

International Standard



487

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

**Steel roller chains, types S and C, attachments
and chain wheels***Chaînes à rouleaux en acier, types C et C, plaques-attaches et roues dentées***Second edition — 1984-09-01**3^e édition en 1998

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Steel roller chains, types S and C, attachments and chain wheels

1 Scope and field of application

This International Standard specifies the characteristics of a range of steel roller chains dimensionally derived from the malleable iron type, suitable for conditions of operation and maintenance prevailing in such fields as agriculture, building, quarrying and related industry, mechanical handling, etc., together with associated chain wheels. The dimensions are given in inches and in millimetres; the latter are conversions from the basic inch dimensions.

2 References

ISO 185, *Grey cast iron — Classification*.¹⁾

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

3 Chains

3.1 Nomenclature

Figures 1 and 2 do not define the actual form of the chain plates.

3.2 Designation

Steel roller chains shall be designated by the standard ISO chain numbers as given in tables 1 and 1M.

3.3 Dimensions

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

3.4 Minimum ultimate tensile strength

3.4.1 The minimum ultimate tensile strength is the minimum strength of samples tested to destruction in tensile loading, as defined in 3.4.2. This strength is not a working load. It is in-

tended 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 load, not less than that specified in tables 1 and 1M, 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 load, i.e. the first crest on the load/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 minimum breaking load, it will have been stressed beyond the yield point and will be unfit for service.

3.5 Proof loading

All chains should be proof loaded during manufacture to at least one third of the minimum ultimate tensile load given in tables 1 and 1M.

3.6 Length

Finished chains shall be measured after proof loading (where applicable) but before lubricating.

The standard length for measurement shall be a minimum of 20 times the pitch with a maximum length of 1 524 mm (60 in), and shall terminate with an inner link at each end.

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

To comply with this International Standard, the length shall be the nominal length subject to the limits of tolerance $+ \frac{0,25}{0} \%$.

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

1) At present at the stage of draft. (Revision of ISO/R 185-1961.)

3.7 Bearing pin

The bearing pin ends shall be rivetted on all outer links. A detachable link may, however, be used for connecting the ends of the chain, where the use of a rivetted link is inconvenient.

3.8 Cranked link

To obtain an odd number of pitches in a chain, a cranked link is required. The crank shall be central between pins. Using the symbols of tables 1 and 1M, its length shall not exceed $p - 1,15 h_2$.

Attachment plates shall not be part of a cranked link.

3.9 Marking

The chain should be marked with

- the manufacturer's name or trade mark;
- the ISO chain number (see column 1 of tables 1 and 1M).

4 Attachment plates and links

The four basic types of attachment plates and links covered by this International Standard are as follows:

4.1 C11, C13, C17 and C117 attachment links

Attachment links which form a 'tooth' or 'beak' on the chain for use in harvesting machines, for example corn picking. The dimensions shall conform to those specified in tables 2, 2M, 3 and 3M.

4.2 F1 and F4 attachment plates

Attachment plates which form a vertical platform to serve as a pusher. Each attachment plate accepts one fixing bolt for this purpose. The dimensions shall conform to those specified in tables 4, 4M, 5 and 5M.

4.3 K1 and K8 attachment plates

Attachment plates which form a platform suitable to accommodate slats and similar attachments. Each attachment plate accepts one fixing bolt for this purpose. Dimensions shall conform to those specified in tables 6, 6M, 7, 7M, 8 and 8M.¹⁾

The maximum length of K1 and K8 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 tables 1 and 1M).

1) The dimensions not specified in these tables are at the discretion of the manufacturer.

4.4 M1 attachment plates

Attachment plates which serve as pushers or to accept staybars and similar attachments. The dimensions shall conform to those specified in tables 9 and 9M.

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 Chain wheels

5.1 General

5.1.1 Materials

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

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, as agreed between purchaser and wheel manufacturer.

5.1.3 Range of teeth

This International Standard applies primarily to the following range of teeth:

- preferred: 7, 9, 11, 13, 15, 17, 18, 27 and 30;
- non-preferred: 6, 8, 10, 12, 14, 16 and 34.

5.1.4 Marking

Chain wheels shall be marked with:

- the manufacturer's name or trademark;
- the number of teeth;
- the chain designation.

5.2 Dimensions of teeth on general purpose chain wheels

5.2.1 Tooth form

The teeth shall have the form illustrated in figure 11, with the dimensions given in tables 10, 11 and 11M.

5.2.2 Tooth profile

The teeth shall have the profile and the dimensions given in tables 12 and 12M.

5.2.3 Root diameter, d_f

The root diameters shall be as stated in tables 13 and 13M. They should be checked by using the measurement over pins procedure, given in the annex, 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 12 and tables 12 and 12M, shall be determined from the following formula:

$$d_g = p \cot \frac{180^\circ}{z} - 1,04 h_2 - 0,030 \text{ in}$$

(where p and h_2 are expressed in inches)

or

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

(where p and h_2 are expressed in millimetres)

where

h_2 is the plate depth, in accordance with tables 1 and 1M;
 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

The maximum tip diameter, given in figure 12 and in tables 12 and 12M, shall be determined from the following formula:

$$d_a \text{ max.} = p \cot \frac{180^\circ}{z} + 1,84 h_4$$

where

h_4 is the platform height of K attachments in accordance with tables 6, 6M, 7, 7M, 8 and 8M;
 z is the number of teeth.

NOTE — This formula assumes the presence of slats fastened to the K attachments and passing over the tip of the teeth.

5.2.6 Tolerances

The dimensions in tables 10 to 13M are subject to the limits of tolerance that would be obtainable with industrial casting techniques, except for the following:

- tooth width: $b_{f1} \pm 5 \%$.
- tooth depth: $h - \frac{0}{10} \%$
- root diameter d_f : in accordance with tables 14 and 14M.

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

- $d_f < 10$ in to a tolerance of $-\frac{0}{0,125}$ in;
- $d_f < 250$ mm to a tolerance of $-\frac{0}{3}$ mm.

The sides of the roller seating can also be relieved.

5.3 Dimensions of teeth on precision chain wheels

5.3.1 Tooth form

The tooth form shall be that which would be produced by rotary tooth form cutters as used in the manufacture of transmission roller chain wheels, to ISO 606, with the same number of teeth and the same roller diameter, or, if there is no such size, of 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 tables 12 and 12M.

