



SLOVENSKI STANDARD
oSIST prEN ISO 22074-4:2024
01-februar-2023

Železniška infrastruktura - Sistemi za pritrjevanje tirnic - 4. del: Preskusne metode za določanje odpornosti na ponavljajoče se obremenitve (ISO 22074-4:2022)

Railway infrastructure - Rail fastening systems - Part 4: Test methods for resistance to repeated loading (ISO 22074-4:2022)

Bahninfrastruktur - Schienenbefestigungssysteme - Teil 4: Prüfverfahren bei wiederkehrenden Belastungen (ISO 22074-4:2022)

Infrastructure ferroviaire - Systèmes de fixation du rail - Partie 4: Méthode d'essai pour la détermination de résistance aux charges répétitives (ISO 22074-4:2022)

Ta slovenski standard je istoveten z: prEN ISO 22074-4

[oSIST prEN ISO 22074-4:2024](https://standards.slovenski-institut.si/standards/sist/prEN-ISO-22074-4-2024)

<https://standards.slovenski-institut.si/standards/sist/prEN-ISO-22074-4-2024>

ICS:

45.080	Tračnice in železniški deli	Rails and railway components
--------	-----------------------------	------------------------------

oSIST prEN ISO 22074-4:2024

en,fr,de

INTERNATIONAL STANDARD

ISO 22074-4

First edition
2022-08

Railway infrastructure — Rail fastening systems —

Part 4: Test methods for resistance to repeated loading

Infrastructure ferroviaire — Systèmes de fixation du rail —

*Partie 4: Méthode d'essai pour la détermination de résistance aux
charges répétitives*

(<https://standards.iteh.ai>)
Document Preview

[oSIST prEN ISO 22074-4:2024](https://standards.iteh.ai/catalog/standards/sist/ffe0a5c0-a249-4b4b-b597-35d042faf2e2/osist-pren-iso-22074-4-2024)

<https://standards.iteh.ai/catalog/standards/sist/ffe0a5c0-a249-4b4b-b597-35d042faf2e2/osist-pren-iso-22074-4-2024>



Reference number
ISO 22074-4:2022(E)

© ISO 2022

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[oSIST prEN ISO 22074-4:2024](https://standards.iteh.ai/catalog/standards/sist/ffe0a5c0-a249-4b4b-b597-35d042faf2e2/osist-pren-iso-22074-4-2024)

<https://standards.iteh.ai/catalog/standards/sist/ffe0a5c0-a249-4b4b-b597-35d042faf2e2/osist-pren-iso-22074-4-2024>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2022

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Symbols	2
5 Test procedure	3
5.1 General principle.....	3
5.2 Apparatus.....	4
5.2.1 Rail.....	4
5.2.2 Actuator.....	4
5.2.3 Load application head.....	4
5.2.4 Displacement measuring instruments.....	4
5.2.5 Force measuring instruments.....	5
5.3 Test specimens.....	5
5.3.1 Sleeper or other rail support.....	5
5.3.2 Fastening.....	5
5.4 Procedure for one rail.....	5
5.4.1 General.....	5
5.4.2 Preparation for test.....	5
5.4.3 Clamping force.....	6
5.4.4 Longitudinal rail restraint.....	6
5.4.5 Vertical static stiffness of fastening assembly.....	6
5.4.6 Cyclic loading.....	7
5.4.7 Repeat tests.....	11
5.4.8 Final inspection.....	11
5.5 Procedure for two rails.....	11
5.5.1 General.....	11
5.5.2 Apparatus.....	11
5.5.3 Procedure.....	12
6 Test report	13
Bibliography	15

ISO 22074-4:2022(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 269, *Railway applications*, Subcommittee SC 1, *Infrastructure*.

A list of all parts in the ISO 22074 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

<https://standards.iteh.ai/catalog/standards/sist/ffe0a5c0-a249-4b4b-b597-35d042faf2e2/osist-pren-iso-22074-4-2024>

Railway infrastructure — Rail fastening systems —

Part 4: Test methods for resistance to repeated loading

1 Scope

This document specifies a laboratory test procedure for applying repeated load cycles which generate displacement cycles representative of the displacements caused by traffic on railway track. It is used for assessing the long-term performance of rail fastening systems.

