INTERNATIONAL STANDARD

ISO 606

Third edition
2004-03-15

Short-pitch transmission precision roller and bush chains, attachments and associated chain sprockets

Chaînes de transmission de précision à rouleaux et à douilles, plaques-attaches et roues dentées correspondantes

Reference number
ISO 606:2004(E)

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 606 was prepared by Technical Committee ISO/TC 100, *Chains and chain wheels for power transmission and conveyors*.

This third edition cancels and replaces the second edition (ISO 606:1994) and ISO 1395:1977, of which it constitutes a technical revision.

Introduction

The provisions of this revised International Standard have been established by including sizes of chains used by the majority of countries in the world, and by unifying dimensions, strengths and other data which differed in current national standards, while eliminating those for which it was considered a universal usage had not been established.

The whole field of application open to this medium of transmission has been covered by the ranges of chains already established. To achieve this, the sizes of 6,35 mm pitch to 76,2 mm pitch inclusive have been duplicated, on the one hand, by the inclusion of chains derived from standards originating and centred around ANSI (denoted by suffix A), and on the other by chains representing the unification of the principal standards originating in Europe (suffix B), the two being complementary for the coverage of the widest possible field of application.

The ANSI chain reference numbers (25, 35, 40, 50, etc.) are used world-wide and, to assist in cross-referencing the ISO and ANSI numbers, details are now included in Annex C of this International Standard.

The ANSI heavy series of chains (suffix H) are also included. The ANSI heavy series of chains differ from the ANSI standard series in that thicker plates are used. As there are no existing ISO numbers for these chains, the ANSI numbering system has been adopted.

Clause 4 covers specification details for K and M attachments, and extended pin attachments for use with short-pitch transmission roller and bush chains conforming with this International Standard.

Clause 5, covering chain sprockets, represents the unification of all the relevant national standards in the world and includes, in particular, complete tolerances relating to tooth form.

The inclusion of the dimensions of the chains specified ensures complete interchangeability of any given size and provides interchangeability of individual links of chains.

This edition also includes short-pitch bush transmission chains previously covered in ISO 1395:1977.

Short-pitch transmission precision roller and bush chains, attachments and associated chain sprockets

1 Scope

This International Standard specifies the characteristics of short-pitch precision roller and bush chains with associated sprockets suitable for the mechanical transmission of power and allied applications. It covers dimensions, tolerances, length measurement, preloading, minimum tensile strengths and minimum dynamic strength.

Although Clause 5 applies to chain sprockets for cycles and motor cycles, this International Standard is not applicable to their chains, which are covered by ISO 9633 and ISO 10190, respectively.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 286-2:1988, *ISO system of limits and fits — Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts*

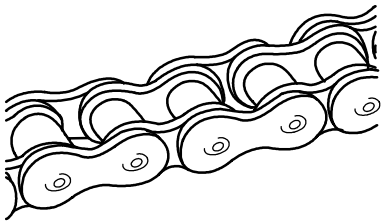
ISO 15654, *Fatigue test method for transmission precision roller chains* [1)]

3 Chains

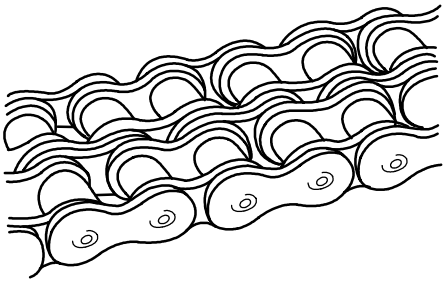
3.1 Nomenclature of assemblies and components

The nomenclature of chain assemblies and their component parts is shown in Figures 1 and 2 (which do not define the actual form of the chain plates).

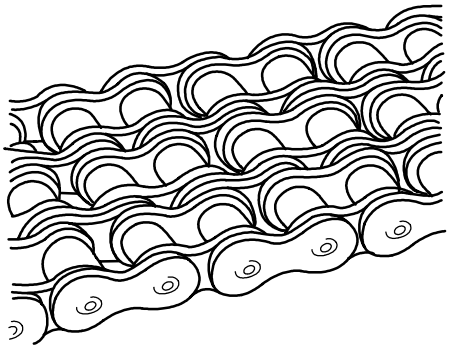
1) To be published.



a) Simplex chain

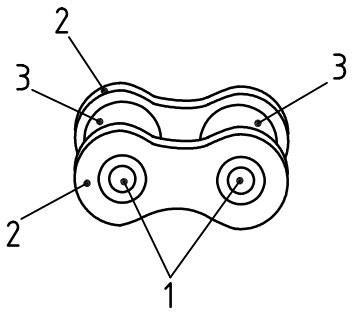


b) Duplex chain



c) Triplex chain

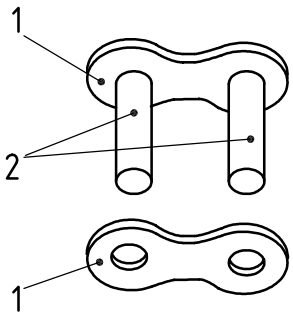
Figure 1 — Types of roller chain assembly



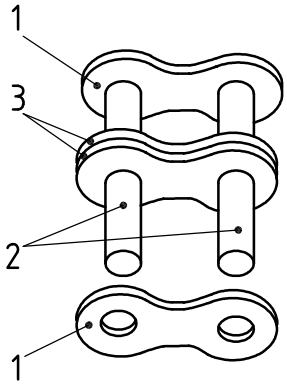
Key

1 bush
2 inner plate
3 roller

a) Inner link



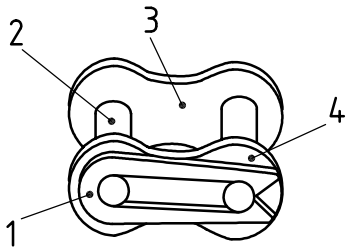
Simplex outer link



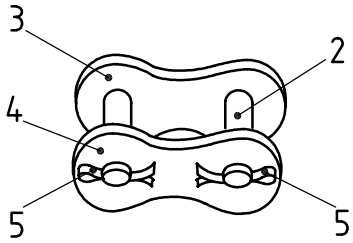
Duplex outer link

Key
1 outer plate
2 bearing pins
3 intermediate plate(s)

b) Outer links for riveting



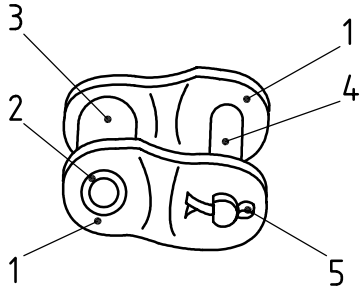
Connecting link with spring clip fastener



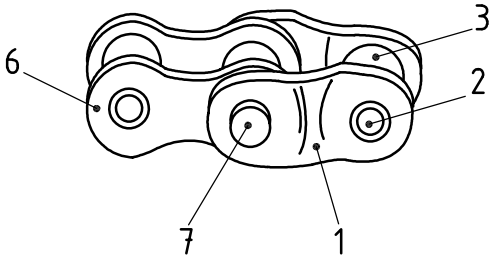
Connecting link with cotter pin fasteners

Key
1 spring clip fastener
2 fixed connecting pin
3 outer plate
4 detachable plate
5 cotter pin fastener

c) Detachable connecting links



Single cranked link



Double cranked link

Key
1 cranked plate
2 bush
3 roller
4 detachable connecting pin
5 cotter pin fastener
6 inner plate
7 bearing pin, riveted

d) Cranked links

NOTE 1 The plate dimensions are specified in Tables 1 and 2.

NOTE 2 Fasteners can be of various designs. Drawings indicate examples.

