BS 2634-2:2010

BSI Standards Publication

Roughness comparison specimens

Part 2: Specification for spark-eroded, shot-blasted, grit-blasted and polished specimens

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Contents

Summary of pages
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Foreword

Publishing information

This part of BS 2634 is published by BSI and came into effect on 30 September 2010. It was prepared by Subcommittee TDW/4/9, *Technical product verification*, under the authority of Technical Committee TDW/4, *Technical product realization*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This part of BS 2634 supersedes BS 2634-2:1987, which is withdrawn.

Relationship with other publications

BS 2634 is published in two parts:

- Part 1: *Specification for turned, ground, bored, milled, shaped and planed specimens*;
- Part 2: *Specification for spark-eroded, shot-blasted, grit-blasted and polished specimens*.

Information about this document

BS 2634-2:1987 was dual numbered with ISO 2632-2:1985, which was withdrawn in 1997.

This is a full revision of BS 2634-2:1987, and introduces the recalibration of roughness comparison specimens after a period of use.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

1 Scope

This part of BS 2634 specifies the characteristics of roughness comparison specimens of spark-eroded, shot-blasted, grit-blasted and polished surfaces. These are intended for tactile and visual comparison with workpiece surfaces of similar lay that have been produced by similar manufacturing methods.

2 Normative references

The following referenced documents are indispensable for the application 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.

BS 2634-1, *Roughness comparison specimens – Part 1: Specification for turned, ground, bored, milled, shaped and planed specimens*

BS EN ISO 4287:1998+A1:2009, *Geometrical product specification (GPS) – Surface texture – Profile method – Terms, definitions and surface texture parameters*

3 Terms and definitions

For the purposes of this part of BS 2634, the terms and definitions given in BS 2634-1 and BS EN ISO 4287:1998+A1 apply.

4 Methods of manufacture

The roughness comparison specimens shall be manufactured:

a) by creating positive replicas of master surfaces which replicate the feel and appearance of the master surface, for instance by electro-forming; or

b) by individually machining the roughness comparison specimens.

NOTE Individually machining a roughness comparison specimen involves directly applying the production process, which the roughness comparison specimen is intended to represent, to its surface.

5 Surface characteristics

Master surfaces intended for reproduction, their replicas and individually manufactured roughness comparison specimens (see Clause **4**) shall exhibit only the characteristics resulting from the machining process that they are intended to represent. They shall not contain uncharacteristic surface irregularities visible by normal or corrected sight.

6 Surface roughness values

Surface roughness values of roughness comparison specimens shall conform to Table 1.

Table 1 **Surface roughness values of roughness comparison specimens**

Machining methods					
Spark-eroded		Shot- and grit-blasted		Polished	
Arithmetical mean deviation					
Ra					
µm	µin	µm	µin	µm	µin
—	—	—	—	0.006 A)	0.25 A)
—	—	—	—	0.012 5 A)	0.5 A)
—	—	—	—	0.025 A)	1 A)
—	—	—	—	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	5.3	250	—	—
12.5	500	12.5	600	—	—
—	—	25	1 000	—	—

NOTE 1 Where it is necessary to provide roughness comparison specimens in intermediate values, these should be chosen from the R 10 series of preferred numbers (see ISO 3).

NOTE 2 Low values are included in Table 1 primarily to give design office personnel some idea of the differences that can be detected (between, for example, 000 6 µm, 0.012 5 µm, 0.05 µm and 0.1 µm) by visual means.

A) *In actual measurements, the required accuracy might not be attainable to determine these values.*

7 Sampling lengths

The sampling length to be used when measuring *Ra* on a roughness comparison specimen should be selected from Table 2, according to the machining method and roughness grade of the specimen.

For repetitive profiles, the length of the sampling length shall be rounded-up to include the nearest whole number of profile cycles.

Table 2 **Sampling lengths**

Arithmetical mean deviation *Ra*		Machining 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 of a roughness comparison specimen

8.1 Initial calibration

8.1.1 Readings shall be taken perpendicular to the direction of lay of the surface of the roughness comparison specimen for directional specimens.

8.1.2 Readings shall be taken at a sufficient number of locations evenly distributed over the measuring area of the roughness comparison specimen to meet the target uncertainty, as specified by the user.

8.1.3 Readings shall only be taken from areas that are representative of the machining method.

NOTE Areas in the surface that are not representative of the machining method are sometimes found in rougher grades of spark-eroded or blast-cleaned surfaces.

8.1.4 The mean value of the readings shall be in accordance with the tolerances given in Table 3.

8.1.5 The standard deviation from the mean value shall be not greater than the percentage of the effective value given in Table 3.

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8.1.6 Where numbers of sampling lengths other than those given in Table 3 are included in the evaluation length, the value for the acceptable maximum of the standard deviation derived from the readings shall be calculated from the formula:

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

where:

σ_s 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 **Tolerances on roughness values for roughness comparison specimens**

Specimen type	Tolerance on mean value (percentage of nominal value)		Standard deviation (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.

8.2 Re-calibration after a period of use

Re-calibration readings shall not be taken from surface areas of a roughness comparison specimen that have become visibly scratched, dented or otherwise marked.

Where the surface area of a roughness comparison specimen is not of a sufficient size to be assessed or to be representative of the machining process due to visible scatches, dents and marks on its surface, then the roughness comparison specimen shall be replaced and not re-calibrated.

9 Minimum roughness comparison specimen size

Each side shall be:

a) a minimum of 20 mm in length for the *Ra* values of 0.006 and 6.3 µm; or

b) a minimum of 30 mm in length for the *Ra* value of 12.5 µm; or

c) a minimum of 50 mm in length for the *Ra* value of 25 µm.

NOTE It is important that roughness comparison specimens are of a size that permits initial and periodic verification.

10 Lay

The roughness comparison specimen shall be designed such that the measurement direction runs parallel to the longest side.

NOTE For the lay characteristics for roughness comparison specimens, see Annex A.

11 Marking

11.1 The measuring area of the roughness comparison specimen shall not be marked.

11.2 Roughness comparison specimens, or their mounting, shall be marked as a minimum with the following:

a) the number and date of this British Standard, i.e. BS 2634-2:2010; [1)]

b) the nominal *Ra* value, expressed in micrometers (µm), and, where required, in microinches (µin); and

c) the name of the machining process which the roughness comparison specimen represents, e.g. spark-eroded, shot-blasted or polished.

[1)] Marking BS 2634-2:2010 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third-party certification of conformity.

Annex A (informative) Lay characteristics

The lay characteristics of roughness comparison specimen surfaces are given in Table A.1.

Table A.1 **Lay characteristics of roughness comparison specimens**

Lay description	Production process represented	Form of specimen
Non-directional (no lay)	Spark-erosion	Flat
Non-directional (no lay)	Shot	Flat
	Grit-blasting	Flat
Straight parallel or criss-cross	Polishing	Flat
		Convex-cylindrical

NOTE Specimens produced by spark-erosion, shot-blasting or grit-blasting are non-directional and normally exhibit no lay.

Bibliography

Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

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