

Steel

bondal[®] CL

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

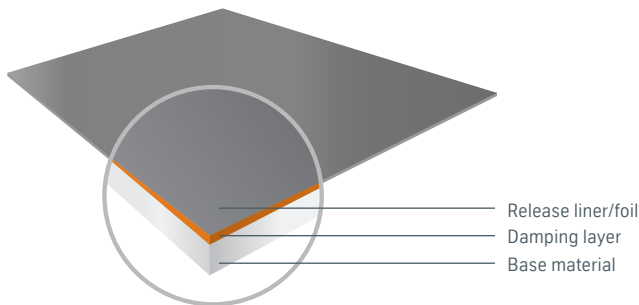


thyssenkrupp

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Material structure

Sandwich structure



Base material

Hot-dip coated sheet. The applicable standard is DIN EN 10346 and the corresponding standard for dimension and shape tolerance 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, incl. a white removable PP release liner. 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.

Dimensions of individual sheets

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- Thickness, min: 0.5 mm (sheet thickness without adhesive & release liner/foil)
- Thickness, max: 3.0 mm (sheet thickness without adhesive & release liner/foil)
- Width: 1,000 mm

Production

Coil ID: 508 mm/610 mm

Product characteristics ¹⁾

Thickness of damping layer

125 µm

Thickness of release liner or foil

100 µm

Adhesion

- Peel strength: not applicable as not full bondal®

Thermal behavior ²⁾

- Processing temperature: material temperature $\geq 18^\circ\text{C}$
- Short-term load: max. 235°C (in laminated condition)
- Run-out resistance: max. 200°C (in laminated condition)
- Operating temperature range (permanent): -40 to 160°C
- Decomposition temperature: from 240°C

