

Steel

bondal[®] CPT

Product information for steel sandwich material
with a viscoelastic polymer core layer

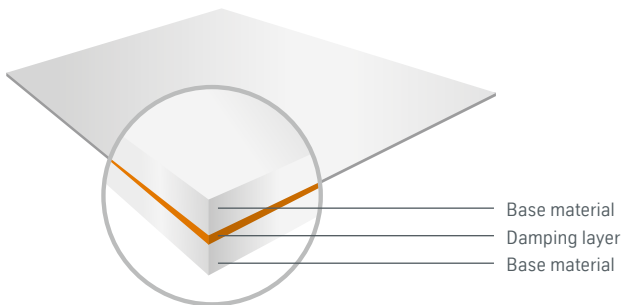


thyssenkrupp

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Material structure

Sandwich structure



Base material

Hot-dip coated or uncoated sheet. The applicable standards are DIN EN 10130, DIN EN 10346 and the corresponding standards for dimension and shape tolerances for the above grades. As bondal[®] is a special product, inquiries for steels for use in construction, steels with high yield strength for cold forming and multiphase steels are subject to a prior feasibility check.

Damping layer

The base material is coated with a damping layer of an acrylate-containing physically bonding pressure-sensitive adhesive PSA. The adhesion of the adhesive between the cover sheets is determined by the contact pressure. As the contact pressure increases, adhesion improves to a certain extent. From a physical perspective, the adhesive between the cover sheets behaves like a highly viscous, plastically and elastically formable liquid.

Conductive additives

Sponge iron

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Dimensions of individual sheets

- Thickness, min: 0.5 mm (sheet thickness incl. coating)
- Thickness, max: 1.0 mm (sheet thickness incl. coating)
- Width: 600 to 1,480 mm

Production

Coil ID: 508 mm / 610 mm

Product characteristics ¹⁾

Thickness of damping layer

40 µm ± 5 µm

Adhesion ²⁾

- Peel strength: min. 30 N/cm
(according to DIN EN ISO 11339:2010-06)
- Shear strength: min. 3.0 N/mm²
(with restriction according to DIN EN 1465:2009-07)

Thermal behavior ³⁾

- Short-term load: max. 200°C/30 min
- Run-out resistance: max. 200°C
- Decomposition temperature: from 240°C

