

# Exel Composites insulated rail joints



## Fail-safe function for the railway signalling systems

Exel Composites manufactures composite rail joints with mechanical strength characteristics similar to steel rails. Our insulating fiberglass fishplates are easy to install, requiring no welding, glues, or other chemicals. They are suitable for both continuous welded rail (CWR) and jointed tracks.

Our rail joints are available as individual fishplates and endplates, or as complete kits including metal fixing parts. We can also customize them to your specifications

## Targeted for safer railways

Signal failures often cause traffic delays, impacting both maintenance and passengers. Exel insulated rail joints offer the highest electrical insulation properties. Thanks to their design and materials, they are virtually fail-safe in terms of insulation. The fishplates are mechanically strong and resistant to environmental factors like UV radiation, heat, moisture, and impurities. Their simple design, with minimal parts, allows for easy and fast installation without the need for chemicals, welding, or detergents, resulting in total cost savings.

Developed in the 1980s, Exel Insulated Rail Joints have been installed thousands of times and are now widely used worldwide, from tropical to arctic climates.

## Production expertise and measured performance

As a leader in the production and design of high-quality composite materials, we understand the demanding requirements of the railway industry. Exel uses materials that meet the highest quality standards, with structures optimized for insulated rail joints. Our in-house developed manufacturing methods and materials are continuously monitored according to ISO 9001 standards.

Our insulated rail joints comply with the European Standard EN 16843:2024 - Mechanical requirements for joints in running rails.

## Customized products to meet specifications

Rail joint designs vary between countries and authorities, and we take this into account when customizing our products. Our fishplate structures are based on extensive research, with designs ranging from UIC 60 welded tracks to special joints for jointed tracks. Due to their unique design and strength, a four-hole configuration is typically favored, but six-hole joints are also available.

## Technical specifications and material properties

Our insulated rail joint design has been verified by extensive full-scale testing for 54E1/UIC54 and 60E1/UIC60. Several mechanical and material tests have been done to verify computer analyses of the product properties. In addition, the products have been field tested in several locations.

Our design has also been tested by a 3rd party according to the European Standard EN 16843:2024 - Mechanical requirements for joints in running rails.

	Target value	Measured value	Test standard	
<b>Properties of 60E1 (UIC60) - Complete Insulated Rail Joint:</b>	Fiber content (fishplate)	-	≥ 65 m-%	ISO 1172
	Flexural modulus (fishplate)	-	≥ 25000 N/mm <sup>2</sup> *	ISO 178
	Water absorbtion (fishplate)	-	< 0.05 %	ISO 62
Fishplates and endplates: Glassfiber reinforced epoxy resin	Tensile strength (full joint)	≥ 1653 kN	> 1672 kN	EN 16843:2024
	Tensile strength, F <sub>max</sub> to break (full joint)	-	~ 1720 kN	EN 16843:2024
	Bending strength (full joint, not F <sub>max</sub> )	≥ 156.85 kN	~ 157.6 kN **	EN 16843:2024
	Electrical insulation (dry, after bending)	> 0.15 MΩ	> 550 MΩ	EN 16843:2024
	Electrical insulation (wet, after bending)	> 0.2 MΩ	> 550 MΩ ***	EN 16843:2024
	Electrical insulation (dry, after tensile load)	> 0.15 MΩ	> 500 MΩ	EN 16843:2024
	Impact resistance (fishplate)	-	≥ 135 KJ/m <sup>2</sup>	ISO 179/ 1A

\* calculated value

\*\* tested to meet the requirement of standard EN 16843:2024, not tested to breakage

\*\*\* test method causes metal particles from the rails to partially cover end plate, which causes invalid results for the "rail-to-rail" measurement

	Measured value	Test standard	Notes	
<b>Material properties based on a coupon test from fishplate 54E1/UIC54:</b>	Bending strength (longitudinal)	~ 500 N/mm <sup>2</sup>	ISO 178	Coupon from 0/90 surface layer
	Bending strength (vertical)	~ 500 N/mm <sup>2</sup>	ISO 178	Coupon from 0/90 surface layer

**NOTE!** Coupon testing procedures are described in referred standard methods. Manufacturing of testing samples must be done with appropriate care and tools to maintain required orientation. Angular fault in samples will cause incoherency and inconsistency in results. Due to this, coupon test results are often not replicable and don't give a valid representation of the properties of a complete fishplate.