



Case Study

High-speed tunnel doors Solid as a rock

A composite for the extremes

Gigantic forces come into play when a train speeds through a tunnel at over 200 km/h. High-speed tunnels such as the ones through the Lötschberg (35 km long) in Switzerland and the Guadarrama mountains (28 km long) in Spain are centennial structures and pioneering accomplishments. People's lives depend on the tunnel doors – whether they open up escape routes in emergencies or remain tightly sealed when a train passes. The pressure wave caused by a train at these speeds is equivalent to one metric ton per square meter (10 kPa). During its lifetime, a tunnel door must withstand this stress two million times and resist cracking due to material fatigue. Thanks to modern adhesive technologies that bond steel and thermal insulation materials, highly stress-resistant safety doors for tunnels are feasible today.

Elastic and ultra-strong

In its fabrication processes for heavy-duty door systems, Hodapp, a German manufacturer of steel doors, uses Collano adhesives to fabricate composites made of sheet steel, mineral wool panels, and other materials. The adhesive must exhibit very good adhesion on different metals and mineral materials and withstand millions of cycles of extreme pressure fluctuations. The prototype composites must pass so-called endurance oscillation tests and fire trials before they are approved for real-world service. The fire resistance of Hodapp composites for train tunnels is rated EI 120 pursuant to DIN EN 13501 and their smoke control performance complies with DIN 18095 Part 3.

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Sliding firestop door for the Sierra Guadarrama high-speed rail tunnel in Spain. Nikolaus Schindler, responsible for development & engineering at Hodapp, shows the prototype: «We obtained the best test results with systems bonded with Collano».

Technical data in brief

Project:	272 sliding firestop doors for the Sierra Guadarrama high-speed rail tunnel in Spain
Year:	2006/2007
Partner:	Hodapp GmbH & Co. KG, Achern-Grossweier, Germany
Application:	Laminated composites with stainless steel panels and fiberglass-reinforced mineral wool panels
Country:	Spain
Product:	Collano A 8 Series, silane-terminated sealant and adhesive for plastics and metalworking applications
Properties:	Elastic adhesive with good adhesion on metal and mineral materials, pressure- and vibration-absorbing..