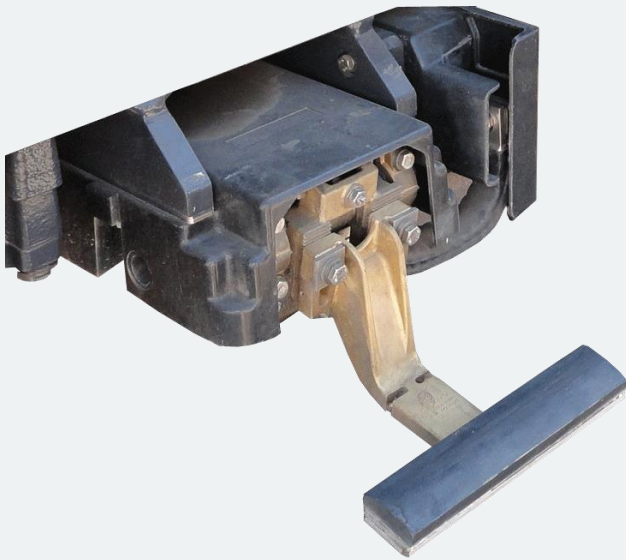


CURRENT COLLECTION BY THIRD RAIL

CURRENT COLLECTION DEVICE (3RD RAIL) SHOES



CHARACTERISTICS OF MERSEN CCD SHOES

LINKED TO THE APPLICATION CHARACTERISTICS...

- ✓ Frequent stops
- ✓ Frequent acceleration and deceleration
- ✓ Multiple regenerative braking
- ✓ High dust exposure

... MERSEN CCD SHOES SATISFY 4 MAJOR CRITERIA:

- ✓ Resistance to mechanical impact
- ✓ Ability to withstand high starting and stopping current loads
- ✓ Excellent sliding properties
- ✓ Non-destructive to the power rail

WE GUARANTEE OUR CUSTOMERS:

RELIABILITY

- Mechanical stability
- Corrosion resistance
- Safe current collection

LONGER LIFETIME OF THE CCD SHOE AND POWER RAIL

- Low weight
- Low friction coefficient
- High combustion resistance

ELECTRICAL LOAD CAPACITY

- Excellent current distribution
- Low electrical losses

ENVIRONMENTALLY FRIENDLY SOLUTIONS

- EcoDesign solutions
- Lead free grades
- Low noise
- No radio interference

EASY TO MAINTAIN SOLUTIONS

CCD SHOE DESIGNS

A CCD shoe consists of a carbon part mounted on a supporting carrier.

The carrier's role is to protect the carbon collector from impacts, to resist deflection and to conduct the current.



DESIGN WITH METAL END PIECES

- ✓ Assembly: metal end pieces
- ✓ Application: fitted to a new system to create a film or to a rail in bad condition to clean its surface with the bronze contact



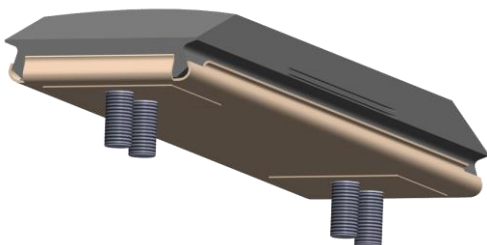
DESIGN AS SOLDERED VERSION

- ✓ Assembly: clamped, soldered
- ✓ Application: all networks with or without ramps
- ✓ Available in different carbon widths and heights



DESIGN AS CAST VERSION

- ✓ Assembly: carbon inserts cast in place
- ✓ Application: new rail in order to create a patina or rail in sub-standard condition to clean its surface with bronze



ECO DESIGN

- ✓ Assembly: clipped
- ✓ Application: all networks
- ✓ Replacement of just the carbon wear strip
- ✓ Elimination of corrosion of the carrier and bolts
- ✓ Excellent resistance to shock, vibrations and mechanical stress

METAL vs. CARBON SHOES

Steel, cast-iron, copper or bronze shoes on third rail collection systems mechanically damage the rail due to their relatively high mass and superior friction coefficient.

Carbon has many advantages over metallic materials, and the benefits to user systems are numerous. As a consequence, more and more railway, third rail and tramway/trolleybus systems have switched to carbon throughout the world.

THE ADVANTAGES OF CARBON FOR 3RD RAIL CURRENT COLLECTION SYSTEMS

Friction behavior and self-lubrication

- Elimination or reduction of greasing
- Longer wire and rail life time thanks to proper patina creation
- Optimized friction once patina is created
- 3rd rail de-icing capability thanks to carbon skin
- Maintenance cost reduction

Very low sparking

- Arcing reduction
- Reduced burn or spark damage
- Prevention of radio interference

Weight reduction

- Stable contact
- Better current collection

Resistance

- To high temperatures: no tendency to weld, even after long periods of static current loading
- To thermal shocks
- To chemical attacks

Other advantages

- Good electrical and thermal conductivity
- Low electrical losses
- Negligible audible noise between rubbing surfaces
- Recognized corrosion-proof characteristics



MERSEN GRADES FOR CCD SHOES

GRADE	Description	Relative density	Electrical resistivity $\mu\Omega.m$	Flexural strength Mpa	Charpy resilience kJ/m^2
		According to IEC60413	According to IEC60413	According to IEC60413	According to ISO179-1
AR129	Plain carbon	1.70	30.0	30	0.8
P6252	Metal-impregnated	2.25	6.0	70	1.2

Indicative values

Contact us to request our complete technical data sheets.

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