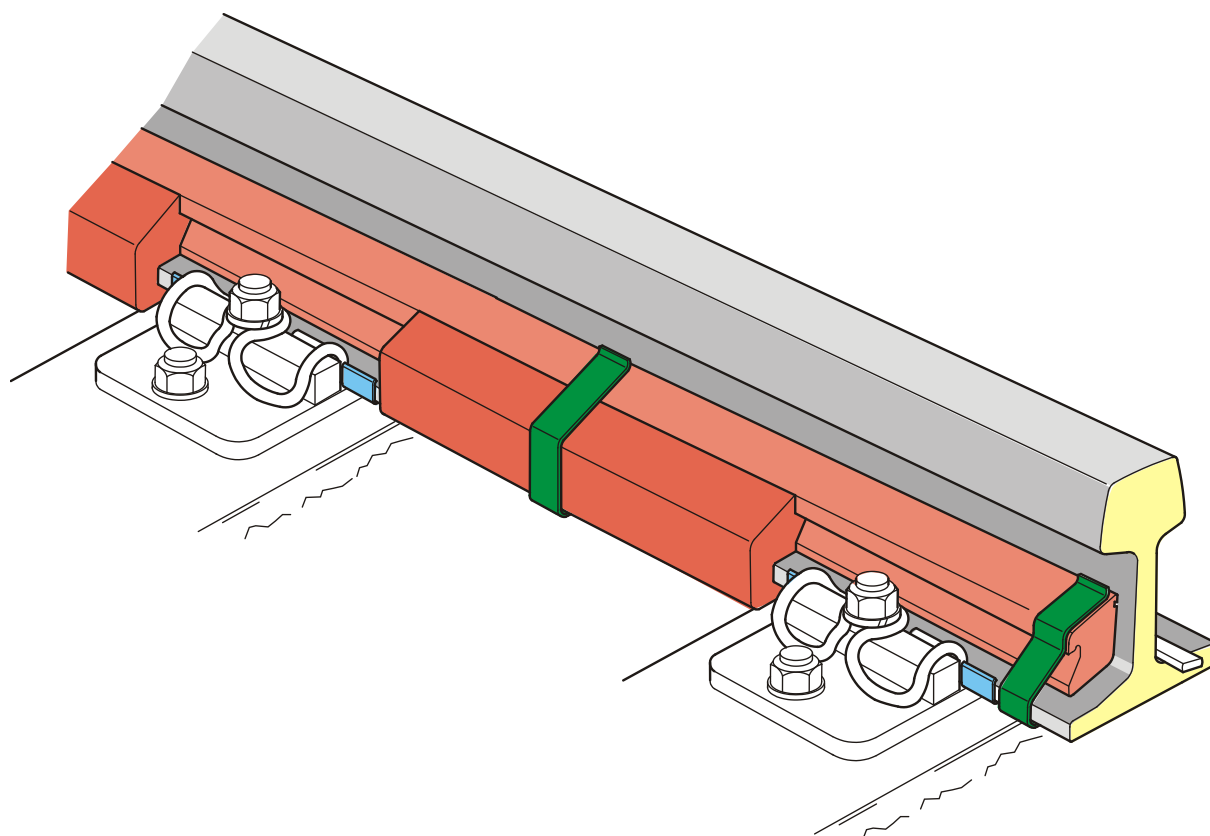


Installation instructions Isoblock Point insulation



Insulation for point heating

**Increasing heat capacity (higher availability of point)
and/or energy saving**

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1. General

This document describes the installation of insulation elements for electrical point heating. The insulation elements are applied in a similar manner when using earth energy and central heating. In particular, attention is paid to the product description and installation and maintenance aspects.

1.1 Introduction

The increase in energy costs and the desired reduction of CO₂ emission make it necessary to use a technique which allows the power consumption of the current point heating systems to be reduced easily. The availability of the point should be guaranteed.

A simple and effective solution is using plastic insulation blocks on the bottom as well as the outer side of the stock rail.



