

Founding  
Surface roughness inspection by  
visualtactile comparators  
English version of DIN EN 1370

**DIN**  
EN 1370

ICS 17.040.20; 77.180

Descriptors: Comparators, surface roughness.

Gießereiwesen – Prüfung der Oberflächenrauheit mit Hilfe von Vergleichsmustern

**European Standard EN 1370:1996 has the status of a DIN Standard.**

### National foreword

This standard has been prepared by CEN/TC 190.

The responsible German body involved in its preparation was the *Normenausschuß Gießereiwesen* (Foundry Practice Standards Committee), Technical Committee *Oberflächenprüfung*.

EN comprises 8 pages.



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ICS 17.040.20; 25.120.30

Descriptors: Comparators, surface roughness.

**English version**

Founding

**Surface roughness inspection by  
visuotactile comparators**

Fonderie – Contrôle de la rugosité de  
surface par comparateurs visotactiles

Gießereiwesen – Prüfung der Ober-  
flächenrauheit mit Hilfe von Vergleichs-  
mustern

This European Standard was approved by CEN on 1996-10-20.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

**CEN**

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

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

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### 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 May 1997, and conflicting national standards shall be withdrawn at the latest by May 1997.

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 1370

Founding – Surface roughness inspection by visualtactile comparators

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

## Introduction

The surface roughness of a casting is influenced by the manufacturing process (moulding, grinding, finishing, etc.), the moulding materials used (sand, coating, etc.), the equipment available and the alloy cast.

Since cast surfaces do not exhibit the same cyclic character as machined surfaces it is difficult to evaluate their roughness using conventional mechanical, optical, or pneumatic devices.

The use of visualtactile comparators is therefore preferred in these circumstances.

Moreover, in order to take account of the irregularities on as-cast surfaces, ground surfaces or other means of finishing of castings, comparators should have relatively large dimensions [greater than or equal to 15 000 mm<sup>2</sup>, see<sup>1)</sup>] in order to make them more reliable and their results repeatable and consistent.

Two sets of comparators are in widespread use:

- "SCRATA comparators for the definition of surface quality of steel castings", available from Steel Castings Technology International, 7 East Bank Road, Sheffield S2 3PT, United Kingdom;
- "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, 92310 Sèvres, France.

## 1 Scope

This standard describes a method for the evaluation of casting roughness by means of visualtactile comparators.

The method is applicable to all casting processes (except pressure die casting) for all cast materials. The method can be used for the assessment of castings or areas of castings in the as-cast condition (beyond removal of casting appendages, such as gates, risers and flash and removal of residues of the moulding material).

This method does not give a means of determining the quality of castings by visual examination<sup>2)</sup>.

However, since non-destructive testing (ultrasonic, dye penetrant etc.) is influenced by surface condition, preliminary roughness evaluation may be made using this method as an aid to subsequent non-destructive testing examination.

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<sup>1)</sup> 100 mm × 150 mm for SCRATA comparators;  
ISO format A6 (105 mm × 148 mm) for BNIF comparators.  
(Comparators are of approximately equivalent areas: 15 000 mm<sup>2</sup> to 15 500 mm<sup>2</sup>).

<sup>2)</sup> Visual inspection of steel castings for evaluating surface discontinuities can be done in accordance with prEN 12454.

## 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.

prEN 12454

Founding – Visual examination of surface discontinuities – Steel sand castings

## 3 Description

The comparators are essentially replicas of actual casting surfaces:

as-cast or after further treatment e.g., shot blasted, ground.

Full size photographs of the replicas are available to assist in making a rapid review of the overall roughness of the comparators. These can give preliminary information for the appropriate selection of a moulding or finishing process.

It is emphasized however that the replica comparators, and not the photographs shall be used to form the basis of an agreement between the manufacturer and the purchaser.

The SCRATA comparator set (for assessing steel casting surface roughness only) comprises<sup>3)</sup>:

- A category for as-cast surfaces;
- H category for ground surfaces;
- G category for specially finished surfaces;

with increasing levels of roughness:

- severity levels 1, 2, 3, 4 and 5.

The BNIF comparator set comprises:

- S1 category for as-cast surfaces (for all alloys);
- S2 category for ground surfaces (for all alloys);
- S3 category for specially finished surfaces (thermal or mechanical dressing of steel castings only);

with increasing levels of roughness:

- severity levels 4/0, 3/0, 2/0, 1/0, 1, 2, 3, 4, 5, 6, 7 and 8.

A description and a comparison of the different categories and levels of the two sets of comparators is given in figures 1 to 3<sup>4)</sup>.

