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SECTION I

INTRODUCTION

The overhead trolley chain conveyor is an extremely flexible material handling means. It is used in practically every industry worldwide. It can be installed to follow almost any path, changing direction vertically or horizontally. Using multiple drives, a single path can be miles (kilometers) in length.

Beyond material transportation in ambient indoor or outdoor environments, typical industrial applications of trolley chain conveyors for product processing include:

- Washing/cleaning/finishing
- Phosphatizing or similar treatments
- Solvent degreasing
- Paint stripping
- Baking/drying up to 525°F (270°C)
- Prime and finish painting
- Freezing
- Cooling
- Food Handling

In certain environments, humans cannot survive or human health is endangered, yet conveying means are essential. Under many conditions, other types of conveyors are not practical or would not have acceptable life expectancy. The overhead trolley chain conveyor combines its directional flexibility (horizontal and vertical curve movement) with its tolerance to adverse environments to broaden its applications to user requirements.

Each product carrier is especially designed to suit secure handling while providing ease in loading and unloading, whether this is done manually, semi-automatically, or automatically. Further design considerations are required where the product is processed and not merely transported.

With adequate part (or carrier) clearance within recommended allowable loading, any type of product may be transported. Carriers may be in the form of hooks, slings, boxes, racks, trays, baskets, or one of other numerous configurations to suit the application requirement.

The preferred conveyor system uses standard components wherever possible in the principal interest of economics (minimum cost). Countless specially designed components are available and are used where required. In this event, it is recommended that the manufacturer be consulted.

This standard provides basic engineering guidelines to enable the proper selection of standard components and develop these into a functional conveyor layout. Content is confined to single drive systems of average loading, path configuration, and length.
SECTION II

DEFINITIONS FOR TROLLEY CHAIN CONVEYORS

Adjustable Speed Drive - A type of drive designed with a speed changing device by which the speed of the conveyor can be changed.

Air-operated Take-up - See Take-up.

Antibackup - See Backstop.

Antirunaway - A safety device to stop a declining conveyor and thus prevent running away in event of an electrical or mechanical failure.

Automatic lubricator - A device used to lubricate the chain, trolley wheels, or other conveyor components automatically as they pass.

Automatic Take-up - See Take-up.

Backstop - A mechanical device to prevent reversal of a loaded conveyor under action of gravity when forward travel is interrupted.

Backup Bar - A metal bar used to back up the caterpillar chain of a drive to hold the drive chain dogs in proper contact with the conveyor chain.

Backup Rollers - Series of rollers so mounted as to back up the conveyor chain to hold it in proper relation to the caterpillar chain dogs.

Balanced Drives - Drives so designed that two or more such drives on a single conveyor may be synchronized to pull predetermined shares of the load.

Beam Clamp - A device for gripping the flange of supporting beams or trusses for the purpose of suspending from same a structure such as a conveyor frame or track.

Bolt Attachment - See Trolley Attachments.

Bracing - Diagonal or horizontal members used to prevent swaying in conveyor supporting structure.

Caterpillar Chain - A short endless chain on which dogs or teeth are spaced to mesh with and move, or be moved by, a conveyor chain.

Caterpillar Chain Dog - A dog or tooth attached to a caterpillar drive chain to provide the driving contact with the conveyor chain.

Caterpillar Drive - See Drive.

Caterpillar Take-up Sprocket - The non-driving sprocket of a caterpillar drive.

Center Link - The loop-shaped link of rivetless chain which provides the bearing surfaces for the pins and permits passage of the trolley load support members through the chain.

Chain Pin - The pin that is used to connect succeeding links of a chain about which the links pivot.
Change of Elevation - Vertical distance between the upper horizontal track of a vertical curve to the corresponding point on the lower horizontal track.

Clevis Pin Attachment - See Trolley Attachments.

Compound Vertical Curve - See Vertical Curve.

Conveyor Guard - See Guard.

Counterweighted Take-up - See Take-up.

Drive -

  Caterpillar Drive - A drive equipped with a caterpillar chain to provide the propelling contact with the conveyor chain.

  Sprocket Drive - A conveyor chain driving unit using a sprocket to transmit power to the chain, located at a turn of approximately 90 degrees or more.

Drive Frame - The structure which supports the drive shaft assembly and machine parts and which contains or supports the motive power or supports the assembly to which the motive power is connected.

Drive Shaft - Main driving shaft on which the conveyor sprocket is mounted.

Drive Sprocket - Sprocket of a caterpillar drive or of a sprocket drive.

Drop - The vertical distance from the bottom of the track to centerline of the chain.

Guard -

  Conveyor Guard - A structure mounted below the conveyor path to protect personnel below.

  Finger Guard - Enclosure around trolleys and chain to protect personnel from falling parts.

  Machinery Guard - A covering or barricade for safety purposes such as gear, chain, and V-belt guards.

Hanger Steel - Angles or rods by which a conveyor is hung from supports above.

Idler Attachment - See Trolley Attachments.

Link - A chain unit of one pitch length.

Load Bar - A device to distribute a load over two or more trolleys.

Machinery Guard - See Guard.

Multiple Drives - Two or more motorized and load-sharing drives applied to a single conveyor for the purpose of reducing the chain tension in any given section.

Pendant Attachment - See Trolley Attachments.

Rivetless Chain - A completely forged, heat-treated chain of pins, side links, and center links which can be assembled or disassembled without the use of tools.
**RollerTurn** - A series of vertical rollers mounted in a frame to guide a conveyor chain around a horizontal curve.

**Roller Turn Roller** - The vertical roller with integral bearings as used in the roller turn.

**Screw Take-up** - See Take-up.

**Side Link** - That portion of the chain which longitudinally connects joint portions at each end of the cen-ter link with chain pins.

**Spring Take-up** - See Take-up.

**Sprocket Drive** - See Drive.

**Superstructure** - Members to which the hanger steel is connected and which transfer the load to the building members.

**Take-up** - The assembly of the necessary structural and mechanical parts which provides the means to adjust the length of chain to compensate for stretch, shrink, or wear and to maintain proper tension.

- **Air-operated Take-up** - A take-up mechanism where adjustments are made automatically by an air cylinder.
- **Automatic Take-up** - A take-up mechanism where adjustments are made automatically.
- **Counterweighted Take-up** - A take-up mechanism where the adjustment is made automatically by the potential energy of weights.
- **Screw Take-up** - A take-up mechanism having provision for manual adjustment by one or more screws.
- **Spring Take-up** - A take-up mechanism where adjustments are made automatically by the potential energy of springs.

**Track** - The I-beam section on which trolley wheels roll while being propelled.

**Traction Wheel** - A smooth, straight face wheel without dogs or teeth.

**Traction Wheel Turn** - See Wheel Turn.

**Trolley** - An assembly of two half-trolleys (each with wheel, bearing, and bracket) and an attachment. It is used to support and move suspended loads and to carry the load connecting and conveying chain.

**Trolley Attachments** -

- **Bolt Attachment** - A trolley attachment having a threaded rod projection for attaching a load bar or various objects.
- **Clevis Attachment** - A forked or clevis type trolley attachment.
- **Idler Attachment** - An attachment used to complete the assembly of a nonload carrying trolley.
- **Pendant Attachment** - A single bar trolley attachment projecting through the chain having a single hole for supporting loads.
**Trolley Brackets** - Drop forged, cast, or pressed steel members to which the trolley wheels are attached with provision for connecting to the chain.

**Trolley Conveyor** - A series of trolleys supported from an overhead track and connected by an endless propelling chain with load usually suspended from the trolley. Trolley conveyors may be designed for single or multiple plane operation.

**Trolley Wheel** - The circular member with integral bearing mounted to the trolley bracket.

- **Full Complement** - Maximum number of balls without a retainer.
- **Retainer** - Balls are separated by a retainer for low friction.

**Vertical Curve** -

- **Compound Vertical Curve** - An assembly of two single vertical curves with necessary connecting track to accomplish a change in elevation.

- **Single Vertical Curve** - A section of track bent in a desired curve to change the direction of a conveyor in the vertical plane.

**Wheel Turn** - A structure having a traction wheel which guides a conveyor chain around a horizontal curve.
SECTION III
CONVEYOR COMPONENTS

RIVETLESS CHAIN DIMENSIONS

Drop Forged

<table>
<thead>
<tr>
<th>Chain</th>
<th>A</th>
<th>B</th>
<th>c max</th>
<th>0</th>
<th>F max</th>
<th>G min</th>
<th>H min</th>
<th>I min</th>
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<td>2</td>
<td>15/32</td>
<td>11/16</td>
<td>3/8</td>
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<td>1/4</td>
<td>53/64</td>
<td>1-1/16</td>
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<td>3/4</td>
<td>1-3/32</td>
<td>1/2</td>
<td>1-27/32</td>
<td>1/2</td>
<td>1-9/32</td>
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<tr>
<td>X-75-13</td>
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<td>(19.05)</td>
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<td>(12.70)</td>
<td>(46.83)</td>
<td>(12.70)</td>
<td>(32.54)</td>
<td>(41.27)</td>
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<tr>
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<td>1</td>
<td>1-13/32</td>
<td>5/8</td>
<td>2-1/4</td>
<td>5/8</td>
<td>1-5/8</td>
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<td>(15.87)</td>
<td>(57.15)</td>
<td>(15.87)</td>
<td>(41.27)</td>
<td>(57.15)</td>
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<td>X-678</td>
<td>6</td>
<td>1-9/32</td>
<td>2</td>
<td>13/16</td>
<td>3-1/8</td>
<td>7/8</td>
<td>2-1/4</td>
<td>3-3/8</td>
</tr>
<tr>
<td>X-150-22</td>
<td>(150)</td>
<td>(32.50)</td>
<td>(50.80)</td>
<td>(20.63)</td>
<td>(79.37)</td>
<td>(22.22)</td>
<td>(57.15)</td>
<td>(85.72)</td>
</tr>
</tbody>
</table>

