
**Guidelines for the selection of roller
chain drives**

Méthode de sélection des transmissions par chaîne à rouleaux

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Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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ISO 10823 was prepared by Technical Committee ISO/TC 100, *Chains and chain wheels for power transmission and conveyors*.

This second edition cancels and replaces the first edition (ISO 10823:1996), which has been technically revised.

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Guidelines for the selection of roller chain drives

1 Scope

This International Standard gives guidelines for the selection of chain drives, composed of a roller chain and sprockets conformant with ISO 606, for industrial applications.

The selection procedures and the chain ratings it describes provide for roller chain drives operating under specified conditions, as defined in 9.1, 9.2 and in Clause 10, with a life expectancy of approximately 15 000 h.

Owing to the wide variations in loading characteristics, environmental conditions and achieved maintenance, it is desirable that the supplier of the chains and sprockets be consulted to ensure that the performance of the product meets the requirements specified both by the user and by this International Standard.

2 Normative references

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

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

3 Symbols

The symbols and units used in this International Standard are given in Table 1.

4 Basic equations

4.1 Input power

The power to be transmitted is the input P , in kilowatts, to the drive sprocket. If input torque is the known requirement, then P can be derived from the following equation:

$$P = \frac{M \times n_1}{9\,550} \quad (1)$$

4.2 Corrected power

To allow for the characteristics of the drive system and the type of load to be transmitted, the input power, P , is multiplied by factors to obtain the corrected power, P_c .

$$P_c = P \times f_1 \times f_2 \quad (2)$$

Table 1 — Symbols, designations and units

| Symbol | Designation | Unit |
|--------|---|-------------------|
| a | Maximum centre distance | mm |
| a_0 | Approximate centre distance | mm |
| f_1 | Application factor to allow for the operating conditions (see Table 2) | — |
| f_2 | Factor for number of teeth on small sprocket [see Figure 4 and Equation (5)] | — |
| f_3 | Factor for calculation of the number of links with different number of teeth (see Table 5) | — |
| f_4 | Factor for the calculation of the centre distance with different numbers of teeth (see Table 6) | — |
| i | Speed ratio | — |
| M | Input torque | N·m |
| n_1 | Input sprocket speed | min ⁻¹ |
| n_2 | Output sprocket speed | min ⁻¹ |
| n_s | Small sprocket speed | min ⁻¹ |
| p | Chain pitch | mm |
| P | Input power | kW |
| P_c | Corrected power | kW |
| v | Chain speed | m·s ⁻¹ |
| X | Number of pitches in chain | — |
| X_0 | Calculated number of pitches in chain | — |
| z_1 | Number of input sprocket teeth | — |
| z_2 | Number of output sprocket teeth | — |
| z_s | Number of small sprocket teeth | — |

5 Drive design specifications

The following design features should be specified before the chain and sprockets are selected:

- power to be transmitted;
- type of driver and driven machinery;
- speeds and sizes of the driver and driven shafts;
- centre distance and layout of the shafts;
- environmental conditions.

NOTE Shaft sizes, unusually long or short centre distances, and/or a complex layout could influence the drive selection.

6 Sprocket selection

Determine the number of teeth on the sprockets using the following procedure:

- a) select the desired number of teeth for the input sprocket;
- b) determine the speed ratio, i , using the equation:

$$i = \frac{n_1}{n_2} \quad (3)$$

- c) determine the number of teeth on the output sprocket, z_2 , using the equation:

$$z_2 = i \times z_1 \quad (4)$$

It is good practice to use sprockets with not less than 17 teeth and not more than 114 teeth.

If the chain drive operates at high speed or if it is subjected to impulse loads, the small sprocket should have at least 25 teeth and the teeth should be hardened.

7 Chain calculations and selection

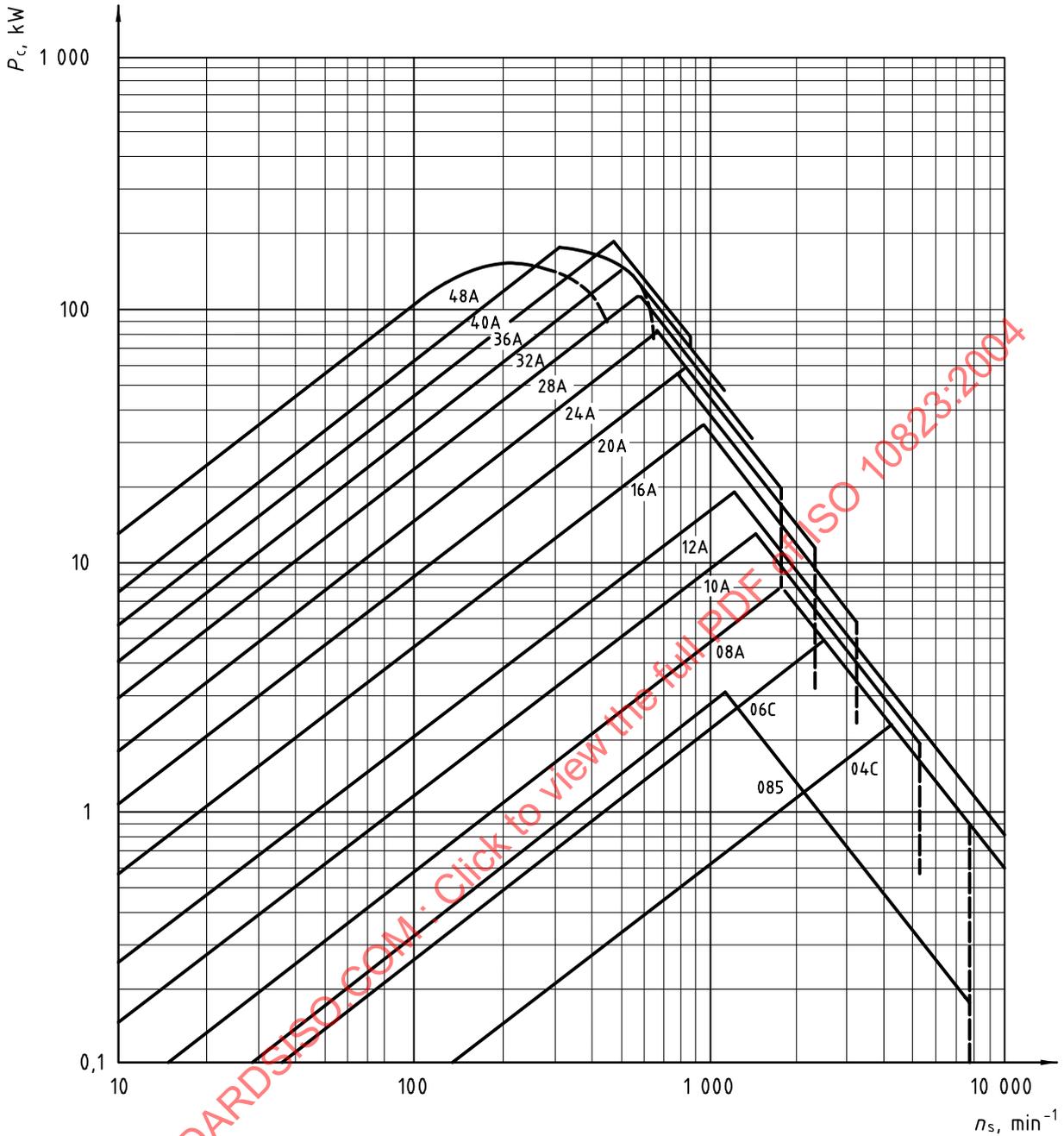
7.1 Normal operating conditions and drive capacities for chains

