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Rubber or plastics covered rollers — Specifications —

Part 2: Surface characteristics

Cylindres revêtus de caoutchouc ou de plastique — Spécifications —

Partie 2: Caractéristiques de surface

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 4, *Products (other than hoses)*.

This third edition cancels and replaces the second edition (ISO 6123-2:1988), of which it constitutes a minor revision to update the normative references.

ISO 6123 consists of the following parts, under the general title *Rubber or plastics covered rollers — Specifications:*

— *Part 1: Requirements for hardness*

— *Part 2: Surface characteristics*

— *Part 3: Dimensional tolerances*

Introduction

Covered rollers are cylindrical cores, generally of metal, with a cover of rubber or plastics or a particular use. They are manufactured in a wide variety of sizes and hardness grades depending on the intended use.

Rubber or plastics covered rollers — Specifications —

Part 2: Surface characteristics

1 Scope

This part of ISO 6123 establishes a classification of rubber or plastics covered rollers according to surface quality or imperfections and surface finish. A test method for the determination of surface roughness is also described.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3274, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Nominal characteristics of contact (stylus) instruments*

ISO 4288, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Rules and procedures for the assessment of surface texture*

ISO 23529, *Rubber — General procedures for preparing and conditioning test pieces for physical test methods*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
arithmetical mean deviation of the profile
R_a
arithmetical mean of the absolute values of the profile departures within the sampling length, l

$$R_a = \frac{1}{l}\int_0^l \left|y\langle x\rangle\right| \mathrm{d}x \text{ or approximately } R_a \approx \frac{1}{n}\sum_{i=1}^{n}\left|y_i\right|$$

where n is the number of discrete profile deviations.

Note 1 to entry: The values of R_a in practice are determined within the evaluation length which includes several sampling lengths. According to ISO 3274, the sampling length is equal to the cut-off.

3.2
ten point height of irregularities
R_z
average value of the absolute values of the heights of five highest profile peaks and the depths of five deepest profile valleys within the sampling length

$$R_z = \frac{\sum_{i=1}^{5}\left|y_{pi}\right| + \sum_{i=1}^{5}\left|y_{vi}\right|}{5}$$

where

y_{pi} is the height of the ith highest peak profile;

y_{vi} is the depth of the ith deepest profile valley.

Note 1 to entry: Depending on the shape of the profile, in certain cases, a problem arises associated with the lack of a number of profile peaks and valleys and/or the super-imposing of waviness on the roughness.

4 Surface quality

4.1 General

The manufacturing process and the raw materials used in the manufacture of rubber or plastics covered rollers may cause sporadic imperfections, in the form of holes and foreign matter, in the surface of the roller covers. The number, size and location of permissible surface imperfections shall be agreed between the interested parties.

The type of surface finish (see Clause 5) shall be observed when selecting the grade of imperfections.

4.2 Grades

The rollers may be graded according to the permissible numbers and sizes of imperfections as follows:

Grade *x/y*

This means that

— imperfections up to and including x mm^2 in area are acceptable;

— not more than two imperfections each having an area between x mm^2 and y mm^2 inclusive are permissible in any 0,1 m^2 of cover area;

— roller covers showing imperfections larger than y mm^2 in area shall be rejected.

The values of x and y shall be agreed between the interested parties.

If no requirements for surface quality are necessary, the rollers shall be designated “grade N”.

EXAMPLE A medium grade of surface quality can be described by the designation:

Grade 0,5/2

This means that

— imperfections up to and including 0,5 mm^2 in area are acceptable;

— not more than two imperfections each having an area be tween 0,5 mm^2 and 2 mm^2 inclusive are permissible in any 0,1 m^2 of cover area;

— roller covers showing imperfections larger than 2 mm^2 in area shall be rejected.

If agreement between the interested parties, or special provisions in national standard, are intended, the required quality should be chosen from the grades given below:

— grade 0,1/0,3

— grade 0,3/1

— grade 0,5/2

— grade 2/5

— grade 5/10

— grade N

5 Surface finish

The surface finish of a roller cover is dictated by the intended use. It shall be characterized either as a type of surface treatment (see 5.1) or as the maximum value of surface roughness (see 5.3), as agreed between the interested parties.

5.1 Methods of surface treatment — Terms and classification

Table 1 shows the generally employed principal methods of surface treatment, by means of which the roller surfaces are classified (see 5.2). The type of surface finish, and the structure or texture which can be achieved, are dependent upon the hardness and composition of the roller cover.