**NOTE:**
Dimensions on top are inches.
Dimensions on bottom are mm.

<table>
<thead>
<tr>
<th>Chain</th>
<th>Average Length of Nominal 10 ft. Strand</th>
<th>Assembled Weight # / ft Kg / m</th>
</tr>
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<tr>
<td>X-228</td>
<td>120.60</td>
<td>0.75</td>
</tr>
<tr>
<td>X-50-6</td>
<td>3063.24</td>
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</tr>
<tr>
<td>X-348</td>
<td>120.60</td>
<td>2.10</td>
</tr>
<tr>
<td>X-75-13</td>
<td>3063.24</td>
<td>3.12</td>
</tr>
<tr>
<td>X-458</td>
<td>120.80</td>
<td>3.10</td>
</tr>
<tr>
<td>X-100-16</td>
<td>3068.32</td>
<td>4.63</td>
</tr>
<tr>
<td>X-678</td>
<td>120.90</td>
<td>6.10</td>
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<tr>
<td>X-150-22</td>
<td>3070.86</td>
<td>9.09</td>
</tr>
</tbody>
</table>

A - Nominal pitch  
B - Height of center link  
C - Width of chain  
D - Height of center link at flat  
E - Overall length of pin  
F - Diameter of pin  
G - Length of pin between heads  
H - Length of flat on center link  
I - Inside width of center link  
* - Actual pitch varies from nominal. Average length of production chain shown above.
## TROLLEY DIMENSIONS

### Vertical Bolts

<table>
<thead>
<tr>
<th>Beam</th>
<th>Chain</th>
<th>Drop</th>
<th>H max</th>
<th>J</th>
<th>K min</th>
<th>L max</th>
<th>M max</th>
<th>N min</th>
<th>O max</th>
<th>P min</th>
<th>Q max</th>
<th>R min</th>
<th>S bolt</th>
<th>T°</th>
</tr>
</thead>
<tbody>
<tr>
<td>3&quot; I (76.2) @ 5.7# / ft</td>
<td>X-348</td>
<td>2-1/2</td>
<td>63.50</td>
<td>41.27</td>
<td>36.51</td>
<td>15.87</td>
<td>96.33</td>
<td>60.96</td>
<td>9.52</td>
<td>9.52</td>
<td>1.56</td>
<td>12.70</td>
<td>6.35</td>
<td>1°</td>
</tr>
<tr>
<td>8.46 kg / m</td>
<td>X-75-13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3&quot; I (101.6) @ 7.7# / ft</td>
<td>X-458</td>
<td>3-3/16</td>
<td>80.96</td>
<td>57.15</td>
<td>47.62</td>
<td>15.87</td>
<td>117.47</td>
<td>33.33</td>
<td>12.70</td>
<td>12.70</td>
<td>1.56</td>
<td>12.70</td>
<td>7.93</td>
<td>1°</td>
</tr>
<tr>
<td>11.45 kg / m</td>
<td>X-100-16</td>
<td>4</td>
<td>101.60</td>
<td>85.72</td>
<td>68.26</td>
<td>19.05</td>
<td>193.70</td>
<td>39.68</td>
<td>12.70</td>
<td>12.70</td>
<td>1.56</td>
<td>12.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4&quot; I (152.4) @ 12.5# / ft</td>
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<td>3-3/8</td>
<td>85.72</td>
<td>68.26</td>
<td>19.05</td>
<td>193.70</td>
<td>39.68</td>
<td>12.70</td>
<td>12.70</td>
<td>12.70</td>
<td>1.56</td>
<td>12.70</td>
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<td></td>
</tr>
<tr>
<td>18.60 kg / m</td>
<td>X-150-22</td>
<td>4</td>
<td>101.60</td>
<td>85.72</td>
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<td>19.05</td>
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<td>12.70</td>
<td>1.56</td>
<td>12.70</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:**
- Dimensions on top are inches.
- Dimensions on bottom are mm.

H - Width of trolley bracket
J - Centerline of lubrication fitting to bottom of beam
K - Minimum distance between wheel inside faces
L - Overall width of trolley assembly
M - Clearance width of trolley bracket at lubrication fitting
N - Centerline of chain to centerline of upper bolt hole
O - Centerline of chain to centerline of lower bolt hole
P - Interface of dimension from centerline of chain to trolley bracket, measured vertically at outside edge of chain
Q - Centerline of chain to bottom of bracket
R - Thickness of attachment
S - Diameter of mounting bolts
T° - Slope of wheels from the vertical
## TROLLEY DIMENSIONS

### Horizontal Bolts

![Diagram of trolley dimensions]

<table>
<thead>
<tr>
<th>Beam</th>
<th>Chain</th>
<th>Drop</th>
<th>H max</th>
<th>J min</th>
<th>K</th>
<th>L max</th>
<th>M min</th>
<th>N max</th>
<th>P</th>
<th>R</th>
<th>S bolt</th>
<th>T°</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;l</td>
<td>X-458</td>
<td>3-13/16</td>
<td>2-1/4</td>
<td>1-7/8</td>
<td>5/8</td>
<td>5-3/8</td>
<td>4-15/16</td>
<td>1-7/8</td>
<td>1-1/4</td>
<td>5/8</td>
<td>3/8</td>
<td>2°</td>
<td>1-3/8</td>
</tr>
<tr>
<td>7.7#/ft</td>
<td>(80.86)</td>
<td>(57.15)</td>
<td>(47.63)</td>
<td>(15.87)</td>
<td>(136.53)</td>
<td>(125.41)</td>
<td>(47.63)</td>
<td>(31.75)</td>
<td>(15.87)</td>
<td>(9.52)</td>
<td></td>
<td>(34.92)</td>
<td></td>
</tr>
<tr>
<td>101.60</td>
<td>4</td>
<td>2-1/4</td>
<td>1-7/8</td>
<td>5/8</td>
<td>5-1/2</td>
<td>4-3/4</td>
<td>2</td>
<td>1-1/4</td>
<td>5/8</td>
<td>3/8</td>
<td>2°</td>
<td>1-3/8</td>
<td></td>
</tr>
<tr>
<td>11.45 kg/m</td>
<td>X-100-16</td>
<td>(101.60)</td>
<td>(57.15)</td>
<td>(47.63)</td>
<td>(15.87)</td>
<td>(139.70)</td>
<td>(120.65)</td>
<td>(50.80)</td>
<td>(31.75)</td>
<td>(15.87)</td>
<td>(9.52)</td>
<td></td>
<td>(34.92)</td>
</tr>
<tr>
<td>6&quot;l</td>
<td>X-678</td>
<td>4</td>
<td>3-3/8</td>
<td>2-11/16</td>
<td>3/4</td>
<td>7-5/8</td>
<td>7-5/8</td>
<td>2-1/2</td>
<td>1-9/16</td>
<td>7/8</td>
<td>1/2</td>
<td>2°</td>
<td>2</td>
</tr>
<tr>
<td>12.5#/ft</td>
<td>(101.60)</td>
<td>(85.72)</td>
<td>(68.26)</td>
<td>(19.05)</td>
<td>(193.68)</td>
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<td>(63.50)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### NOTE:

Dimensions on top are inches.
Dimensions on bottom are mm.

- H - Width of trolley bracket
- J - Centerline of lubrication fitting to bottom of beam
- K - Minimum distance between wheel inside faces
- L - Overall width of trolley assembly
- M - Clearance width of trolley bracket at lubrication fitting
- N - Centerline of chain to centerline of upper bolt hole
- P - Interface of dimension from centerline of chain to trolley bracket, measured vertically at outside edge of chain
- R - Thickness of attachment
- S - Diameter of mounting bolts
- T° - Slope of wheels from the vertical
- W - Distance between centerline of bolt holes
### TROLLEY DIMENSIONS

**For X-228 Chain**

<table>
<thead>
<tr>
<th>Beam</th>
<th>Chain</th>
<th>Drop</th>
<th>H max</th>
<th>J</th>
<th>K min</th>
<th>L max</th>
<th>M max</th>
<th>N</th>
<th>O m in</th>
<th>P</th>
<th>Q max</th>
<th>R</th>
<th>S</th>
<th>T°</th>
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<tbody>
<tr>
<td>2' 1</td>
<td>X-228</td>
<td>1-7/8</td>
<td>1</td>
<td>3/16</td>
<td>1-11/16</td>
<td>3-1/2</td>
<td>1-29/32</td>
<td>31/32</td>
<td>3-13/32</td>
<td>1/4</td>
<td>3/16</td>
<td>5-1/2</td>
<td>1-1/32</td>
<td></td>
</tr>
<tr>
<td>@ 3.76 # / ft</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50.801</td>
<td>X-50-6</td>
<td>(47.60)</td>
<td>(25.40)</td>
<td>(119.06)</td>
<td>(88.90)</td>
<td>(19.05)</td>
<td>(48.41)</td>
<td>(24.60)</td>
<td>(86.51)</td>
<td>(6.35)</td>
<td>(4.76)</td>
<td>(26.19)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>@ 5.59 kg / m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:**

Dimensions on top are inches.
Dimensions on bottom are mm.

