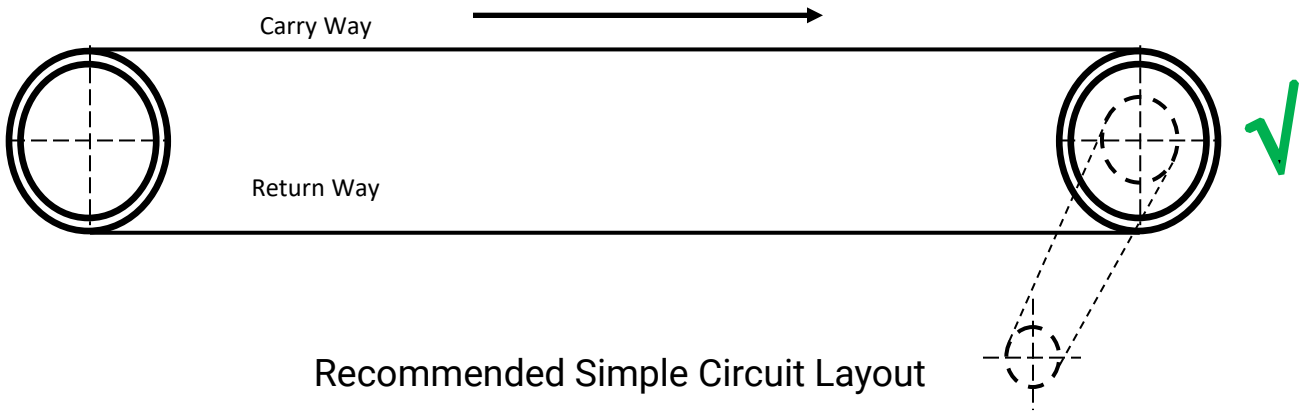
Self Tracking Belt

Conveyor Design Guidelines

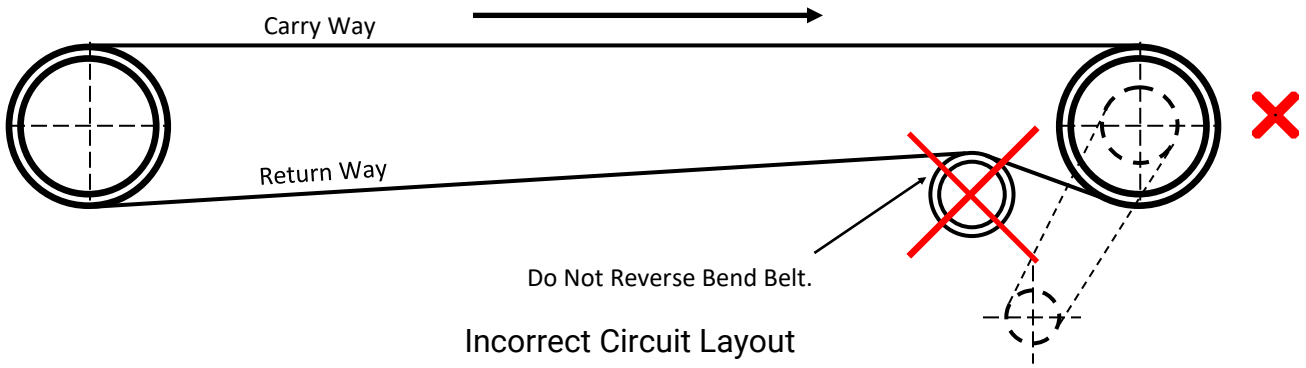
SELF TRACKING BELT is a friction driven belt system which utilises grooved rollers at both infeed and discharge to maintain belt tracking. The top of the belt is smooth and flat while the bottom underside has crimped lateral weft wires to align and locate the longitudinal warp braid wires. The crimped aligned lateral weft wires align with the grooves in both the infeed & discharge rollers and any intermediate support rollers or support wear strips. Conveyor circuit design guidelines are as below:-

CONVEYOR CIRCUIT DESIGN.