Figure 2 — Types of link

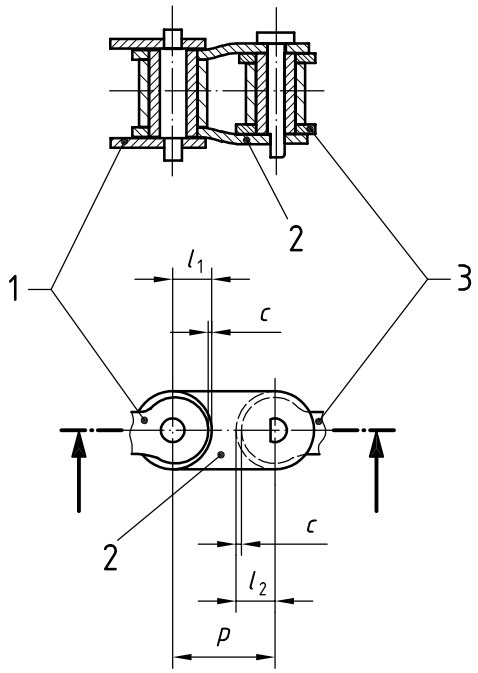
3.2 Designation

Chains are designated by the standard ISO chain number given in Tables 1 and 2. The ISO chain numbers in Table 1 are supplemented by a hyphenated suffix 1 for simplex chain, 2 for duplex chain and 3 for triplex chain, for example, 16B-1, 16B-2, 16B-3. Chains 081, 083, 084 and 085 do not follow this procedure since they are normally available in simplex form only.

The chains designated in Table 2 are the ANSI heavy series, which are also supplemented by a hyphenated suffix 1 for simplex chain, 2 for duplex chain and 3 for triplex chain, for example, 80H-1, 80H-2, 80H-3.

3.3 Dimensions

Chains shall conform to the dimensions shown in Figure 3 and given in Tables 1 and 2. Maximum and minimum dimensions are specified to ensure interchangeability of links produced by different makers of chain. They represent limits for interchangeability, but are not the manufacturing tolerances.



Key

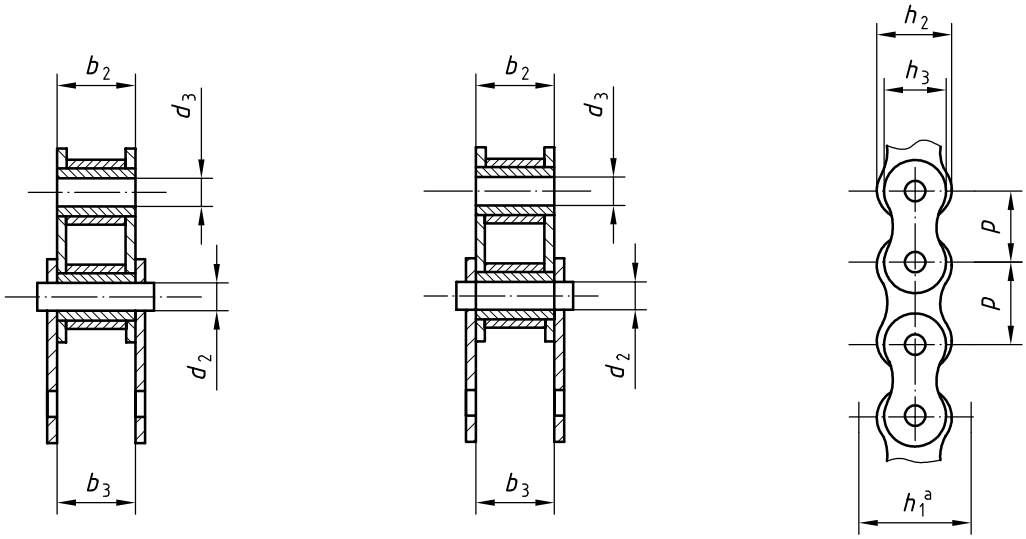
c clearance between cranked link plates and straight plates available during articulation

p pitch

1 outer plate
2 cranked plate
3 inner plate

NOTE For the symbols, see Table 1.

a) Cranked link

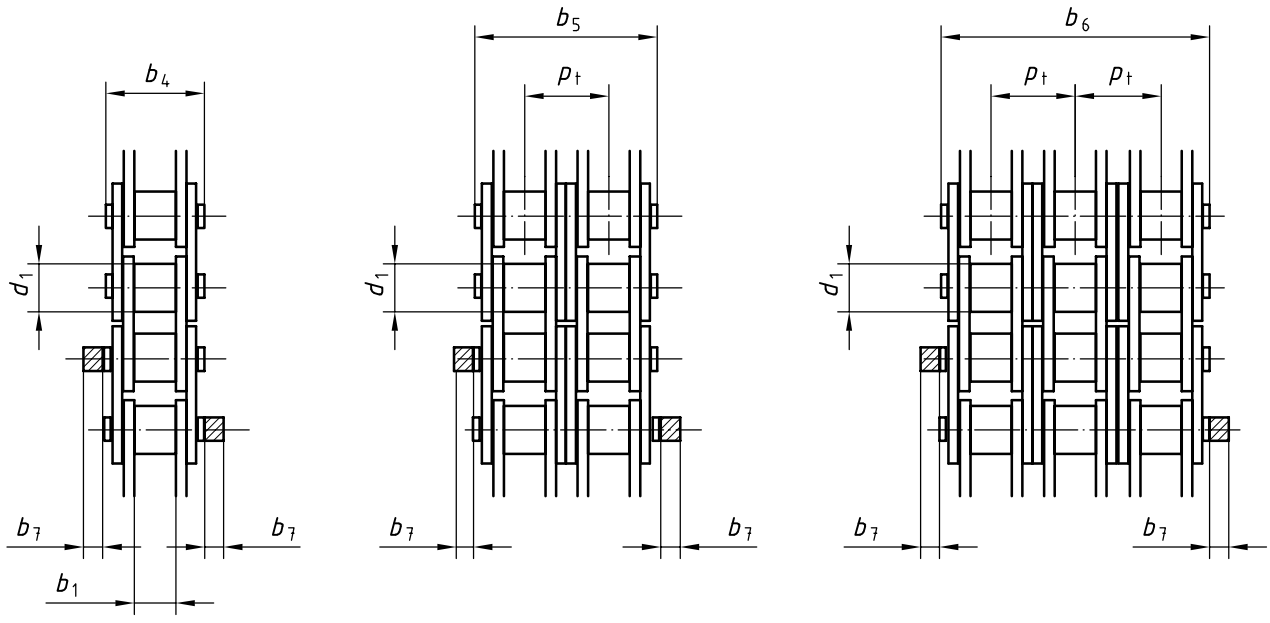


Plain pin Shouldered pin

NOTE For the symbols, see Table 1.

[a] Clearance between the cranked link plates and the straight plates available during articulation.

b) Sections through chain



Simplex chain Duplex chain Triplex chain

NOTE For the symbols, see Table 1.

c) Types of chain

Figure 3 — Chains

The overall width of a simplex, duplex or triplex chain with a joint fastener is given by

a) for riveted pin end chains if the fastener is on one side only:

$(b_4 + b_7)$ or $(b_5 + b_7)$ or $(b_6 + b_7)$;

b) for riveted pin end chains if the fastener is on two sides:

$[b_4 + (2b_7)]$ or $[b_5 + (2b_7)]$ or $[b_6 + (2b_7)]$;

c) for headed pin end chains if the fastener is on one side only:

$[b_4 + (1{,}6b_7)]$ or $[b_5 + (1{,}6b_7)]$ or $[b_6 + (1{,}6b_7)]$;

d) for headed pin end chains if the fastener is on two sides:

$[b_4 + (3{,}2b_7)]$ or $[b_5 + (3{,}2b_7)]$ or $[b_6 + (3{,}2b_7)]$;

The overall width of chains wider than triplex is given by

$b_4 + [p_t \times (\text{number of strands in chain} - 1)]$.

3.4 Performance requirements

3.4.1 General

WARNING — The test requirements are not to be taken as working loads. These loads could be selected, indirectly, using ISO 10823.

The test results shall be invalid if the chain has previously been in service or stressed in any way (other than by preloading in accordance with 3.4.3).

The tests given in 3.4.2 to 3.4.5 shall only be performed on unused, undamaged chain to determine whether the subject chain complies with the minimum requirements specified in Tables 1 and 2.

