ASME B29.100-2011
(Revision of ASME B29.100-2002)

Double-Pitch Roller Chains, Attachments, and Sprockets

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

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The American Society of Mechanical Engineers
Three Park Avenue • New York, NY • 10016 USA

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The American Society of Mechanical Engineers
Three Park Avenue, New York, NY 10016-5990

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FOREWORD

For the first edition of ASME B29.100, the B29 Standards Committee agreed to propose a draft standard to consolidate and revise the following three chain standards: ASME B29.1M, Precision Power Transmission Roller Chains, Attachments, and Sprockets; ASME B29.3M, Double-Pitch Power Transmission Roller Chains and Sprockets; and ASME B29.4M, Double-Pitch Conveyor Roller Chains, Attachments, and Sprockets. The new standard was designated ASME B29.100-2002 and was approved as an American National Standard on April 3, 2002.

B29.3. For many years, roller chain manufacturers furnished for specific installations an economical power transmission chain differing only in pitch from the standardized series of transmission roller chains that conformed to American Standard ASA B29.1. Such practice became so common and the chains of such universal use that in 1948 the Roller Chain Technical Committee of the Association of Roller and Silent Chain Manufacturers, now known as the American Chain Association, developed standards that were submitted for adoption as American Standards.

This standard described a limited series of double-pitch power transmission roller chains that supplements the base chain series conforming to the standard B29.1. These chains differ from the base chains only in pitch, which is double that of the corresponding base chain. Supplementary information in Appendix A on speed and power transmission ratings indicated their special usefulness for drives operating at slow to moderate speeds, with moderate loads and long center distances.

ASME B29.3M-1994 incorporated a restatement of the definition of minimum ultimate tensile strength, and minor changes in the values for maximum pin diameter and minimum bushing inner diameter. The dimensional changes were to allow a direct error-free conversion from U.S. Customary inch units to SI (Metric) units. Similar changes were made in the International Standard ISO 1275. ASME B29.3M-1994 was approved by the American National Standards Institute on March 15, 1994.

ASME B29.100-2002 included three significant modifications to B29.3: a revision to the minimum ultimate tensile strength definition, the addition of the requirements for roller chain preloading, and the removal of some sprocket data that was identical to B29.1. The sprocket information sections were revised to reference the appropriate sections of B29.1 sprocket data.

B29.4. For many years, roller chain manufacturers have furnished a substantial volume of precision steel roller chains and sprockets of a limited series for specific conveying applications. Such chains consist of pins and bushings identical to American National Standard B29.1 transmission roller chains; rollers identical to or, alternatively, approximately twice as large in diameter as those of such transmission roller chains; and link plates with straight-edged contours, extended in pitch to be double the pitch of those of the corresponding transmission roller chains conforming to the latest edition of B29.1. (Such chains are referred to in this Standard as base series chains.)

These double-pitch steel conveyor chains have frequently been assembled with some parts of modified design to adapt the chains for use in conveying, elevating, or timing operations. The parts most commonly modified are pin link plates, roller link plates, and pins.

Previously, variation in link plate thickness, attachment link plate hole size and location, diameter and length of extension pins, and sprocket details caused lack of interchangeability and tended to restrict users to one source of supply. For these reasons, the Association of Roller and Silent Chain Manufacturers began to develop the B29.4 standard in 1947. It was approved as an American National Standard on May 30, 1972, and supplemented B29.1.

Nonmandatory Appendix A included suggestions on application and use of chains covered by this Standard. The information on conveyor capacity ratings indicated the special usefulness of these chains and attachment links for slow-speed conveyor applications.

ASME B29.4M-1994, which was approved by the American National Standards Institute on March 15, 1994, incorporated a restatement of the definition of minimum ultimate tensile strength, and minor changes in the values for maximum pitch diameter and minimum bushing inner diameter. The dimensional changes were to allow a direct error-free conversion from

U.S. Customary units to SI (Metric) units. Similar changes were made in the International Standard ISO 1275.

ASME B29.100-2002 included three significant modifications to B29.4: a revision to the minimum ultimate tensile strength definition, the addition that roller chains conforming to this standard should be preloaded at the discretion of the manufacturer or by agreement between the manufacturer and the user, and the removal of some sprocket data that was identical to B29.1. The sprocket information sections were revised to reference the appropriate sections of B29.1 sprocket data.

In 2008, the B29 Standards Committee agreed to remove the portion of the ASME B29.100 standard formerly known as ASME B29.1 from the incorporated standard. The former standards ASME B29.3 and ASME B29.4 were consolidated in ASME B29.100-2011. No changes were made to dimensional limits or capacities. Some text and several tables were merged to eliminate redundancies. ASME B29.100-2011 was approved as an American National Standard on November 16, 2011.

Dimensional limits in this Standard are presented in U.S. Customary inch–pound units. Companion tabulations are included to show conversions of the final limiting values into SI (Metric) units in accordance with ASME Guide SI-1, ASME Orientation and Guide for Use of SI (Metric) Units. Most formulas and relationships are intentionally presented only in U.S. Customary units, to preclude any ambiguity between them and the tabulated values.

In most respects, ASME B29.100-2011 is harmonized with ISO 1275. However, the B29 Standards Committee decided to maintain the separate B29.100 standard for the following two reasons:

(a) ISO permits only SI units to be shown in International Standards. The ANS chains and sprockets in this Standard were originally designed in U.S. Customary inch–pound units. Conversion to SI units and rounding before making critical calculations introduce deviations that can be detrimental to roller chain functioning.

(b) The ANS tooth form in ASME B29.100 fits within the ISO 1275 sprocket tooth form envelope, but the tooth form in ASME B29.100 is described in much more detail. Deviations from the ANS tooth form, but within the ISO 1275 envelope, can be detrimental to chain performance.

ASME B29 STANDARDS COMMITTEE
Chains, Attachments, and Sprockets for Power Transmission and Conveying

(The following is the roster of the Committee at the time of approval of this Standard.)

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Proposing Revisions. Revisions are made periodically to the Standard to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the Standard. Approved revisions will be published periodically.

The Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation.

Interpretations. Upon request, the B29 Committee will render an interpretation of any requirement of the Standard. Interpretations can only be rendered in response to a written request sent to the Secretary of the B29 Standards Committee.

The request for interpretation should be clear and unambiguous. It is further recommended that the inquirer submit his/her request in the following format:

Subject:	Cite the applicable paragraph number(s) and the topic of the inquiry.
Edition:	Cite the applicable edition of the Standard for which the interpretation is being requested.
Question:	Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for an approval of a proprietary design or situation. The inquirer may also include any plans or drawings that are necessary to explain the question; however, they should not contain proprietary names or information.

Requests that are not in this format will be rewritten in this format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

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Attending Committee Meetings. The B29 Standards Committee regularly holds meetings, which are open to the public. Persons wishing to attend any meeting should contact the Secretary of the B29 Standards Committee.

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DOUBLE-PITCH ROLLER CHAINS, ATTACHMENTS, AND SPROCKETS

1 DOUBLE-PITCH ROLLER CHAINS

1.1 Nomenclature

The following definitions are illustrated in Figs. 1 and 2:

connecting links (cotter pin type) [Fig. 2, sketches (f) and (g)]: outside links consisting of a pin link plate, *E*; two pins, *G–G;* a detachable pin link plate, *D*; and two cotter pins, *H–H.*

double-pitch conveyor roller chain, large roller series [Fig. 1, sketch (b)]: same as the small roller series (see below), except that the rollers are approximately twice the diameter. The large roller series is intended for use when the conveyed load is carried by the rollers.

double-pitch conveyor roller chain, small roller series [Fig. 1, sketch (a)]: series of alternately assembled roller links and pin links in which the pins articulate inside the bushings and the rollers are free to turn on the bushings. The pins and bushings are press-fitted into their respective link plates. The pitch of the link plates is twice that of link plates of the base series chain. Pin link plates and roller link plates have identical straight-edged contours. Some chains have extra-thickness link plates that are intended for use when the conveyed load is carried by the link plate edges.

double-pitch power transmission roller chain [Fig. 1, sketch (c)]: similar to double-pitch conveyor roller chain, small roller series, except the link plate widths are usually reduced in the center to produce a figure-eight shape. This reduces the weight of the chain to make it more suitable for power transmission applications.

offset links (conveyor offset link — large roller series, cotter pin type) [Fig. 2, sketch (i)]: links consisting of two offset link plates, *I–I;* a bushing, *B*; a roller of the standard roller series, C_S; a removable pin, *J*; and a cotter pin, *H*.

offset links (conveyor offset link — power transmission series, cotter pin type) [Fig. 2, sketch (j)]: links consisting of two offset link plates, *I–I;* a bushing, *B*; a roller of the standard roller series, C_S; a removable pin, *J*; and a cotter pin, *H*.

offset links (conveyor offset link — small roller series, cotter pin type) [Fig. 2, sketch (h)]: links consisting of two offset link plates, *I–I;* a bushing, *B*; a roller of the standard roller series, C_S; a removable pin, *J*; and a cotter pin, *H*.

pin links (riveted type) [Fig. 2, sketches (d) and (e)]: outside links consisting of two pin link plates, *E–E*, and two pins, *F–F.*

roller links for large roller conveyor series [Fig. 2, sketch (b)]: inside links consisting of two roller link plates, *A–A;* two bushings, *B–B;* and two rollers of the large roller series, C_L–C_L.

roller links for power transmission series [Fig. 2, sketch (c)]: inside links consisting of two figure-eight shaped roller link plates, *A–A;* two bushings, *B–B;* and two small-diameter rollers, C_S–C_S.

roller links for small roller conveyor series [Fig. 2, sketch (a)]: inside links consisting of two straight-edged roller link plates, *A–A;* two bushings, *B–B;* and two small-diameter rollers, C_S–C_S.

1.2 General Proportions

Sizes of the various chain components, and assembled length and strength, are approximately proportional to pitch, *P*, as follows:

(a) The roller diameter for the small roller conveyor and power transmission chains equals approximately 0.312*P*, and for the large roller series it equals approximately 0.625*P*.

(b) The *chain width* is defined as the distance between roller link plates and equals approximately 0.312*P*.

(c) The pin diameter equals approximately 0.156*P*.

(d) The thickness of link plates for regular series chain sizes not designated H equals approximately 0.062*P*. For heavy series chain sizes designated H, the link plate thickness equals approximately

(1) 0.062 × pitch in inches + 0.031 in. for U.S. Customary units

(2) 0.062 × pitch in millimeters + 0.79 mm for SI (Metric) units

(e) The maximum width of link plates equals 0.475*P* for both pin-link and roller-link plates that have identical straight-edged contours.

1.3 Numbering System — Standard Chain Numbers

The power transmission series is identified by the numerical sum of 2000 and the standard base series chain number. Conveyor chain of the small roller series is identified by the prefix C, followed by the numerical sum of 2000 and the standard base series chain number.

Identification of conveyor chain of the large roller series is the same as that of the small roller series, except that the right-hand digit is 2 instead of 0. The addition of the suffix H designates heavy thickness link plates.

EXAMPLES:

(1) Double-pitch power transmission series chain, chain no. 2040 (1.0 in. pitch), uses the same pins, bushings, and rollers as chain no. 40 (0.5 in. pitch), but the link plates have double the pitch.

(2) Double-pitch conveyor roller chain of the small roller series, chain no. C2040, uses the same pins, bushings, and rollers as chain no. 40, but has double the pitch.