Recommended Simple Circuit Layout

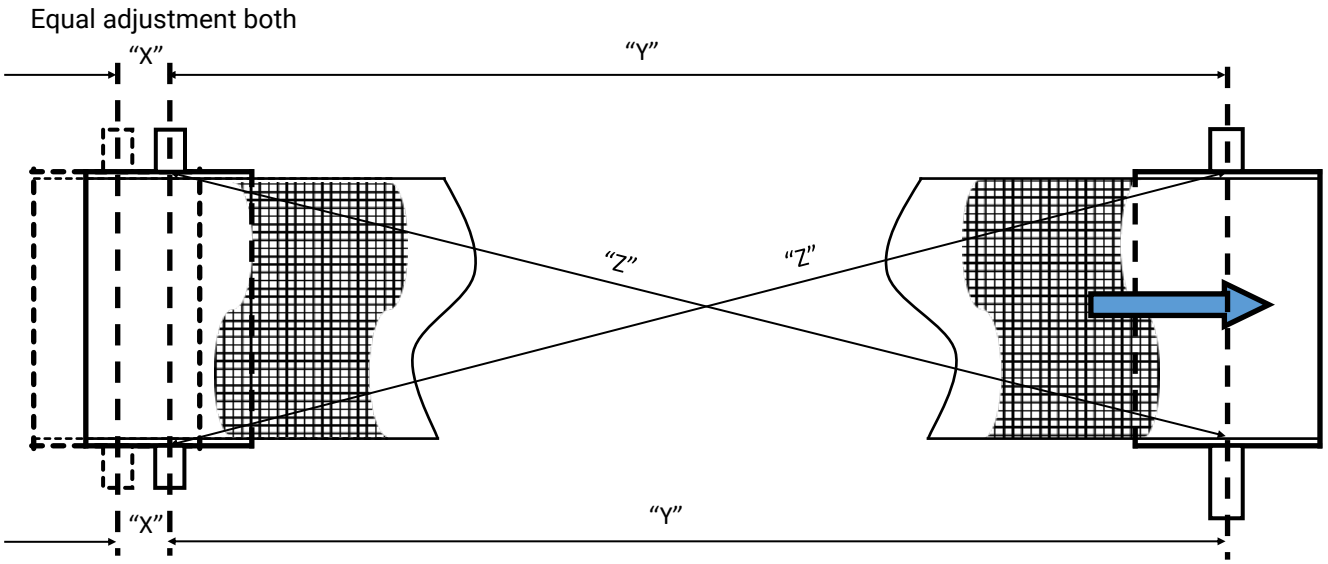
Belt carry way can be supported on grooved free to rotate rollers or on longitudinal grooved wear strip rails. See below for further details. The return way can be supported on free to rotate parallel rollers or flat strip longitudinal wear strips. All wear strips should be tapered down at the leading edge to prevent belt catching.



Incorrect Circuit Layout

Important Note: Reverse flexing of belt will result in early belt failure.

CONVEYOR SET UP & ADJUSTMENT



Ensure that conveyor set up is square with end rollers parallel. Across corners dimension "Z" must be equal.

Belt tension adjustment can be operated mechanically, pneumatically, hydraulically or by gravity weighted cables over pulleys. At all times ensure that the tension adjustment operates with a parallel guiding system. DO NOT OVER TENSION (see below)

The SELF TRACKING BELT does not require high tension to ensure slip free drive. Only enough tension should be applied to the belt to prevent belt slip on the drive roller during normal production operation.

The belt tension is listed below in Newtons/mtr of belt width.

