INTERNATIONAL STANDARD

ISO 487

Third edition
1998-07-15

Steel roller chains, types S and C, attachments and sprockets

Chaînes à rouleaux en acier, types S et C, plaques-attaches et roues dentées

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 487 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 487:1984), which has been revised to include the latest features and products that are needed by industries using these chains and attachments. This edition introduces a new range of higher strength chains ("H" series) and the "F4" attachments for the S45 and S55 chains whilst deleting the "corn picker" attachments as these are not deemed relevant to current practice in industry.

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

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Steel roller chains, types S and C, attachments and sprockets

1 Scope

This International Standard specifies the characteristics of a range of steel roller chains, dimensionally derived from the malleable iron type and suitable for the conditions of operation and maintenance prevailing in such fields as agriculture, building, quarrying and related industry, mechanical handling, etc., and of associated chain sprockets.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 185:1988, *Grey cast iron — Classification*.

ISO 606:1994, *Short-pitch transmission precision roller chains and chain wheels*.

3 Chains

3.1 Nomenclature

The nomenclature of chains and their component parts is given in figures 1 and 2.

3.2 Designation

Steel roller chains shall be designated by the standard ISO chain numbers given in table 1.

3.3 Dimensions

The chains shall conform to the dimensions given in table 1. Maximum and minimum dimensions are specified to ensure the interchangeability of links produced by different chain makers. They represent limits for interchangeability, but are not the actual tolerances that should be used in manufacture.

3.4 Minimum tensile strength

3.4.1 The minimum tensile strength is the value that shall be exceeded when a tensile force is applied to a sample which is tested to destruction as described in 3.4.2. This strength is not a working force. 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.

3.4.2 A tensile force, not less than that specified in table 1, shall be applied slowly 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 force, i.e. the summit of the force/extension diagram.

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

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

3.5 Pre-loading

It is recommended that all chains be pre-load tested by applying a force equivalent to at least one third of the minimum tensile strength given in table 1.

3.6 Length measurement

Finished chains shall be measured after pre-loading (where applicable) but before they are lubricated.

The standard length for measurement shall be a minimum of 20 times the pitch with a maximum length of 1524 mm and shall terminate with an inner link at each end.

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

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

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

3.7 Cranked link

A cranked link is required to obtain an odd number of pitches in a chain. The crank shall be central between pins. Using the symbols given in table 1, its length shall not exceed $p - 1{,}15h_2$.

Attachment plates shall not be part of a cranked link.

3.8 Marking

The chains shall be marked with the manufacturer's name or trademark.

It is recommended that the chains be marked with the ISO chain number specified in table 1.

4 Chain attachment plates

The three basic types of attachment plates covered by this International Standard are described in 4.1 to 4.3.

4.1 F1 and F4 attachment plates

F1 and F4 attachment plates form a vertical platform to serve as a pusher. Each attachment plate accepts one fixing bolt for this purpose. Dimensions shall be in accordance with tables 2 and 3.

4.2 K1 attachment plates

K1 attachment plates form a platform suitable to accommodate slats or other devices. Each attachment plate accepts one fixing bolt for this purpose. Dimensions shall be in accordance with tables 4 and 5. The dimensions not specified in these tables are at the discretion of the manufacturer.

The maximum length of K1 attachment plates and/or of their bending radius shall be such as to preclude interference with the plates of adjoining links having the maximum depth (as shown in column 6, plate depth h_2, of table 1).

4.3 M1 attachment plates

M1 attachment plates serve as pushers or to accept staybars or other devices. The dimensions shall conform to those specified in table 6.

The length of M1 attachment plates (in the direction along the chain) shall not exceed 87 % of the pitch (half this amount on either side of the link centre).

NOTE — The form and length of attachment plates should provide for the possibility of their use on adjoining links of the chain, noting that the attachment plates may be placed on one side or on both sides of the chain, and on either the inner or the outer link, or on both.

5 Sprockets

5.1 General

5.1.1 Materials

Grey iron castings of grade 15, in accordance with ISO 185, are of adequate strength for the sprockets.