(3) Double-pitch conveyor roller chain of the large roller series, chain no. C2062H, uses the same pins and bushings as chain no. 60H, but has double the pitch and rollers of twice the diameter.

1.4 Minimum Ultimate Tensile Strength

Chains meeting the requirements of this Standard will have a minimum ultimate tensile strength equal to or greater than the values listed in Table 1 or Table 1M.

Minimum ultimate tensile strength (M.U.T.S.) for chains covered by this Standard is the minimum force at which an unused, undamaged chain could fail when subjected to a single tensile loading test.

WARNING: The minimum ultimate tensile strength is NOT a "working load." The M.U.T.S. greatly exceeds the maximum force that may be applied to the chain.

1.4.1 Test Procedure. A tensile force is slowly applied, at a rate not exceeding 2.0 in./min (50.8 mm/min) in a uniaxial direction, to the ends of the chain sample.

1.4.2 Tensile Test Is a Destructive Test. Even though the chain may not visibly fail when subjected to the minimum ultimate tensile force, it will have been damaged and will be unfit for service.

1.5 Chain Preloading

Conveyor chains conforming to this Standard should be preloaded during manufacturing by applying a tensile force equal to a minimum of 30% of the M.U.T.S. given in Table 1 or Table 1M. The amount of preload, if any, is at the discretion of the manufacturer or by agreement between the manufacturer and the user.

Power transmission chains conforming to this Standard shall be preloaded during manufacture by applying a tensile force equal to a minimum of 30% of the M.U.T.S. given in Table 1 or Table 1M.

1.6 Tolerance for Chain Length

New chains, under standard measuring load, shall not be underlength. Overlength tolerance is 0.016 in./ft (1.33 mm/m).

1.7 Measuring Load

Measuring load is the load under which the chain is to be measured for length. It is equal to 1% of the minimum ultimate tensile strength, with a minimum of 31 lb (138 N). Length measurements are to be taken over a length of at least 12 in. (300 mm).

1.8 General Chain Dimensions

See Fig. 3 and Table 1 or Table 1M. The general dimensions for double-pitch power transmission chains shall be the same as for small roller double-pitch conveyor chains, as shown in Fig. 3, sketch (a), except that the power transmission chains have figure-eight shaped link plates.

1.9 Dimensional Limits for Interchangeability of Links

To ensure interchangeability of links produced by different makers of chain, the following standard maximum and minimum dimensions are adopted (see also Table 2 or Table 2M). They are not the actual dimensions to be used in manufacturing, but rather the limiting dimensions, maximum and minimum, within which it is necessary to remain to ensure the desired interchangeability. (The following values are in conventional units.)

(a) The minimum distance between roller link plates is the nominal width of the chain minus the quantity (0.002 + 0.003 × pitch/2).

(b) Maximum pin diameter: see Table 2 or Table 2M.

(c) Minimum hole diameter in bushing: see Table 2 or Table 2M.

(d) Maximum overall width of roller link = nominal width of chain + (2.12 × nominal link plate thickness).

(e) Minimum distance between pin link plates = maximum overall width of roller link + 0.002.

(f) Standard offset links (see Fig. 4) are made to accommodate chains having link plates with a maximum height equal to 0.475 × pitch. Therefore,

$$X\ (\text{min.}) = 0.24P + 0.030$$

where

P = chain pitch

2 ATTACHMENTS FOR DOUBLE-PITCH CONVEYOR CHAINS

2.1 Nomenclature

Attachment link plates for conveyor chains, identical for the small-roller and large-roller series, are of two principal kinds: straight link plate extension or bent link plate extension (see Fig. 5). Extensions have a single hole or two holes, and are assembled on one or both sides of the chain as follows:

(a) straight link plate extension, single hole, one side of the chain

(b) straight link plate extension, single hole, both sides of the chain

(c) straight link plate extension, two holes, one side of the chain

(d) straight link plate extension, two holes, both sides of the chain

(e) bent link plate extension, single hole, one side of the chain

(f) bent link plate extension, single hole, both sides of the chain

(g) bent link plate extension, two holes, one side of the chain

(h) bent link plate extension, two holes, both sides of the chain

2.2 General Proportions

Principal dimensions conform approximately to the following equations. It is recommended that these equations be applied when extending these standards to additional sizes of chain.

(a) Distance from the centerline of the single hole in the straight link plate extension to the pitch line

$$D = 0.438 \times \text{chain pitch}$$

(b) Distance from the centerlines of two holes in the straight link plate extension to the pitch line

$$D = 0.500 \times \text{chain pitch}$$

(c) Distance from the centerline of the single hole or two holes in the bent link plate extension to the chain centerline

$$D = 0.500 \times \text{chain pitch}$$

(d) Distance from the top of the bent link plate extension to the pitch line

$$C = 0.375 \times \text{chain pitch}$$

(e) Distance between the two holes in the straight or bent link plate extension

$$H = 0.375 \times \text{chain pitch}$$

(f) Angle of bend of the link plate extension = 90 deg

(g) Diameter of the pin extension

D_p = nominal diameter of the chain pin

(h) Length of the pin extension

$$L = 0.375 \times \text{chain pitch}$$

2.3 Tolerance for Chain Length

New chains with attachments, under standard measuring load, may be overlength by 0.031 in./ft (2.58 mm/m) but shall not be underlength.

2.4 Dimensional Limits for Interchangeability of Extensions

(a) For straight link plate extensions with one attachment hole, small roller series, see Table 3.

(b) For straight link plate extensions with two attachment holes, small roller series, see Table 4.

(c) For bent link plate extensions with one attachment hole, small roller series, see Table 5.

(d) For bent link plate extensions with two attachment holes, small roller series, see Table 6.

(e) For extended pins, small and large roller series, see Table 7.

3 SPROCKETS FOR DOUBLE-PITCH ROLLER CHAINS

3.1 Types of Sprockets

See para. 3.1 and Fig. 4 in ASME B29.1.

3.2 Sprocket Tooth Section Profile and Dimensions

Figure 6, and Tables 8 and 8M, depict tooth section profile and dimensions. The nomenclature used is given below. The sprocket chamfer dimensions, g and h, are noncritical and are given only as a guide for general design proportions.

Sprocket tooth section profile design for large roller series conveyor chains is the same as for the base series chains having the same pitch and roller diameter, 1.000 in. (25.4 mm) through 2.500 in. (63.5 mm) pitch. It should be noted that large roller series conveyor chains, 3.000 in. (76.2 mm) and 4.000 in. (101.6 mm) pitch, have roller diameters not conforming exactly to the proportions established for base series chains.

P = chain pitch
W = chain width
MHD = maximum hub diameter
g = width of chamfer
= $0.062P$ (but not to exceed $W/3$)
h = depth of chamfer = $0.25P$
R_c = chamfer radius
= $0.532P$ (approximately tangent to side)
r_f max. = fillet radius
= $0.02P$ for maximum hub diameter (but not to exceed 0.040 in. or 1.02 mm)
t max. = maximum flange thickness
= 0.93(W in inches) − 0.006 in.
= 0.93(W in millimeters) − 0.15 mm

3.3 Tooth Form

The sprocket tooth form for double-pitch chains is the same as the tooth form for the corresponding base chains, except for necessary changes in diametral dimensions.

See paras. 3.5 and 3.6 and Fig. 6 in ASME B29.1.

3.4 Diameters and Measuring Dimensions

3.4.1 Small Roller Series. See Fig. 7.

(a) Effective teeth are shown in solid lines. An "extra" set of tooth spaces is shown in broken lines.

(b) Sprockets for double-pitch conveyor chains, small roller series, may have one or two sets of effective teeth, i.e., teeth that engage chain rollers in one revolution of the sprocket. A sprocket is single-cut if it has only one set of effective teeth. A double-cut sprocket has two sets of effective teeth. Tooth spaces of the second set are located midway between those of the first.

(c) Double-cut sprockets with an odd number of actual teeth, such as 21, and therefore with half as many effective teeth, $10\frac{1}{2}$, provide automatic hunting, each actual tooth engaging a chain roller once during two revolutions of such a sprocket.

(d) Double-cut sprockets with an even number of actual teeth have an integral number of effective teeth and cannot provide automatic hunting, because only one set of effective teeth can engage chain rollers, regardless of how many revolutions the sprocket may have made. Manual shifting of the chain by one-half effective tooth is necessary to provide distribution of wear to the previously inactive set of teeth.

3.4.2 Large Roller Series. See Fig. 8.

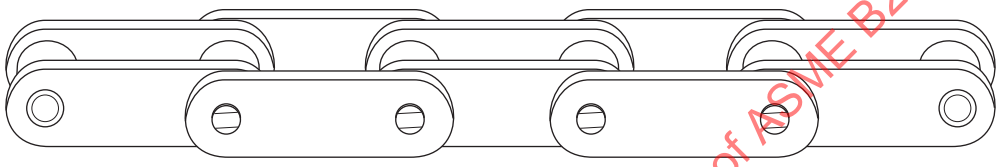
3.5 Sprocket Tolerances

See Tables 9 and 9M. See Tables 8 and 8M of ASME B29.1 for maximum eccentricity and face runout tolerances for commercial sprockets.

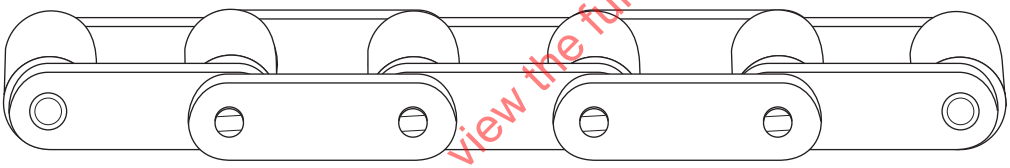
3.6 Tabulation of Diameters

See Tables 10 and 11.