3.4.2 Tensile testing

3.4.2.1 The minimum tensile strength is that value which shall be exceeded when a tensile force is applied to a sample tested to destruction in accordance with 3.4.2.2.

NOTE This minimum tensile strength is not a working load, but is intended primarily as a comparative figure between chains of various constructions.

3.4.2.2 Apply a tensile force slowly to the ends of a chain length containing at least five free pitches by means of fixtures 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 force, i.e. the summit of the force/extension diagram. The force at this point shall exceed the minimum tensile strength stated in Tables 1 and 2.

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

3.4.2.3 The tensile test shall be considered as 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.

3.4.2.4 These requirements do not apply to cranked links, connecting links or chains with attachments, as their tensile strength could be reduced.

3.4.3 Preloading

Chains manufactured in conformance with this International Standard shall be preloaded by applying a minimum tensile force equivalent to 30 % of the minimum tensile strength given in Tables 1 and 2.

3.4.4 Length validation

Measurement of chains shall take place after preloading but before lubrication.

The standard length for measurement shall be a minimum of

a) 610 mm for ISO chain numbers 04C to 12B and 081 to 085 inclusive, or

b) 1 220 mm for ISO chain numbers 16A to 72B inclusive.

The chain shall be supported throughout its entire length and the measuring force specified in Tables 1 and 2 shall be applied.

The measured length shall be the nominal length $^{+0,15\ \%}_{0}$ except for chains with attachments, when it shall be the nominal length $^{+0,30\ \%}_{0}$.

The length accuracy of chains which have to work in parallel may be matched within closer tolerances.

3.4.5 Dynamic testing

Chains in conformance with this International Standard shall survive a conformance test, as specified in ISO 15654, using the dynamic strength values given in Tables 1 or 2 for the particular chain. These requirements do not apply to cranked links, connecting links or chains with attachments, as their dynamic strength could be reduced. The methods used for calculating the minimum dynamic strength are given in Annex C. The method for determining the maximum test force for the conformance test is given in Annex D.

3.5 Marking

The chain shall be marked with the manufacturer's name or trademark. The chain number quoted in Tables 1 or 2 should be marked on the chain.

3.6 Cranked links

Cranked links should not be used with the heavy series chains or on chains which are intended for highly stressed applications. Where a cranked link is used a reduction in performance will occur.

Table 1 — Principal chain dimensions, measuring forces, tensile strengths and dynamic strength values (see Figures 1 and 3)

ISO Chain number [a]	Pitch	Maximum roller diameter	Minimum width between inner plates	Maximum bearing pin body diameter	Minimum bush bore	Minimum chain path depth	Maximum inner plate depth	Maximum outer or intermediate plate depth	Minimum cranked link dimensions [b]			Transverse pitch	Maximum width over inner link	Minimum width between outer plates	Maximum width over bearing pins			Maximum additional width for joint fastener [c]	Measuring force			Minimum tensile strength			Minimum dynamic strength Simplex [d, e, f]
															Chain				Chain			Chain			
															Simplex	Duplex	Triplex		Simplex	Duplex	Triplex	Simplex	Duplex	Triplex	
	p	d_1	b_1	d_2	d_3	h_1	h_2	h_3	l_1	l_2	c	p_t	b_2	b_3	b_4	b_5	b_6	b_7				F_u			F_d
	mm																		N			kN			N
04C	6,35	3,30 [g]	3,10	2,31	2,34	6,27	6,02	5,21	2,65	3,08	0,10	6,40	4,80	4,85	9,1	15,5	21,8	2,5	50	100	150	3,5	7,0	10,5	630
06C	9,525	5,08 [g]	4,68	3,60	3,62	9,30	9,05	7,81	3,97	4,60	0,10	10,13	7,46	7,52	13,2	23,4	33,5	3,3	70	140	210	7,9	15,8	23,7	1410
05B	8,00	5,00	3,00	2,31	2,36	7,37	7,11	7,11	3,71	3,71	0,08	5,64	4,77	4,90	8,6	14,3	19,9	3,1	50	100	150	4,4	7,8	11,1	820
06B	9,525	6,35	5,72	3,28	3,33	8,52	8,26	8,26	4,32	4,32	0,08	10,24	8,53	8,66	13,5	23,8	34,0	3,3	70	140	210	8,9	16,9	24,9	1 290
08A	12,70	7,92	7,85	3,98	4,00	12,33	12,07	10,42	5,29	6,10	0,08	14,38	11,17	11,23	17,8	32,3	46,7	3,9	120	250	370	13,9	27,8	41,7	2 480
08B	12,70	8,51	7,75	4,45	4,50	12,07	11,81	10,92	5,66	6,12	0,08	13,92	11,30	11,43	17,0	31,0	44,9	3,9	120	250	370	17,8	31,1	44,5	2 480
081	12,70	7,75	3,30	3,66	3,71	10,17	9,91	9,91	5,36	5,36	0,08	—	5,80	5,93	10,2	—	—	1,5	125	—	—	8,0	—	—	—
083	12,70	7,75	4,88	4,09	4,14	10,56	10,30	10,30	5,36	5,36	0,08	—	7,90	8,03	12,9	—	—	1,5	125	—	—	11,6	—	—	—
084	12,70	7,75	4,88	4,09	4,14	11,41	11,15	11,15	5,77	5,77	0,08	—	8,80	8,93	14,8	—	—	1,5	125	—	—	15,6	—	—	—
085	12,70	7,77	6,25	3,60	3,62	10,17	9,91	8,51	4,35	5,03	0,08	—	9,06	9,12	14,0	—	—	2,0	80	—	—	6,7	—	—	1 340
10A	15,875	10,16	9,40	5,09	5,12	15,35	15,09	13,02	6,61	7,62	0,10	18,11	13,84	13,89	21,8	39,9	57,9	4,1	200	390	590	21,8	43,6	65,4	3 850
10B	15,875	10,16	9,65	5,08	5,13	14,99	14,73	13,72	7,11	7,62	0,10	16,59	13,28	13,41	19,6	36,2	52,8	4,1	200	390	590	22,2	44,5	66,7	3 330
12A	19,05	11,91	12,57	5,96	5,98	18,34	18,10	15,62	7,90	9,15	0,10	22,78	17,75	17,81	26,9	49,8	72,6	4,6	280	560	840	31,3	62,6	93,9	5 490
12B	19,05	12,07	11,68	5,72	5,77	16,39	16,13	16,13	8,33	8,33	0,10	19,46	15,62	15,75	22,7	42,2	61,7	4,6	280	560	840	28,9	57,8	86,7	3 720
16A	25,40	15,88	15,75	7,94	7,96	24,39	24,13	20,83	10,55	12,20	0,13	29,29	22,60	22,66	33,5	62,7	91,9	5,4	500	1 000	1 490	55,6	111,2	166,8	9 550
16B	25,40	15,88	17,02	8,28	8,33	21,34	21,08	21,08	11,15	11,15	0,13	31,88	25,45	25,58	36,1	680	99,9	5,4	500	1 000	1 490	60,0	106,0	160,0	9 530
20A	31,75	19,05	18,90	9,54	9,56	30,48	30,17	26,04	13,16	15,24	0,15	35,76	27,45	27,51	41,1	77,0	113,0	6,1	780	1 560	2 340	87,0	174,0	261,0	14 600
20B	31,75	19,05	19,56	10,19	10,24	26,68	26,42	26,42	13,89	13,89	0,15	36,45	29,01	29,14	43,2	79,7	116,1	6,1	780	1 560	2 340	95,0	170,0	250,0	13 500
24A	38,10	22,23	25,22	11,11	11,14	36,55	36,2	31,24	15,80	18,27	0,18	45,44	35,45	35,51	50,8	96,3	141,7	6,6	1 110	2 220	3 340	125,0	250,0	375,0	20 500
24B	38,10	25,40	25,40	14,63	14,68	33,73	33,4	33,40	17,55	17,55	0,18	48,36	37,92	38,05	53,4	101,8	150,2	6,6	1 110	2 220	3 340	160,0	280,0	425,0	19 700
28A	44,45	25,40	25,22	12,71	12,74	42,67	42,23	36,45	18,42	21,32	0,20	48,87	37,18	37,24	54,9	103,6	152,4	7,4	1 510	3 020	4 540	170,0	340,0	510,0	27 300

