



SLOVENSKI STANDARD
oSIST prEN ISO 9717:2023
01-julij-2023

Kovinske in druge anorganske prevleke - Fosfatne prevleke na kovinah (ISO/DIS 9717:2023)

Metallic and other inorganic coatings - Phosphate conversion coating of metals (ISO/DIS 9717:2023)

Metallische und andere anorganische Überzüge - Phosphatumwandlungsüberzüge auf Metallen (ISO/DIS 9717:2023)

Revêtements métalliques et autres revêtements inorganiques - Couches de conversion au phosphate sur métaux (ISO/DIS 9717:2023)

Ta slovenski standard je istoveten z: prEN ISO 9717

ICS:

25.220.20	Površinska obdelava	Surface treatment
25.220.40	Kovinske prevleke	Metallic coatings

oSIST prEN ISO 9717:2023

en,fr,de

DRAFT INTERNATIONAL STANDARD

ISO/DIS 9717

ISO/TC 107/SC 8

Secretariat: KATS

Voting begins on:
2023-04-21Voting terminates on:
2023-07-14

Metallic and other inorganic coatings — Phosphate conversion coating of metals

Revêtements métalliques et autres revêtements inorganiques — Couches de conversion au phosphate sur métaux

ICS: 25.220.20

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[oSIST prEN ISO 9717:2023](https://standards.iteh.ai/catalog/standards/sist/b1256d05-4a2f-4899-9812-089899d25aec/osist-pren-iso-9717-2023)

<https://standards.iteh.ai/catalog/standards/sist/b1256d05-4a2f-4899-9812-089899d25aec/osist-pren-iso-9717-2023>

This document is circulated as received from the committee secretariat.

THIS DOCUMENT IS A DRAFT CIRCULATED FOR COMMENT AND APPROVAL. IT IS THEREFORE SUBJECT TO CHANGE AND MAY NOT BE REFERRED TO AS AN INTERNATIONAL STANDARD UNTIL PUBLISHED AS SUCH.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

RECIPIENTS OF THIS DRAFT ARE INVITED TO SUBMIT, WITH THEIR COMMENTS, NOTIFICATION OF ANY RELEVANT PATENT RIGHTS OF WHICH THEY ARE AWARE AND TO PROVIDE SUPPORTING DOCUMENTATION.

ISO/CEN PARALLEL PROCESSING



Reference number
ISO/DIS 9717:2023(E)

© ISO 2023

iTeh STANDARD PREVIEW (standards.iteh.ai)

[oSIST prEN ISO 9717:2023](https://standards.iteh.ai/catalog/standards/sist/b1256d05-4a2f-4899-9812-089899d25aacc/osist-pren-iso-9717-2023)

<https://standards.iteh.ai/catalog/standards/sist/b1256d05-4a2f-4899-9812-089899d25aacc/osist-pren-iso-9717-2023>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2023

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
Introduction.....	vi
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	1
4 Information to be supplied by the purchaser to the processor.....	1
5 Coating types and their importance.....	2
5.1 Coating types.....	2
5.2 Designation of phosphate conversion coating.....	2
5.3 Example for designation of phosphate conversion coating.....	3
6 Requirements.....	3
6.1 Appearance.....	3
6.2 Coating mass per unit area.....	3
6.3 Post treatment.....	3
6.4 Correlation of coating thickness and area related mass.....	4
7 Heat treatment.....	4
Annex A (normative) Determination of phosphate conversion coating resistance to neutral salt spray test.....	5
Annex B (informative) General information.....	8
Annex C (informative) Identification of phosphate conversion coating.....	11
Bibliography.....	13

[oSIST prEN ISO 9717:2023](https://standards.iteh.ai/catalog/standards/sist/b1256d05-4a2f-4899-9812-089899d25aee/osist-pren-iso-9717-2023)

<https://standards.iteh.ai/catalog/standards/sist/b1256d05-4a2f-4899-9812-089899d25aee/osist-pren-iso-9717-2023>

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 107, *Metallic and other inorganic coatings, Subcommittee SC 8, Chemical conversion coatings*.

This fourth edition cancels and replaces the third edition (ISO 9717:2017), which has been technically revised.

