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Belt drives — V-ribbed belts for the automotive industry — Fatigue test

Transmissions par courroies — Courroies striées pour la construction automobile — Essai de fatigue

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

This third edition cancels and replaces the second edition (ISO 11749:2014), which has been technically revised.

The main changes are as follows:

— addition of Table 1 with symbols;

— addition of the test condition with constant belt tensioning force in 8.1.2 and 8.2.1.3;

— change in pulley surface roughness R_a to < 3,2 µm;

— revision of test pulley dimensions (Table 2).

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Belt drives — V-ribbed belts for the automotive industry — Fatigue test

1 Scope

This document specifies a dynamic test method for the quality control of V-ribbed belts (PK profile) which are used predominantly for accessory drive applications in the automotive industry.

The dimensional characteristics of the belts and of corresponding pulleys are the subject of ISO 9981.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Symbols

For the purpose of this document, the symbols given in Table 1 apply.

Table 1 — Symbols

Symbols	Designation	Unit
b_e	effective line differential	mm
d_B	checking ball or rod diameter	mm
d_e	effective diameter	mm
d_{e1}	effective diameter of driving and driven pulleys	mm
d_{e2}	effective diameter of idler pulley	mm
d_p	pitch diameter	mm
d_{r3}	outside diameter of reverse bending idler pulley	mm
e	groove pitch	mm
f	lateral distance	mm
F	belt tensioning force	N
g	additional slip	%
i_f	rotational frequency ratio at measurement of the additional slip	—
i_o	rotational frequency ratio at the initial	—
k	standard value to calculate belt tensioning force	N/kW
K	diameter over balls or rods	mm
M	torque load	Nm

[a] Rotations per minute.

Table 1 *(continued)*

Symbols	Designation	Unit
n	Number of grooves	—
n_f	final rotational speed of the driven shaft	r/min [a]
n_o	initial rotational speed of the driven shaft	r/min [a]
N	driver speed	r/min [a]
N_f	final rotational speed of the driving shaft	r/min [a]
N_o	initial rotational speed of the driving shaft	r/min [a]
P_s	specified power	kW
r_b	radius at the groove root	mm
r_t	radius at the groove tip	mm
R_a	surface roughness	µm
$2x$	position of the ball or rod to groove tip	mm
α	groove angle	—

[a] Rotations per minute.

5 Principle

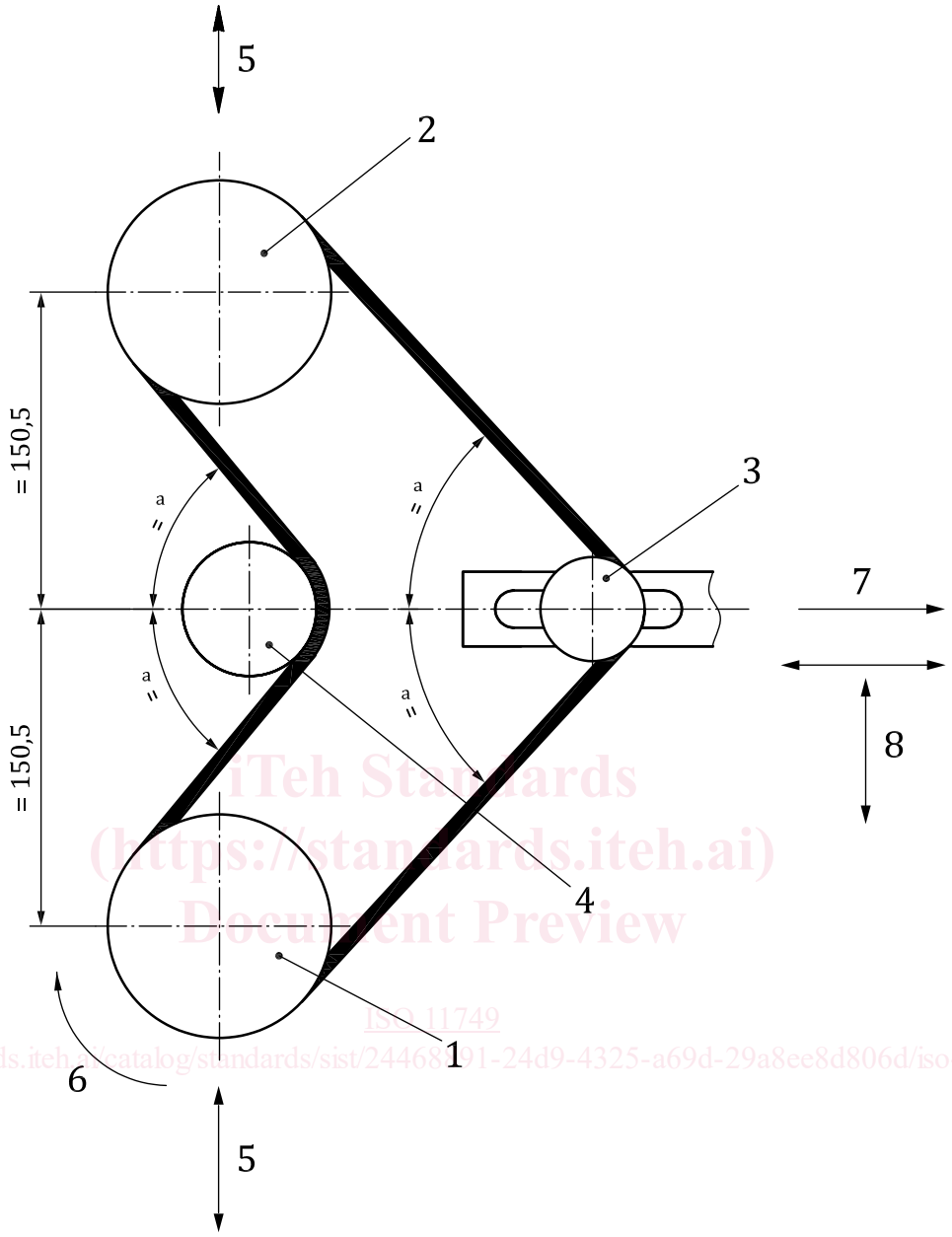
Determination of the performance of a belt under specified conditions on a two-, three-, or four-pulley test machine is as described in Clause 6.

