light to render them into composites. This renovation method is very cost- and time-effective compared with complete pipeline replacement. Reinforcement is also applicable to thermal protection for cables comprising a silicone rubber matrix or a thin metal sheet combination with flexibility. Fishing rods, rackets (for badminton or tennis) and baseball bats are additional sports and leisure applications.

Our tailored cylindrical fabrics have yet more potential to be employed in a wide range of applications. Customized design capability by SHINDO IM Company will be a breakthrough for additional innovations and solutions.

FIGURES

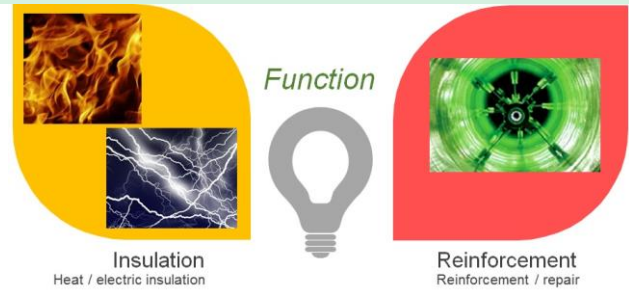


Fig. 8 Conceptual functional applications of our tailored cylindrical material.

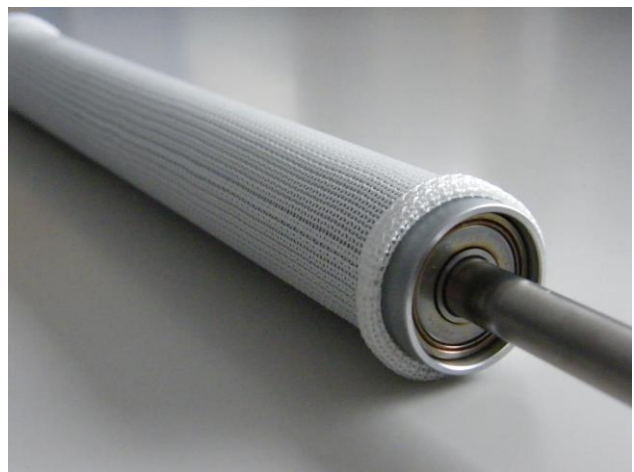


Fig. 9 Covered roller application of our tailored cylindrical fabric.



Fig. 10 Pipeline renovation before (left) and after (right) using our glass cylindrical material with resin-impregnated composites.