INTERNATIONAL STANDARD

ISO 3512

Second edition 1992-07-15

Heavy-duty cranked-link transmission chains

Chaînes de transmission à maillons coudés de haute résistance

Reference number
ISO 3512:1992(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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 3512 was prepared by Technical Committee ISO/TC 100, *Chains and chain wheels for power transmission and conveyors*.

This second edition cancels and replaces the first edition (ISO 3512:1976), which has been technically revised.

Annex A forms an integral part of this International Standard. Annex B is for information only.

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Heavy-duty cranked-link transmission chains

1 Scope

This International Standard specifies dimensions, tolerances, measuring forces and minimum tensile strengths, together with the tooth gap forms and rim profiles of the associated chain wheels, for cranked-link or offset sidebar roller chains suitable for the mechanical transmission of power and allied applications under onerous conditions.

The dimensions of chains specified ensure complete interchangeability of any given size and provide interchangeability of individual links of the chain for repair purposes.

NOTE 1 Since these chains have been derived from an "inch" series of chains, their original dimensions are given in annex B.

2 Chains

2.1 Nomenclature of assemblies and components

The nomenclature of chain assemblies and their component parts are illustrated in figures 1 and 2; the figures do not define the actual form of the chain plates. The symbols for chains are given in table 1 and are shown in figure 3.

2.2 Designation

Heavy-duty cranked-link roller chains shall be designated by the standard ISO chain number given in table 1: the first two digits express the nominal pitch in eighths of an inch, while the second (last) two digits express the basic bearing pin diameter in sixteenths of an inch.

2.3 Dimensions

Chains shall conform to the dimensions shown in figure 3 and given in table 1. Maximum and minimum dimensions are specified to ensure interchangeability of links as produced by different makers of chain. They represent limits for interchangeability, but are not the manufacturing tolerances.

Pitch, p, is a theoretical reference dimension used in calculating strand lengths and chain wheel dimensions; it is not intended for inspection of individual links.

2.4 Tensile testing

2.4.1 The minimum tensile strength is that value which shall be exceeded when a tensile force is applied to a sample which is tested to destruction as defined in 2.4.2. This minimum tensile strength is not a working force. It is intended primarily as a comparative figure between chains of various constructions. For application information, the manufacturers or their published data should be consulted.

2.4.2 A tensile force, not less than the tensile strength specified in table 1, shall be applied slowly to the ends of a chain length, containing at least three free pitches, by means of shackles permitting free movement on both sides of the chain centreline, in the normal plane of articulation.

Failure shall be considered to have occurred at the first point where increasing extension is no longer accompanied by increasing load; i.e. the summit of the force extension diagram.

Tests in which failures occur adjacent to the shackles shall be disregarded.

2.4.3 The tensile test shall be considered a destructive test. Even though a chain may not visibly fail when subjected to a force equivalent to the minimum tensile strength, it will have been stressed beyond the yield point and will be unfit for service.

2.5 Length accuracy

Finished chains shall be measured either dry or after only light lubrication.

The standard nominal length for measurement shall be that nearest 3 050 mm.

The chain shall be supported throughout its entire length and the measuring force specified in table 1 shall be applied.

The measured length shall be the nominal length $^{+0,32}_{0}$ %.

The length accuracy of chains which have to work in parallel shall be within the above limits but matched by agreement with the manufacturer.

2.6 Working clearances

The form of the line of cranking or offset, across the width of each link, may be curved or straight (see lower part of figure 3).

If straight, the distance from the pitch point shall be l_1 or l_2.

If curved, this distance shall be l_5 or l_6. Radii l_5 and l_6 shall be sufficient to allow clearance over the adjacent plate nose contained by the clearance radii l_3 and l_4 during chain articulation round a seven-tooth wheel.

Side plates may be extended, provided that the extension is within a 30° included angle with respect to the sidebar, as indicated in figure 3. The chain link construction shall always allow for this extension to be adopted.