Table 1 (*continued*)

ISO Chain number [a]	Pitch	Maximum roller diameter	Minimum width between inner plates	Maximum bearing pin body diameter	Minimum bush bore	Minimum chain path depth	Maximum inner plate depth	Maximum outer or intermediate plate depth	Minimum cranked link dimensions [b]			Transverse pitch	Maximum width over inner link	Minimum width between outer plates	Maximum width over bearing pins			Maximum additional width for joint fastener [c]	Measuring force			Minimum tensile strength			Minimum dynamic strength Simplex [d, e, f]
															Chain				Chain			Chain			
															Simplex	Duplex	Triplex		Simplex	Duplex	Triplex	Simplex	Duplex	Triplex	
	p	d_1	b_1	d_2	d_3	h_1	h_2	h_3	l_1	l_2	c	p_t	b_2	b_3	b_4	b_5	b_6	b_7				F_u			F_d
	mm																		N			kN			N
28B	44,45	27,94	30,99	15,90	15,95	37,46	37,08	37,08	19,51	19,51	0,20	59,56	46,58	46,71	65,1	124,7	184,3	7,4	1 510	3 020	4 540	200,0	360,0	530,0	27 100
32A	50,80	28,58	31,55	14,29	14,31	48,74	48,26	41,68	21,04	24,33	0,20	58,55	45,21	45,26	65,5	124,2	182,9	7,9	2 000	4 000	6 010	223,0	446,0	669,0	34 800
32B	50,80	29,21	30,99	17,81	17,86	42,72	42,29	42,29	22,20	22,20	0,20	58,55	45,57	45,70	67,4	126,0	184,5	7,9	2 000	4 000	6 010	250,0	450,0	670,0	29 900
36A	57,15	35,71	35,48	17,46	17,49	54,86	54,30	46,86	23,65	27,36	0,20	65,84	50,85	50,90	73,9	140,0	206,0	9,1	2 670	5 340	8 010	281,0	562,0	843,0	44 500
40A	63,50	39,68	37,85	19,85	19,87	60,93	60,33	52,07	26,24	30,36	0,20	71,55	54,88	54,94	80,3	151,9	223,5	10,2	3 110	6 230	9 340	347,0	694,0	1 041,0	53 600
40B	63,50	39,37	38,10	22,89	22,94	53,49	52,96	52,96	27,76	27,76	0,20	72,29	55,75	55,88	82,6	154,9	227,2	10,2	3 110	6 230	9 340	355,0	630,0	950,0	41 800
48A	76,20	47,63	47,35	23,81	23,84	73,13	72,39	62,49	31,45	36,40	0,20	87,83	67,81	67,87	95,5	183,4	271,3	10,5	4 450	8 900	13 340	500,0	1 000,0	1 500,0	73 100
48B	76,20	48,26	45,72	29,24	29,29	64,52	63,88	63,88	33,45	33,45	0,20	91,21	70,56	70,69	99,1	190,4	281,6	10,5	4 450	8 900	13 340	560,0	1 000,0	1 500,0	63 600
56B	88,90	53,98	53,34	34,32	34,37	78,64	77,85	77,85	40,61	40,61	0,20	106,60	81,33	81,46	114,6	221,2	327,8	11,7	6 090	12 190	20 000	850,0	1 600,0	2 240,0	88 900
64B	101,60	63,50	60,96	39,40	39,45	91,08	90,17	90,17	47,07	47,07	0,20	119,89	92,02	92,15	130,9	250,8	370,7	13,0	7 960	15 920	27 000	1 120,0	2 000,0	3 000,0	106 900
72B	114,30	72,39	68,58	44,48	44,53	104,67	103,63	103,63	53,37	53,37	0,20	136,27	103,81	103,94	147,4	283,7	420,0	14,3	10 100	20 190	33 500	1 400,0	2 500,0	3 750,0	132 700

[a] For details of heavy series chains, see Table 2.

[b] Cranked links are not recommended for use on highly stressed applications.

[c] The actual dimensions will depend on the type of fastener used, but they should not exceed the dimensions given, details of which should be obtained by the purchaser from the manufacturer.

[d] These dynamic strength values do not apply to cranked links or connecting links or chains with attachments.

[e] Dynamic test values for duplex and triplex chains should not be proportioned from the simplex test values.

[f] Dynamic strength values are based on test specimens each of 5 free pitches except for 36A, 40A, 40B, 48A, 48B, 56B, 64B and 72B chains which are based on test specimens each of 3 free pitches. See Annex C for method of calculation.

[g] Bush diameter.

Table 2 — Principal dimensions, measuring forces, tensile strengths and dynamic strength values of ANSI heavy series chains

ISO Chain number [a]	Pitch	Maximum roller diameter	Minimum width between inner plates	Maximum bearing pin body diameter	Minimum bush bore	Minimum chain path depth	Maximum inner plate depth	Maximum outer or intermediate plate depth	Minimum cranked link dimensions [b]			Transverse pitch	Maximum width over inner link	Minimum width between outer plates	Maximum width over bearing pins			Maximum additional width for joint fastener [c]	Measuring force			Minimum tensile strength			Minimum dynamic strength Simplex [d, e, f]
															Chain				Chain			Chain			
															Simplex	Duplex	Triplex		Simplex	Duplex	Triplex	Simplex	Duplex	Triplex	
	p	d_1	b_1	d_2	d_3	h_1	h_2	h_3	l_1	l_2	c	p_t	b_2	b_3	b_4	b_5	b_6	b_7				F_u			F_d
	mm																		N			kN			N
60H	19,05	11,91	12,57	5,96	5,98	18,34	18,10	15,62	7,90	9,15	0,10	26,11	19,43	19,48	30,2	56,3	82,4	4,6	280	560	840	31,3	62,6	93,9	6 330
80H	25,40	15,88	15,75	7,94	7,96	24,39	24,13	20,83	10,55	12,20	0,13	32,59	24,28	24,33	37,4	70,0	102,6	5,4	500	1 000	1 490	55,6	112,2	166,8	10 700
100H	31,75	19,05	18,90	9,54	9,56	30,48	30,17	26,04	13,16	15,24	0,15	39,09	29,10	29,16	44,5	83,6	122,7	6,1	780	1 560	2 340	87,0	174,0	261,0	16 000
120H	38,10	22,23	25,22	11,11	11,14	36,55	36,2	31,24	15,80	18,27	0,18	48,87	37,18	37,24	55,0	103,9	152,8	6,6	1 110	2 220	3 340	125,0	250,0	375,0	22 200
140H	44,45	25,40	25,22	12,71	12,74	42,67	42,23	36,45	18,42	21,32	0,20	52,20	38,86	38,91	59,0	111,2	163,4	7,4	1 510	3 020	4 540	170,0	340,0	510,0	29 200
160H	50,80	28,58	31,55	14,29	14,31	48,74	48,26	41,66	21,04	24,33	0,20	61,90	46,88	46,94	69,4	131,3	193,2	7,9	2 000	4 000	6 010	223,0	446,0	669,0	36 900
180H	57,15	35,71	35,48	17,46	17,49	54,86	54,30	46,86	23,65	27,36	0,20	69,16	52,50	52,55	77,3	146,5	215,7	9,1	2 670	5 340	8 010	281,0	562,0	843,0	46 900
200H	63,50	39,68	37,85	19,85	19,87	60,93	60,33	52,07	26,24	30,36	0,20	78,31	58,29	58,34	87,1	165,4	243,7	10,2	3 110	6 230	9 340	347,0	694,0	1 041,0	58 700
240H	76,20	47,63	47,35	23,81	23,84	73,13	72,39	62,49	31,45	36,40	0,20	101,22	74,54	74,60	111,4	212,6	313,8	10,5	4 450	8 900	13 340	500,0	1 000,0	1 500,0	84 400

[a] For details of standard series chains, see Table 1.

