



Nederlandse norm

NEN-ISO 9328-3

(en)

Steel flat products for pressure purposes -
Technical delivery conditions - Part 3: Weldable
fine grain steels, normalized (ISO 9328-
3:2018, IDT)

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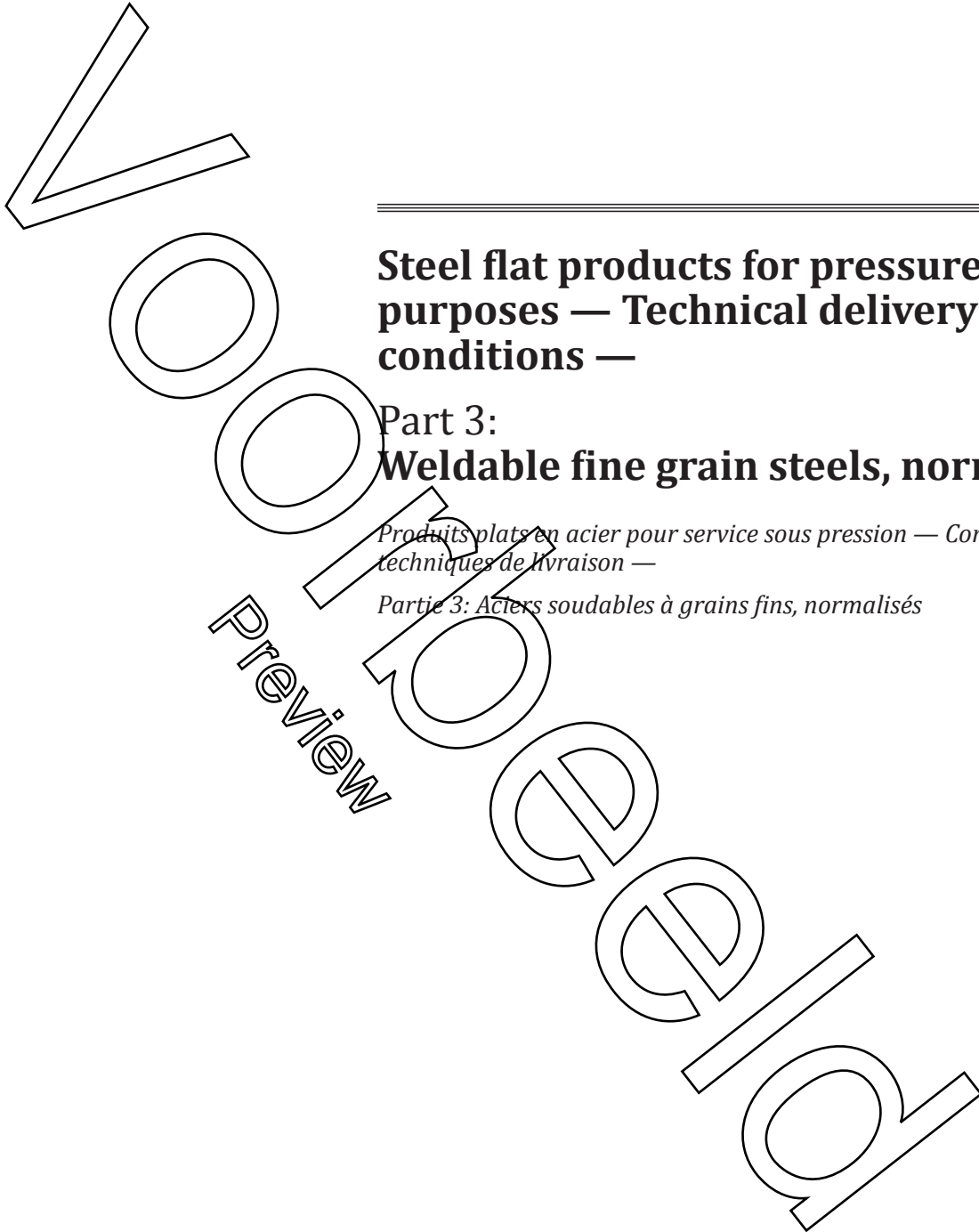
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Steel flat products for pressure purposes — Technical delivery conditions —

**Part 3:
Weldable fine grain steels, normalized**

Produits plats en acier pour service sous pression — Conditions techniques de livraison —

Partie 3: Aciers soudables à grains fins, normalisés



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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).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 10, *Steel for pressure purposes*.

This fourth edition cancels and replaces the third edition (ISO 9328-3:2011), which has been technically revised. The following changes have been made:

- the term “product thickness” has been replaced with “nominal thickness”;
- classification of the steels, examples of ordering and statements concerning weldability have been revised;
- the technical data in [Annex A](#) have been aligned with EN 10028-3.
- in [Table B.1](#), “B ≤ 0,001 0” has been added and the specifications of “P” and “S” have been changed.

A list of all the parts in the ISO 9328 series can be found on the ISO website.

Steel flat products for pressure purposes — Technical delivery conditions —

Part 3: Weldable fine grain steels, normalized

1 Scope

This document specifies the requirements for flat products for pressure equipment made of weldable fine grain steels as specified in [Tables A.1](#) and [B.1](#). The requirements and definitions of ISO 9328-1 also apply to this document.

NOTE 1 Fine grain steels are understood as steels with a ferritic grain size of 6 or finer when tested in accordance with ISO 642.

NOTE 2 This document offers the possibility to specifying products in accordance with European design codes and ASME-type design codes.