H - Width of trolley bracket
J - Centerline of lubrication fitting to bottom of beam
K - Minimum distance between wheel inside faces
L - Overall width of trolley assembly
M - Clearance width of trolley bracket at lubrication fitting
N - Centerline of chain to centerline of upper bolt hole
O - Centerline of chain to centerline of lower bolt hole
P - Interface of dimension from centerline of chain to trolley bracket
Q - Centerline of chain to bottom of bracket
R - Thickness of attachment
S - Diameter of mounting bolts
T° - Slope of wheels from the vertical
# Trolley Attachment Dimensions

![Diagram of trolley attachments](image)

<table>
<thead>
<tr>
<th>Beam</th>
<th>Chain</th>
<th>N</th>
<th>R</th>
<th>S dia.</th>
<th>U</th>
<th>V max</th>
<th>W</th>
<th>X</th>
<th>Z</th>
<th>AA</th>
<th>AB</th>
<th>AC min</th>
<th>AD min</th>
<th>AE min</th>
<th>AN</th>
<th>AP</th>
<th>AR</th>
</tr>
</thead>
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<tr>
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<td>X-458</td>
<td>2</td>
<td>5/8</td>
<td>3/8</td>
<td>11/16</td>
<td>2-1/4</td>
<td>3</td>
<td>3</td>
<td>3/4</td>
<td>9/16</td>
<td>5/8</td>
<td>5/16</td>
<td>4</td>
<td>1-13/16</td>
<td>4-5/8</td>
<td>13/16</td>
<td>13/16</td>
</tr>
<tr>
<td>7.7 # / ft</td>
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<td>2</td>
<td>(50.80)</td>
<td>(15.87)</td>
<td>(9.52)</td>
<td>(17.46)</td>
<td>(57.15)</td>
<td>(34.92)</td>
<td>(14.28)</td>
<td>(15.80)</td>
<td>(7.93)</td>
<td>(57.15)</td>
<td>(46.03)</td>
<td>(117.47)</td>
<td>(20.63)</td>
<td>(20.63)</td>
<td>(12.70)</td>
</tr>
<tr>
<td>101.601 @ 11.45 kg / m</td>
<td>2</td>
<td>(63.50)</td>
<td>(22.23)</td>
<td>(12.70)</td>
<td>(22.23)</td>
<td>(85.72)</td>
<td>(50.80)</td>
<td>(92.07)</td>
<td>(25.40)</td>
<td>(25.40)</td>
<td>(6.35)</td>
<td>(82.55)</td>
<td>(42.86)</td>
<td>(156.36)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6&quot; I @</td>
<td>X-678</td>
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<td>7/8</td>
<td>1/2</td>
<td>7/8</td>
<td>3-3/8</td>
<td>2</td>
<td>1</td>
<td>13/16</td>
<td>1</td>
<td>1/4</td>
<td>3-1/4</td>
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<td>6-5/32</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>(63.50)</td>
<td>(22.23)</td>
<td>(12.70)</td>
<td>(22.23)</td>
<td>(85.72)</td>
<td>(50.80)</td>
<td>(92.07)</td>
<td>(25.40)</td>
<td>(25.40)</td>
<td>(6.35)</td>
<td>(82.55)</td>
<td>(42.86)</td>
<td>(156.36)</td>
<td>-</td>
<td>-</td>
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<tr>
<td>152.41 @ 18.60 kg / m</td>
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<td>(63.50)</td>
<td>(22.23)</td>
<td>(12.70)</td>
<td>(22.23)</td>
<td>(85.72)</td>
<td>(50.80)</td>
<td>(92.07)</td>
<td>(25.40)</td>
<td>(25.40)</td>
<td>(6.35)</td>
<td>(82.55)</td>
<td>(42.86)</td>
<td>(156.36)</td>
<td>-</td>
<td>-</td>
<td>-</td>
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</tbody>
</table>

**NOTE:**
Dimensions on top are inches.
Dimensions on bottom are mm.

- **N** - Centerline of chain to centerline of bolt holes
- **R** - Thickness of attachment
- **S** - Diameter of mounting bolts
- **U** - Width of opening between assembled clevis halves
- **V** - Width of attachment
- **W** - Distance between centerlines of bolt holes
- **X** - Centerline of chain to centerline of load mounting hole
- **Y** - Centerline of chain to bottom of bolt attachment
- **Z** - Hole diameter for load mounting
- **AA** - Diameter of rod on bolt attachment
- **AB** - Thickness of clevis half
- **AC** - Overall length of rod on bolt attachment
- **AD** - Centerline of load mounting hole to inside bend line of clevis attachment
- **AE** - Centerline of chain to bottom of bolt attachment
- **AN** - Centerline of load mounting hole to bottom of pendant attachment
- **AP** - Bolt diameter for pendant load mounting
- **AR** - Thickness of pendant load mounting boss
### TROLLEY ATTACHMENT DIMENSIONS

#### Bolts Vertical

![Diagram showing trolley attachment dimensions](image)

#### Beam Size

<table>
<thead>
<tr>
<th>Beam</th>
<th>Chain</th>
<th>R dia.</th>
<th>S</th>
<th>U</th>
<th>V</th>
<th>W</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>N</th>
<th>AA</th>
<th>AB min.</th>
<th>AC min.</th>
<th>AD min.</th>
<th>AE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3&quot; @ 5.7#/ft</td>
<td>X-348</td>
<td>1/4</td>
<td>5/16</td>
<td>9/16</td>
<td>1-1/2</td>
<td>1-7/8</td>
<td>3-1/8</td>
<td>1/2</td>
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<td>1/2</td>
<td>1/8</td>
<td>1-13/16</td>
<td>1</td>
<td>4-1/4</td>
<td></td>
</tr>
<tr>
<td>8.46 kg/m</td>
<td>X-75-13</td>
<td>(6.35)</td>
<td>(7.93)</td>
<td>(14.28)</td>
<td>(38.10)</td>
<td>(47.60)</td>
<td>(79.38)</td>
<td>(15.87)</td>
<td>(12.70)</td>
<td>(25.40)</td>
<td>(46.03)</td>
<td>(25.40)</td>
<td>(184.15)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4&quot; @ 7.7#/ft</td>
<td>X-458</td>
<td>3/8</td>
<td>3/8</td>
<td>11/16</td>
<td>2-1/8</td>
<td>2-1/8</td>
<td>2-7/8</td>
<td>3/4</td>
<td>1/2</td>
<td>1-5/16</td>
<td>5/8</td>
<td>3/16</td>
<td>2-1/8</td>
<td>1</td>
<td>4-15/16</td>
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<tr>
<td>101.6 kg/m</td>
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<td>(9.52)</td>
<td>(17.46)</td>
<td>(53.97)</td>
<td>(53.97)</td>
<td>(73.03)</td>
<td>(19.05)</td>
<td>(12.70)</td>
<td>(33.33)</td>
<td>(15.87)</td>
<td>(4.76)</td>
<td>(53.97)</td>
<td>(25.40)</td>
<td>(125.41)</td>
</tr>
<tr>
<td>6&quot; @ 12.5#/ft</td>
<td>X-678</td>
<td>1/2</td>
<td>1/2</td>
<td>13/16</td>
<td>3</td>
<td>2-3/4</td>
<td>3-5/8</td>
<td>1-1/8</td>
<td>3/4</td>
<td>1-5/8</td>
<td>7/8</td>
<td>1/4</td>
<td>3</td>
<td>1-1/8</td>
<td>6-1/8</td>
</tr>
<tr>
<td>152.4 kg/m</td>
<td>X-150-22</td>
<td>(12.70)</td>
<td>(12.70)</td>
<td>(20.64)</td>
<td>(76.20)</td>
<td>(69.85)</td>
<td>(92.07)</td>
<td>(28.58)</td>
<td>(19.05)</td>
<td>(41.27)</td>
<td>(22.23)</td>
<td>(6.35)</td>
<td>(76.20)</td>
<td>(28.58)</td>
<td>(155.57)</td>
</tr>
</tbody>
</table>

**NOTE:**

*Dimensions on top are inches.*

*Dimensions on bottom are mm.*

- **N** - Centerline of chain to center line of bolt holes
- **R** - Thickness of attachment
- **S** - Diameter of mounting bolts
- **U** - Width of opening between assembled clevis halves
- **V** - Width of attachment
- **W** - Distance between centerlines of bolt holes
- **X** - Centerline of chain to centerline of load mounting hole
- **Y** - Centerline of load mounting hole to bottom of attachment
- **Z** - Hole diameter for load mounting
- **AA** - Diameter of rod on bolt attachment
- **AB** - Thickness of clevis half
- **AC** - Overall length of rod on bolt attachment
- **AD** - Centerline of load mounting hole to inside bend line of clevis attachment
- **AE** - Centerline of chain to bottom of bolt attachment
## ROLLER TURN DIMENSIONS

