AS 2382—1981

Australian Standard®

Surface roughness comparison specimens

The following scientific, industrial and governmental organizations and departments were officially represented on the committee entrusted with the preparation of this standard:

Confederation of Australian Industry

CSIRO, Division of Applied Physics

CSIRO, Division of Mechanical Engineering

Department of Defence

Department of Industry and Commerce

Department of Technical and Further Education

Federal Chamber of Automotive Industries

Institute of Technology, South Australia

Institution of Engineers Australia

Institution of Production Engineers

Metal Trades Industry Association of Australia

Railways of Australia Committee

Society of Manufacturing Engineers

University of New South Wales

University of Queensland

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PREFACE

This standard was prepared by the Association's Committee on Limits and Fits and Metrology as part of its program to prepare a rational selection of metrology standards in metric units.

The need for a standard arises because of the widespread use of tactile and visual methods of assessing surface roughness in industry generally. Such methods require the use of standardized surface roughness comparison specimens.

In preparing this standard, the committee fully took into account the relevant ISO standards, and the standard is based on and is technically equivalent to the following documents:

ISO 2632/1 Roughness Comparison Specimens—Part I: Turned, Ground, Bored, Milled, Shaped and Planed

ISO 2632/2 Roughness Comparison Specimens—Part II: Spark-eroded, Shot Blasted and Grit Blasted, and Polished

ISO 2632/3 Roughness Comparison Specimens—Part III: Cast Surfaces

The standard covers individually machined (or cast) specimens, but with the developments which have taken place in the electroforming of specimens, it is the latter form which is most commonly used in industry. The electroformed high fidelity specimens can be reproduced from a single master surface thus reducing the problems of achieving and maintaining compatibility between specimens. Reference is also made to plastics specimens which may have particular merits in the assessment of non-metallic parts.

Surface roughness can be assessed by actual measurement (see AS 1965) or by tactile and visual comparison with reference specimens referring to the same machining or casting process. For the latter purpose, sets of reference specimens are widely used in workshop and inspection departments.

This standard may require reference to the following publications:

AS 1100 Drawing Practice
Part 2—Abbreviations and Symbols

AS 1965 The Measurement of Surface Roughness with Direct-reading Stylus Electronic Instruments

SAA MP19 Report on Preferred Numbers and Their Use

AS . . . . . Surface Texture*

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* In course of preparation.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
for
SURFACE ROUGHNESS COMPARISON SPECIMENS

SECTION 1. SCOPE AND GENERAL REQUIREMENTS

1.1 SCOPE. This standard specifies the characteristics of surface roughness comparison specimens intended for tactile and visual comparison with workpiece surfaces produced by similar processes. Roughness comparison specimens for the following processes are given:

(a) Turned, ground, bored, milled, shaped or planed specimens: (Section 2).

(b) Spark-eroded, shot blasted, grit blasted, or polished specimens: (Section 3).

(c) Specimens for cast surfaces: (Section 4).

(d) Calibration of surface roughness specimens: (Section 5).

The standard also includes definitions used in surface roughness and gives information on cut-off lengths and marking requirements. Appendices give information on typical sets of mounted roughness comparison specimens, the use of roughness comparison specimens, roughness grade numbers and roughness average values of R_a (arithmetic mean deviation) in both metric and the corresponding imperial units.

1.2 DEFINITIONS. For the purpose of this standard, the following definitions apply:

NOTE: For other terms and definitions, see AS ....*

1.2.1 Surface roughness comparison specimen—a specimen surface of known average roughness height (R_a) representing a particular casting, machining or other production process. The specimen is used to give design and workshop personnel guidance on the feel and appearance of the particular production process and surface grade to enable visual and tactile evaluation of the production surface.

1.2.2 Surface roughness—the topography of a surface which consists of short wavelengths only.

1.2.3 Arithmetic mean deviation (R_a)—the arithmetic average of the deviation of a profile above and below the reference curve or line. This parameter has the dimensions of length.

1.2.4 Measuring traverse length (evaluation length)—the length of the modified profile used in measurement of surface roughness parameters. It may contain one or more cut-off lengths.

1.2.5 Cut-off (λ_B)—the value of the wavelength (λ) defined by convention as the longest wave length transmitted by the instrument.

NOTE: The transmission cut-off corresponds in concept with the sampling length which is often used in geometric definitions of roughness parameters. Cut-off and sampling length are numerically equal.

1.2.6 Lay—the direction of the predominant surface pattern ordinarily determined by the production method used.

1.2.7 Flaws—unintentional irregularities which occur at one place, or at relatively infrequent or widely varying intervals on the surface.

NOTE: Flaws include such defects as cracks, blow holes, inclusions, ridges, scratches, etc.

1.3 METHODS OF MANUFACTURE. Surface roughness comparison specimens are normally manufactured as follows:

(a) By electroforming positive replicas of master surfaces.

(b) By making positive replicas in plastics materials of master surfaces, and by coating or otherwise, so that the feel and appearance of the natural cast or manufactured surface should be represented.

(c) By direct application of the production process which the specimen is intended to represent, i.e. individual machined specimens.

1.4 SURFACE CHARACTERISTICS. Electroformed and plastics replicas reproduced from master surfaces, or individually machined specimens, shall exhibit only the characteristics resulting from the natural action of the casting or production process which they are intended to represent. For cast surfaces this shall also include any shot blasting, grit blasting, or any other appropriate cleaning treatment. They shall not contain other surface irregularities such as can be induced by abnormal conditions.

1.5 FLAWS. The effect of flaws shall not be included in the roughness measurement. Where flaws are to be restricted or controlled, a special note as to the method of inspection should be included on the drawing or specification.

1.6 SIZE OF SURFACE ROUGHNESS SPECIMENS. Surface roughness comparison specimens shall be of a size adequate to permit initial and periodic calibration. The minimum lengths of the longer sides shall be—

(a) for R_a values of 0.2 μm to 6.3 μm . . . 20 mm;

(b) for the R_a value 12.5 μm . . . . . 30 mm;

(c) for R_a values 25 μm and above . . . . . 50 mm.

1.7 MARKING. Each surface roughness specimen, or its mounting, shall be marked with the following information, which shall not be applied to the reference surface of the specimen:

(a) Specimens for cast surfaces.

(i) The manufacturer's trade (identification) mark together with the roughness number, where applicable (see Table 1.1).

* AS ...., Surface Texture (in course of preparation).