The typical capacity rating charts shown in Figures 1, 2 and 3 apply to chain drives operating under the following conditions:

- a) a chain drive with two sprockets on parallel horizontal shafts;
- b) a small sprocket with 19 teeth;
- c) a simplex chain without cranked link;
- d) a chain length of 120 pitches (different chain lengths will affect chain life);
- e) a speed ratio of from 1:3 to 3:1;
- f) an expected life of 15 000 h;
- g) an operating temperature between $-5\text{ }^{\circ}\text{C}$ and $+70\text{ }^{\circ}\text{C}$;
- h) sprockets correctly aligned and chain maintained in correct adjustment (see Clause 10);
- i) uniform operation without overload, shocks or frequent starts;
- j) clean and adequate lubrication throughout the chain's life (see Clause 9).

Figures 1, 2 and 3 can be used to select the size of chain suitable for a chain drive as a function of the corrected power, P_c , and the small sprocket rotational speed, n_s .

The capacity rating charts given in Figures 1, 2 and 3 are representative of those published by chain manufacturers. Individual manufacturers can rate their chains differently. It is therefore recommended that the appropriate manufacturer's rating chart be consulted.



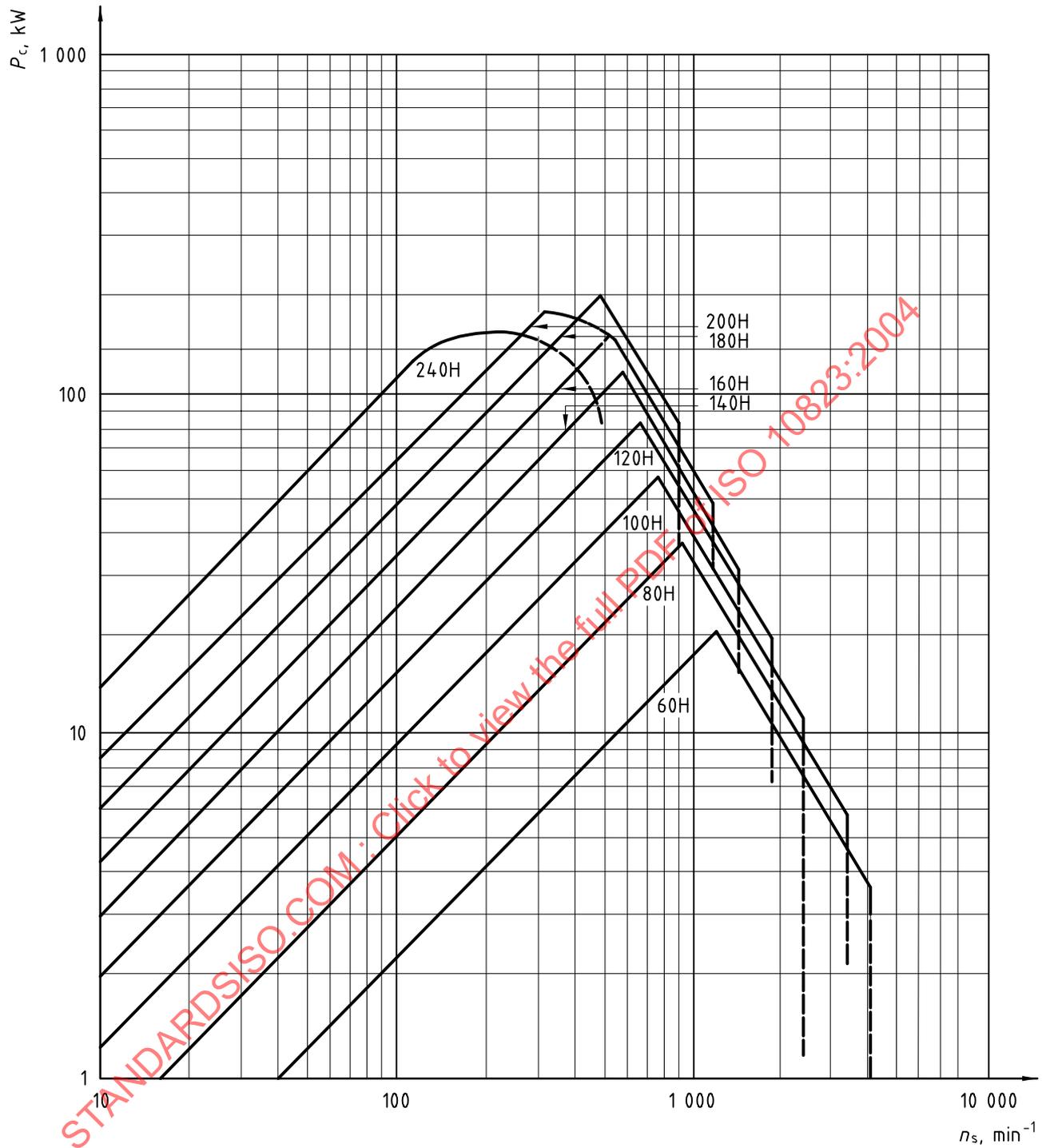
Key

- P_c corrected power
- n_s small sprocket speed

NOTE 1 The power rating of duplex chain can be calculated by multiplying the value of P_c for simplex chain by 1,7.

