TC 57

International Standard ISO 2632/2

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Roughness comparison specimens — Part 2: Spark-eroded, shot-blasted and grit-blasted, and polished

Échantillons de comparaison viso-tactile de rugosité — Partie 2: Électro-érosion, grenaillage sphérique et angulaire, et polissage

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Withdrawn

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Descriptors : surface condition, roughness, roughness measurement, reference sample, viso-tactile comparison specimens, specifications, dimensions, marking.

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 2632/2 was prepared by Technical Committee ISO/TC 57, *Metrology and properties of surfaces*.

ISO 2632/2 was first published in 1977. This second edition cancels and replaces the first edition which has been revised as follows:

- new values have been added to tables 1 and 2;
- clause 8 has been expanded;
- a new clause (clause 9 "Minimum specimen size") has been added;
- table 5 has been deleted;
- references and editorial presentation have been updated.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Roughness comparison specimens — Part 2: Spark-eroded, shot-blasted and grit-blasted, and polished

1 Scope and field of application

This part of ISO 2632 specifies the characteristics of specimens of spark-eroded, shot-blasted and grit-blasted, and polished surfaces which are intended for tactile and visual comparison with workpiece surfaces of similar lay, produced by similar manufacturing methods.

It is complementary to ISO 2632/1 and ISO 2632/3.

2 References

ISO 3, *Preferred numbers — Series of preferred numbers.*

ISO 468, *Surface roughness — Parameters, their values and general rules for specifying requirements.*

ISO 1302, *Technical drawings — Method of indicating surface texture on drawings.*

ISO 1880, *Instruments for the measurement of surface roughness by the profile method — Contact (stylus) instruments of progressive profile transformation — Profile recording instruments.*

ISO 2632/1, *Roughness comparison specimens — Part 1: Turned, ground, bored, milled, shaped and planed.*

ISO 2632/3, *Roughness comparison specimens — Part 3: Cast surfaces.*

ISO 3274, *Instruments for the measurement of surface roughness by the profile method — Contact (stylus) instruments of consecutive profile transformation — Contact profile meters, system M.*

ISO 4287/1, *Surface roughness — Terminology — Part 1: Surface and its parameters.*

3 Definitions

3.1 roughness comparison specimen: A specimen surface of a known surface roughness parameter representing a particular machining or other production process. The specimen is used to give design personnel guidance on the feel and appearance of the particular production process and roughness grade, and to enable workshop personnel to evaluate and control workpiece surfaces by tactile and visual comparison with the specimen surface.

3.2 lay: The direction of the predominant surface pattern, ordinarily determined by the process used in producing the surface.

Other terms used to describe surface characteristics or measurement are defined in ISO 4287/1.

4 Methods of manufacture

The specimens shall be manufactured as follows:

a) by electro-forming positive replicas of master surfaces;

b) by making positive replicas in plastics or other materials of master surfaces which represent the feel and appearance of the natural manufactured surface;

c) by direct application of the production process which the specimen is intended to represent (individually manufactured specimens).

5 Surface characteristics

Master surfaces for reproduction or their replicas, and individually manufactured specimens (see clause 4) shall exhibit only the characteristics resulting from the natural action of the manufacturing process which they are intended to represent.

6 Ranges of roughness grades

The ranges of roughness grades shall be as given in table 1.

7 Sampling lengths

The sampling lengths given in table 2 shall be used in evaluating the specimens. In the case of repetitive profiles, the sampling length shall be rounded-off to include the nearest greater whole number of cycles.

Table 1 — Ranges of roughness grades of roughness comparison specimens

Manufacturing methods					
spark-eroded		shot- and grit-blasted		polished	
Arithmetical mean deviation, R_a					
µm	µin	µm	µin	µm	µin
—	—	—	—	0,006*	0.25*
—	—	—	—	0,0125*	0.5*
—	—	—	—	0,025*	1*
—	—	—	—	0,05	2
—	—	—	—	0,1	4
—	—	0,2	8	0,2	8
0,4	16	0,4	16	—	—
0,8	32	0,8	32	—	—
1,6	63	1,6	63	—	—
3,2	125	3,2	125	—	—
6,3	250	6,3	250	—	—
12,5	500	12,5	500	—	—
—	—	25	1 000	—	—

* See note 3 below.

