SAFETRACK®

www.safetrack.se

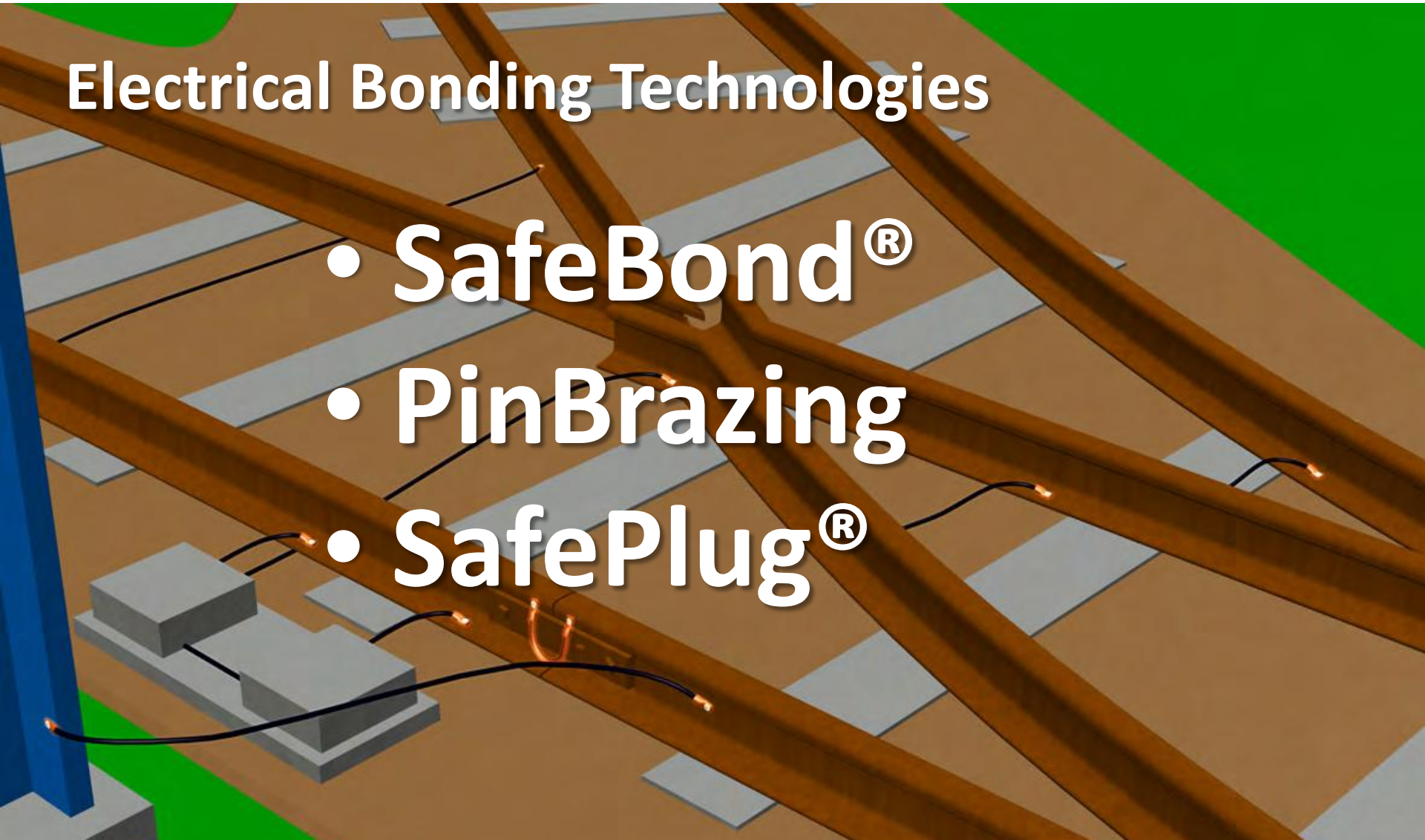
Safely connecting the world ...

SAFETRACK®
www.safetrack.se

Safely connecting the world ...

Electrical Bonding Technologies

- SafeBond®
- PinBrazing
- SafePlug®



SAFETRACK®
www.safetrack.se

Safely connecting the world ...

SafeBond®

The Method without metallurcial effect to the rail

Cables can safely be attached anywhere on the rail even on manganese rail.

Approved and used since 2001 by:

UNION PACIFIC

SafeBond® Advantages

Safely connecting the world ...

- **Safe for the rail – No metallurgical effects**
- **Cables can be attached anywere on the rail**
- **Silver brazing method ensure:**
  - *Lowest possible transition resistance, 5 micro Ω*
- **Low melting temperature, 650°C (1200°F)**
- **Broken Rail Detection**

SafeBond® Advantages

Safely connecting the world ...

- **Fast method**
- **Brazing method!**

Not welding!

- **Does not melt or mix the steel and copper the only melting material is the brazing material**

SafeBond® vs PinBrazing

Safely connecting the world ...