NOTE 2 The power rating of triplex chain can be calculated by multiplying the value of P_c for simplex chain by 2,5.

Figure 1 — Typical capacity chart for selection of Type A simplex chains based on a 19-tooth sprocket conforming with ISO 606



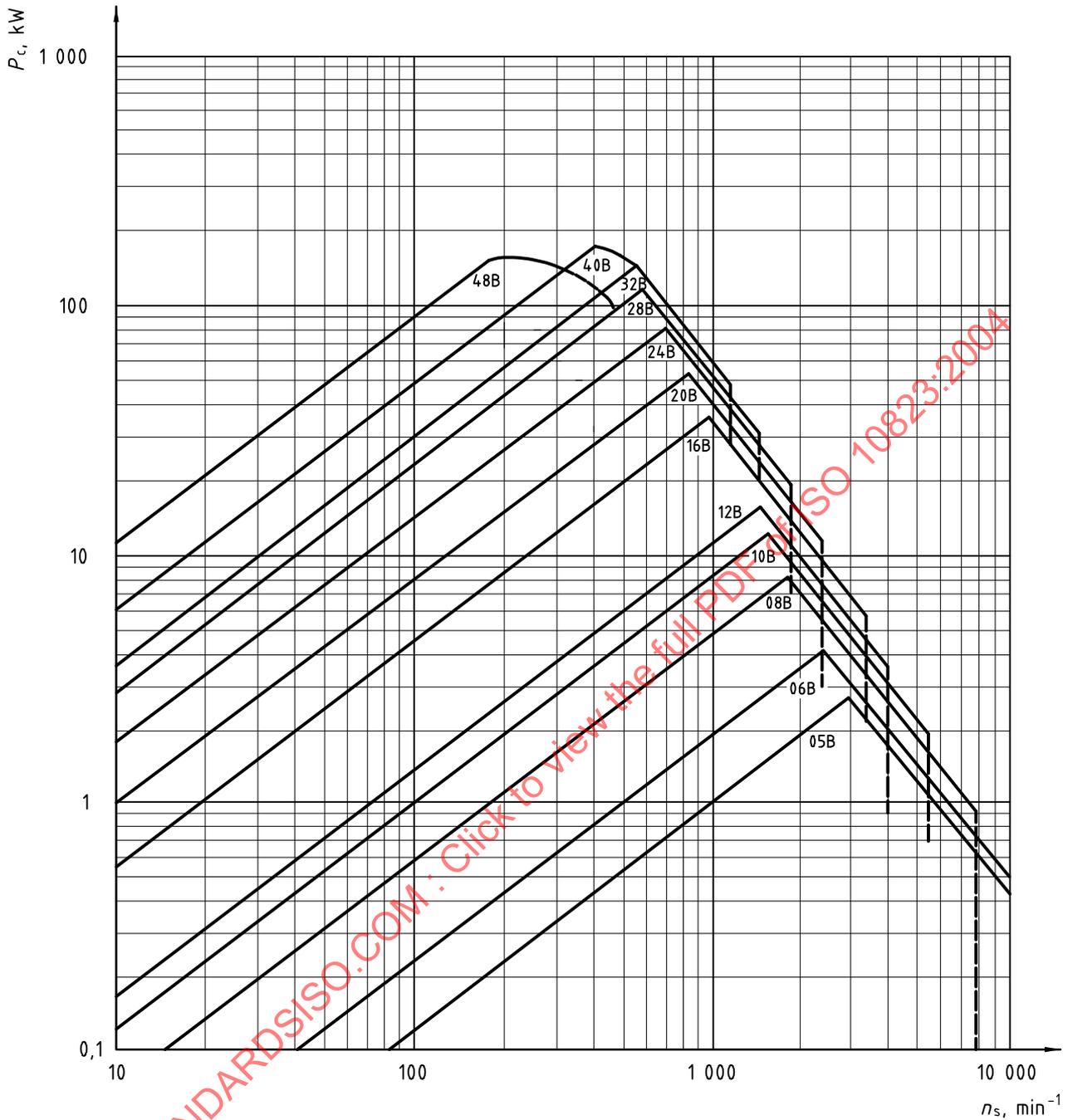
Key

P_c corrected power
 n_s small sprocket speed

NOTE 1 The power rating of duplex chain can be calculated by multiplying the value of P_c for simplex chain by 1,7.

NOTE 2 The power rating of triplex chain can be calculated by multiplying the value of P_c for simplex chain by 2,5.

Figure 2 — Typical capacity chart for selection of Type A heavy-series simplex chains based on a 19-tooth sprocket conforming with ISO 606



Key

- P_c corrected power
- n_s small sprocket speed

- NOTE 1 The power rating of duplex chain can be calculated by multiplying the value of P_c for simplex chain by 1,7.
- NOTE 2 The power rating of triplex chain can be calculated by multiplying the value of P_c for simplex chain by 2,5.

Figure 3 — Typical capacity chart for selection of Type B simplex chains based on a 19-tooth sprocket conforming with ISO 606

7.2 Correction for other operating conditions for chains

7.2.1 Power correction

If the characteristics of the chain drive and its operating conditions are different from those described in 7.1, the transmitted power shall be corrected by using Equation (2).

The derivation of factors f_1 and f_2 are given in 7.2.2 and 7.2.3.

7.2.2 Application factor f_1

Factor f_1 takes into account dynamic overloads dependant on the chain drive operating conditions and resulting, in particular, from the nature of the driver and driven elements. The value of factor f_1 can be selected directly or by analogy using Table 2 in conjunction with the definitions given in Tables 3 and 4.