### Beam Chain Specifications

<table>
<thead>
<tr>
<th>Beam Chain</th>
<th>Nominal Chain Diameter</th>
<th>Nominal Radius</th>
<th>Degrees of Turn</th>
<th>Drop</th>
<th>AL min</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>30 45 60 90 180</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3&quot; I @ 5.7#/ft</td>
<td>76.20 l@ 8.46 kg/m</td>
<td>18 (460)</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X-348</td>
<td>X-75-13</td>
<td>24 (610)</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4&quot; I @ 7.7#/ft</td>
<td>101.60 l@ 11.45 kg/m</td>
<td>24 (610)</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X-458</td>
<td>X-100-16</td>
<td>30 (760)</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>36 (910)</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>48 (1220)</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>60 (1520)</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>72 (1830)</td>
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<td></td>
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</tr>
<tr>
<td>6&quot; I @ 12.5#/ft</td>
<td>152.40 l@ 18.60 kg/m</td>
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<td>X-678</td>
<td>X-150-22</td>
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<tr>
<td></td>
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<td>48 (1220)</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>60 (1520)</td>
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<tr>
<td></td>
<td></td>
<td>72 (1830)</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Notes
- **AL**: Bottom of beam to top of roller hub
- **Drop**: Bottom of beam to centerline of chain
- **✓**: Standard size
- **( )**: Dimensions on top are inches. Dimensions on bottom are mm.
## Traction Wheel Turn Dimensions

<table>
<thead>
<tr>
<th>Beam Chain</th>
<th>Nominal Radius</th>
<th>Degrees of Turn</th>
<th>Drop</th>
<th>AF</th>
<th>AL</th>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
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<td>30 (760)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td></td>
<td>36 (910)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
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<td>42 (1070)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
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<td>✓</td>
<td>✓</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
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<td>152.40 I @ 18.60 kg/m</td>
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<td>4</td>
<td>2</td>
<td>2-3/4</td>
</tr>
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<td>X-678</td>
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<td>X-150-22</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

- **Drop**: Bottom beam to center line chain
- **AF**: Height of traction wheel rim
- **AL**: Top of traction wheel rim to bottom of beam
- **✓**: Standard size

**NOTE:** Dimensions on top are inches. Dimensions on bottom are mm.
SECTION IV

DESIGN PROCEDURE AND ENGINEERING DATA

OVERHEAD TROLLEY CONVEYOR SYMBOLS

Plan View
TYPICAL TROLLEY CONVEYOR INSTALLATION

CONVEYOR DATA

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tr>
<td>Conveyor Speed</td>
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<tr>
<td>Chain</td>
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<td></td>
</tr>
<tr>
<td>Voltage</td>
<td></td>
</tr>
<tr>
<td>Phase</td>
<td></td>
</tr>
<tr>
<td>Hz.</td>
<td></td>
</tr>
<tr>
<td>Vertical Curve Rad.</td>
<td>Degree</td>
</tr>
</tbody>
</table>

SECTION A-A
SEE PAGE IV-23 FOR GUARD INFORMATION

GUARD MATERIAL

TYPICAL GUARD CROSS SECTION
The following step procedure will assist you in designing an Overhead Trolley Conveyor System:

Step A  Draw plant layout.
1. Draw layout to largest practical scale. For example: 1/4" = 1 '0" or 1/8" = 1 '0"; mm - 50 to 1 or 100 to 1
2. Make a plan view of plant area in which the conveyor is to be erected. Show dimensioned column or bay lines. Indicate “North” direction relative to building.
3. Locate and label all obstructions which affect the path of the conveyor, such as columns, walls, machinery, work areas, and aisles on the plan view.

Step B  Design a Carrier
1. Determine number of parts to be placed on each carrier and their relative position on carrier. Make the carrier as compact as possible.
2. Design carrier to permit easy loading and unloading of parts.
3. Design the carrier to carry loads within the rated capacity of the trolley. Trolley capacities are listed in this section.
4. Design carrier bracket to fit a trolley attachment to which the load or carrier can most easily be attached, keeping within the load ratings.
5. Standard trolley attachments can be selected from the data and illustrations in this section.

Step C  Determine Conveyor Size
1. Select a trolley arrangement, either a single trolley with attachment or double trolley with load bar, in this section that has a capacity rating exceeding the total weight of the carrier designed in Step B and the carried load.
2. The trolley size will determine the size of the conveyor in the average conveyor application. However, the chain pull, as calculated in Step N, must not exceed the recommended capacity for the selected size chain as shown in this section.

Step D  Determine Track Elevations

1. Elevations are measured from floor line to top of I-beam track.

2. At loading and unloading areas, the conveyor height must permit a person to load and unload the carrier easily.

3. The conveyor height over work areas and aisles must allow traffic to pass freely under guards.

4. Indicate the elevation at all vertical curves. See typical conveyor layout at beginning of this section.

Step E  Determine Material Flow

1. On plant layout, locate all load and unload points and, also, any processing stations that will be served by the conveyor. Typical stations: Dip tanks, paint booths, bake ovens (indicate temperature).

2. Draw conveyor route so that it connects all areas in their proper work sequence with the most practical path for the system, using standard components where possible. Keep parallel conveyor routes as closely spaced as possible to reduce the amount of supporting members and guards required.

3. Be sure the path of conveyor does not interfere with any machine operations or work areas.

4. Indicate location of drive, take-up, vertical curves, and horizontal turns relative to column lines. Refer to typical layout and conveyor symbols and glossary at beginning of this section.

Step F  Select Vertical Curves

1. For increased conveyor life, use the largest recommended radius possible for vertical curves in your layout. Use minimum radius vertical curves only in conveyor areas where necessary. See vertical curve radii chart, Page 27.

2. Select a load spacing.

3. Using Figure 9, select a degree of incline for vertical curves that will provide a clearance between carriers, or load silhouette when they are moving on the incline. To assure clearance between carriers, dimension “A” must be greater than carrier length.

4. Because of carrier sway, clearance must be provided between top of carrier and conveyor chain.

5. Indicate on layout drawing the horizontal length (tangent to tangent) of each vertical curve, its radius and degree.

6. Locate each vertical curve relative to some adjacent component, as shown on typical conveyor layout at beginning of this section.
**Step G  Select Horizontal Turns**

1. Make a plan view layout of horizontal turn, as shown in Figure 10. Clearance between adjacent carriers or maximum load silhouette while they are negotiating turns will determine the minimum horizontal turn radius.

2. For increased conveyor life, use the largest standard radius possible for horizontal turns in your layout. Select the horizontal turns best suited to your requirements from Section III, Conveyor Components.

3. Provide for one (1) 180-degree horizontal turn in your layout, as near as possible on the output side of the drive unit, for use as a slack chain takeup. If possible, place this takeup at the bottom of a vertical curve.

**Step H  Determine Guard Requirements**

1. For standard guard methods, refer to Pages 25 and 26.
2. Select type of conveyor guard best suited to your requirements.

3. Be sure loaded carriers will clear all guards. Six inches clearance on each side is usually sufficient. It is especially important to check clearances on horizontal and vertical curves. Carrier templates can be used for this purpose.

4. Locate each guard relative to some adjacent conveyor component or column line as shown on typical conveyor layout at beginning of this section.

Step I  Determine Trolley Spacing

1. Refer to Step F, Numbers 3, 4 and 5, and to Step G, Number 1. Note the carrier spacing selected for proper clearances. Refer to Page 24 and note the recommended spacing for trolleys. If your required carrier spacing is greater than the recommended trolley spacing, intermediate trolleys are required.

2. When laying out the conveyor path, a distance equal to the maximum trolley spacing selected should be allowed between tangent lines of vertical curves and horizontal turns.

Step J  Determine Maximum Conveyor Speed

1. A speed of 50 to 70 feet per minute is normally considered as maximum. However, 30 FPM usually allows easy loading and unloading and assures longer conveyor life. Lowest possible speeds are recommended to suit required production. Required conveyor speed in feet per minute is equal to the number of carriers per minute multiplied by carrier spacing in feet.

2. To illustrate this formula:

   a. Assume your production rate is 1,200 parts per hour.
   b. Assume each carrier holds four (4) parts.
   c. Required number of carriers per hour equals 1,200 - 4 or 300 carriers.
   d. Required number of carriers per minute is 300 - 60 or 5 carriers.
   e. Assume a carrier spacing of 24" or 2'.
   f. Five (5) carriers per minute multiplied by carrier spacing of 2 feet equals a conveyor speed of 10 FPM.

3. To allow for variation in production requirements, it is advisable to set a maximum speed of about two times that calculated. A variable speed drive with a speed range of about 3 to 1 is the most common.

   a. The maximum speed is 20 FPM or 2 x 10 FPM.
   b. Using a 3 to 1 ratio variable speed drive would give you a speed range of 6.6 FPM to 20 FPM.

Step K  Determine Conveyor Length

1. Obtain the sum of all straight track dimensions.

2. Obtain the sum of all arc lengths on the horizontal turns.

3. Obtain the sum of all arc lengths on the vertical curves by using the vertical curve charts in Section V, Vertical Curve Data.
4. The total length of the conveyor is equal to the sum of Steps No. 1, No. 2, and No. 3.

**Step L  Determine Moving Load**

1. The moving load on a conveyor is equal to the sum of the weights of all moving parts—chain, trolleys, carriers, and loads.

2. Establish distances from loading to unloading points and determine the number of loaded and empty carriers in the system during maximum loading of conveyor.

3. The following example illustrates the procedure for determining moving load assuming the conveyor is 300 feet long, carriers are at 2-foot centers, and distance from loading to unloading points is 250 feet.

   a. 300 feet X-458 chain with trolleys at 2-foot centers at 7.1 lbs. per ft. ........... 2,130 lbs.
   b. 125 loaded carriers at 250 lbs. each ........................................... 31,250 lbs.
   c. 25 empty carriers at 20 lbs. each ............................................ 500 lbs.
   The total moving load is .................................................. 33,880 lbs.

**Step M  Determine Lift Load**

1. The lift load is the amount of force required to pull the moving load upward along the vertical curves in the entire system.