The shortest V-ribbed belt which can be tested on the four-pulley test machine (see Figures 1 and 2) is approximately 1 000 mm. Belts with lengths between 800 mm and 1 000 mm inclusive can be tested on the three-pulley test machine (see Figure 3). Shorter belts should be tested on the two-pulley test machine (see Figure 4) as described in 8.2.1.2.

A number of conditions with fixed belt tensioning force shall be agreed between the manufacturer and user, including the power to be transmitted and the number of times the belt can be retensioned.

The minimum acceptable life, in hours, shall be agreed between the manufacturer and users.

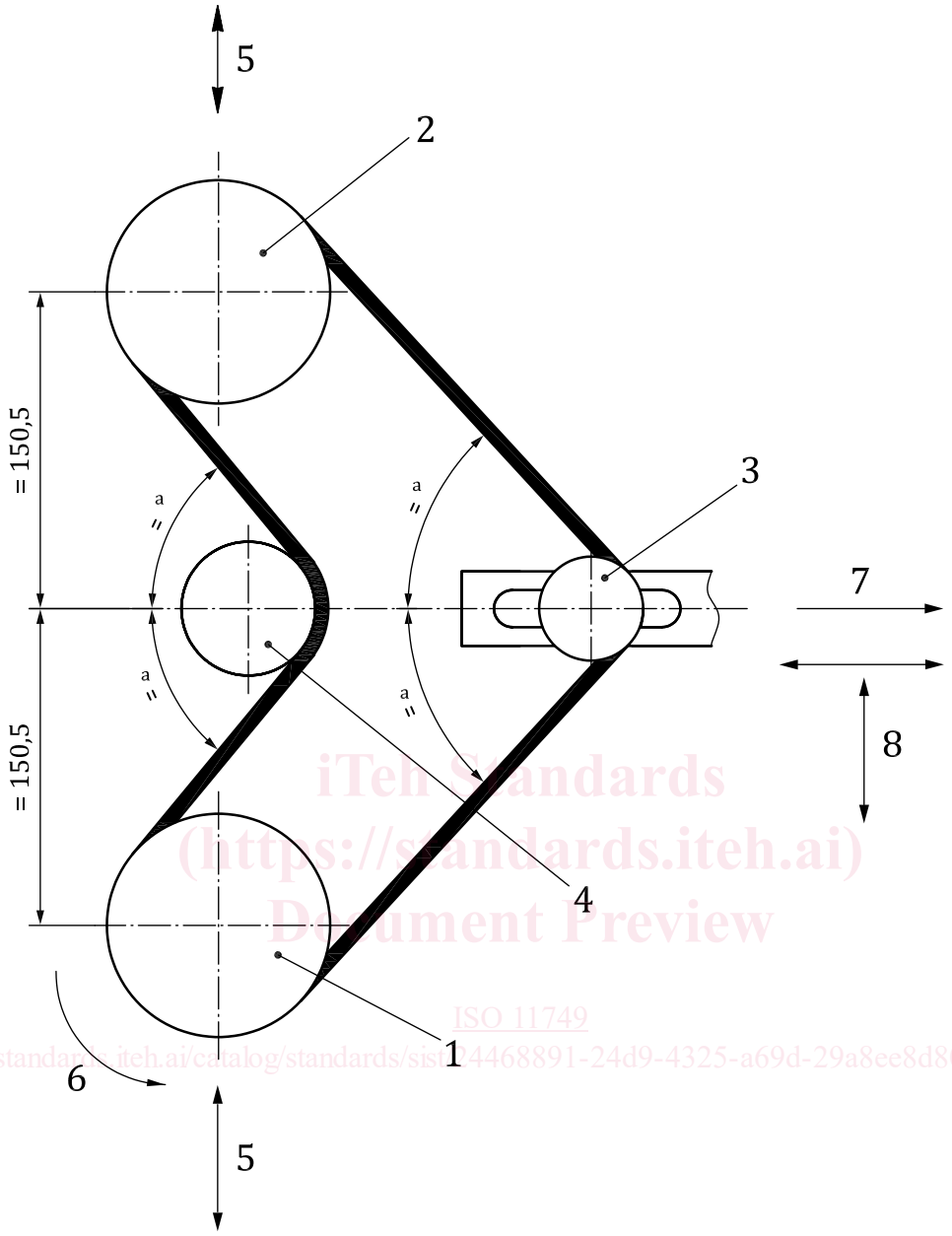
Belt failure occurs when the belt no longer satisfies the agreed conditions.