5.3.3 Root diameter, d_f

The requirements of 5.2.3 shall apply.

5.3.4 Blank diameter

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

$$d_a = d_f + 2 h$$

where

d_f is the root diameter taken from tables 14 and 14M;
 h is the depth taken from tables 12 and 12M.

5.3.5 Shroud diameter, d_g

The requirements of 5.2.4 shall apply.

5.3.6 Tip diameter, d_a

The requirements of 5.2.5 shall apply.

5.3.7 Tolerances

The major dimensions are subject to limits of tolerance as follows:

- tooth width, b_{f1} , (see tables 12 and 12M): $\pm 1,5 \%$;
- root diameter, d_f , (see tables 13 and 13M): $-\frac{0}{0,2} \%$,

subject to a maximum of:

- 1) $-0,020$ in ($-0,51$ mm) for $d_f \geq 5$ in (127 mm),
- 2) $-0,010$ in ($-0,25$ mm) for $d_f < 5$ in (127 mm);
- c) blank and tip diameter d_a : double the limits specified for root diameter d_f .

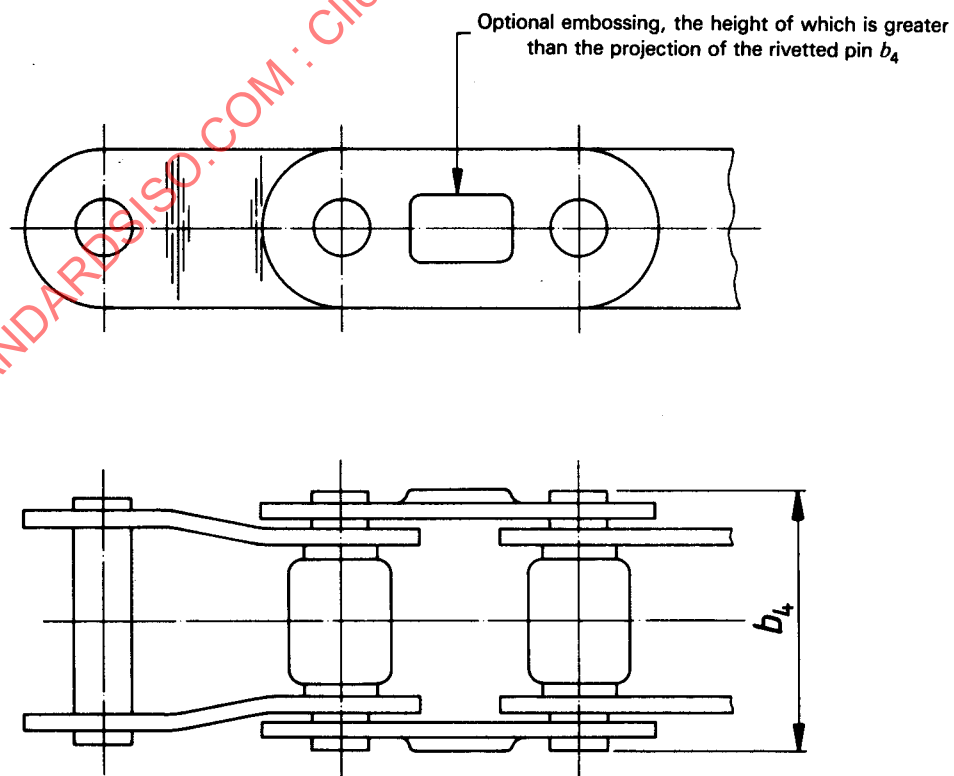
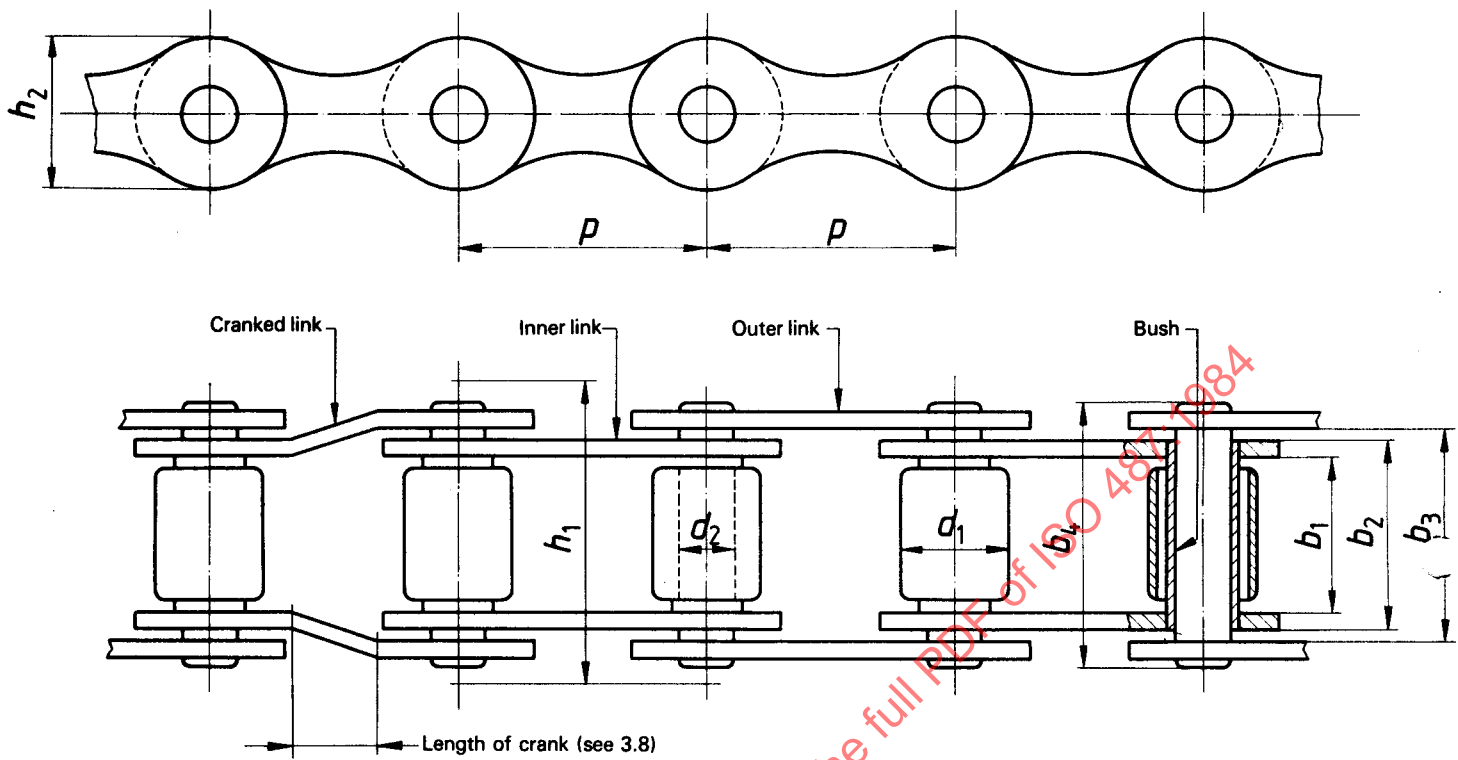