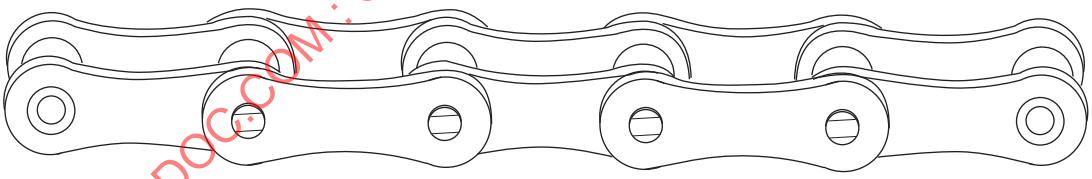
Fig. 1 Double-Pitch Roller Chains



(a) Double-Pitch Conveyor Roller Chain, Small Roller Series

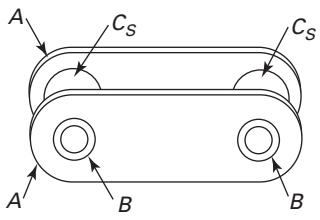


(b) Double-Pitch Conveyor Roller Chain, Large Roller Series

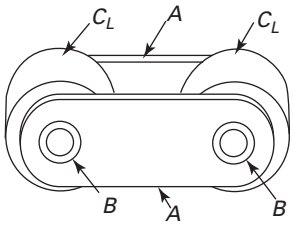


(c) Double-Pitch Power Transmission Roller Chain

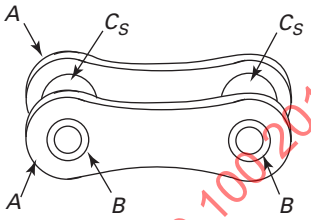
Fig. 2 Double-Pitch Roller Chain Components and Connecting Links



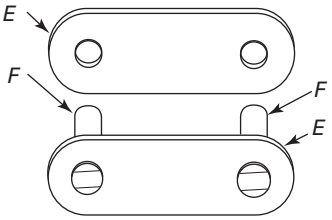
(a) Conveyor Roller Link, Small Roller



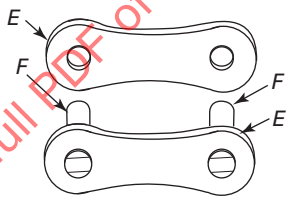
(b) Conveyor Roller Link, Large Roller



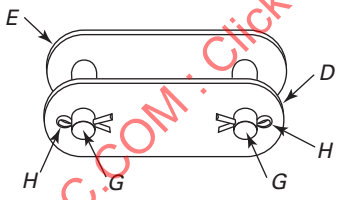
(c) Power Transmission Roller Link



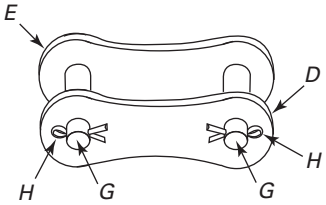
(d) Conveyor Pin Link



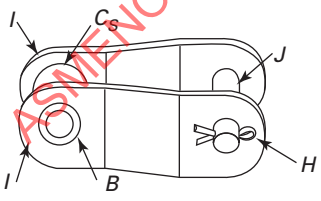
(e) Power Transmission Pin Link



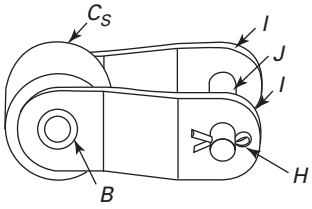
(f) Conveyor Connecting Link



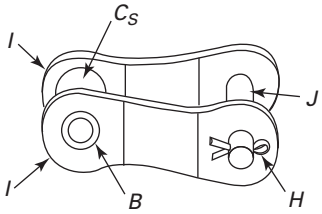
(g) Power Transmission Connecting Link



(h) Conveyor Offset Link, Small Roller

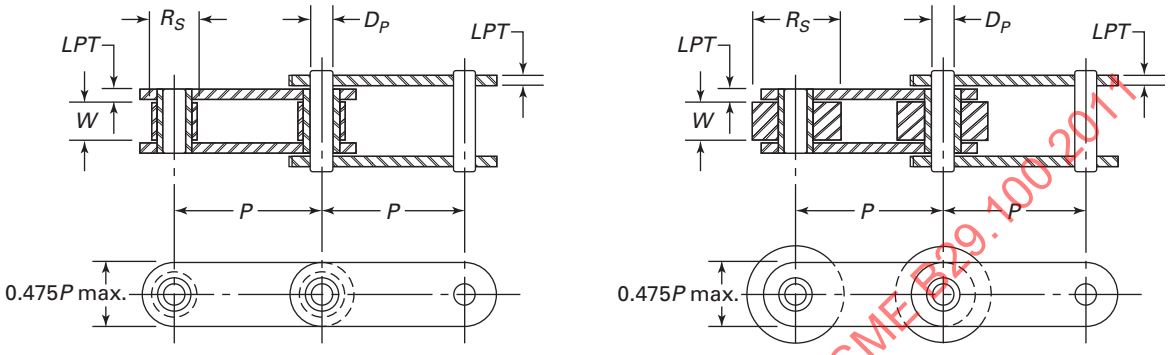


(i) Conveyor Offset Link, Large Roller



(j) Power Transmission Offset Link

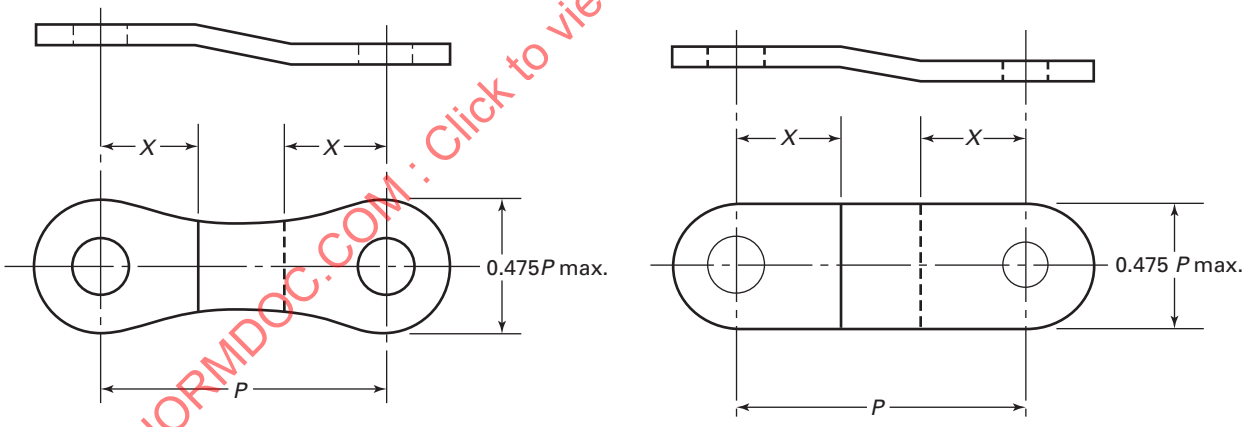
Fig. 3 General Chain Dimensions



(a) Small Roller Series **(b) Large Roller Series**

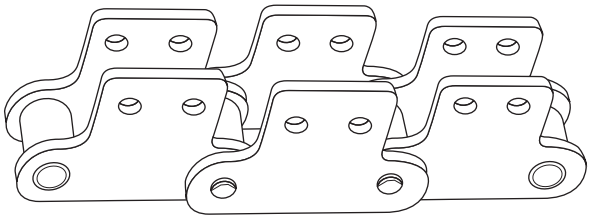
D_p = pin diameter
LPT = link plate thickness
P = chain pitch
R_L = roller diameter, large roller series
R_S = roller diameter, small roller series
W = chain width between roller link plates

Fig. 4 Double-Pitch Offset Plates

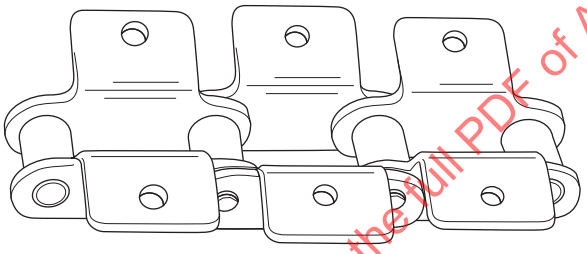


(a) Power Transmission **(b) Conveyor**

Fig. 5 Attachment Link Plates for Double-Pitch Conveyor Chains

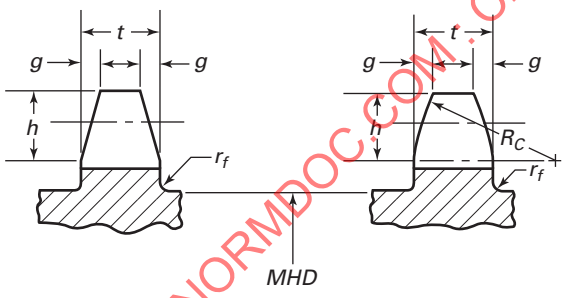


(a) Straight Link Plate Extensions

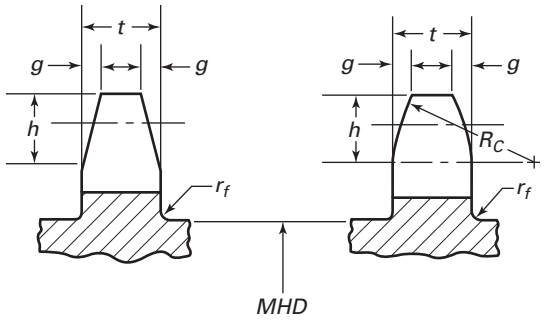


(b) Bent Link Plate Extensions

Fig. 6 Sprocket Tooth Section Profile

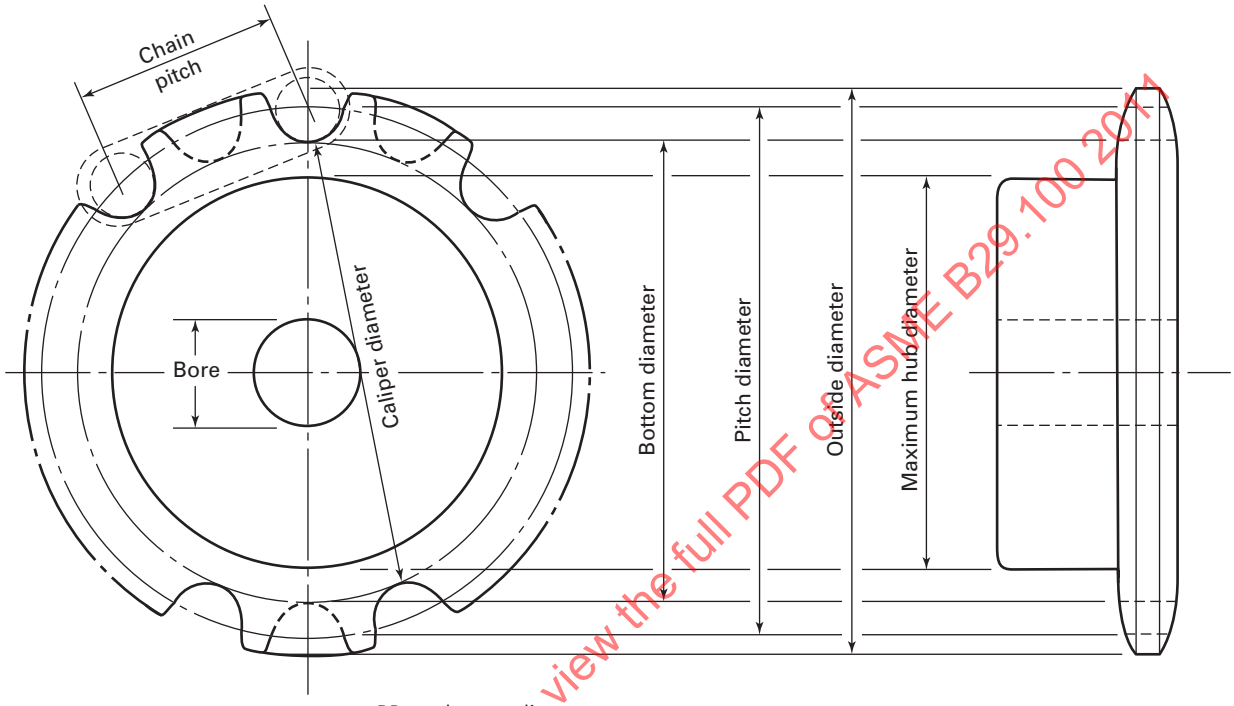


(a) Small Roller Series



(b) Large Roller Series

Fig. 7 Sprocket Diameters, Small Roller and Power Transmission Series



BD = bottom diameter
= $PD - R_S$
CD = caliper diameter
N = number of effective teeth
P = chain pitch
PD = pitch diameter
$= \dfrac{P}{\sin \dfrac{180 \text{ deg}}{N}}$
R_S = roller diameter

CD, single-cut, if N is an odd number [Note (1)] $= PD\left(\cos \dfrac{90 \text{ deg}}{N}\right) - R_S$

CD, single-cut, if N is an even number [Note (2)] $= PD - R_S = BD$

CD, double-cut, if N is a fractional number [Note (1)] $= PD\left(\cos \dfrac{45 \text{ deg}}{N}\right) - R_S$

CD, double-cut, whether N is an odd or even number [Note (2)] $= PD - R_S = BD$

Tolerances on bottom or caliper diameter of sprockets:

Plus tolerance = 0.000

Minus tolerance = 0.002(P in inches)$\sqrt{N}$ + 0.006 in. with a minimum tolerance of 0.012 in. and a maximum of 0.048 in.