[b] Cranked links are not recommended for use on highly stressed applications.

[c] The actual dimensions will depend on the type of fastener used, but they should not exceed the dimensions given, details of which should be obtained by the purchaser from the manufacturer.

[d] These dynamic strength values do not apply to cranked links or connecting links or chains with attachments.

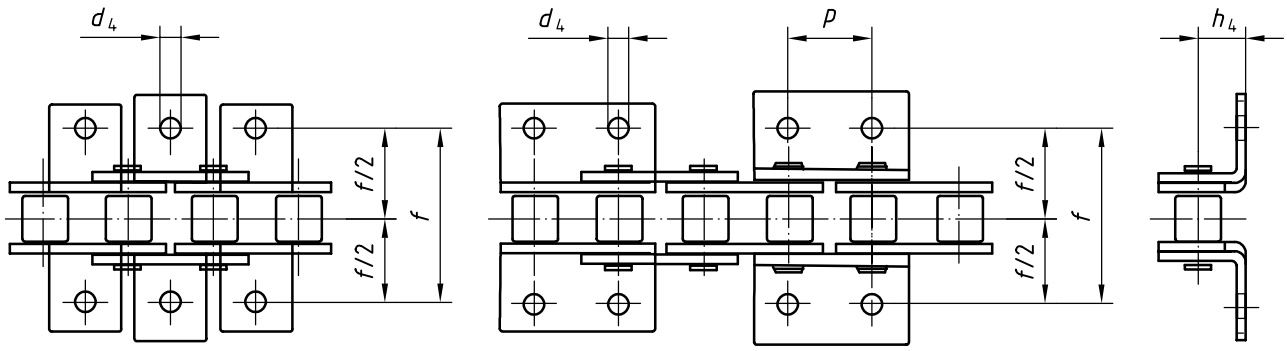
[e] Dynamic test values for duplex and triplex chains should not be proportioned from the simplex test values.

[f] Dynamic strength values are based on test specimens each of 5 free pitches except for 36A, 40A, 40B, 48A, 48B, 56B, 64B and 72B chains which are based on test specimens each of 3 free pitches. See Annex C for method of calculation.

4 Attachments

4.1 Nomenclature

The nomenclature for chain attachments is given in Figures 4, 5, 6 and 7, and in Tables 1, 3, 4 and 5.



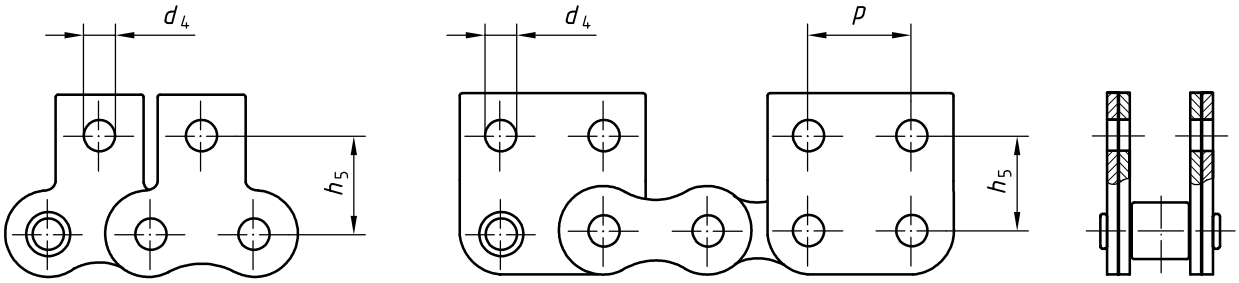
NOTE 1 For d_4, h_4 and f, see Table 3; for p, see Table 1.

NOTE 2 K attachment plates can be positioned on either outer or inner links.

NOTE 3 K1 plates could be identical to K2 plates except that they have one hole located centrally.

NOTE 4 The assembly of K2 plates on adjacent links is not possible.

Figure 4 — K attachment plates



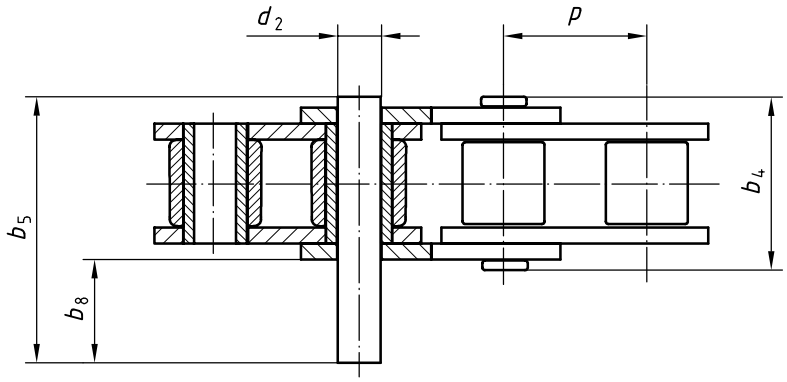
NOTE 1 For d_4 and h_5, see Table 4; for p, see Table 1.

NOTE 2 M attachment plates can be positioned on either outer or inner links.

NOTE 3 M1 plates could be identical to M2 plates except that they have one hole located centrally.

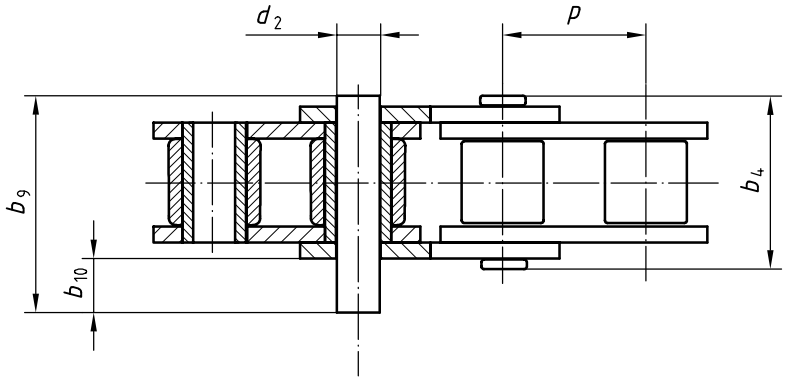
NOTE 4 The assembly of M2 plates on adjacent links is not recommended.

Figure 5 — M attachment plates



NOTE For b_4 and p, see Table 1; for b_5, b_8 and d_2, see Table 5.

Figure 6 — Extended bearing pins (based on duplex pin) **— Type X**



NOTE For b_4 and p, see Table 1; for b_9, b_{10} and d_2, see Table 5.

Figure 7 — Extended bearing pins (commonly used in "A" series) **— Type Y**

4.2 General

Except when otherwise stated, the characteristics, dimensions and tests for the chain with attachments shall be in accordance with Clause 3.

4.3 Designation

Three types of attachment are given, with the common dimensional basis as given in Tables 3, 4 and 5. Their designation and distinguishing features are as follows.

a) K attachments, as shown in Figure 4:

   K1, with one attachment hole centrally located in each platform;

   K2, with two attachment holes longitudinally located.

b) M attachments, as shown in Figure 5:

   M1, with one attachment hole centrally located in the plate;

   M2, with two attachment holes longitudinally located.

c) Extended pin: with the bearing pin extended on one side of the chain as shown in Figures 6 and 7. Alternative pin extensions are shown, one based on the use of the duplex pin (see Figure 6) and the other (see Figure 7) based on those extended pins commonly used in "A" series chains.

4.4 Dimensions

Attachments shall conform to the dimensions given in Tables 3, 4 and 5.

4.5 Manufacture

The actual form of the attachment plates is left to the discretion of the manufacturer. K attachment plates are normally bent from M attachment plates.

