International Standard 4348

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Flat-top chains and associated chain wheels for conveyors

Chaînes charnières et roues pour convoyeurs

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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 developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized 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 4348 was developed by Technical Committee ISO/TC 100, *Chains and chain wheels for power transmission and conveyors*.

This second edition was submitted directly to the ISO Council, in accordance with clause 6.11.2 of part 1 of the Directives for the technical work of ISO. It cancels and replaces the first edition (i.e. ISO 4348-1978), which had been approved by the member bodies of the following countries :

Australia	Italy	Sweden
Belgium	Japan	Turkey
Czechoslovakia	Korea, Rep. of	United Kingdom
Finland	Mexico	USA
France	Netherlands	USSR
Germany, F. R.	Romania	Yugoslavia
India	South Africa, Rep. of	
Ireland	Spain	

No member body expressed disapproval of the document.

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Flat-top chains and associated chain wheels for conveyors

0 Introduction

This International Standard lays down the dimensions of a selected range of flat-top chains which are manufactured in various countries and which are in world-wide use. Flat-top chains are also known as "slat band" and "table top" chains.

It should be noted that the specified dimensions for the chains are based upon inch units.

1 Scope and field of application

This International Standard specifies the characteristics of flat-top chains and associated chain wheels as used principally on conveyors for bottles. It covers dimensions, limits for interchangeability, measuring loads and minimum ultimate tensile strengths.

2 Chains

2.1 Nomenclature

This International Standard specifies two types of chain :

— single-hinge (see figure 1 and tables 1 and 1M);

— double-hinge (see figure 4 and tables 2 and 2M).

2.2 Designation

Flat-top chains shall be designated by the letter C followed by the nominal slat width expressed in units of 0.25 in, followed by S or D depending upon whether the chains are of single-hinge or double-hinge design.

Example :

C12S designates a single-hinge chain with a nominal slat width of 3.0 in.

2.3 Dimensions

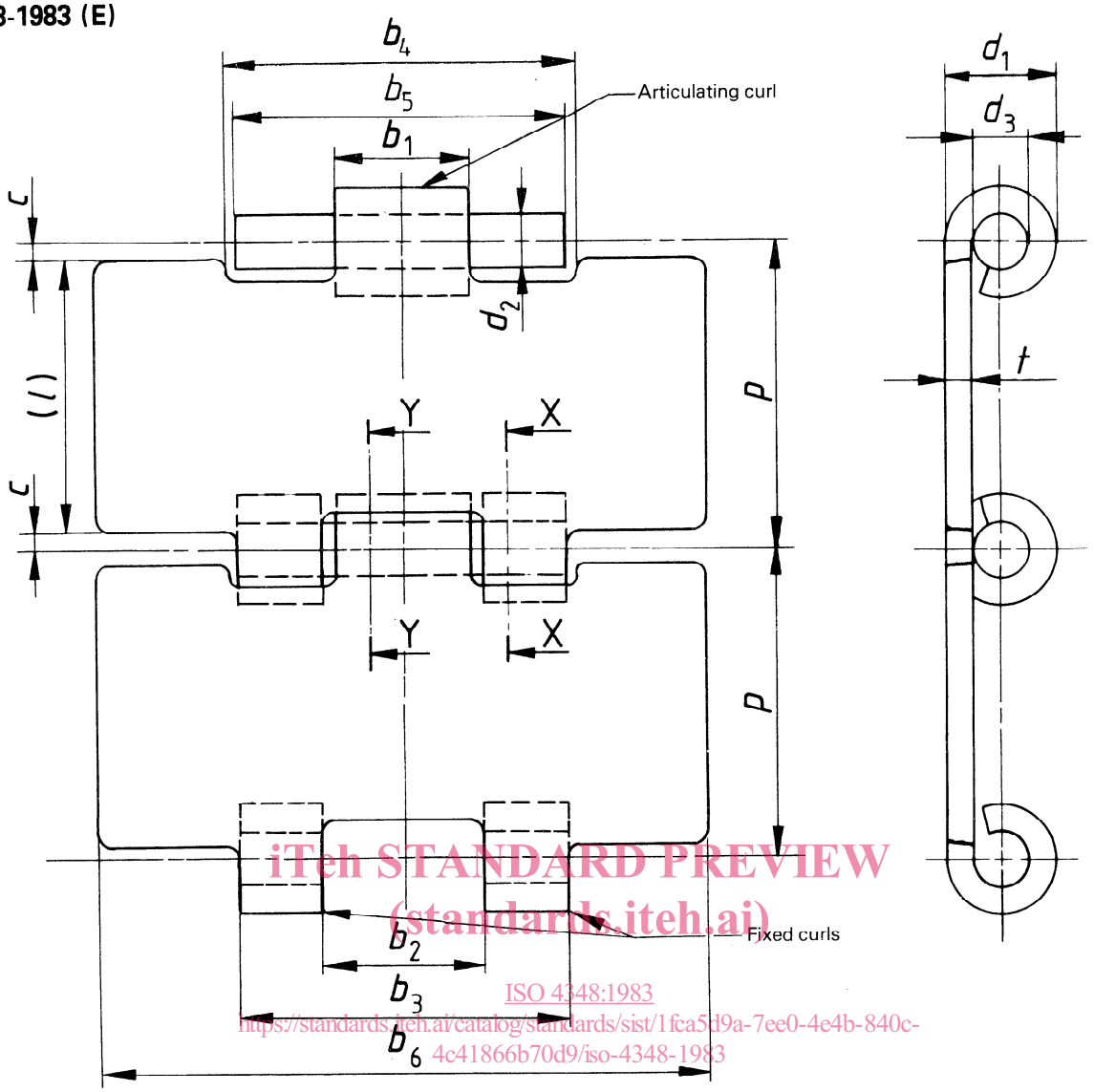
2.3.1 The chains shall conform to the dimensions given in tables 1, 1M, 2 and 2M. Maximum and minimum dimensions are specified to ensure interchangeability of slats produced by different manufacturers.