= 0.002(P in millimeters)$\sqrt{N}$ + 0.152 mm with a minimum tolerance of 0.30 mm and a maximum of 1.20 mm

Fig. 7 Sprocket Diameters, Small Roller and Power Transmission Series (Cont'd)

Approximate outside diameter of sprockets

$$= PD \text{ in inches} + \left(\frac{P \text{ in inches}}{2}\right)\left(0.6 - \tan\frac{90 \text{ deg}}{N}\right)$$

$$= PD \text{ in millimeters} + \left(\frac{P \text{ in millimeters}}{2}\right)\left(0.6 - \tan\frac{90 \text{ deg}}{N}\right)$$

Maximum hub diameter (*MHD*) of sprockets

$$= (P \text{ in inches})\left(\cot\frac{180 \text{ deg}}{N} - 0.5\right) - 0.030 \text{ in.}$$

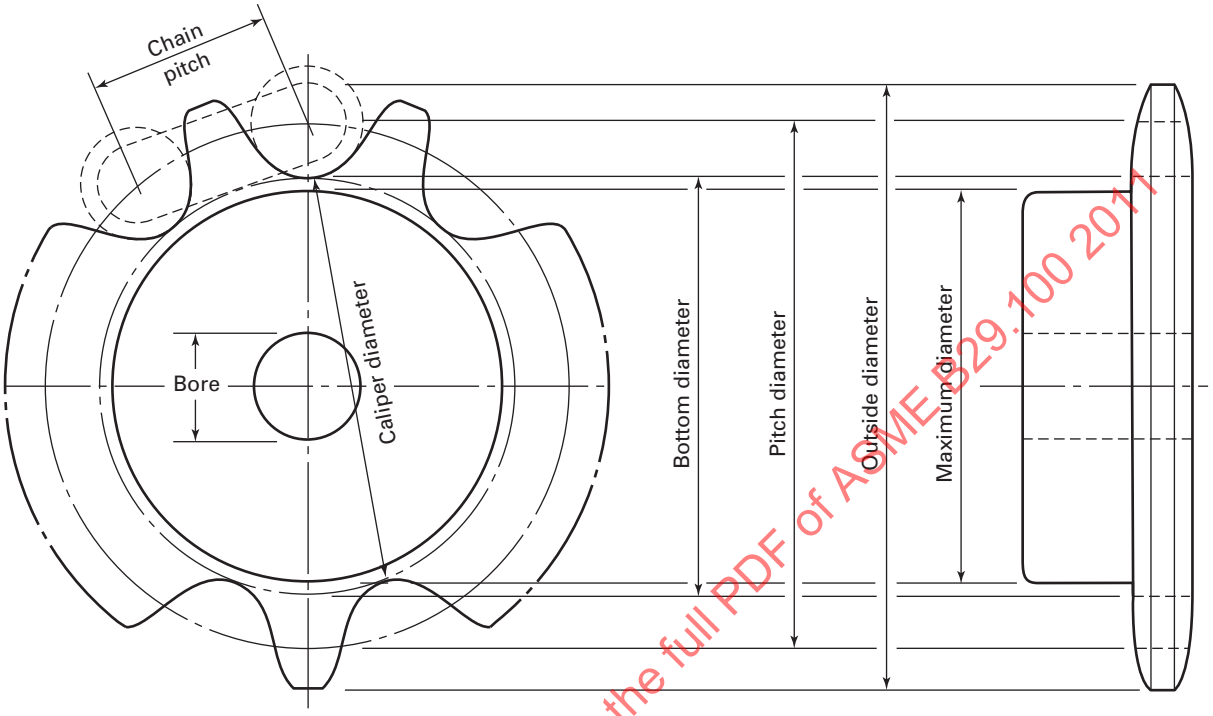
$$= (P \text{ in millimeters})\left(\cot\frac{180 \text{ deg}}{N} - 0.5\right) - 0.76 \text{ mm}$$

NOTES:

(1) These caliper diameters are measured across any two tooth spaces that are most nearly diametrically opposite to each other.

(2) These caliper diameters are measured across any two tooth spaces that are exactly diametrically opposite to each other.

Fig. 8 Sprocket Diameters, Large Roller Series



N = number of teeth (not shown)
P = chain pitch
PD = pitch diameter
R_L = roller diameter (not shown)

$$\text{Bottom diameter of sprocket} = PD - R_L$$

$$\text{Pitch diameter of sprocket} = \frac{P}{\sin \frac{180 \text{ deg}}{N}}$$

$$\text{Caliper diameter for even number of teeth} = \text{bottom diameter}$$

$$\text{Caliper diameter for odd number of teeth} = PD\left(\cos \frac{90 \text{ deg}}{N}\right) - R_L$$

Tolerances on bottom or caliper diameter of sprockets:

Plus tolerance = 0.000

Minus tolerance = 0.002(P in inches)$\sqrt{N}$ + 0.006 in. with a minimum tolerance of 0.012 in. and a maximum of 0.048 in.

= 0.002(P in millimeters)$\sqrt{N}$ + 0.152 mm with a minimum tolerance of 0.30 mm and a maximum of 1.20 mm

Maximum hub diameter (MHD) of sprockets = (P in inches) $\left(\cot \frac{180 \text{ deg}}{N} - 0.5\right)$ – 0.030 in.

= (P in millimeters) $\left(\cot \frac{180 \text{ deg}}{N} - 0.5\right)$ – 0.76 mm

[but not to exceed bottom diameter in inches (0.030 in.) or bottom diameter in millimeters (0.76 mm)]

Table 1 General Chain Dimensions, Measuring Loads, and Minimum Ultimate Tensile Strengths, in. and lb

Standard Chain Number	Chain Pitch, P	Roller Diameter		Nominal Width, W [Note (1)]	Pin Diameter, D_p	Link Plate Thickness, LPT	Measuring Load, lb	M.U.T.S., lb
		Small, R_s	Large, R_L					
2040	1.000	0.312	. . .	0.312	0.156	0.060	31	3,125
C2040, C2042	1.000	0.312	0.625	0.312	0.156	0.060	31	3,125
2050	1.250	0.400	. . .	0.375	0.200	0.080	49	4,880
C2050, C2052	1.250	0.400	0.750	0.375	0.200	0.080	49	4,880
2060	1.500	0.469	. . .	0.500	0.234	0.094	70	7,030
C2060, C2062	1.500	0.469	0.875	0.500	0.234	0.094	70	7,030
C2060H, C2062H	1.500	0.469	0.875	0.500	0.234	0.125	70	7,030
2080	2.000	0.625	. . .	0.625	0.312	0.125	125	12,500
C2080, C2082	2.000	0.625	1.125	0.625	0.312	0.125	125	12,500
C2080H, C2082H	2.000	0.625	1.125	0.625	0.312	0.156	125	12,500
2100	2.500	0.750	. . .	0.750	0.375	0.156	195	19,530
C2100, C2102	2.500	0.750	1.562	0.750	0.375	0.156	195	19,530
C2100H, C2102H	2.500	0.750	1.562	0.750	0.375	0.187	195	19,530
2120	3.000	0.875	. . .	1.000	0.437	0.187	281	28,125
C2120, C2122	3.000	0.875	1.750	1.000	0.437	0.187	281	28,125
C2120H, C2122H	3.000	0.875	1.750	1.000	0.437	0.219	281	28,125
C2160, C2162	4.000	1.125	2.250	1.250	0.562	0.250	500	50,000
C2160H, C2162H	4.000	1.125	2.250	1.250	0.562	0.281	500	50,000

NOTE:
(1) See Table 2 for actual minimum dimensions.

Table 1M General Chain Dimensions, Measuring Loads, and Minimum Ultimate Tensile Strengths, mm and N

Standard Chain Number	Chain Pitch, *P*	Roller Diameter		Nominal Width, *W* [Note (1)]	Pin Diameter, D_p	Link Plate Thickness, *LPT*	Measuring Load, N	M.U.T.S., N
		Small, R_s	Large, R_L					
2040	25.40	7.92	. . .	7.92	3.96	1.52	138	13 900
C2040, C2042	25.40	7.92	15.88	7.92	3.96	1.52	138	13 900
2050	31.75	10.16	. . .	9.53	5.08	2.03	218	21 706
C2050, C2052	31.75	10.16	19.05	9.53	5.08	2.03	218	21 706
2060	38.10	11.91	. . .	12.70	5.94	2.39	311	31 269
C2060, C2062	38.10	11.91	22.23	12.70	5.94	2.39	311	31 269
C2060H, C2062H	38.10	11.91	22.23	12.70	5.94	3.18	311	31 269
2080	50.80	15.88	. . .	15.88	7.92	3.18	556	55 600
C2080, C2082	50.80	15.88	28.58	15.88	7.92	3.18	556	55 600
C2080H, C2082H	50.80	15.88	28.58	15.88	7.92	3.96	556	55 600
2100	63.50	19.05	. . .	19.05	9.53	3.96	867	86 869
C2100, C2102	63.50	19.05	39.67	19.05	9.53	3.96	867	86 869
C2100H, C2102H	63.50	19.05	39.67	19.05	9.53	4.75	867	86 869
2120	76.20	22.23	. . .	25.40	11.10	4.75	1 250	125 100
C2120, C2122	76.20	22.23	44.45	25.40	11.10	4.75	1 250	125 100
C2120H, C2122H	76.20	22.23	44.45	25.40	11.10	5.56	1 250	125 100
C2160, C2162	101.60	28.58	57.15	31.75	14.27	6.35	2 224	222 400
C2160H, C2162H	101.60	28.58	57.15	31.75	14.27	7.14	2 224	222 400

NOTE:
(1) See Table 2M for actual minimum dimensions.

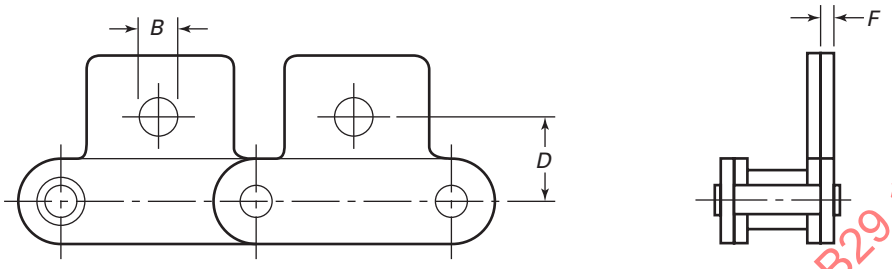
Table 2 Ultimate Dimensional Limits for Interchangeability, in.

