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Conveyor chains, attachments and chain wheels — Part II : Chain wheels

Chaînes convoyeurs, plaques d'attache et roues pour chaînes — Partie II : Roues pour chaînes

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up 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.

International Standard ISO 1977/II (originally draft International Standard ISO/DIS 2564) was drawn up by Technical Committee ISO/TC 100, *Chains and chain wheels for power transmission and conveyors*, and circulated to the Member Bodies in August 1971.

It has been approved by the Member Bodies of the following countries :

Australia	Germany	Sweden
Austria	India	Thailand
Belgium	Ireland	Turkey
Czechoslovakia	Japan	United Kingdom
Egypt, Arab Rep. of	Romania	U.S.A.
Finland	South Africa, Rep. of	U.S.S.R.
France	Spain	

No Member Body expressed disapproval of the document.

Conveyor chains, attachments and chain wheels — Part II : Chain wheels

0 INTRODUCTION

This document has been prepared as a basis for national standards with a view to providing a broad "dimensional envelope" within which functional interchangeability of chain wheels of different manufacturing sources can be obtained.

It forms part of ISO 1977, dealing with conveyor chains, attachments and chain wheels. Other parts are :

- *Part I : Chains — Metric series.*¹⁾
- *Part III : Attachments — Metric series.*

1 SCOPE AND FIELD OF APPLICATION

This International Standard gives specifications for chain wheels for use with conveyor chain conforming to part I and specifies control criteria to ensure correct meshing,

operation and transmission of load when used under normal operating conditions. The controls do not necessarily determine the design parameters of conveyor chain wheels.

2 NOMENCLATURE

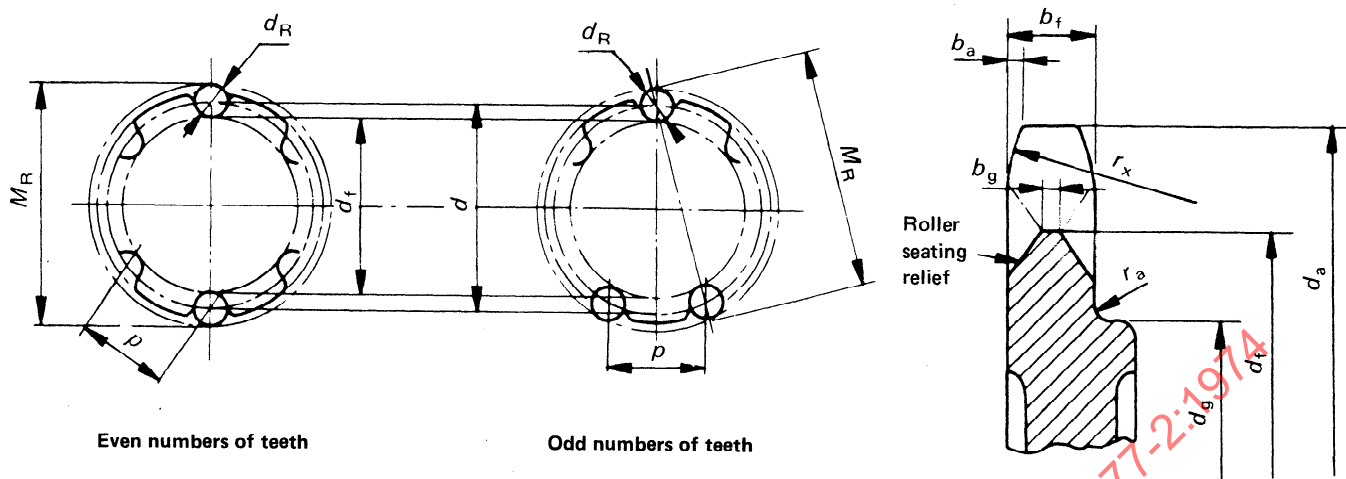
2.1 Chains

The nomenclature (and symbols) for basic chain dimensions on which all chain wheel data are based is given in part I.