2.3.2 Hinge clearance dimensions e and f are both based on the maximum values of t and d_1 as given in tables 1 and 1M, and must be recalculated for any other values.

The basis for the calculations shall be that no part of an adjacent slat may come within the swept clearance k as shown in figures 2 and 3.

2.3.3 The dimensions d_2 and d_3 given in tables 1 and 1M ensure free movement of the articulating curls around the bearing pin.

The methods of torsional and axial bearing pin restraint within the fixed curls shall be at the manufacturer's discretion.



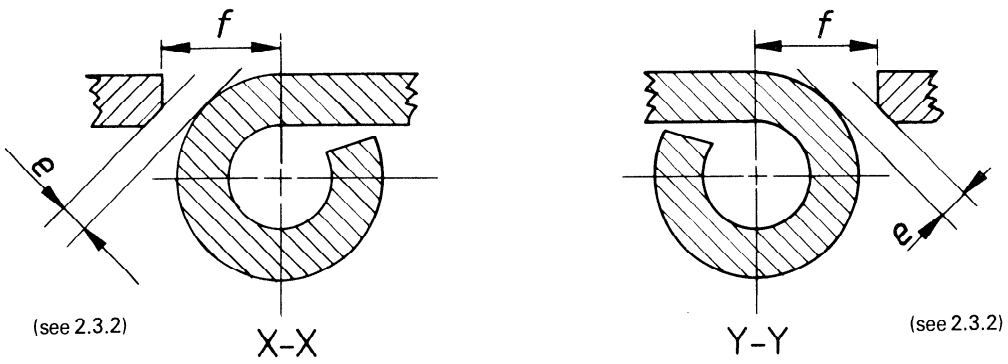
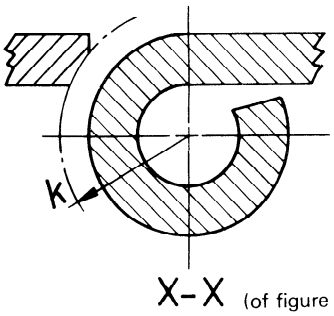


Figure 1 — Single-hinge chain



k = 6,70 mm (0.264 in)

