

Selection

STEP 1. Specifications

When selecting the correct Cableveyor, several things must be taken into consideration. The following data must be known for proper selection.

1. Application conditions.
2. Moving stroke (ft.)
3. Moving speed (ft./min.)
4. Number and external diameters of the cables/hoses to be installed.
5. Total weight of the cables/hoses. (lbs./ft.)
(In the case of hoses, the weight of the carrying element such as oil, water, etc., should be included.)
6. Allowable bending radius of cables and hoses (inch).
This is determined from the intended function.

STEP 2. Determining the moving stroke and bending radius

The tentative selection of Cableveyor and the support roller is made as follows. Determine the approximate radius with the capability graph (page B-102). This graph is based on the distance of the moving stroke and the weight of the cables and hoses.

1. Estimate the distance of the moving stroke when a support roller is not being used. If the moving stroke is too long, use a support roller. Note that in some cases, it is more efficient not to install one.
2. Determine the bending radius of the cables or hoses.

Allowable bending radius (Actual bending radius) < Standard chain bending radius (R).

Regarding the bending radius of the cables or hoses, refer to the calculations below.

- In the case of cables,
Allowable bending radius \geq external diameter \cdot 6
- In the case of hoses,
Allowable bending radius \geq external diameter \cdot 9

STEP 3. Adjusting the moving stroke

The length of moving stroke must be adjusted if used under the circumstances listed in the Service Factor Table below.

Length of moving stroke \cdot service factor = adjusted moving stroke

For selection purposes, use the adjusted moving stroke length with the capability graph.

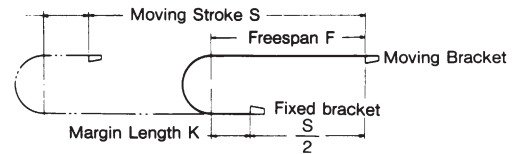
Service Factor Table

Operating Conditions	Installation Suggestion	Service Factor
Frequent starting and stopping	Sometimes support rollers or guides are needed to prevent the chain from falling.	1.5
Sudden starts and stops with large vibrations	Use a large bending radius to decrease frequent vibrations caused by multiple-angle movements of the chain.	2

STEP 4. Calculation of the number of chain links

$$l = \frac{\frac{S}{2} + \pi R + 2K}{P}$$

Margin length for each chain size (K)



Chain Size	K (at least)
TK070	4.13
TK095	5.71
TK130	7.68
TK180	10.63

STEP 5. Standard supporter selection

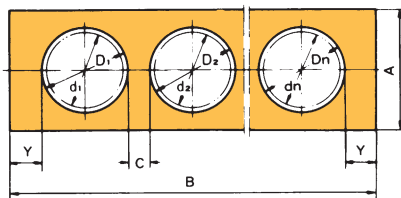
1. TK TYPE

1. Dimension (A): The size of the supporter may be chosen from the reference table for each chain size. (maximum cable/hose diameter)
 $B' = Y + D_1 + C + D_2 + C + \dots + D_n + Y$
 $B \geq B'$
2. Dimension (B): $B' =$ Calculated maximum supporter width
 $B =$ Standard supporter width as chosen from the table
 $D = d \times 1.1$, but $D-d \geq 0.08$ inch
 $C \geq 0.16$ inch
 $Y =$ Refer to the below table
3. Number of supporters (N):
 Supporters should be installed at every 2nd pitch.

