

TECHNICAL PROPERTIES OF LANTOR B.V. SORIC® flexible core.

Acoustic properties

Soric® flexible core is expected to act as a semi-sound barrier, it creates a certain thickness with enclosed cells in the core of the laminate which will dampen sound waves.

The microspheres present are creating a layer with hollow closed spheres in a Soric® laminate and as a result is expected to have (slightly) better sound insulating properties in comparison to a full glass laminate.

Laminate calculation service

Lantor B.V. has a laminate calculation service. Lantor can calculate the effect of Soric® flexible core on the mechanical properties of a laminate. E.g when hand-lay-up as a process is used Lantor B.V. compares the properties of the hand-lay-up laminate with a new laminate in e.g vacuum infusion using Soric® flexible core. It is also possible to compare infusion laminates with each other.

Compatibility with resins

The compatibility of Soric® flexible core with different types of resins is shown below.

Resin	Compatibility
Unsaturated Polyester	Compatible
Vinylester	Compatible
Epoxy	Compatible
Polyurethane	Compatible
Phenolic	Compatible

It is possible to use Soric® flexible core in combination with filled resins. For the infusion process resin viscosity ideally lies below 200 cps. For other processes the viscosity might be higher. Soric® flexible core is used with filled resins which are used in order to create better surface quality or improve fire resistance properties.

Density

Dry weight is normally given in g/m² and impregnated density g/cm³

Product code	TF2	SF2	SF3	XF2	XF3	XF4	XF5	XF6
Soric dry weight (g/m ²)	130	130	180	140	190	260	320	375
Resin uptake (kg/m ²)	1.0	1.0	1.3	1.0	1.4	1.9	2.4	2.8
Soric density impregnated (kg/m ³)	700	700	600	600	600	600	600	600

Double layers of Soric

Applying two layers of Soric® flexible core directly on top of each other is possible.

The bonding between the Soric® flexible core layers is excellent; it is not necessary to use a layer of CSM between the layers of Soric® flexible core.

Several tested laminates with two layers of Soric® flexible core in a flexural and tensile test showed no failure was present between the layers of Soric.

Fire resistance

The lowest oxygen index (LOI) for Soric® flexible core lies between 20-21% , meaning the pure material itself can be considered as combustible which is to be expected from a thermoplastic material.

When Soric® flexible core is used in combination with fire resistant resins, a good level of fire resistance however can be obtained.

Siemens Axiva GmbH evaluated fire resistant Epoxy laminates with Soric® flexible core according to DIN5510.

Their findings/ classification were:

Flammability: S4
Smoke development: SR2
Drip forming: ST2

This means a fire resistant epoxy laminate with Soric® flexible core after heating of 8 seconds with a flame caught fire, but after removal of the flame extinguished within 1 second. Sufficient to be homologated in the ICE-3 train in Germany.

Mechanical properties

Typical properties of Soric® flexible core impregnated with Unsaturated Polyester resin. Differences between the types are mainly caused by the differences in resin absorption.

Mechanical property	TF	SF	XF	Test method
Flexural strength N/mm ²	17	12	7	ASTM D790
Flexural modulus N/mm ²	1400	1000	800	ASTM D790
Tensile strength across layers N/mm ²	6	5	4	ASTM C297
Compression strength (10% strain) N/mm ²	3	3	7	ISO 844
Shear strength N/mm ²	6	5	3	ASTM C273
Shear modulus N/mm ²	30	35	35	ASTM C273

Pressure resistance of Soric

Soric® flexible core keeps stays intact, keeps it's thickness, under pressure both under vacuum pressure (-1 bar) as RTM-pressures (3-10 bar).

The compression of Soric® flexible core at -1 bar (VI) is about 15%.

Temperature resistance

Lantor Soric® flexible core has been tested for temperature resistance.

Long term maximum temperature is 170 °C, short term temperature resistance is 200 °C.

With respect to heat resistance, tests were performed exposing a UP laminate with Soric® flexible core to 80 °C for 2 periods of three hours and 180 °C for 1 hour.

Visual inspection did not show any deterioration or delamination.

Water absorption

Lantor BV tests water absorption of Soric® flexible core with samples of Soric® which have been impregnated with resin, but do not have glass skins. The sides of these plates are sawn, this means the Soric® flexible core cells are directly exposed to water.

The results of a 28 day immersion in distilled water at 35 degrees Celsius were:

- Soric XF, impregnated, 75 mm x 75 mm, water absorption, 4.5 g
- Soric SF, impregnated, 75 mm x 75 mm, water absorption, 1.9 g
- Soric TF, impregnated, 75 mm x 75 mm, water absorption, 1.4 g

Mechanical properties of the samples after 28 days of water absorption at 35 °C are at least 65% of the properties before immersion.

Sufficient to obtain a ABS certificate of Design Assessment (04-LD425509-PDA) for the Marine industry.

Cosmetics

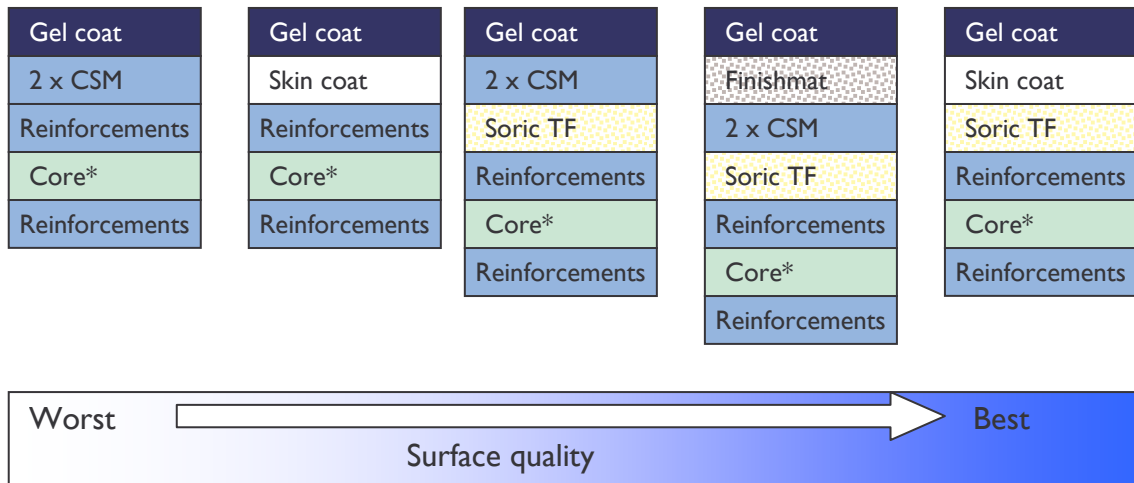
Soric® TF flexible core can be used as an infusion core and as a print through barrier at the same time. Soric® TF blocks print through of glass reinforcements like multiaxials or woven roving and/or print through of cores like PVC foam and Balsa.

Soric TF blocks print through more efficient than a skin coat, however to use Soric® TF in combination with a skin coat or without a skin coat is possible.

In Lantor’s BV experience the best surface quality can be obtained by using a skin coat and Soric TF.

An alternative is Lantor Finishmat D7760, a veil of acrylic fibres which smoothens the resin in the very top of a laminate.

The schematic elow shows possibilities one has in order to improve surface quality.



Thermal Insulation

The thermal insulation of impregnated Soric has been measured according to ISO 8302. The tests were conducted with impregnated XF4 (resin type Synolite 6811-N1).

Coefficient of thermal conductivity: 0,064 W/(m.K).

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