The main changes are as follows:

- the Introduction has been clarified (1 bracket shifted);
- [5.1 Table 1](#) formatted and for Znph second line added to describe types of Znph; new [Table 1](#) copied on [Table C.1](#)
- [5.2](#) and ff.: all terms are uniformed from “phosphate coating” or “conversion coating” to “phosphate conversion coating” (when applicable);
- [5.2](#) and ff.: “after-treatment” was changed to “post treatment”; other definitions and spelling changed according to ISO 2080;
- [6.3 Table 2](#): definition of T1 recharged, second sentence deleted (this is content of T2);
- [6.3](#): last sentence updated to describe impact of neutral salt spray test;
- [6.4](#): revision of [6.4](#), thickness measurement replaced by area related mass;
- [Annex B](#): last sentence deleted: [Table B.1](#) updated;
- [Annex B](#): [Table B.1](#) and [B.3](#) headlines updated;
- [Annex B](#): [Table B.4](#) headline updated;
- [Annex C](#): the element nickel has been added to [C.1](#), [C.2.3](#), [C.2.5](#) and [C.4](#); ICP was added as method to [C.2.3](#); XRF was added as method to [C.3](#).

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.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[oSIST prEN ISO 9717:2023](https://standards.iteh.ai/catalog/standards/sist/b1256d05-4a2f-4899-9812-089899d25aacc/osist-pren-iso-9717-2023)

<https://standards.iteh.ai/catalog/standards/sist/b1256d05-4a2f-4899-9812-089899d25aacc/osist-pren-iso-9717-2023>

Introduction

Phosphate conversion coatings are produced by treating substrates with appropriate solutions. The main constituents of these solutions are the appropriate dihydrogen orthophosphates. These coatings differ in coating mass per unit area and apparent density, depending on.

They are intended to

- impart corrosion resistance,
- improve adhesion to paints and other organic finishes,
- facilitate cold-forming operations, such as wire drawing, tube drawing and extrusion, and
- modify surface frictional properties to facilitate sliding.

Phosphate conversion coatings are produced by treatment with solutions, the main constituents of which are the appropriate dihydrogen orthophosphates. These coatings are applied principally to ferrous materials and zinc, and differ in coating mass per unit area and apparent density, depending on

- the construction material and surface condition of the components,
- previous mechanical and chemical treatment of the components, and
- processing conditions for phosphating.

All phosphate conversion coatings are porous but can be sealed substantially by subsequent sealant processes.

The International Organization for Standardization (ISO) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent.

ISO takes no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured ISO that he/she is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with ISO. Information may be obtained from the patent database available at www.iso.org/patents.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those in the patent database. ISO shall not be held responsible for identifying any or all such patent rights.

Metallic and other inorganic coatings — Phosphate conversion coating of metals

WARNING — This document calls for the use of substances and/or procedures that could be injurious to health if adequate safety measures are not taken. This document does not address any health hazards, safety or environmental matters associated with its use. It is the responsibility of the producers, purchasers and/or users of this document to establish appropriate health, safety and environmentally acceptable practices and take appropriate actions.

1 Scope

This document specifies the requirements for phosphate conversion coatings which are usually destined for application on ferrous materials, aluminium, zinc, cadmium, and their alloys (see [Annex B](#)).

2 Normative references

The following documents are referred to in the text in such a way that some or all 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 2080, *Metallic and other inorganic coatings — Surface treatment, metallic and other inorganic coatings — Vocabulary*

ISO 3892, *Conversion coatings on metallic materials — Determination of coating mass per unit area — Gravimetric methods*

ISO 4519, *Electrodeposited metallic coatings and related finishes — Sampling procedures for inspection by attributes*

ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 2080 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/>

4 Information to be supplied by the purchaser to the processor

The following information shall be provided by the purchaser.

