BRITISH STANDARD

BS EN
12454:1998

Founding — Visual examination of surface discontinuities — Steel sand castings

The European Standard EN 12454:1998 has the status of a British Standard

ICS 77.140.80

National foreword

This British Standard is the English language version of EN 12454:1998.

The UK participation in its preparation was entrusted to Technical Committee ISE/NFE/9, Foundry Technology, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 5 and a back cover.

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Descriptors: Foundry engineering, steel products, cast steels, sand castings, surface properties, defect tolerances, visual examination, acceptability

English version

Founding — Visual examination of surface discontinuities — Steel sand castings

Fonderie — Examen visuel des discontinuités de surface — Pièces en acier moulées en sable

Gießereiwesen — Visuelle Bestimmung von Oberflächenfehlern — Stahl-Sandgußstücke

This European Standard was approved by CEN on 9 April 1998.

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CEN

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

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Ref. No. EN 12454:1998 E

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 190, Foundry technology, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 1998, and conflicting national standards shall be withdrawn at the latest by November 1998.

Within its programme of work, Technical Committee CEN/TC 190 requested CEN/TC 190/WG 4.20, Surface inspection to prepare the following standard:

EN 12454, *Founding — Visual examination of surface discontinuities — Steel sand castings*.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Contents

Introduction

Agreement between the manufacturer and the purchaser on the required surface quality of steel sand castings has frequently been hindered by the absence of suitable specifications. This standard is aimed at avoiding misunderstandings arising from imprecise information at the enquiry and/or order stage.

There are two points to consider when examining the surface of a casting:

— surface roughness;

— surface discontinuities.

EN 1370 deals with surface roughness inspection.

Assessment with visual surface examination of castings is by the use of visual comparators.

1 Scope

This standard specifies the method to be used for visual examination to assess surface discontinuities of steel castings produced in conventional sand moulds. A set of visual comparators [1] comprising replicas of actual casting discontinuities forms the basis of the assessment.

This standard does not apply to steel castings made by the resin-shell, investment and other precision moulding techniques.

This standard defines several categories of discontinuities and severity levels within each of these categories.

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

EN 1370, *Founding — Surface roughness inspection by visualtactile comparators.*

EN 1559-1, *Founding — Technical conditions of delivery — Part 1: General.*

prEN 1559-2, *Founding — Technical conditions of delivery — Part 2: Additional requirements for steel castings.*

NOTE Informative references to documents used in the preparation of this standard, and cited at the appropriate places in the text, are listed in a bibliography, see annex A.

3 Description

The set of comparators [1] comprises nine categories.

For the purposes of this standard, six categories have been selected. Within these categories, 2, 3 or 4 severity levels, increasing in severity from 1 to 4, have been chosen.

NOTE The categories not included[1)] in the standard relate to surface roughness and are therefore included in EN 1370.

The selected comparator [1] series for surface discontinuities and the number of severity levels are:

— surface inclusions: non-metallic material trapped on the casting surface (4 severity levels);

— gas porosity: indications of gas at the casting surface (4 severity levels);

— laps and cold shuts: surface irregularities giving a wrinkled appearance (3 severity levels);

— scabs: slightly raised surface irregularities (2 severity levels);

— inserts: indications of chaplets or internal chills (2 severity levels);

— welds: indications of welds as welded, fully or partially removed by thermal or mechanical dressing (4 severity levels).

Table 1 gives the relationship between the severity levels in this standard and the selected comparators [1].

The different categories and severity levels of comparators are shown in Table 2.

Table 1 — Relationship between severity levels and the selected comparators

Categories	Severity levels			
	1	2	3	4
	Identification according to [1]			
Surface inclusions	B 1	B 2	B 4	B 5
Gas porosity	C 2	C 1	C 3	C 4
Laps and cold shuts	D 1	D 1	D 2	D 5
Scabs	—	—	E 3	E 5
Inserts	—	—	F 1	F 3
Welds	J 1	J 2	J 3	J 5

NOTE The severity level required can be different for each category.

[1)] The categories not included in this standard are:

— A surface roughness: the natural surface of the casting after shot-blasting (4 severity levels);

— G surface finish: thermal dressing (4 severity levels);

— H surface finish: mechanical dressing (4 severity levels).

Table 2 — Relationship between surface roughness and detectable surface discontinuities

Categories	Minimum surface conditions increasing roughness[1] →			
	comparators according to [2]			
	1 S1	2 S1	3 S1	6 S1
	comparators according to [1]			
	A 1	A 2	A 3	A 4
	Detectable severity level of surface discontinuities			
Surface inclusions	1 to 4	1 to 4	4	4
Gas porosity	1 to 4	1 to 4	3 to 4	4
Laps and cold shuts	1 to 4	1 to 4	3 to 4	3 to 4
Scabs	3 to 4	3 to 4	3 to 4	3 to 4
Inserts	3 to 4	3 to 4	3 to 4	3 to 4
Welds	1 to 4	1 to 4	2 to 4	2 to 4

[1] The surface roughness influences the minimum discontinuity severity level which can be assessed. For example, it is unlikely that severity level 1 surface inclusions can be detected on an A 3 surface condition.

4 Requirements

When visual surface assessment of casting quality is required, the acceptance level shall be agreed by the time of acceptance of the order.

The order shall be subject to an agreement between the manufacturer and the purchaser in accordance with EN 1559-1 and prEN 1559-2 and shall specify at least the following points:

— the areas of the castings which are to be assessed. They shall be clearly indicated by the time of enquiry and/or acceptance of the order;

— the category and severity level required;

NOTE By special agreement G and H categories [1] can be included in the requirements and the assessment.

— the manufacturing stage at which surfaces are to be assessed.

5 Conditions for examination

5.1 The severity level of discontinuities that are to be visually detected is critically dependant on the roughness of the surface on which they appear.

Table 2 gives the severity level that can normally be detected according to the surface roughness as defined in EN 1370.

5.2 For evaluating casting surfaces, the areas to be assessed shall be visually compared, without optical aids, with the appropriate comparators on the basis of the category and severity level.

Comparison of the comparators with the casting surface shall be made with the comparators held next to the casting under good lighting conditions, e.g. minimum 350 lx.

The evaluation shall be performed by trained personnel with satisfactory visual acuity.

5.3 When two or more discontinuity categories are present in any area to be assessed, each shall be assessed according to its own severity level.

5.4 The assessment shall be satisfactory if, in the required area, it is equal to or better than the stated reference comparators.

6 Recording of results of inspection

If requested by the purchaser, the manufacturer shall keep a record of the examination and provide a report.

The identification of the casting shall permit the correlation of a product with the related inspection document.

The records compiled by the manufacturer during the examination shall contain at least the following:

— identification of the casting;

— name and qualification of the person undertaking the examination;

— designated category and specified severity level for each area examined.

Annex A (informative)

Bibliography

In the preparation of this European Standard, use was made of a number of documents for reference purposes. These informative references are cited at the appropriate places in the text and the publications are listed hereafter.

[1] *SCRATA comparators for the definition of surface quality of steel castings*, available from The Castings Development Centre, 7 East Bank Road, Sheffield, S2 3PT, United Kingdom[2)].

[2] *BNIF 359 Recommandation technique du Bureau de Normalisation des Industries de la Fonderie. Caractérisation d'états de surface des pièces moulées — Utilisation des échantillons types de 110 × 160 mm*, available from Editions Techniques des Industries de la Fonderie, 44 avenue de la Division Leclerc, F-92312 Sèvres Cedex, France.

[2)] The SCRATA set of comparators comprises replica plates (150 mm × 100 mm each) and corresponding photographs.

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