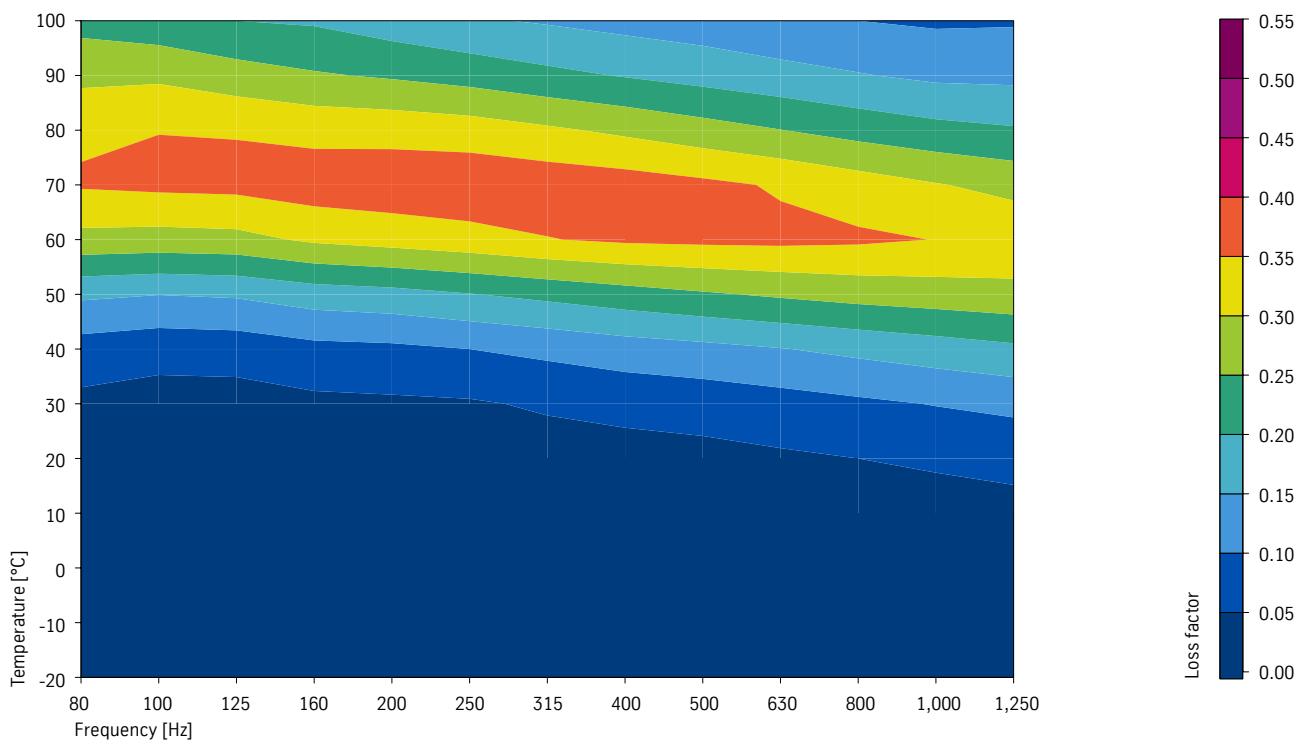
Damping properties of composite

Material: bondal® CPT

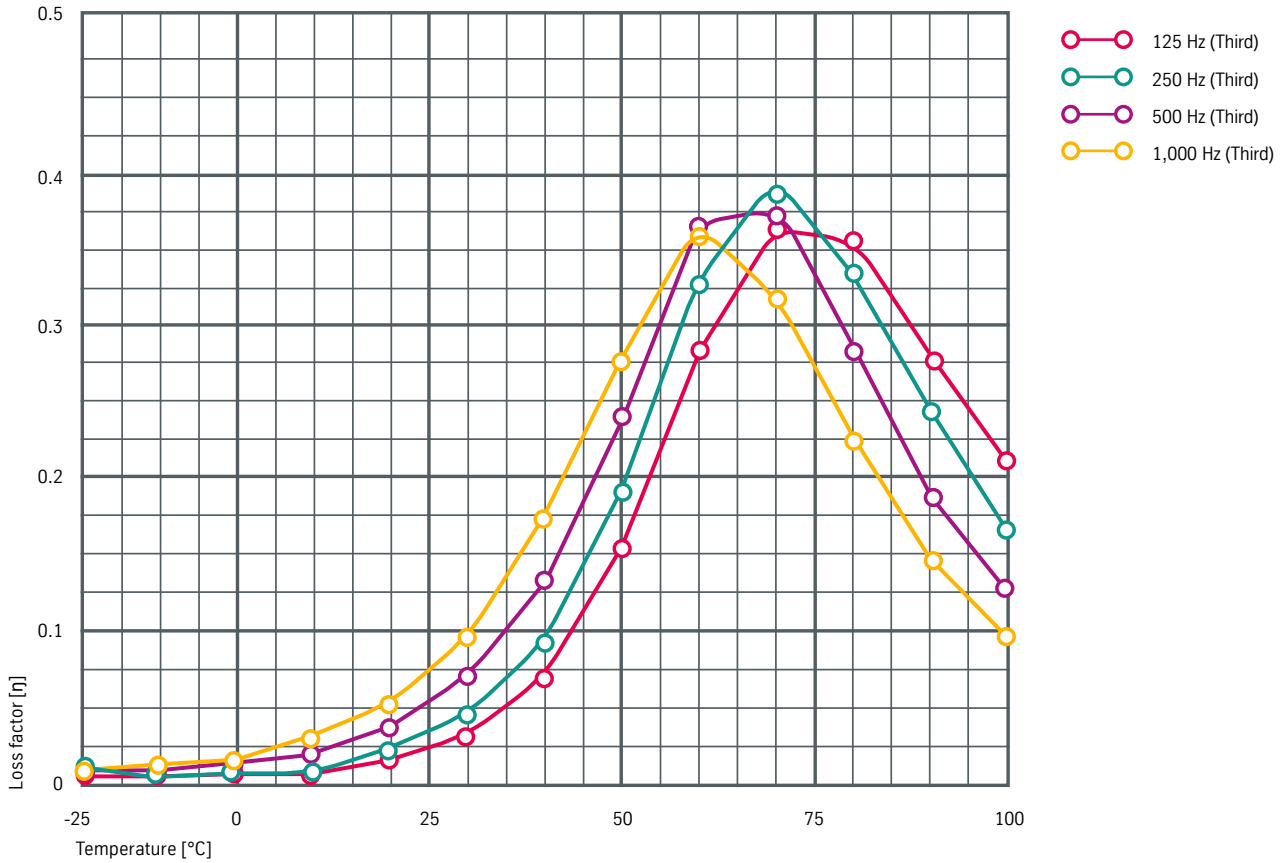
Rod dimension incl. thickness structure: 0.6 mm/0.04 mm/0.6 mm x 50 mm x 456 mm