Table 1 — Chain dimensions, measuring loads and breaking loads (Inch-pound units)

ISO chain number	Pitch	Roller diameter	Width between inner plates	Width between outer plates	Plate depth	Bearing pin body diameter	Width over			Measuring load	Ultimate tensile load
	p	d_1	b_1	b_3	h_2	d_2	inner link b_2	bearing pins b_4	detachable joint h_1		
	in	in	in	in	in	in	in	in	in	lbf	lbf
S32	1.150	0.450	0.625	0.81	0.53	0.176	0.795	1.05	1.25	30	1 800
S42	1.375	0.562	0.750	1.01	0.78	0.276	1.000	1.35	1.55	50	6 000
S45	1.630	0.600	0.875	1.14	0.68	0.226	1.125	1.50	1.70	50	4 000
S52	1.500	0.600	0.875	1.14	0.68	0.226	1.125	1.50	1.70	50	4 000
S55	1.630	0.700	0.875	1.14	0.68	0.226	1.125	1.50	1.70	50	4 000
S62	1.650	0.750	1.000	1.26	0.68	0.226	1.252	1.60	1.80	100	6 000
S77	2.297	0.719	0.875	1.24	1.03	0.351	1.227	1.70	2.05	125	10 000
S88	2.609	0.900	1.125	1.49	1.03	0.351	1.477	2.00	2.30	125	10 000
C550	1.630	0.664	0.780	1.030	0.794	0.283	1.025	1.400	1.550	100	8 800
C620	1.654	0.705	0.965	1.249	0.794	0.283	1.244	1.660	1.810	100	8 800

Table 1M — Chain dimensions, measuring loads and breaking loads (Metric units)

ISO chain number	Pitch	Roller diameter	Width between inner plates	Width between outer plates	Plate depth	Bearing pin body diameter	Width over			Measuring load	Ultimate tensile load
	p	d_1	b_1	b_3	h_2	d_2	inner link b_2	bearing pins b_4	detachable joint h_1		
	mm	mm	mm	mm	mm	mm	mm	mm	mm	daN	daN
S32	29,21	11,43	15,88	20,57	13,5	4,47	20,19	26,7	31,8	13	800
S42	34,93	14,27	19,05	25,65	19,8	7,01	25,40	34,3	39,4	22	2 670
S45	41,40	15,24	22,23	28,96	17,3	5,74	28,58	38,1	43,2	22	1 780
S52	38,10	15,24	22,23	28,96	17,3	5,74	28,58	38,1	43,2	22	1 780
S55	41,40	17,78	22,23	28,96	17,3	5,74	28,58	38,1	43,2	22	1 780
S62	41,91	19,05	25,40	32,00	17,3	5,74	31,80	40,6	45,7	44	2 670
S77	58,34	18,26	22,23	31,50	26,2	8,92	31,17	43,2	52,1	56	4 450
S88	66,27	22,86	28,58	37,85	26,2	8,92	37,52	50,8	58,4	56	4 450
C550	41,40	16,87	19,81	26,16	20,2	7,19	26,04	35,6	39,4	44	3 910
C620	42,01	17,91	24,51	31,72	20,2	7,19	31,60	42,2	46,0	44	3 910

NOTE — The minimum bush bore is 0,1 mm (0.004 in) larger than the maximum pin body diameter d_2 .