PinBrazing

- Melting temperature of the solder material, 650°C
- The electric arc is between the Brazing pin and the Rail.
- Cable lug with a hole in it.
- The Brazing pin has solder material and flux powder inside.

SafeBond®

- Melting temperature of the solder material, 650°C
- The electric arc is between the Brazing pin and top of the Cable lug.
- Cable lug is solid with no hole.

SafeBond® vs PinBrazing

Safely connecting the world ...

PinBrazing

•The brazing flux and solder material are transported by the electric arc from the electrode to the brazing area.

• The tip of the Brazing pin is inserted in the hole of the cable lug and becomes an integrated part of the connection.

• The Method used since 1955.
More than 70 Million brazings.

SafeBond®

• The cable lug is equipped with solder material. Brazing flux is added manually before brazing.

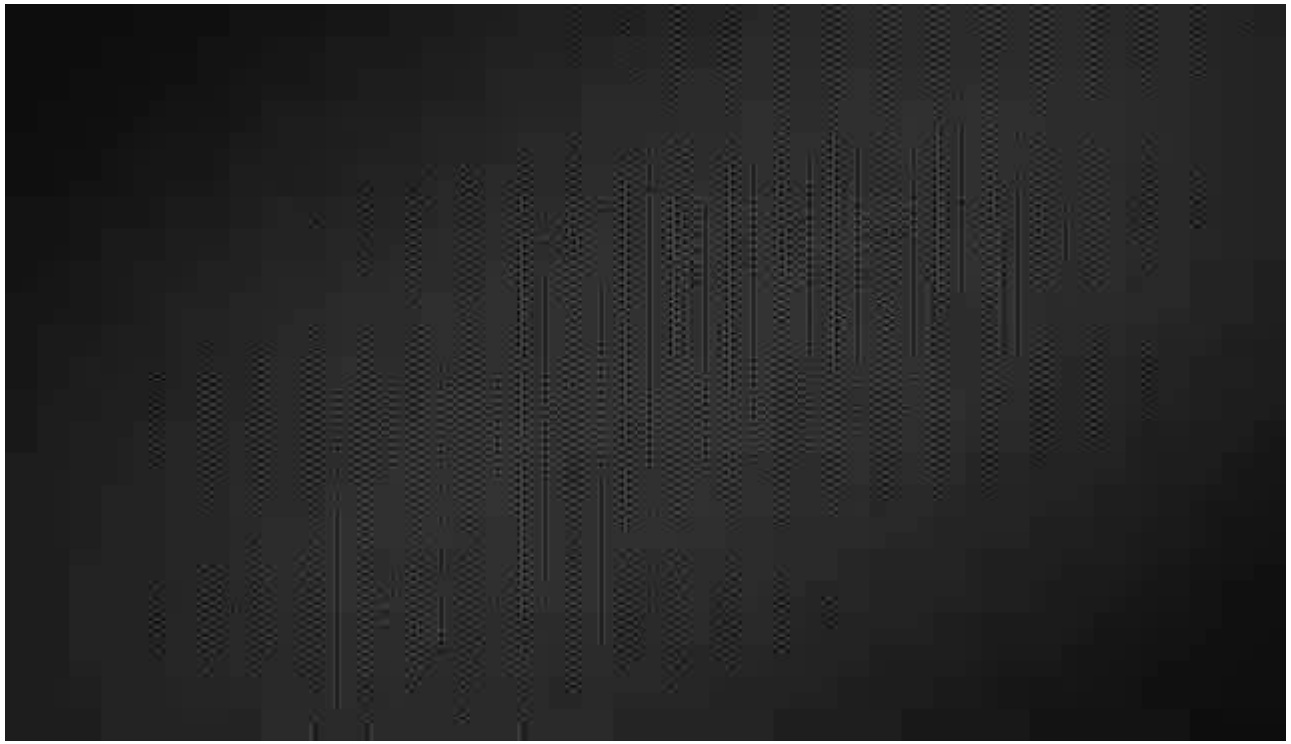
• The brazing flux and solder material is positioned in the brazing area before the electric arc operation starts.

• The electrode does not become a part of the connection.
• Used since 2000.
More than 1 Million connections.

SAFETRACK®
www.safetrack.se

Safely connecting the world ...

SafeBond®



SAFETRACK®
www.safetrack.se

Procedure

Safely connecting the world ...

1. Grinding

2. Apply Flux on braze area

3. Apply Flux on top of lug

4. Insert the Electrode and Ferrule in the Gun

5. Pull the trigger

6. Eject the electrode from gun. Ready.

SAFETRACK®
www.safetrack.se

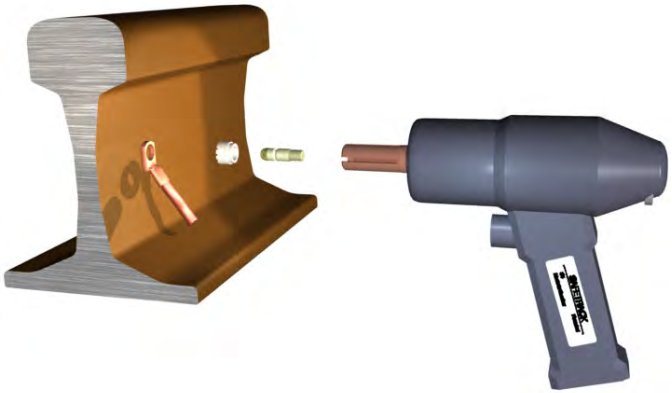
Safely connecting the world ...