## 4 Requirements

4.1 The method detailed in this standard shall only apply to the surfaces of castings and the percentage or number of castings to be checked.

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<sup>3)</sup> Other SCRATA comparators categories (surfaces defects) are not included in the present standard: B (inclusions), C (gas porosity), D (laps, cold shuts), E (scabs), F (chaplets), J (welds). For details of these see prEN 12454

<sup>4)</sup> The figures give guidance on the casting roughness obtainable with a particular process.

These conditions shall be clearly indicated in the call for tenders, in price requests and particularly in the order sent to the manufacturer and accepted by him. This information enables the manufacturer to assess the costs of manufacture to achieve the required surface roughness, the costs of additional inspections and operations and the manufacturing risks involved.

**4.2** The casting areas where roughness is to be controlled shall be clearly indicated on the drawing at the enquiry and order stages. The category and level shall be stated.

**4.3** To evaluate casting roughness the areas indicated on the drawing shall be compared without optical aids, but with the appropriate visuotactile comparators of the category and level involved.

Comparison between the appropriate comparator and the casting surface shall be made with the comparators held next to the casting under good conditions of lighting.

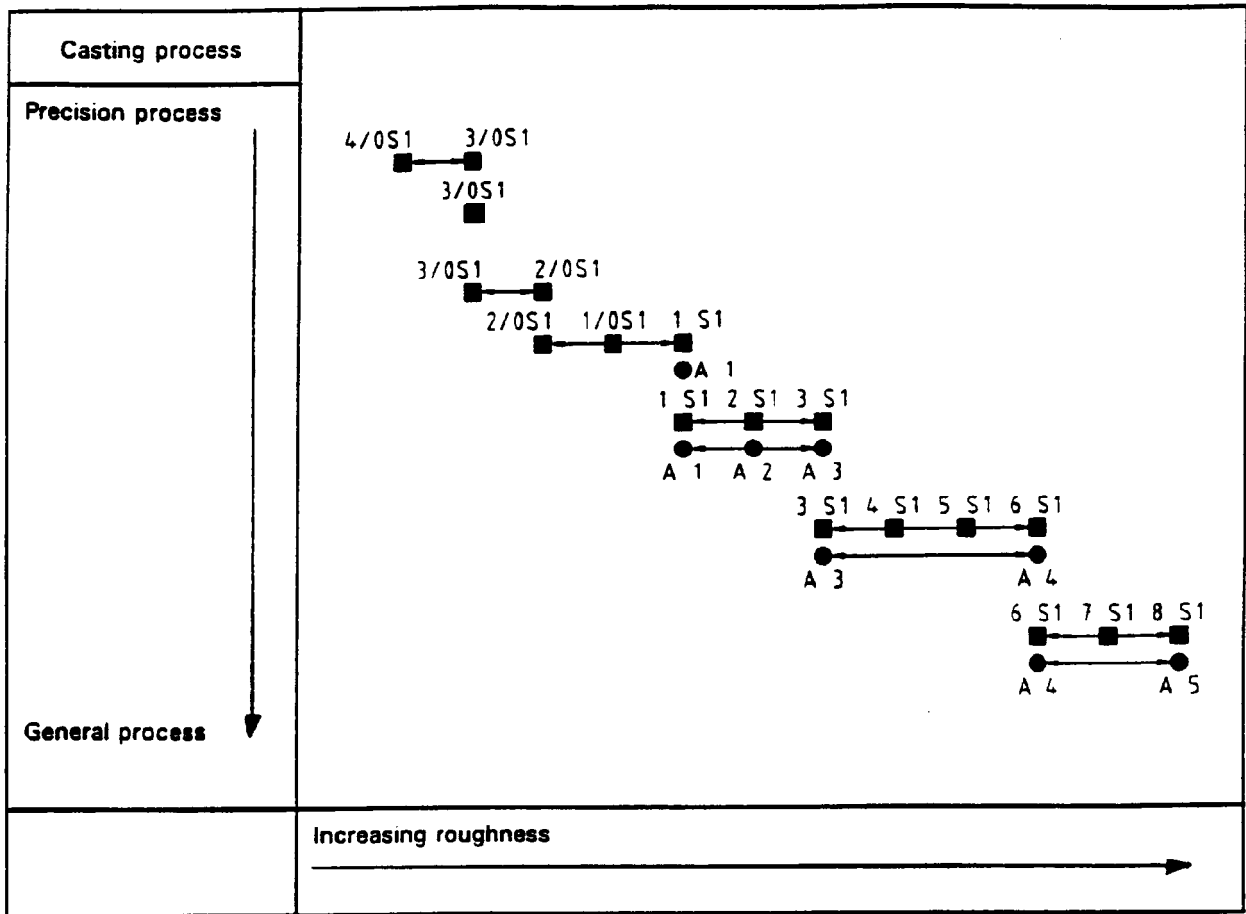
**NOTE:** When the surface to be checked is significantly smaller than the surface of a comparator, an agreement on the method to be used should be made between the manufacturer and the purchaser.