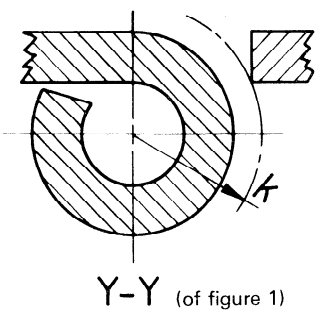


Figure 2 — Hinge clearance of chamfered slat

Figure 3 — Hinge clearance of slat with square edge

Table 1 — Chain dimensions, measuring loads and tensile strength of single-hinge flat-top chains (inch-pound units)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
ISO chain number	Pitch[1] p	Curl diameter d_1 max.	Bearing pin diameter d_2 max.	Articulating curl bore diameter d_3 min.	Slat thickness t max.	Width over articulating curl b_1 max.	Width between fixed curls b_2 min.	Width over fixed curls b_3 max.	Slat hinge clearance width b_4 min.	Width over bearing pins b_5 max.	Slat width b_6 maximum	Slat width b_6 nominal	Slat length[2] l	Slat clearance c min.	Hinge clearance tangential[3] e min.	Hinge clearance linear[3][4] f min.	Measuring load	Ultimate tensile strength min.
	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	lbf	lbf
C 12 S C 13 S C 14 S C 16 S C 18 S C 24 S C 30 S	1.50	0.517	0.251	0.252	0.132	0.787	0.791	1.656	1.657	1.677	3.040 3.290 3.540 4.040 4.540 6.040 7.540	3.000 3.250 3.500 4.000 4.500 6.000 7.500	1.468	0.016	0.006	0.200	in carbon steel 45 or 2 250 in corrosion-resistant steel grade 1[5] 36 or 1 800 grade 2[5] 28 1 400	

1) Chain pitch p is a theoretical dimension used in calculating strand lengths and chain wheel dimensions; it is not intended for the inspection of individual links.

2) Dimension l is quoted for reference only and will be dependent upon actual dimension c.

3) See 2.3.2 according to the option chosen.

4) Dimension given only for guidance in tool manufacture.

5) These grades are purely arbitrary and relate to the appropriate tensile strength of the corrosion-resistant steel. The manufacturer should be consulted for details of the corrosion-resisting properties of the steels.

Table 1M – Chain dimensions, measuring loads and tensile strength of single-hinge flat-top chains (metric units)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
ISO chain number	Pitch[1] p	Curl diameter d_1 max.	Bearing pin diameter d_2 max.	Articulating curl bore diameter d_3 min.	Slat thickness t max.	Width over articulating curl b_1 max.	Width between fixed curls b_2 min.	Width over fixed curls b_3 max.	Slat hinge clearance width b_4 min.	Width over bearing pins b_5 max.	Slat width b_6 maximum	Slat width b_6 nominal	Slat length[2] l	Slat clearance c min.	Hinge clearance tangential[3] e min.	Hinge clearance linear[3][4] f min.	Measuring load	Ultimate tensile strength min.
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	daN	daN
C 12 S	38,10	13,13	6,38	6,40	3,35	20,00	20,10	42,05	42,10	42,60	77,20	76,20	37,28	0,41	0,14	5,08	in carbon steel: 20 or 1 000	
C 13 S											83,60	82,60						
C 14 S											89,90	88,90						
C 16 S											102,60	101,60						
C 18 S											115,30	114,30						
C 24 S											153,40	152,40						
C 30 S											191,50	190,50					in corrosion-resistant steel grade 1[5]: 16 or 800 / grade 2[5]: 12 or 625	

1) Chain pitch p is a theoretical dimension used in calculating strand lengths and chain wheel dimensions; it is not intended for the inspection of individual links.

2) Dimension l is quoted for reference only and will be dependent upon actual dimension c.

3) See 2.3.2 according to the option chosen.

4) Dimension given only for guidance in tool manufacture.

5) These grades are purely arbitrary and relate to the appropriate tensile strength of the corrosion-resistant steel. The manufacturer should be consulted for details of the corrosion-resisting properties of the steels.