The length of the attachment plate is also left to the discretion of the manufacturer, but should be sufficient to accommodate the two attachment holes longitudinally in the case of Type K2 and not interfere with the working of the adjoining links. A common length could be adopted for both Type K1 and K2.

4.6 Marking

It is not a requirement that K and M attachment plates be marked.

The marking of the extended pin chain shall be the same as that which would be shown on a chain with no attachments (see 3.5).

Table 3 — Attachment plate K — Dimensions (see Figure 4)

ISO chain number	Platform height h_4 mm	Minimum hole diameter d_4 mm	Traverse distance between hole centres f mm
06C	6,4	2,6	19
08A	7,9	3,3	25,4
08B	8,9	4,3	25,4
10A	10,3	5,1	31,8
10B	10,3	5,3	31,8
12A	11,9	5,1	38,1
12B	13,5	6,4	38,1
16A	15,9	6,6	50,8
16B	15,9	6,4	50,8
20A	19,8	8,2	63,5
20B	19,8	8,4	63,5
24A	23	9,8	76,2
24B	26,7	10,5	76,2
28A	28,6	11,4	88,9
28B	28,6	13,1	88,9
32A	31,8	13,1	101,6
32B	31,8	13,1	101,6
40A	42,9	16,3	127

Table 4 — Attachment plate M — Dimensions (see Figure 5)

ISO chain number	Height from chain centre line h_5 mm	Minimum diameter of holes d_4 mm
06C	9,5	2,6
08A	12,7	3,3
08B	13	4,3
10A	15,9	5,1
10B	16,5	5,3
12A	18,3	5,1
12B	21	6,4
16A	24,6	6,6
16B	23	6,4
20A	31,8	8,2
20B	30,5	8,4
24A	36,5	9,8
24B	36	10,5
28A	44,4	11,4
32A	50,8	13,1
40A	63,5	16,3

Table 5 — Extended pin dimensions (see Figures 6 and 7)

Dimensions in millimetres

ISO chain number	Pin extension Type "X"		Pin extension [a] Type "Y"		Pin diameter Types "X" and "Y"
	b_8 max.	b_5 max.	b_{10} max.	b_9 max.	d_2 max.
05B	7,1	14,3	—	—	2,31
06C	12,3	23,4	10,2	21,9	3,6
06B	12,2	23,8	—	—	3,28
08A	16,5	32,3	10,2	26,3	3,98
08B	15,5	31	—	—	4,45
10A	20,6	39,9	12,7	32,6	5,09
10B	18,5	36,2	—	—	5,08
12A	25,7	49,8	15,2	40	5,96
12B	21,5	42,2	—	—	5,72
16A	32,2	62,7	20,3	51,7	7,94
16B	34,5	68	—	—	8,28
20A	39,1	77	25,4	63,8	9,54
20B	39,4	79,7	—	—	10,19
24A	48,9	96,3	30,5	78,6	11,11
24B	51,4	101,8	—	—	14,63
28A	—	—	35,6	87,5	12,71
32A	—	—	40,6	102,6	14,29

[a] The pin extensions of Type "Y" are given as alternatives, as they are commonly used in "A" series chains.

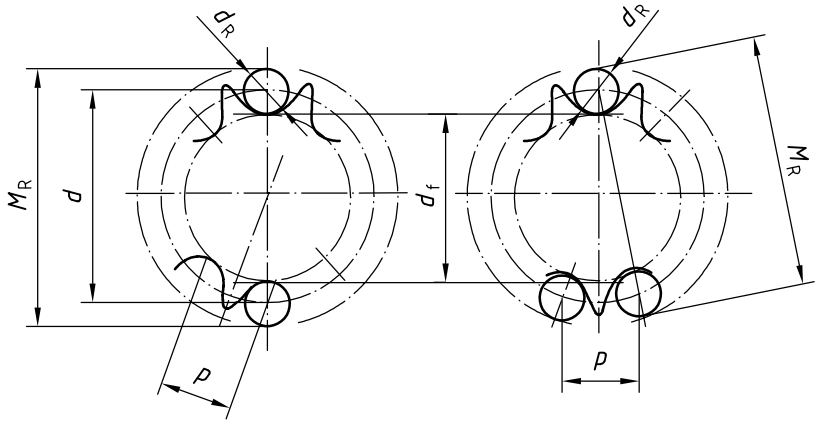
5 Chain sprockets

5.1 General

This clause gives specifications for chain sprockets for use with short-pitch transmission precision roller and bush chains conforming to Clause 3 and specifies general criteria for ensuring correct meshing, operation and transmission of load when used under normal operating conditions.

5.2 Nomenclature

The nomenclature for chain sprockets is shown in Figures 8, 9 and 10.



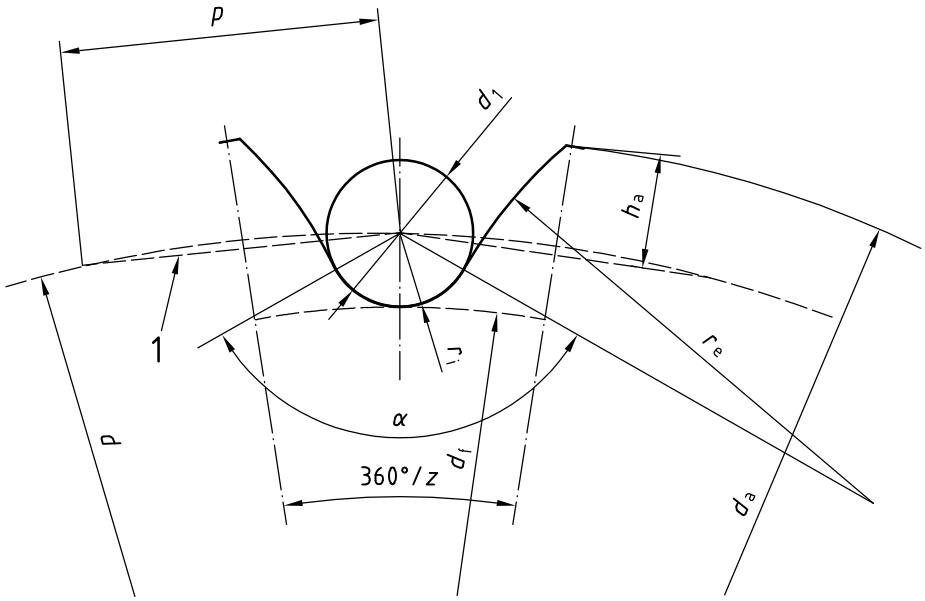
Even number of teeth Odd number of teeth

Key

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

NOTE This nomenclature is valid for both roller and bush chains.

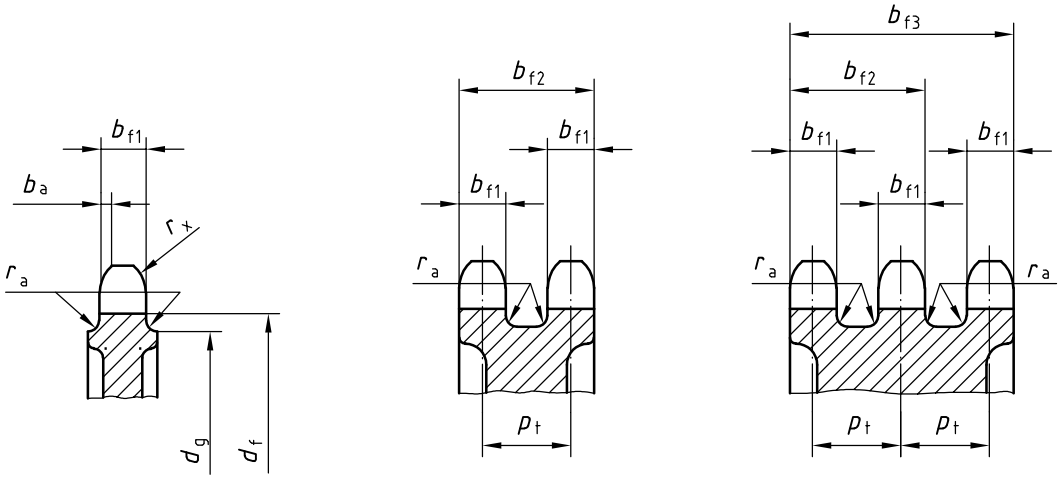
Figure 8 — Chain sprocket diametral dimensions



Key

1	pitch polygon
p	chordal pitch, equal to chain pitch
d	pitch-circle diameter
d_1	maximum roller diameter
r_i	roller-seating radius
α	roller-seating angle
r_e	tooth-flank radius
h_a	height of tooth above pitch polygon
d_a	tip diameter
d_f	root diameter
z	number of teeth

Figure 9 — Tooth gap forms



For a sprocket rim in the axial plane sectioned through the centre of the tooth gap.