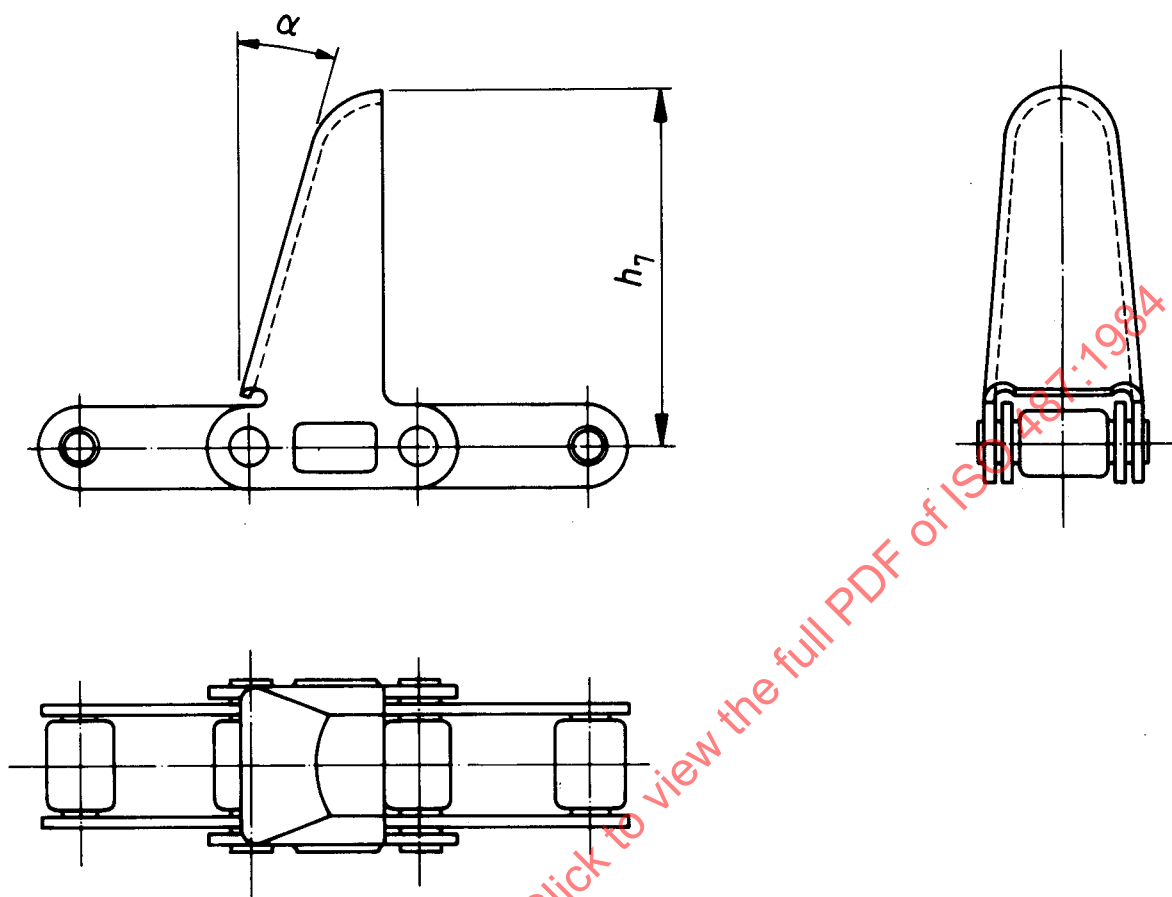


Figure 3 — C11 and C13 attachment links

Table 2 — Dimensions of C11 and C13 attachment links for type C chains (in inches)

ISO chain number	Attachment link type	Face angle α°	Overall height h_7
C550	C11	15 to 17	2.500
C550	C13	15	3.625

Table 2M — Dimensions of C11 and C13 attachment links for type C chains (in millimetres)

ISO chain number	Attachment link type	Face angle α°	Overall height h_7
C550	C11	15 to 17	63,5
C550	C13	15	92,1

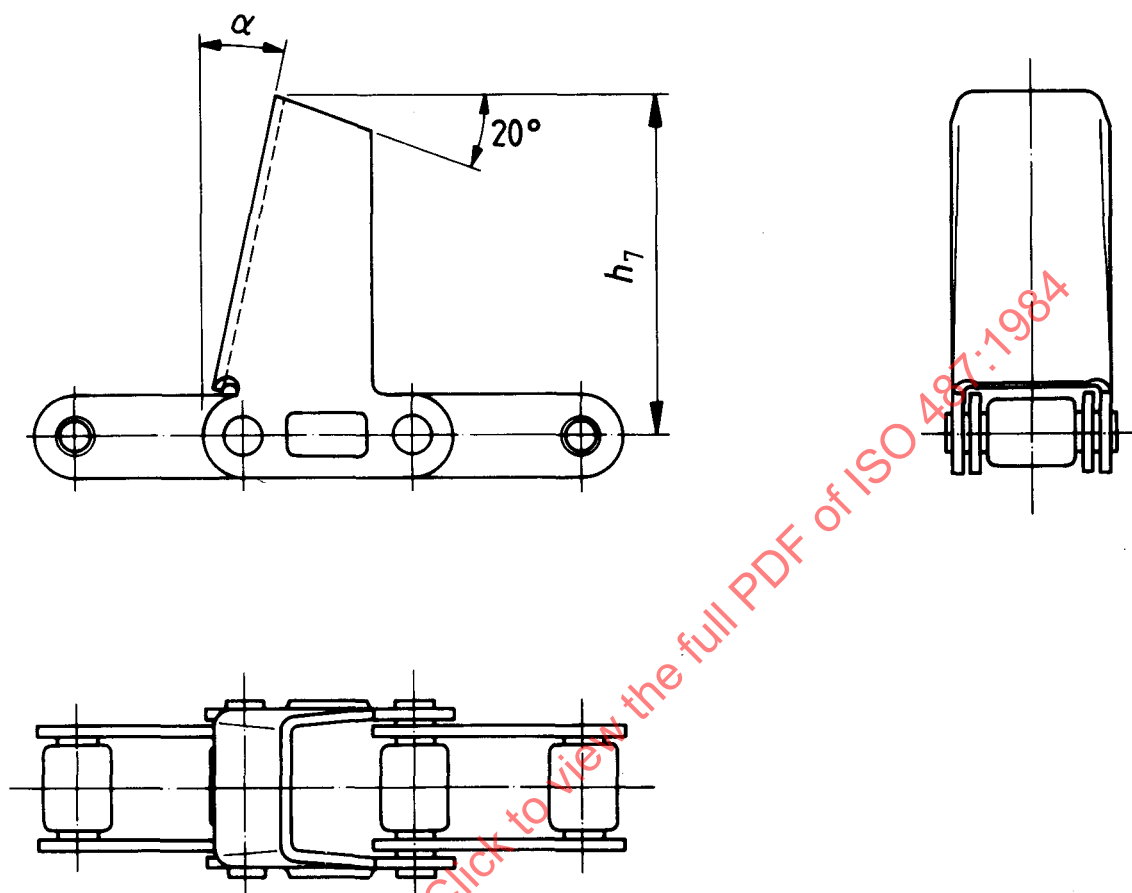


Figure 4 — C17 and C117 attachment links

Table 3 — Dimensions of C17 and C117 attachment links for type C chains (in inches)

ISO chain number	Attachment link type	Face angle α°	Overall height h_7
C550	C17	15 to 20	3.000
C550	C117	15	2.500

Table 3M — Dimensions of C17 and C117 attachment links for type C chains (in millimetres)

ISO chain number	Attachment link type	Face angle α°	Overall height h_7
C550	C17	15 to 20	76,2
C550	C117	15	63,5

