



**SLOVENSKI STANDARD**  
**oSIST prEN 16431:2025**  
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**Železniške naprave - Infrastruktura - Votli pragovi in nosilci**

Railway applications - Infrastructure - Hollow sleepers and bearers

Bahnanwendungen - Infrastruktur - Hohlschwellen für Gleise und Weichen

Applications ferroviaires - Voie - Traverses et supports creux

**Ta slovenski standard je istoveten z: prEN 16431**

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## Railway applications - Infrastructure - Hollow sleepers and bearers

Applications ferroviaires - Voie - Traverses et supports creux

Bahnwendungen - Infrastruktur - Hohlschwellen für Gleise und Weichen

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**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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**prEN 16431:2024 (E)****European foreword**

This document (prEN 16431) has been prepared by Technical Committee CEN/TC 256 “Railway applications”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document supersedes EN 16431:2014.

In comparison with the previous edition (EN 16431:2014), the following technical modifications have been made:

- update clauses concerning the fastening system and references to the new fastening system standard series;
- improve the document with the latest experience acquired by suppliers and customers in the field of design of hollow sleepers and bearers;
- include improvements about acceptance procedures, particularly with regard to the testing of hollow sleeper body and its fastening system interface.

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## 1 Scope

This document defines technical criteria and control procedures which are satisfied by hollow sleepers and bearers used in ballasted track with Vignole rails. The hollow sleepers and bearers designed for ballasted track can also be used in ballastless track. In this case, the requirements are defined by the customer.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13481 (all parts), *Railway applications - Track - Performance requirements for fastening systems*

EN 13481-7:2022, *Railway applications - Track - Performance requirements for fastening systems - Part 7: Fastening systems for switches and crossings, check rails, insulated rail joints and rail expansion devices*

EN ISO 22074-3, *Railway infrastructure — Rail fastening systems — Part 3: Proof load test method for pull-out resistance (ISO 22074-3)*

EN ISO 22074-4, *Railway infrastructure — Rail fastening systems — Part 4: Test methods for resistance to repeated loading (ISO 22074-4)*

EN ISO 22074-5, *Railway infrastructure — Rail fastening systems — Part 5: Test method for electrical resistance (ISO 22074-5)*

EN ISO 22074-6, *Railway infrastructure — Rail fastening systems — Part 6: Test method for resistance to severe environmental conditions (ISO 22074-6)*

EN ISO 22074-8, *Railway infrastructure — Rail fastening systems — Part 8: Test method for vertical stiffness (ISO 22074-8)*

EN 50125-3, *Railway applications - Environmental conditions for equipment - Part 3: Equipment for signalling and telecommunications*

EN 13230-2:2016, *Railway applications - Track - Concrete sleepers and bearers - Part 2: Prestressed monoblock sleepers*

EN 17343, *Railway applications - General terms and definitions*

## 3 Terms, definitions and abbreviations

### 3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 17343 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

**prEN 16431:2024 (E)****3.1.1****hollow sleepers**

sleepers and bearers with hollow structure, with support for Vignole rails on ballasted or ballastless track, including the fastenings systems and all components, with a minimum of 50 % of the cross sectional-area hollow throughout its length

**3.1.2****special hollow sleepers**

sleepers and bearers with a length > 2,6 m and minimum of three fastening points at different positions (for example bearers in moveable crossings, inside double slips...)

**3.1.3****body**

hollow structure which is in contact with the ballast/slab and supports the fastening system and other components

**3.1.4****other components of the hollow sleepers**

parts inside or around the body of the hollow structure except fastening system components

**3.1.5****interface**

any device used to fix the fastening system to the top of hollow sleeper or bearer body

**3.1.6****top width**

maximum width of the hollow sleepers at the top (including the body and the fastening system)

**3.1.7****bottom width**

maximum width of the hollow sleepers at the bottom level of the body (in the tamping area)

**3.1.8****tamping area**

distance on each side to the rail centre where the ballast has to be tamped

**3.1.9****bending moment**

moment applied on the hollow sleeper or bearer which produces tension and compression in the element