1.2 Scope

The use of point insulation considerably decreases the operation costs due to

- ➔ the lower power consumption at the same availability of the point or
- ➔ a higher availability of the switch with a constant energy consumption

Measurements in a climate chamber performed by Eindhoven University of Technology in the Netherlands and measurements in the field on the railways have demonstrated that point insulation can reduce energy consumption by approximately 40 to 60%.

1.3 Copyright

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2. Description of point insulation

2.1 Composition

An insulation block consists of an insulating plastic block that is secured on the stock rail and and/or switch blade using spring clamps.

2.2 Principle of point insulation

A point is heated using heating elements (electrical point heating). The heating elements are usually mounted on the inner side of the stock rail. The outer side of the switch blade (and stock rail) is also heated when required.

The heating results in considerable (heat) radiation loss at the outer and bottom side of the rail. This heat is not used to keep the rail snow-free and ice-free.

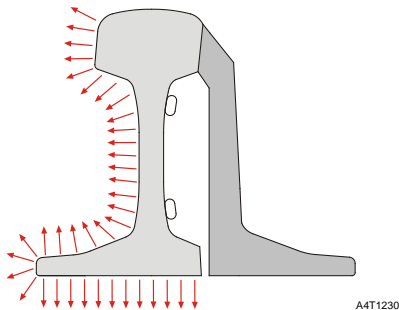


Fig. 2.1 Heat loss for FULL depth switch

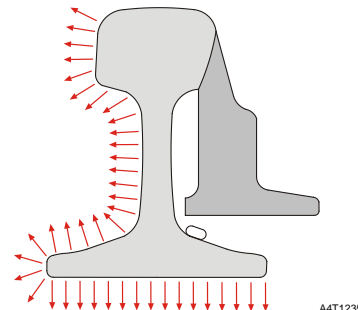


Fig. 2.2 Heat loss for SHALLOW depth switch

Insulation is applied to prevent unnecessary heat loss. The heat loss mainly takes place at the outer and lower side of the rail.

When applying insulation in a point, the type of rail fastening is important.

In practice this means the following:

- In points with high slide chair fixation (e.g., 54E1), insulation can only be applied between the slide chairs. Both the outer side and the bottom side are insulated (fig. 2.3)
- In points with low slide chair fixation (e.g., 49E1, 54E3, 60E1), insulation can be applied both between the slide chairs (outer side and bottom side of rail) and above the clamps (outer side of rail only) (figure 2.4).

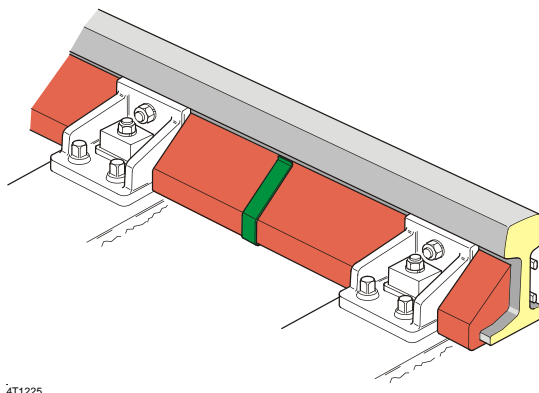


Fig. 2.3 Point with high slide chair fixation

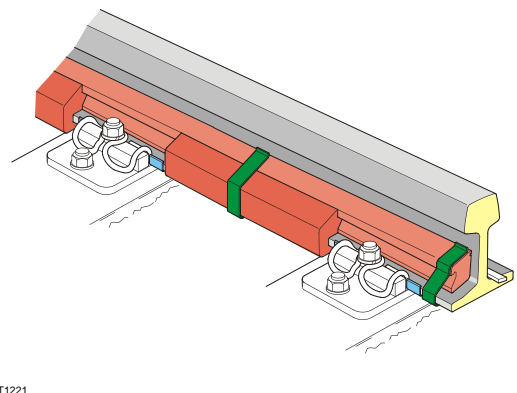


Fig. 2.4 Point with low slide chair fixation

2.3 Composition and specifications

A few important and practical properties of point insulation:

- The design of the insulation elements is exactly the same as the rail, therefore, the wind and melt water have nearly no influence on the cooling of the rail.
- The insulation can easily be shortened or adjusted on site if any point components (bolts, welds, etc.) are in the way.
- Insulation of the required dimensions is provided ex works in standard length,
- The insulation blocks are tough and strong which minimises the chance of damage and breakage.
- The insulation blocks are clamped very firmly on the rail, so that they cannot come loose from the rail due to (high-speed) train traffic up to 200km/h.
- Insulation is, in general, at least 10 mm thick, thereby realising maximum insulation values.
- Insulation limits the natural heating of the rail in the summer.
- Signal cables along the rail can be clamped in the partly standard insulation recess (this recess is a standard possibility, not an option).
- Insulation is printed with recycling, fire norm, production date and switch type.

Some examples:

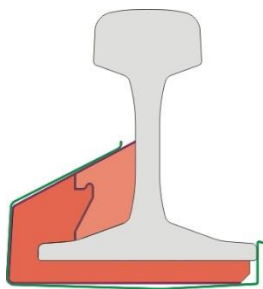


Fig. 2.5 Insulation (2 parts) for low slide chair fixation
A4T1260

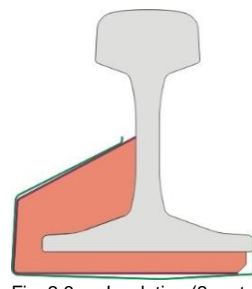


Fig. 2.6 Insulation (2 parts) for high slide chair fixation
A4T1250

2.4 Specifications / properties

| | |
|----------------------------|---|
| Basic material | : EPP (expanded polypropylene flame retardant (FR)) |
| Insulation value λ | : 0.038 W/mK |
| Properties | : tough, strong, elastic, easy to process and humidity resistant |
| Temperature | : -40 to +90 °C |
| Flammability properties: | self-extinguishing according to EN13501-1 class D and halogen-free |
| UV resistance | : good UV resistance |
| Design lifetime | : min. 10 years when placed according to installation instructions |
| Durability | : resistant to practically all substances used around the track, such as oils, greases, water and herbicides (and vermin) |
| Recycling | : 100% recyclable |
| Colour | : grey |
| Dimensions | : depending on type of rail |
| Spring clamp | : stainless spring steel |

2.5 Influence of the tamping and brushing machine

Insulation is applied in most cases tamping machine-free.

The following is of importance:

- The tamping machine lifts the point under head of rail with the rollers or switch hook. The insulation blocks are not affected because of the 30mm free space under the rail head
- The tamping machine lifts the point with the switch hook under the rail foot. The switch hook is used under the foot when the rail head or switch hook are too worn. The insulation blocks have to be disassembled in this case (in the case of switches with a low chair fixation it only concerns the foot section of the insulation blocks).

Brushes, combined with the tamping machine, are used when the ballast has been topped up. Due to the considerable force of the brushes, for new point supplies the insulation should be applied after the rails have been brushed. The point section should be brushed manually (usually the standard procedure) if insulation has already been applied on the point.

Comments:

- The assembly and disassembly of insulation is easy and fast.

2.6 Impact on on/off behaviour of the heating system

Most heating systems are provided with a rail temperature sensor at the bottom side of the rail foot of a heated point section. The location of the point insulation influences the switching behaviour (see also Ch. 3.5.1):

Possible switch behaviour:

| | |
|----|---------------------|
| a) | Energy saving |
| b) | Higher availability |

- a) Insulation is applied (sideways) against the rail temperature sensor (*) as much as possible (see Ch. 3.5.1 photo a).

The available heat near the sensor is retained in the rail longer resulting in a much slower cooling curve of the sensor.