Warp Braid Cable Diameter	Normal Operating Tension	Maximum Tension
2.0mm	1500—5000 N/m of width	10000 N/m of width
2.8mm	1500—7500 N/m of width	18000 N/m of width

At elevated temperature the belt will expand at the following coefficient of thermal expansion: 16×10^{-6} / °C

When designing in the length of take up adjuster the following formulae is to be used to establish belt length expansion at high operating temperature.

$$L_1 = L_0 [1 + (16 \times 10^{-6} (T_1 - T_0))$$

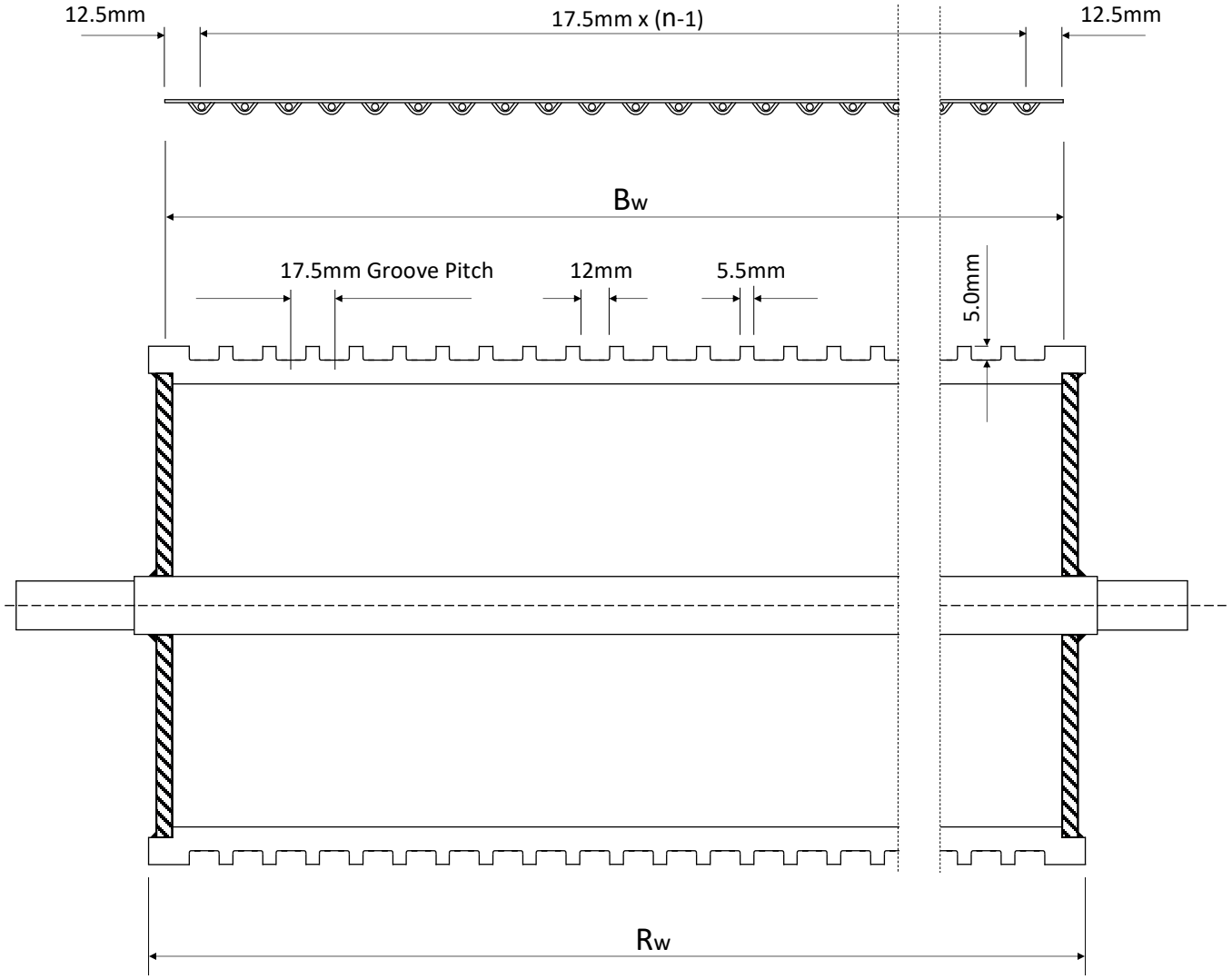
L_1	Belt length at temperature T_1 (operating temperature)
L_0	Belt length at T_0 (ambient temperature)
T_1	Belt operating temperature
T_0	Ambient temperature at installation.

