UDC 621·867·6 [669·14]

Indian Standard

(Reaffirmed 1995)

SPECIFICATION FOR STEEL ROLLER CONVEYORS

(First Revision)

Conveyors, Vertical Hoists and Bucket Elevators Sectional Committee, EDC 61; Special Type Conveyors Subcommittee, EDC 61 : 7 [Ref : Doc : EDC 61 (3871)]

1. Scope — Specifies the requirements for fixed and portable steel non-powered roller conveyors for normal industrial use.

1.1 This standard does not cover power driven roller conveyors.

2. Terminology — For the purpose of this standard, terminology given in IS : 4240-1984 'Glossary of conveyor terms and definitions (*first revision*)' shall apply.

3. Design and Constructional Requirements

3.1 *General* — Typical components of steel roller conveyors and their assemblies are illustrated together with their designations in Fig. 1 to 4.

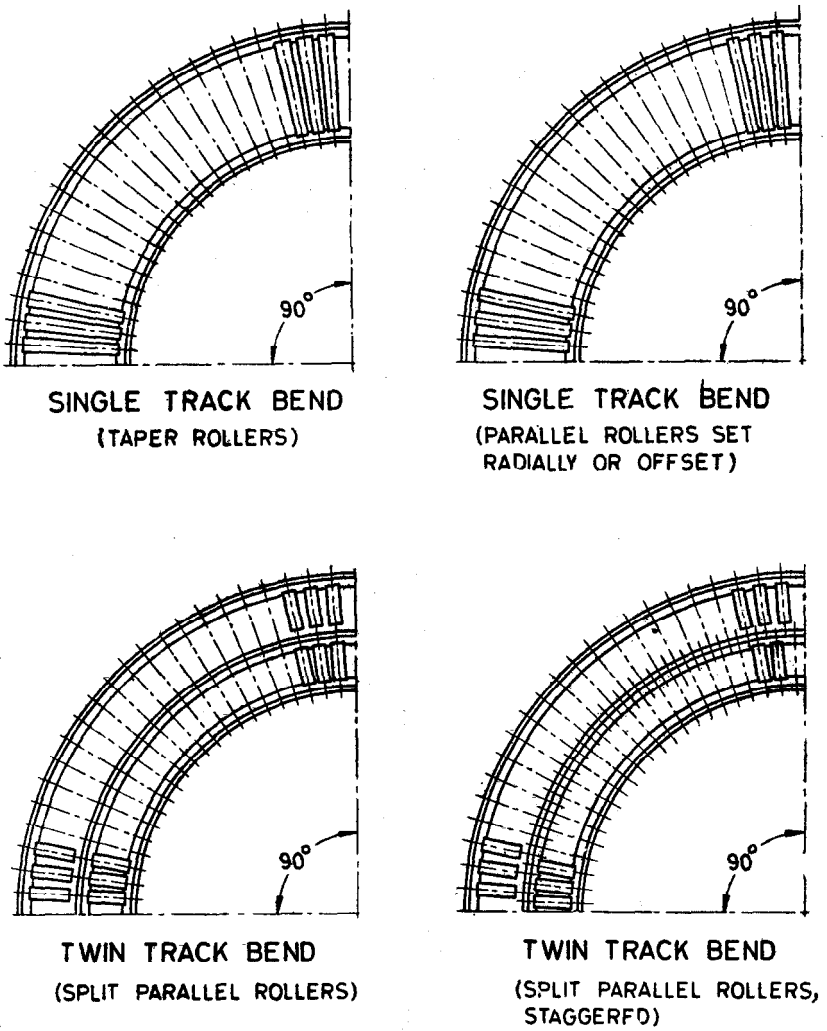

FIG. 1 TYPICAL ARRANGEMENTS OF ROLLERS IN BENDS (CURVED SECTIONS FRAME)