Table 2 — Application factor f_1

| Driven machine characteristics (see Table 4) | Driver machine characteristics (see Table 3) | | |
|---|---|---------------|-----------------|
| | Smooth running | Slight shocks | Moderate shocks |
| Smooth running | 1,0 | 1,1 | 1,3 |
| Moderate shocks | 1,4 | 1,5 | 1,7 |
| Heavy shocks | 1,8 | 1,9 | 2,1 |

Table 3 — Definitions of characteristics of driver machines

| Driver machine characteristics | Machine type examples |
|--------------------------------|---|
| Smooth running | Electric motors, steam and gas turbines and Internal combustion engines with hydraulic coupling |
| Slight shocks | Internal combustion engines with six cylinders or more with mechanical coupling, electric motors subjected to frequent starts (more than two per day) |
| Moderate shocks | Internal combustion engines with less than six cylinders with mechanical coupling |

Table 4 — Definitions of characteristics of driven machines

| Characteristics of driven machine | Machine type examples |
|-----------------------------------|--|
| Smooth running | Centrifugal pumps and compressors, printing machines, uniformly loaded belt conveyors, paper calendars, escalators, liquid agitators and mixers, rotary dryers, fans |
| Moderate shocks | Reciprocating pumps and compressors with three or more cylinders, concrete mixing machines, non-uniformly loaded conveyors, solid agitators and mixers |
| Heavy shocks | Excavators, roll and ball mills, rubber-processing machines, planers/presses/shears/pumps/compressors with one or two cylinders, oil drilling rigs |

7.2.3 Factor f_2

Factor f_2 takes account of the number of teeth on the small sprocket only for the portion of the power ratings limited by plate fatigue. Its value shall be determined using Equation (5). Values of f_2 for 11 to 45 teeth are shown in Figure 4.

$$f_2 = \left(\frac{19}{z_s} \right)^{1,08} \tag{5}$$

Use the equations in B.3 and B.4 to account for the number of teeth on the small sprocket for the portions of the power ratings limited by roller and bushing impact fatigue and pin–bushing galling.

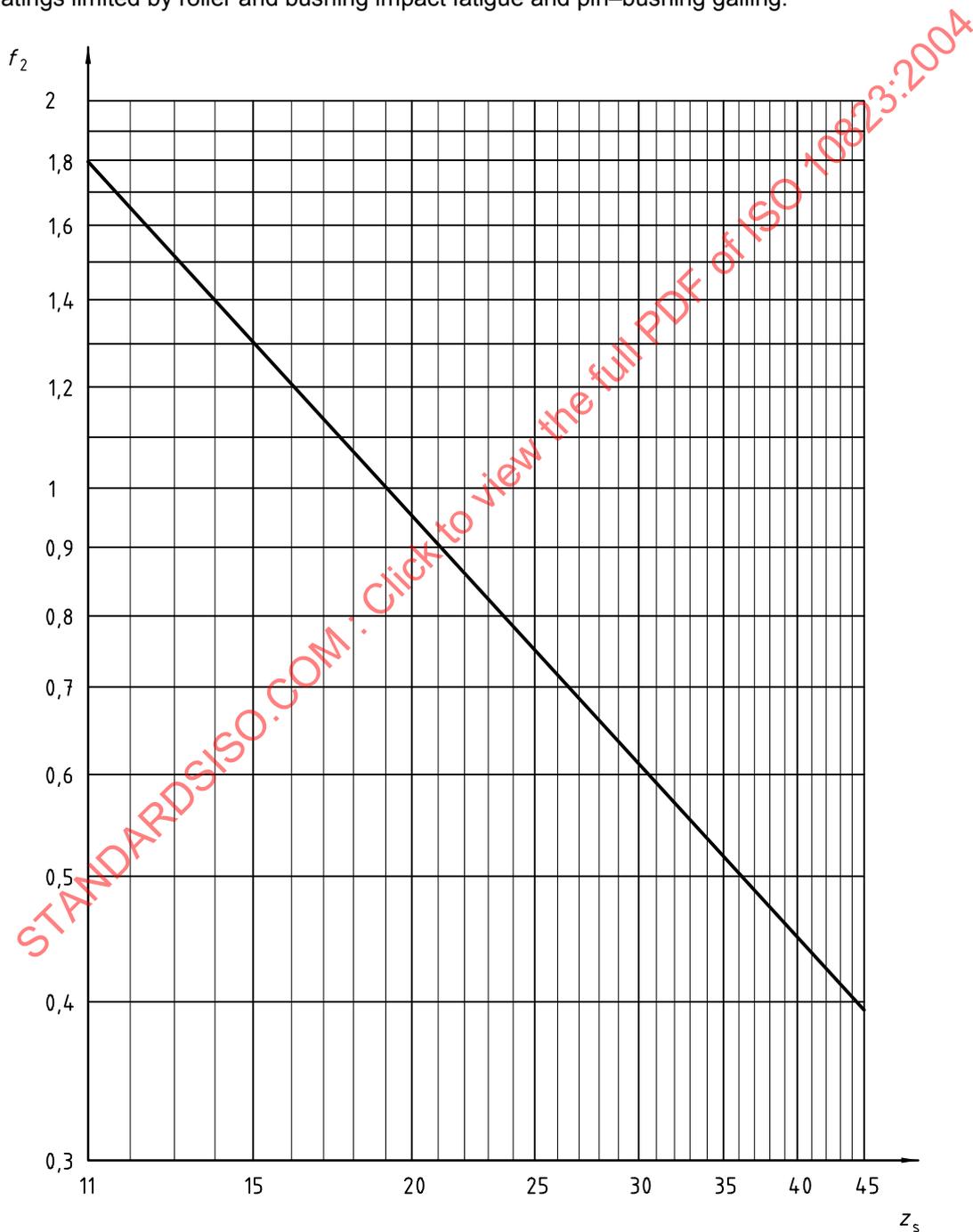


Figure 4 — Factor f_2 allowing for the number of teeth on the small sprocket z_s

7.3 Chain selection

From the chain capacity charts (see Figures 1, 2 and 3), select the smallest pitch of simplex chain that will transmit the required power at the required speed of the small sprocket.