5.1.2 Dimensions of teeth

The dimensions of the teeth shall comply with the requirements of either 5.2 or 5.3, according to the application and the method of manufacture.

5.1.3 Marking

It is recommended that the sprockets be marked with the following information:

a) manufacturer's name or trademark;

b) number of teeth;

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

5.2 Dimensions of teeth on general purpose sprockets with cast or flame cut tooth profiles

5.2.1 Tooth form

The teeth shall have the form shown in figure 8, with the dimensions given in tables 7 and 8.

5.2.2 Tooth profile

The teeth shall have the profile shown in figure 9 and the dimensions given in table 9.

5.2.3 Root diameter, d_f

The root diameters shall be in accordance with table 10. They shall be checked by using the measurement over pins procedure, given in annex A, with the measuring pins touching the working faces of the teeth.

5.2.4 Shroud diameter, d_g

The maximum diameter of the shroud, given in figure 9 and table 9, shall be determined from the following formula:

$$d_g = p \cot \frac{180°}{z} - 1{,}04\, h_2 - 0{,}76 \text{ mm}$$

where

h_2 is the plate depth in accordance with table 1, in millimetres;

p is the chain pitch, in millimetres;

z is the number of teeth.

NOTE — This formula assumes the use of plates with a straight form.

5.2.5 Tip diameter, d_a

5.2.5.1 The tip diameter shall be determined from the following formula:

$$d_a = d_f + 2h$$

where

d_f is the root diameter of the teeth, in millimetres;

h is the tooth depth, in millimetres.

5.2.5.2 When slats or other devices are fastened to K attachments and pass over the tips of the teeth, the maximum tip diameter of the sprocket, given in figure 9 and in table 9, shall be determined from the following formula:

$$d_{a,max} = p \cot \frac{180°}{z} + 1{,}84\, h_4$$

where

h_4 is the platform height of K attachments in accordance with tables 4 and 5, in millimetres.

p is the chain pitch, in millimetres;

z is the number of teeth.

5.2.6 Tolerances

The dimensions in tables 7 to 10 are subject to the limits of tolerance that would be obtainable with industrial casting techniques, except for the following:

a) tooth width: $b_{f1} \pm 5$ %;

b) tooth depth: $h\ ^{0}_{-10}$ %;

c) root diameter d_f in accordance with table 11;

NOTE — For applications where some build-up of foreign matter in the roller seating pocket is encountered, the lower ranges of the root diameter tolerances may be used, widening, if necessary, the tolerance for root diameter for

$d_f \leqslant 250$ mm to a tolerance of $^{0}_{-3}$ mm.

The sides of the roller seating can also be relieved.

5.3 Dimensions of sprockets with machined tooth forms and profiles

5.3.1 Tooth form

The tooth form shall be that which would be produced by rotary tooth form cutters used in the manufacture of transmission roller chain sprockets in accordance with ISO 606, with the same number of teeth and the same roller diameter, or, if there is none, with the nearest larger roller diameter.

NOTE — This description does not exclude other methods of manufacturing the same tooth form.

5.3.2 Tooth profile

The teeth shall have a profile in accordance with the dimensions given in table 9.

5.3.3 Root diameter, d_f

The requirements of 5.2.3 shall apply.

5.3.4 Blank diameter

5.3.4.1 The blank diameter of the sprocket, i.e. the diameter to which the blank is produced and which equals the tip diameter of the finished sprocket, shall be determined from the following formula:

$$d_a = d_f + 2h$$

where

d_f is the root diameter taken from table 10, in millimetres;

h is the tooth depth taken from table 9, in millimetres.

5.3.4.2 When slats or other devices fixed to K attachments pass over the tips of the teeth, then the dimension $d_{a,max}$ shall be determined in accordance with 5.2.5.2.

5.3.5 Shroud diameter, d_g

The requirements of 5.2.4 shall apply.

