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2016-04-01

**Synchronous belt drives — Metric
pitch, curvilinear profile systems G, H,
R and S, belts and pulleys**

*Transmissions synchrones — Pas métrique, systèmes à denture
curviligne G, H, R et S, courroies et poulies*

Preview

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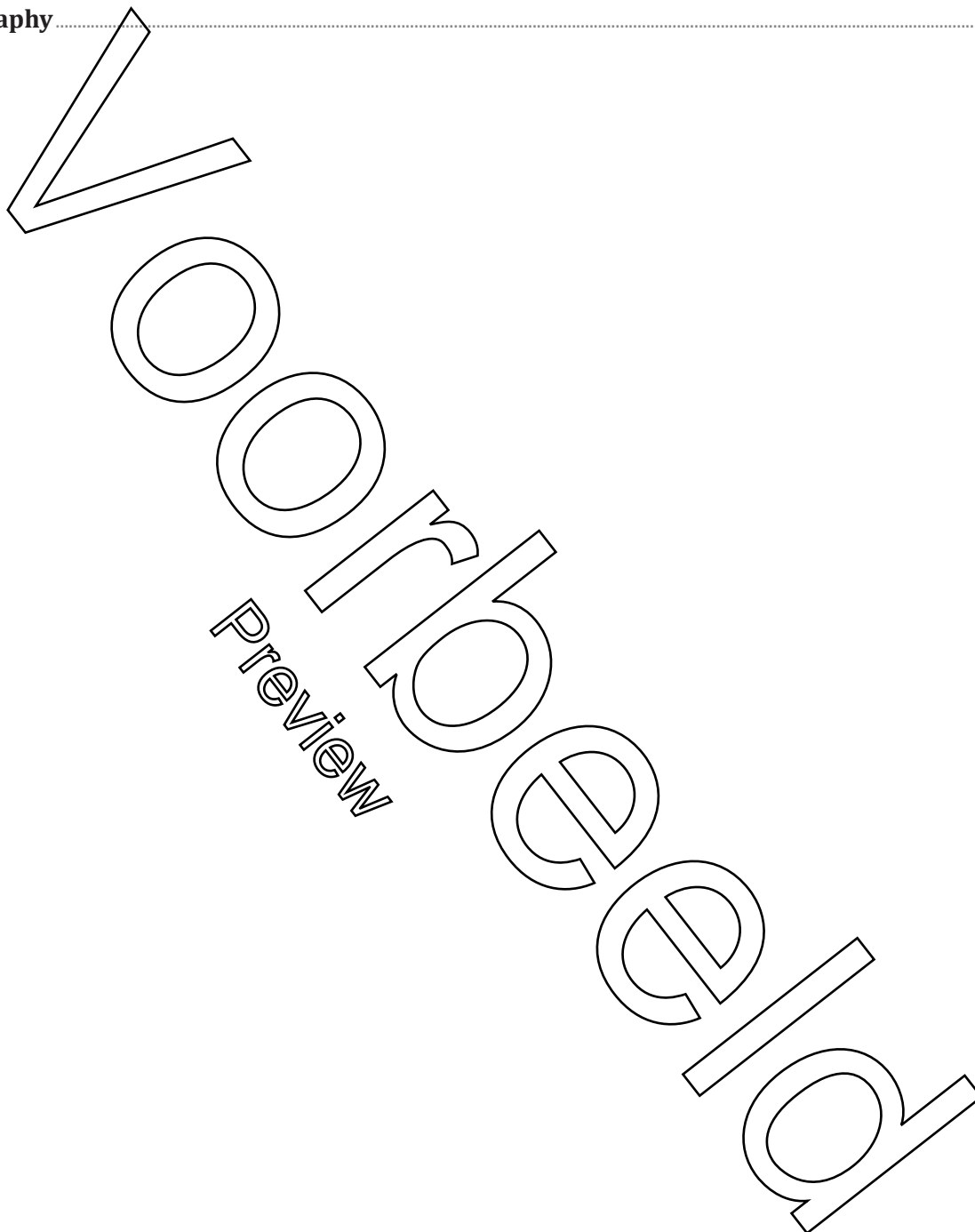
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Foreword

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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 41, *Belts and pulleys (including veebelts)*, Subcommittee SC 4, *Synchronous belt drives*.