Standard Chain Number	Chain Pitch, *P*	Related B29.1 Chain Number	Maximum Roller Diameter		Minimum Distance Between Roller Link Plates, *W*	Maximum Width of Roller Link	Minimum Distance Between Pin Link Plates	Maximum Pin Diameter	Minimum Bushing Inner Diameter	Minimum Value of *X* for Offset Plate (Fig. 4)
			Small, R_s	Large, R_L						
2040	1.000	40	0.312	. . .	0.309	0.440	0.442	0.1567	0.1575	0.270
C2040, C2042	1.000	40	0.312	0.625	0.309	0.440	0.442	0.1567	0.1575	0.270
2050	1.250	50	0.400	. . .	0.370	0.545	0.547	0.2004	0.2012	0.330
C2050, C2052	1.250	50	0.400	0.750	0.370	0.545	0.547	0.2004	0.2012	0.330
2060	1.500	60	0.469	. . .	0.495	0.699	0.701	0.2346	0.2354	0.390
C2060, C2062	1.500	60	0.469	0.875	0.495	0.699	0.701	0.2346	0.2354	0.390
C2060H, C2062H	1.500	60H	0.469	0.875	0.495	0.765	0.767	0.2346	0.2354	0.390
2080	2.000	80	0.625	. . .	0.620	0.890	0.892	0.3126	0.3134	0.510
C2080, C2082	2.000	80	0.625	1.125	0.620	0.890	0.892	0.3126	0.3134	0.510
C2080H, C2082H	2.000	80H	0.625	1.125	0.620	0.956	0.958	0.3126	0.3134	0.510
2100	2.500	100	0.750	. . .	0.744	1.081	1.083	0.3756	0.3764	0.630
C2100, C2102	2.500	100	0.750	1.562	0.744	1.081	1.083	0.3756	0.3764	0.630
C2100H, C2102H	2.500	100H	0.750	1.562	0.744	1.146	1.148	0.3756	0.3764	0.630
2120	3.000	120	0.875	. . .	0.993	1.396	1.398	0.4374	0.4382	0.750
C2120, C2122	3.000	120	0.875	1.750	0.993	1.396	1.398	0.4374	0.4382	0.750
C2120H, C2122H	3.000	120H	0.875	1.750	0.993	1.464	1.466	0.4374	0.4382	0.750
C2160, C2162	4.000	160	1.125	2.250	1.242	1.780	1.782	0.5626	0.5634	0.990
C2160H, C2162H	4.000	160H	1.125	2.250	1.242	1.846	1.848	0.5626	0.5634	0.990

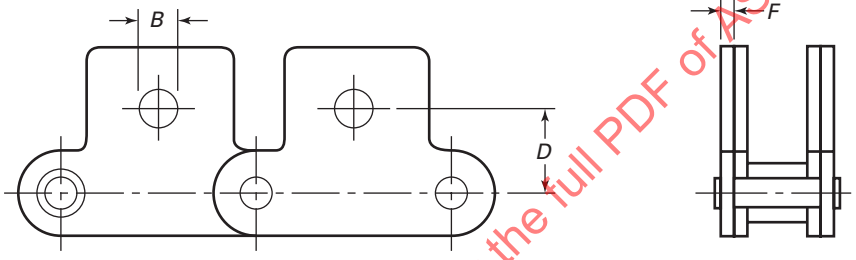
Table 2M Ultimate Dimensional Limits for Interchangeability, mm

Standard Chain Number	Chain Pitch, *P*	Related B29.1 Chain Number	Maximum Roller Diameter		Minimum Distance Between Roller Link Plates, *W*	Maximum Width of Roller Link	Minimum Distance Between Pin Link Plates	Maximum Pin Diameter	Minimum Bushing Inner Diameter	Minimum Value of *X* for Offset Plate (Fig. 4)
			Small, R_s	Large, R_L						
2040	25.40	40	7.92	. . .	7.85	11.18	11.23	3.98	4.00	6.86
C2040, C2042	25.40	40	7.92	15.88	7.85	11.18	11.23	3.98	4.00	6.86
2050	31.75	50	10.16	. . .	9.40	13.84	13.89	5.09	5.11	8.38
C2050, C2052	31.75	50	10.16	19.05	9.40	13.84	13.89	5.09	5.11	8.38
2060	38.10	60	11.91	. . .	12.57	17.75	17.81	5.96	5.98	9.91
C2060, C2062	38.10	60	11.91	22.23	12.57	17.75	17.81	5.96	5.98	9.91
C2060H, C2062H	38.10	60H	11.91	22.23	12.57	19.43	19.48	5.96	5.98	9.91
2080	50.80	80	15.88	. . .	15.75	22.61	22.66	7.94	7.96	12.95
C2080, C2082	50.80	80	15.88	28.58	15.75	22.61	22.66	7.94	7.96	12.95
C2080H, C2082H	50.80	80H	15.88	28.58	15.75	24.28	24.33	7.94	7.96	12.95
2100	63.50	100	19.05	. . .	18.90	27.46	27.51	9.54	9.56	16.00
C2100, C2102	63.50	100	19.05	39.67	18.90	27.46	27.51	9.54	9.56	16.00
C2100H, C2102H	63.50	100H	19.05	39.67	18.90	29.11	29.16	9.54	9.56	16.00
2120	76.20	120	22.23	. . .	25.22	35.46	35.51	11.11	11.13	19.05
C2120, C2122	76.20	120	22.23	44.45	25.22	35.46	35.51	11.11	11.13	19.05
C2120H, C2122H	76.20	120H	22.23	44.45	25.22	37.19	37.24	11.11	11.13	19.05
C2160, C2162	101.60	160	28.58	57.15	31.55	45.21	45.26	14.29	14.31	25.15
C2160H, C2162H	101.60	160H	28.58	57.15	31.55	46.89	46.94	14.29	14.31	25.15

Table 3 Dimensional Limits for Straight Link Plate Extension With One Attachment Hole



(a) Straight Link Plate Extensions on One Side of Chain, Small Roller Series

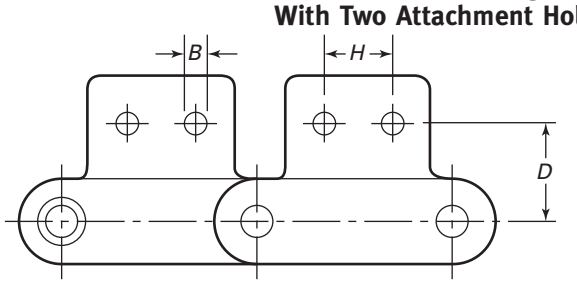


(b) Straight Link Plate Extensions on Both Sides of Chain, Small Roller Series

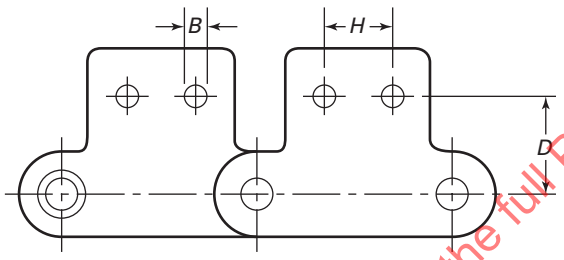
Standard Chain Number	U.S. Customary Units			SI (Metric) Units		
	Minimum *B*, in.	*D*, in.	*F*, in.	Minimum *B*, mm	*D*, mm	*F*, mm
C2040, C2042	0.200	0.438	0.060	5.08	11.12	1.52
C2050, C2052	0.261	0.562	0.080	6.63	14.27	2.03
C2060, C2062	0.323	0.688	0.094	8.20	17.48	2.39
C2060H, C2062H	0.323	0.688	0.125	8.20	17.48	3.18
C2080, C2082	0.386	0.875	0.125	9.80	22.22	3.18
C2080H, C2082H	0.386	0.875	0.156	9.80	22.22	3.96
C2100, C2102	0.516	1.125	0.156	13.11	28.58	3.96
C2100H, C2102H	0.516	1.125	0.188	13.11	28.58	4.78
C2120, C2122	0.578	1.312	0.188	14.68	33.32	4.78
C2120H, C2122H	0.578	1.312	0.219	14.68	33.32	5.56
C2160, C2162	0.766	1.750	0.219	19.46	44.45	5.56
C2160H, C2162H	0.766	1.750	0.281	19.46	44.45	7.14

GENERAL NOTE: Dimensional limits of attachment link plates for conveyor chains of the large roller series, not illustrated, are identical to those for conveyor chains of the small roller series.

Table 4 Dimensional Limits for Straight Link Plate Extension With Two Attachment Holes



(a) Straight Link Plate Extensions on One Side of Chain, Small Roller Series

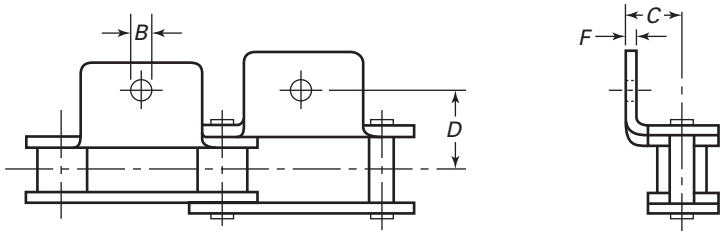


(b) Straight Link Plate Extensions on Both Sides of Chain, Small Roller Series

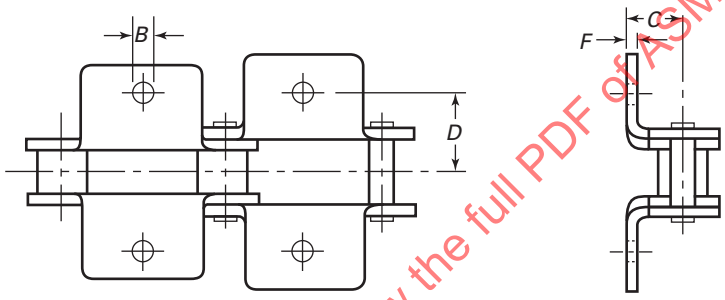
Standard Chain Number	U.S. Customary Units				SI (Metric) Units			
	Minimum *B*, in.	*D*, in.	*H*, in.	*F*, in.	Minimum *B*, mm	*D*, mm	*H*, mm	*F*, mm
C2040, C2042	0.131	0.531	0.375	0.060	3.33	13.49	9.52	1.52
C2050, C2052	0.200	0.625	0.469	0.080	5.08	15.88	11.91	2.03
C2060, C2062	0.200	0.750	0.562	0.094	5.08	19.05	14.27	2.39
C2060H, C2062H	0.200	0.750	0.562	0.125	5.08	19.05	14.27	3.18
C2080, C2082	0.261	1.000	0.750	0.125	6.63	25.40	19.05	3.18
C2080H, C2082H	0.261	1.000	0.750	0.156	6.63	25.40	19.05	3.96
C2100, C2102	0.323	1.250	0.938	0.156	8.20	31.75	23.83	3.96
C2100H, C2102H	0.323	1.250	0.938	0.188	8.20	31.75	23.83	4.78
C2120, C2122	0.386	1.469	1.125	0.188	9.80	37.31	28.58	4.78
C2120H, C2122H	0.386	1.469	1.125	0.219	9.80	37.31	28.58	5.56
C2160, C2162	0.516	2.000	1.500	0.219	13.11	50.80	38.10	5.56
C2160H, C2162H	0.516	2.000	1.500	0.281	13.11	50.80	38.10	7.14

GENERAL NOTE: Dimensional limits of attachment link plates for conveyor chains of the large roller series, not illustrated, are identical to those for conveyor chains of the small roller series.