Area based mass: 9.2 kg/m²

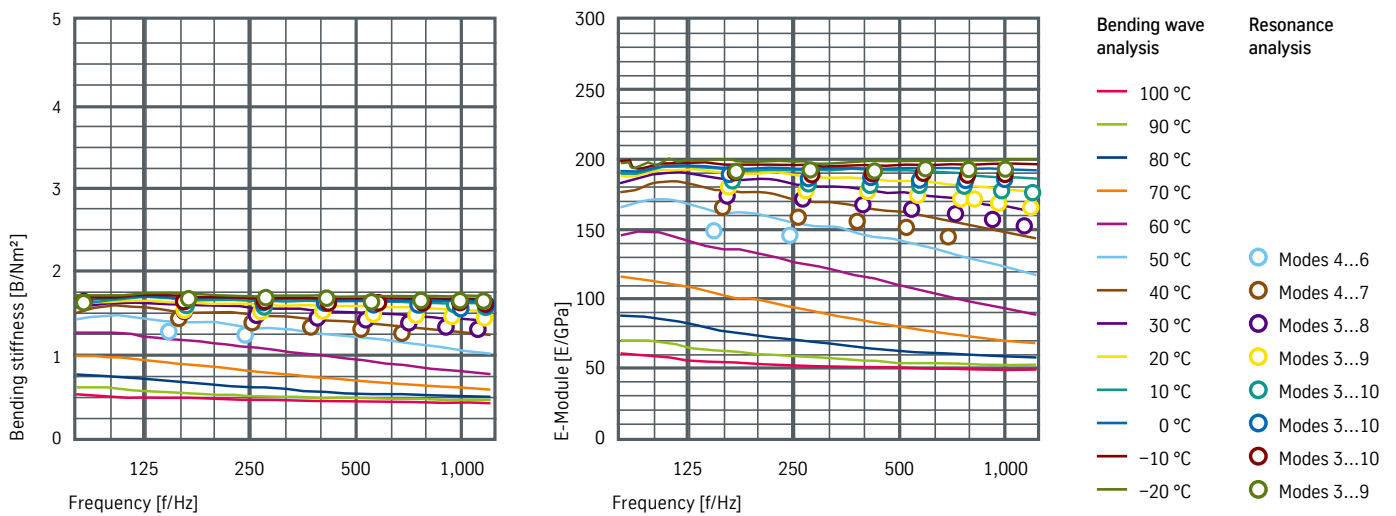
Loss factor measurement according to the Müller BBM bending wave method ⁴⁾



Bending wave method Müller BBM



Frequency dependence of flexural strength and modulus of elasticity⁴⁾



Equation of bending stiffness:

$$B = \frac{64 m'' f_n^2 b l^4}{\pi^2 \beta_n^4}$$

where:

- B Bending stiffness in Nm²
- m'' Area based mass in kg/m²
- n Ordinal number of oscillations $n = 1, 2, \dots$
- f_n Resonance frequency of relevant mode in Hz

- b Width of rod in m
- l Length of rod in m
- β_n $\beta_1 = 1.1944, \beta_2 = 2.9860, \beta_n = 2n - 1$

Notes on processing

Forming behavior

- Bending and folding: not recommended
- Deep drawing and stretch forming: generally possible; blankholder force may have to be adapted
- Forming temperature: material temperature $\geq 18^\circ\text{C}$

Joining

- Resistance spot welding ⁵⁾: spot weldability due to pigmented core layer
- Welding fumes: extraction recommended
- Fusion welding (MIG/MAG): not suitable
- Mechanical joining: like solid sheet
- Adhesive bonding: like solid sheet (but one cover sheet only)

Separating

Cutting ⁶⁾, stamping, drilling

Cleaning

Alkaline cleaning methods are recommended, no solvent degreasing

Painting

As with solid sheet, paint baking temperatures ³⁾
max: $200^\circ\text{C}/30\text{ min}$

Recycling

Like normal steel sheet

Other information

Storage and shipping

The maximum bondal® coil weights depend on the damping layer and the dimensions of the material. To ensure the shape stability of bondal® coils, support should be provided where necessary (cardboard sleeve, steel angle ring). bondal® sheets are shipped in crates with means to relieve pressure. Stacking of bondal® coils for storage is not permitted due to the risk of ovalization. bondal® coils must not be subjected to the weight of other coils or to heavy loads and should therefore only be stored one-high. Otherwise the same packaging, shipping and storage rules apply as for sheets and coils of the base material. thyssenkrupp recommends that you transport the product dry, check for moisture on receipt, store in a dry place and avoid condensation. Direct sunlight must be avoided at all costs. If stored outdoors, the product should be covered with tarpaulins.

¹⁾The mechanical properties of the adhesive bond refer to a flat sample in the unprocessed as-delivered condition and are valid for a maximum of 6 months after the product has been made available.

²⁾Shear test: deviations from the currently valid standard DIN EN 1465:2009-07
- Test surface: 25 mm x 25 mm
- Crosshead speed: 2 mm/min

Test report contains only information on the tested material, the fracture pattern and the mean value of the tested tensile shear strength.

³⁾Note that in higher temperature ranges, e.g. during paint baking, composite adhesion is necessarily much lower temporarily (i.e. as long as the temperature is elevated). For parts that are not secured against debonding through forming – i.e. lightly-formed or unformed parts – fixing measures are recommended, e.g. spot welding, clinching or riveting in at-risk areas.

⁴⁾The loss factors and frequency dependence of the flexural strength and the modulus of elasticity were determined after artificial ageing of the samples at $180^\circ\text{C}/30\text{ min}$ (EDC simulation).

⁵⁾Resistance spot welding should always be done with a pre-pulse and a constant current control (CCR) in favor of a more stable welding process. Coated sheets are only limited suitable for resistance spot welding.

⁶⁾Recommended clearance: $\leq 3.0\%$ of the sheet thickness.

Special mill grades are supplied subject to the special conditions of thyssenkrupp. Other delivery conditions not specified here will be based on the applicable specifications. The specifications used will be those valid on the date of issue of this product information brochure.

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