2.7 Marking

The chains shall be marked with the following:

a) manufacturer's name or trade mark;

b) ISO chain number quoted in table 1.

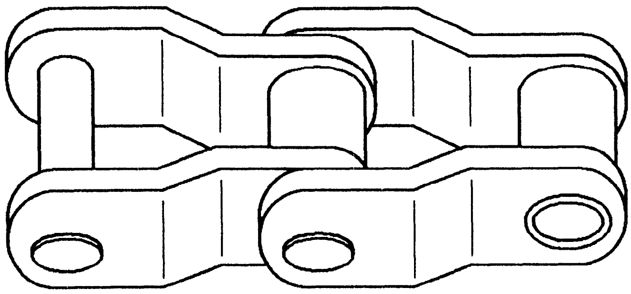


Figure 1 — Cranked-link chain assembly

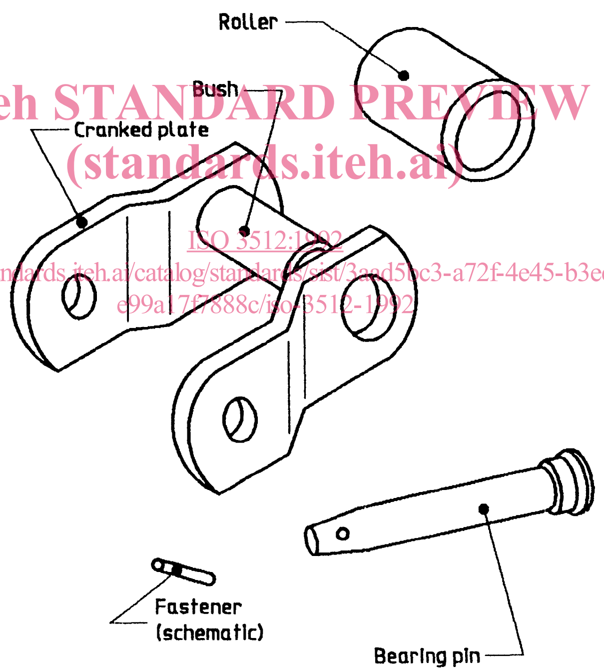


Figure 2 — Typical cranked-link components

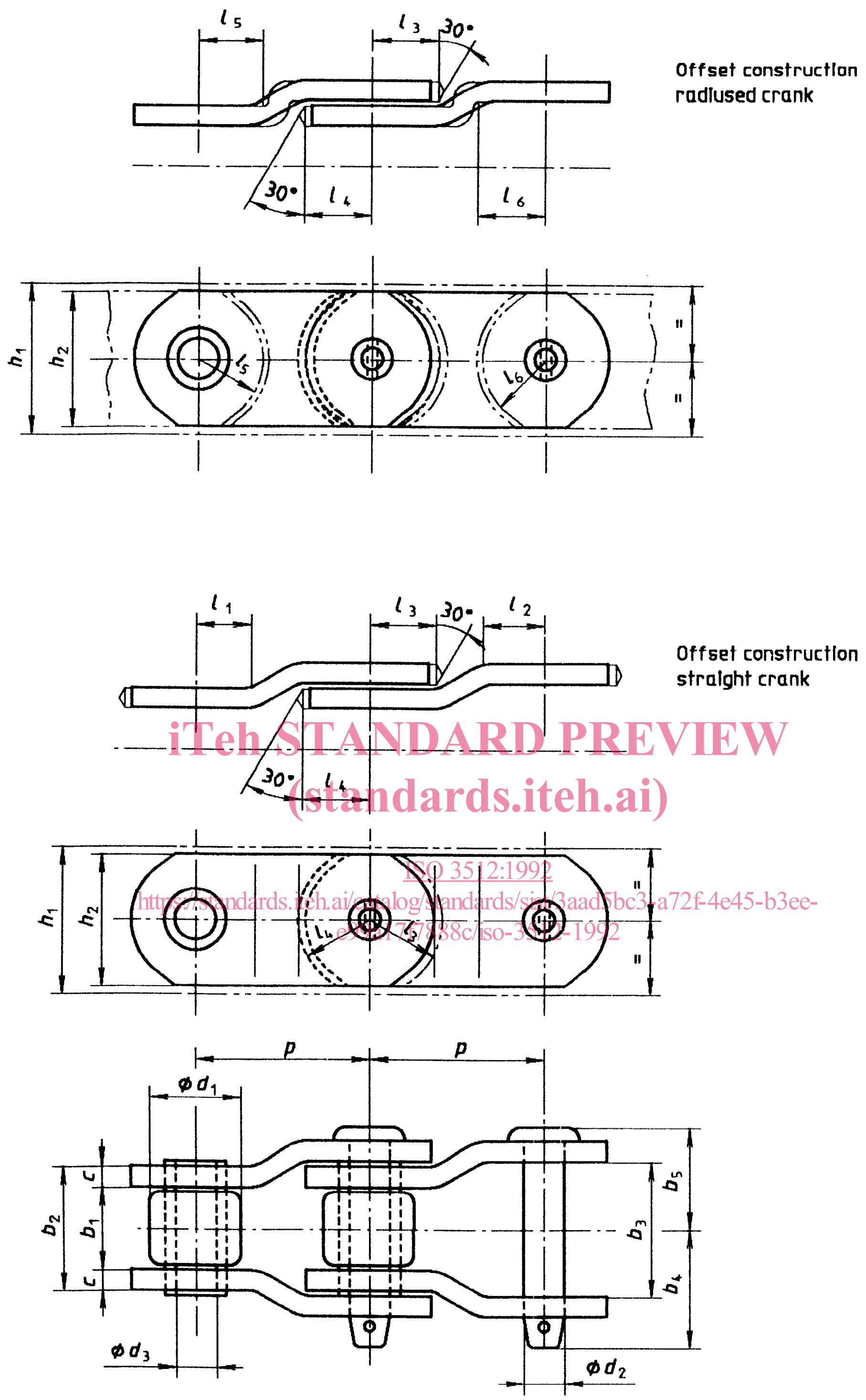


Figure 3 — Symbols for dimensions (see table 1)

Table 1 — Principal chain dimensions, measuring forces and minimum tensile strengths (see figure 3)

ISO chain number	Pitch	Roller diameter	Width between plates at inner end	Bearing pin body diameter	Bush bore	Chain path depth	Plate depth	Crank clearance dimensions 1)		Width over link at inner end	Width between plates at outer end	Width over pin fastening to centreline	Width over pin head to centreline	Chain plate thickness	Measuring force	Tensile strength
	p	d_1 max.	b_1 2) nom.	d_2 max.	d_3 min.	h_1 min.	h_2 max.	l_1 min.	l_2 min.	b_2 max.	b_3 min.	b_4 max.	b_5 max.	c nom.		min.