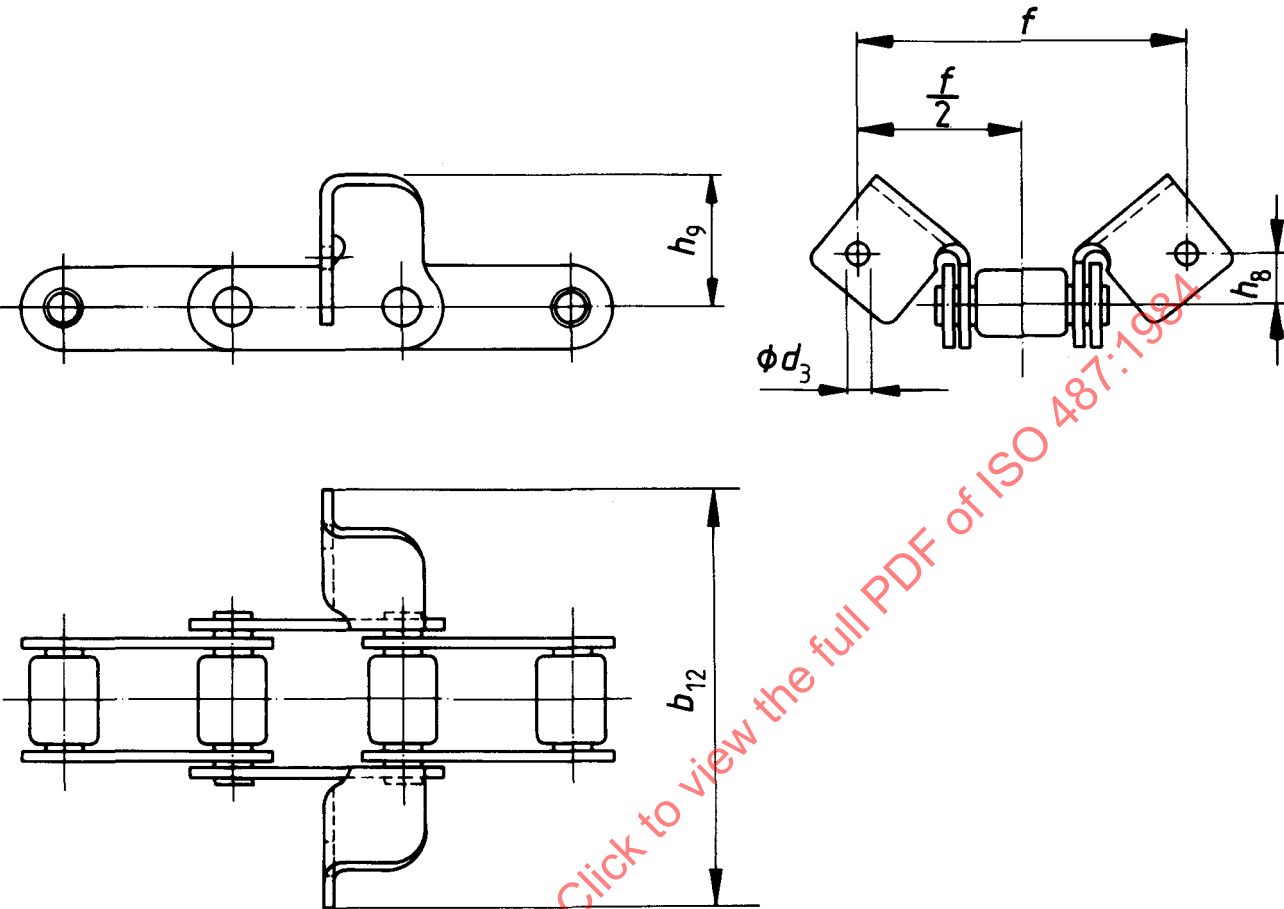


Figure 5 — F1 attachment plates

Table 4 — Dimensions of F1 attachment plates for type C chains (in inches)

ISO chain number	Transverse pitch for bolts f	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	3.125	4.125	0.328	0.625	1.250

Table 4M — Dimensions of F1 attachment plates for type C chains (in millimetres)

ISO chain number	Transverse pitch for bolts f	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	79,4	104,8	8,3	15,9	31,8

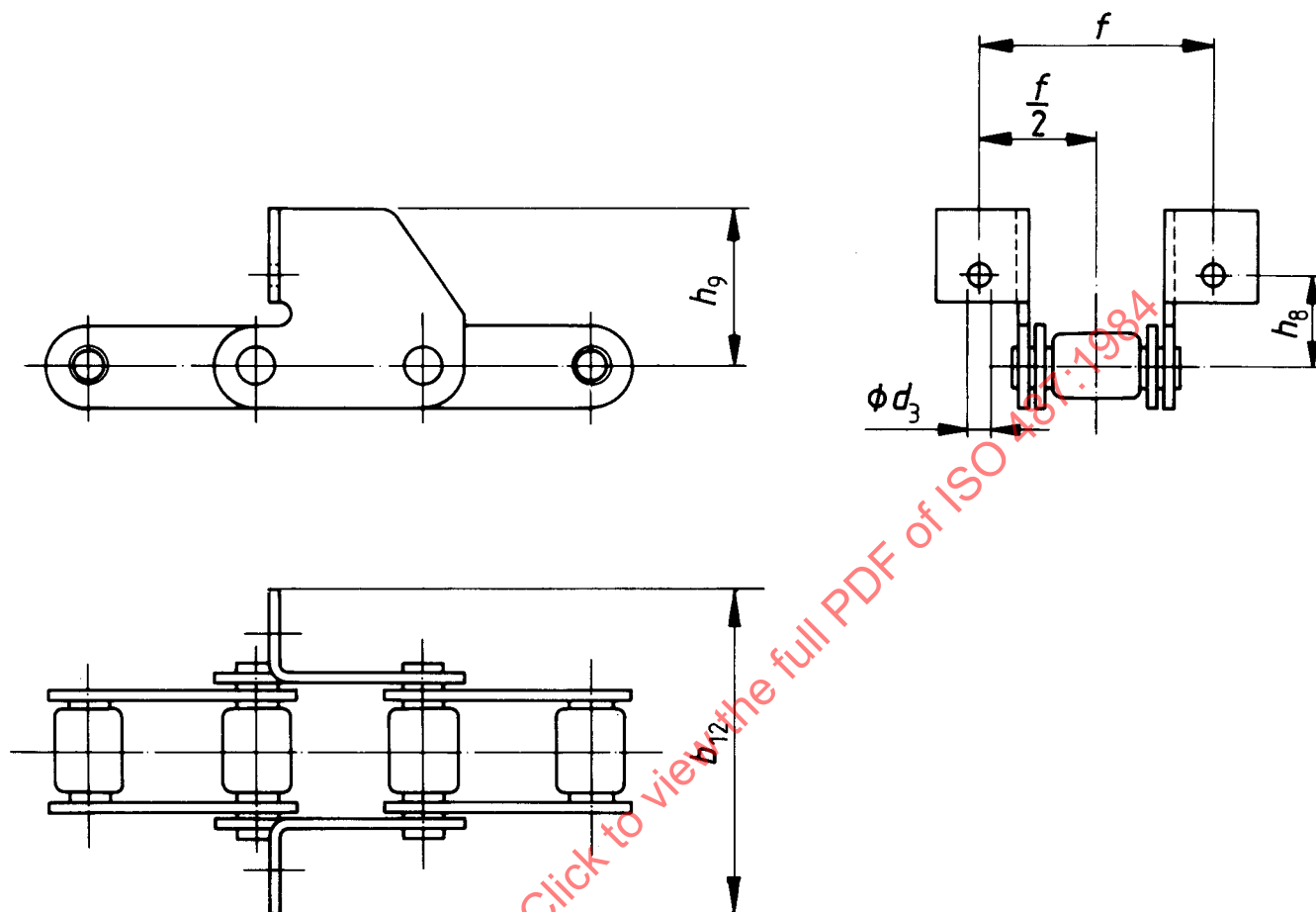


Figure 6 — F4 attachment plates

Table 5 — Dimensions of F4 attachment plates for type C chains (in inches)