**4.4** The comparison is satisfactory if, in the area under consideration, the roughness corresponds to that of the comparator or, if it is generally smoother.

**4.5** The manufacturer shall, if requested by the purchaser, keep a record of the examination and provide a report.

The records of the manufacturer compiled during the examination shall contain the following:

- the identification of the casting;
- the name and the qualification of the person undertaking the examination;
- the reference to the comparator used;
- the designated category and level of each area checked for roughness.

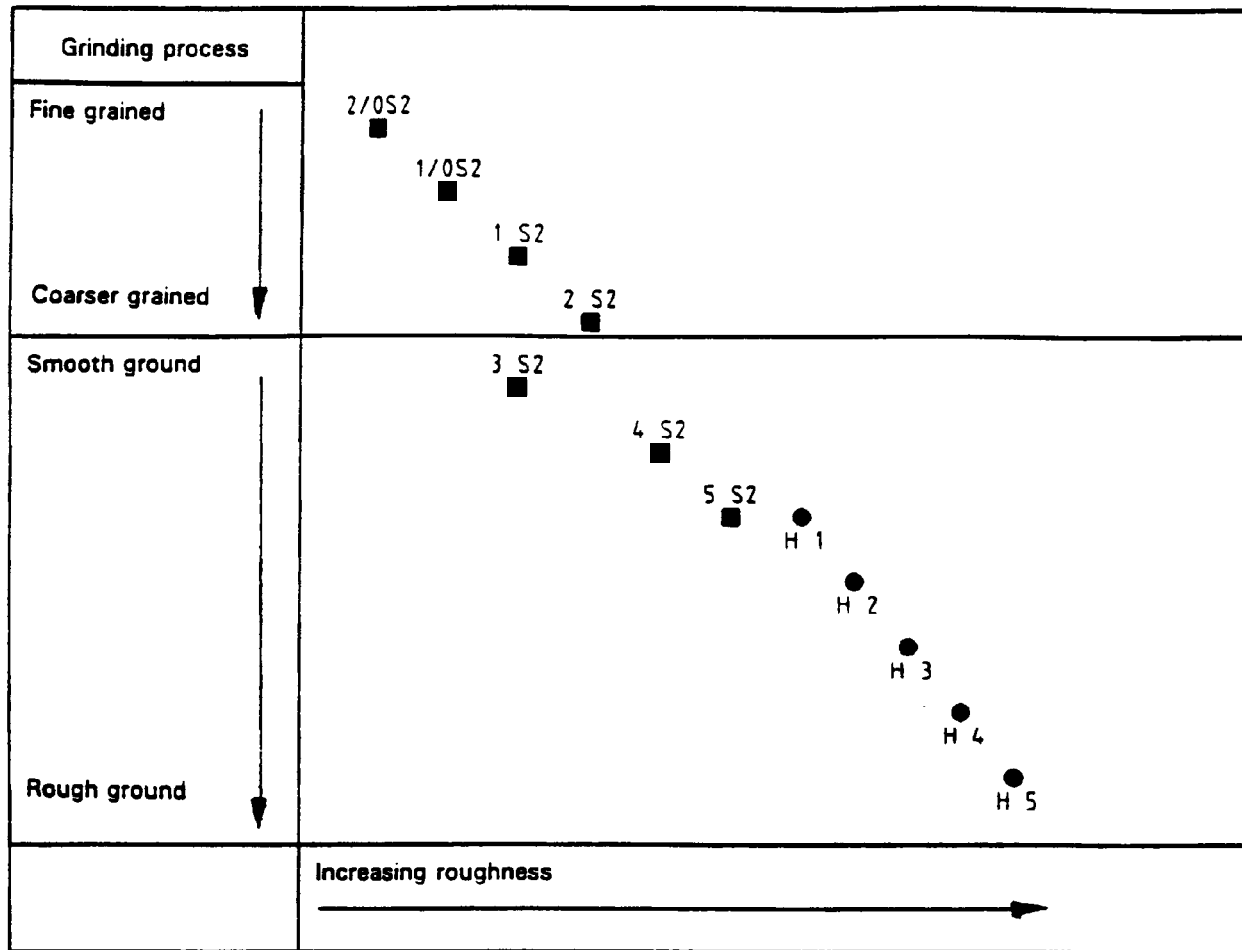


- BNIF comparators
- SCRATA comparators

NOTE Surface roughness depends on the casting process, the alloy and the size of the casting.