Econect can be used for both SafeBond and PinBrazing (Different guns)

ECO NECT

SafeBond®

PinBrazing



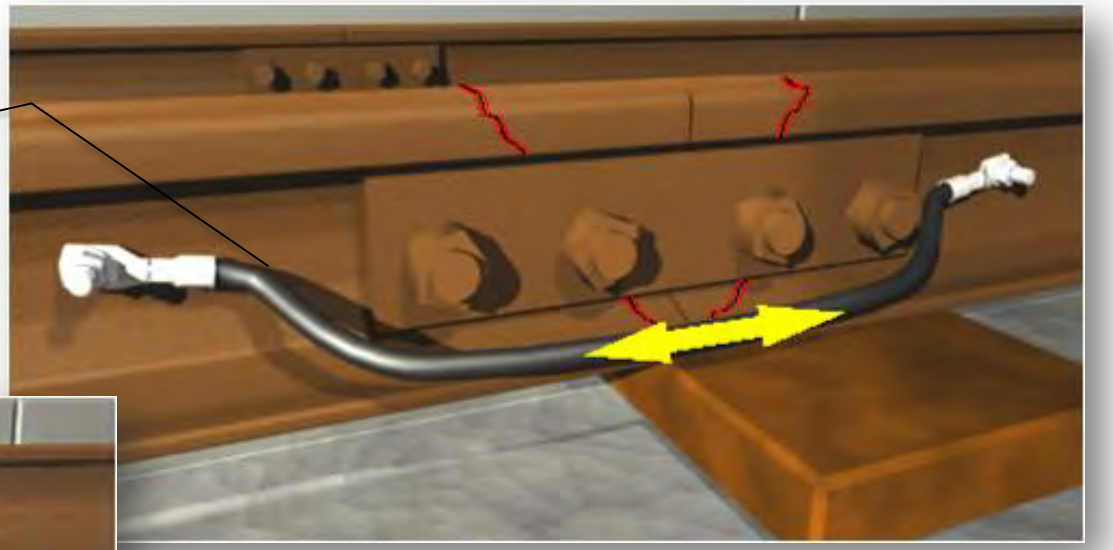
SAFETRACK®
www.safetrack.se

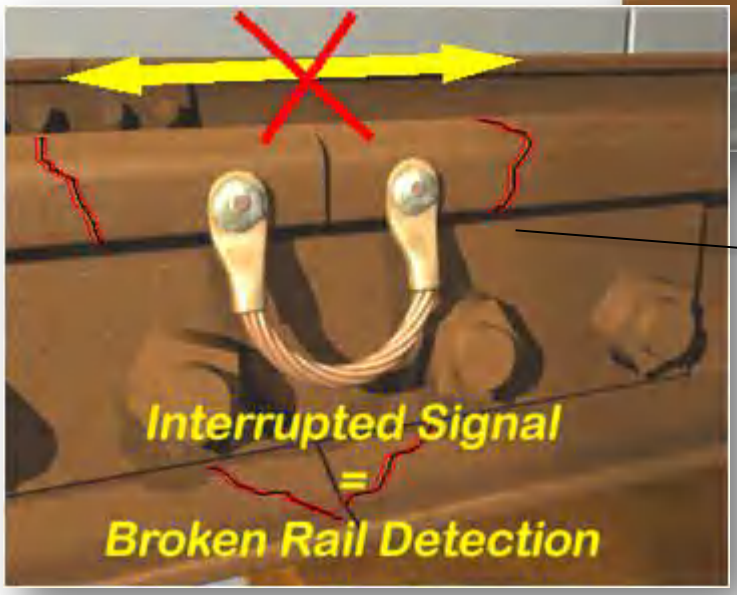
Safely connecting the world ...

Important!
Broken Rail Detection Feature

A drilled connection will continue to give a clear signal even if the rail is broken

(Broken rails often occur from drilled holes)





A SafeBonded or PinBrazed Rail Bond on the head of the rail will give an interrupted signal if the rail is broken in the joint