Key

1 driving pulley
2 driven pulley (power-absorption unit)
3 idler pulley, set in slide
4 reverse bending idler pulley
5 direction of adjustment of driving and driven pulley
6 direction of rotation with fixed belt tensioning force
7 belt tensioning force applied to the idler pulley
8 direction of adjustment of idler pulley assembly and its support
a Equal (=), the angle as shown by Figure 1 is specified for the initial test layout and may change slightly with retensioning during the course of the test.

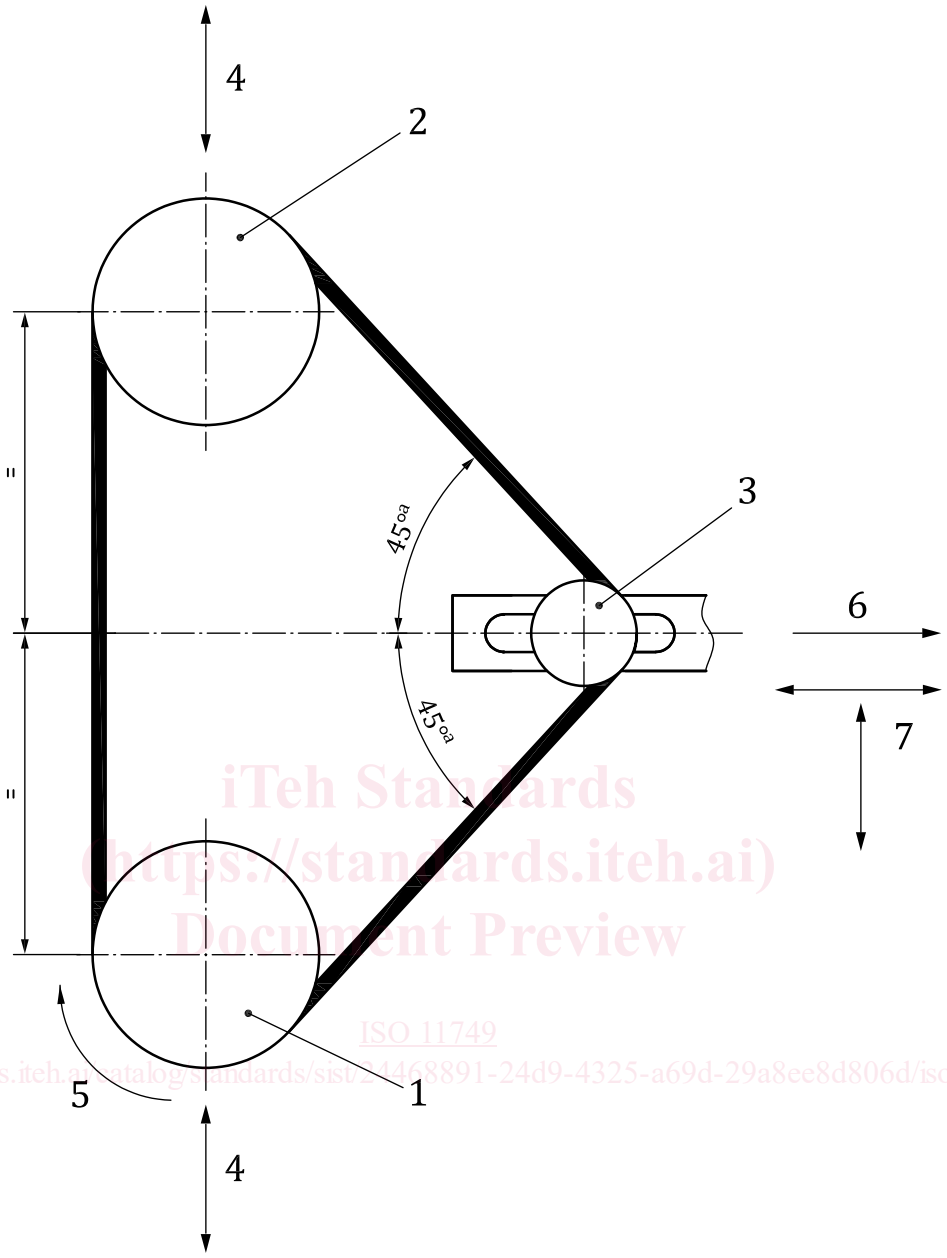
Figure 1 — Four-pulley test machine layout (fixed belt tensioning force)