Table 5 Dimensional Limits for Bent Link Plate Extension With One Attachment Hole



(a) Bent Link Plate Extensions on One Side of Chain, Small Roller Series

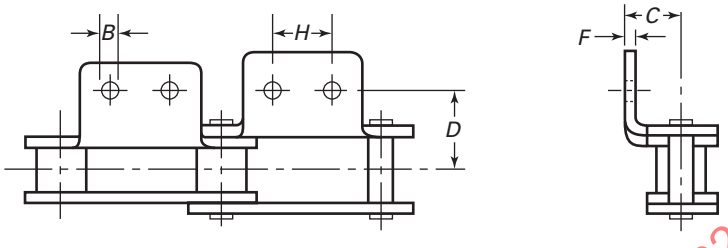


(b) Bent Link Plate Extensions on Both Sides of Chain, Small Roller Series

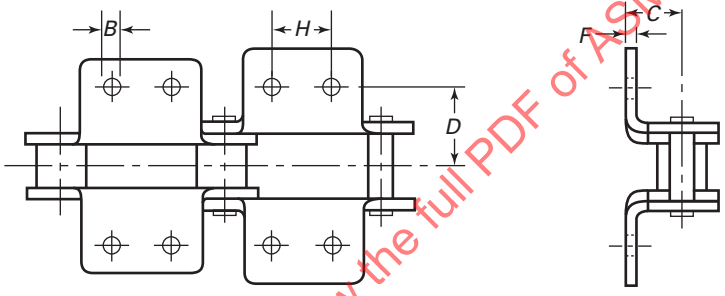
	U.S. Customary Units				SI (Metric) Units			
Standard Chain Number	Minimum *B*, in.	*C*, in.	*D*, in.	*F*, in.	Minimum *B*, mm	*C*, mm	*D*, mm	*F*, mm
C2040, C2042	0.131	0.359	0.500	0.060	3.33	9.12	12.70	1.52
C2050, C2052	0.200	0.438	0.625	0.080	5.08	11.13	15.88	2.03
C2060, C2062	0.200	0.578	0.844	0.094	5.08	14.68	21.44	2.39
C2060H, C2062H	0.200	0.578	0.844	0.125	5.08	14.68	21.44	3.18
C2080, C2082	0.261	0.750	1.094	0.125	6.63	19.05	27.79	3.18
C2080H, C2082H	0.261	0.750	1.094	0.156	6.63	19.05	27.79	3.96
C2100, C2102	0.323	0.922	1.312	0.156	8.20	23.42	33.32	3.96
C2100H, C2102H	0.323	0.922	1.312	0.188	8.20	23.42	33.32	4.78
C2120, C2122	0.386	1.094	1.562	0.188	9.80	27.79	39.67	4.78
C2120H, C2122H	0.386	1.094	1.562	0.219	9.80	27.79	39.67	5.56
C2160, C2162	0.516	1.438	2.062	0.219	13.11	36.53	52.37	5.56
C2160H, C2162H	0.516	1.438	2.062	0.281	13.11	36.53	52.37	7.14

GENERAL NOTE: Dimensional limits of attachment link plates for conveyor chains of the large roller series, not illustrated, are identical to those for conveyor chains of the small roller series.

Table 6 Dimensional Limits for Bent Link Plate Extension With Two Attachment Holes



(a) Bent Link Plate Extensions on One Side of Chain, Small Roller Series

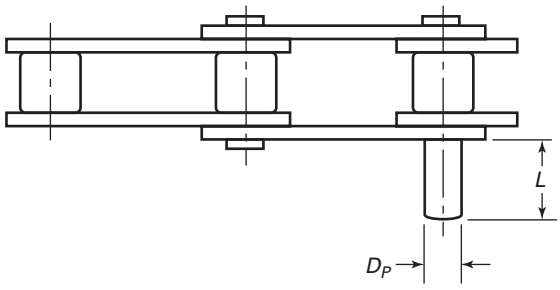


(b) Bent Link Plate Extensions on Both Sides of Chain, Small Roller Series

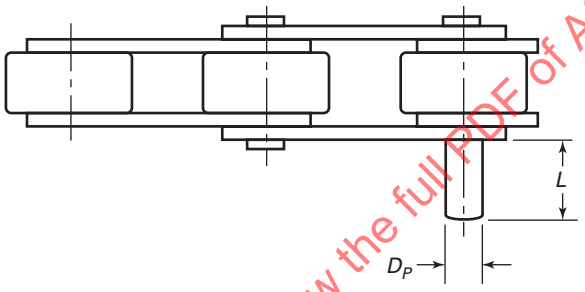
	U.S. Customary Units					SI (Metric) Units				
Standard Chain Number	Minimum *B*, in.	*C*, in.	*D*, in.	*H*, in.	*F*, in.	Minimum *B*, mm	*C*, mm	*D*, mm	*H*, mm	*F*, mm
C2040, C2042	0.131	0.359	0.500	0.375	0.060	3.33	9.12	12.70	9.52	1.52
C2050, C2052	0.200	0.438	0.625	0.469	0.080	5.08	11.13	15.88	11.91	2.03
C2060, C2062	0.200	0.578	0.844	0.562	0.094	5.08	14.68	21.44	14.27	2.39
C2060H, C2062H	0.200	0.578	0.844	0.562	0.125	5.08	14.68	21.44	14.27	3.18
C2080, C2082	0.261	0.750	1.094	0.750	0.125	6.63	19.05	27.79	19.05	3.18
C2080H, C2082H	0.261	0.750	1.094	0.750	0.156	6.63	19.05	27.79	19.05	3.96
C2100, C2102	0.323	0.922	1.312	0.938	0.156	8.20	23.42	33.32	23.83	3.96
C2100H, C2102H	0.323	0.922	1.312	0.938	0.188	8.20	23.42	33.32	23.83	4.78
C2120, C2122	0.386	1.094	1.562	1.125	0.188	9.80	27.79	39.67	28.58	4.78
C2120H, C2122H	0.386	1.094	1.562	1.125	0.219	9.80	27.79	39.67	28.58	5.56
C2160, C2162	0.516	1.438	2.062	1.500	0.219	13.11	36.53	52.37	38.10	5.56
C2160H, C2162H	0.516	1.438	2.062	1.500	0.281	13.11	36.53	52.37	38.10	7.14

GENERAL NOTE: Dimensional limits of attachment link plates for conveyor chains of the large roller series, not illustrated, are identical to those for conveyor chains of the small roller series.

Table 7 Dimensional Limits for Conveyor Chain With Extended Pins



(a) Extended Pin, Small Roller Series



(b) Extended Pin, Large Roller Series

Standard Chain Number	U.S. Customary Units			SI (Metric) Units		
	Pitch, in.	D_P, in.	L, in.	Pitch, mm	D_p, mm	L, mm
C2040, C2042	1.000	0.156	0.375	25.40	3.96	9.52
C2050, C2052	1.250	0.200	0.469	31.75	5.08	11.91
C2060, C2062	1.500	0.234	0.562	38.10	5.94	14.27
C2060H, C2062H	1.500	0.234	0.562	38.10	5.94	14.27
C2080, C2082	2.000	0.312	0.750	50.80	7.92	19.05
C2080H, C2082H	2.000	0.312	0.750	50.80	7.92	19.05
C2100, C2102	2.500	0.375	0.938	63.50	9.52	23.62
C2100H, C2102H	2.500	0.375	0.938	63.50	9.52	23.62
C2120, C2122	3.000	0.437	1.125	76.20	11.10	28.58
C2120H, C2122H	3.000	0.437	1.125	76.20	11.10	28.58
C2160, C2162	4.000	0.562	1.500	101.60	14.27	38.10
C2160H, C2162H	4.000	0.562	1.500	101.60	14.27	38.10

Table 8 Sprocket Tooth Section Profile Dimensions, in.

Standard Chain Number	Pitch, *P*	Width of Chain, *W*	Maximum Sprocket Thickness, *t*	Minus Tolerance on *t*	Depth of Chamfer, *h*	Width of Chamfer, *g*	Radius, R_c
C2040, C2042	1.000	0.312	0.284	0.035	0.250	0.062	0.531
C2050, C2052	1.250	0.375	0.343	0.036	0.312	0.078	0.664
C2060, C2062	1.500	0.500	0.459	0.036	0.375	0.094	0.796
C2060H, C2062H	1.500	0.500	0.459	0.036	0.375	0.094	0.796
C2080, C2082	2.000	0.625	0.575	0.040	0.500	0.125	1.062
C2080H, C2082H	2.000	0.625	0.575	0.040	0.500	0.125	1.062
C2100, C2102	2.500	0.750	0.692	0.046	0.625	0.156	1.327
C2100H, C2102H	2.500	0.750	0.692	0.046	0.625	0.156	1.327
C2120, C2122	3.000	1.000	0.924	0.057	0.750	0.188	1.593
C2120H, C2122H	3.000	1.000	0.924	0.057	0.750	0.188	1.593
C2160, C2162	4.000	1.250	1.156	0.062	1.000	0.250	2.124
C2160H, C2162H	4.000	1.250	1.156	0.062	1.000	0.250	2.124

Table 8M Sprocket Tooth Section Profile Dimensions, mm

Standard Chain Number	Pitch, *P*	Width of Chain, *W*	Maximum Sprocket Thickness, *t*	Minus Tolerance on *t*	Depth of Chamfer, *h*	Width of Chamfer, *g*	Radius, R_c
C2040, C2042	25.40	7.92	7.21	0.89	6.35	1.57	13.49
C2050, C2052	31.75	9.52	8.71	0.91	7.92	1.98	16.87
C2060, C2062	38.10	12.70	11.66	0.91	9.52	2.39	20.22
C2060H, C2062H	38.10	12.70	11.66	0.91	9.52	2.39	20.22
C2080, C2082	50.80	15.88	14.60	1.02	12.70	3.18	26.97
C2080H, C2082H	50.80	15.88	14.60	1.02	12.70	3.18	26.97
C2100, C2102	63.50	19.05	17.58	1.17	15.88	3.96	33.71
C2100H, C2102H	63.50	19.05	17.58	1.17	15.88	3.96	33.71
C2120, C2122	76.20	25.40	23.47	1.45	19.05	4.78	40.46
C2120H, C2122H	76.20	25.40	23.47	1.45	19.05	4.78	40.46
C2160, C2162	101.60	31.75	29.36	1.57	25.40	6.35	53.95
C2160H, C2162H	101.60	31.75	29.36	1.57	25.40	6.35	53.95

Table 9 Minus Tolerances on the Bottom or Caliper Diameters of Sprockets for Various Numbers of Effective Teeth, in.

Standard Chain Number	Chain Pitch, *P*	Effective Number of Teeth, *N*				
		Up Through 15½	16–24½	25–35½	36–48½	49–60
C2040, C2042	1.000	0.012	0.014	0.016	0.018	0.020
C2050, C2052	1.250	0.014	0.016	0.019	0.021	0.024
C2060, C2062	1.500	0.015	0.018	0.021	0.024	0.027
C2060H, C2062H	1.500	0.015	0.018	0.021	0.024	0.027
C2080, C2082	2.000	0.018	0.022	0.026	0.030	0.034
C2080H, C2082H	2.000	0.018	0.022	0.026	0.030	0.034
C2100, C2102	2.500	0.021	0.026	0.031	0.036	0.041
C2100H, C2102H	2.500	0.021	0.026	0.031	0.036	0.041
C2120, C2122	3.000	0.024	0.030	0.036	0.042	0.048
C2120H, C2122H	3.000	0.024	0.030	0.036	0.042	0.048
C2160, C2162	4.000	0.030	0.038	0.046	0.048	0.048
C2160H, C2162H	4.000	0.030	0.038	0.046	0.048	0.048

GENERAL NOTE: No plus tolerances.