2. To calculate this force, determine the net difference in elevation of all the loaded vertical curves (inclines and declines) in the system. This net vertical rise or fall (feet) will be considered the total lifting height of the conveyor.

3. The lift load or chain pull for the elevation changes of the conveyor is equal to the total lift height (feet) multiplied by the individual load weight (pounds), then divided by the load spacing feet.

   Example: Assume that the net elevation change of all loaded vertical curves results in a total rise or lifting height of 12'0"; the load on each carrier is 230 lbs.; and the carriers are on two (2) foot centers.

   \[
   \text{Lift Load} = \frac{12'0" \times 230}{2'0"} = 1,380 \text{ pounds}
   \]

   The chain, trolleys, and carriers are excluded from the calculations because they are balanced by the portion of the system that moves down the vertical curves. Note: If the net difference of elevation in the system is negative due to greater elevation change as a result of loaded declines, the lift load resultant will be negative.

**Step N  Determine Chain Pull**

1. Chain pull is the effort necessary to maintain the normal operating speed of a conveyor under a rated capacity load. To arrive at this final driving effort, it is necessary to add the lift load and the friction factors, expressed as a small percentage of the moving load, which act as resistance to the progress of the conveyor. The moving load and the lift load were calculated in Steps L and M.

2. Frictional resistance is found in the bearings of the trolley wheels, roller or traction wheel turns, vertical curves, and the drive unit itself. This friction figure is represented as a small percentage and is listed in the chart below for each conveyor size. It should be noted that these percentages
are for average conveyors which travel under normal conditions.

3. Select from the chart the friction factor indicated for your conveyor size.

   NOTE: A large number of vertical and horizontal curves will create slightly higher friction.

Note: Conveyor manufacturer should be consulted for specific information on friction factors

4. To determine chain pull due to friction, multiply total moving load by selected friction factor. Using figures from previous examples, the following illustrates proper procedure:

   a. Total moving load (from Step L) ....................................... 33,880 Ibs.
   b. Multiply by friction factor (chart above) ............................     .025
      Friction chain pull .............................................................      847 Ibs.

5. Add lift load to friction chain pull to obtain total chain pull.

   a. Friction chain pull .............................................................     847 Ibs.
   b. Lift load (from Step M) ...................................................... 1,380 Ibs.
      Total chain pull ................................................................. 2,227 Ibs.

6. Refer to Page 24 and determine if chain size selected has sufficient capacity for required chain pull.

7. Consult conveyor manufacturer to obtain a drive of sufficient size for the calculated chain pull.

   Note: Above method of calculating chain pull is a fair approximation to determine drive size or number of drives required. When adverse environmental conditions exist (such as high temperature, caustic solutions, excessive dust, corrosive solutions) or the conveyor is abnormally long or complex (1,000 feet; 20 changes of direction), a progressive chain pull computation is necessary where the friction losses are progressively calculated and accumulated through the path along the conveyor.

Metric Conversion:
Calculations may be performed in the English system, as shown, or in metric.

Step 0 Locate Drive

1. Locate the drive so it will apply a pulling force on the most heavily loaded portion of the system.

2. For best results, locate the drive at some high point in the conveyor system and place the takeup
just after the drive at a lower point.

3. Locate drive on conveyor layout. Relate location to some adjacent component, as shown in Typical Conveyor Layout at beginning of this section.

Step P Summarize

1. For quick and easy reference, make a legend on your layout covering the following subjects (Refer to Typical Conveyor Layout):
   a. Speed of conveyor. Mark direction of travel.
   b. Length of conveyor
   c. Trolley spacing
   d. Carrier spacing
   e. Weight of empty carrier
   f. Maximum weight of loaded carrier
   g. Total moving load
   h. Maximum lift load
   i. Maximum chain pull
   j. Type of drive (caterpillar or sprocket); electrical specs
   k. Cross section of guard with dimensions

Step Q Safety Codes (Reference current ANSI B20.1)

1. In areas where the parted chain, cable, or other linkage would permit a runaway condition on an inclined or declined section and where personnel are present, antirunaway or anti-backup devices shall be provided. A good rule of thumb is one device for every 5 feet of vertical change in distance. The conveyor path may be arranged so that travel of the uncontrolled conveyor will be arrested before it enters an area where personnel are present.

2. In areas where personnel perform work on the load and guards would impair their function, the loads must be cradled, hooked, bolted, or securely attached by some means to the carrier.

3. Nip points occur at traction wheels, sprockets, caterpillar drives, and roller turns and shall be guarded unless guarded by location.

4. Guards shall be provided to restrict personnel from entering hazardous loading, unloading, and transfer areas. When guarding is not feasible, clear and legible warning shall be provided.

5. Where conveyors are located above personnel and the possibility exists that the transported product may fall off for any cause, conveyor guard shall be provided.
Conveyor Drives

The most important component of the conveyor system is the drive. The drive gives the conveyor motion and controls conveyor speed.

Types of Drives

Two Standard types of drives (caterpillar and sprocket) are available for overhead trolley conveyor systems. A caterpillar drive uses a chain made of precision steel rollers with driving dogs that mesh with the links of the conveyor chain to deliver driving force. A sprocket drive makes use of a sprocket whose teeth mesh with the links of the conveyor chain to deliver driving force.

Standard Drive Speed Ranges

All drives are furnished with either constant or variable speeds. Variable speed drives allow flexible production schedules. Variable speed drives are commonly 3:1. Greater speed variations are available.

Plan view of drive frames indicating hand of drive.

To determine the hand of the drive, look in the direction of the chain travel (the chain is moving away from you). If the drive is to be placed on the right side of chain, it is a right hand drive. If it is on the left side of chain, it is a left hand drive.

NOTE: Overload protection shall be provided on all drives.

### COMBINED CHAIN AND TROLLEY WEIGHTS PER FOOT OF CONVEYOR FOR UNIFORM TROLLEY SPACING

<table>
<thead>
<tr>
<th>Beam</th>
<th>Chain</th>
<th>Trolley Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>6&quot;</td>
</tr>
<tr>
<td>3 &quot;</td>
<td>X-348</td>
<td>8.3 (12.34)</td>
</tr>
<tr>
<td>76.2</td>
<td>X-75-13</td>
<td>8.3</td>
</tr>
<tr>
<td>4 &quot;</td>
<td>X-458</td>
<td>15.1 (22.47)</td>
</tr>
<tr>
<td>101.6</td>
<td>X-100-16</td>
<td>15.1</td>
</tr>
<tr>
<td>6 &quot;</td>
<td>X-678</td>
<td>38.25</td>
</tr>
<tr>
<td>152.4</td>
<td>X-150-22</td>
<td>38.25</td>
</tr>
</tbody>
</table>

Numbers shown inside ( ) are kilograms per meter.
### Recommended Maximum Allowable Chain Pull on Drop Forged Rivetless Chain (Heat Treated)

<table>
<thead>
<tr>
<th>Chain Size</th>
<th>Maximum Chain Pull</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-348</td>
<td>1500 lbs</td>
</tr>
<tr>
<td>X-75-13</td>
<td>680 kg</td>
</tr>
<tr>
<td>X-458</td>
<td>3000 lbs</td>
</tr>
<tr>
<td>X-100-16</td>
<td>1360 kg</td>
</tr>
<tr>
<td>X-678</td>
<td>5500 lbs</td>
</tr>
<tr>
<td>X-150-22</td>
<td>2500 kg</td>
</tr>
</tbody>
</table>

### Minimum Recommended Radius and Diameter Turns for Various Trolley Spacings

<table>
<thead>
<tr>
<th>Chain Size</th>
<th>Trolley Spacing</th>
<th>Traction Wheel Diameter</th>
<th>Roller Turn Radius</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-348</td>
<td>up to 18&quot;</td>
<td>457.2</td>
<td>18&quot;</td>
</tr>
<tr>
<td>X-75-13</td>
<td>24&quot;</td>
<td>609.6</td>
<td>457.2</td>
</tr>
<tr>
<td></td>
<td>30&quot;</td>
<td>762.0</td>
<td></td>
</tr>
<tr>
<td>X-458</td>
<td>up to 24&quot;</td>
<td>609.6</td>
<td>24&quot;</td>
</tr>
<tr>
<td>X-100-16</td>
<td>32&quot;</td>
<td>812.8</td>
<td>609.6</td>
</tr>
<tr>
<td></td>
<td>36&quot;</td>
<td>914.4</td>
<td></td>
</tr>
<tr>
<td>X-678</td>
<td>12&quot;</td>
<td>304.8</td>
<td></td>
</tr>
<tr>
<td>X-150-22</td>
<td>24&quot;</td>
<td>609.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>36&quot;</td>
<td>914.4</td>
<td></td>
</tr>
</tbody>
</table>

### Approximate Allowable Suspended Load on Single Trolley

<table>
<thead>
<tr>
<th>I-Beam Track Size</th>
<th>Maximum Load Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>3&quot; @ 5.7#/ft</td>
<td>200 lbs</td>
</tr>
<tr>
<td>76.2 1 Qa 8.46 kg/m</td>
<td>90 kg</td>
</tr>
<tr>
<td>4&quot; @ 7.7#/ft</td>
<td>400 lbs</td>
</tr>
<tr>
<td>101.6 1 Q 11.45 kg/m</td>
<td>180 kg</td>
</tr>
<tr>
<td>6&quot; @ Qa 12.5 #/ft</td>
<td>1200 lbs</td>
</tr>
<tr>
<td>152.4 1 Q 18.60 kg/m</td>
<td>540 kg</td>
</tr>
</tbody>
</table>

### Dual Trolley with Load Bar

Load Capacity = Two times single trolley
Dimensions are in inches and mm.
GUARDS

Conveyor guards are recommended where loaded conveyors pass over aisles, work stations, machinery, or where work carriers are not permanently fastened to conveyor, to prevent injury or damage from falling parts. Dimensions of guards are determined by the size of loaded carriers. Six inches minimum clearance on each side is required. Vertical height should permit loaded carriers to clear a fallen part lying on the bottom of the guard. Check all pertinent safety codes for specific requirements. A wide variety of materials is available for guard construction, including woven wire mesh, expanded metal, and sheet steel. Size and weight of the part being handled determine the correct choice. Support steel and headers are usually structural angles.