Where the speed exceeds the limit of the smallest pitch simplex chain, or a more compact drive is necessary, a multiplex chain of smaller pitch should be considered. Select multiplex chains from the capacity charts (see Figures 1, 2 and 3) using the factors provided in Note 1 and Note 2 with each chart.

7.4 Chain length

For a drive with two sprockets, having a known chain pitch p and approximate centre distance a_0 , calculate the number of chain pitches, X_0 , using Equations (6) and (7).

The calculated number of pitches, X_0 should be rounded up to a whole even number, X , to avoid the use of cranked links.

For sprockets with the same number of teeth ($z = z_1 = z_2$):

$$X_0 = 2 \frac{a_0}{p} + z \quad (6)$$

For sprockets with different number of teeth:

$$X_0 = 2 \frac{a_0}{p} + \frac{z_1 + z_2}{2} + \frac{f_3 \times p}{a_0} \quad (7)$$

where factor $f_3 = \left(\frac{|z_2 - z_1|}{2\pi} \right)^2$

Calculated values for f_3 are given in Table 5.

7.5 Chain speed

Calculate the chain speed using the following equation:

$$v = \frac{n_1 \times z_1 \times p}{60\,000} \quad (8)$$

Table 5 — Calculated values of factor f_3

| $ z_2 - z_1 $ | f_3 | $ z_2 - z_1 $ | f_3 | $ z_2 - z_1 $ | f_3 | $ z_2 - z_1 $ | f_3 | $ z_2 - z_1 $ | f_3 |
|---------------|---------|---------------|--------|---------------|--------|---------------|---------|---------------|---------|
| 1 | 0,025 3 | 21 | 11,171 | 41 | 42,580 | 61 | 94,254 | 81 | 166,191 |
| 2 | 0,101 3 | 22 | 12,260 | 42 | 44,683 | 62 | 97,370 | 82 | 170,320 |
| 3 | 0,228 0 | 23 | 13,400 | 43 | 46,836 | 63 | 100,536 | 83 | 174,500 |
| 4 | 0,405 3 | 24 | 14,590 | 44 | 49,040 | 64 | 103,753 | 84 | 178,730 |
| 5 | 0,633 3 | 25 | 15,831 | 45 | 51,294 | 65 | 107,021 | 85 | 183,011 |
| 6 | 0,912 | 26 | 17,123 | 46 | 53,599 | 66 | 110,339 | 86 | 187,342 |
| 7 | 1,241 | 27 | 18,466 | 47 | 55,955 | 67 | 113,708 | 87 | 191,724 |
| 8 | 1,621 | 28 | 19,859 | 48 | 58,361 | 68 | 117,128 | 88 | 196,157 |
| 9 | 2,052 | 29 | 21,303 | 49 | 60,818 | 69 | 120,598 | 89 | 200,640 |
| 10 | 2,533 | 30 | 22,797 | 50 | 63,326 | 70 | 124,119 | 90 | 205,174 |
| 11 | 3,065 | 31 | 24,342 | 51 | 65,884 | 71 | 127,690 | 91 | 209,759 |
| 12 | 3,648 | 32 | 25,938 | 52 | 68,493 | 72 | 131,313 | 92 | 214,395 |
| 13 | 4,281 | 33 | 27,585 | 53 | 71,153 | 73 | 134,986 | 93 | 219,081 |
| 14 | 4,965 | 34 | 29,282 | 54 | 73,863 | 74 | 138,709 | 94 | 223,187 |
| 15 | 5,699 | 35 | 31,030 | 55 | 76,624 | 75 | 142,483 | 95 | 228,605 |
| 16 | 6,485 | 36 | 32,828 | 56 | 79,436 | 76 | 146,308 | 96 | 233,443 |
| 17 | 7,320 | 37 | 34,677 | 57 | 82,298 | 77 | 150,184 | 97 | 238,333 |
| 18 | 8,207 | 38 | 36,577 | 58 | 85,211 | 78 | 154,110 | 98 | 243,271 |
| 19 | 9,144 | 39 | 38,527 | 59 | 88,175 | 79 | 158,087 | 99 | 248,261 |
| 20 | 10,132 | 40 | 40,529 | 60 | 91,189 | 80 | 162,115 | 100 | 253,302 |

8 Maximum sprocket centre distance

For the number of chain pitches, X , derived in 7.4, determine the maximum distance between centres of the sprockets, a , using Equations (9) or (10).

For two sprockets with the same number of teeth ($z = z_1 = z_2$):

$$a = p \left(\frac{X - z}{2} \right) \tag{9}$$

For two sprockets with different numbers of teeth:

$$a = f_4 p \left[2X - (z_1 + z_2) \right] \tag{10}$$

Values for factor f_4 are given in Table 6.

