BS ISO 254:2011

BSI Standards Publication

Belt drives — Pulleys — Quality, finish and balance

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National foreword

This British Standard is the UK implementation of ISO 254:2011. It supersedes BS ISO 254:1998 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MCE/10, Belts & Pulley Drive.

A list of organizations represented on this committee can be obtained on request to its secretary.

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

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INTERNATIONAL STANDARD

ISO 254

Fourth edition
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Belt drives — Pulleys — Quality, finish and balance

Transmissions par courroies — Poulies — Qualité, état de surface et équilibrage

Reference number
ISO 254:2011(E)

Foreword

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Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 254 was prepared by Technical Committee ISO/TC 41, *Pulleys and belts (including veebelts)*, Subcommittee SC 1, *Friction*.

This fourth edition cancels and replaces the third edition (ISO 254:1998), of which it constitutes a minor revision. In particular, Clause 4 has been technically revised to include test pulleys.

Belt drives — Pulleys — Quality, finish and balance

1 Scope

This International Standard specifies the characteristics of quality which are common to all transmission pulleys. It establishes specific quality levels for the finish and balance of transmission pulleys and test pulleys.

This International Standard is applicable to transmission pulleys for V-belts, V-ribbed belts, flat or synchronous belts; it does not apply to those pulleys for variable speed drives that have one or more moving flanges.

The other characteristics of transmission pulleys can be found in the relevant International Standards.

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.

ISO 1940-1, *Mechanical vibration — Balance quality requirements for rotors in a constant (rigid) state — Part 1: Specification and verification of balance tolerances*

ISO 4287, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters*

3 Choice and quality of materials

The pulleys shall be made of any material that can be shaped to the standardized dimensions and tolerances, and is capable of withstanding the conditions of service (heating, mechanical stresses, abrasion, environment, etc.) without damage. Moreover, it is desirable that the pulley material be capable of dissipating any significant heat which can be generated by the belts.

4 Surface roughness

4.1 Transmission pulleys

The surface roughness of the working surfaces shall not be coarser than the value given in Table 1.

Table 1 — Transmission pulleys

Working surface	Surface roughness, Ra [a] µm
V-pulley and V-ribbed pulley grooves and all pulley bores	3,2
Flat pulley rims and all pulley rim edges	6,3
Synchronous pulley tooth flanks and tips:	
— industrial type drives	3,2
— high-performance type drives (for example for automotive applications)	1,6

[a] As defined in ISO 4287.

4.2 Test pulleys

The surface roughness of the working surfaces shall not be coarser than the value given in Table 2.

Table 2 — Test pulleys

Working surface	Surface roughness, Ra [a] µm
V-pulley and V-ribbed pulley grooves (dynamic test)	1,6
Synchronous pulley grooves	1,6
Idler pulleys	1,6
[a] As defined in ISO 4287.	

4.3 Edges

The edges of flat pulley rims, V-pulley grooves and V-ribbed pulley grooves shall be chamfered or radiused.

5 Balance

5.1 The purpose of balancing a pulley is to improve its mass distribution so as to diminish the out-of-balance forces exerted as it revolves; these forces cannot be completely eliminated, but the remaining imbalance shall not be greater than the allowable limit.

5.2 As balancing is an expensive operation, the specified limit of the residual imbalance should be given a value as large as the envisioned applications allow.

5.3 Two classes of balancing may be considered:

— balancing in one plane, called static balancing;

— balancing in two planes, called dynamic balancing.

5.4 Static balancing is usually sufficient; dynamic balancing may be necessary for pulleys with a wide-faced rim or those revolving at relatively high speeds.

5.5 Pulleys manufactured for stock shall be statically balanced since their future conditions of use are not known at the time of manufacture.

5.6 Static balancing shall be done so as to leave an eccentric residual mass on the working diameter (datum or effective, according to the type of pulley) which does not exceed the larger of the two following values:

a) 0,005 kg;

NOTE This value applies only to pulleys where there is adequate material to remove for balancing. Many light-duty pulleys have inadequate space to drill balancing holes or to add appropriate masses by permanent means.

b) 0,2 % of the equivalent mass of the pulley, eventually including any companion bushing.

The equivalent mass is taken as the mass of a geometrically identical pulley made of cast iron.

5.7 When the rotational frequency, n, in minutes to the power minus one (min^{-1}), of a pulley becomes known, it is advisable to ascertain whether dynamic balancing may be necessary, as follows.

NOTE The term “rotations per minute (r/min)” is usually used for rotating machines.

Determine the limiting speed n_1 (min^{-1}) by reference to Figure 1 or by calculation using the formula:

$$n_1 = \sqrt{\frac{1,58 \times 10^{11}}{ld}} \qquad (1)$$

where

l is the pulley rim face width, in millimetres;

d is the diameter (datum or effective) of the pulley, in millimetres.