When chain link number (l')
is even, number of supporters is, $n = \frac{l'}{2}$

When chain link number (l')
is odd, number of supporters is, $n = \frac{l' - 1}{2}$

SUPPORTER CHOICE TABLE



Chain Size	min (Y)
TK070	0.39
TK095	0.59
TK130	0.71
TK180	0.71
H250	0.98

STEP 6. Freespan confirmation

$$K' = \frac{P \cdot \ell' - \left(\frac{S}{2} + \pi R \right)}{2}$$

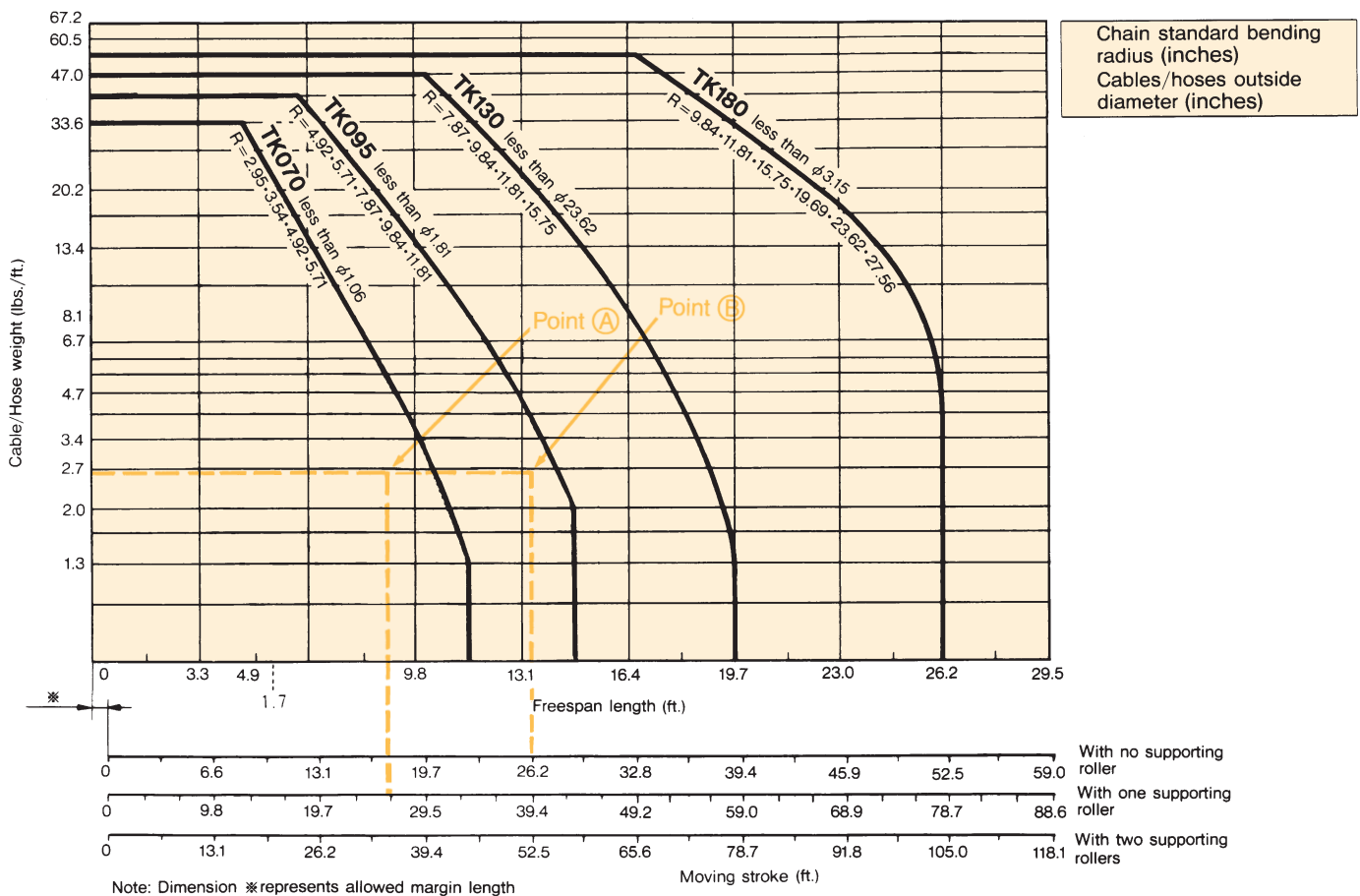
Freespan without support roller $F_0 = \frac{S}{2} + K'$

Freespan with one support roller $F_1 = \frac{S}{3} + K'$

Freespan with two support rollers $F_2 = \frac{S}{4} + K'$

The values of F_0 , F_1 , and F_2 must not exceed the maximum freespan from the capability graph below. If it does, a larger chain size must be chosen or more support rollers added, but only up to a maximum of two.