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Gr 5

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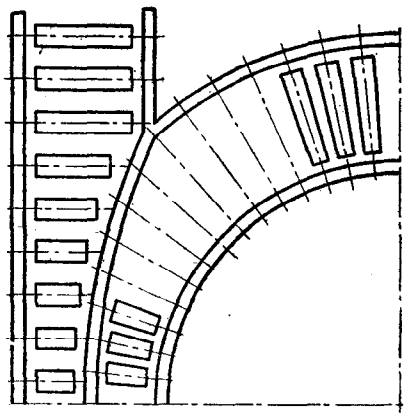
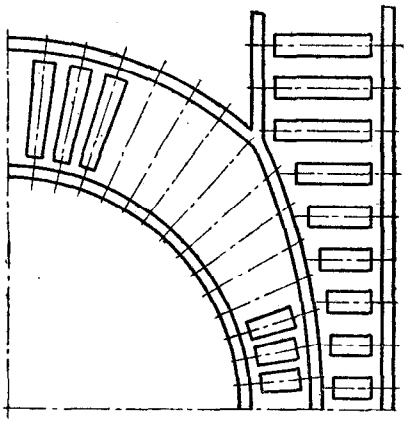


A RIGHT HAND JUNCTION IN STEEL ROLLER CONVEYORS



A LEFT HAND JUNCTION IN STEEL ROLLER CONVEYORS

FIG. 2 TYPICAL ARRANGEMENTS OF ROLLERS IN JUNCTIONS

3.2 *Rollers*

3.2.1 *Material* — Rollers shall be made of electric resistance welded (ERW) steel tubes and spindles of bright bars complying with the requirements of IS : 3601-1966 'Steel tubes for mechanical and general engineering purposes', and IS : 7270-1974 'Bright bars (standard quality)' or IS : 7271-1974 'Bright bars (ordinary/commercial quality)'.

3.2.2 Rollers used on straight sections of conveyors shall be parallel and square with the frames. For curved tracks either parallel or taper rollers may be used.

3.2.3 *Roller diameters* — Roller diameter, thickness of roller tubing and dimensions for spindles shall conform to Table 1.

TABLE 1 DIMENSIONS FOR ROLLER DIAMETERS AND SPINDLE
(*Clauses* 3.2.3 *and* 3.2.7 and *Fig.* 3 *and* 4)
All dimensions in millimetres.

Roller Diameter d_1	Thickness of Roller Tubing	Diameter of Round Spindle d_2 $^{0}_{-0.25}$	Hexagon Spindle Across Flats	Radii of Curved Tracks
25·0	1·2	6·5	—	630 or 800
38·0	1·2	10·0	—	630 or 800
50·0	1·6	10·0	9·5 or 12·0	800 or 1 000
57·0	1·6	10·0	9·5 or 12·0	800 or 1 000
63·5	3·2	16·0 or 20·0	15·0	800 or 1 000
76·0	3·2	16·0 or 20·0 or 22·0	7·5	800 or 1 000
88·9	5·4	25·0	25·0	1 250

3.2.4 *Roller pitch*

3.2.4.1 A minimum of full 3-roller contact between rollers and base of rigid flat based load shall be ensured.

3.2.4.2 At loading points, roller pitch may be reduced or special rollers provided to accommodate shock loads.

3.2.4.3 Flexible loads such as thin cardboard cartons may need a reduced pitch of roller or required wheel conveyors to prevent sagging.

3.2.4.4 Projections below running surfaces (such as binding wire, straps, seam), impair the free travel of the load and might impose the full load weight on each individual roller.

3.2.4.5 Giving due considerations to requirements specified in **3.2.4.1** to **3.2.4.4** the roller pitch in millimetres shall be selected from the following recommended pitches, depending on the diameter of the roller and the dimensions of the load:

37·5, 50, 75, 100, 150, 200

3.2.4.6 The pitch on the centre line of the bend may not be same as that of the adjacent straight track.

3.2.4.7 Subject to agreement between the user and the supplier the pitches may also be taken from an arithmetical progression starting from 50 mm with an arithmetical ratio of 25 mm.

3.2.5 *Roller lengths*

3.2.5.1 Cardboard cartons, rim based containers or flexible based leads shall have rollers wider than the load.

3.2.5.2 The polygonal effect of loads at bends may sometimes be the controlling factor in determining the minimum width of roller required (*see* Appendix A).

3.2.5.3 The roller lengths shall be selected from the following:

100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1 000 and 1 250 mm.

3.2.5.4 Subject to agreement between the user and the supplier the length of rollers may also be taken from arithmetical progression starting from 100 mm with an arithmetical ratio of 50 mm. Rigid flat based loads can be carried on rollers of width less than the load.

3.2.6 *Assembly*

3.2.6.1 For straight sections of conveyor, rollers shall be parallel to each other.

3.2.6.2 Means shall be provided to prevent rotation of all roller spindles except where the design provides for rotating spindles secured in the rollers.