Table 6 — Calculated values of factor f_4

| $\frac{ X - z_s }{z_2 - z_1}$ | f_4 | $\frac{ X - z_s }{z_2 - z_1}$ | f_4 | $\frac{ X - z_s }{z_2 - z_1}$ | f_4 | $\frac{ X - z_s }{z_2 - z_1}$ | f_4 |
|-------------------------------|----------|-------------------------------|----------|-------------------------------|----------|-------------------------------|----------|
| 13 | 0,249 91 | 2,7 | 0,247 35 | 1,54 | 0,237 58 | 1,26 | 0,225 20 |
| 12 | 0,249 90 | 2,6 | 0,247 08 | 1,52 | 0,237 05 | 1,25 | 0,224 43 |
| 11 | 0,249 88 | 2,5 | 0,246 78 | 1,50 | 0,236 48 | 1,24 | 0,223 61 |
| 10 | 0,249 86 | 2,4 | 0,246 43 | 1,48 | 0,235 88 | 1,23 | 0,222 75 |
| 9 | 0,249 83 | 2,3 | 0,246 02 | 1,46 | 0,235 24 | 1,22 | 0,221 85 |
| 8 | 0,249 78 | 2,2 | 0,245 52 | 1,44 | 0,234 55 | 1,21 | 0,220 90 |
| 7 | 0,249 70 | 2,1 | 0,244 93 | 1,42 | 0,233 81 | 1,20 | 0,219 90 |
| 6 | 0,249 58 | 2,0 | 0,244 21 | 1,40 | 0,233 01 | 1,19 | 0,218 84 |
| 5 | 0,249 37 | 1,95 | 0,243 80 | 1,39 | 0,232 59 | 1,18 | 0,217 71 |
| 4,8 | 0,249 31 | 1,90 | 0,243 33 | 1,38 | 0,232 15 | 1,17 | 0,216 52 |
| 4,6 | 0,249 25 | 1,85 | 0,242 81 | 1,37 | 0,231 70 | 1,16 | 0,215 26 |
| 4,4 | 0,249 17 | 1,80 | 0,242 22 | 1,36 | 0,231 23 | 1,15 | 0,213 90 |
| 4,2 | 0,249 07 | 1,75 | 0,241 56 | 1,35 | 0,230 73 | 1,14 | 0,212 45 |
| 4,0 | 0,248 96 | 1,70 | 0,240 81 | 1,34 | 0,230 22 | 1,13 | 0,210 90 |
| 3,8 | 0,248 83 | 1,68 | 0,240 48 | 1,33 | 0,229 68 | 1,12 | 0,209 23 |
| 3,6 | 0,248 68 | 1,66 | 0,240 13 | 1,32 | 0,229 12 | 1,11 | 0,207 44 |
| 3,4 | 0,248 49 | 1,64 | 0,239 77 | 1,31 | 0,228 54 | 1,10 | 0,205 49 |
| 3,2 | 0,248 25 | 1,62 | 0,239 38 | 1,30 | 0,227 93 | 1,09 | 0,203 36 |
| 3,0 | 0,247 95 | 1,60 | 0,238 97 | 1,29 | 0,227 29 | 1,08 | 0,201 04 |
| 2,9 | 0,247 78 | 1,58 | 0,238 54 | 1,28 | 0,226 62 | 1,07 | 0,198 48 |
| 2,8 | 0,247 58 | 1,56 | 0,238 07 | 1,27 | 0,225 93 | 1,06 | 0,195 64 |

9 Lubrication

9.1 Methods of lubrication

The method of lubrication that should be used to ensure satisfactory control of wear in the chain drive is determined by the speed and capacity rating of the chain.

The lubrication ranges, which define the minimum required methods of lubrication to be used, are derived from the chart given in Figure 5. The definitions of the lubrication ranges are as follows.

Range 1: oil supply by means of oil can or brush, applied manually at frequent intervals.

Range 2: drip feed lubrication.

Range 3: oil bath or disc lubrication.

Range 4: forced-feed lubrication with filter and, if necessary, an oil cooler.

NOTE An oil cooler could be necessary if the drive operates in a confined space at high power and speeds.

9.2 Oil viscosity

The viscosity classes of oils that should be used for chain drive lubrication at different operating ambient temperatures are shown in Table 7.

Ensure that the lubricating oil is free from contaminants, particularly abrasive particles.

Table 7 — Chain drive lubrication oil viscosity class

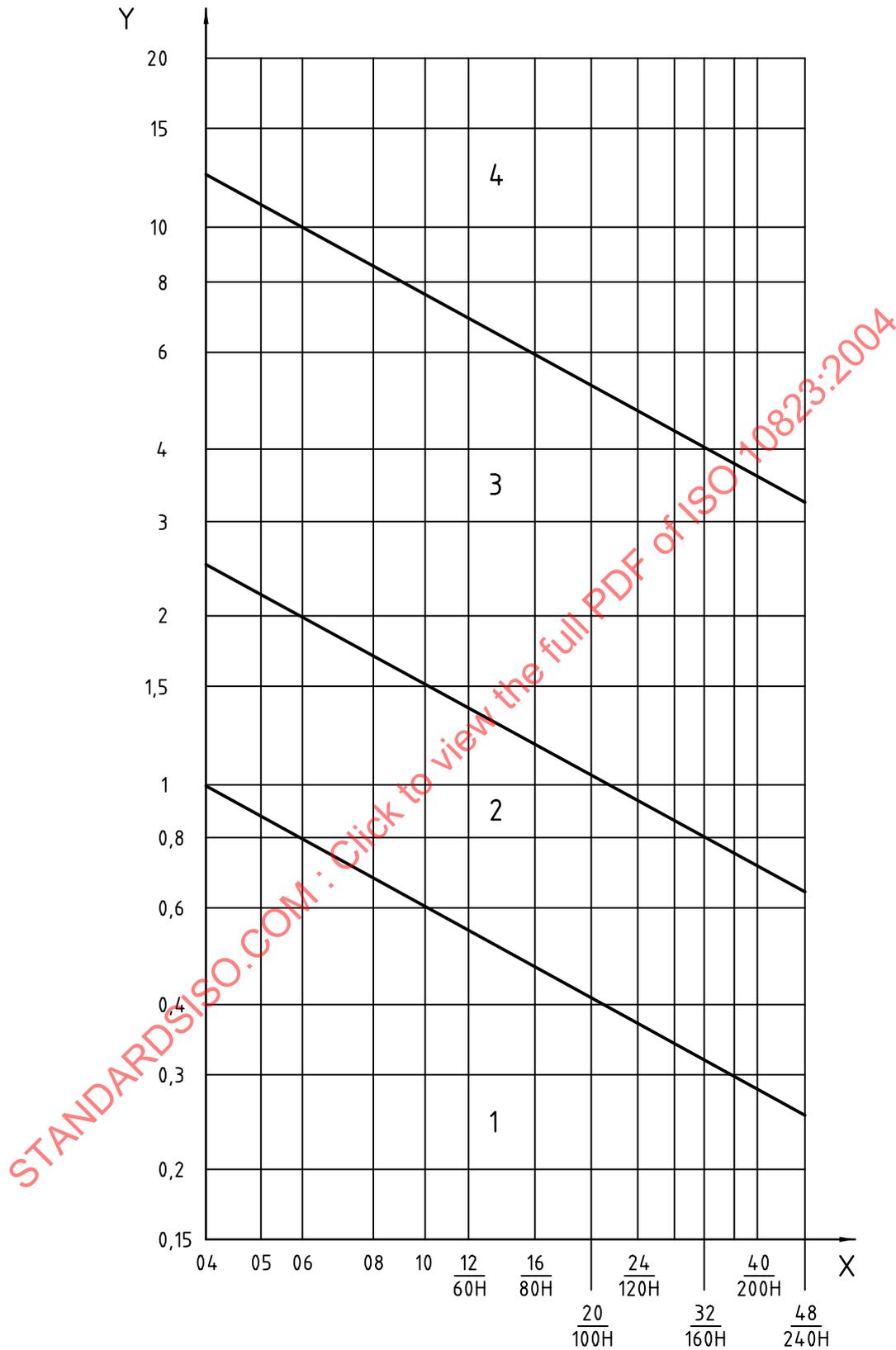
| | | | | |
|--|---------------------|-------------------|--------------------|--------------------|
| Ambient temperature, t, °C | $-5 \leq t \leq +5$ | $+5 < t \leq +25$ | $+25 < t \leq +45$ | $+45 < t \leq +70$ |
| Oil viscosity class | VG 68 (SAE 20) | VG 100 (SAE 30) | VG 150 (SAE 40) | VG 220 (SAE 50) |