This document is applicable to surface mounted rail on sleepers, bearers and slab track and embedded rail.

This test procedure applies to a complete fastening assembly.

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.

ISO 22074-1, *Railway infrastructure — Rail fastening systems — Part 1: Vocabulary*

ISO 22074-2, *Railway infrastructure — Rail fastening systems — Part 2: Test method for longitudinal rail restraint*

ISO 22074-7, *Railway infrastructure — Rail fastening systems — Part 7: Test method for clamping force and uplift stiffness*

ISO 22074-8:2022, *Railway infrastructure — Rail fastening systems — Part 8: Test method for vertical stiffness*

ISO 7500-1:2018, *Metallic materials — Calibration and verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Calibration and verification of the force-measuring system*

ISO 9513, *Metallic materials — Calibration of extensometer systems used in uniaxial testing*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 22074-1 apply.

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

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

3.1

performance requirement

requirement relating to applied loading and pass/fail criteria identified before the test is carried out

Note 1 to entry: These requirements can be set out in a client's technical specification or in standards such as the EN 13481 series or EN 17319.

ISO 22074-4:2022(E)

4 Symbols

For the purposes of this document, the following symbols apply.

α	angle between the load line and a line normal to the datum surface of the rails	°
F	longitudinal restraint i.e. maximum axial longitudinal load on the rail without non-elastic displacement occurring	kN
F_{SAmax}	force applied to the assembly in measurement of static stiffness of the assembly	kN
F_{SA1}	lower limit of force for determining the static stiffness of assembly	kN
F_{SA2}	upper limit of force for determining the static stiffness of assembly	kN
P_{max}	maximum load applied by the actuator during the repeated load test	kN
P_{min}	minimum load applied by the actuator during the repeated load test	kN
P_L	component of force parallel to the datum surface of the rails	kN
P_V	component of force normal to the datum surface of the rails	kN
X	position of the line of application of P_L below the centre of curvature of the gauge corner of the rail head as shown in Figure 1	mm

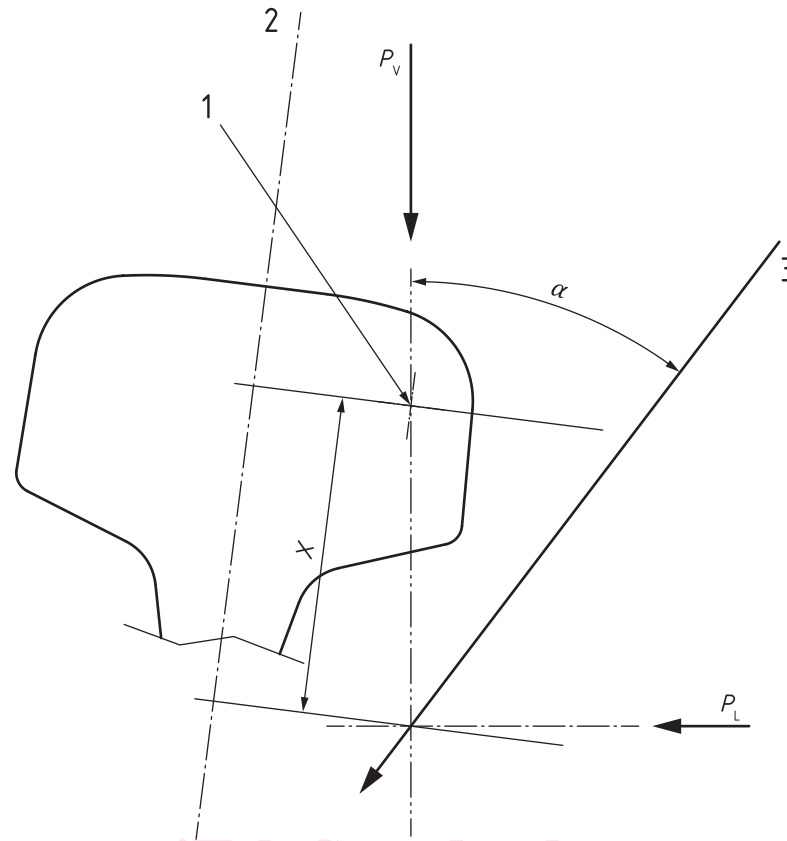
NOTE 1 $\frac{P_L}{P_V} = \tan \alpha$

NOTE 2 Datum surface is defined in ISO 22074-1.