Table 9M Minus Tolerances on the Bottom or Caliper Diameters of Sprockets for Various Numbers of Effective Teeth, mm

Standard Chain Number	Chain Pitch, *P*	Effective Number of Teeth, *N*				
		Up Through 15½	16–24½	25–35½	36–48½	49–60
C2040, C2042	25.40	0.30	0.36	0.41	0.46	0.51
C2050, C2052	31.75	0.36	0.41	0.48	0.53	0.61
C2060, C2062	38.10	0.38	0.46	0.53	0.61	0.69
C2060H, C2062H	38.10	0.38	0.46	0.53	0.61	0.69
C2080, C2082	50.80	0.46	0.56	0.66	0.76	0.86
C2080H, C2082H	50.80	0.46	0.56	0.66	0.76	0.86
C2100, C2102	63.50	0.53	0.66	0.79	0.91	1.04
C2100H, C2102H	63.50	0.53	0.66	0.79	0.91	1.04
C2120, C2122	76.20	0.61	0.76	0.91	1.07	1.22
C2120H, C2122H	76.20	0.61	0.76	0.91	1.07	1.22
C2160, C2162	101.60	0.76	0.97	1.17	1.22	1.22
C2160H, C2162H	101.60	0.76	0.97	1.17	1.22	1.22

GENERAL NOTE: No plus tolerances.

Table 10 Sprocket Factors, Small Roller and Power Transmission Series

Number of Effective Teeth	Pitch Diameter	Approximate Outside Diameter	Caliper Diameter Factor	
			Single Cut (*N* is Odd)	Double Cut (*N* is Fractional)
5	1.7013	1.839	1.6180	. . .
5½	1.8496	2.003	. . .	1.8308
6	2.0000	2.166	. . .	. . .
6½	2.1519	2.329	. . .	2.1361
7	2.3048	2.491	2.2470	. . .
7½	2.4586	2.652	. . .	2.4451
8	2.6131	2.814	. . .	. . .
8½	2.7682	2.975	. . .	2.7564
9	2.9238	3.136	2.8794	. . .
9½	3.0798	3.296	. . .	3.0692
10	3.2361	3.457	. . .	. . .
10½	3.3927	3.617	. . .	3.3831
11	3.5495	3.778	3.5133	. . .
11½	3.7065	3.938	. . .	3.6978
12	3.8637	4.098	. . .	. . .
12½	4.0211	4.258	. . .	4.0131
13	4.1786	4.418	4.1481	. . .
13½	4.3362	4.578	. . .	4.3289
14	4.4940	4.738	. . .	. . .
14½	4.6518	4.897	. . .	4.6450
15	4.8097	5.057	4.7834	. . .
15½	4.9677	5.217	. . .	4.9614
16	5.1258	5.377	. . .	. . .
16½	5.2840	5.536	. . .	5.2780
17	5.4422	5.696	5.4190	. . .
17½	5.6005	5.855	. . .	5.5948
18	5.7588	6.015	. . .	. . .
18½	5.9171	6.175	. . .	5.9118
19	6.0755	6.334	6.0548	. . .
19½	6.2340	6.494	. . .	6.2289
20	6.3924	6.653	. . .	. . .
20½	6.5509	6.813	. . .	6.5461
21	6.7095	6.972	6.6907	. . .
21½	6.8681	7.131	. . .	6.8635
22	7.0267	7.291	. . .	. . .
22½	7.1853	7.450	. . .	7.1809
23	7.3439	7.610	7.3268	. . .
23½	7.5026	7.769	. . .	7.4984
24	7.6613	7.929	. . .	. . .
24½	7.8200	8.088	. . .	7.8160
25	7.9787	8.247	7.9630	. . .
25½	8.1375	8.407	. . .	8.1336
26	8.2962	8.566	. . .	. . .
26½	8.4550	8.725	. . .	8.4513
27	8.6138	8.884	8.5992	. . .
27½	8.7726	9.044	. . .	8.7690
28	8.9314	9.203	. . .	. . .
28½	9.0902	9.363	. . .	9.0868

Table 10 Sprocket Factors, Small Roller and Power Transmission Series (Cont'd)

Number of Effective Teeth	Pitch Diameter	Approximate Outside Diameter	Caliper Diameter Factor	
			Single Cut (*N* is Odd)	Double Cut (*N* is Fractional)
29	9.2491	9.522	9.2355	. . .
29½	9.4080	9.681	. . .	9.4046
30	9.5668	9.841	. . .	. . .
30½	9.7256	10.000	. . .	9.7224
31	9.8845	10.159	9.8718	. . .
31½	10.0434	10.318	. . .	10.0403
32	10.2023	10.478	. . .	. . .
32½	10.3612	10.637	. . .	10.3582
33	10.5201	10.796	10.5082	. . .
33½	10.6790	10.956	. . .	10.6761
34	10.8379	11.115	. . .	. . .
34½	10.9969	11.274	. . .	10.9940
35	11.1558	11.433	11.1446	. . .
35½	11.3148	11.593	. . .	11.3120
36	11.4737	11.752	. . .	. . .
36½	11.6237	11.911	. . .	11.6300
37	11.7916	12.070	11.7810	. . .
37½	11.9506	12.230	. . .	11.9480
38	12.1095	12.389	. . .	. . .
38½	12.2685	12.548	. . .	12.2660
39	12.4275	12.707	12.4174	. . .
39½	12.5865	12.867	. . .	12.5840
40	12.7455	13.026	. . .	. . .
40½	12.9045	13.185	. . .	12.9021
41	13.0635	13.344	13.0539	. . .
41½	13.2225	13.504	. . .	13.2201
42	13.3815	13.663	. . .	. . .
42½	13.5405	13.822	. . .	13.5382
43	13.6995	13.981	13.6904	. . .
43½	13.8585	14.140	. . .	13.8563
44	14.0175	14.300	. . .	. . .
44½	14.1765	14.459	. . .	14.1744
45	14.3355	14.618	14.3269	. . .
45½	14.4946	14.777	. . .	14.4925
46	14.6536	14.937	. . .	. . .
46½	14.8127	15.096	. . .	14.8106
47	14.9717	15.255	14.9634	. . .
47½	15.1308	15.414	. . .	15.1287
48	15.2898	15.573	. . .	. . .
48½	15.4488	15.733	. . .	15.4468
49	15.6079	15.892	15.5999	. . .
49½	15.7669	16.051	. . .	15.7649
50	15.9260	16.210	. . .	. . .
50½	16.0850	16.369	. . .	16.0831
51	16.2441	16.529	16.2364	. . .
51½	16.4031	16.688	. . .	16.4012
52	16.5622	16.847	. . .	. . .
52½	16.7212	17.006	. . .	16.7194

Table 10 Sprocket Factors, Small Roller and Power Transmission Series (Cont'd)

Number of Effective Teeth	Pitch Diameter	Approximate Outside Diameter	Caliper Diameter Factor	
			Single Cut (*N* is Odd)	Double Cut (*N* is Fractional)
53	16.8803	17.165	16.8729	. . .
53½	17.0393	17.325	. . .	17.0375
54	17.1984	17.484	. . .	. . .
54½	17.3575	17.643	. . .	17.3557
55	17.5165	17.802	17.5094	. . .
55½	17.6756	17.961	. . .	17.6739
56	17.8347	18.121	. . .	. . .
56½	17.9938	18.280	. . .	17.9920
57	18.1528	18.439	18.1459	. . .
57½	18.3119	18.598	. . .	18.3102
58	18.4710	18.757	. . .	. . .
58½	18.6301	18.917	. . .	18.6284
59	18.7892	19.076	18.7825	. . .
59½	18.9482	19.235	. . .	18.9466
60	19.1073	19.394	. . .	. . .

GENERAL NOTES:

(a) This Table includes standard pitch diameters, outside diameters, and caliper diameter factors for single-cut sprockets where the number of effective teeth is odd, and double-cut sprockets where the number of effective teeth is fractional to suit a double-pitch chain of unit pitch (e.g., 1 in. or 1 mm), small roller series. (The respective diameters for sprockets to suit a chain of any other pitch are directly proportional to the pitch of the chain.)

(b) For other pitches of double-pitch roller chain, small roller series:
  (1) pitch diameter = pitch diameter from this Table × chain pitch
  (2) outside diameter = outside diameter from this Table × chain pitch
  (3) caliper diameter factor for single cut, if *N* is an odd number = $PD(\cos 90 \text{ deg}/N)$
  (4) caliper diameter factor for double cut, if *N* is a fractional number = $PD(\cos 45 \text{ deg}/N)$
  (5) caliper diameter for single cut, if *N* is an odd number, and double cut, if *N* is a fractional number = (caliper diameter factor from this Table × chain pitch) − roller diameter, R_S
  (6) caliper diameter for single cut, if *N* is an even number, and double cut, if *N* is an odd or even number = pitch diameter − roller diameter, R_S

Table 11 Sprocket Factors, Large Roller Series

Number of Effective Teeth	Pitch Diameter	Outside Diameter	Caliper Diameter Factor	Number of Effective Teeth	Pitch Diameter	Outside Diameter	Caliper Diameter Factor
5	1.7013	1.976	1.6180	33	10.5201	11.073	10.5082
6	2.0000	2.332	. . .	34	10.8379	11.392	. . .
7	2.3048	2.676	2.2470	35	11.1558	11.711	11.1446
8	2.6131	3.014	. . .	36	11.4737	12.030	. . .
9	2.9238	3.348	2.8794	37	11.7916	12.349	11.7810
10	3.2361	3.678	. . .	38	12.1095	12.668	. . .
11	3.5495	4.006	3.5133	39	12.4275	12.987	12.4174
12	3.8637	4.332	. . .	40	12.7455	13.306	. . .
13	4.1786	4.657	4.1481	41	13.0635	13.625	13.0539
14	4.4940	4.981	. . .	42	13.3815	13.944	. . .
15	4.8097	5.304	4.7834	43	13.6995	14.263	13.6904
16	5.1258	5.627	. . .	44	14.0175	14.582	. . .
17	5.4422	5.949	5.4190	45	14.3355	14.901	14.3269
18	5.7588	6.271	. . .	46	14.6536	15.219	. . .
19	6.0755	6.593	6.0548	47	14.9717	15.538	14.9634
20	6.3924	6.914	. . .	48	15.2898	15.857	. . .
21	6.7095	7.235	6.6907	49	15.6079	16.176	15.5999
22	7.0267	7.555	. . .	50	15.9260	16.495	. . .
23	7.3439	7.876	7.3268	51	16.2441	16.813	16.2364
24	7.6613	8.196	. . .	52	16.5622	17.132	. . .
25	7.9787	8.516	7.9630	53	16.8803	17.451	16.8729
26	8.2962	8.836	. . .	54	17.1984	17.769	. . .
27	8.6138	9.156	8.5992	55	17.5165	18.088	17.5094
28	8.9314	9.475	. . .	56	17.8347	18.407	. . .
29	9.2491	9.795	9.2355	57	18.1528	18.725	18.1459
30	9.5668	10.114	. . .	58	18.4710	19.044	. . .
31	9.8845	10.434	9.8718	59	18.7892	19.363	18.7825
32	10.023	10.753	. . .	60	19.1073	19.681	. . .