10 Good practice in drive design

10.1 Sprocket centre distance

The preferred centre distance should measure between 30 times and 50 times the chain pitch. There should be a minimum contact arc of 120° on the small sprocket.

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X $\frac{\text{A-series}}{\text{A-heavy}}$ or B-series chain numbers

Y chain speed v , $\text{m}\cdot\text{s}^{-1}$

For 1, 2, 3 and 4, see 9.1.

Figure 5 — Lubrication ranges selection chart

10.2 Chain adjustment

The recommended method of chain adjustment is by correction of the centre distance.

Rotate the sprockets away from each other to make one span taut. Then measure the total mid-span movement, A–C, in the slack span (see Figure 6).

When the centres are inclined less than 45° from the horizontal, the amount of movement, A–C, should be from 2 % (± 1 %) to 6 % (± 3 %) of the centre distance.

When the centres are inclined more than 45° from the horizontal, the amount of movement, A–C, should be from 1 % ($\pm 0,5$ %) to 3 % ($\pm 1,5$ %) of the centre distance.

10.3 Idlers

Alternatively, adjustment of the chain can be achieved by means of idlers, idler sprockets or other suitable means, especially in the case of a chain drive that has an inclination of more than 60° to the horizontal.

Care shall be taken to ensure that additional forces are not applied to the chain.

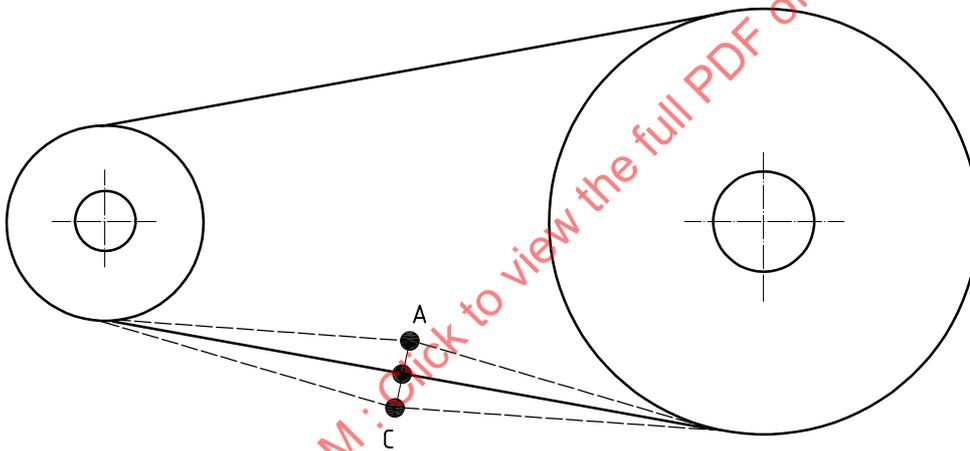
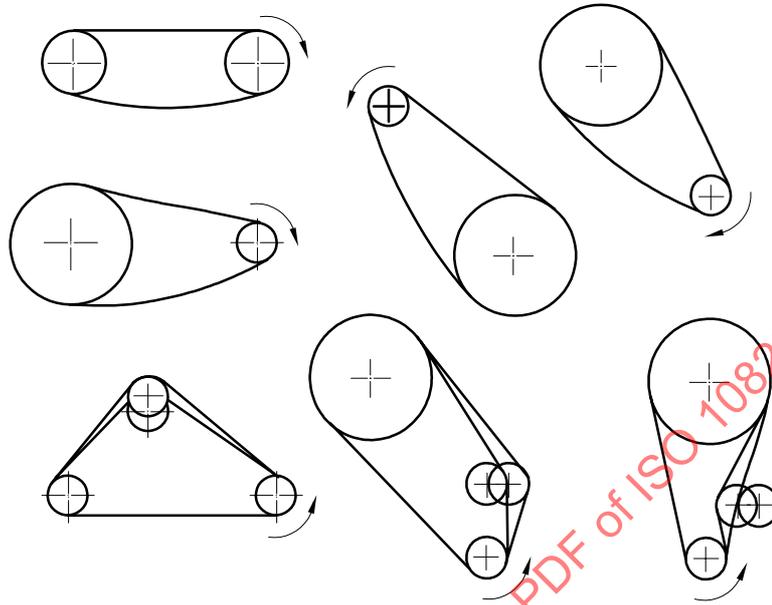


Figure 6 — Chain slack adjustment

10.4 Drive layout

Drive arrangements that normally provide good function and life are shown in Figure 7.



NOTE For drive arrangements not shown, consult a chain manufacturer.