Result→ In comparison with a non-insulated point considerably less energy will be required for a comparable heat capacity in the point (=energy saving).
The average savings are approx. 50% at a switching on-off cycle between 3-7°C.

- b) Insulation is not applied against the rail temperature sensor but at a short distance (see Ch. 3.5.1 photo b). The heating and cooling curve in comparison with a non-insulated point does not change.

Result→ In comparison with a non-insulated point a much higher rail temperature will be concerned with equal energy consumption (=higher availability).
The temperature increase is approx. 6-8°C at a switching on-off cycle between 3-7°C.

(*) A fundamental basic principle is that the sensor matches the version applied by Heatpoint . The design, response time and position on the rail all impact the degree of energy-saving.

3 Point insulation assembly

3.1 General

Point insulation is used to limit unnecessary heat loss

3.2 Safety regulations

Observe the regulations regarding work area safety.

3.3 Preparation

When ordering materials the following points must be taken into account:

1. Determine the following:
 - type of switch
 - type of rail profile (i.e. 54E1, 49E1, 54E3)
 - type of slide chair fixation (high or low)
 - heated length of the switch
 - presence of cables
2. Bear cutting losses in mind (e.g. 5%) and extra insulation length with regard to the heated length (e.g. 2 x 0.5m. per switch side)



3.4 Required tools

Measuring tape, hand saw, wire brush, screwdriver and brush

3.5 Assembly

The procedure to apply the insulation is included in an annex. Ensure you select the correct point type (high – full depth or low –shallow depth slide chair fixation) as example.

For a full depth switch (high slide chair fixation) a brief video instruction is available on YouTube (<http://youtu.be/CV1BdeKgD4w>)

Implementation:

- 1) The rail, including its bottom side, should be thoroughly cleaned (use the wire brush) for a correct application.
- 2) Make sure there is sufficient room between the bottom side of the rail and the ballast so that the insulation can be easily placed.

The insulation is supplied with some acid-free grease (eg Vaseline) on the inside of the insulation (the part that contacts the rail) to prevent a possible slight form of corrosion.



- 3) Spray a thin layer of transparent tectyl coating at the top side of the (dry) rail foot (places to install the insulation, maximum 1 aerosol can per switch).
- 4) Place the insulation across the entire length of the heat exchanger, bearing an over length of approx. 0.5m at both ends in mind.



Apply additional insulation (over length) at the non-heated switch part (both ends) (see photo)

- 5) Affix at least one spring clip per switch sleeper section. If necessary, several clips can also be affixed. Ensure that the clip hooks securely over the rail foot and that the potentially sharp section that hooks over the rail foot does not damage the insulation during assembly.
- 6) Ensure that the insulation rests flush with the rail everywhere. The insulation can be shortened if needed to make it fit. In particular take care when suspending the switch rollers and bolts for the switch supports (see also attachments 1+2), rail temperature sensor (see also Ch. 3.5.1) or fixation clips/clamps for the heating elements.
- 7) The rods of the point machine must remain sufficiently free of the foot insulation.

Final check:

- a) After assembly, the insulation should be flush against the rail and have as few transition seams as possible (not too many short pieces). Pay particular attention to the pointy upper side and the part under the rail foot, which should firmly press against the rail.
- b) The spring clips should catch properly around the rail foot

3.5.1 Procedure at the rail temperature sensor

As indicated in section 2.6, the insulation can be applied in 2 ways near the heated rail temperature sensor. Depending on the application it is possible to choose between energy saving or increase heat capacity (a combination is also possible).

Energy saving: Place the insulation laterally tight against the rail temperature sensor. If the sensor is placed close to a slide chair, the sensor must be slid so that at least 10cm insulation can be applied to both sides of the sensor (see picture a).

Increase heat capacity: Keep the sensor sideways about 10cm left and right away from insulation (see picture b).



a) Insulation tight against the rail temperature sensor



b) Insulation away from the rail temperature sensor

3.5.2 Installation around clamps for heating elements

As indicated in Ch. 3.5, during installation spring clips for the heating elements should be considered.