2.2 Chain wheels

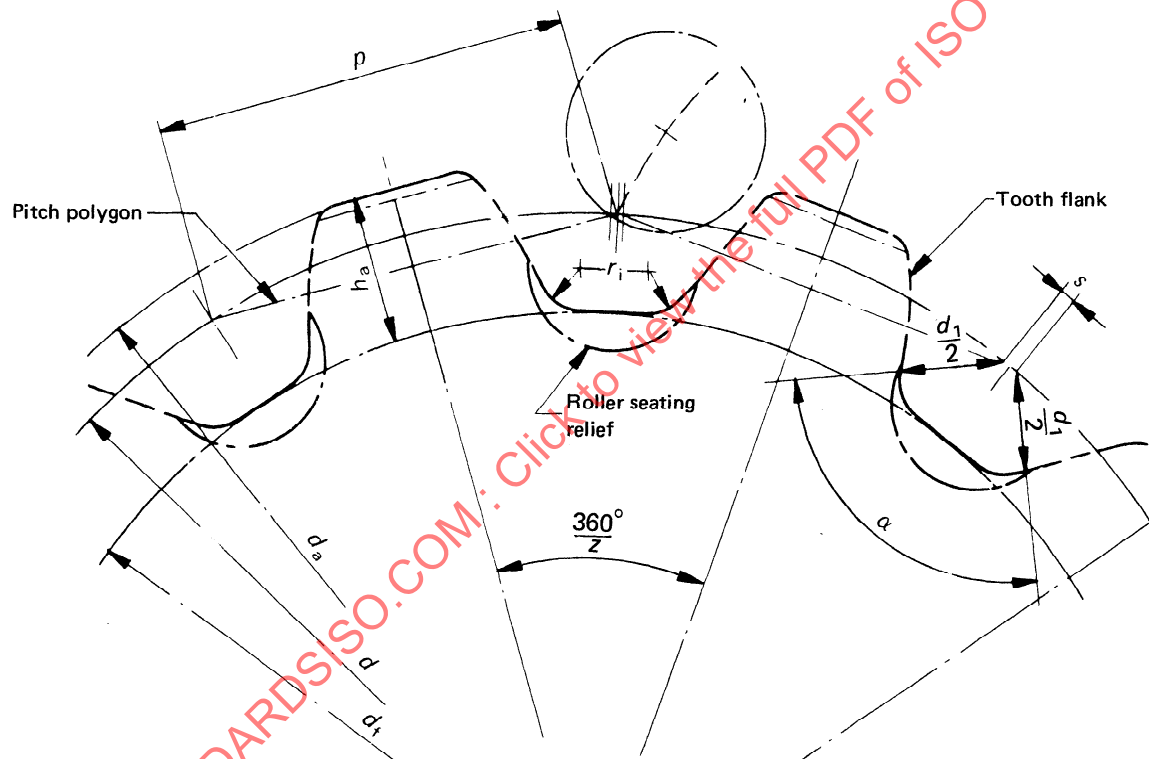
The nomenclature for chain wheels is given in the figure on the following page.

1) In preparation. (Revision of ISO/R 1977.)



Even numbers of teeth

Odd numbers of teeth



b_a = tooth side relief
 b_t = tooth width
 b_g = relieved tooth width, minimum
 d = pitch circle diameter
 d_a = tip diameter
 d_t = root diameter
 d_g = absolute maximum shroud diameter
 d_R = measuring pin diameter
 d_1 = plain roller diameter, maximum*
 d_2 = bearing pin diameter

h_a = tooth height above bottom diameter
 M_R = measurement over measuring pins
 p = chordal pitch and is equal to chain pitch
 r_a = shroud radius
 r_i = roller seating radius
 r_x = minimum tooth side radius
 s = pitch line clearance
 z = number of teeth
 α = roller seating angle.

FIGURE – Nomenclature for chain wheels

(Nomenclature valid in the case of a roller chain; in other cases replace the term "roller" by "bush").

* Depending on the case d_1 may be replaced by d_4 or d_7 .

3 FORM AND DIMENSIONS

3.1 Diametral dimensions

3.1.1 Pitch circle diameter

$$d = \frac{p}{\sin \frac{180^\circ}{z}} \quad (\text{See the annex for unitary dimensions of normal range of teeth.})$$

3.1.2 Measuring pin diameter

$d_R = d_1, d_4$ or d_7 (as appropriate) subject to tolerance $h11.1$)

3.1.3 Root diameter

$d_i \text{ max.} = d - d_1, d_4$ or d_7 (as appropriate).

3.1.4 Measurement over measuring pins

M_R for even numbers of teeth = $d + d_R \text{ min.}$

M_R for odd numbers of teeth = $d \cos \frac{90^\circ}{z} + d_R \text{ min.}$

NOTES

1 For a wheel having an even number of teeth, measurement is made over the appropriate pins inserted in diametrically opposed tooth spaces. For a wheel having an odd number of teeth, measurement is made over pins inserted in the tooth spaces most nearly diametrically opposite. During measurement, the pins shall always be in contact with the corresponding working faces of the teeth.

