SLOVENSKI STANDARD
SIST EN 50022:1998

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Low-voltage switchgear and controlgear for industrial use - Mounting rails - Top hat rails 35 mm wide for snap-on mounting of equipment

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Industrielle Niederspannung-Schaltgeräte - Tragschienen - Hutschienen 35 mm breit zur Schnappbesfestigung von Geräten

Appareillage industriel à basse tension - Profilés supports - Profilés chapeau de longeur 35 mm pour la fixation d'appareils encliquetables

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English version

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CENELEC General Secretariat or to any CENELEC member.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für elektrotechnische Normung

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This European Standard has been prepared by CENELEC Technical Committee 17X.

1. General

To ensure the universal utilization of snap-on mounting of equipment, it is appropriate to standardize certain types of rail.

This standard specifies two types of top hat rail, both 35 mm wide : one, 7.5 mm high, is already widely used; the other, 15 mm high, is new; it is more rigid and permits the mounting of heavier equipment and/or greater distances between fixing points.

For the mounting of equipment that is too large or too heavy for either 35 mm top hat rail, a 75 mm top hat rail is specified in EN 50 023.

2. Scope

This standard specifies 35 mm wide steel top hat rails for the snap-on mounting of equipment.

3. Dimensions

The dimensions of both types of top hat rail are given in figure 1.

These dimensions apply over the whole length of the top hat rail, but shall not be verified anywhere less than 10 mm from the ends.

Dimensions in millimetres

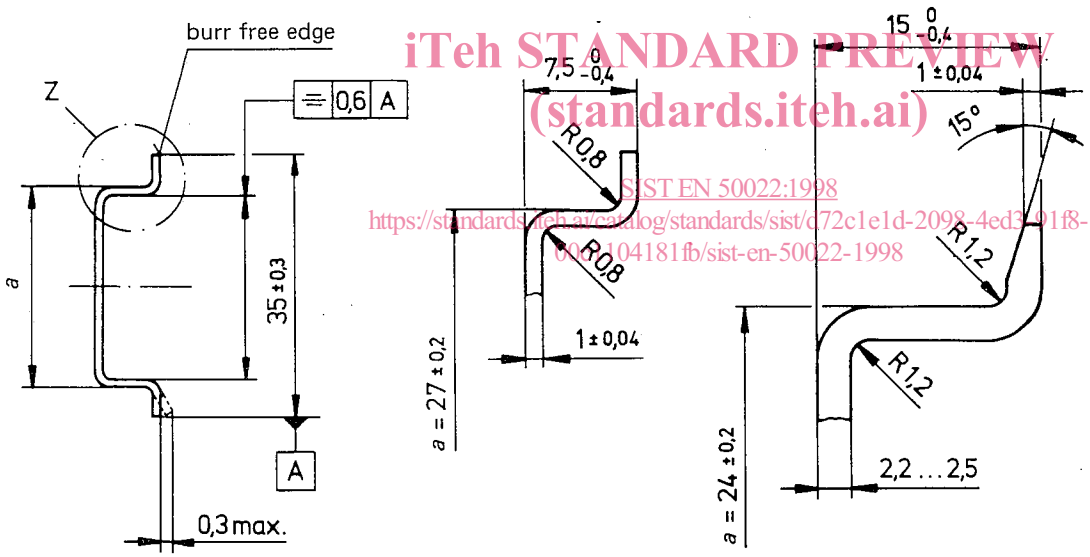


Figure 1. Top hat rails 35 mm wide

4. Designation

The designation of a 35 mm wide top hat rail, 7.5 mm high :
top hat rail EN 50 022 – 35 x 7.5
The designation of a 35 mm wide top hat rail, 15 mm high :
top hat rail EN 50 022 – 35 x 15

5. Material

The material used shall be :
cold rolled carbon steel sheet;
skin passed after annealing;
bright surface finish;
tensile strength between 320 N/mm^2 and 420 N/mm^2;
elongation at least 30 %;
180° bend tested longitudinally and transversely with regard to the direction of rolling.

Each country may indicate its corresponding national standard.

Other qualities of steel may be used only by agreement between the manufacturer and the user.

6. Finish

The finish shall be zinc-plated and chromated, with a layer thickness of at least 6 µm, except for cut surfaces resulting from cutting to length.

Other finishes may be used by agreement between the manufacturer and the user.