Then:

if $n < n_1$: static balancing should be suitable;

if $n > n_1$: dynamic balancing may be necessary.

5.8 For dynamic balancing, the operation shall be implemented in accordance with ISO 1940-1. The balance quality grade G is determined by the largest of the following two numbers:

$$G_1 = 6,3 \text{ mm/s} \qquad (2)$$

$$G_2 = \frac{5v}{M} \text{ mm/s} \qquad (3)$$

The expression for G_2 is derived from the definition in ISO 1940-1.

In Formula (3):

5 is the practical limit of the residual eccentric mass, in grams, specified in 5.6 a);

v is the circumferential pulley speed, in metres per second;

M is the equivalent mass of the pulley, in kilograms, as given in 5.6 b).

The G quality grade may be less than G_1 or G_2 if the user specifies a particular requirement.

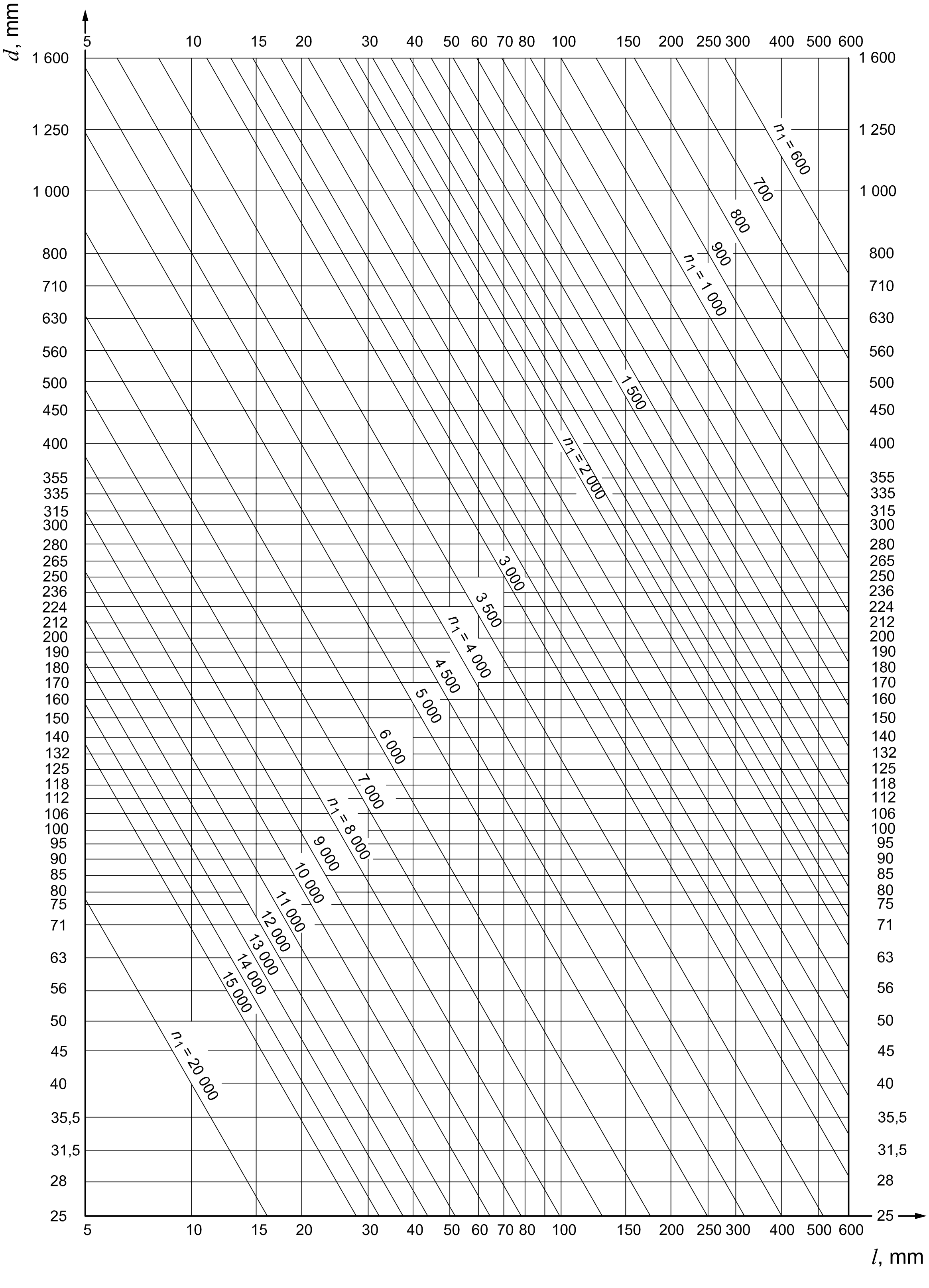

Figure 1 — Limit n_1 (min^{-1}) for static or dynamic balancing

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