5.3.6 Tolerances

The major dimensions are subject to the following limits of tolerance:

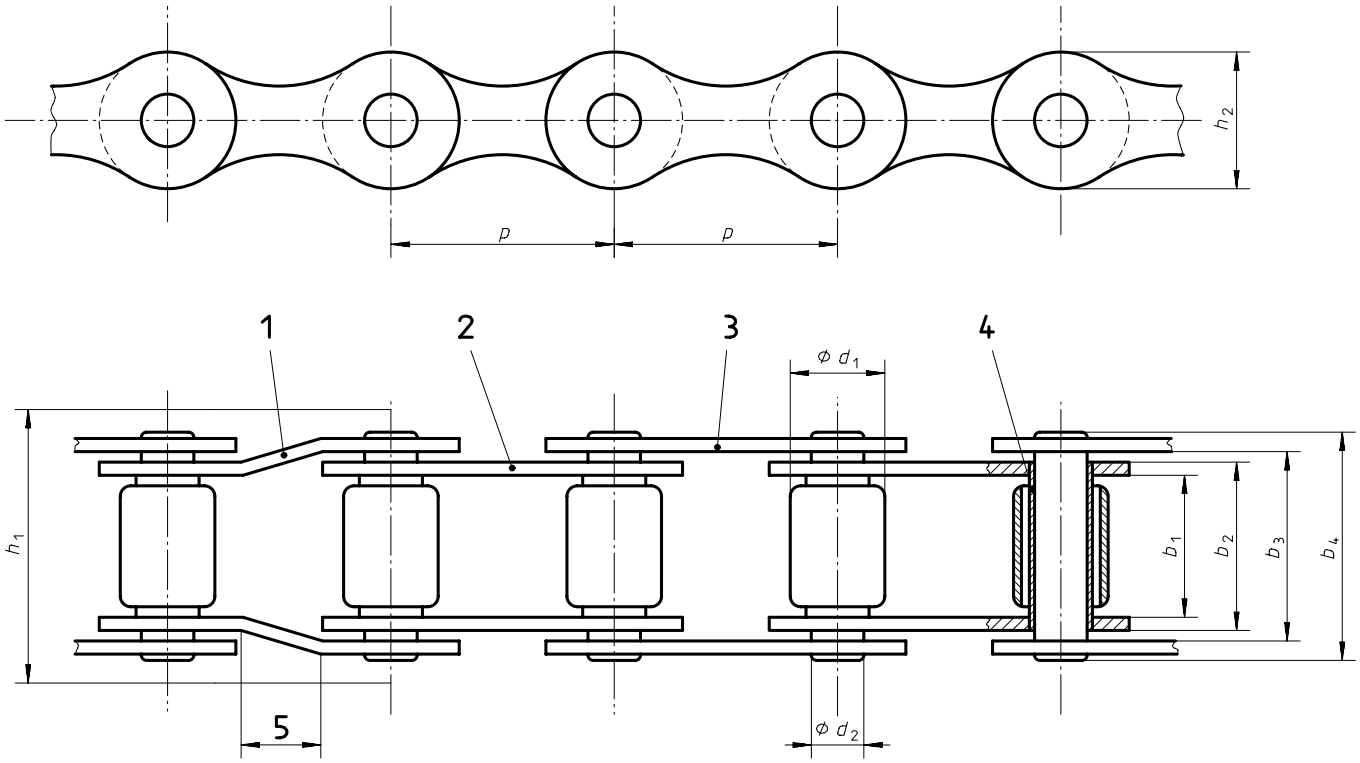
a) tooth width, b_{f1}, (see table 9): ± 1,5 %;

b) root diameter, d_f, (see table 10): $^{0}_{-0,2}$ %, subject to a maximum of:

1) – 0,51 mm for $d_f \geqslant 127$ mm,

2) – 0,25 mm for $d_f < 127$ mm;

c) blank and tip diameter d_a: double the limits specified for root diameter d_f.