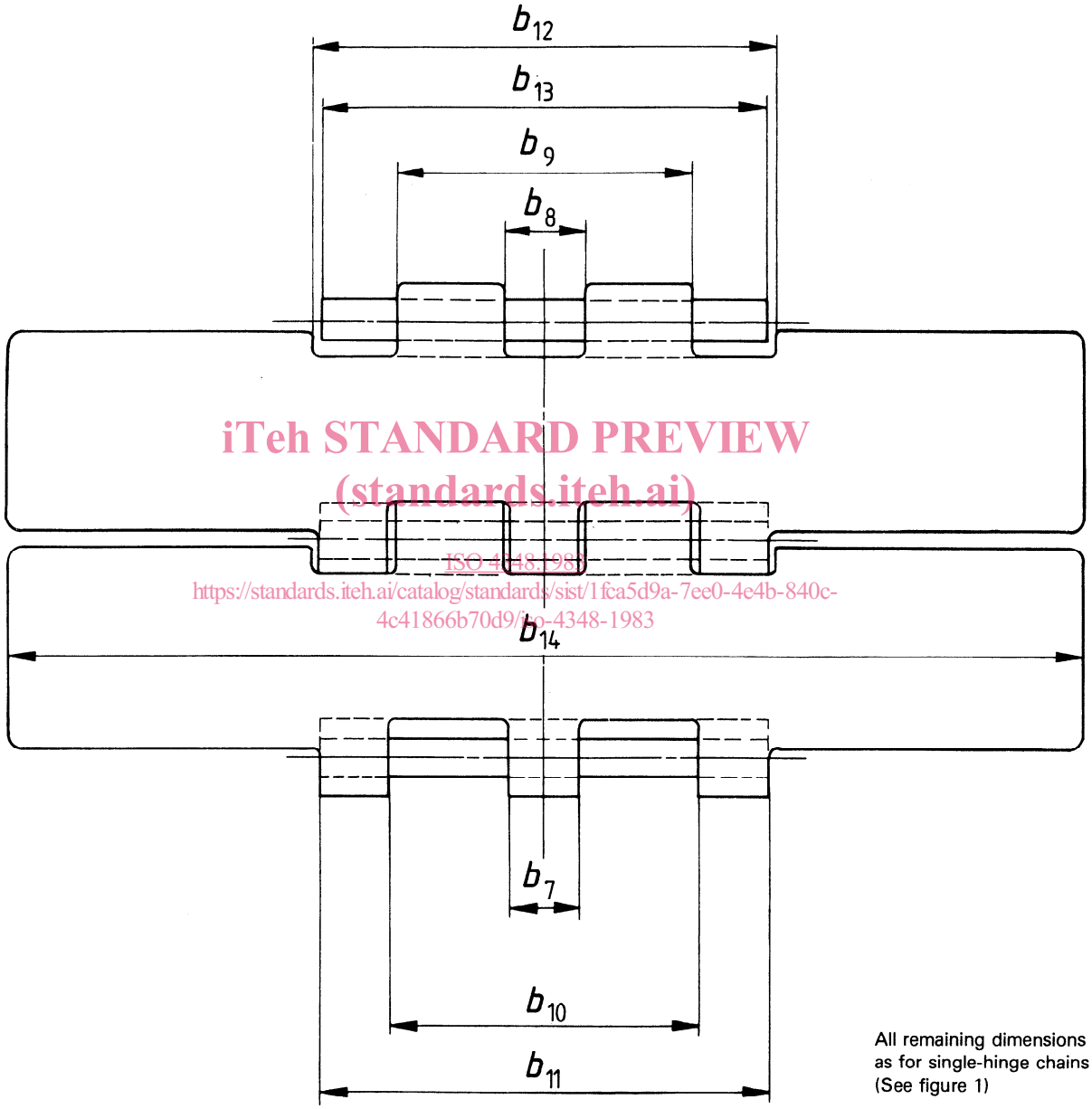


Figure 4 — Double-hinge chain

Table 2 — Chain dimensions, measuring loads and tensile strength of double-hinge flat-top chains (inch-pound units)

1	2	3	4	5	6	7	8	9	10	11	12
ISO chain number	Width over centre fixed curl b_7 max.	Width between articulating curls b_8 min.	Width over articulating curls b_9 max.	Width between outer fixed curls b_{10} min.	Width over outer fixed curls b_{11} max.	Slat hinge clearance width b_{12} min.	Width over bearing pins b_{13} max.	Slat width b_{14} maximum	Slat width b_{14} nominal	Measuring load	Ultimate tensile strength min
	in	in	in	in	in	in	in	in	in	lbf	lbf
C 30 D	0.531	0.539	2.106	2.110	3.169	3.173	3.190	7.540	7.500	in carbon steel: 90 | 4 500; in corrosion-resistant steel grade 1: 72 | 3 600; grade 2: 56 | 2 800	