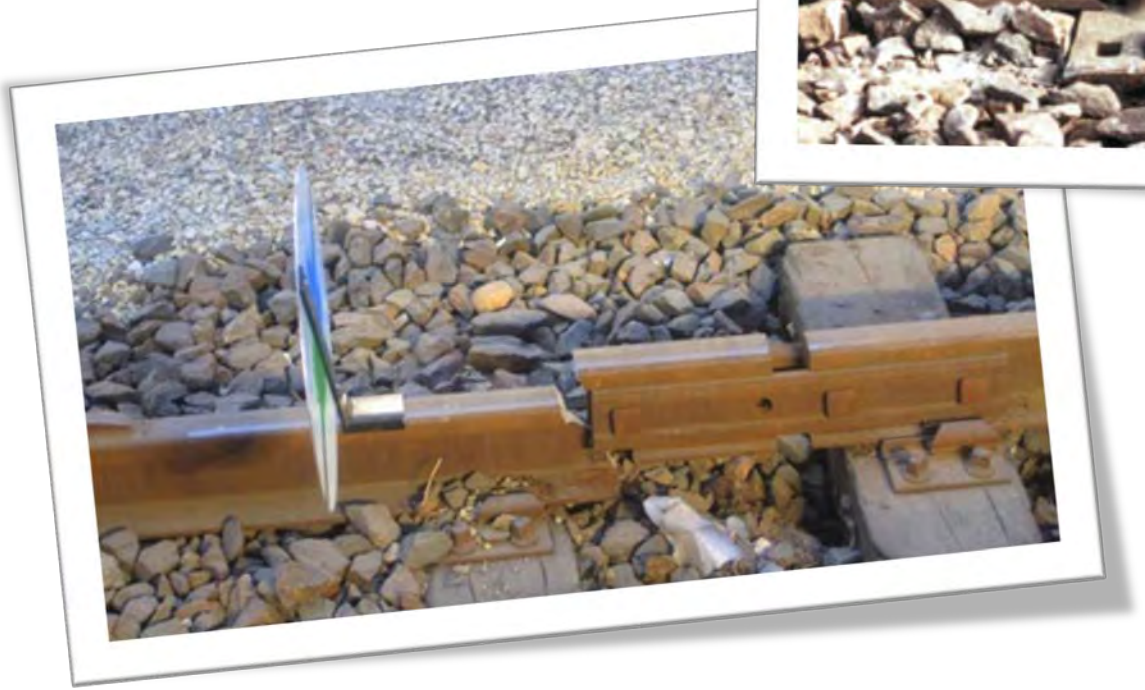
An accident can be prevented!

SAFETRACK®
www.safetrack.se

Advantages of Broken Rail Detection

Safely connecting the world ...

Devistating results of broken rails due to drilled holes in the web of the rail.



Metallurgical Test

KOCKUMS

RAPPORT
utfärdad av ackrediterat laboratorium
REPORT issued by an Accredited Laboratory

Författare / Report by
John Ivarsson

Datum / Date: 04-02-05
Reg.nr / Reg. no: 16/51/14656
Sidnr / Page: 2(3)
Sektion / Section: Hållfasthetsprovning
Mechanical testing
Medarbetare / Assistants:

Brazed test peaces were delivered To Kockums Laboratory for hardness tests and metallographic examination.

The hardness test were carried out according to Vickers,HV1. The uncertainty of the measured values are estimated to ± 3 %

Mark; SB50-S90

Distance from fusion line,mm	Hardness,HV1
0,14	271
0,22	269
0,41	281
0,95	288
Base material	288

No transformed zone was found.
No metal penetration

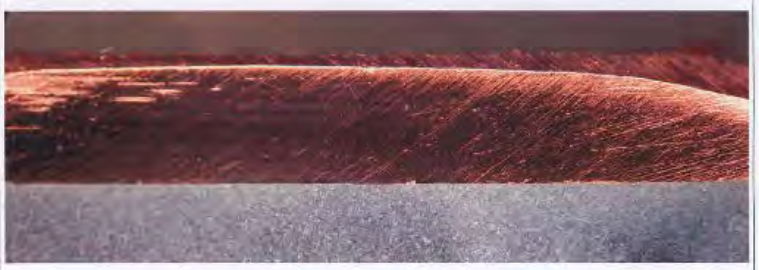
KOCKUMS

RAPPORT
utfärdad av ackrediterat laboratorium
REPORT issued by an Accredited Laboratory

Författare / Report by
John Ivarsson

Datum / Date: 04-02-05
Reg.nr / Reg. no: 16/51/14656
Sidnr / Page: 3(3)
Sektion / Section: Hållfasthetsprovning
Mechanical testing
Medarbetare / Assistants:

Picture 1
Scale X 9
Etched in NITAL



Underskrift av den som gjort provningen / Signature of person responsible for testing: John Ivarsson

Godkänd / Approved:

Consumables

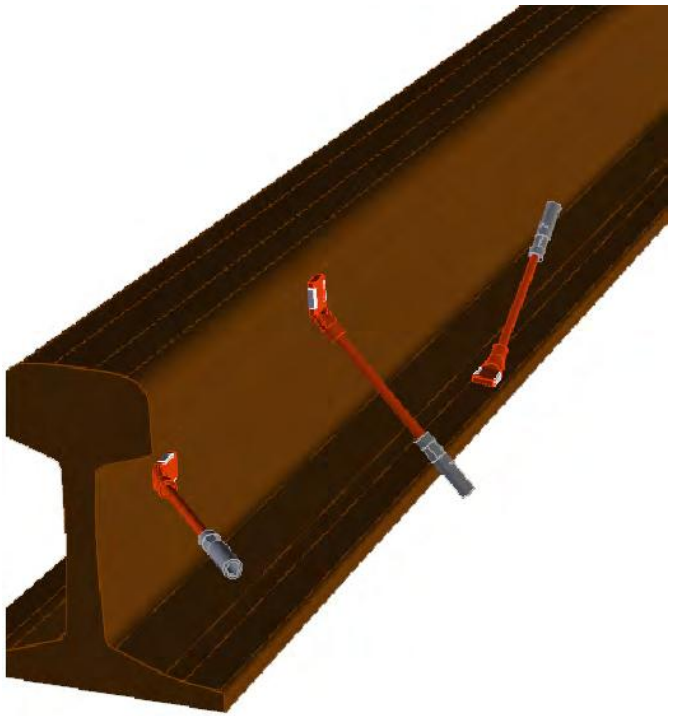
Comes in cpl. pack including:

- Rail Bond
- Braze Electrode
- Ceramic Ferrule

SAFETRACK®

www.safetrack.se

Safely connecting the world ...



SAFETRACK®
www.safetrack.se

ECO NECT

Safely connecting the world ...

ECONECT

- Brazing Capacity: 50 PinBrazings or 25 SafeBonds per charge
- Li-Ion Battery. Nano technology, Patent
- Recharged in 2h
- Constant Energy Control System. Patent
- Automatic Brazing Gun included. Patent
- Internal Battery Pre heater included
- Grinder included
- Tool Case included
- Grounding Device included
- System Voltage: 36V DC
- Weight: 9,8 kg

SAFETRACK®
www.safetrack.se

Safely connecting the world ...

SB101

- Brazing Capacity: 50-60 SafeBond® per charge
- Recharged in 8-10h
- Constant Energy Control System. Patent
- Automatic Brazing Gun included. Patent
- Grinder included
- Grounding Device included
- System Voltage: 36V DC
- Weight: 50 kg

X250

- Brazing Capacity: 400 PinBrazings or 200 SafeBonds per charge or continuously connected to the mains
- Constant Energy Control System. Patent
- Automatic Brazing Gun included. Patent
- Built in Battery Charger
- Grinder included
- Grounding Device included
- System Voltage: 36V DC
- Weight: 74,5 kg

SAFETRACK®
www.safetrack.se

Safely connecting the world ...

Used by:

Union Pacific
LB Foster
Nortrak
Meridian Rail

Comparision between Methods

Method	Time	Strength	Transition resistance	Metallurgical	Environment	Operator safety	Weather	Optical control	Flexibility	Total economy	TOTAL	Place
SafeBond®	**5**	**5**	**5**	**5**	**4**	**5**	**5**	**5**	**5**	**4**	**48**	**1**
PinBrazing	5	5	5	3	4	5	5	5	5	5	**47**	2
Electro welding	4	5	5	1	2	2	3	5	5	5	**37**	3
Propan brazing	1	5	5	4	5	3	3	5	5	1	**36**	4
Drilling	2	5	2	5	3	4	5	1	1	2	**30**	5
Thermit welding	3	4	5	2	1	1	1	5	3	4	**29**	6

Safetrack´s judgement over methods

PinBrazing


ECO NECT
ON/OFF
SETTING
GUN
GRINDER CHARGING
GROUND
ECO NECT
SAFETRACK

PinBrazing

- Used since 1950

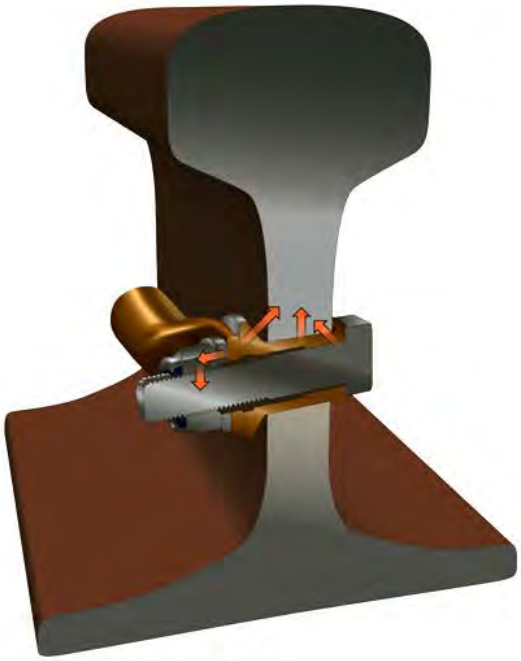
- RailBonds available in:

-Annealed Galvanized Steel

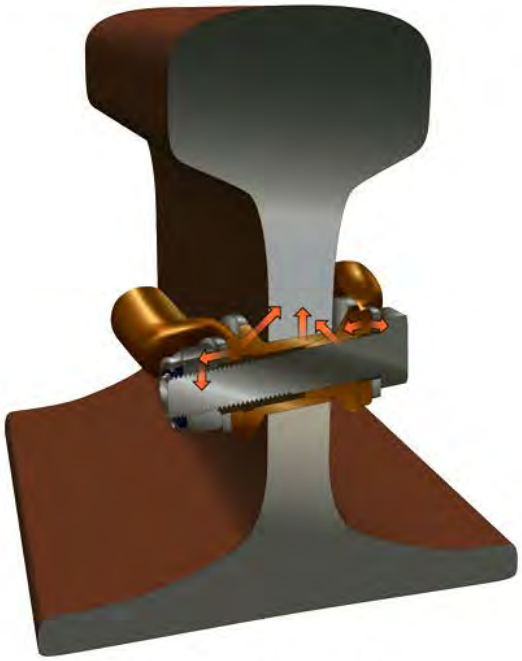
-**Safe**Cable©

SafePlug®

SafePlug®



Single cable lug



Double cable lugs (Twin)

= electric flow

SafePlug®

SAFETRACK®
www.safetrack.se

Safely connecting the world ...

SafePlug®

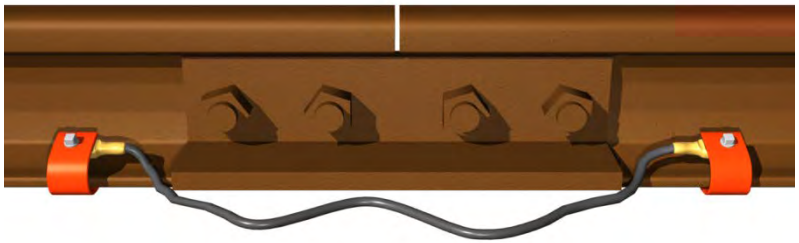
Testad av NEFI High Power Laboratory (ABB)

27.000A under 1 sek
68.000A Peakvärde
2.000.000 cykels utmattningstestad

Godkänd av:

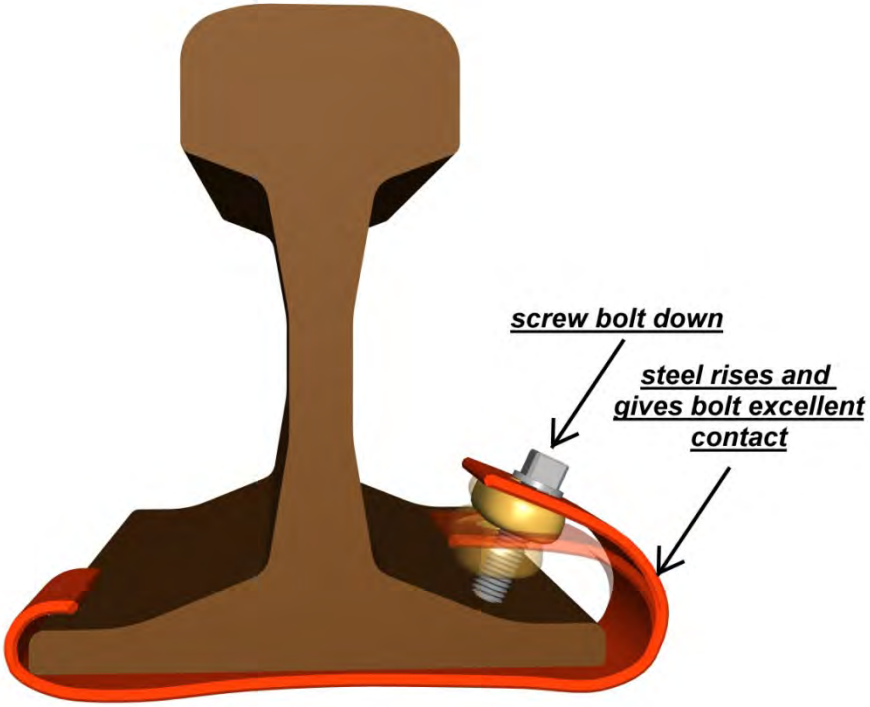
Jernbaneverket	*Norge*
VR	*Finland*
ÖBB	*Österrike*
TCDD	*Turkiet*
Göteborgs spårvägar	*Sverige*