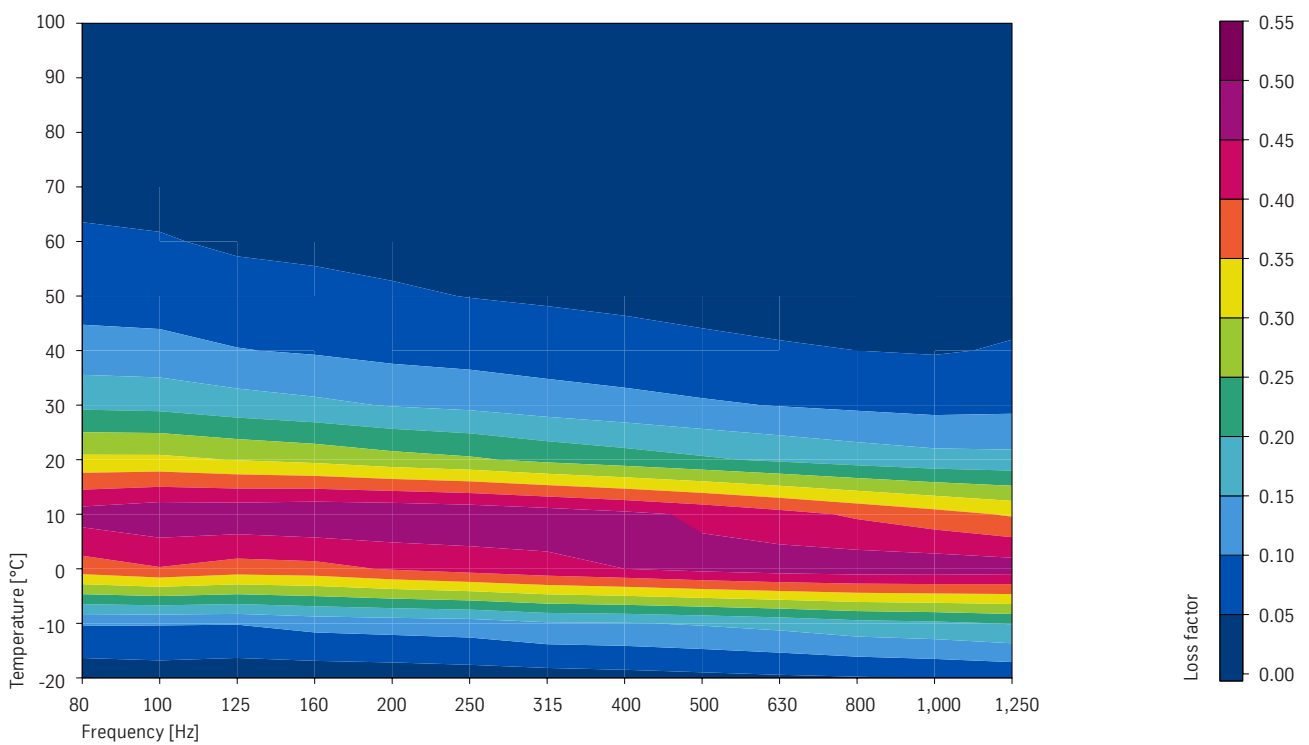
Damping properties of composite

Material: bondal® CL

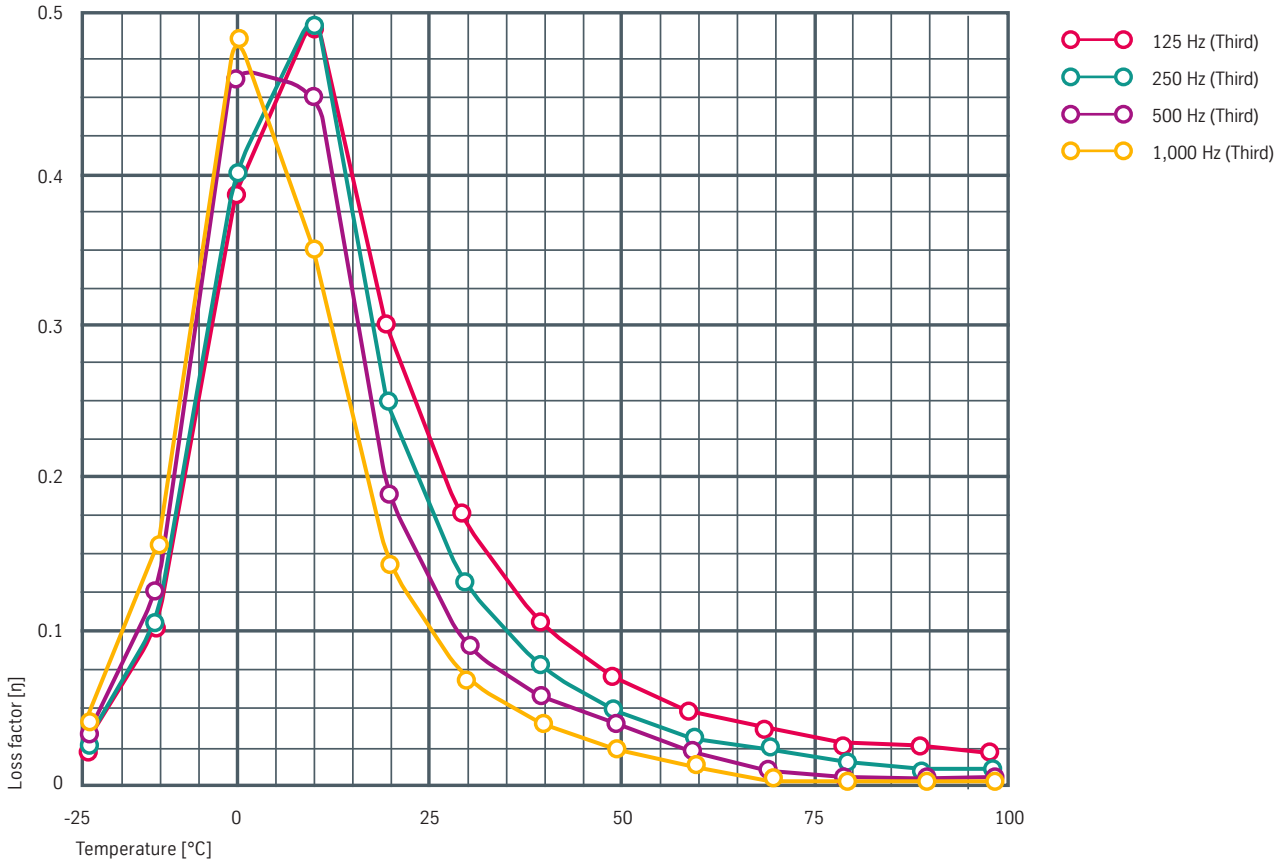
Rod dimension incl. thickness structure: 0.6 mm/0.125 mm/0.6 mm x 50 mm x 456 mm