GROOVED ROLLER DESIGN

Speed as well as roller diameter have an influence on belt life. Due to the flexibility of the longitudinal warp braid wired rollers with belt wrap can be relatively small. It is good practice to maximise all roller diameters, however the following minimum diameters should be noted:

Longitudinal warp braid wire diameter.	Minimum outside diameter of grooved roller. (mm)
2.0mm	210mm
2.8mm	315mm

Belt support rollers which have no belt wrap can be smaller than the above diameters.



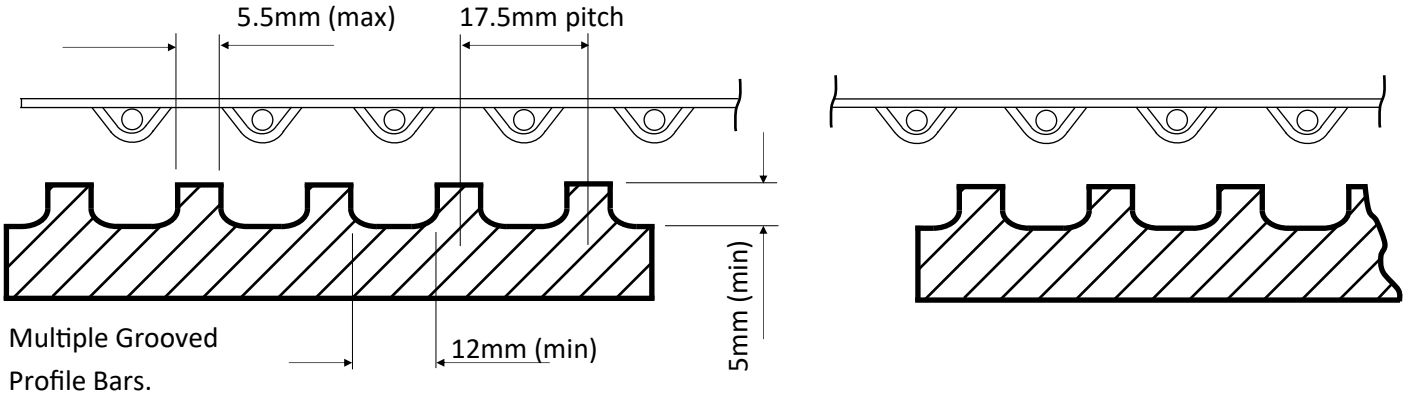
Belt Width (**Bw**) mm = [17.5 x (n-1)] + 25
Roller Width (**Rw**) mm = Bw + 25
Number of Grooves or Cables (**n**) = $\left(\frac{Bw-25}{17.5}\right)+1$

Note: If "Thick Wall" tubing does not allow a reasonable material thickness after machining then consider "Hollow Bar".

