

ElroSafe underbody shielding for battery system protection



GENERAL FUNCTION

ElringKlinger's underbody shielding made out of thermoplastic sandwich material based on glass fiber reinforcements offers excellent impact behaviour as well as thermal shielding and insulation for battery systems of electric vehicles.



TECHNOLOGY

Sandwich panels are manufactured by using two surface layers made of unidirectional (UD) thermoplastic tapes with glass or carbon fiber reinforcement and a solid core which is also a fiber reinforced thermoplastic material. The panels are compression-molded into skid plates up to a size of 2.2 by 1.6 m.

HIGH STRENGTH AND FLEXIBILITY

Compared to Aluminum (Al) or thermoset composites the thermoplastic materials UD-tape and DLFT provided by ElringKlinger offer high strength (800 to 1.000 MPa) in combination with high flexibility, which results in a superior damage tolerance. At low day-to-day impact loadings Al deforms permanently due to a lower strength of around 250 MPa, which can result in multiple replacements of the complete part during service. Thermoset composites fail at significantly lower impact energy levels compared to thermoplastic ones because the brittle matrix resins are less ductile.

EXCELLENT SHIELDING AGAINST HIGH-SPEED IMPACTS

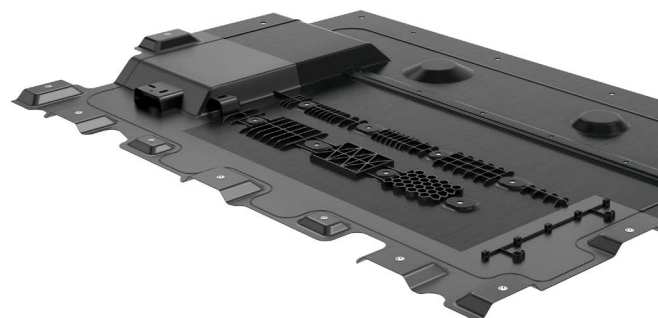
High speed impact tests show insufficient shielding characteristics of Al plates which can lead to ignition of battery packs. Shielding made from thermoset composites failed by serving a minimum while thermoplastic sandwich panels show only minor scratching on the impacted surface.

HIGH LEVEL OF THERMAL AND ACOUSTIC INSULATION

Underbody shielding made from thermoplastic sandwich materials allow improved thermal management of the battery system as well as acoustic shielding for better noise reduction.

FUNCTIONAL INTEGRATION

Further functions such as local fixation points for electronic components can easily be integrated by injection molding or welding.

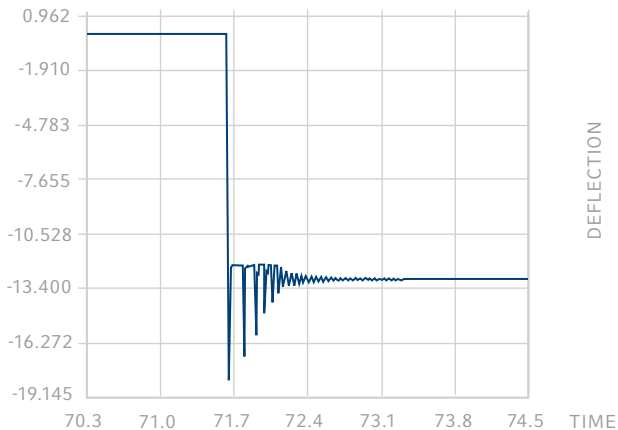




PARAMETERS

DEFLECTION UNDER LOAD IMPACT (IMPACTOR: D=180MM/100KG/84J)

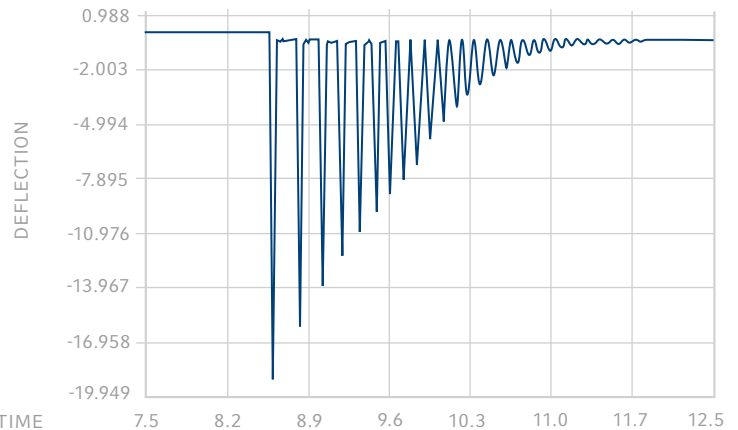
PANEL SIZE: 340 MM X 290 MM, FREE BENDING LENGTH: 260 MM



Aluminum EN AW-5754 H22 3mm | 8,1kg/m²

Total deflection: 19mm

Remaining deflection: 12mm



Thermoplastic composite sandwich 5mm | 8,1kg/m²

Total deflection: 17mm

Remaining deflection: 0mm

Source: ElringKlinger AG, R&D



BENEFITS

- Excellent damage tolerance under high-speed impact loading
- Higher durability leading to reduced cost for repair and maintenance
- High level of thermal insulation
- High level of design freedom for various space requirements
- Various material combinations possible
- Further functional integration easily possible



ELRINGKLINGER – YOUR PARTNER FOR COMPOSITE COMPONENTS

Product Development (Design, Engineering and Simulation) – Process Development – Tool Shop – Tool Sampling/Prototyping – Testing – Change-Management – Series Production – Part Measurement



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