2 The limits of tolerance for the measurement over pins are identical with those for the corresponding root diameters.

3.2 Wheel tooth gap form

The tooth gap is defined taking the following criteria into consideration :

3.2.1 Working face

This is the functional part of the tooth form. It is the area which lies between the lines of contact of two rollers, the centre line of one lying on the pitch circle and the centre line of the other lying on a circle of diameter equal to

$$\frac{p + 0,25 d_2}{\sin \frac{180^\circ}{z}}$$

unless reduced due to the limitations imposed by having all lines perpendicular to the tooth form pass inside the adjacent pitch point on the pitch circle.

The working face may be straight or convex.

3.2.2 Pressure angle

The angle between the pitch line of the chain link and the line perpendicular to the working face at the point of roller contact. The pressure angle at any point on the working face shall be in accordance with the following table :

Number of teeth z	Pressure angle degrees	
	min.	max.
6 or 7	7	10
8 or 9	9	12
10 or 11	12	15
12 or 13	14	17
14 or 15	16	20
16 to 19	18	22
20 to 27	20	25
28 and over	23	28

3.2.3 Tooth height

When attachments bridge the chain link, the tip of the tooth shall not project above the chord of the pitch circle by an amount greater than $0,8 h_4$ (where h_4 is the platform height of attachment as given in ISO 1977/III).

3.2.4 Pitch line clearance

$s \text{ min.} = 0,04 p$ (for wheels of unmachined tooth form)

or $0,08 d_1$ (for wheels of machined tooth form).

3.2.5 Maximum roller seating radius

$r_i \text{ max.} = \frac{d_1}{2}$ (or $\frac{d_4}{2}$, or $\frac{d_7}{2}$ as appropriate).

3.2.6 Tooth flank

Regardless of the size of the seating radius or whether a straight or curved tooth form is employed, it is essential to achieve clearance equal to $\frac{d_1}{2}$ (or $\frac{d_4}{2}$, or $\frac{d_7}{2}$ as appropriate) between the pitch line clearance dimension lines and the tooth flank measured along the seating angle dimension lines (see the figure).

3.3 Wheel rim profile

3.3.1 Tooth width

$b_f \text{ max.} = 0,9 b_1 - 1 \text{ mm}$

$b_f \text{ min.} = 0,87 b_1 - 1,7 \text{ mm}$

except for flanged rollers where

$b_f \text{ max.} = 0,9 (b_1 - b_{11}) - 1 \text{ mm}$

$b_f \text{ min.} = 0,87 (b_1 - b_{11}) - 1,7 \text{ mm}$

1) See ISO/R 286, ISO System of limits and fits — Part 1 : General, tolerances and deviations.

3.3.2 Minimum tooth side radius

$$r_x = 1,6 b_1$$

3.3.3 Tooth side relief (nominal)

$$b_a = 0,16 b_1$$

3.3.4 Minimum relieved tooth width

$$b_g = 0,25 b_f$$

NOTE — Under some conditions of use the material being conveyed may build up in the space between the roller and the tooth and to prevent malfunctioning it is permissible to relieve the roller seating as shown in the figure.

3.3.5 Shroud radius

r_a act. = actual shroud radius provided.

3.3.6 Absolute maximum shroud diameter

$$d_g = p \cot \frac{180^\circ}{z} - h_2 - 2r_a \text{ act.}$$

3.4 Radial run-out

Between the bore and the root diameter the radial run-out shall not exceed a value for total indicator reading derived from :

0,005 d_f or 1,5 mm (whichever is the greater) for unmachined teeth;

or 0,001 $d_f + 0,1$ mm or 0,2 mm (whichever is the greater) for machined teeth.

Radial run-out for machined teeth shall in no case exceed 2 mm.

3.5 Axial run-out

Measured with reference to the bore and the flat part of the side face of the teeth, the axial run-out shall not exceed the same values for total indicator reading as given in 3.4 above.

Axial run-out for machined teeth shall in no case exceed 2 mm.

3.6 Range of teeth

These recommendations apply to a range of teeth from 6 to 40 inclusive.

The preferred range of numbers of teeth is 8, 10, 12, 16 and 24.

3.7 Bore tolerances

Unless otherwise agreed between manufacturer and purchaser, bores shall be to H9 limits.

3.8 Marking

It is recommended that wheels should be marked with

- maker's name or trademark;
- number of teeth;
- chain designation (ISO chain number or maker's equivalent).