Typical Sections

Sheet Metal Type
Sheet metal guards are often used after dip tanks or washes, where dripping may be problem, and on conveyors carrying small or fine materials that would pass through expanded metal or wire mesh.
Expanded Metal or Wire Mesh Type
Conveyor guards are fabricated from heavy gauge expanded metal or wire mesh and welded to angle iron frames.

Multiple Run
If several runs of loaded conveyors can be routed close together, a single wide guard will serve more than one conveyor.
SECTION V

VERTICAL CURVE DATA

TRACK -- VERTICAL CURVE RADII FOR OVERHEAD CONVEYORS AS RELATED TO TROLLEY SPACING.

Minimum and Recommended Radius of Vertical Curve

<table>
<thead>
<tr>
<th>Chain</th>
<th>X-228</th>
<th>X-348</th>
<th>X-458</th>
<th>X-678</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trolley Spacing</td>
<td>min</td>
<td>rec.</td>
<td>min</td>
<td>rec.</td>
</tr>
<tr>
<td>8&quot;</td>
<td>2'-0</td>
<td>4'-0</td>
<td>3'-0</td>
<td>6'-0</td>
</tr>
<tr>
<td>203.2</td>
<td>609.6</td>
<td>1219.2</td>
<td>4'-0</td>
<td>5'-0</td>
</tr>
<tr>
<td>12&quot;</td>
<td>3'-0</td>
<td>4'-0</td>
<td>5'-6&quot;</td>
<td>8'-0</td>
</tr>
<tr>
<td>304.8</td>
<td>914.4</td>
<td>1219.2</td>
<td>1219.2</td>
<td>5'-6&quot;</td>
</tr>
<tr>
<td>16&quot;</td>
<td>4'-0</td>
<td>4'-0</td>
<td>4'-0</td>
<td>8'-0</td>
</tr>
<tr>
<td>406.4</td>
<td>1219.2</td>
<td>1219.2</td>
<td>1219.2</td>
<td>1981.2</td>
</tr>
<tr>
<td>18&quot;</td>
<td>5'-0</td>
<td>6'-0</td>
<td>6'-6&quot;</td>
<td>12'-0</td>
</tr>
<tr>
<td>457.2</td>
<td>609.6</td>
<td>2438.4</td>
<td>2438.4</td>
<td>2133.7</td>
</tr>
<tr>
<td>20&quot;</td>
<td>6'-0</td>
<td>6'-0</td>
<td>6'-0</td>
<td>6'-0</td>
</tr>
<tr>
<td>508.0</td>
<td>1828.8</td>
<td>1828.8</td>
<td>1981.2</td>
<td>2438.4</td>
</tr>
<tr>
<td>24&quot;</td>
<td>8'-0</td>
<td>8'-0</td>
<td>6'-6&quot;</td>
<td>8'-0</td>
</tr>
<tr>
<td>609.6</td>
<td>2438.4</td>
<td>2438.4</td>
<td>1981.2</td>
<td>2438.4</td>
</tr>
<tr>
<td>30&quot;</td>
<td>7'-8&quot;</td>
<td>10'-0</td>
<td>10'-0</td>
<td>10'-0</td>
</tr>
<tr>
<td>762.0</td>
<td>2336.8</td>
<td>3048.0</td>
<td>2438.4</td>
<td>2438.4</td>
</tr>
<tr>
<td>32&quot;</td>
<td>9'-0</td>
<td>12'-0</td>
<td>12'-0</td>
<td>12'-0</td>
</tr>
<tr>
<td>812.8</td>
<td>2336.8</td>
<td>3048.0</td>
<td>2438.4</td>
<td>2438.4</td>
</tr>
<tr>
<td>36&quot;</td>
<td>9'-0</td>
<td>12'-0</td>
<td>16'-0</td>
<td>20'-0</td>
</tr>
</tbody>
</table>

NOTE: Minimum radii to be used only when absolutely required and only after considering chain pull, imposed load on trolley, beam wear, and possibility of surge.

NOTE: Dimensions on top are english. Dimensions on bottom are mm (metric).
FOR VERTICAL DROP GREATER THAN SHOWN SUBTRACT DROP "D" OF APPROPRIATE DEGREE AND RADIUS IN CHART FROM ACTUAL DROP "D" AND USE THE REMAINDER TO COMPUTE "S" AND "L" DIMENSIONS AS SHOWN BELOW.

### FOR 15 DEGREE CURVES

- \( S = \) REMAINDER x 3.864
- \( L = \) REMAINDER x 3.732 + "L" FROM CHART

### FOR 20 DEGREE CURVES

- \( S = \) REMAINDER x 2.924
- \( L = \) REMAINDER x 2.7475 + "L" FROM CHART

### FOR 30 DEGREE CURVES

- \( S = \) REMAINDER x 2.000
- \( L = \) REMAINDER x 1.732 + "L" FROM CHART

### FOR 45 DEGREE CURVES

- \( S = \) REMAINDER x 1.414
- \( L = \) REMAINDER + "L" FROM CHART

**EXAMPLE FOR 8'-0" RADIUS, 30 DEGREE, 5'-0" DROP, VERTICAL CURVE**

- TOTAL DROP: 5' - 0"
- CHART DROP: 2' - 10-1/4"
- REMAINDER: 2' - 1-3/4"

\[
S = 34.25 \times 2.000 = 68.50 \text{, 5' - 8-1/2"} \\
L = 34.25 \times 1.732 + 96.0 = 156.321 \text{, 12' - 11-5/16"}
\]

To calculate the arc length of any curve, horizontal or vertical, for use in determining the total chain length the following formula can be used:

\[
\text{ARC LENGTH} = \frac{3.1416 \times \text{ARC RADIUS} \times \text{ARC DEGREE}}{180}
\]

**Example:** Find the arc length of an 18" radius 45 degree horizontal turn.

\[
\text{ARC LENGTH} = \frac{31416 \times 18 \times 45}{180} = 14.137 \text{ or 1 ' - 2-1/8"}
\]
## COMPOUND VERTICAL CURVE CHART

### 4'-0 RADIUS

<table>
<thead>
<tr>
<th>Drop ft. in</th>
<th>mm</th>
<th>L ft. in.</th>
<th>mm</th>
<th>A ft. in.</th>
<th>mm</th>
<th>Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3-1/4</td>
<td>82.6</td>
<td>2-0-7/8</td>
<td>631.8</td>
<td>1'-0-9/16</td>
<td>319.1</td>
<td>15°</td>
</tr>
<tr>
<td>O'-5-13/16</td>
<td>147.6</td>
<td>2'-8-13/16</td>
<td>833.4</td>
<td>1'-4-3/4</td>
<td>425.4</td>
<td>20°</td>
</tr>
<tr>
<td>1'-0-7/8</td>
<td>327.0</td>
<td>4-0</td>
<td>1219.2</td>
<td>2'-1-1/8</td>
<td>638.2</td>
<td>30°</td>
</tr>
<tr>
<td>2'-4-1/8</td>
<td>714.4</td>
<td>5-7-7/8</td>
<td>1724</td>
<td>3'-1-11/16</td>
<td>957.3</td>
<td>45°</td>
</tr>
</tbody>
</table>

### 5'-0 RADIUS

<table>
<thead>
<tr>
<th>Drop ft. in</th>
<th>mm</th>
<th>L ft. in.</th>
<th>mm</th>
<th>A ft. in.</th>
<th>mm</th>
<th>Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>O'-4-1/16</td>
<td>103.2</td>
<td>2'-7-1/16</td>
<td>789</td>
<td>1'-3-11/16</td>
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</tr>
<tr>
<td>0-7-1/4</td>
<td>184.2</td>
<td>3'-5-1/16</td>
<td>1043</td>
<td>1'-8-15/16</td>
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<td>20°</td>
</tr>
<tr>
<td>1'-4-1/16</td>
<td>408.0</td>
<td>5'-0</td>
<td>1524</td>
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<td>798.5</td>
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</tr>
<tr>
<td>2'-11-1/8</td>
<td>892.2</td>
<td>7'-0-7/8</td>
<td>2155.8</td>
<td>3-11-1/8</td>
<td>1197</td>
<td>45°</td>
</tr>
</tbody>
</table>