Key

1 driving pulley
2 driven pulley (power-absorption unit)
3 idler pulley, set in slide
4 reverse bending idler pulley
5 direction of adjustment of driving and driven pulley
6 direction of rotation with constant belt tensioning force
7 belt tensioning force applied to the idler pulley
8 direction of adjustment of idler pulley assembly and its support
a Equal (=), the angle as shown by Figure 2 is specified for the initial test layout and may change slightly with retensioning during the course of the test.

Figure 2 — Four-pulley test machine layout (constant belt tensioning force)



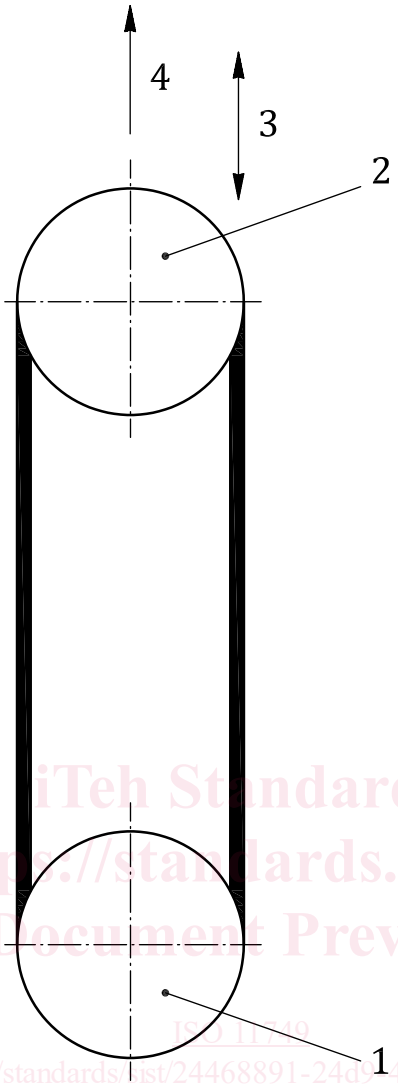
Key

1 driving pulley
2 driven pulley (power-absorption unit)
3 idler pulley, set in slide
4 direction of adjustment of driving and driven pulley
5 direction of rotation
6 belt tensioning force applied to the idler pulley
7 direction of adjustment of idler pulley assembly and its support

The belt, mounted on the test pulleys shall be aligned to within ±0,25° in relation to the plane through the centre of each pulley.

[a] 45° is specified for the initial test layout and may change slightly with retensioning during the course of the test.

Figure 3 — Three-pulley test machine layout



Key

1 driving pulley

2 driven pulley (power-absorption unit)

3 direction of adjustment of the movable pulley (method of locking in place)

4 belt tensioning force applied to the movable pulley

The belt, mounted on the test pulleys, can be aligned to within ±0,25° in relation to the plane through the centre of each pulley.

Figure 4 — Two-pulley test machine layout