TCOD & Temporary Bonds

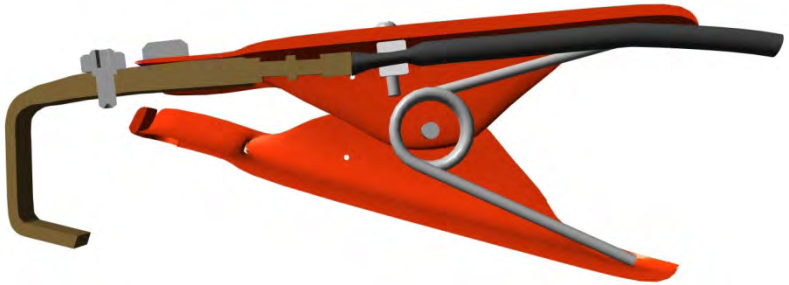


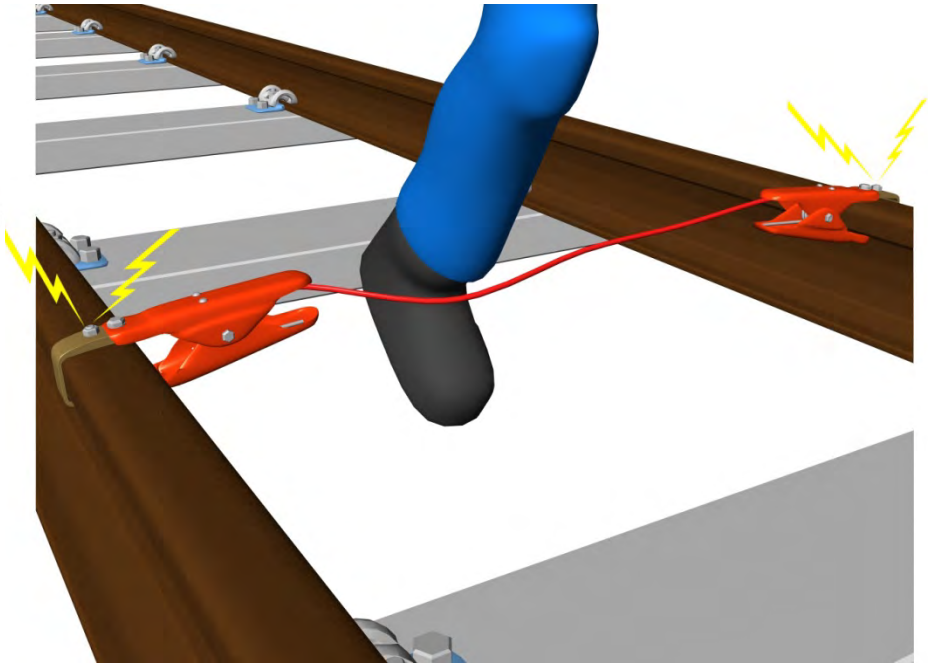
Used and approved by:

NetworkRail



Shunting Devices





SAFETRACK®
www.safetrack.se

Safely connecting the world ...

SAFECABLE

The Theft Deterrent Cable

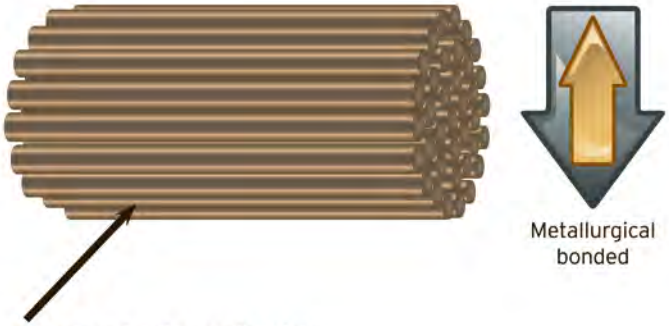
SAFETRACK®

www.safetrack.se

Safely connecting the world ...

SAFECABLE

The Theft Deterrent Cable | Den stöldförebyggande kabeln



The unique SafeCable is made of soft annealed steel and copper wires to withstand vibrations in the rail and to make it as flexible as possible. The steel and copper are metallurgical bonded together. The electrical conductivity is 55% of the same size of a copper cable.

The cable is magnetic which means that thieves who checks with magnets for copper avoid stealing the cable but if they anyway try to cut it they find it hard to cut and a great disappointment waiting for them at the recycling companies. The cable has no scrap value!

Railbonds for PinBrazing can be made in different

Den unika SafeCable-kabeln är gjord av mjukglödgad stålwire och koppar för att motstå vibrationer i rälen och för att vara så flexibel som möjligt. Stålet och kopparn är molekylärt sammanbundet. Den elektriska ledningsförmågan är mer än 55% av motsvarande kopparkabel.

Kabeln är magnetisk vilket gör att tjuvar som kontrollerar med magneter efter koppar undviker att stjäla kabeln. Försöker ändå tjuvarna att klippa den upptäcker de att den är mycket svårklippt och på återvinningsföretagen väntar ytterligare en besvikelse. Den saknar skrotvärde!

Förbindningar för Pinnlödning kan göras i olika

SAFETRACK®
www.safetrack.se

Safely connecting the world ...

Catenary Systems

KRUCH

SAFETRACK®
www.safetrack.se

Safely connecting the world ...

KRUCH

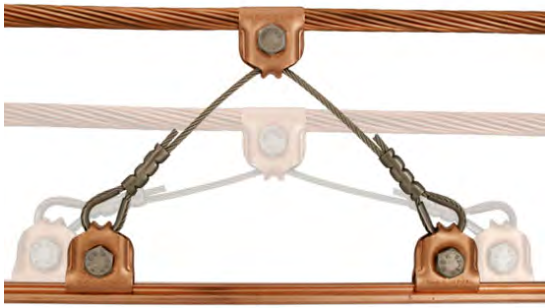
Catenary Systems

SAFETRACK®
www.safetrack.se
Safely connecting the world ...