Capability Graph



Chain standard bending radius (inches)
Cables/hoses outside diameter (inches)

How to use the capability graph

For the TK095, if the weight of the cables or hoses is 4.03 lbs./ft., the moving strokes are:

- 25.6 ft. with no support roller
- 38.4 ft. with one support roller
- 51.2 ft. with two support rollers

There are five different bending radii of the chain standardized at 4.92, 5.71, 7.87, 9.84, 11.81 inches. Maximum hole diameter is 1.81 inches.

Example

Weight of the cables or hoses: 2.69 lbs./ft.
Allowable bending radius of cables or hoses: 7.48 inches
External diameter of the biggest cable or hose: \varnothing 11.81 inches
Moving stroke: 26.25 ft.

With no support roller:

The intersection of the cable weight axis (2.75 lbs./ft.) and the freespan length axis (26.25 ft.) at point A is within the range of TK095. Therefore, it can use a bending radius within 78.74 inches and satisfy the diameter of the cable or hose.

With one support roller:

The intersection at point B is within the range of TK070, but the allowable bending radius of cables or hoses is more than the allowable bending radius of the cableveyor. The diameter of the hoses or cables is bigger than that which is on the chart. Therefore, it does not satisfy the requirement.

SAMPLE SELECTION

Example

- | | | | |
|--|--|--|--|
| 1. Situation | Indoor, normal temperatures | 5. Allowable bending radius | cable 10.63 inches, oil hoses 10.24 inches |
| 2. Moving stroke | 29.5 ft. | 6. The cables or hoses will be set horizontally on one line. | |
| 3. Number and external diameter of the cables or hoses | cables $\phi 1.73 \cdot 2$, oil hoses $\phi 1.42 \cdot 2$ | 7 The fixed bracket will be in the middle of the length of travel. | |
| 4. Weight at installation | cables 2.01 lbs./ft. $\cdot 2$, oil hoses 1.34 lbs./ft. $\cdot 2$, total weight 6.7 lbs./ft. | 8. Speed of travel | 100 ft./min. |
| | | 9. Vibrations | none |

STEP 1. Specifications

See STEP 1 of the SELECTION outline (page B-101).

STEP 2. Tentative selection

From the capability graph on page B-102, TK130 would satisfy what is required since it has no supporting roller, and since the moving stroke is 29.5 ft. (length of travel) and 6.7 lbs./ft. for cable and hose weight.

STEP 3. Selection of the bending radius

R11.81 and R15.35 will satisfy the requirement for a larger than allowable bending radius (10.63 inches).

STEP 4. Calculation of the number of chain links

Once the chain size has tentatively been referred to, the number of chain links may be calculated according to the following equation.

$$\ell = \frac{\frac{S}{2} + \pi R + 15.35}{5.12} = \frac{\frac{354}{2} + 11.81\pi + 15.35}{5.12} = 44.9 \text{ links}$$

The fraction is rounded off to $\ell' = 45$ Links.

STEP 5. Freespan confirmation

Freespan F (without support rollers) is confirmed by adding the margin length $(K') + (S/2)$.

$$K' = \frac{130 \cdot 45 \text{ links} - \left(\frac{354}{2} + 300 \pi\right)}{2} = 8.03 \text{ inches}$$

$$F_0 = \frac{S}{2} + K' + \frac{354}{2} + 8.03 = 85.20 \text{ inches}$$

From the capability graph on page B-102 a freespan of up to 17.22 ft. is approved for a cable/hose weight of 6.72 lbs./ft. Since $F_0 = 15.43$ ft. is less than 17.22 ft., the TK130, R11.81 chain size is the most suitable. If $F_0 > 17.22$ ft., a larger chain size should be used — TK180, R11.81, for example.