Table 1 — Surface finishes

Type	Surface treatment	Sequence of treatment
1	Polishing	↑
2	Grinding, fine	↑
3	Grinding, standard	↑
4	Turning	↑
5	Unground finish	↑

5.2 Description by surface treatment — Types

The surface structures described for Types 1 to 4 are produced by regular treatments and have a roughness without preferential direction.

The type required shall be chosen by agreement between the interested parties.

5.2.1 Type 1 — Polished finish

In soft elastomers, the surface is velvet-like; in hard rubber (ebonite) or plastics, it is smooth.

Grinding marks and scratches shall not be visible to the naked eye. Sporadic grinding blemishes are permissible. Not all qualities permit this finish.

5.2.2 Type 2 — Fine grinding finish

Slight grinding and feed marks are visible to the naked eye, but are not noticeable when touching the roller.

5.2.3 Type 3 — Standard grinding finish

Grinding marks and grinding feed are visible and just noticeable when touching the roller.

5.2.4 Type 4 — Turned finish

The surface is solely turned, with as little feed of the turning tool as practicable. Turning grooves are visible and noticeable when touching the roller.

5.2.5 Type 5 — Unground finish

The surface of the roller is without any treatment or dressing, for example a cloth-marked roller surface as it comes from the vulcanization process or a rough-cast plastics-covered roller.

5.2.6 Type S — Special treatment

This applies to surface finishes other than those in 5.2.1 to 5.2.5, for example a fine-cast plastics-covered roller, or to a finish for specific applications with a special structure as defined by agreement between the interested parties.

5.3 Characterization by surface roughness

5.3.1 Requirement

The surface finish of rubber or plastics covered rollers shall be quantitatively expressed in one of the following units, as agreed between the interested parties:

a) arithmetical mean deviation of the profile R_a (see 3.1), in micrometers;

b) ten point height of irregularities R_z (see 3.2), in micrometers.

The roughness of the cover surface shall appear visually uniform.

5.3.2 Method of testing

5.3.2.1 Test instrument: Profile meter

a) **General**

The determination of surface roughness shall be carried out by using a contact profile meter, system M, as specified in ISO 3274. Unless specified below, the basic parameters and metrological characteristics of the instrument shall be those specified in ISO 3274.

The instrument shall be equipped with a suitable support for use on curved surfaces.

The contact stylus shall be calibrated at the indicated measurement values, for example by use of a reference surface of known roughness.

b) **Stylus**

Stylus angle: 1,57 rad (90°)

Radius of stylus tip: 5 µm max.

Static measuring force at mean level of stylus: 4 mN max.

c) **Sampling length, evaluation length and cut-off**

The sampling length l and the evaluation length l_n shall be as specified in ISO 4288.

NOTE For rubber·or plastics covered rollers, the following values of cut-off λ_B sampling length l and evaluation length l_n are encountered in practice.

Table 2 — Parameter for specified R_a

R_a µm	λ_B mm	l mm	l_n mm
> 0,1 up to 2	0,8	0,8	4,0
> 2 up to 10	2,5	2,5	12,5

Table 3 — Parameter for specified R_z

R_z µm	λ_B mm	l mm	l_n mm
> 0,5 up to 10	0,8	0,8	4,0
> 10 up to 50	2,5	2,5	12,5

5.3.2.2 Test conditions

a) **Temperature**

The test shall be carried out, whenever possible, at a standard temperature (23 °C ± 2 °C or 27 °C ± 2 °C) in accordance with ISO 23529. The covered roller shall be brought to the test temperature prior to testing to ensure temperature equilibrium.

The test temperature shall be recorded.

b) **Cover surface**

Before measurements are made, the cover surface shall be cleaned carefully to remove dust and other contaminants which have collected during storage .The cleaning shall not damage the surface.

NOTE Wiping the surface with isopropylalcohol has been found suitable.

5.3.2.3 Test procedure

a) **Measuring areas**

For rollers having a cover up to 2,5 m long, the roughness shall be measured in five areas*:*

— three areas, each 120° apart, around the circumference in the middle of the roller;

— one area at each end, at a distance of 10 % of the cover length from the end.

For rollers having a cover over 2,5 m long, the roughness shall be measured in nine areas*:*

— three areas, each 120° apart, around the circumference in the middle of the roller;

— three areas at each end, each 120° apart, around the circumference, and each at a distance of 10 % of the cover length from the end.

b) **Operation**

Firmly locate the roller to be tested with its longitudinal axis horizontal and with the area in which the surface roughness is to be measured uppermost. Place the measuring equipment on the roller and adjust the pick-up so that the correct static measuring force at the mean level of the stylus is exerted on the surface.

Make one measurement in each measuring area with the stylus traverse line parallel to the axis of the roller.