3.2.7 *Spindles* — Spindle diameters shall conform to Table 1. Means shall be provided to prevent rotation of all roller shafts except where the design provides for rotating shafts secured in the rollers.

3.2.8 *Bearings*

3.2.8.1 Rollers may be fitted with a variety of end bearings, the most commonly used being non-precision (uncaged) ballraces, several types of which include external seats. Other end bearings incorporate oil impregnated or nylon bushes. End bearings are constructed from : (a) pressed plated, (b) machined plated retained in pressed plate enclosures, or (c) solid bar machinings. Components are hardened where necessary and although the majority have a natural finish, anticorrosion protection can be applied where the duty warrants this.

3.2.8.2 The diameter of roller and spindle is normally related to the safe load capacity although this can be affected by operational conditions. The selection of the most suitable type of bearing to fit a particular size of roller enabling it to fulfil a specific function is best left to the manufacturer and for this purpose detailed knowledge of the application is essential.

3.2.8.3 Bearing shall be positively located into tubes by one or more of the following recommended methods:

a) Synchronized dimpling,

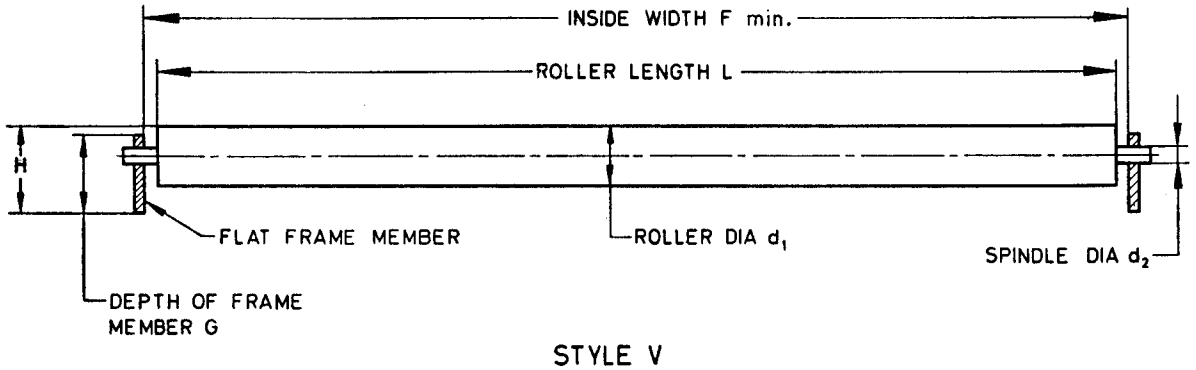
b) Welding, or

c) Peening (tube closure over bearing).

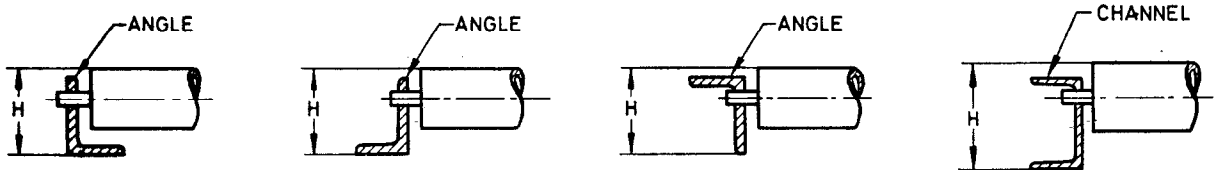
3.2.9 *Frame*

3.2.9.1 *Construction* — Frames shall be adequately braced to ensure permanent alignment of rollers and of sufficient strength to ensure that deflection under load does not affect adversely the distribution of the load over the rollers or the efficient working of the conveyor. Typical arrangements of frame members are shown in Fig. 3.

Note — Where frame members of greater depth than the minimum specified roller low-mount, that is, not standing proud of the frame in which case the frame rails act as a guard for packages being conveyed.



STYLE V



STYLE W STYLE X STYLE Y STYLE Z

FIG. 3 TYPICAL ARRANGEMENT OF FRAME MEMBERS

3.2.9.2 *Couplings* — Appropriate connecting couplings shall be provided at the ends of each separate length of conveyor by means of hooks or point plates. Coupling holes at each end of the frame members shall be positioned in the vertical or horizontal flanges angle members.