STEP 6. Standard supporter selection

Supporter hole diameter may be calculated by the following equation, where $D \geq 1.1d$ and where D is rounded off to the nearest even whole number, making the diameter $\phi 1.89 \cdot 2$, $\phi 1.58 \cdot 2$.

The supporter length B' is –

$$B' = \sum D + \sum C + \text{Min}.36 \quad (C = \text{Min}.1.42)$$

$$B' = \{(1.89 \cdot 2) + (1.58 \cdot 2)\} + (0.16 \cdot 3) + 1.42 = 8.82 \text{ inches}$$

The supporter dimension table shows that a supporter of this size fits cables/hoses of 1.73 inches the best. When deciding on the supporter dimensions, the next largest size appearing on the table must be chosen when the calculated figure does not appear. For example, a value of 8.82 would take the next bigger figure on the table, or 0.98. As the supporter length B' becomes greater, the spaces between holes (C) must also increase to maintain balance.

STEP 7. Amount of supporters needed.

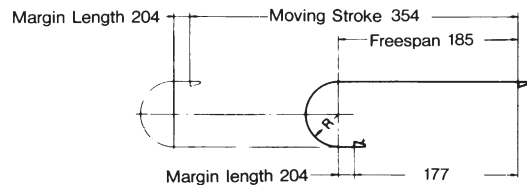
$$n = \frac{\ell' - 1}{2} = \frac{45 - 1}{2} = 22 \text{ pieces} \quad \text{Where: } \ell' = \text{Number of chain links}$$

$$n = \text{Number of supporters}$$

STEP 8. Cableveyor choice

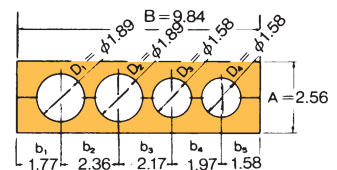
Chain: TK130, R11.81
 Assembly: 45 links + brackets at both ends
 Supporter size: 2.56 \cdot 9.84 (split type)
 Supporter hole diameter: $D_1 = \phi 1.89$, $D_2 = \phi 1.89$, $D_3 = \phi 1.58$, $D_4 = \phi 1.58$
 Supporter hole pitch: $b_1 = 1.77$, $b_2 = 2.36$, $b_3 = 2.17$, $b_4 = 1.97$, $b_5 = 1.58$