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

[oSIST prEN ISO 22074-4:2024](https://standards.itih.ai/catalog/standards/sist/ffe0a5c0-a249-4b4b-b597-35d042faf2e2/osist-pren-iso-22074-4-2024)

<https://standards.itih.ai/catalog/standards/sist/ffe0a5c0-a249-4b4b-b597-35d042faf2e2/osist-pren-iso-22074-4-2024>

**Key**

- 1 centre of gauge corner radius
- 2 centre line of the rail profile
- 3 line of load application

Figure 1 — Position of load application

oSIST prEN ISO 22074-4:2024

<https://standards.iteh.ai/catalog/standards/sist/ffe0a5c0-a249-4b4b-b597-35d042faf2e2/osist-pren-iso-22074-4-2024>

5 Test procedure**5.1 General principle**

A constant amplitude, cyclic force is applied at a predetermined load line and position on the rail head. The magnitude, inclination and point of application of the load to be used are determined from the stiffness of the fastening assembly, axle loads and curve conditions of the track for which the fastening assembly is being tested.

A constant amplitude, cyclic force is applied by a single actuator.

Performance is determined by the change in clamping force, longitudinal rail restraint, vertical stiffness and rail position, and visual inspection of the components during test.

If the test conditions are dependent on the dynamic low frequency stiffness of the fastening system, it shall be measured before the repeated load test procedure set out in [5.4](#) or [5.5](#), following the procedure of ISO 22074-8:2022, 7.2.

NOTE For the reference test method described in [Clause 5](#), guidance on the derivation of loads and loading geometry is included in CEN/TR 17320.

ISO 22074-4:2022(E)

5.2 Apparatus

5.2.1 Rail

Short lengths of rail (approximately 0,5 m per rail seat or longer if required), of the section for which the fastening assembly under test is designed shall be used. The rail shall be unlaminated and neither have loose rust on the surface nor be polished on the foot.

The head of the rail can be modified to accommodate the load application except when testing fastenings which support the web of the rail. The dimension X , as shown in [Figure 5](#), refers to the design rail section for the fastening assembly.

For embedded rail, the rail is part of the test specimen and its length is specified in [5.3.1](#).

5.2.2 Actuator

An actuator capable of applying a force of up to 150 kN in a cyclic manner at a frequency of (4 ± 1) Hz shall be used.

NOTE For simultaneous loading of two and four rail seats, the required capacity is correspondingly greater.

5.2.3 Load application head

A head in contact with the rail which is capable of transmitting the applied force to a rail at the required position relative to the rail head shall be used.

5.2.4 Displacement measuring instruments

5.2.4.1 Calibration procedure

If contacting displacement measuring instruments are used, they shall conform to ISO 9513.

If non-contacting displacement measuring instruments are used, they shall be calibrated to ensure that they are capable of measuring the displacement of the rail, relative to the supporting sleeper or other element as required in [5.2.4.2](#).

5.2.4.2 Calibration requirement

The instrument shall be capable of measuring displacements as follows:

- for assemblies with an expected dynamic low frequency stiffness ≤ 100 MN/m, displacement measurement within $\pm 0,02$ mm;
- for assemblies with an expected dynamic low frequency stiffness > 100 MN/m, displacement measurement within $\pm 0,01$ mm.

5.2.4.3 Fixtures for mounting displacement measuring instruments

For measurement of displacements during repeated loading, mounting fixtures shall be provided which minimize additional measurement errors under the conditions within which the test is running.

When displacements are to be measured while the test is running, steps should be taken to ensure that any fixtures used to support the displacement measuring instruments are short and stiff. This is to ensure that the dynamic response of the fixture does not affect significantly the accuracy or repeatability of the measurements.