Catenary Systems

KRUCH

Flexible gliding hanger for lowered catenary cables



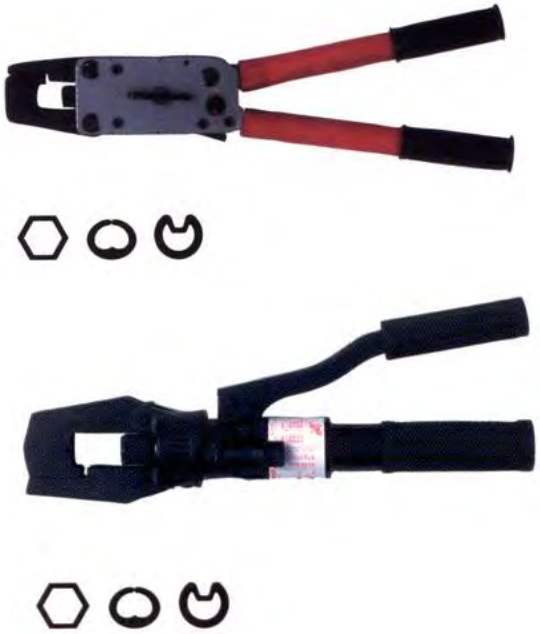
Hanger without Thimble

SAFETRACK®
www.safetrack.se

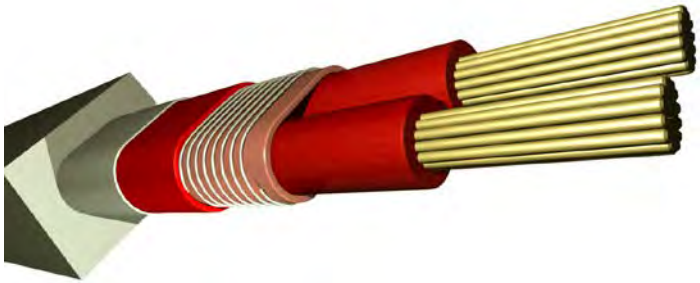
Safely connecting the world ...

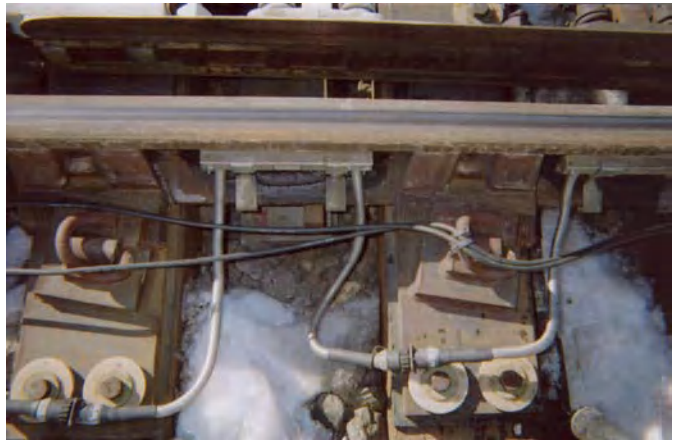
Cable Crimping System

High quality systems for electrical connections



Rail Heating





Rail Heating

SAFETRACK®
www.safetrack.se

Safely connecting the world ...

Welding Modules

Welding Modules

SAFETRACK®
www.safetrack.se
Safely connecting the world ...

Welding Modules

SAFETRACK®
www.safetrack.se
Safely connecting the world ...

Welding Accessories

SAFETRACK®
www.safetrack.se
Safely connecting the world ...

Work Tents

SAFETRACK®
www.safetrack.se

Safely connecting the world ...

Trolleys

SAFETRACK®
www.safetrack.se

Safely connecting the world ...

Trolleys

Rail Instruments

SAFETRACK®
www.safetrack.se

Safely connecting the world ...

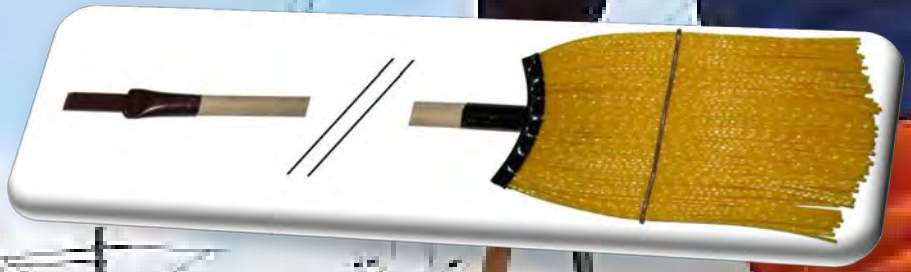
Rail Tools

SAFETRACK®

www.safetrack.se

Safely connecting the world ...

Heavy Duty Switch Brooms



SAFETRACK®
www.safetrack.se
Safely connecting the world ...

Safety Equipment

SAFETRACK®
www.safetrack.se

Safely connecting the world ...

Lightings

SAFETRACK®
www.safetrack.se

Safely connecting the world ...

www.safetrack.se