- a) A description of the coating according to this document, i.e., ISO 9717 (see [5.2](#)).
- b) In cases of phosphating steel parts with tensile strength $\geq 1\ 000$ MPa, also in locally restricted areas, e.g., for case-hardened or cold-formed structures or in weld seam areas, the safety against brittle fracture (hydrogen embrittlement) is of primary importance. The phosphating process shall be carried out in such a manner that a risk of hydrogen embrittlement is kept to a minimum. Appropriate measures to minimize the risk of hydrogen embrittlement shall be specified by the purchaser and applied by the supplier. Any heat treatment in accordance with specifications

ISO/DIS 9717:2023(E)

or recommendations cannot ensure complete prevention of hydrogen embrittlement. The effectiveness of a heat treatment, if any, shall be verified by the supplier.

- c) The sampling procedure, the acceptable quality limit or any other requirements and tests that deviate from ISO 4519.
- d) The surface treatment or phosphating.
- e) The desired appearance of the treated surface.
- f) The desired corrosion resistance.
- g) The quality appearance and surface condition of the basis metal, if any, if these properties affect the performance and/or appearance of coatings.
- h) Where applicable, technical measures to minimize the risk of hydrogen embrittlement as specified by the purchaser.

5 Coating types and their importance

5.1 Coating types

The phosphate conversion coating shall be designated in accordance with [Table 1](#).

Table 1 — Designation of phosphate conversion coatings

Elements present in phosphate conversion coating	Coating type
Iron (II)	Feph
Manganese	Mnph
Zinc (no Calcium)	Znph
Zinc and Mn, Ni, Fe(II) (no Calcium)	Znph
Zinc and Calcium	ZnCaph

There are various coating types of zinc phosphate that are altered because of the build-in of iron and/or nickel and/or manganese. This altered metal is usually present as a double salt, such as $Zn_2ME(PO_4)_2 \times 4 H_2O$, whereby ME can be Fe(II), Ni and/or Mn. Zn will continue to be the main metal element of those coatings, which do not have separate markings in order to avoid confusion. It should also be noted that metal taken from the basis material is included in the conversion coating.

Information for coating characteristics can be found in [Annex B](#) and the identification methods can be found in [Annex C](#).

5.2 Designation of phosphate conversion coating

The designation of the phosphate conversion coating shall consist of the following information.

- a) number of this document, i.e., ISO 9717, and the designation “phosphate coating”;
- b) followed by a hyphen;
- c) designation of basis material: by means of the material chemical symbol (or the symbol of the primary alloy components);
- d) followed by a solidus (/);
- e) a symbol describing the type of coating;
- f) followed by a solidus (/);

- g) a symbol, which indicates the function of the conversion coating as follows:
1. r = adhesion promoter and/or corrosion protection;
 2. z = simplification of cold forming;
 3. g = reduction of friction;
 4. e = electrical insulation;
- h) followed by a solidus (/);
- i) a number, which indicates the surface-related mass per square metre with a measurement uncertainty of $\pm 30\%$.

If the phosphate coating receives a supplementary treatment, the following information shall be added to the designation:

- j) solidus (/)
- k) a symbol, which defines the supplementary treatment (see [Table 2](#)).

Repeat this process if necessary.

Solidi (/) shall be used to separate data fields in the designation corresponding to the different sequential processing steps. Double separators or solidi indicate that a step in the process is either not required or has been omitted (see ISO 27830).

5.3 Example for designation of phosphate conversion coating

A coating of zinc phosphate type Znph, which has been applied on a ferrous material to prevent corrosion (r), with an area related mass of $(3 \pm 0,9)$ g/m² (3) and a post treatment with a sealant (T2) and a painting (T1), has the following designation:

Phosphate coating ISO 9717 — Fe/Znph/r/3/T2/T1

6 Requirements

6.1 Appearance

Zinc phosphate, zinc calcium phosphate and manganese phosphate conversion coatings shall evenly cover the metal surface and shall not show any white stains, corrosion products or fingerprints.

NOTE Slight fluctuations in the appearance of phosphate coatings because of contact with frames, local changes in surface roughness, properties of the basis material, or through minor contact inside the drum do not constitute any reason for claim.

6.2 Coating mass per unit area

The coating mass is measured in accordance with the procedures specified in ISO 3892.

6.3 Post treatment

Untreated phosphate conversion coatings do not provide a corrosion protection. A suitable post treatment can affect a temporary protection. [Table 2](#) shows the symbols when post treatments are required.