	mm														N	kN
2010	63,5	31,75	38,1	15,9	15,95	48,3	47,8	22,4	23,9	54,38	54,51	47,8	42,9	7,9	900	250
2512	77,9	41,28	39,6	19,08	19,13	61,1	60,5	26,9	29,5	59,13	59,26	55,6	47,8	9,7	1 300	340
2814	88,9	44,45	38,1	22,25	22,33	61,1	60,5	31,8	33,3	64,01	64,14	62	55,6	12,7	1 800	470
3315	103,45	45,24	49,3	23,85	23,93	64,1	63,5	33,3	35,1	78,28	78,41	71,4	63,5	14,2	2 200	550
3618	114,3	57,15	52,3	27,97	28,07	80	79,2	39,6	41,2	81,46	81,58	76,2	65	14,2	2 700	760
4020	127	63,5	69,9	31,78	31,88	93	91,9	47,8	52,3	102,39	102,51	90,4	77,7	15,7	3 600	990
4824	152,4	76,2	76,2	38,13	38,25	105,7	104,6	55,6	58,7	115,09	115,21	98,6	88,9	19	5 000	1 400
5628	177,8	88,9	82,6	44,48	44,63	134,6	133,4	65	68,1	127,79	127,91	114,3	101,6	22,4	6 800	1 890

NOTE — Overall width of the connecting link = $b_4 + b_5$. In the case of a fastener on both sides, overall width = $2b_4$.