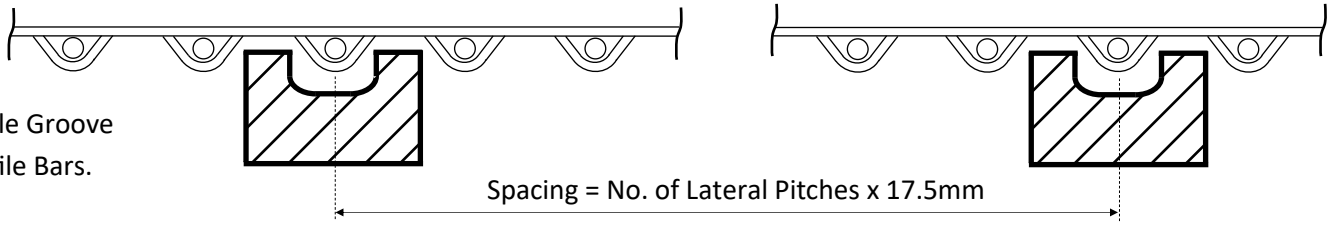
Methods of Belt Support

Carry Way Support:-

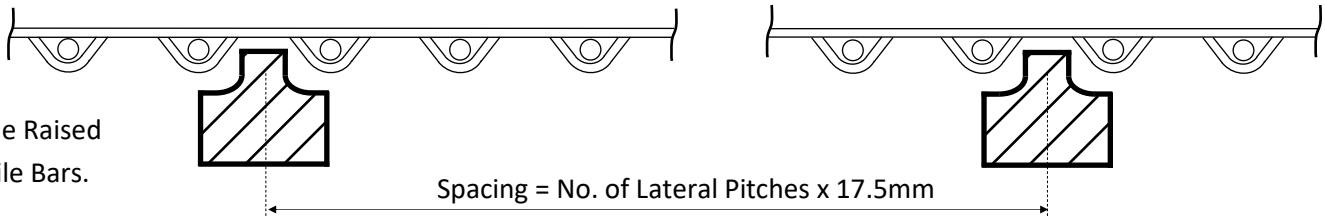
There are many ways of providing carry way belt support. Below is a series of suggested arrangements that should be considered. When designing support DO NOT allow contact with the crimped weft cross wire positions.



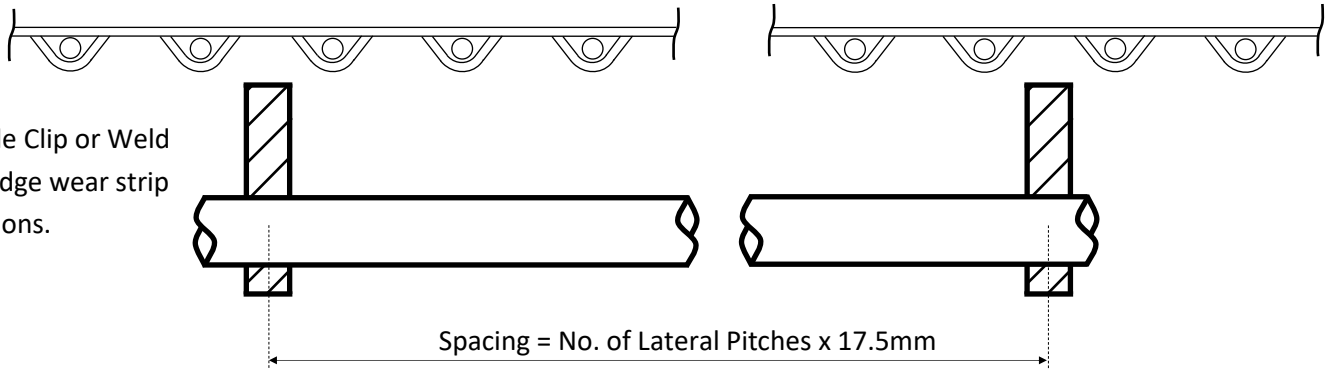
Multiple Grooved Profile Bars.



Single Groove Profile Bars.



Single Raised Profile Bars.



Single Clip or Weld on edge wear strip sections.

Notes:-

1) Where possible use low friction material for wear strips.

