

Initial selection by performance diagram

The plotting of the performance curve was based on the following initial values: Number of teeth of small chain wheel $z_1 = 19$, ratio $i = 3:1$, shockfree operation $Y = 1$, centre distance $40 \times p$ ($p =$ pitch), perfect lubrication, 2 shafts.

Since these conditions are met in very few cases only, the power to be transmitted P will be corrected to the diagram power P_D , taking into consideration the variable factors f_1 to f_6 .

Overall factor

$$P_D = P \cdot f_G$$

$$f_G = f_1 \cdot f_2 \cdot f_3 \cdot f_4 \cdot f_5 \cdot f_6$$

To pre-select a chain the following factors should be taken into account:

Factors:

f_1 Effect of the number of teeth of the small chain wheel z

| | | | | | | | | |
|-------|------|------|------|------|-----|------|------|------|
| z | 11 | 13 | 15 | 17 | 19 | 21 | 23 | 25 |
| f_1 | 1,72 | 1,46 | 1,27 | 1,12 | 1,0 | 0,91 | 0,83 | 0,76 |

f_2 Effect of ratio i

| | | | | | |
|-------|------|------|-----|------|------|
| i | 1:1 | 2:1 | 3:1 | 5:1 | 7:1 |
| f_2 | 1,22 | 1,08 | 1,0 | 0,92 | 0,86 |

f_3 Effect of Shock factor Y

| | | | | |
|-------|---|------|------|------|
| Y | 1 | 2 | 3 | 4 |
| f_3 | 1 | 1,37 | 1,59 | 1,72 |

f_4 Effect of ratio of centre distance $\frac{a}{p}$

| | | | | | |
|---------------|------|-----|------|------|------|
| $\frac{a}{p}$ | 20 | 40 | 60 | 80 | 160 |
| f_4 | 1,18 | 1,0 | 0,91 | 0,87 | 0,69 |

f_5 Effect of lubrication

| Chain speed v in m/s | | < 4 | 4-7 | > 7 |
|------------------------|------------------------------------|-----|--------------|--------------|
| f_5 | perfect | 1,0 | 1,0 | 1,0 |
| | inadequate with clean conditions | 1,4 | 2,5 | unacceptable |
| | inadequate with unclean conditions | 2,5 | 4,0 | unacceptable |
| | none | 5,0 | unacceptable | unacceptable |

f_6 Effect of number of chain wheels

$$f_6 = \sqrt[3]{\left(\frac{1}{z_1} + \frac{1}{z_2} + \frac{1}{z_3} + \dots \right) 10^3} \times 0,584$$

$f_6 = 1$ for drive comprising two shafts

Pre-selection of a chain from DIN 8187 performance curve – Example:

In the performance curve the power (0,25 kW) crosses the vertical speed line (40 min⁻¹) in the upper area of chain L 85. This chain would be adequate, without taking into account the various factors.

Determining diagram power P_D and factor f_G :

The factors are taken from the adjacent tables. Intermediate values are interpolated.

No. of teeth chosen for small chain wheel $z_1 = 17$ $f_1 = 1,12$

Ratio $i = 4$ $f_2 = 0,96$

Assumed shock factor $Y = 2$ $f_3 = 1,37$

Ratio of centre distance $\frac{a}{p} = \frac{380}{12,7} = 30$ $f_4 = 1,09$

Perfect lubrication $f_5 = 1$

Chain drive with 2 chain wheels $f_6 = 1$

$$f_G = 1,12 \cdot 0,96 \cdot 1,37 \cdot 1,09 \cdot 1 \cdot 1 = 1,60$$

$$P_D = P \cdot f_G = 0,25 \cdot 1,60 = 0,40 \text{ kW}$$

If $P_D = 0,40$ kW is checked at $n = 40$ min⁻¹ in the power curve, it will be found that the L 85 chain is not strong enough. The next stronger chain M 106 is selected and verified by calculation. For calculation examples see page 36.