Connection clamp: The connection clamps can't be moved.

Spring clamp: The spring clamps should be applied to the sliding chairs as much as possible. If necessary, they can be moved aside with a hammer (see also Appendix 2).

General: Insulation part A must be shortened so that insulation can be tightened against the clips. In addition, take into account that the insulation is properly fitted on the rail. In this case, use additional spring clips for clamping the insulation. Insulation part B does not have to be adjusted.



Connection clamp for fixation connection head heating element

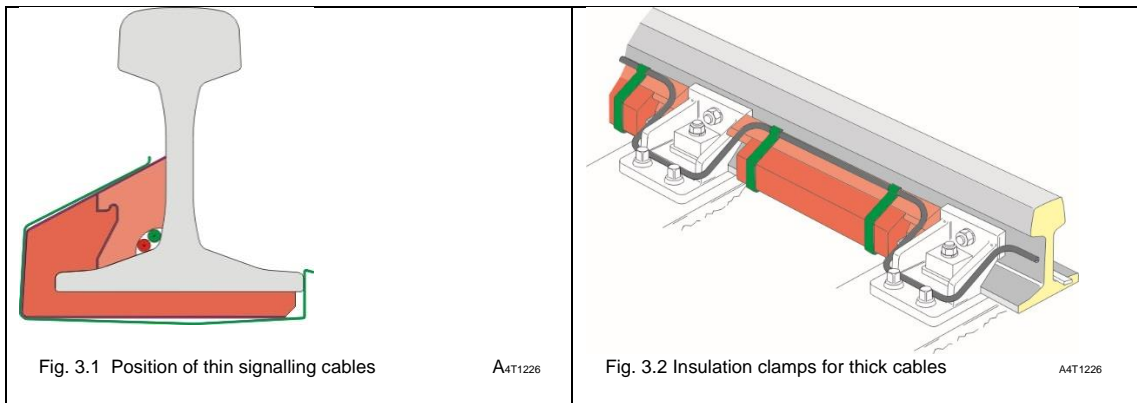
Spring clip for fixation heating element

3.5.3 Installation of cables along the switch

It may occur cables are placed along the switch.
Depending on the type of cable, the following 2 solutions are possible.

Thin signalling cables: these cables can be placed behind the insulation using the standard recess (see also Appendix 1 and 2).

Thick rigid cables: these cables must be connected with special cable clips with the cable on top of the insulation. The cable must not be placed directly underneath the head of the stock rail in connection with the use of the tamping machine.



3.6 Disassembly

An insulation block can easily be removed.

1. Use a solid screwdriver and insert it sideways into the spring opening at the bottom side of the rail foot (near the bend in the spring).
2. Press the spring downwards to ensure it does not catch behind the rail foot.
3. Pull the insulation block in the sleeper section from the rail by placing your fingers behind the foot insulation (bottom side of the rail foot). With a high chair fixation the insulation block can jam. Make a rotational movement and remove the block upwards.

4 Ordering method

Isoblock point insulation can be ordered from:

Heatpoint B.V.
Landzigt 32A
3454 PE De Meern, The Netherlands
T: +31.302074175 E: info@heatpoint.nl W: www.heatpoint.nl

or through local agencies.

4.1 Storage and packing

When performing assembly activities, the lightweight insulation blocks may be blown away when a train passes. Ensure sound packaging of the insulation blocks when these are not yet assembled.

Packing materials become the property of the commissioning party upon delivery and should be discarded by the commissioning party in an environmentally friendly manner.

4.2 Inspection

Prior to assembly the delivered insulation blocks should be checked for possible damages.

4.3 Guarantee

The guarantee period is 12 months, starting from the date of delivery (date on packing slip). In case of defective materials Heatpoint must receive written notification from the commissioning party within 2 weeks of delivery. After consultation the commissioning party will send the materials to Heatpoint. Heatpoint will assess the materials. Any follow-up actions will be discussed with the commissioning party.