ISO chain number	Transverse pitch for bolts f	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	1.875	2.688	0.344	1.219	1.688

Table 5M — Dimensions of F4 attachment plates for type C chains (in millimetres)

ISO chain number	Transverse pitch for bolts f	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	31,0	42,9

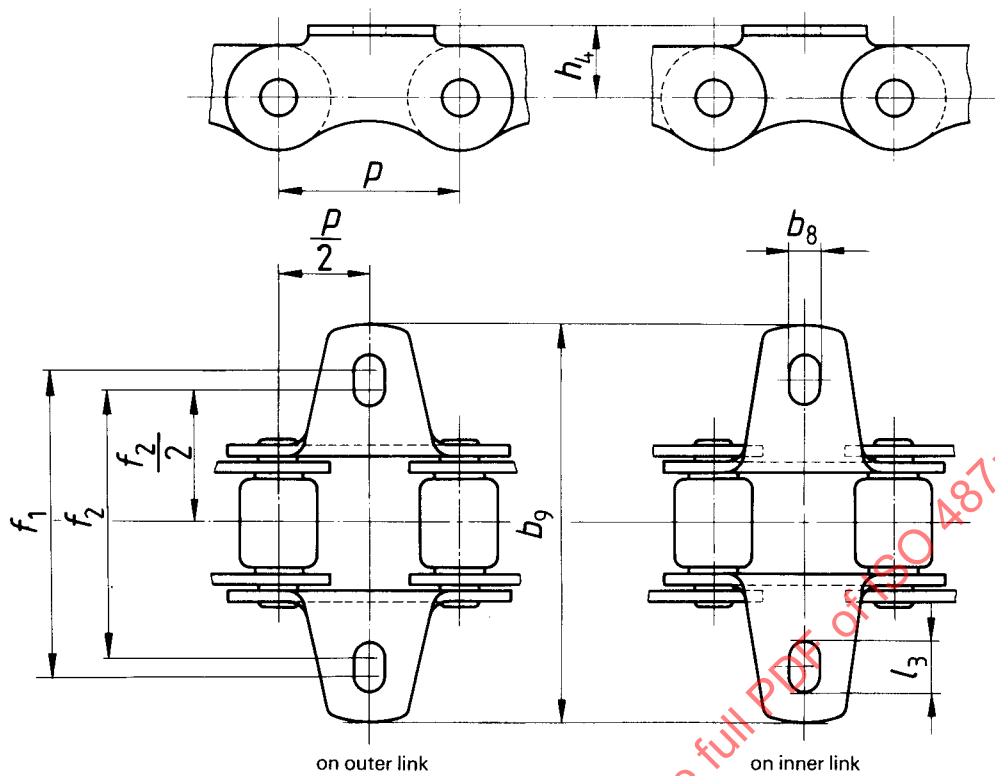


Figure 7 — K1 attachment plates for type S chains

Table 6 — Dimensions of K1 attachment plates for type S chains (in inches)

ISO chain number	Transverse pitch for bolts ¹⁾		Slot width	Slot length	Width over attachment	Platform height
	f_1 max.	f_2 min.	b_8 min.	l_3 min.	b_9 max.	h_4
S32	1.750	1.625	0.209	0.272	2.40	0.34
S42	2.250	2.000	0.328	0.453	2.95	0.55
S45	2.250	2.000	0.328	0.453	2.95	0.45
S52	2.375	2.250	0.328	0.390	3.05	0.45
S55	2.250	2.000	0.328	0.453	2.95	0.45
S62	2.875	2.375	0.328	0.579	3.75	0.45
S77	3.125	2.875	0.328	0.453	4.00	0.82
S88	3.875	3.750	0.328	0.390	4.70	0.82

Table 6M — Dimensions of K1 attachment plates for type S chains (in millimetres)

ISO chain number	Transverse pitch for bolts ¹⁾		Slot width	Slot length	Width over attachment	Platform height
	f_1 max.	f_2 min.	b_8 min.	l_3 min.	b_9 max.	h_4
S32	44,5	41,3	5,3	6,9	61,0	8,6
S42	57,2	50,8	8,3	11,5	74,9	14,0
S45	57,2	50,8	8,3	11,5	74,9	11,4
S52	60,3	57,2	8,3	9,9	77,5	11,4
S55	57,2	50,8	8,3	11,5	74,9	11,4
S62	73,0	60,3	8,3	14,7	95,3	11,4
S77	79,4	73,0	8,3	11,5	101,6	20,8
S88	98,4	95,3	8,3	9,9	119,4	20,8

1) Centre distance of slots in attachment plates = $\frac{f_1 + f_2}{2}$ nominal. These slots are to provide clearance over bolts, in associated fittings, which can vary in transverse pitch from f_1 to f_2 .