Key

b_a	tooth side relief
b_{f1}	tooth width
b_{f2}, b_{f3}	width over teeth
d_f	sprocket root diameter
d_g	absolute maximum shroud diameter
p_t	strand transverse pitch
r_a	shroud fillet radius
r_x	tooth side radius

Figure 10 — Sprocket rim profiles

5.3 Diametral dimensions of sprocket rim

5.3.1 Nomenclature

See Figure 8.

5.3.2 Dimensions

5.3.2.1 Pitch-circle diameter, d

The chain sprocket pitch-circle diameter, d, is given by

$$d = \frac{p}{\sin\frac{180°}{z}}$$

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

5.3.2.2 Measuring-pin diameter, d_R

The chain sprocket measuring-pin diameter d_R is given by

$$d_R = d_1$$

(see Figure 9)

with a tolerance of $^{+0,01}_{0}$ mm.

5.3.2.3 Root diameter, d_f

The chain sprocket root diameter d_f is given by

$$d_f = d - d_1$$

with a tolerance in accordance with Table 6.

Table 6 — Root diameter tolerances

Dimensions in millimetres

Root diameter d_f	Tolerance
$d_f \leqslant 127$	$^{0}_{-0,25}$
$127 < d_f \leqslant 250$	$^{0}_{-0,3}$
$d_f > 250$	h11 [a]
[a] See ISO 286-2.	

5.3.2.4 Measurement over pins

For an even number of teeth, the measurement over pins is given by

$$M_R = d + d_{R,\min}$$

For an odd number of teeth, the measurement over pins is given by

$$M_R = d \cos\frac{90°}{z} + d_{R,\min}$$

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

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

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

5.4 Sprocket tooth gap forms

5.4.1 Nomenclature

See Figure 9.

5.4.2 Dimensions

5.4.2.1 General

The limits of the tooth gap form are determined by the minimum and maximum tooth gap forms. The actual tooth gap form, which is provided by cutting or an equivalent method, shall have tooth flanks of a form lying between the minimum and maximum flank radii and blending smoothly with the roller seating curve subtending the respective angles.

5.4.2.2 Minimum form

The corresponding values for r_e, r_i and α are given by

$$r_{e,\max} = 0{,}12 d_1 (z + 2)$$

$$r_{i,\min} = 0{,}505 d_1$$

$$\alpha_{\max} = 140° - \frac{90°}{z}$$

5.4.2.3 Maximum form

The corresponding values for r_e, r_i and α are given by

$$r_{e,\min} = 0{,}008 d_1 (z^2 + 180)$$

$$r_{i,\max} = 0{,}505 d_1 + 0{,}069 \sqrt[3]{d_1}$$

$$\alpha_{\min} = 120° - \frac{90°}{z}$$

5.5 Tooth heights and tip diameters

5.5.1 Nomenclature

See Figure 9.

5.5.2 Dimensions

The maximum and minimum values of the tip diameter d_a are given by

$$d_{a,max} = d + 1{,}25p - d_1$$

$$d_{a,min} = d + p\left(1 - \frac{1{,}6}{z}\right) - d_1$$

NOTE $d_{a,min}$ and $d_{a,max}$ can be applied arbitrarily both to the minimum and maximum gap forms, subject to the limitations imposed on the maximum diameter by the cutter.

To facilitate the construction of the tooth gap form to a large scale, the tooth height above the pitch polygon can be obtained from the following formulae:

$$h_{a,max} = 0{,}625p - 0{,}5d_1 + \frac{0{,}8p}{z}$$

$$h_{a,min} = 0{,}5\,(p - d_1)$$

NOTE $h_{a,max}$ is related to $d_{a,max}$ and $h_{a,min}$ to $d_{a,min}$.

5.6 Sprocket rim profiles

5.6.1 Nomenclature

See Figure 10.

5.6.2 Dimensions

5.6.2.1 Tooth width

Tooth width dimensions are given by the following.

a) For $p \leqslant 12{,}7$ mm:

- $b_{f1} = 0{,}93b_1$: h14 [2)] for simplex chain sprockets;
- $b_{f1} = 0{,}91b_1$: h14 for duplex and triplex chain sprockets;
- $b_{f1} = 0{,}88b_1$: h14 for quadruplex chain wheels and above.

b) For $p > 12{,}7$ mm:

- $b_{f1} = 0{,}95b_1$: h14 for simplex chain sprockets;
- $b_{f1} = 0{,}93b_1$: h14 for duplex and triplex chain sprockets.

2) See ISO 286-2.

The formulae given in a) for quadruplex chains and above may be used by agreement between user and manufacturer.

5.6.2.2 Other dimensions

For all chains: b_{f2} and b_{f3} = (number of strands − 1) × p_t + b_{f1} (tolerance h14 [3)] on b_{f1})

For all chains: $r_{x,nom} = p$

For chain numbers 081, 083, 084 and 085: $b_{a,nom} = 0{,}06\,p$

For all other chains: $b_{a,nom} = 0{,}13\,p$

For chain numbers 04C and 06C: $d_g = p\cot\frac{180^\circ}{z} - 1{,}05h_2 - 1{,}00 - 2r_a$

For all other chains: $d_g = p\cot\frac{180^\circ}{z} - 1{,}04h_2 - (0{,}76\text{ mm})$

5.7 Radial run-out

Radial run-out between the bore and root diameter shall not exceed a total indicator reading of greater than the larger of the two following values:

(0,000 8 d_f + 0,08) mm, or

0,15 mm,

up to a maximum of 0,76 mm.

5.8 Axial run-out (wobble)

Axial run-out, measured with reference to the bore and the flat part of the side face of the teeth, shall not exceed a total indicator reading of

(0,000 9 d_f + 0,08) mm,

up to a maximum of 1,14 mm.

For fabricated (welded) sprockets, 0,25 mm is acceptable if the above formula gives smaller values.

5.9 Pitch accuracy of sprocket teeth

Pitch accuracy of sprocket teeth is important and chain manufacturers should be consulted for details.

5.10 Number of teeth

This International Standard primarily applies to a number of teeth from 9 to 150 inclusive.

The preferred numbers of teeth are 17, 19, 21, 23, 25, 38, 57, 76, 95 and 114.

5.11 Bore tolerance

Unless otherwise agreed between manufacturer and purchaser, bore tolerance shall be H8 [3)].

3) See ISO 286-2.

5.12 Marking

Sprockets shall be marked with the following:

a) manufacturer's name or trademark;

b) number of teeth;

c) chain designation (ISO chain number and/or manufacturer's equivalent).

Annex A
(normative)

Pitch circle diameters

Table A.1 gives the correct pitch circle diameters for sprockets to suit a chain of unit pitch. The pitch circle diameters for sprockets to suit a chain of any other pitch are directly proportional to the pitch of the chain.