**3.1.10****positive bending moment**

moment which produces tension at the bottom of the hollow sleeper or bearer

**3.1.11****negative bending moment**

moment which produces tension at the top of the hollow sleeper or bearer



## 3.2 Abbreviations

For the purposes of this document, the following abbreviations apply:

MGT	Mass Gross Tons
USP	Under Sleeper Pad
FEM	Finite Element Method
fyk	Characteristic value of yield strength
S&C	Switch and Crossing

## 4 Requirements

### 4.1 General

A hollow sleeper or bearer is different from a regular sleeper or bearer by the fact that at least 50 % of the cross-sectional area is hollow to permit containment of devices and/or systems as:

- switch and crossing actuation, detection and locking (in the case of bearers);
- wheel detection;
- rods, bars, cables, pipes, etc.

A sufficient space for maintenance of these devices and/or systems shall be considered.

In this document electrical, mechanical, chemical and corrosion tests for approval are defined which provide assurance of the capability of hollow sleepers and bearers to resist repetitive loading and provide sufficient durability.

Additional controls during the manufacturing process are not part of this document and shall follow the corresponding material test standards.

### 4.2 Mechanical requirements

The body of the hollow sleepers and bearers shall be designed in order to withstand the bending moments due to the traffic load.

The fastening system interface and the mechanical resistance of the body shall be checked according to Clause 5 and 6 of this document.

Elastic fastening systems should be used.

Elastic fastening systems shall only use components from homologated fastening systems according to EN 13481 series.

Specific design may require rigid fastening systems (e.g. bearers housing actuation, detection and locking system for turnouts).

NOTE Test load, given in Table 1 and Table 2 correspond to the category C of EN 13481 and category E limited to a maximum axle load of 300 kN.

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### 4.3 Functional requirements

All types of hollow sleepers and bearers shall meet the following requirements:

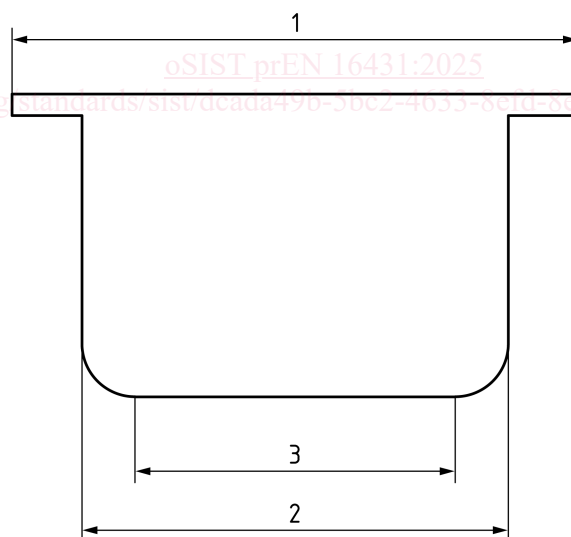
- the height between the top of the rail and the bottom of the hollow sleeper or bearer shall be defined by the customer. This height is usually the same as the neighbouring sleepers or bearers;
- the tamping area shall be defined by the customer;
- the mass per unit of length of the hollow sleeper (including rail fastening, cover plates) shall be  $\geq 80$  kg/m;
- the length of the hollow sleepers and bearers shall be defined by the customer (regarding transportation and installation limits or regulations);
- the maximum bottom width shall be 350 mm, and flat part of the bottom shall represent minimum 70 % of the bottom width (see Figure 1);
- the electrical resistance shall be checked according to subclauses 5.5, 6.3 and 7.2 of this document.

Hollow bearers shall fulfil the following additional requirements:

- the maximum top width in the tamping area shall be 425 mm (see Figure 1);
- the position of the tamping area and the dimensions of the hollow bearer body shall be agreed between supplier and customer.

Hollow sleepers in track shall fulfil the following additional requirements:

- the maximum width shall not exceed 350 mm (see Figure 1);



#### Key

- 1 maximum top width
- 2 maximum bottom width
- 3 flat part of the bottom

The bottom of the hollow sleeper or bearer should be aligned at the same level as the bottom of the adjacent sleepers and bearers (mounting on same ballast level).

**Figure 1 — Dimensions of hollow sleeper or bearer**