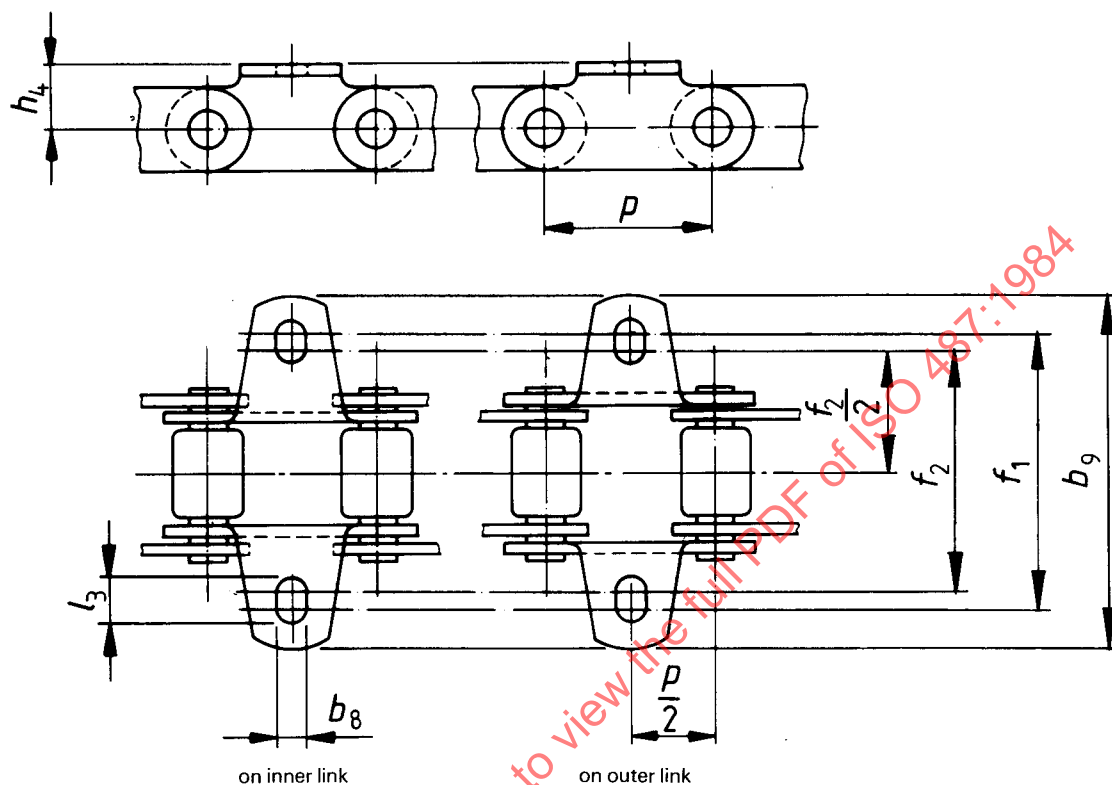


Figure 8 — K1 attachment plates for type C chains

Table 7 — Dimensions of K1 attachment plates for type C chains (in inches)

ISO chain number	Transverse pitch for bolts ¹⁾		Slot width b_8 min.	Slot length l_3 min.	Width over attachment b_9 max.	Platform height h_4
	f_1 max.	f_2 min.				
C550	2.133	2.000	0.328	0.394	3.000	0.50

Table 7M — Dimensions of K1 attachment plates for type C chains (in millimetres)

ISO chain number	Transverse pitch for bolts ¹⁾		Slot width b_8 min.	Slot length l_3 min.	Width over attachment b_9 max.	Platform height h_4
	f_1 max.	f_2 min.				
C550	54,2	50,8	8,3	10,0	76,2	12,7

1) Centre distance of slots in attachment plates = $\frac{f_1 + f_2}{2}$ nominal. These slots are to provide clearance over bolts, in associated fittings, which can vary in transverse pitch from f_1 to f_2 .

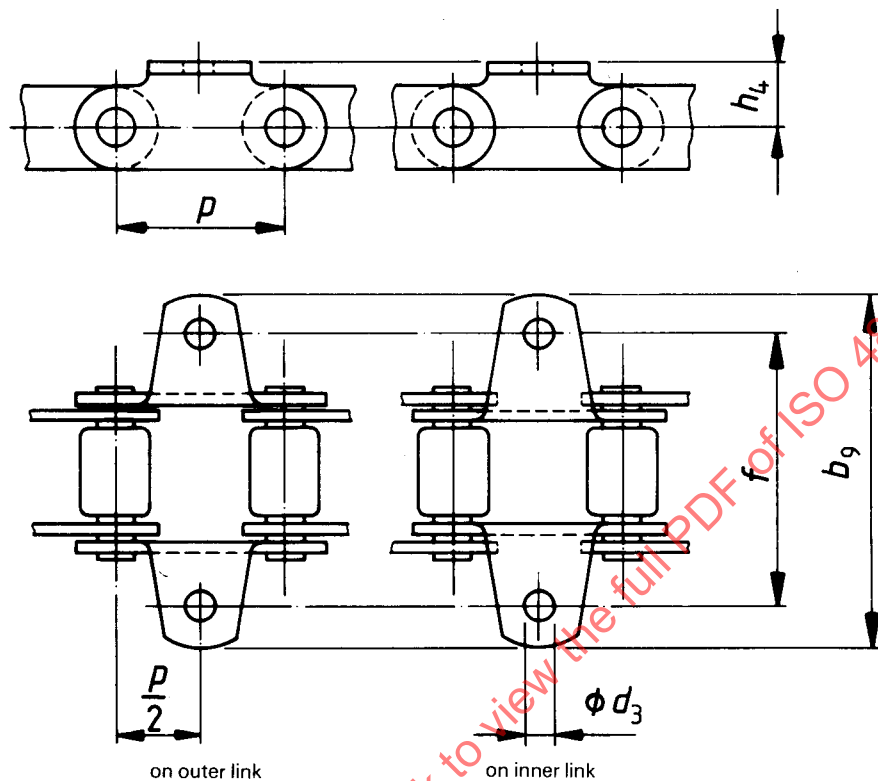


Figure 9 — K8 attachment plates

Table 8 — Dimensions of K8 attachment plates
for type C chains (in inches)

ISO chain number	Transverse pitch for bolts f	Bolt hole diameter d_3 min.	Width over attachment b_9 max.	Platform height h_4
C550	2.000	0.266	3.000	0.50

Table 8M — Dimensions of K8 attachment plates
for type C chains (in millimetres)

ISO chain number	Transverse pitch for bolts f	Bolt hole diameter d_3 min.	Width over attachment b_9 max.	Platform height h_4
C550	50,8	6,7	76,2	12,7