This second edition cancels and replaces the first edition (ISO 13050:1999), which has been technically revised.

This corrected version of ISO 13050:2014 incorporates the following corrections: in Formulas (1) and (2), "Ao" has been added before the first square bracket in each equation.

Voorbeeld
Preview

Synchronous belt drives — Metric pitch, curvilinear profile systems G, H, R and S, belts and pulleys

1 Scope

This International Standard specifies the principal characteristics of metric pitch curvilinear synchronous endless belts and pulleys in G, H, R, and S profile systems for use in synchronous belt drives (also known in the past as timing belt drives, positive belt drives, gear belt drives) for mechanical power transmission and where positive indexing or synchronization might be required.

The principal belt and pulley characteristics include the following:

- a) nominal belt tooth dimensions;
- b) belt tooth pitch spacing;
- c) belt length and width dimensions and tolerances;
- d) belt length measurement specifications;
- e) pulley groove dimensions and tolerances;
- f) pulley diameter and width dimensions and tolerances;
- g) pulley quality specification.

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.

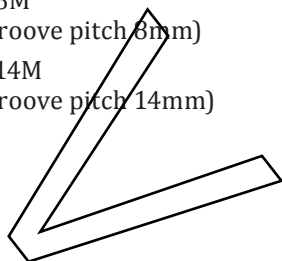
ISO 254, *Belt drives — Pulleys — Quality, finish and balance*

3 Synchronous belt drive system types

Four profile systems and 14 profiles for curvilinear synchronous drives are standardized.

Profile system G

- Profile G8M
(Tooth/groove pitch 8mm)
- Profile G14M
(Tooth/groove pitch 14mm)

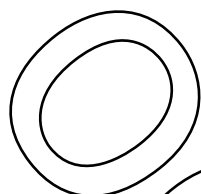


Profile system R

- Profile R3M
(Tooth/groove pitch 3mm)
- Profile R5M
(Tooth/groove pitch 5mm)
- Profile R8M
(Tooth/groove pitch 8mm)
- Profile R14M
(Tooth/groove pitch 14mm)
- Profile R20M
(Tooth/groove pitch 20mm)

Profile system H

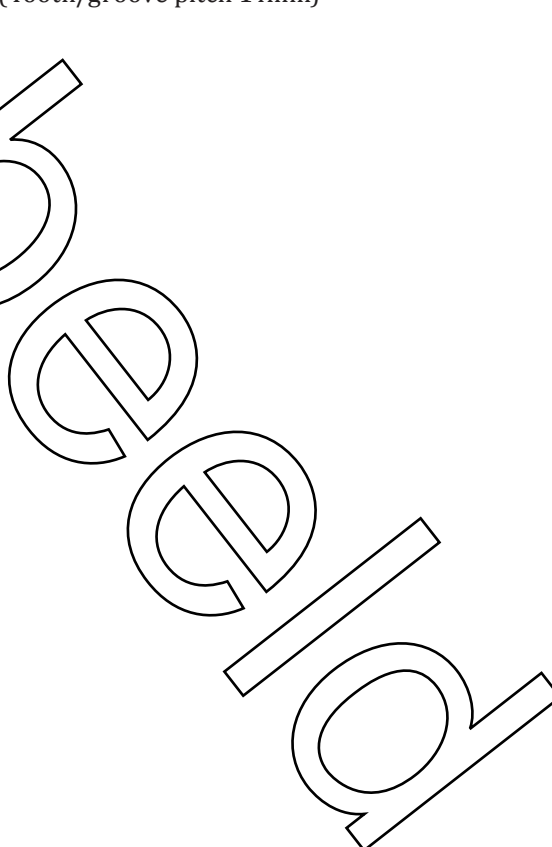
- Profile H3M
(Tooth/groove pitch 3mm)
- Profile H5M
(Tooth/groove pitch 5mm)
- Profile H8M
(Tooth/groove pitch 8mm)
- Profile H14M
(Tooth/groove pitch 14mm)
- Profile H20M
(Tooth/groove pitch 20mm)



Profile system S

- Profile S8M
(Tooth/groove pitch 8mm)
- Profile S14M
(Tooth/groove pitch 14mm)

Preview



4 Belt nomenclature

A belt is identified as follows:

- the belt length or pitch length in millimetres, e.g. 1 400 mm;
- the profile system, e.g. “G”, “H”, “R”, or “S”;
- the pitch or tooth pitch in millimetres, e.g. 14 mm;
- the width or belt width in millimetres, e.g. 40 mm (for profile system S, the width in millimetres \times 10);
- double-sided belts are designated by adding the letter “D” before the designation of the profile system.