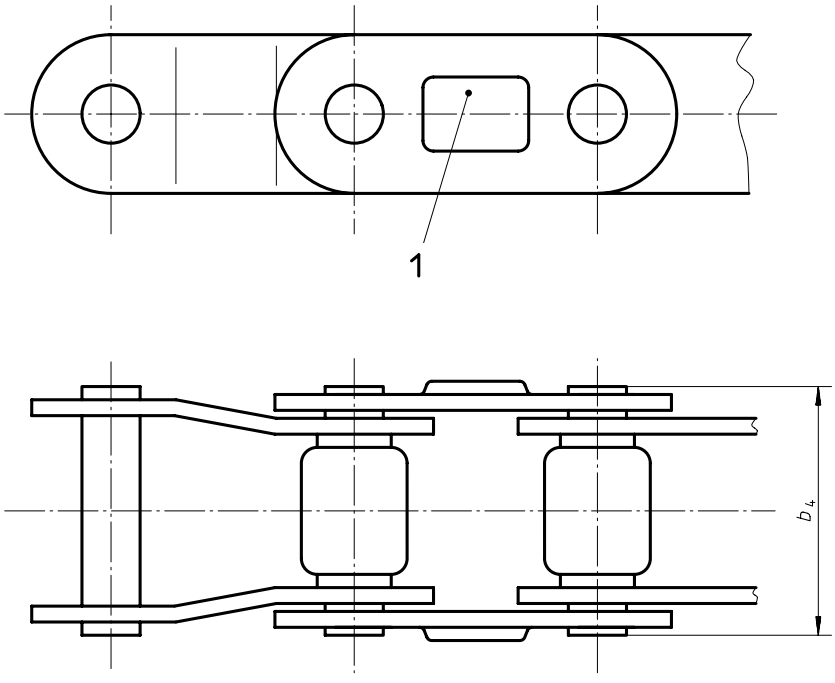
Key

1 Cranked link
2 Inner link
3 Outer link
4 Bush
5 Length of crank (see 3.7)

NOTES

1) The illustrations do not define the actual form of the chain plates, pins, bushes and rollers.
2) For dimensions, see table 1.

Figure 1 — Type S chain characteristics



Key

1 Optional embossing, the height of which is greater than the projection of the rivetted pin b_4

NOTE — The illustrations do not define the actual form of the chain plates, pins, bushes and rollers.

Figure 2 — Type C chain — Additional characteristics

Table 1 — Chain dimensions, measuring forces and minimum tensile strengths

ISO chain number	Pitch	Roller diameter	Width between inner plates	Width between outer plates	Plate depth	Bearing pin body diameter	Width over inner link	Width over bearing pins	Width over detachable joint	Measuring force	Minimum tensile strength
	p	d_1	b_1	b_3	h_2	d_2	b_2	b_4	h_1		
		max.	min	min.	max.	max.	max.	max.	max.		
	mm	mm	mm	mm	mm	mm	mm	mm	mm	kN	kN
S32	29,21	11,43	15,88	20,57	13,5	4,47	20,19	26,7	31,8	0,13	8
S32-H	29,21	11,43	15,88	20,57	13,5	4,47	20,19	26,7	31,8	0,13	17,5
S42	34,93	14,27	19,05	25,65	19,8	7,01	25,4	34,3	39,4	0,22	26,7
S42-H	34,93	14,27	19,05	25,65	19,8	7,01	25,4	34,3	39,4	0,22	41
S45	41,4	15,24	22,23	28,96	17,3	5,74	28,58	38,1	43,2	0,22	17,8
S45-H	41,4	15,24	22,23	28,96	17,3	5,74	28,58	38,1	43,2	0,22	32
S52	38,1	15,24	22,23	28,96	17,3	5,74	28,58	38,1	43,2	0,22	17,8
S52-H	38,1	15,24	22,23	28,96	17,3	5,74	28,58	38,1	43,2	0,22	32
S55	41,4	17,78	22,23	28,96	17,3	5,74	28,58	38,1	43,2	0,22	17,8
S55-H	41,4	17,78	22,23	28,96	17,3	5,74	28,58	38,1	43,2	0,22	32
S62	41,91	19,05	25,4	32	17,3	5,74	31,8	40,6	45,7	0,44	26,7
S62-H	41,91	19,05	25,4	32	17,3	5,74	31,8	40,6	45,7	0,44	32
S77	58,34	18,26	22,23	31,5	26,2	8,92	31,17	43,2	52,1	0,56	44,5
S77-H	58,34	18,26	22,23	31,5	26,2	8,92	31,17	43,2	52,1	0,56	80
S88	66,27	22,86	28,58	37,85	26,2	8,92	37,52	50,8	58,4	0,56	44,5
S88-H	66,27	22,86	28,58	37,85	26,2	8,92	37,52	50,8	58,4	0,56	80
C550	41,4	16,87	19,81	26,16	20,2	7,19	26,04	35,6	39,7	0,44	39,1
C550-H	41,4	16,87	19,81	26,16	20,2	7,19	26,04	35,6	39,7	0,44	57,8
C620	42,01	17,91	24,51	31,72	20,2	7,19	31,6	42,2	46,8	0,44	39,1
C620-H	42,01	17,91	24,51	31,72	20,2	7,19	31,6	42,2	46,8	0,44	57,8