1) l_3 max. = l_1 min.; l_4 max. = l_2 min..

2) Minimum width = $0{,}95b_1$.

3 Chain wheels

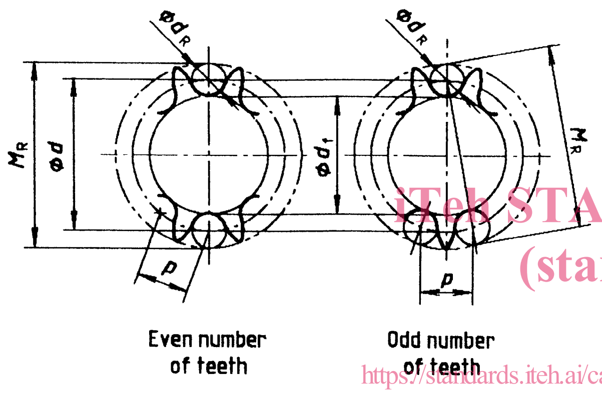
3.1 Nomenclature

The nomenclature for basic chain dimensions on which all the following wheel data are based is given in table 1. Chain wheel nomenclature is covered under the respective headings.

3.2 Diametral dimensions of wheel rim

3.2.1 Nomenclature

See figure 4.



p = chordal pitch, equal to chain pitch
d_R = measuring-pin diameter
z = number of teeth
d = pitch-circle diameter
d_f = root diameter
M_R = measurement over pins

Figure 4 — Chain wheel diametral dimensions

3.2.2 Dimensions

3.2.2.1 Pitch-circle diameter, d

$$d = \frac{p}{\sin \frac{180^\circ}{z}}$$

Annex A gives the pitch-circle diameter for unit pitch as a function of the number of teeth.

3.2.2.2 Measuring-pin diameter, d_R

$d_R = d_1$ (see figure 5)

subject to tolerance limits of $^{+0,01}_{0}$ mm.

3.2.2.3 Root diameter, d_f

$$d_f = d - d_1$$

subject to the tolerance limits given in tables 2 and 3.

Table 2 — Machined teeth

Dimensions in millimetres

Root diameter	Tolerance
$d_f \leqslant 305$	$^{0}_{-0,38}$
$305 < d_f \leqslant 1\,215$	$^{0}_{-0,5}$
$d_f > 1\,215$	$^{0}_{-0,77}$

Table 3 — Non-machined teeth

Dimensions in millimetres

Root diameter	Tolerance
$d_f \leqslant 305$	$^{0}_{-1,52}$
$305 < d_f \leqslant 508$	$^{0}_{-2,54}$
$508 < d_f \leqslant 914$	$^{0}_{-3,81}$
$d_f > 914$	$^{0}_{-6,35}$

3.2.2.4 Measurement over pins

For an *even* number of teeth:

$$M_R = d + d_R \text{ min.}$$

For an *odd* number of teeth:

$$M_R = d \cos \frac{90^\circ}{z} + d_R \text{ min.}$$

The measurement over pins of wheels with an *even* number of teeth shall be carried out over pins inserted in opposite tooth gaps.

The measurement over pins of wheels with an *odd* number of teeth shall be carried out over pins in the tooth gaps most nearly opposite.

During measurements, the pins shall always be in contact with the corresponding working faces of the respective teeth.

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

3.3 Wheel tooth gap forms

3.3.1 Nomenclature

See figure 5.

3.3.2 Dimensions

The actual tooth gap form which is provided by cutting or by an equivalent method shall have tooth flanks of a form defined by the tooth flank (topping) radius, the working face length and roller seating curve, with a smooth blending from one portion to the next, taking into account the criteria set out in 3.3.2.1 to 3.3.2.6.