Table 2M — Chain dimensions, measuring loads and tensile strength of double-hinge flat-top chains (metric units)

1	2	3	4	5	6	7	8	9	10	11	12
ISO chain number	Width over centre fixed curl b_7 max.	Width between articulating curls b_8 min.	Width over articulating curls b_9 max.	Width between outer fixed curls b_{10} min.	Width over outer fixed curls b_{11} max.	Slat hinge clearance width b_{12} min.	Width over bearing pins b_{13} max.	Slat width b_{14} maximum	Slat width b_{14} nominal	Measuring load	Ultimate tensile strength min
	mm	mm	mm	mm	mm	mm	mm	mm	mm	daN	daN
C 30 D	13,50	13,70	53,50	53,60	80,50	80,60	81,00	191,50	190,50	in carbon steel: 40 | 2 000; in corrosion-resistant steel grade 1: 32 | 1 600; grade 2: 25 | 1 250	

2.4 Minimum ultimate tensile strength

2.4.1 The minimum tensile strength is the minimum strength of samples tested to destruction in tensile loading, as defined in 2.4.2. This strength is not a working load. It is intended primarily as a comparative figure between chains of various materials and constructions. For application information, the manufacturers or their published data should be consulted.

2.4.2 A tensile load shall be applied to the ends of a chain length, containing at least five free pitches, by means of shackles permitting free movement on both sides of the chain centre line, 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 first crest on the load/extension diagram.

NOTE — This will indicate failure in the terms of this International Standard whether hinges break or uncurl.

2.4.3 The tensile test shall be considered a destructive test. Even though a chain may not fail when subjected to the minimum ultimate tensile load, as given in table 1, 1M, 2 or 2M, it will have been stressed beyond the yield point and will be unfit for service.

2.5 Length accuracy

The standard length for measurement shall be 40 pitches measured before lubrication.

The chain shall be supported throughout its entire length and the measuring load specified in tables 1, 1M, 2 and 2M.

To comply with this International Standard, the nominal standard length shall be subject to a tolerance of $^{+\ 0,3}_{-\ 0,1}$ %.

2.6 Marking

Chains shall be marked with :

a) the manufacturer's name or trade mark;

b) the ISO chain number (see column 1 of tables 1, 1M, 2 and 2M).

3 Chain wheels (sprockets)

NOTE — The following applies to single-hinge and double-hinge chains.

3.1 Nomenclature

Chain wheel nomenclature is covered below.

The given chain wheel design is proposed as a minimum and is the less expensive approach since only one cutter is used. There are other tooth forms which optimize load absorption and allowable chain elongation. For the latter designs, the chain and sprocket manufacturer should be consulted.

Wheels for flat-top chains are provided with two effective sets of teeth each having a number of teeth z, the location of the tooth spaces of the second set being midway between those of the first. The total number of teeth is z_1. With such double-cut sprockets, z_1 will be an integer, but z will be fractional if z_1 is an odd number.

The effective number of teeth z is always the value used in rim diameter calculations.

3.2 Diametral dimensions and tooth shape

3.2.1 Nomenclature

The nomenclature of diametral dimensions and tooth shape is given in figure 5.

3.2.2 Dimensions of the diameters

NOTE — Values for p and d_1 will be found in tables 1 and 1M.

3.2.2.1 Pitch circle diameter

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

3.2.2.2 Measuring pin diameter

$$d_R = d_1$$

3.2.2.3 Maximum root diameter

$$d_f \text{ max.} = d - d_1$$

3.2.2.4 Measurement over measuring pins (see figure 6)

$$M_R \text{ for EVEN numbers of teeth} = d + d_R$$

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

For an EVEN number of teeth, measurement shall be made over pins inserted in diametrically opposed tooth spaces.

For an ODD number of teeth, measurement shall be made over pins inserted in the tooth space most nearly diametrically opposite.

During measurement, the pins shall always be in contact with the working faces of the teeth.