3.2.9.3 *Dimensions* — Frames sections are normally manufactured in 2·5 m or 3·0 m lengths make-up sections of shorter length are also employed where necessary. The height (*H*) from top of roller to underside of roller frame varies according to the design of frame.

3.2.10 *Curved track*

3.2.10.1 For curved tracks, either parallel or taper rollers may be used. The axial centre lines of the rollers shall be radial from the centre of curvature of the track. Various arrangements of rollers in bends are indicated in Fig. 1 and the arrangements of rollers in junctions are indicated in Fig. 2.

3.2.10.2 Typical types of curved tracks are illustrated in Fig. 1. They are made in multiples of 30°, 45°, 60° and 90°.

3.2.10.3 The pitch of rollers on curved sections depends upon the duty and application of the plant and it is recommended that the user shall always consult with the manufacturer on this particular matter.

3.2.10.4 The radius (*r*) of the curve is measured to the inside face of the inside frame rail and varies with width of track and diameter of roller and shall be selected from Table 1.

3.2.10.5 Taper tube rollers are 38 × 57 mm in diameters and corresponding recommended curved track radius (*r*) are 800 mm and 1 000 mm.

3.2.10.6 Side guides on the curved track may be provided as agreed to between the purchaser and the supplier.

4. Dimensions — The recommended dimensions for roller conveyor components are given in Table 2 read with Fig. 3 and 4.

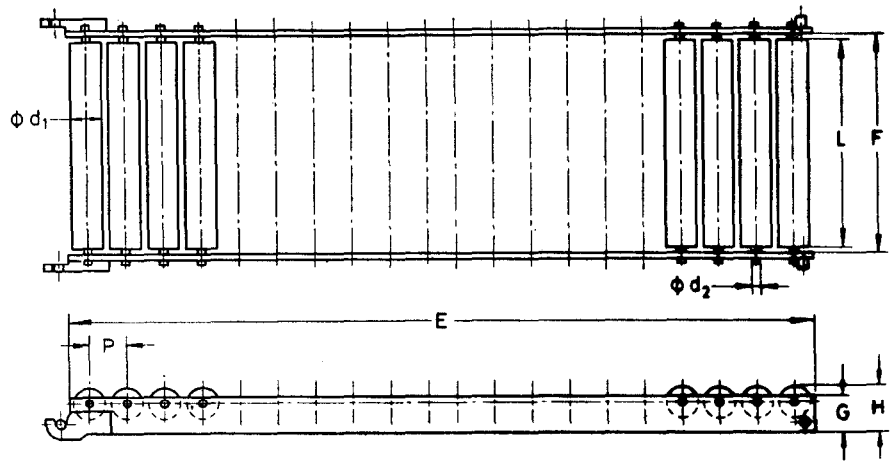


FIG. 4 DIMENSIONS FOR STEEL ROLLER CONVEYORS (STRAIGHT SECTION FRAME)

TABLE 2 RECOMMENDED DIMENSIONS FOR ROLLER CONVEYORS
(*Clause* 4, and *Fig.* 3 *and* 4)

All dimensions in millimetres.

Rating Maximum Working and on Roller kg	Roller			Length of Frame Width *Min* *E* *m*	Dimensions of Steel Roller Conveyor Frame				
	Outside Diameter d_1	Length, *Max* *L*	Pitch *P*		Inside Width of Frame, *Min* *F*	Depth of Frame *G*	Minimum Height, *H*, from Roller Top to Base of Frame for Styles		
							V, *W* and *X*	*Y*	*Z*
10	25·0	500	50/100	2·5	L+10	40	45	—	—
16	38·0	630	50/100/150	2·5/3·0	L+10	50	60	—	—
20	50·0	800	100/150	2·5/3·0	L+10	50	70	—	—
32	57·0	800	100/150	2·5/3·0	L+15	50	70	70	—
40	57·0	800	100/150	2·5/3·0	L+15	50	90	90	90
80	63·5	800	100/150/200	2·5/3·0	L+20	75	90	90	90
100	76·0	1 000	150/200/250	2·5/3·0	L+20	100	115	115	115
160	76·0	1 000	200/250	2·5/3·0	L+20	100	115	115	115

4.1 The maximum load per roller shall not exceed that given in Table 1 for each type of conveyor and it is based on a smoothly rolling load evenly distributed over more and not less than two-thirds of each roller length.

