SELECTING SMALL-SIZED CONVEYOR CHAINS

Selection

Selection small-sized conveyor chains can be made in the following steps, except for some particular cases;

(1) Confirming conveying conditions
(2) Preliminarily determining the type of conveyor chain
(3) Confirming allowable load to rollers
(4) Determining maximum tensile force acting on chain
(5) Determining the size of conveyor chain

Confirming Conveying Conditions

(1) Type of conveyor chain (slat, top roller, carrier, etc.)
(2) Conveying direction (horizontal, vertical, slope, etc.)
(3) Weight and dimensions of material conveyed
(4) Total amount of material conveyed, and frequency of conveying
(5) Speed of Conveyor
(6) Length of conveyor
(7) Lubrication
(8) Operating conditions of conveyor, such as temperature and humidity.

Preliminarily Determining the Type of Conveyor Chain

$$T(kgf) = W_T \times f \times K$$

T: Maximum static tensile force acting to chain
W_T: Weight of materials conveyed, except for chain, kgf
f: Coefficient of friction (see Table 4)
K: Coefficient of speed (see Table 1)

When two conveyor chains are arranged in parallel, T is reduced to a half.
Here, temporarily determine the type and size of the conveyor whose maximum allowable tensile force is less than that determined above.

Table 1 Coefficient of speed

Speed of conveyor chain, m/min	Coefficient of speed K
Up to 15	1.0
15～ 30	1.2
30～ 50	1.4
50～ 70	1.6
70～ 90	2.2
90～110	2.8
110～120	3.2

Confirming Allowable Load to Roller

Allowable load-carrying rollers of the conveyor chain shall not exceed those listed in Table 2 and Table 3.

Table 2 Allowable Loads to Main Rollers

KCM Chain Number	Plastic roller R-roller	Steel roller	
		S-roller	R-roller
40、2040、2042	20	15	65
50、2050、2052	30	20	100
60、2060、2062	50	30	160

Unit: kgf/roller

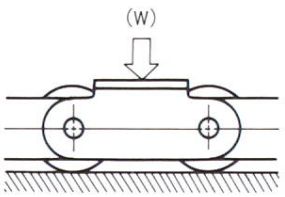
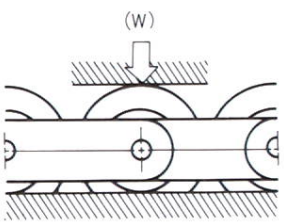


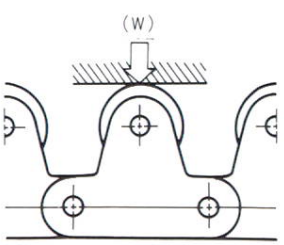
Table 3 Allowable Loads to Load-carrying Roller

KCM Chain Number	Speed increase roller	Side rollers		Top rollers	
		Plastic	Steel	Plastic	Steel
3-type carrier chain, speed increase chain	6	—	—	—	—
40, 2040, 2042, 4-type speed increase chain	14	5	15	5	15
50, 2050, 2052, 5-type speed increase chain	22	7	20	7	20
60, 2060, 2062, 6-type speed increase chain	36	10	30	10	30
80, 2080, 2082	—	18	55	18	55

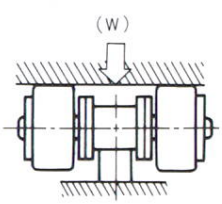
Unit: kgf/roller



Speed increase roller



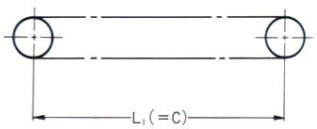
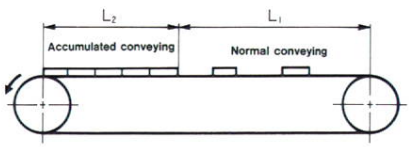
Top roller



Side roller

Determining Maximum Tensile Force Acting on Chain

Horizontal conveying

Normal conveying	$T=(W+2.1m\cdot C)f_1$ $kW=\frac{T\cdot V}{5565}\cdot\frac{1}{\eta}$ 
Accumulated conveying	$T=(w_1+m)L_1\cdot f_1+w_2\cdot L_2\cdot f_2+(w_2+m)L_2\cdot f_3+1.1m(L_1+L_2)f_1$ $kW=\frac{T\cdot V}{5565}\cdot\frac{1}{\eta}$ 

Determining the size of Conveyor Chain

Finally determine the size of the conveyor chain whose maximum allowable tensile force does not exceed the product of maximum tensile force (T) acting on the conveyor chain and factor K (Table 1)

T×K≤Max.allowable tensile force of conveyor chain

When two conveyor chains are arranged parallel, T is reduced to a half.

Table 4 Coefficient of rolling friction

Roller	Steel roller		Plastic roller
	Not lubricated	Lubricated	
R-roller	0.12	0.08	0.08
S-roller	0.21	0.14	0.12

Coefficient of rolling friction (ring plate)

Not lubricated	Lubricated
0.3	0.2

Table 5 Coefficient of friction between chain and rail during conveying

KCM chain type	Type of main roller		Not lubricated	Lubricated
Speed incrcase chain	Normal/high load		——	0.08
Chain w/side rollers	Plastic roller	S-roller	——	0.12
		R-roller	——	0.08
	Steel roller	S-roller	0.14	0.21
		R-roller	0.08	0.12
Chain w/top rollers	Steel roller	S-roller	0.14	0.21
		R-roller	0.08	0.12

T: Max, static tensile force acting on chain, kgf
V: Conveying speed (chain speed), m/min
C: Center-to-center distance between sprockets, m
W: Max. total weight of conveyed materials on conveyor, kgf In case of separated materials:
W=C/Conveying interval×Weight of conveyed material (kgf/piece)
L_1: Length of conveying portion,m
w_1: Weight of conveyed material on conveyed portion, kgf/m
L_2: Length of conveying portion, m
w_2: Weight of conveyed material on Accumulating portion, kgf/m
m: Weight of conveying portion, including chain, kgf/m
kW: Required power, kW
η: Power transmission coefficient of drive
f_1: Coefficient of friction between chain and rail when conveying (see Table 5)
f_2: Coefficient of friction between chain and conveyed material when accumulating (see Table 6)
f_3: Coefficient of friction between chain and rail when accumulating (see Table 7)

Table 6 Coefficient of friction between chain and conveyed material when accumulating

KCM chain type	Type of carrying roller	Not lubricated	Lubricated
Triple speed chain	Normal	—	0.08
	High load	—	0.14
Chain w/side rollers	Plastic roller	—	0.06
	Steel roller	0.06	0.09
Chain w/top rollers	Plastic roller	—	0.06
	Steel roller	0.06	0.09

Table 7 Coefficient of friction between chain and rail when accumulating

KCM chain type	Type of main roller	Not lubricated
Triple speed chain	Normal	0.16
	High load	0.2

NOTE: f3 = f1, except for speed increase chain.