NOTES

1 The minimum bush bore is 0,1 mm larger than the maximum pin body diameter d_2.

2 Cranked links are not recommended for arduous applications.

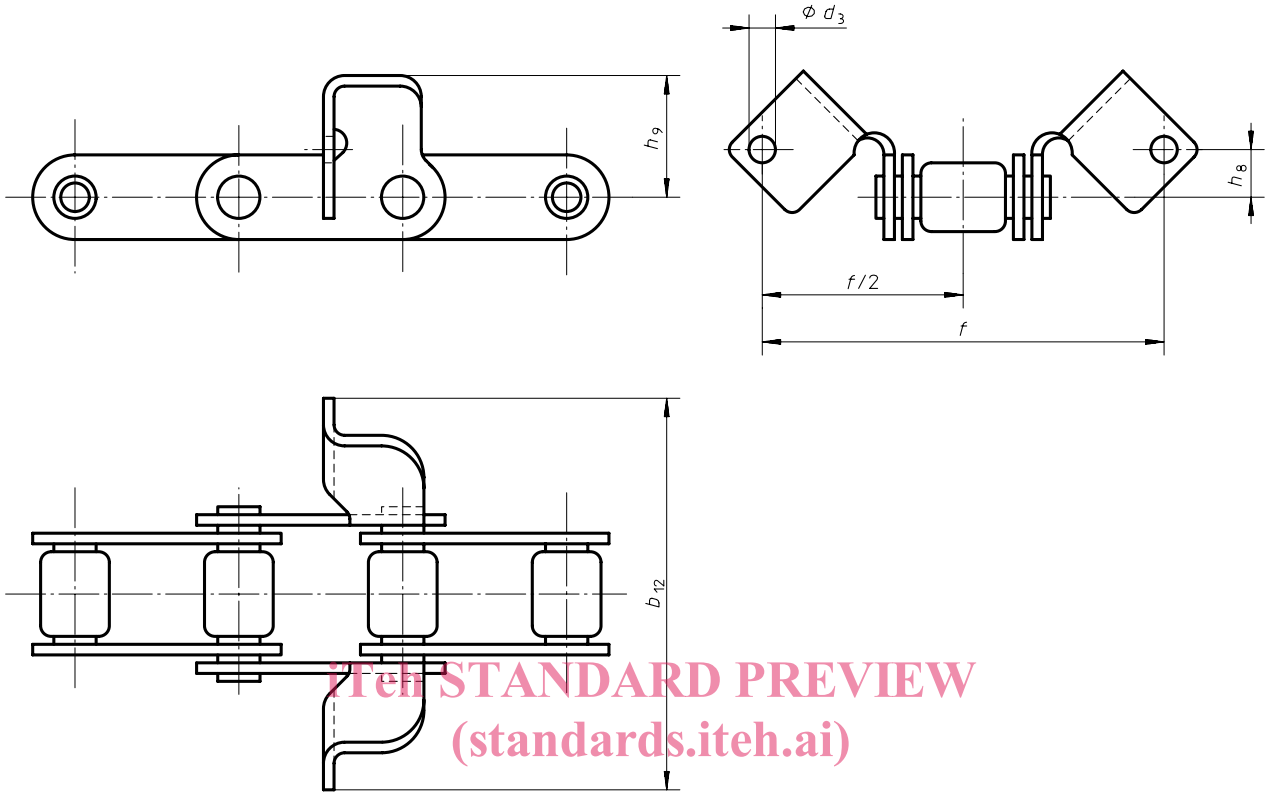


Figure 3 — F1 attachment plates

Table 2 — Dimensions of F1 attachment plates for type C chains

Dimensions in millimetres

	f	b_{12} max.	d_3 min.	h_8	h_9 max.
C550	79,4	104,8	8,3	15,9	31,8