### 6'-0 RADIUS

<table>
<thead>
<tr>
<th>Drop ft. in</th>
<th>mm</th>
<th>L ft. in.</th>
<th>mm</th>
<th>A ft. in.</th>
<th>mm</th>
<th>Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>O'-4-15/16</td>
<td>125.4</td>
<td>3'-1-1/4</td>
<td>946.2</td>
<td>1'-6-7/8</td>
<td>472.4</td>
<td>15°</td>
</tr>
<tr>
<td>O'-8-11/16</td>
<td>220.7</td>
<td>4'-1-1/4</td>
<td>1251</td>
<td>2'-1-1/8</td>
<td>638.2</td>
<td>20°</td>
</tr>
<tr>
<td>1-7-5/16</td>
<td>490.5</td>
<td>6'-0</td>
<td>1828.8</td>
<td>3'-11-16</td>
<td>957.3</td>
<td>30°</td>
</tr>
<tr>
<td>3'-6-3/16</td>
<td>1071.6</td>
<td>8'-5-13/16</td>
<td>2586</td>
<td>4'-8-9/16</td>
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### 6'-6" RADIUS

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<th>Drop ft. in</th>
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<th>mm</th>
<th>A ft. in.</th>
<th>mm</th>
<th>Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>O'-5-5/16</td>
<td>134.9</td>
<td>3'-4-3/8</td>
<td>1025.5</td>
<td>1'-8-7/16</td>
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</tr>
<tr>
<td>O'-9-7/16</td>
<td>239.7</td>
<td>4'-5-3/8</td>
<td>1355.7</td>
<td>2'-3-1/4</td>
<td>692.2</td>
<td>20°</td>
</tr>
<tr>
<td>1-8-7/8</td>
<td>530.2</td>
<td>6-6</td>
<td>1981.2</td>
<td>4'-13-16</td>
<td>1036.3</td>
<td>30°</td>
</tr>
<tr>
<td>3-9-11/16</td>
<td>1160.5</td>
<td>9'-2-5/16</td>
<td>2801.9</td>
<td>5-1-1/4</td>
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### 8'-0 RADIUS

<table>
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<th>mm</th>
<th>A ft. in.</th>
<th>mm</th>
<th>Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>O'-6-1/2</td>
<td>165.1</td>
<td>4'-1-11/16</td>
<td>1262.1</td>
<td>2'-1-1/8</td>
<td>638.2</td>
<td>15°</td>
</tr>
<tr>
<td>0-11-5/8</td>
<td>295.3</td>
<td>5-5-11/16</td>
<td>1668.5</td>
<td>2'-9-1/2</td>
<td>850.9</td>
<td>20°</td>
</tr>
<tr>
<td>2-1-3/4</td>
<td>654.1</td>
<td>8-0</td>
<td>2438.4</td>
<td>4'-2-1/4</td>
<td>1276.4</td>
<td>30°</td>
</tr>
<tr>
<td>4'-8-1/4</td>
<td>1428.8</td>
<td>11'-3-3/4</td>
<td>3448</td>
<td>6'-3-3/8</td>
<td>1914.5</td>
<td>45°</td>
</tr>
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### 10'-0 RADIUS

<table>
<thead>
<tr>
<th>Drop ft. in</th>
<th>mm</th>
<th>L ft. in.</th>
<th>mm</th>
<th>A ft. in.</th>
<th>mm</th>
<th>Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>O'-8-3/16</td>
<td>208.0</td>
<td>5'-2-1/8</td>
<td>1578</td>
<td>2'-7-7/16</td>
<td>798.5</td>
<td>15°</td>
</tr>
<tr>
<td>1'-2-1/2</td>
<td>368.3</td>
<td>6-10-1/16</td>
<td>2084.4</td>
<td>3'-5-7/8</td>
<td>1063.6</td>
<td>20°</td>
</tr>
<tr>
<td>2-8-1/8</td>
<td>816.0</td>
<td>10'-0</td>
<td>3048</td>
<td>5'-2-13/16</td>
<td>1595.4</td>
<td>30°</td>
</tr>
<tr>
<td>5'-10-15/16</td>
<td>1785.9</td>
<td>14'-1-11/16</td>
<td>4310.1</td>
<td>7'-10-1/4</td>
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### 12'-0 RADIUS

<table>
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<th>mm</th>
<th>L ft. in.</th>
<th>mm</th>
<th>A ft. in.</th>
<th>mm</th>
<th>Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>O'-9-13/16</td>
<td>249.2</td>
<td>6-2-9/16</td>
<td>1893.9</td>
<td>3-1-11/16</td>
<td>957.3</td>
<td>15°</td>
</tr>
<tr>
<td>1-5-3/8</td>
<td>441.3</td>
<td>8-2-1/2</td>
<td>2501.9</td>
<td>4-2-1/4</td>
<td>1276.35</td>
<td>20°</td>
</tr>
<tr>
<td>3'-2-9/16</td>
<td>979.5</td>
<td>12'-0</td>
<td>3657.6</td>
<td>6-3-3/8</td>
<td>1914.5</td>
<td>30°</td>
</tr>
<tr>
<td>7'-0-3/8</td>
<td>2143.1</td>
<td>16-11-5/8</td>
<td>5172.1</td>
<td>9-5/18</td>
<td>2873.4</td>
<td>45°</td>
</tr>
</tbody>
</table>

### 15'-0 RADIUS

<table>
<thead>
<tr>
<th>Drop ft. in</th>
<th>mm</th>
<th>L ft. in.</th>
<th>mm</th>
<th>A ft. in.</th>
<th>mm</th>
<th>Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>1'-0-1/4</td>
<td>311.2</td>
<td>7'-9-3/16</td>
<td>2367</td>
<td>3'-11-1/8</td>
<td>1197</td>
<td>15°</td>
</tr>
<tr>
<td>1-9-11/16</td>
<td>550.9</td>
<td>10'-3-1/8</td>
<td>3127.4</td>
<td>5'-2-13/16</td>
<td>1595.4</td>
<td>20°</td>
</tr>
<tr>
<td>4'-0-1/4</td>
<td>1225.6</td>
<td>15'-0</td>
<td>4572</td>
<td>7'-10-1/4</td>
<td>2394</td>
<td>30°</td>
</tr>
<tr>
<td>8'-3-7/16</td>
<td>2678.1</td>
<td>21-2-9/16</td>
<td>6465.9</td>
<td>11-9-3/8</td>
<td>3590.9</td>
<td>45°</td>
</tr>
</tbody>
</table>

### 20'-0 RADIUS

<table>
<thead>
<tr>
<th>Drop ft. in</th>
<th>mm</th>
<th>L ft. in.</th>
<th>mm</th>
<th>A ft. in.</th>
<th>mm</th>
<th>Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>1'-4-3/8</td>
<td>415.9</td>
<td>10-4-1/4</td>
<td>3156</td>
<td>5'-2-13/16</td>
<td>1595.4</td>
<td>15°</td>
</tr>
<tr>
<td>2'-4-15/16</td>
<td>735.0</td>
<td>13'-8-3/16</td>
<td>4170.4</td>
<td>6-11-3/4</td>
<td>2127.3</td>
<td>20°</td>
</tr>
<tr>
<td>5'-4-5/16</td>
<td>1633.5</td>
<td>20'-0</td>
<td>6096</td>
<td>10'-5-8</td>
<td>3190.9</td>
<td>30°</td>
</tr>
<tr>
<td>11'-8-9/16</td>
<td>3570.3</td>
<td>28'-3-7/16</td>
<td>8621.7</td>
<td>15'-8-1/2</td>
<td>4787.9</td>
<td>45°</td>
</tr>
</tbody>
</table>
### Section Vi
#### Preventive Maintenance and Inspection Procedure

**Chain**

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Probable Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Excessive chain wear. (Note: The chain will elongate due to wear: this is normal and is no fault of the system).</td>
<td>A. Lack of lubrication B. Incorrect lubrication</td>
<td>A. Lubricate chain. B. Verify lubricant; replace if necessary.</td>
</tr>
<tr>
<td></td>
<td>C. Sluggish or frozen trolley wheels</td>
<td>C. See #1 under &quot;Trolleys.&quot;</td>
</tr>
<tr>
<td></td>
<td>D. Roller turn roller frozen</td>
<td>D. See #1 under &quot;Roller Turns.&quot;</td>
</tr>
<tr>
<td></td>
<td>E. Obstruction in chain path</td>
<td>E. Remove obstruction and remove and replace chain if damaged.</td>
</tr>
<tr>
<td></td>
<td>F. Conveyor overloaded</td>
<td>F. Conveyor should not be loaded beyond its designated capacities.</td>
</tr>
<tr>
<td></td>
<td>G. Maintenance schedule not adhered to</td>
<td>G. Reinstitute maintenance.</td>
</tr>
<tr>
<td>2. Excessive slack chain.</td>
<td>A. Chain growth through normal wear</td>
<td>A. Adjust take-up and, if necessary, remove links in chain.</td>
</tr>
<tr>
<td></td>
<td>B. Maintenance schedule not adhered to</td>
<td>B. Reinstitute maintenance.</td>
</tr>
<tr>
<td>3. Surging chain.</td>
<td>A. Same as #1 above. Also see &quot;Drive.&quot;</td>
<td>A. Same as #1 above. Also see &quot;Drive.&quot;</td>
</tr>
</tbody>
</table>

**Trolleys**

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Probable Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sluggish or frozen trolley wheels</td>
<td>A. Residue accumulated from over lubrication</td>
<td>A. Remove from conveyor and clean. Remove welsh plug to clean and press on new plug with blunt tool.</td>
</tr>
<tr>
<td></td>
<td>B. Bearings corroded or worn out</td>
<td>B. Replace wheels.</td>
</tr>
<tr>
<td></td>
<td>C. Lack of lubrication</td>
<td>C. Lubricate chain.</td>
</tr>
<tr>
<td></td>
<td>D. Incorrect lubrication</td>
<td>D. Verify lubricant: replace if necessary.</td>
</tr>
<tr>
<td></td>
<td>E. Maintenance schedule not adhered to</td>
<td>E. Reinstitute maintenance.</td>
</tr>
<tr>
<td>2. Bent trolley brackets</td>
<td>A. Damaged in jam or by obstruction</td>
<td>A. Remove obstruction and replace damaged trolley bracket with new bracket. (Do not attempt to straighten bent brackets.)</td>
</tr>
</tbody>
</table>