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 4948-1, *Steels — Classification — Part 1: Classification of steels into unalloyed and alloy steels based on chemical composition*

ISO 4948-2, *Steels — Classification — Part 2: Classification of unalloyed and alloy steels according to main quality classes and main property or application characteristics*

ISO 9328-1:2018, *Steel flat products for pressure purposes — Technical delivery conditions — Part 1: General requirements*

EN 10314, *Method for the derivation of minimum values of proof strength of steel at elevated temperatures*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 9328-1 apply.

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

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

4 Classification and designation

4.1 Classification

4.1.1 The steel grades covered by this document are given in four qualities:

- a) the room temperature quality (P...N; PT...N);

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- b) the elevated temperature quality (P...NH; PT...NH);
- c) the low temperature quality (P...NL1; PT...NL1);
- d) the special low temperature quality (P...NL2).

4.1.2 In accordance with ISO 4948-1 and ISO 4948-2, the grades P275NH, P275NL1, P355N, P355NH, P355NL1, P355NL2, PT400N, PT400NH, PT400NL1, PT440N, PT440NH, PT440NL1, PT490N and PT490NH are alloy-quality steels, the grades P275NL2 and the grades P420NH, P420NL1, P420NL2, P460NH, P460NL1, P460NL2, PT520N and PT520NH are alloyed special steels.

4.2 Designation

Shall be in accordance with ISO 9328-1.

NOTE 1 Steel grades in [Annex A](#) are classified in accordance with their yield strength; steel grades in [Annex B](#) are classified in accordance with their tensile strength.

NOTE 2 Information on the designation of comparable steel grades in national or regional standards is given in [Annex C](#).

5 Information to be supplied by the purchaser**5.1 Mandatory information**

Shall be in accordance with ISO 9328-1.

Additionally, for steel grades in accordance with [Annex B](#), the test direction for the impact test shall be agreed upon (see [9.2](#) and [Table A.4](#), footnote b).

5.2 Options

A number of options are specified in this document. These are listed below under a) to r). Additionally, the relevant options of ISO 9328-1 apply if the purchaser does not indicate a wish to implement any of these options at the time of enquiry and order, the products shall be supplied in accordance with the basic specification (see ISO 9328-1):

- a) delivery condition other than specified in [Tables A.3](#) and [B.3](#) (see [6.2.1](#));
- b) tests in the simulated normalized condition (see [6.2.2](#));
- c) delivery of products in the untreated condition (see [6.2.3](#));
- d) maximum carbon-equivalent value (see [6.3.3](#));
- e) specification of an impact energy value of 40 J (see Note to [6.4.1](#) and [Table A.3](#));
- f) application of the $R_{p0,2}$ values of [Table A.4](#) for the corresponding P...NL1 and P...NL2 grades (see [6.4.2](#));
- g) test on simulated heat-treated samples (see [6.7.2](#));
- h) hydrogen-induced cracking (HIC) test in accordance with [Annex D](#) (see [6.10](#));
- i) mid-thickness test pieces for the impact test and/or tensile test (see [Clause 8](#));
- j) verification of impact energy for longitudinal test pieces (see [9.3](#));
- k) tensile properties for increased nominal thicknesses (see [Table A.3](#), footnote d);
- l) $R_{p0,2}$ values at elevated temperatures for increased nominal thicknesses (see [Table A.4](#), footnote c);

- m) modified values for R_{eH} and R_m for grades P460NH and P460NL1 (see [Table A.3](#), footnote f);
- o) altered maximum value for Cr, Cu, Mo, Nb, Ni, Ti and V (see [Table B.1](#), footnote b);
- p) Al_{total} content < 0,020 % (see [Table B.1](#), footnote c);
- q) increased maximum carbon contents for grades PT...NH (see [Table B.1](#), footnote d);
- r) other test requirements for the impact test (see [Table B.4](#), footnote c).

5.3 Example for ordering

An order of 10 plates with nominal dimensions thickness = 50 mm, width = 2 000 mm, length = 10 000 mm, made of a steel grade with the name P275NL2 as specified in this document, to be delivered with inspection certificate 3.1 as specified in ISO 10474, is designated as follows:

10 plates – 50 × 2 000 × 10 000 – ISO 9328-3 P275NL2 – Inspection certificate 3.1

6 Requirements

6.1 Steelmaking process

Shall be in accordance with ISO 9328-1.

6.2 Delivery condition

6.2.1 Unless otherwise agreed at the time of enquiry and order (see [6.2.3](#)), the products covered by this document shall be supplied in the normalized condition.

For steels with minimum yield strength ≥ 460 MPa, delayed cooling or additional tempering is permitted. If such a treatment is performed, this shall be noted in the inspection document.

6.2.2 At the discretion of the manufacturer, normalizing may be replaced with normalizing rolling for the steel grades in [Annex A](#) (see ISO 9328-1:2018, 3.1). In this case, additional tests in the simulated normalized condition with an agreed frequency of testing may be agreed upon at the time of enquiry and order, to verify that the obtained properties also comply with the standard requirements (see [5.2](#), Option 2).

6.2.3 If so agreed at the time of enquiry and order, products covered by this document may be delivered in the untreated condition. The products delivered in untreated conditions shall be appropriately marked (+AR) to denote that heat treatment has not been performed.

6.2.4 For products delivered untreated, the specified tests shall be carried out by the manufacture on test pieces in the simulated normalized condition (but see [6.2.1](#)).

NOTE Tests in a simulated heat-treated condition are carried out to verify the suitability of the final product in the usual delivery condition. However, they do not discharge the processor from the obligation of providing proof of the specified properties in the finished product when adequately heat treated.

6.3 Chemical composition

6.3.1 The requirements of [Tables A.1](#) and [B.1](#) apply for the chemical composition according to the cast (heat) analysis.

6.3.2 The product analysis may deviate from the specified values of the cast (heat) analysis given in [Tables A.1](#) and [B.1](#) by the values given in [Table 1](#).

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