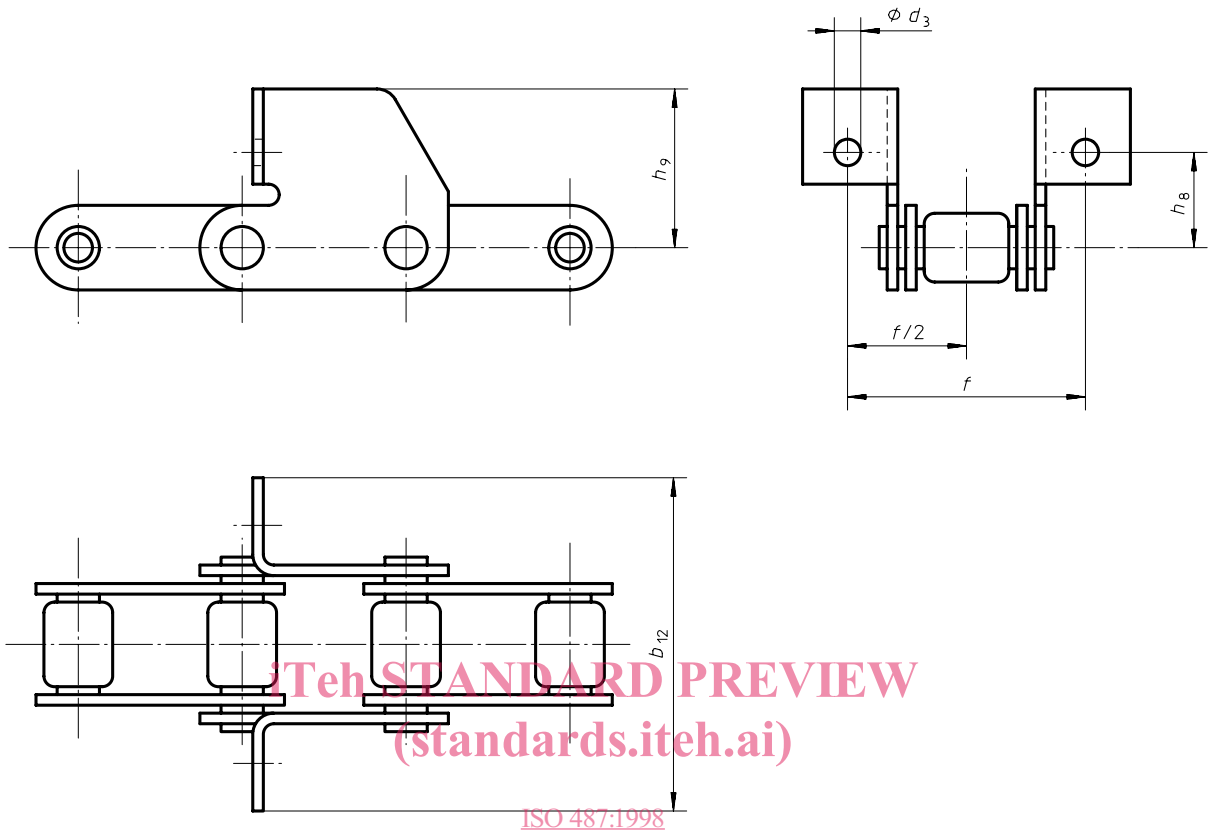


Figure 4 — F4 attachment plates

Table 3 — Dimensions of F4 attachment plates for type C chains

Dimensions in millimetres

ISO chain number	Transverse pitch for bolts	Width over attachment plate b_{12} max.	Bolt hole diameter d_3 min.	Height of bolt hole centre h_8	Overall height h_9 max.
C550	47,6	68,2	8,7	31	43,2
S45	58	90	6,5	20	30,9
S55	58	90	6,5	20	30,9