5. Workmanship

5.1 *Appearance* – Each part of the conveyor shall be well finished and be free from defects harmful in use such as flaws, cracks, fissures and others.

5.2 *Flatness of Rollers* — The flatness of roller shall be determined by placing a straight edge over three rollers at random position and measuring the mutual clearance on the upper faces and the measured value shall be 1·5 mm or less as shown in Fig. 5.

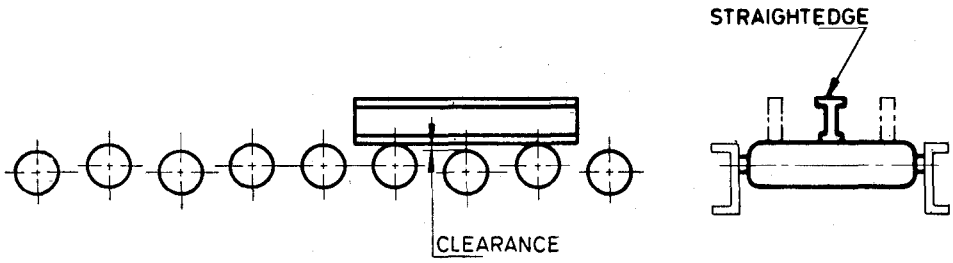


FIG. 5 FLATNESS OF ROLLERS

5.3 *Bend of Frame*

5.3.1 *Straight track type conveyor* — The bend of frame of straight track type conveyor at no load condition be 4 mm or less in vertical direction (δ_1) and 3 mm or less in horizontal direction (δ_2) as shown in Fig. 6.

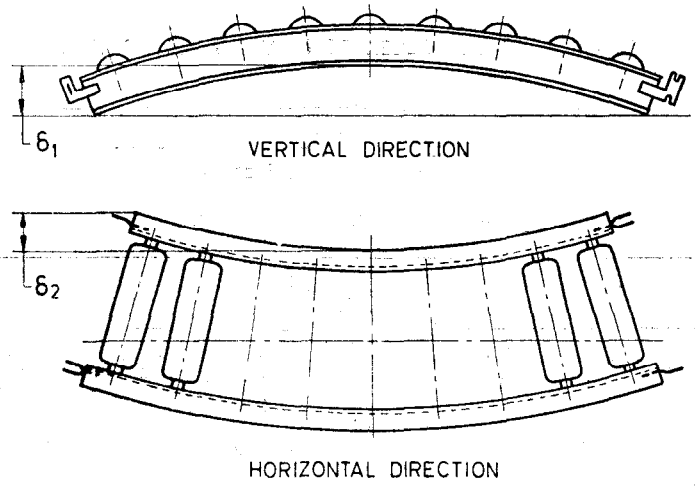


FIG. 6 BEND OF FRAME FOR STRAIGHT TRACK TYPE CONVEYOR

5.3.2 *Curved track type conveyors* — The bend of frame of curved track type conveyor at no load condition shall be 3·2 mm or less in vertical direction (δ) as shown in Fig. 7.

6. Technical Requirements

6.1 *Strength of Single Roller* — The roller shall not cause abnormalities of each part when rotated under the equally distributed static load of 1 500 N per roller.

6.2 *Strength of Frame*

6.2.1 *Straight track type conveyor* — The strength of frame of the straight track type shall be such that the maximum flexure (δ) is 7 mm or less when a static load (W) of 1 500 N is loaded on two rollers (*see* Fig. 8). After removing this load the frame shall be free from abnormalities of strain.

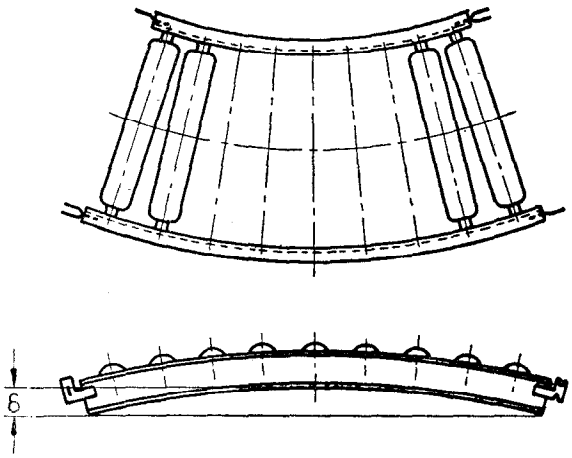
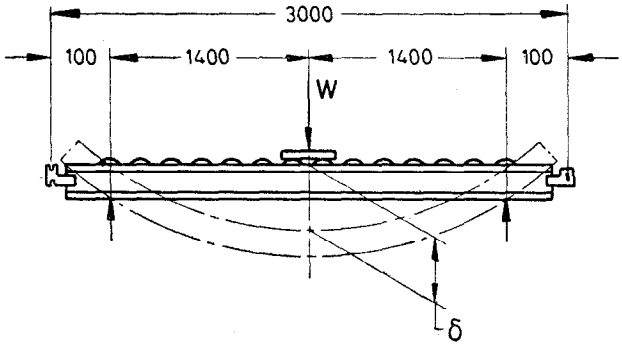