The guarantee is void if the insulation blocks have not been handled according to the instructions.

Heatpoint is not responsible for labour and safety costs if the materials are to be replaced under the guarantee.

5 Maintenance instructions

The insulation blocks require no particular maintenance and can stay assembled on the switches throughout the year.

It is advisable however to undertake an annual inspection before the winter season starts. This inspection can include:

- Checking whether all insulation blocks are still present.
- Checking whether the insulation blocks are undamaged.
- Checking whether the insulation blocks are flush with the rail.
- Checking whether the spring clips are present and hook properly over the rail foot.
- Checking whether the insulation blocks are not obsolete (month/year production date on insulation).
- Checking whether the insulation is properly affixed to the Tw-rail temperature sensor.

6 Disposal instructions

The point insulation does not contain any environmentally hazardous substances and can, therefore, be disposed of easily; special instructions are not required.

It is also possible to recycle the materials and send them to a specialist processing company.

7 Annex overview

| No. | Description | Drawing no. | Version no. |
|-----|--|-------------|-------------|
| 1 | Isoblock for points with a high slide plate fixation (full depth switch) | A6T2200 | 2.3 |
| 2 | Isoblock for points with a low slide plate fixation (shallow depth switch) | A6T2250 | 1.4 |

Annex 1:

MONTAGE

spring clip fits around the railfoot

ADVICE:
Apply a thin layer of acid-free grease on the rail at the locations where insulation is applied

| Pos.no. | Description | Prod. no. - Heatpoint |
|---------|----------------------------------|-----------------------|
| 1 | Isoblock 54E1 L=42 cm | A201051100 |
| 2 | Spring clip for 100 mm rail foot | A200100310 |
| 3 | Spring clip for 140 mm rail foot | A200100410 |

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SWITCH ROLLERS

cutting straight in case of brackets for switch rollers (2x)

cutting corners in case of brackets for switch rollers (2x)

A

POINT MACHINE

isolation + spring clip (taking into account free space point machine)

point machine

B

POINT SUPPORT

nut/bolt for point support

cutting straight near nut/bolt

C

CABLE

cutting recess parts (in the presence of cable)

D

Drawn: Co van Noordwijk
Date: 20-10-2014

Drawn number: A6T2200-EN
Size: A4

Version: 2.3
Material:

**Isoblock 54E1(UIC54)
assembly for full depth
switches**

Annex 2:

electric heating elements
isoblock

ASSEMBLY INSULATION PART B
clip heating element
heating element

ASSEMBLY INSULATION PART A
part B
part A
saw

ASSEMBLY SPRING CLIPS
*apply clip type B only if necessary

type A
type B*

spring clip fits around the railfoot

CABLE
nut/bolt for point support
cutting recess parts (in the presence of cable)

D
cutting recess parts (in the presence of cable)

ADVISE:
Apply a thin layer of acid-free grease on the rail at the locations where insulation is applied

| Pos. no. | Description | Prod. no. - Heatpoint |
|----------|-------------------------------------|-----------------------|
| 1a | isoblock part A 49E1/54E3 L=80,5 cm | A201050100 |
| 2a | isoblock part B 49E1/54E3 L=80,5 cm | A201050110 |
| 3a | Spring clip type A 49E1/54E3 | A200100110 |
| 4a | Spring clip type B 49E1/54E3 | A200100120 |
| 1b | isoblock part A 60E1 L=80,5 cm | A201050200 |
| 2b | isoblock part B 60E1 L=80,5 cm | A201050210 |
| 3b | Spring clip type A 60E1 | A200100200 |
| 4b | Spring clip type B 60E1 | A200100210 |

Drawn: Co van Noordwijk
Date: 20-10-2014
Drawn number: A672250-EN
Size: A4
Version: 1,4
Material:

Isoblock 49E1, 54E3, 60E1 assembly for shallow depth switches

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