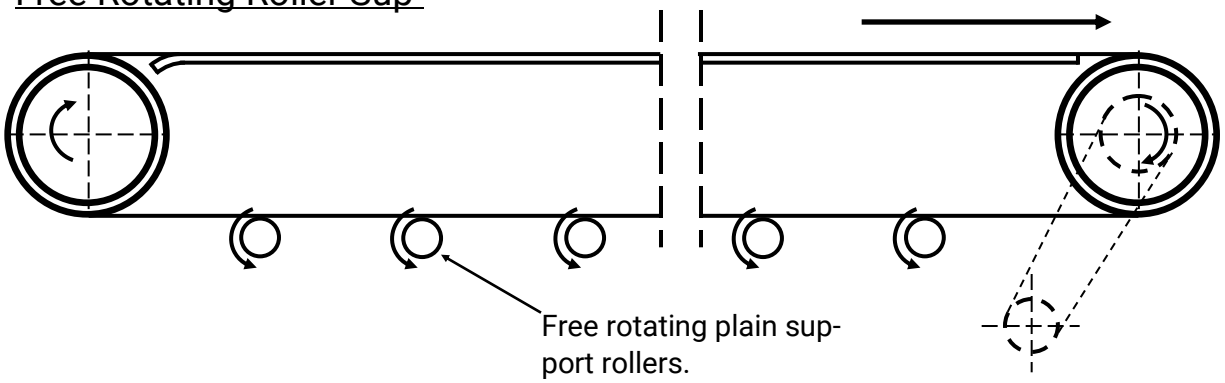
2) The belt can also be supported over a series of grooved rollers with groove dimensions similar to the drive / idle roller. See page 5.

3) Please ensure that the wear strips have a tapered down belt lead in at any point where the underside of the belt starts to engage the wear strips.

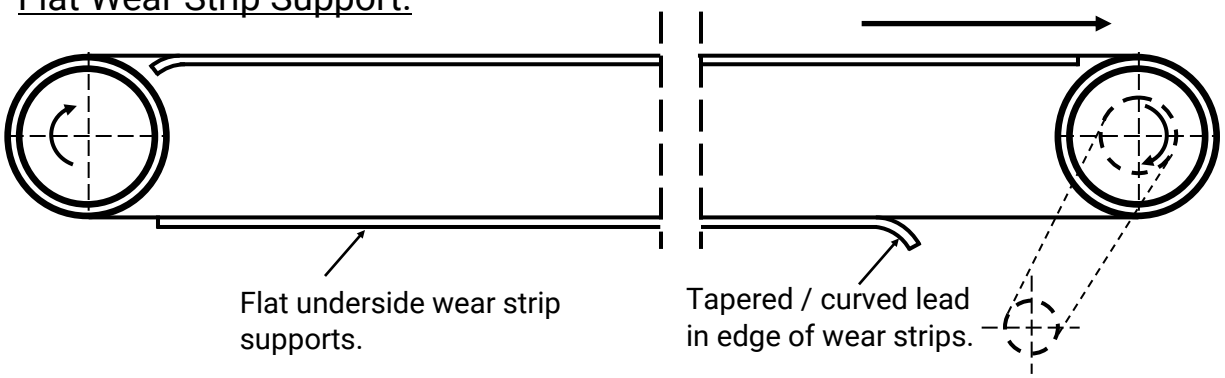
4) The spacing is dependant upon the belt load, belt weight and belt tension to limit the belt deflection across the width.