Area based mass: 9.36 kg/m^2

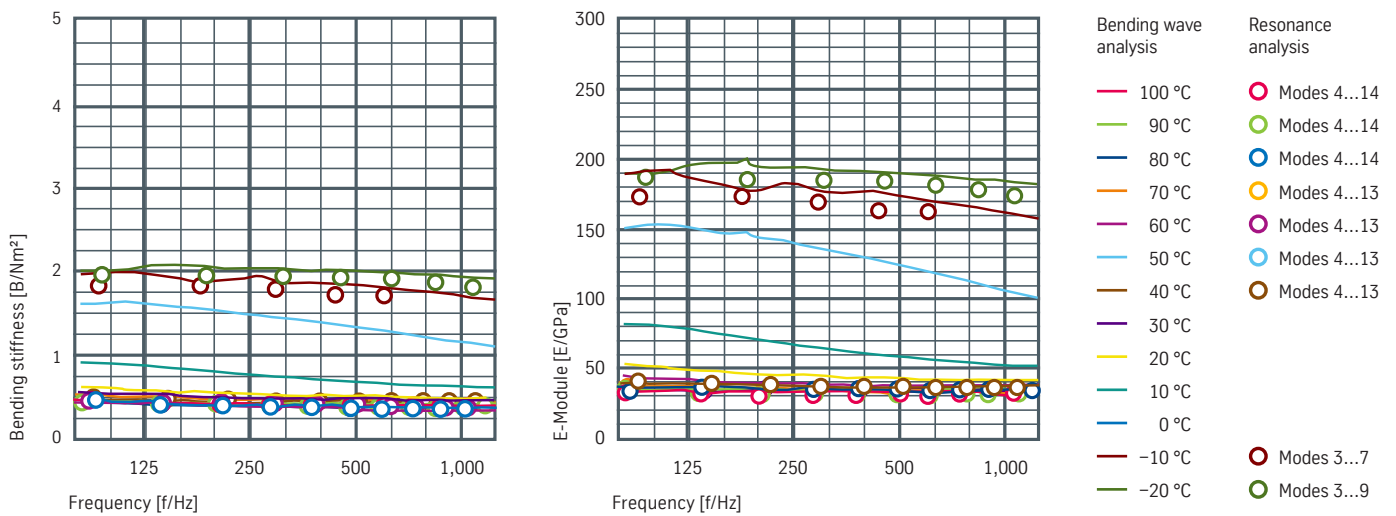
Loss factor measurement according to the Müller BBM bending wave method ³⁾



Bending wave method Müller BBM



Frequency dependence of flexural strength and modulus of elasticity³⁾



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

Surface treatment

As with all self-adhesive strips it is important that the surface of the part to be applied with bondal® CL is clean, dry and free of grease and oil.

Information on application to the part

Optimum adhesion requires a minimum contact pressure of 2 bar. Higher pressure increases the adhesion. After bonding, the composite must be mechanically joined in adequate form for safety reasons.

Coating

Typical automotive industry pretreatment and paint processes (electrocoating) can be performed without impairing the baths. bondal® CL applied to a part can be painted like normal steel sheet, but the paint baking temperature²⁾ must not exceed the permissible limits (max. temperature load).

Resistance to chemicals and other environmental effects

Chemicals and other environmental effects

The damping layer is resistant to weak acids and bases (pH 5–9) as well as to UV light and moisture. In addition, all non-polar solvents (e.g. heptane or hexane) are safe to use. Polar solvents such as MEK or acetone must be tested before use (risk of swelling). The damping layer is resistant to engine oils as per Ford BU 112-02.

Recycling

bondal® CL can be recycled and disposed of like painted steel scrap. Release liners resulting from the use of bondal® CL must be disposed of safely and reliably in accordance with local regulations.

Mechanical and engineering properties

The stated mechanical and engineering properties apply for a maximum of six months from the date the products are made available.

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⁾ 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.

³⁾ 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°C/30 min (EDC simulation).

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.

General information

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