3.3.2.1 Working face

This is the functional part of the tooth form having a length equal to 0,01pz, unless reduced by the limitation 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.

NOTE 2 The above relationship allows for a chain pitch elongation of approximately 6 % where $z < 40$, progressively decreasing to under 2 % at $z = 100$.

3.3.2.2 Pressure angle, θ

This is the angle between the pitch line of the chain link and the line perpendicular to the working face at the point of roller contact.

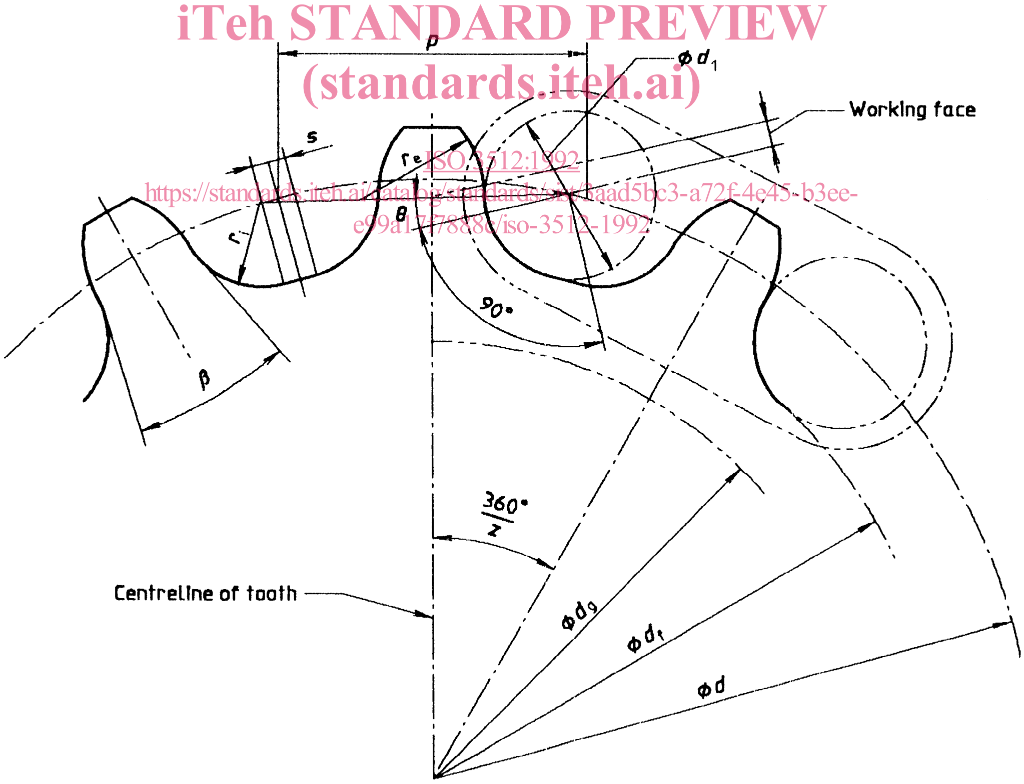
The values of θ at any point on the working face length vary according to the value of z, and are set out in annex A.

3.3.2.3 Maximum clearance diameter, d_g

$$d_g = p \cot \frac{180^\circ}{z} - 1{,}05 h_2 - 2 r_a \text{ (actual)}$$

where h_2 is the plate depth (see figure 3 and table 1).

The circle defines the limit beyond which no portion of the hubs, beads, lugs or fillets shall extend in the proximity of the chain plates.



p = chordal pitch, equal to chain pitch
d = pitch-circle diameter
d_1 = roller diameter, maximum
r_i = roller seating radius
s = pitch line clearance
θ = pressure angle
β = tooth thickness angle (see annex A)
r_e = tooth flank (topping) radius
d_f = root diameter
d_g = chain clearance diameter
z = number of teeth

Figure 5 — Tooth gap forms