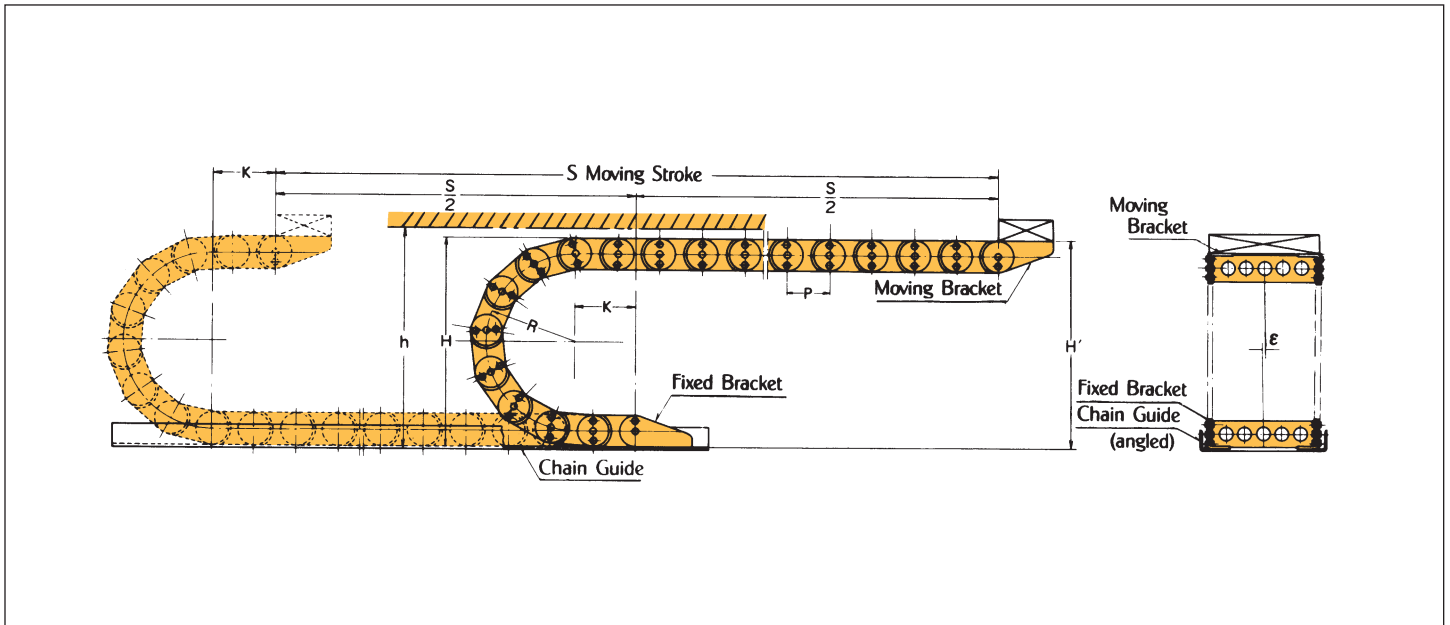
SAMPLE LAYOUT



SUPPORTER CHOICE TABLE

Hole Diameter	D ₁	D ₂	D ₃	D ₄	
		1.89	1.89	1.58	1.58
Hole Pitch	b ₁	b ₂	b ₃	b ₄	b ₅
	1.77	2.36	2.17	1.97	1.58





- (1) A chain guide is necessary for Cableveyor. An angled steel plate is best.
- (2) Installation height of the moving bracket (H') and tolerance for the center of the fixed and moving brackets (ϵ) should be set according to the table below.

Dimension in inches

Chain Size	ϵ (max.)	H'
TK070	0.16	$H + 0.40$
TK095	0.24	
TK130	0.31	
TK180	0.39	

- (3) Under normal circumstances, lubrication is not necessary. However, for corrosive conditions, a lubricant should be used for protection.
- (4) Since the TK types do not bend at the bracket chain joint, a minimum extension margin of 1.5 pitches (K on the diagram above) should be adhered to. If this extension margin is difficult to comply with, only one pin should be used in the center of the moving bracket. In addition, if the unit is operated at speeds of 65 ft./min. or more, the location of the moving bracket and fixed bracket should be switched. Two pins should be used with the moving bracket and only one pin (in the center) with the fixed bracket.
- (5) If the TK split-type supporter must be detached, care should be taken to reassemble the supporter in the same way with the corresponding marks on each half of the supporter properly aligned with each other.

- (6) When detaching and reassembling supporters, make sure that the chain is kept horizontal. If not, the chain will not move in a straight line.
- (7) Check that bolts and other hardware are tight when assembling and when operating, since they may become loose through operational vibration.
- (8) Do not put heavy objects or allow people to sit on the chain, as this will result in chain damage.
- (9) Note that the chain will sag in its unloaded condition as it is designed to straighten out by its own weight when attached.

Notes on Fitting Cables or Hoses into the Cableveyor

- (1) The end of the cable/hose should have an extension margin to insure that no damage occurs between the cable/hose and its attachment. Usually, this amounts to six times the hose diameter.
- (2) The minimum cable/hose length necessary is given by the following equation:

$$L = \{(\text{chain pitch} \cdot \text{link number}) + \text{cable/hose length from chain to its attachment}\} \cdot 1.015$$

Note, however, that the hose's internal pressure causes a slight reduction in hose length. This should be considered when attaching hoses.