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

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FOREWORD

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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.

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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.

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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

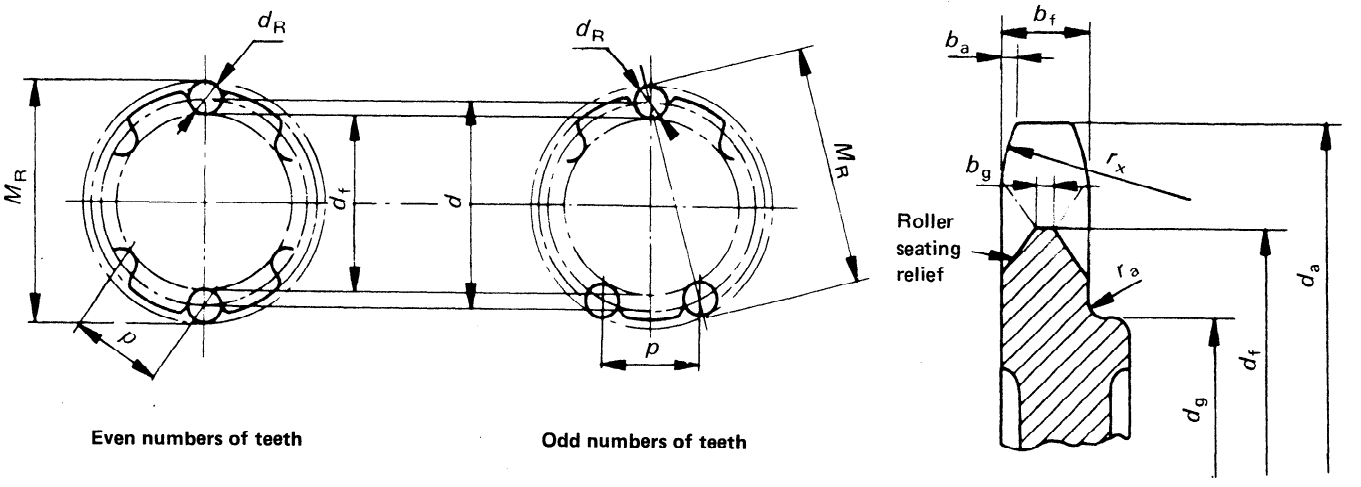
2.1 Chains

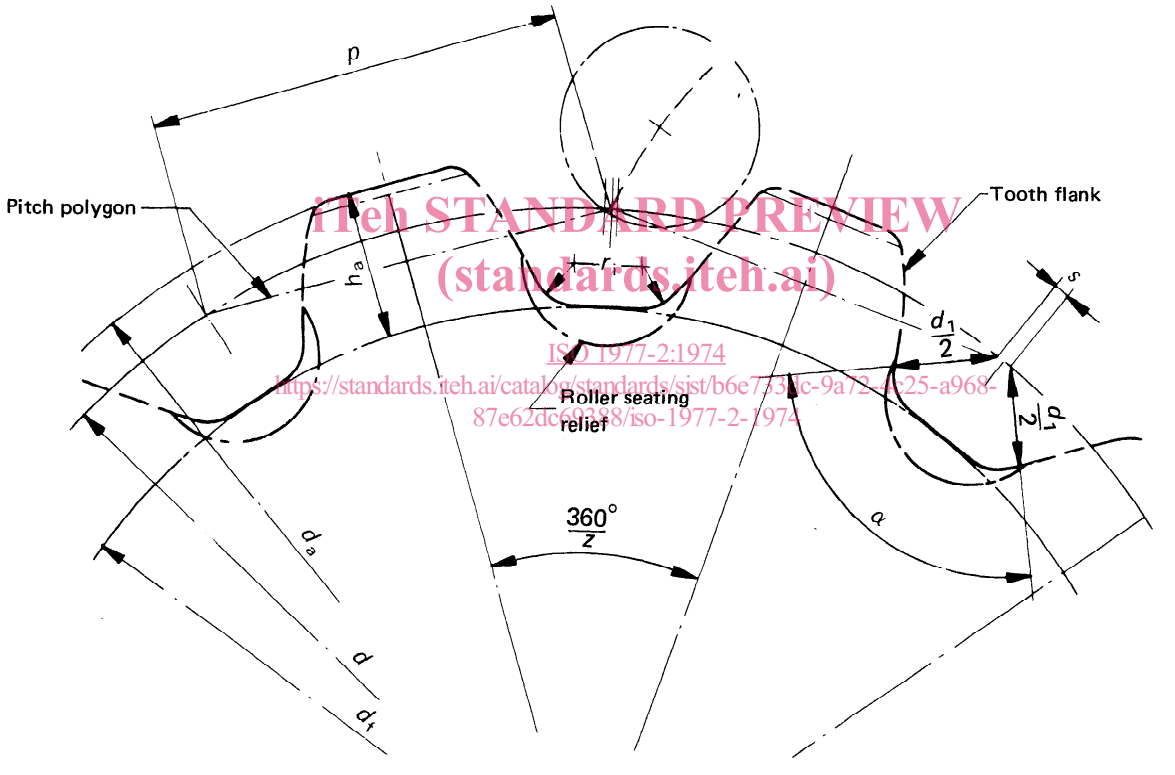
The nomenclature (and symbols) for basic chain dimensions on which all chain wheel data are based is given in part I.