NOTES

1 The values given in table 1 are selected from one of the preferred series of ISO 468. In cases when it is necessary to provide specimens in intermediate values, these should be chosen from the R 10 series of preferred numbers (see ISO 3).

2 Certain of the finer values are included primarily to give design office personnel some idea of the differences that can be detected (between, for example 0,006, 0,0125, 0,025, 0,05 and 0,1 µm) by visual means.

3 In actual measurements, the required accuracy may not be attainable to determine the values marked with an asterisk (*).

Table 2 — Sampling lengths

Arithmetical mean deviation, R_a		Manufacturing methods					
		spark-eroded		shot- and grit-blasted		polished	
		Sampling lengths					
µm	µin	mm	in	mm	in	mm	in
0,006	0.25	—	—	—	—	0,08	0.003
0,0125	0.5	—	—	—	—	0,08	0.003
0,025	1	—	—	—	—	0,08	0.003
0,05	2	—	—	—	—	0,25	0.01
0,1	4	—	—	—	—	0,25	0.01
0,2	8	—	—	0,8	0.03	0,8	0.03
0,4	16	0,8	0.03	0,8	0.03	—	—
0,8	32	0,8	0.03	0,8	0.03	—	—
1,6	63	0,8	0.03	0,8	0.03	—	—
3,2	125	2,5	0.1	2,5	0.1	—	—
6,3	250	2,5	0.1	2,5	0.1	—	—
12,5	500	2,5	0.1	2,5	0.1	—	—
25	1 000	—	—	2,5	0:1	—	—

8 Calibration

Sufficient readings shall be taken across the direction of lay of the surface at evenly distributed positions to enable the mean value and the standard deviation to be determined. 25 readings have been found sufficient for many engineering surfaces but this number may be decreased for periodic surfaces or increased to meet excessive scatter of results.

The mean value of the readings shall not vary from the nominal value by an amount greater than the percentage of the nominal value as given in table 3.

The standard deviation from the mean value shall not be greater than an amount equal to the percentage of the effective value as given in table 3.

The figures are to be based on readings obtained with an instrument working correctly, in accordance with ISO 1880 and ISO 3274. If the instrument used for a determination has a known or assumed error, this error should be taken into consideration. If other numbers of sampling lengths are included in the evaluation length, the value for the acceptable maximum of the standard deviation so derived from the 25 readings shall be calculated from the formula:

$$\sigma_n = \sigma_5 \sqrt{\frac{5}{n}}$$

where

σ_5 is the standard deviation from table 3 for five sampling lengths;

n is the number of sampling lengths in the evaluation length under consideration.

Table 3 — Tolerance values for roughness comparison specimens

Type of specimens	Tolerance on mean value (as a percentage of nominal value)		Standard deviation (as a percentage of effective value) for evaluation length comprising			
			3 sampling lengths	4 sampling lengths	5 sampling lengths	6 sampling lengths
Spark-eroded	+ 12	− 17	15	13	12	11
Shot- and grit-blasted	+ 12	− 17	15	13	12	11
Polished	+ 12	− 17	15	13	12	11

NOTE — The standard deviation for five sampling lengths in the evaluation length has been used for calculating the standard deviation for three, four and six sampling lengths in the evaluation length.

9 Minimum specimen size

Comparison specimens shall be of a size adequate to permit initial and periodic verification. No side shall be shorter than 20 mm for R_a values of 0,006 to 6,3 µm; 30 mm for the R_a value of 12,5 µm; 50 mm for the R_a value of 25 µm.

10 Lay

10.1 Direction

The general direction of the lay should preferably be parallel to the shorter side of the specimen.

10.2 Lay characteristics

The lay characteristics are as given in table 4.

Table 4 — Lay characteristics

Lay description	Production process represented	Form of specimen
non-directional	spark-erosion	flat
	shot-blasting grit-blasting	flat
multi-directional	polishing	flat convex-cylindrical

11 Marking

Each specimen, or its mounting, shall be marked with the following:

a) the "ISO" mark;

b) the nominal R_a value, expressed in micrometres, and, where required, also in micro-inches;

c) the production process represented by the specimen, i.e. spark-eroded, shot-blasted, etc.

NOTES

1 Consideration will be given to the inclusion of requirements for marking the specimens with other parameters as these are defined and adopted.

2 Marking should not be applied to the reference surface of the specimen.