EXAMPLE A synchronous belt in the above profile systems of 1 400 mm length, 14 mm pitch, and 40 mm wide is identified as follows:

Profile system G
1400-G14M-40
1400-DG14M-40

Profile system R
1400-R14M-40
1400-DR14M-40

Profile system H
1400-H14M-40
1400-DH14M-40

Profile system S
1400-S14M-400
1400-DS14M-400

5 Pulley nomenclature

A pulley is identified as follows:

- the letter “P” indicates a pulley;
- the number of grooves, e.g. 30;
- the profile system, e.g. “G”, “R”, or “S”;
- the pitch or groove pitch in millimetres, e.g. 14 mm;
- the width or belt width in millimetres, e.g. 40 mm (for profile system S, the width in millimetres \times 10).

EXAMPLE A pulley in the above profile systems of 30 grooves, 14 mm pitch, and 40 mm wide is identified as follows:

Profile system G
P30-G14M-40

Profile system R
P30-R14M-40

Profile system H
P30-H14M-40

Profile system S
P30-S14M-400

6 Profile system G

6.1 Belt dimensions and tolerances

6.1.1 Belt tooth dimensions

The nominal belt tooth dimensions are given in [Table 1](#) and shown in [Figure 1](#).

Table 1 — Nominal tooth dimensions

Dimensions in millimetres

Profile	Belt pitch	b_g	h_g	R1	Ao	a^a	xo	L1
G8M	8	5,200	3,43	0,74	2,29	0,80	0,379	1,378
G14M	14	9,100	6,00	1,30	4,00	1,40	0,661	2,422

^a a is the belt design pitch differential.

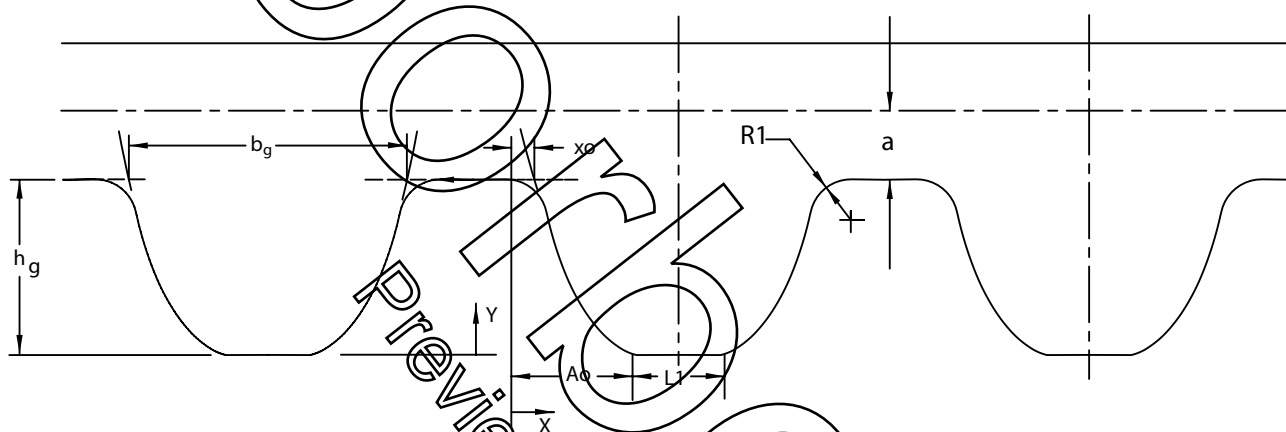


Figure 1 — Tooth dimensions — Profile system G

Detail of tooth face

For $Ao \geq x \geq xo$:

$$y = Ao \left[\ln \left(Ao / x + \sqrt{(Ao / x)^2 - 1} \right) - \sqrt{1 - (x / Ao)^2} \right] \quad (1)$$

where

xo corresponds to $y = hg$;

$L1$ is equal to $hg - 2(Ao - xo)$.

NOTE 1 Indicated base tooth profile remains constant in all parts.