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.)





b_a = tooth side relief
b_f = tooth width
b_g = relieved tooth width, minimum
d = pitch circle diameter
d_a = tip diameter
d_f = 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*

$$d = \frac{p}{\sin \frac{180^\circ}{z}}$$ (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_f 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 $= d + d_R$ min.

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

NOTES

1 For a wheel having an even number of teeth, measurement is made over the appropriate pins inserted in diametrally opposed tooth spaces. For a wheel having an odd number of teeth, measurement is made over pins inserted in the tooth spaces most nearly diametrally 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 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 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 max. $= 0{,}9\, b_1 - 1$ mm

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

except for flanged rollers where

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

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

a) maker's name or trademark;

b) number of teeth;

c) chain designation (ISO chain number or maker's equivalent).

ANNEX

PITCH CIRCLE DIAMETERS

The following table gives correct pitch circle diameters for wheels to suit a chain of unit pitch. The pitch circle diameters for wheels to suit a chain of any other pitch are directly proportional to the pitch of the chain.

Number of teeth	Pitch circle diameter	Number of teeth	Pitch circle diameter	Number of teeth	Pitch circle diameter
5	1,701 3	17	5,442 2	29	9,249 1
5 1/2	1,849 6	17 1/2	5,600 5	29 1/2	9,408 0
6	2,000 0	18	5,758 8	30	9,566 8
6 1/2	2,151 9	18 1/2	5,917 1	30 1/2	9,725 6
7	2,304 8	19	6,075 5	31	9,884 5
7 1/2	2,458 6	19 1/2	6,234 0	31 1/2	10,043 4
8	2,613 1	20	6,392 5	32	10,202 3
8 1/2	2,768 2	20 1/2	6,550 9	32 1/2	10,361 2
9	2,923 8	21	6,709 5	33	10,520 1
9 1/2	3,079 8	21 1/2	6,868 1	33 1/2	10,679 0
10	3,236 1	22	7,026 6	34	10,838 0
10 1/2	3,392 7	22 1/2	7,185 3	34 1/2	10,996 9
11	3,549 4	23	7,343 9	35	11,155 8
11 1/2	3,706 5	23 1/2	7,502 6	35 1/2	11,314 8
12	3,863 7	24	7,661 3	36	11,473 7
12 1/2	4,021 1	24 1/2	7,820 0	36 1/2	11,632 7
13	4,178 6	25	7,978 7	37	11,791 6
13 1/2	4,336 2	25 1/2	8,137 5	37 1/2	11,950 6
14	4,494 0	26	8,296 2	38	12,109 5
14 1/2	4,651 8	26 1/2	8,455 0	38 1/2	12,268 5
15	4,809 7	27	8,613 8	39	12,427 5
15 1/2	4,967 7	27 1/2	8,772 6	39 1/2	12,586 5
16	5,125 8	28	8,931 4	40	12,745 5
16 1/2	5,284 0	28 1/2	9,090 2		

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