GENERAL NOTES:

(a) This Table includes standard pitch diameters, outside diameters, and caliper diameter factors for odd numbers of teeth of sprockets to suit a conveyor chain of unit pitch (e.g., 1 in. or 1 mm), large roller series. (The respective diameters for sprockets to suit a chain of any other pitch are directly proportional to the pitch of the chain.)

(b) For other pitches of conveyor roller chain, large roller series:
- (1) pitch diameter = pitch diameter from this Table × chain pitch
- (2) outside diameter = outside diameter from this Table × chain pitch
- (3) caliper diameter factor = $PD(\cos 90 \text{ deg}/N)$
- (4) caliper diameter (odd teeth) = (caliper diameter factor from this Table × chain pitch) − roller diameter, R_L
- (5) caliper diameter (even teeth) = pitch diameter − roller diameter, R_L

NONMANDATORY APPENDIX A
CONVEYOR CHAIN SELECTION[1]

A-1 CHAIN SELECTION

Conveyor chains are selected for specific operating conditions on the basis of the maximum loading that is expected to be encountered (see Tables A-1 and A-1M). Chain joint wear is negligible when loads are uniform, sprockets are of adequate size, and proper lubrication is provided.

A-1.1 Coefficients of Friction

The factors in Tables A-2 and A-3 are based on operation on smooth, flat, clean tracks at temperatures not exceeding 350°F (177°C). When clean tracks cannot be maintained, the factors should be increased. When the operating temperature exceeds 350°F (177°C), the chain manufacturer should be consulted for the factors for the specific conditions. Use static figures for chains operating at 3 ft/min (914 mm/min) or less.

Supporting of the conveyed load by the rollers of the small roller series is not recommended, since some of the rollers may not turn due to the small ratio of roller outside diameter to roller inside diameter. Such use of the standard roller series may result in flats being worn on the outside of the roller surface.

A-1.2 Lubrication

Conveyor chains should be kept as clean as operating conditions will permit, for the purpose of fostering effective lubrication to minimize metal-to-metal contact of pin–bushing and bushing–roller joints. Oil should be applied to upper edges of all link plates while in the lower span of chain, since access to joint clearances is possible only through clearances between roller link plates and rollers. Oil applied on the centerline of rollers cannot reach pin–bushing joints and therefore cannot retard the rate of wear elongation of chain pitch.

A good grade of mineral oil, without additives, of medium or light consistency, free flowing at the prevailing temperature, should be used.

Heavy oils and greases are not recommended for lubrication of conveyor roller chains, except under unusual conditions of service, because they generally are too stiff to enter and fill the small clearances between the chain parts.

Chains may be lubricated by any means that will ensure adequate oiling of every chain joint, whether lubrication is continuous by means of wicks; or it is intermittent and periodic, oil being applied manually by brush or spout can, or intermittently drip fed to wipers as may be advisable for services for which surplus lubrication must be avoided to prevent contamination by the lubricant of the material being conveyed.

Tracks may be lubricated with the same type of free-flowing oil used for chain joint lubrication or, if desirable, with a more viscous oil having better adherence to the track and providing better lubrication for conditions where link plate edges are sliding on the supporting track.

Engineers of chain manufacturers should be consulted in regard to lubrication of conveyor chains for which lubrication other than as outlined in this Nonmandatory Appendix might seem to be desirable.

A-1.3 Sprockets

Sprockets should have cut teeth. Tooth shape, thickness, profile, and diameters should conform to this Standard. The use of sprockets with the largest practical number of teeth, preferably no fewer than 15 effective teeth, is essential for smoothest operation and longest chain and sprocket life. Sprockets having 17 effective teeth or fewer will preferably be of steel, with hardness of 180 Brinell minimum. If the conveyors are exposed to abrasive conditions, either 0.20 carbon steel, carburized, hardened, and drawn; or 0.40 or higher carbon steel, heat treated and drawn; are generally recommended, the hardness usually being between 300 Brinell minimum and 550 Brinell maximum.

Larger sprockets may be made from unhardened steel plates, bars, castings, or forgings, or cast iron, depending upon the duty imposed.

A-1.4 Center Distance Adjustment

Especially for long conveyors, it is desirable that take-up devices be provided.

The arc of meshing of the chain on loaded sprockets should be no less than 135 deg. Idler sprockets should have at least three teeth in mesh with the chain, and preferably will mesh with slack spans.

A-1.5 Alignment

Alignment of shafting and sprocket tooth faces must be such as to conform to usual standards of good workmanship: shafts being parallel and horizontal, installations being such that loading will be properly

[1] Made available through the cooperation of the American Chain Association.

distributed across the chain width or, when pairs of chains are used in parallel, equally shared. Shafting, bearings, and foundation should be suitable to maintain the initial static alignment.

If double-pitch conveyor chains are applied in power transmission service, refer to Nonmandatory Appendix B for selection information.

Table A-1 Recommended Maximum Working Load, lb

Pitch, in.	Chain Speed, ft/min								
	5	25	50	75	100	200	300	400	500
1.000	530	525	510	490	465	335	230	160	115
1.250	870	865	840	805	765	555	380	265	190
1.500	1,215	1,205	1,170	1,125	1,065	775	530	370	265
2.000	2,070	2,055	2,000	1,915	1,815	1,320	905	630	455
2.500	3,425	3,400	3,310	3,175	3,000	2,180	1,500	1,040	750
3.000	4,855	4,815	4,690	4,495	4,250	3,090	2,125	1,480	1,065
4.000	8,585	8,210	8,000	7,670	7,250	5,275	3,625	2,520	1,815

Table A-1M Recommended Maximum Working Load, N

Pitch, mm	Chain Speed, m/min								
	2	10	15	25	30	60	90	120	150
25.40	2 360	2 340	2 270	2 180	2 070	1 490	1 020	710	510
31.75	3 870	3 850	3 740	3 580	3 400	2 470	1 690	1 180	845
38.10	5 400	5 360	5 200	5 000	4 740	3 450	2 360	1 650	1 180
50.80	9 210	9 140	8 900	8 520	8 070	5 870	4 030	2 800	2 020
63.50	15 200	15 100	14 700	14 100	13 300	9 700	6 670	4 630	3 340
76.20	21 600	21 400	20 900	20 000	18 900	13 700	9 450	6 580	4 740
101.60	38 200	36 500	35 600	34 100	32 200	23 500	16 100	11 200	8 070

Table A-2 Coefficients of Friction When Conveyed Load Is Carried by Link Plate Edges

Coefficient of Friction	Dry	Lubricated
Static	0.33	0.24
Sliding	0.27	0.21

Table A-3 Coefficients of Friction When Conveyor Load Is Carried by Rollers (Large Roller Series Only)

Standard Chain Number	Static		Rolling	
	Dry	Lubricated	Dry	Lubricated
C2042	0.17	0.12	0.14	0.10
C2052	0.16	0.11	0.13	0.09
C2062, C2062H	0.16	0.11	0.13	0.09
C2082, C2082H	0.15	0.10	0.12	0.08
C2102, C2102H	0.14	0.09	0.11	0.07
C2122, C2122H	0.14	0.09	0.11	0.07
C2162, C2162H	0.13	0.08	0.10	0.07

NONMANDATORY APPENDIX B
TRANSMISSION CHAIN SELECTION[1]

B-1 DESIGN FACTORS

The horsepower ratings in Tables B-1 through B-6 generally apply to lubricated double-pitch roller chains described in this Standard. The ratings reflect a service factor of 1, the use of recommended lubrication methods, and a drive arrangement where two aligned sprockets are mounted on parallel shafts in a horizontal plane. Under these conditions, approximately 15,000 hr of service life at full-load operation may generally be expected.

It is beyond the scope of this Standard to present selection procedures for all conditions; consult chain manufacturers for assistance with any special application requirements.

B-2 SERVICE FACTORS

Service factors as given in the following tabulation should be used in connection with the horsepower ratings, the load capacity being multiplied by the factor to obtain the desired chain capacity:

	Conditions of Service	
Type of Load	10-hr Day	24-hr Day
Uniform load, average conditions	1.0	1.2
Moderate shock, abnormal conditions	1.2	1.4
Heavy shock, abnormal conditions	1.4	1.7

B-3 LUBRICATION

Lubrication of roller chains is essential for effectively minimizing metal-to-metal contact of pin–bushing joints of the chain. Oil should be applied to link plate edges as subsequently explained under Type I method of lubrication, since access to pin–bushing clearances is possible only through clearances between pin link plates and roller link plates. Oil applied on the centerline of rollers cannot reach pin–bushing joints and therefore cannot retard chain wear elongation.

A good grade of mineral oil, without additives, of medium or light consistency, free flowing at the prevailing temperature, should be used.

Temperature, °F	Recommended Lubricant
20–40	SAE 20
40–100	SAE 30
100–120	SAE 40
120–140	SAE 50

Drives should be protected against dirt and moisture. The method of lubrication, which is influenced by the speed of the chain and the amount of power transmitted, should be in accordance with one of the following:

(a) Type I. Drip (4 to 10 drops per minute), shallow bath, or manual with oil applied frequently with a brush or spout can to upper edges of all link plates when in the lower span of chain.[2]

(b) Type II. Rapid drip (20 drops per minute minimum) or continuous with shallow bath, disc, or slinger.[2]

(c) Type III. Continuous, with disc, slinger, or circulating pump.

The choice of method or type of lubrication should, in general, be guided by the following:

Chain Speed	Method of Lubrication
Up to 600 ft/min (3 m/s)	Type I
600 ft/min to 1,500 ft/min (3 m/s to 7.6 m/s)	Type II
Above 1,500 ft/min (7.6 m/s)	Type III

Heavy oils and greases are not recommended for lubrication of roller chains except under unusual conditions of service, because they are generally too stiff to enter and fill the small clearances between the chain parts. Engineers of chain manufacturers should be consulted in regard to lubrication of roller chain drives for which lubrication other than as outlined might seem to be desirable.

B-4 SPROCKETS

Sprockets should have tooth shape, thickness, profile, and diameters conforming to these standards. Small sprockets, 17 effective teeth and fewer, will preferably be of steel, 180 Brinell minimum, for speeds to about 600 ft/min (3 m/s). For speeds greater than 600 ft/min (3 m/s), either 0.20 carbon steel, carburized, hardened,

[1] Made available through the cooperation of the American Chain Association.

[2] A circulating pump may be required when transmitted horsepower is substantial and center distance is short.

and drawn; or 0.40 or higher carbon steel, heat treated and drawn; are generally recommended, the hardness usually being between 300 Brinell minimum and 550 Brinell maximum depending on the type of service. Sprocket speeds should not exceed those shown in Table B-7.

Larger sprockets may be made from unhardened steel plates, bars, castings, or forgings, or cast iron, depending upon the duty imposed.

B-5 CENTER DISTANCE

Center distance between sprockets should be sufficient to provide approximately 135-deg minimum arc of meshing of the chain on the smaller sprocket. Means for adjustment of center distance is recommended, especially if there is fluctuation of load or if the sprockets are on vertical centers.

B-6 ALIGNMENT

Alignment of shafting and sprocket tooth faces must be such as to provide distribution of the load across the entire chain width. Shaftings, bearings, and foundations should be suitable to maintain the initial static alignment.

NOTE: The horsepower tables are directly applicable only if the sprockets are on parallel, horizontal shafts.