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V- and ribbed V-belts — Dynamic test to determine pitch zone location

Courroies trapézoïdales et striées — Méthode d'essai dynamique de détermination de l'emplacement de la zone primitive

Reference number
ISO 8370 : 1987 (E)

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 8370 was prepared by Technical Committee ISO/TC 41, *Pulleys and belts (including vee-belts).*

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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V- and ribbed V-belts — Dynamic test to determine pitch zone location

0 Introduction

A V- or ribbed V-belt pulley groove is defined by its effective width or datum width.

When a specific belt is placed in the groove, it will operate with a pitch zone at a finite position relative to the groove which needs to be defined for power transmission design calculations.

1 Scope and field of application

This International Standard specifies a dynamic method of determining the location of the pitch zone of a V- or ribbed V-belt, which is expressed as an effective line differential b_e (see figure 1) or a datum line differential b_d (see figure 2).

2 Reference

ISO 1081, *Drives using V-belts and grooved pulleys — Terminology.*

3 Definitions

For the purposes of this International Standard, the definitions in ISO 1081 apply.

4 Procedure

Calculation of the pitch diameter of the pulley on a test fixture by measuring the rotational frequency of the pulley and either the belt velocity over a straight span or the centre distance between the pulleys and the time of the belt rotation.

5 Apparatus

Test fixture, with two pulleys of equal diameter, of the dimensions specified for the measuring pulleys of the specific belt according to the appropriate ISO Standard. The centre distance between the pulley shafts shall be adjustable to accommodate the required belt lengths of a specific belt and a means of applying the measuring force specified in the appropriate ISO Standard shall be provided. A clamping device shall be provided to lock the centre distance.

The fixture shall include a means of mechanically rotating one of the pulleys at a reasonable speed. While the specific speed is not critical, it shall be fast enough to ensure smooth operation. About 1 000 r/min is suggested. A fixture shall be provided for measuring the rotational frequency and either the velocity of the belt or the centre distance between the pulleys and the time of the belt rotation.

6 Operation

Fit the belt onto the fixture described in clause 5. Apply the measuring force as specified in the appropriate ISO Standard to tension the belt. Start the machine and allow it to operate for 5 min to seat the belt fully in the pulleys.

After the run-in period, clamp the movable shaft in place so that the centre distance remains constant.

With the machine operating, accurate and simultaneous measurements of the rotational frequency of one pulley and either the speed of the belt in one of the straight spans or the centre distance between the pulleys and the time of the belt rotation shall be taken. Record these measurements.

7 Calculations

7.1 Pitch diameter

Calculate the pitch diameter of the belt operating in the pulley from one of the two following formulae:

$$d_p = \frac{60\,000}{\pi} \times \frac{v}{n} \qquad \ldots (1)$$

where

d_p is the pitch diameter, in millimetres;

v is the belt velocity, in metres per second;

n is the rotational frequency, in revolutions per minute.

$$d_p = \frac{120}{\pi} \times \frac{e}{nt - 60} \qquad \ldots (2)$$

where

d_p is the pitch diameter, in millimetres;

e is the centre distance between the pulleys, in millimetres;

n is the rotational frequency, in revolutions per minute;

t is the time of the belt rotation, in seconds.

7.2 Effective line differential (see figure 1)

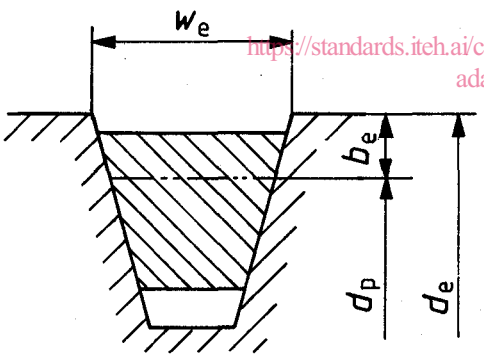

Figure 1 — Effective line differential

Calculate the effective line differential from the formula

$$b_e = \frac{d_e - d_p}{2}$$

where

b_e is the effective line differential, in millimetres;

d_e is the effective diameter, in millimetres;

d_p is the pitch diameter, in millimetres.

In most cases, the pitch diameter of the belt operating in the pulley (determined by the location of the pitch zone of the belt) is smaller than the effective diameter described by the pulley; the effective line differential is positive. A negative value for the effective line differential means that the pitch zone of the belt is at a diameter larger than the effective diameter (in the case of ribbed V-belts).

7.3 Datum line differential (see figure 2)

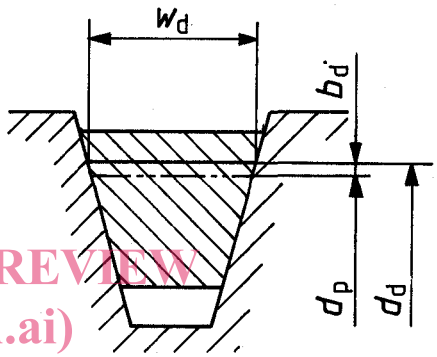

Figure 2 — Datum line differential

Calculate the datum line differential from the formula

$$b_d = \frac{d_d - d_p}{2}$$

where

b_d is the datum line differential, in millimetres;

d_d is the datum diameter, in millimetres;

d_p is the pitch diameter, in millimetres.

If the pitch diameter of the belt operating in the pulley (determined by the location of the pitch zone of the belt) is smaller than the datum diameter described by the pulley, the datum line differential will be positive. A negative value for the datum line differential means the pitch zone of the belt is at a diameter larger than the datum diameter.

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Descriptors : belts, power transmission belts, V-belts, tests, dynamic tests.

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