Table A.1 — Pitch circle diameters

Number of teeth z	Pitch circle diameter, d, for unit pitch [a] mm	Number of teeth z	Pitch circle diameter, d, for unit pitch [a] mm	Number of teeth z	Pitch circle diameter, d, for unit pitch [a] mm
9	2,923 8	32	10,202 3	55	17,516 6
10	3,236 1	33	10,520 1	56	17,834 7
11	3,549 4	34	10,838 0	57	18,152 9
12	3,863 7	35	11,155 8	58	18,471 0
13	4,178 6	36	11,473 7	59	18,789 2
14	4,494 0	37	11,791 6	60	19,107 3
15	4,809 7	38	12,109 6	61	19,425 5
16	5,125 8	39	12,427 5	62	19,743 7
17	5,442 2	40	12,745 5	63	20,061 9
18	5,758 8	41	13,063 5	64	20,380 0
19	6,075 5	42	13,381 5	65	20,698 2
20	6,392 5	43	13,699 5	66	21,016 4
21	6,709 5	44	14,017 6	67	21,334 6
22	7,026 6	45	14,335 6	68	21,652 8
23	7,343 9	46	14,653 7	69	21,971 0
24	7,661 3	47	14,971 7	70	22,289 2
25	7,978 7	48	15,289 8	71	22,607 4
26	8,296 2	49	15,607 9	72	22,925 6
27	8,613 8	50	15,926 0	73	23,243 8
28	8,931 4	51	16,244 1	74	23,562 0
29	9,249 1	52	16,562 2	75	23,880 2
30	9,566 8	53	16,880 3	76	24,198 5
31	9,884 5	54	17,198 4	77	24,516 7

Table A.1 (*continued*)

Number of teeth z	Pitch circle diameter, d, for unit pitch [a] mm	Number of teeth z	Pitch circle diameter, d, for unit pitch [a] mm	Number of teeth z	Pitch circle diameter, d, for unit pitch [a] mm
78	24,334 9	105	33,427 5	132	42,020 9
79	25,153 1	106	33,745 8	133	42,339 1
80	25,471 3	107	34,064 0	134	42,657 4
81	25,789 6	108	34,382 3	135	42,975 7
82	26,107 8	109	34,700 6	136	43,294 0
83	26,426 0	110	35,018 8	137	43,612 3
84	26,744 3	111	35,337 1	138	43,930 6
85	27,062 5	112	35,655 4	139	44,248 8
86	27,380 7	113	35,973 7	140	44,567 1
87	27,699 0	114	36,291 9	141	44,885 4
88	28,017 2	115	36,610 2	142	45,203 7
89	28,335 5	116	36,928 5	143	45,522 0
90	28,653 7	117	37,246 7	144	45,840 3
91	28,971 9	118	37,565 0	145	46,158 5
92	29,290 2	119	37,883 3	146	46,476 8
93	29,608 4	120	38,201 6	147	46,795 1
94	29,926 7	121	38,519 8	148	47,113 4
95	30,244 9	122	38,838 1	149	47,431 7
96	30,563 2	123	39,156 4	150	47,750 0
97	30,881 5	124	39,474 6	—	—
98	31,199 7	125	39,792 9	—	—
99	31,518 0	126	40,111 2	—	—
100	31,836 2	127	40,429 5	—	—
101	32,154 5	128	40,474 8	—	—
102	32,472 7	129	41,066 0	—	—
103	32,791 0	130	41,384 3	—	—
104	33,109 3	131	41,702 6	—	—

[a] This is sometimes referred to as “unit pitch circle diameter”.

Annex B
(informative)

Equivalent chain designations

See Table B.1.

Table B.1 — Equivalent chain designations

Chain pitch mm	ISO chain number	ANSI chain number
6,35	04C	25
9,525	06C	35
12,7	08A	40
12,7	085	41
15,875	10A	50
19,05	12A	60
25,4	16A	80
31,75	20A	100
38,1	24A	120
44,45	28A	140
50,8	32A	160
57,15	36A	180
63,5	40A	200
76,2	48A	240

Annex C
(informative)

Method of calculating chain minimum dynamic strength

C.1 "A" series chain

For 085 chain only: $F_d = K_s \times A_i \times p^{(-0,000\,8\,p)}$.

For all other chains: $F_d = K_s \times 0,118 \times p^{(2\,-\,0,000\,8\,p)}$;

where

F_d is the chain minimum dynamic strength at 3×10^6 cycles, in newtons (N);

A_i is 12,01 mm^2 for 085 chain only;

K_s is

— 115 N/mm^2 for 085 chain only,

— 134 N/mm^2 for chains up to and including 32A,

— 139 N/mm^2 for chains 36A and above [4];

p is the chain pitch, in millimetres (mm).

C.2 "A" series heavy chain

$$F_d = K_s \times 0,118 \times p^{(2\,-\,0,000\,8\,p)} \times \left(\frac{b_{i\,heavy}}{b_{i\,standard}} \right)^{0,5}$$

where

b_i is the estimated inner plate thickness given by

$$\frac{(b_2 - b_1)}{2,11} \text{ mm};$$

b_2 is the maximum width over inner link, in millimetres (mm);

b_1 is the minimum width between inner plates, in millimetres (mm);

4) Constant K_s is increased from 134 N/mm^2 to 139 N/mm^2 to allow for the reduction in the test specimen length from 5 free pitches to 3 free pitches when conducting the dynamic strength test.

K_s is

— 134 N/mm^2 for chains up to and including 160H,

— 139 N/mm^2 for chains 180H and above [5];

p is the chain pitch, in millimetres (mm).

C.3 "B" series chain

$$F_d = K_s \times A_i \times p^{(-0{,}000\,9p)}$$

where

A_i is the sectional area of inner plate, given by

$2b_i \times (0{,}99h_2 - d_b)$ mm^2;

b_i is the estimated inner plate thickness, given by

$$\frac{(b_2 - b_1)}{2{,}11} \text{ mm};$$

d_b is the estimated bush diameter, given by

$$d_2 \times \left(\frac{d_1}{d_2}\right)^{0{,}475} \text{ mm};$$

b_2 is the maximum width over the inner link, in millimetres (mm);

b_1 is the minimum width between the inner plates, in millimetres (mm);

d_2 is the maximum pin diameter, in millimetres (mm);

d_1 is the maximum roller diameter, in millimetres (mm);

h_2 is the maximum inner plate depth, in millimetres (mm);

K_s is

— 134 N/mm^2 for chains up to and including 32B,

— 139 N/mm^2 for chains 40B and above [5];

p is the chain pitch, in millimetres (mm).

5) Constant K_s is increased from 134 N/mm^2 to 139 N/mm^2 to allow for the reduction in the test specimen length from 5 free pitches to 3 free pitches when conducting the dynamic strength test.

Annex D
(informative)

Method of determining maximum test force F_{max} when conducting dynamic strength conformance test

D.1 General

The maximum test force F_{max} is given by

$$F_{max} = \frac{F_d F_u + \left[F_{min}(F_u - F_d) \right]}{F_u}$$

where

F_{max} is the maximum test force, in newtons (N);

F_d is the minimum dynamic strength as given in Table 1 or Table 2, in newtons (N);

F_u is the minimum tensile strength as given in Table 1 or Table 2, in newtons (N);

F_{min} is the minimum test force, in newtons (N).

D.2 Example for Chain 16B

If the chain manufacturer were to choose a minimum test force (F_{min}) of 2 700 N (i.e. 4,5 % of the minimum tensile strength according to Table 1). Then, the maximum test force F_{max} would be determined as follows:

$$F_{max} = \frac{F_d F_u + \left[F_{min}(F_u - F_d) \right]}{F_u}$$

and from Table 1

$F_d = 9\,530$ N,

$F_u = 60\,000$ N, and

$F_{min} = 2\,700$ N,

then

$$F_{max} = \frac{(9\,530 \times 60\,000) + \left[2\,700 \times (60\,000 - 9\,530) \right]}{60\,000} = 11\,800 \text{ N}.$$

Bibliography

[1] ISO 9633:2001, *Cycle chains — Characteristics and test methods*

[2] ISO 10190:1992, *Motor cycle chains — Characteristics and test methods*

[3] ISO 10823:1996, *Guidance on the selection of roller chain drives*

[4] ISO 13203, *Chains, sprockets and accessories — Vocabulary*[6)]

6) To be published.

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