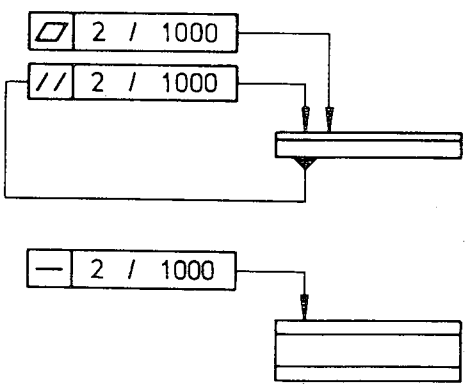
7. Availability

Top hat rails shall be supplied either in manufactured lengths of at least 1 m, or in ready cut lengths.

8. Tolerances on form

The tolerances on form are shown in figure 2, in accordance with ISO/R 1101*.

Top hat rail 35 x 7.5



Top hat rail 35 x 15

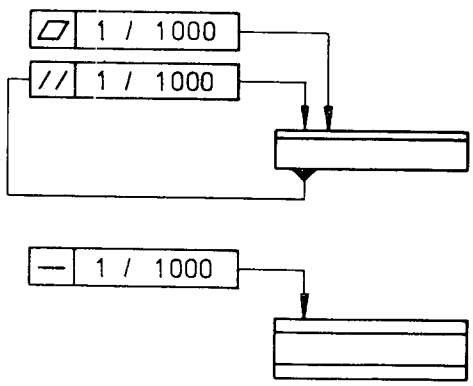


Figure 2. Tolerances on form

*Reference of corresponding national standard (see national appendix B).

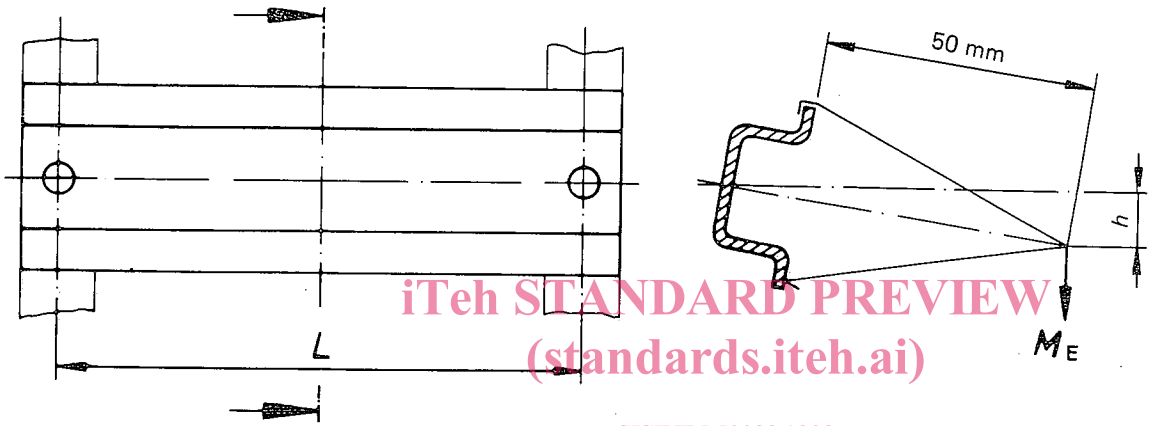
Appendix

Guidance for the use of top hat rails

To determine the permissible load of rails, correctly used, the twisting deformation is always the most important factor. The sagging stress, on the other hand, is small and can be disregarded.

Research has shown that, as a result of the current practice of fixing rails by means of two screws, a torsion stress $\tau >$ 50 N/mm^2 can cause a permanent deformation of the rail. The maximum permissible torque for that stress is independent of the distance between rail fixing points, e.g. 750 N mm for a top hat rail 35 x 7.5. For distances between fixing points used in practice, with this force an excessive deformation occurs generally in the middle of the top hat rail.

A method for assessing this deformation is shown in figure 3.



M is the torque due to the force from the equipment mounted on the rail, which equals force times the distance between the centre of gravity and the mounting plane (in N mm) (possibly supplemented to take shocks into account)

M_E is the moment (in N mm) of the equivalent torque acting in the middle of the rail for a number of individual moments M of similar equipment:

$$M_E = \frac{\Sigma M}{2}$$

J_P is the polar moment of inertia of the rail (in mm^4)

G is the sliding modulus (steel plate 80 000 N/mm^2)

L is the distance between fixing points (in mm)

h is the deflection (in mm) of the rail at 50 mm from the fixing surface of the equipment:

$$h = \frac{M_E . L}{4 . J_P . G} . 50$$

Figure 3. Assessment of deflection of rail

Using this method, the maximum equivalent torque M_E as a function of the distance L between fixing points has been calculated for three values of deflection h, for both types of rail and is shown in figure 4.