Return Way Support:-

Free Rotating Roller Sup-

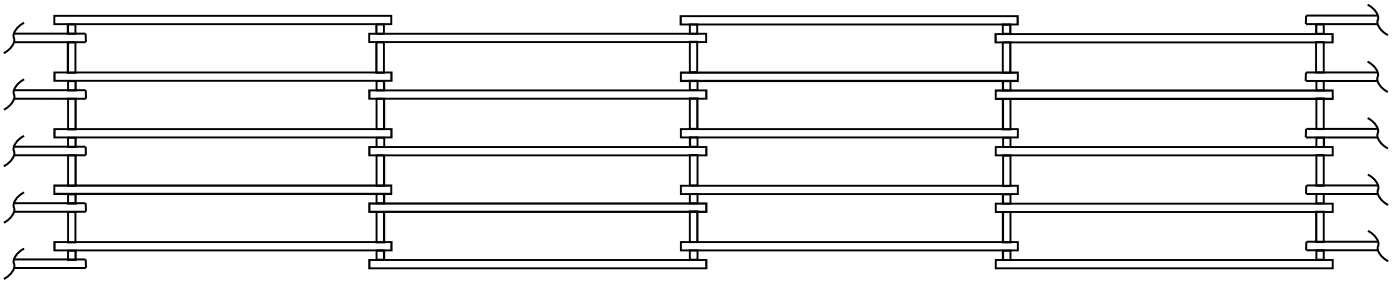


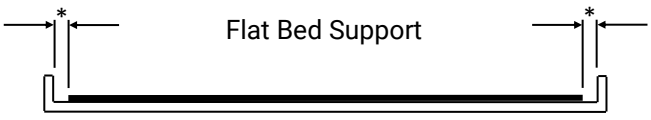
Flat Wear Strip Support.

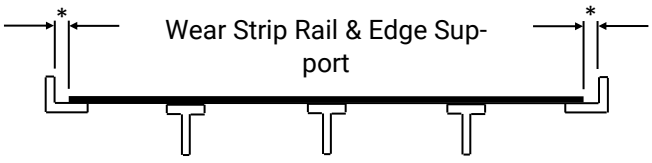


Typical arrangements of return way only flat wear strip that may be considered.

Straight In-line Staggered Wear Strips







* Ensure adequate clearance between the belt edge and any frame construction to prevent belt edge contact during use.

Note: It is recommended that all wear strip surfaces are faced with low friction material where possible.

Return Way Only Belt Support—Contd...

Free Rotating Rollers

All support rollers must be free to rotate and set horizontally and perpendicular to the centre line of the conveyor / belt. In general diameters vary between 50mm and 150mm. They should have sufficient diameter to suit the width of the belt and application without deflection. The spacing can vary between 900mm and 3mtrs, however to limit the catenary belt sag between rollers and belt tension minimise the spacing. The catenary belt sag between rollers also acts as a natural belt take-up mechanism.

It is also possible to use a combination of straight wear strips & free to rotate rollers.

Technical Design Data:-

Conveyor Data Requirement	Formula	Units
Drive Tension for Horizontal Conveyors **(T_H)**	**= [(W_M + W_B) x F_C + (W_B x F_R)] x L**	**Kgf**
Drive Tension for Incline Conveyors **(T_I)**	**= T_H + (H_I x W_M)**	**Kgf**
Additional Back Pressure Tension **(T_{BP})**	**= 0.8* x (T_H ….or T_I for incline conveyors)**	**Kgf**
Maximum Total Belt Tension **(T_T)**	**= T_{BP} + (T_H ….or T_I for incline conveyors)**	**Kgf**
Belt Deflection (Sag) between Cross Roller Supports **(D)**	**= 570 [(W_M+ W_B) x A^2] / T_T**	**mm**

* Factor is for 180° of belt wrap around drive. This factor will increase for belt wrap angles of less than 180°

W_M	Product Load (Kg/mtr of belt length)	**W_B**	Belt Weight (Kg/mtr of belt length)
F_C	Coefficient of friction for Carry Way	**F_R**	Coefficient of friction for Return Way
L	Conveyor Length (mtrs)	**H_I**	Height Increase for Incline Conveyors (mtrs)
A	Distance Between Cross Supports (mtrs)		

Coefficients of Friction

Free Rotating Support Rollers	0.1
Plastic Wear Strips (lubricated)	0.1
Plastic Wear Strips (unlubricated)	0.2
Steel Wear Strips (lubricated)	0.25
Steel Wear Strips (unlubricated)	0.35

If you require conveyor design assistance then please call Wire Belt Technical Sales Team.