Figure 1: Comparison between the sets of comparators (SCRATA and BNIF): Levels of as-cast surfaces (for information only)

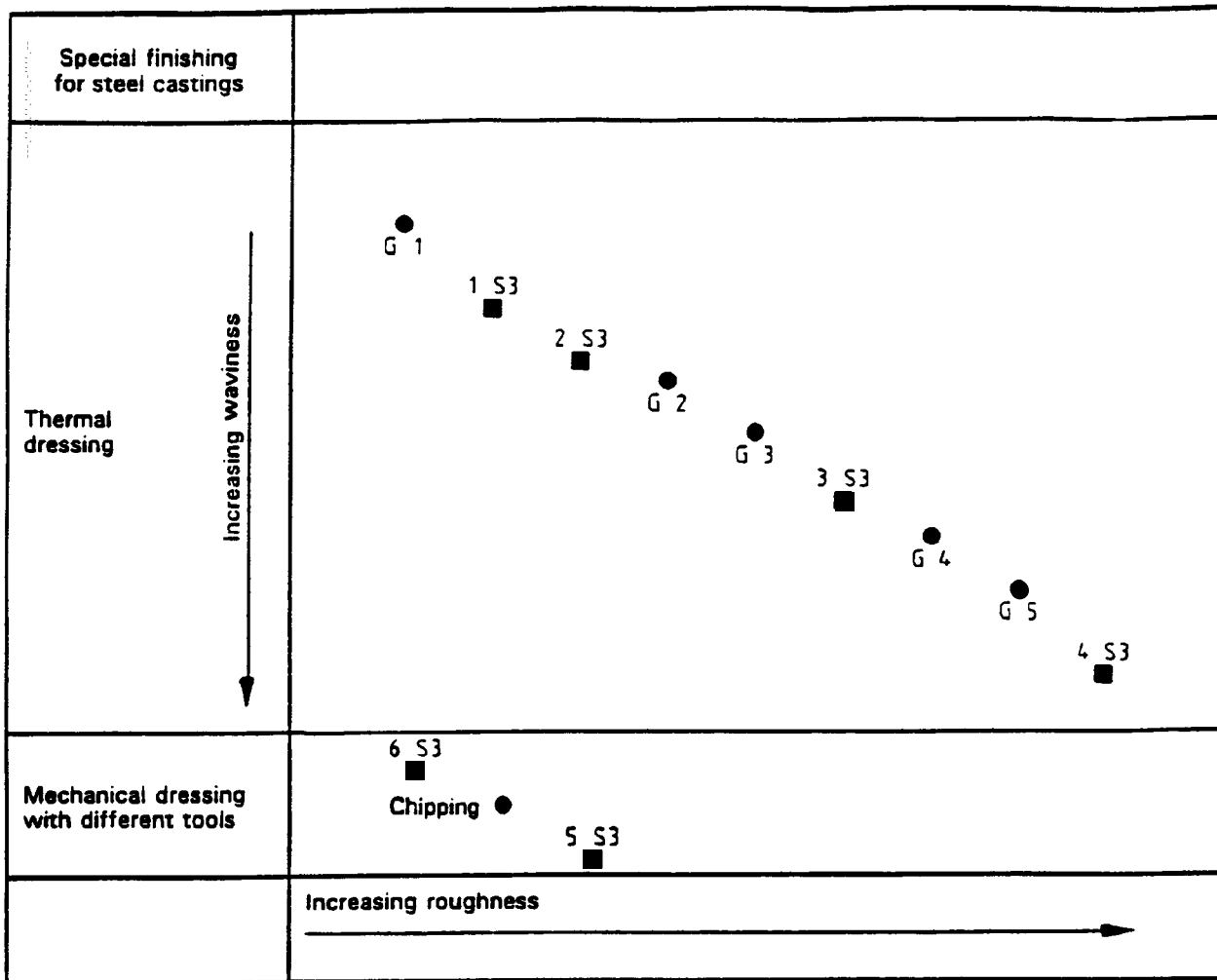




■ BNIF comparators

● SCRATA comparators

**Figure 2: Comparison between the sets of comparators (SCRATA and BNIF): Levels of ground surfaces (for information only)**



■ BNIF comparators

● SCRATA comparators

Figure 3: Comparison between the sets of comparators (SCRATA and BNIF): Levels of special finished surfaces of steel castings (for information only)