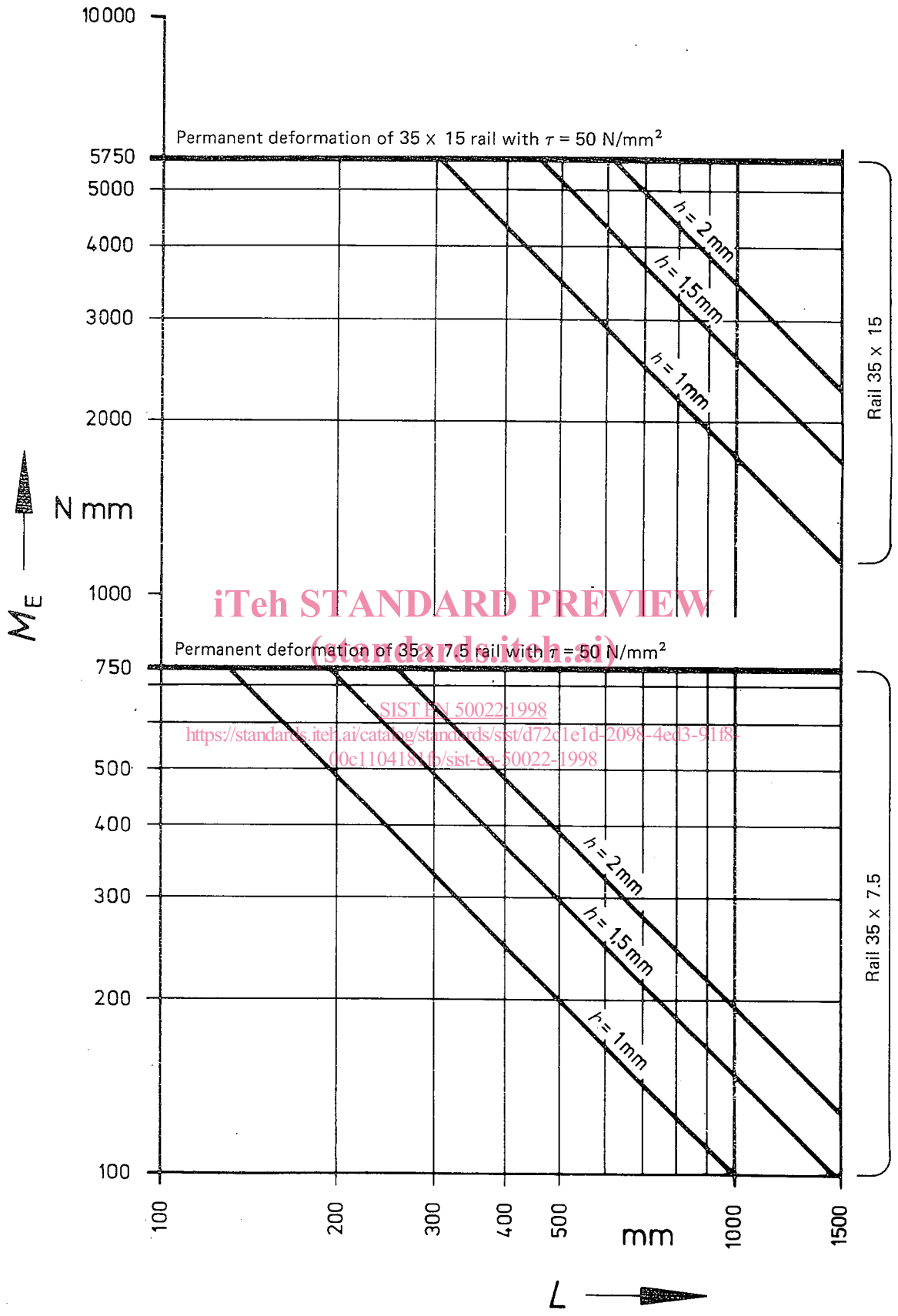


Figure 4. Load capacity, $M_E = f(L, h)$

Example 1.

A rail 35 x 7.5, L = 300 mm, may be loaded with M_E = 350 N mm for h = 1 mm.

Example 2.

It is required to use a rail 800 mm long to support equipment having an equivalent torque M_E = 480 N mm for h = 1 mm.

1st possibility: rail 35 x 15

Figure 4 shows that L = 800 mm is convenient for $M_E \leqslant 2100$ N mm

2nd possibility: rail 35 x 7.5

Figure 4 shows
that L = 800 mm is only acceptable with $M_E \leqslant 120$ N mm,
and that L = 400 mm could be acceptable, since $M_E \leqslant 250$ N mm.
As 250 N mm $>$ 480/2 N mm, an intermediate fixing point at L = 400 mm would be sufficient.