Figure 7 — Commonly used drive arrangements

Annex A (informative)

Example of chain drive selection

A.1 Given parameters

The layout of the chain drive to which the example refers is shown diagrammatically in Figure A.1. The parameters are as follows.

| | |
|------------------------------|--------------------------------|
| Power transmitted: | $P = 1,40 \text{ kW}$ |
| Input speed: | $n_1 = 100 \text{ min}^{-1}$ |
| Output speed: | $n_2 = 34 \text{ min}^{-1}$ |
| Speed ratio: | $i = n_1/n_2 = 2,94$ |
| Driving machine: | geared electric motor |
| Driven machine: | conveyor, non-uniformly loaded |
| Approximate centre distance: | $a_0 = 850 \text{ mm}$ |

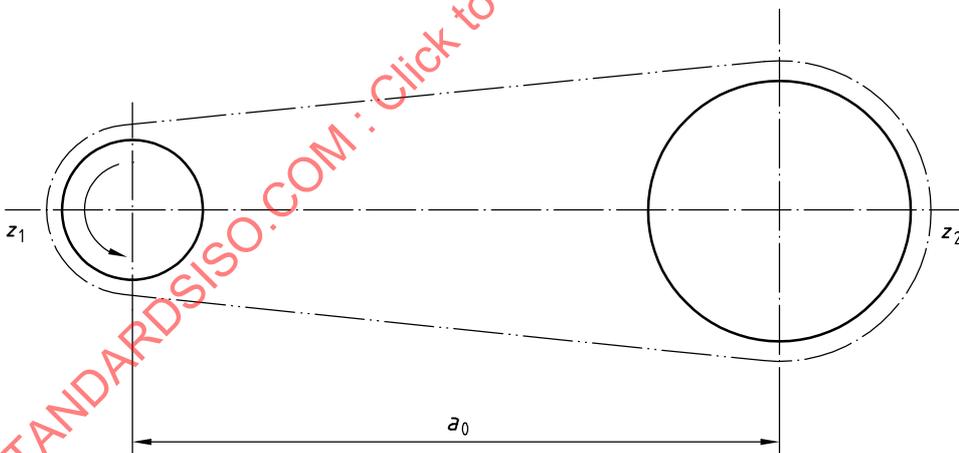


Figure A.1 — Chain drive layout

A.2 Sprocket selection

Selected number of teeth for driving sprocket

$$z_1 = 17$$

Number of teeth on driven sprocket

$$z_2 = i \times z_1 = 2,94 \times 17 = 50 \text{ [from Equation (4)]}$$

A.3 Chain calculations and selection

A.3.1 Power correction

Application factor: $f_1 = 1,4$ (derived from Table 2)

Sprocket factor: $f_2 = 1,13$ [derived from Equation (5) and Figure 4]

Corrected power: $P_c = P \times f_1 \times f_2$ [from Equation (2)]

$$= 1,4 \times 1,4 \times 1,13$$

$$= 2,21 \text{ kW}$$

A.3.2 Chain selection

Applying $P_c = 2,21 \text{ kW}$ and $n_1 = 100 \text{ min}^{-1}$ to the chain drive capacity charts in Figures 1, 2 and 3, select roller chain 16A – 1, 60H – 1, or 16B – 1.

Chain pitch, p , is 25,4 mm for 16A and 16B chains, and 19,05 mm for 60H chain (in conformance with ISO 606).

A.3.3 Chain length

Calculated number of links

$$X_0 = 2 \frac{a_0}{p} + \frac{z_1 + z_2}{2} + \frac{f_3 \times p}{a_0} \text{ [from Equation (7)]}$$

where $f_3 = 27,585$

when $|z_2 - z_1| = |50 - 17| = 33$ (from Table 5)

therefore,

— for 16A and 16B chains:

$$X_0 = \frac{2 \times 850}{25,4} + \frac{17 + 50}{2} + \frac{27,585 \times 25,4}{850} = 101,25 \text{ pitches}$$

and

the selected number of links: $X = 102$ pitches (i.e. next higher even number).

— for 60H chain:

$$X_0 = \frac{2 \times 850}{19,05} + \frac{17 + 50}{2} + \frac{27,585 \times 19,05}{850} = 123,36 \text{ pitches}$$

and

the selected number of links: $X = 124$ pitches (i.e. next higher even number).

A.3.4 Chain speed

$$v = \frac{n_1 \times z_1 \times p}{60\,000} \text{ [from Equation (8)]}$$

$$v = \frac{100 \times 17 \times 25,4}{60\,000} = 0,72 \text{ m}\cdot\text{s}^{-1} \text{ for 16A and 16B chains, and}$$

$$v = \frac{100 \times 17 \times 19,05}{60\,000} = 0,54 \text{ m}\cdot\text{s}^{-1} \text{ for 60H chain}$$

A.4 Maximum sprocket centre distance

Maximum centre distance:

$$a = f_4 p [2X - (z_1 + z_2)] \text{ [from Equation (10)]}$$

where $f_4 = 0,247\,00$ for 16A and 16B chains, when

$$\frac{X - z_s}{|z_2 - z_1|} = \frac{102 - 17}{|50 - 17|} = 2,576 \text{ (interpolated from Table 6)}$$

and $f_4 = 0,248\,30$ for 60H chain, when

$$\frac{X - z_s}{|z_2 - z_1|} = \frac{124 - 17}{|50 - 17|} = 3,242 \text{ (interpolated from Table 6)}$$

therefore,

$$a = (0,247\,00 \times 25,4) \times [(2 \times 102) - (17 + 50)] = 859,5 \text{ mm for 16A and 16B chains, and}$$

$$a = (0,248\,30 \times 19,05) \times [(2 \times 124) - (17 + 50)] = 856,15 \text{ mm for 60H chain}$$

A.5 Lubrication

Applying $v = 0,72 \text{ m}\cdot\text{s}^{-1}$ with chain 16A – 1 or 16B – 1 to the lubrication range chart given in Figure 5, select lubrication Range 2, which requires the minimum method of oil supply to be by means of drip feed lubrication (see 9.1).

Applying $v = 0,54 \text{ m}\cdot\text{s}^{-1}$ with chain 60H – 1 to the lubrication range chart given in Figure 5, select lubrication Range 2. This requires the minimum method of oil supply to be by means of drip feed lubrication (see 9.1).