**Roller Turns**

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Probable Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sluggish or frozen roller turn rollers</td>
<td>A. Dirt or grease residue</td>
<td>A. Clean thoroughly or replace if bearings are damaged. See lubrication charge on Page VI-31.</td>
</tr>
<tr>
<td></td>
<td>B. Lack of lubrication</td>
<td>B. Lubricate chain.</td>
</tr>
<tr>
<td></td>
<td>C. Incorrect lubrication</td>
<td>C. Verify lubricant: replace if necessary.</td>
</tr>
<tr>
<td></td>
<td>D. Maintenance schedule not adhered to</td>
<td>D. Reinstitute maintenance.</td>
</tr>
</tbody>
</table>

**I-Beam**

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Probable Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Excessive wear or peening of flanges at vertical curves</td>
<td>A. Excessive chain tension</td>
<td>A. See #1 under &quot;Chain.&quot;</td>
</tr>
<tr>
<td>2. Excessive wear on I-beam web</td>
<td>A. Bent trolley brackets</td>
<td>A. See #2 under &quot;Trolleys.&quot;</td>
</tr>
<tr>
<td></td>
<td>B. Eccentric Loading</td>
<td>B. Load carriers symmetrical.</td>
</tr>
<tr>
<td>Trouble</td>
<td>Probable Cause</td>
<td>Remedy</td>
</tr>
<tr>
<td>---------</td>
<td>----------------</td>
<td>--------</td>
</tr>
<tr>
<td>1. Floating frame movement sluggish or frozen</td>
<td>A. Spring compression, air pressure or counterweight load too great</td>
<td>A. Reduce the spring, air or counterweight loading.</td>
</tr>
<tr>
<td></td>
<td>B. Dry or damaged expansion joints</td>
<td>B. Lubricate if dry and replace with new expansion joints if damaged.</td>
</tr>
<tr>
<td></td>
<td>C. Guide wheels worn or frozen with dirt and grease residue</td>
<td>C. Clean thoroughly or replace if worn.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Probable Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Drive stops</td>
<td>A. Conveyor chain pull is excessive</td>
<td>A. See #1 under &quot;Chain&quot;.</td>
</tr>
<tr>
<td></td>
<td>B. Set screws on pulley are loose and causing pulley to rotate on shaft</td>
<td>B. Align pulley and tighten set screws.</td>
</tr>
<tr>
<td>3. Excessive noise in reducer</td>
<td>A. Lack of lubrication</td>
<td>A. Fill reducer with oil to oil level plate; or if needed change oil. Grease all fittings.</td>
</tr>
<tr>
<td></td>
<td>B. Oil leak</td>
<td>B. Tighten all grease fittings and pipe plugs, clear breather tube opening and add lubricant.</td>
</tr>
<tr>
<td></td>
<td>C. Worn or broken gear or bearing</td>
<td>C. Disassemble reducer and replace damaged part.</td>
</tr>
<tr>
<td>4. Motor running above normal temperature</td>
<td>A. Conveyor chain pull excessive</td>
<td>A. See #1 under &quot;Chain&quot;.</td>
</tr>
<tr>
<td></td>
<td>B. Electrical</td>
<td>B. Inspect electrical wiring and controls.</td>
</tr>
<tr>
<td></td>
<td>C. Bearing failure</td>
<td>C. Inspect and replace motor.</td>
</tr>
<tr>
<td>5. Slapping or pulsating caterpillar chain</td>
<td>A. Chain too loose</td>
<td>A. Adjust drive take-up unit until chain is snug. (Do not remove any links of caterpillar chain or dogs.)</td>
</tr>
<tr>
<td></td>
<td>B. Conveyor chain or caterpillar chain worn beyond use</td>
<td>B. Replace</td>
</tr>
<tr>
<td>6. Floating frames sluggish or frozen</td>
<td>A. Obstruction</td>
<td>A. Remove obstruction and repair or replace any damaged equipment.</td>
</tr>
<tr>
<td></td>
<td>B. Guide wheels worn or frozen with dirt or grease residue.</td>
<td>B. Clean thoroughly or replace if worn.</td>
</tr>
</tbody>
</table>
# LUBRICATION GUIDE FOR OVERHEAD MONORAIL CONVEYORS

<table>
<thead>
<tr>
<th>Component</th>
<th>Inspection Interval see note #1</th>
<th>Lubricants at Temperatures to 250°F see note #2</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trolley Wheels:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open Race</td>
<td>30 days (Note 1)</td>
<td>Oil: ISO 15-150</td>
<td>Note #1: The inspection interval and lubrication frequency should be adjusted according to the application, i.e., elevated temperatures and/or process conditions.</td>
</tr>
<tr>
<td>Closed</td>
<td>30 days (Note 1)</td>
<td>Grease: NLGI #2</td>
<td></td>
</tr>
<tr>
<td>Chain Pins</td>
<td>30 days (Note 1)</td>
<td>Oil: ISO 15-150</td>
<td></td>
</tr>
<tr>
<td>Caterpillar Drive:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roller Chain</td>
<td>30 days</td>
<td>Oil: ISO 15-150</td>
<td></td>
</tr>
<tr>
<td>Dogs</td>
<td>30 days</td>
<td>Grease: NLGI #2</td>
<td></td>
</tr>
<tr>
<td>Back-Up Rollers</td>
<td>30 days</td>
<td>Grease: NLGI #2</td>
<td></td>
</tr>
<tr>
<td>Back-Up Bar</td>
<td>30 days</td>
<td>Grease: NLGI #2</td>
<td></td>
</tr>
<tr>
<td>Traction Wheels:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>anti-friction</td>
<td>30 days (Note 1)</td>
<td>Grease: NLGI #2</td>
<td>Note #2: Consult conveyor manufacturer or lubrication specialists for lubricant recommendat</td>
</tr>
<tr>
<td>carbon</td>
<td>30 days</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>graphite</td>
<td>30 days</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Roller Turns:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>anti-friction</td>
<td>30 days (Note 1)</td>
<td>Grease: NLGI #2</td>
<td></td>
</tr>
<tr>
<td>carbon</td>
<td>30 days</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>graphite</td>
<td>30 days</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Floating Frame Wheels</td>
<td>30 days</td>
<td>Grease: NLGI #2</td>
<td></td>
</tr>
<tr>
<td>Take-up Frame Wheels</td>
<td>30 days</td>
<td>Grease: NLGI #2</td>
<td></td>
</tr>
<tr>
<td>Track</td>
<td>30 days</td>
<td>None</td>
<td>Inspect for wear.</td>
</tr>
<tr>
<td>Drive:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reducer Bearings</td>
<td>30 days</td>
<td>None</td>
<td>See Manufacturer's Nameplate for lubrication requirements on reducer and motor.</td>
</tr>
<tr>
<td>Gear Box</td>
<td>30 days</td>
<td>See comments</td>
<td></td>
</tr>
<tr>
<td>Idler Sprockets</td>
<td>30 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor</td>
<td>30 days</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Equipment, Maintenance and Services

Automated equipment for precise delivery of lubricants to conveyor wear points, cleaning equipment, and maintenance services are available to the users of conveyors. Consult with the conveyor manufacturer or the providers of these products and services for application assistance.
SUGGESTED INSPECTION CHECKLIST FOR TROLLEY CONVEYOR SYSTEMS

Check For

1. Chain
   A. Lubrication
   B. Excessive wear
   C. Slack chain

2. Trolleys
   A. Lubrication
   B. Sluggish or frozen wheels
   C. Bent bracket
   D. Loose bracket bolts

3. I-Beam
   A. Wear and peening on flanges at vertical curves
   B. Wear on web at load or unload points, horizontal and vertical curves
   C. Obstacles on track interfering with trolley path

4. Roller Turns
   A. Lubrication
   B. Roller bearing wear
   C. Roller face wear
   D. Loose roller bolts
   E. Loose bracket bolts

5. Traction Wheels
   A. Lubrication
   B. Bearings
   C. Rim wear
   D. Check for loose hub bolts
   E. Alignment

6. Take-up
   A. Lubrication
   B. Roller bearing wear
   C. Roller face wear
   D. Loose roller bolts
   E. Loose bracket bolts
   F. Travel remaining
   G. Spring (screw) adjustment
   H. Expansion joint conditions:
      1. Lubrication
      2. Wear
      3. Free movement
   I. Ease of floating frame travel

7. Drive
   A. Lubrication
      1. Cat chain
      2. Machinery components
      3. Bearings
      4. Oil level in reducer
   B. Wear
      1. Cat chain
      2. Back-up bar
      3. Back-up rollers
      4. Cat unit sprockets
   C. Adjustments
      1. Cat unit take-up. Cat chain should be tight
      2. Back-up bar
      3. Limit switch cut-off tripper bar
   D. Overload condition
      1. Chain pull indicator reading in overload zone
      2. Motor or reducer running at excessive temperature
   E. Belt drive condition
      1. Pulleys are aligned and set screws are tight
      2. Belts are in good condition and are not slipping
   F. Excessive oil leakage from reducer
   G. Loose mounting bolts
   H. Ease of floating frame travel