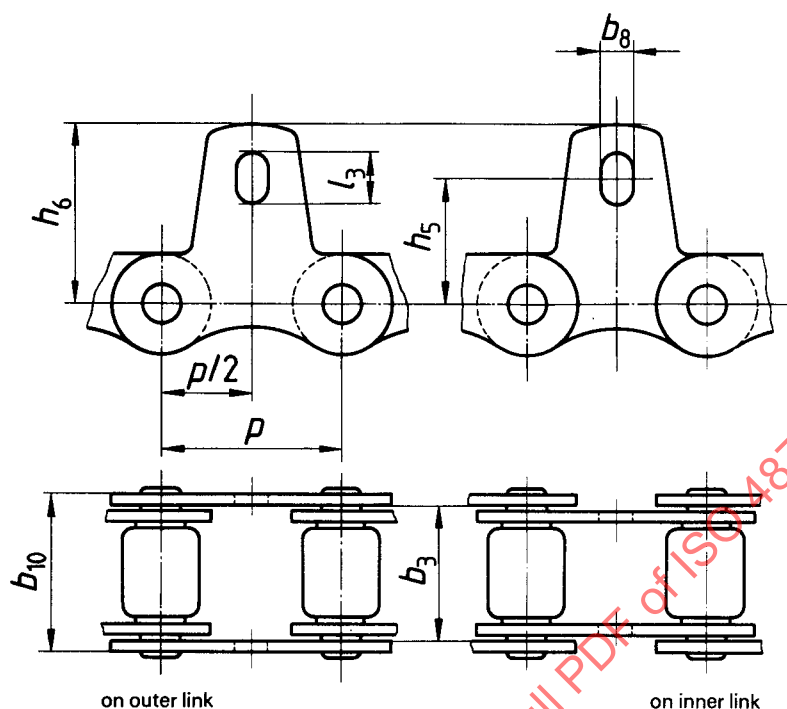


Figure 10 — M1 attachment plates

Table 9 — Dimensions of M1 attachment plates for type S chains (in inches)

ISO chain number	Height of slot centre h_5	Overall height h_6 max.	Slot width b_8 min.	Slot length l_3 min.	Width between outer plates b_3 min.	Width over outer plates b_{10} max.
S32	0.68	1.03	0.209	0.272	0.81	0.96
S42	0.93	1.35	0.328	0.453	1.01	1.25
S45	0.78	1.19	0.328	0.453	1.14	1.38
S52	0.87	1.25	0.328	0.390	1.14	1.38
S55	0.78	1.19	0.328	0.453	1.14	1.38
S62	0.97	1.52	0.328	0.579	1.26	1.50
S77	1.43	1.97	0.328	0.453	1.24	1.58
S88	1.72	2.19	0.328	0.390	1.49	1.83

Table 9M — Dimensions of M1 attachment plates type S chains (in millimetres)

ISO chain number	Height of slot centre h_5	Overall height h_6 max.	Slot width b_8 min.	Slot length l_3 min.	Width between outer plates b_3 min.	Width over outer plates b_{10} max.
S32	17,3	26,2	5,3	6,9	20,57	24,4
S42	23,6	34,3	8,3	11,5	25,65	31,8
S45	19,8	30,2	8,3	11,5	28,96	35,1
S52	22,1	31,8	8,3	9,9	28,96	35,1
S55	19,8	30,2	8,3	11,5	28,96	35,1
S62	24,6	38,6	8,3	14,7	32,00	38,1
S77	36,3	50,0	8,3	11,5	31,50	40,1
S88	43,7	55,6	8,3	9,9	37,85	46,5

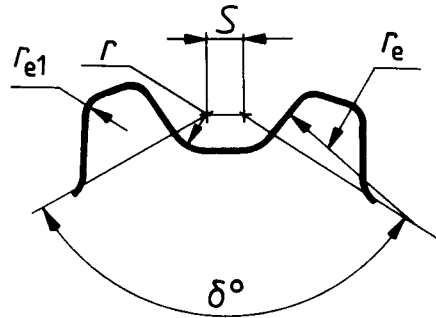


Figure 11 — Form of teeth on general purpose chain wheels and key to tables 10, 11 and 11M

Table 10 — Included angle of teeth of general purpose chain wheels (see figure 11)

Number of teeth z	Included angle δ°
6	100
7	105
8	110
9	115
10	120
11 and over	125

Table 11 — Dimensions of tooth shape on general purpose chain wheels (in inches) (see figure 11)

ISO chain number	Tooth form							
	6, 7 and 8 teeth				9 teeth and over			
	r_e	$r^{1)}$ min.	$S^{1)}$	r_{e1}	r_e	$r^{1)}$ min.	$S^{1)}$ max.	r_{e1}
S32	0.73	0.20	0.25	0.10	0.85	0.20	0.25	0.10
S42	0.85	0.25	0.25	0.20	1.05	0.25	0.25	0.20
S45	1.05	0.25	0.40	0.20	1.15	0.25	0.40	0.20
S52	1.05	0.25	0.35	0.20	1.15	0.25	0.35	0.20
S55	1.15	0.30	0.35	0.20	1.30	0.30	0.35	0.20
S62	1.30	0.30	0.30	0.20	1.40	0.30	0.30	0.20
S77	1.40	0.30	0.55	0.20	1.35	0.30	0.55	0.20
S88	1.35	0.40	0.60	0.30	1.70	0.40	0.60	0.30
C550	1.14	0.28	0.37	0.20	1.30	0.219	0.41	0.20
C620	1.18	0.30	0.30	0.20	1.40	0.232	0.41	0.20

Table 11M — Dimensions of tooth shape on general purpose chain wheels (in millimetres) (see figure 11)

ISO chain number	Tooth form							
	6, 7 and 8 teeth				9 teeth and over			
	r_e	$r^{1)}$ min.	$S^{1)}$	r_{e1}	r_e	$r^{1)}$ min.	$S^{1)}$ max.	r_{e1}
S32	18,5	5,1	6,4	2,5	21,6	5,1	6,4	2,5
S42	21,6	6,4	6,4	5,1	26,7	6,4	6,4	5,1
S45	26,7	6,4	10,2	5,1	29,2	6,4	10,2	5,1
S52	26,7	6,4	8,9	5,1	29,2	6,4	8,9	5,1
S55	29,2	7,6	8,9	5,1	33,0	7,6	8,9	5,1
S62	33,0	7,6	7,6	5,1	35,6	7,6	7,6	5,1
S77	35,6	7,6	14,0	5,1	34,3	7,6	14,0	5,1
S88	34,3	10,2	15,2	7,6	43,2	10,2	15,2	7,6
C550	28,9	7,2	9,3	5,1	33,0	5,56	10,4	5,1
C620	30,0	7,6	7,6	5,1	35,6	5,89	10,4	5,1

1) These dimensions should meet the requirement: $S + 2r > d_1 + 0,05 p$ (where p is the chain pitch).