NOTE 2 "O" reference points remain in contact with the part outer surface generated by part radius of curvature.

NOTE 3 Groove profile bottom surface in circular part form is an arc whose chordal distance is $L1$ and whose radius originates at the part centre.

6.1.2 Belt widths and tolerances

Belt widths and tolerances are given in [Table 2](#).

Table 2 – Widths and width tolerances

Dimensions in millimetres

Profile	Nominal belt width	Tolerance on width for belt pitch lengths		
		Up to and including 840 mm	Over 840 mm and up to and including 1 680 mm	Over 1 680 mm
G8M	21	+0,8 -0,8	+0,8 -1,2	+0,8 -1,2
	27	+0,8 -0,8	+0,8 -1,2	+0,8 -1,2
	36	+0,8 -0,8	+0,8 -1,2	+0,8 -1,2
	62	+1,2 -1,2	+1,2 -1,6	+1,6 -1,6
G14M	20	+0,8 -0,8	+0,8 -1,2	+0,8 -1,2
	37	+0,8 -0,8	+0,8 -1,2	+0,8 -1,2
	68	+1,2 -1,6	+1,6 -1,6	+1,6 -2,0
	90	+1,6 -1,6	+1,6 -2,0	+2,0 -2,0
	125	+2,4 -2,4	+2,4 -2,8	+2,4 -3,2

6.1.3 Pitch length measurement

See Annex A for tolerances and Annex B for the relationship between the centre distance and the belt pitch length.

6.1.3.1 Measuring fixture (see [Figure 3](#))

The pitch length of a synchronous belt shall be determined by placing the belt on a measuring fixture composed of the following elements.

6.1.3.1.1 Two pulleys of equal diameter, as specified in [Table 3](#), of the proper belt profile and having standard tooth space dimensions. These pulleys should be made to the tolerances shown in [Table 3](#). One pulley shall be free to rotate on a fixed-position shaft, while the other shall be free to rotate on a moveable shaft to permit the centre distance to change.

6.1.3.1.2 Means of applying a total measuring force to the moveable pulley.

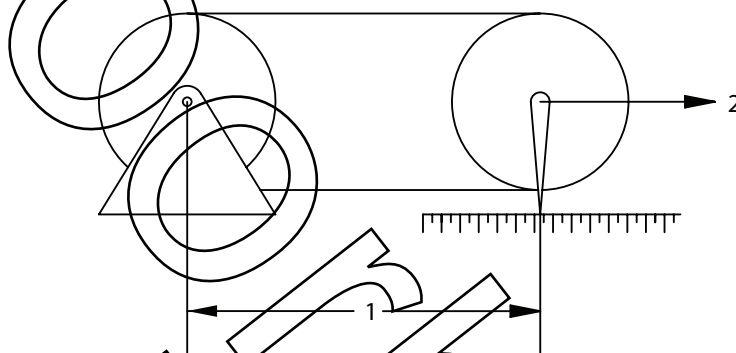
6.1.3.1.3 Means of measuring the centre distance between the two pulleys with the necessary degree of accuracy for centre distance measurement.

6.1.3.2 Total measuring force

The total measuring force to be applied for measuring belts is given in [Table 4](#).

6.1.3.3 Procedure

In measuring the pitch length of a synchronous belt, the belt should be rotated at least two revolutions to seat it properly and to divide the total force equally between the two spans of the belt. The pitch length shall be calculated by adding the pitch circumference of one of the pulleys to twice the measured centre distance.



- Key**
 1 centre distance
 2 total measuring force

Figure 2 — Diagram of fixture for measuring pitch length

Table 3 — Belt length measuring pulleys

Dimensions in millimetres

Profile	Number of grooves	Pitch circumference	Outside diameter ^a	Radial runout F.I.M. ^b	Axial runout F.I.M. ^b
G8M	34	272	84,980 ±0,013	0,013	0,025
G14M	40	560	175,454 ±0,025	0,013	0,051

^a Pulleys outside of the diameter tolerance range specified can be used if the resulting belt length measurements are corrected for the actual pulley diameters.
^b Full indicator movement.

NOTE The number of pulley teeth specified in [Table 3](#) determines the recommended sizes for measuring the belt pitch length. Practically, other sizes of pulleys could be used provided they have the same number of teeth, and meet the dimensional requirements of [Table 3](#).

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