FIG. 7 BEND OF FRAME FOR CURVED TRACK TYPE CONVEYOR



All dimensions in millimetres.

FIG. 8 STRENGTH OF FRAME FOR STRAIGHT TRACK TYPE CONVEYOR

6.2.2. *Curved track type conveyor* — The frame of the curved track type conveyor shall provide sufficient strength.

6.3 *Performance*

6.3.1 A single roller shall be capable to be easily rotated with the tip of finger.

6.3.2 *Gliding time for straight track type conveyor* — The time required until the front end of a gliding test piece comes to *YY'* line shall be within 7 seconds, when a straight track type conveyor is placed at an angle of 3 degree from horizontal plane and a gliding test piece as specified in **6.3.4** is placed with its back end on *XX'* line and it is let glide naturally by its self weight nearly in parallel with the frame (*see* Fig. 9).

6.3.3 *Gliding time for curved track type conveyor* — The time required until the front end of a gliding test piece comes to *O'Y* line shall be within 7 seconds for the curved line conveyor $\theta = 90°$ and be within 5 seconds for that $\theta = 45°$, when the curved track type conveyors are connected and placed at an angle of 3 degree from horizontal plane and a gliding test piece as specified in **6.3.4** in place with its centre *OX* line of the curved track type conveyor B and it is let glide naturally by its self weight along the conveyor (*see* Fig. 10).

6.3.4 *Gliding test piece* — The gliding test piece shall be a flat and smooth square steel plate, its base dimension 500 × 500 mm and 30 ± 3 kg in mass and the condition of its bottom surface shall be as black skin state and the corner parts shall be rounded to radius of 0·5 mm or less.

7. Designation — A steel roller conveyor of 10 kg rating and conforming to this standard shall be designated as:

Roller Conveyor, 10, 5895

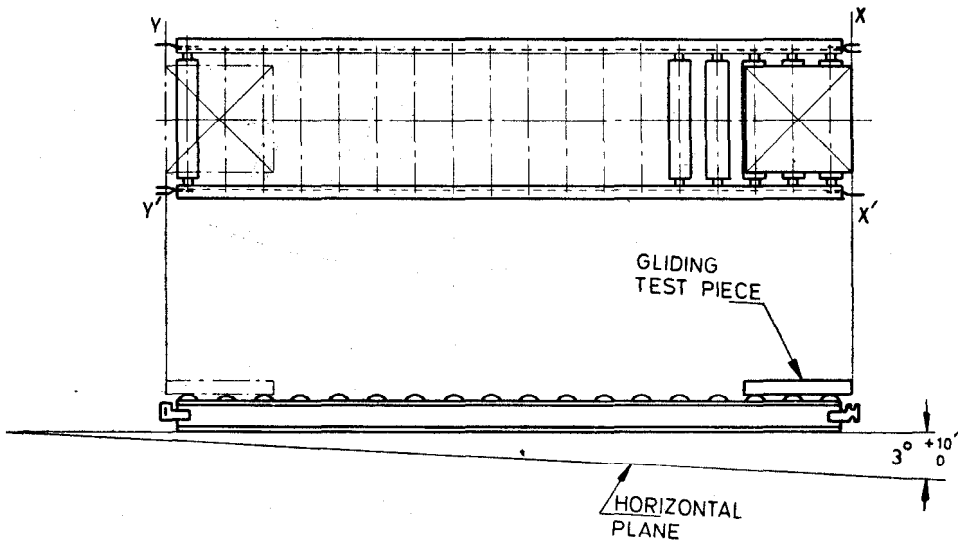


FIG. 9 GLIDING TIME FOR STRAIGHT TRACK TYPE CONVEYOR

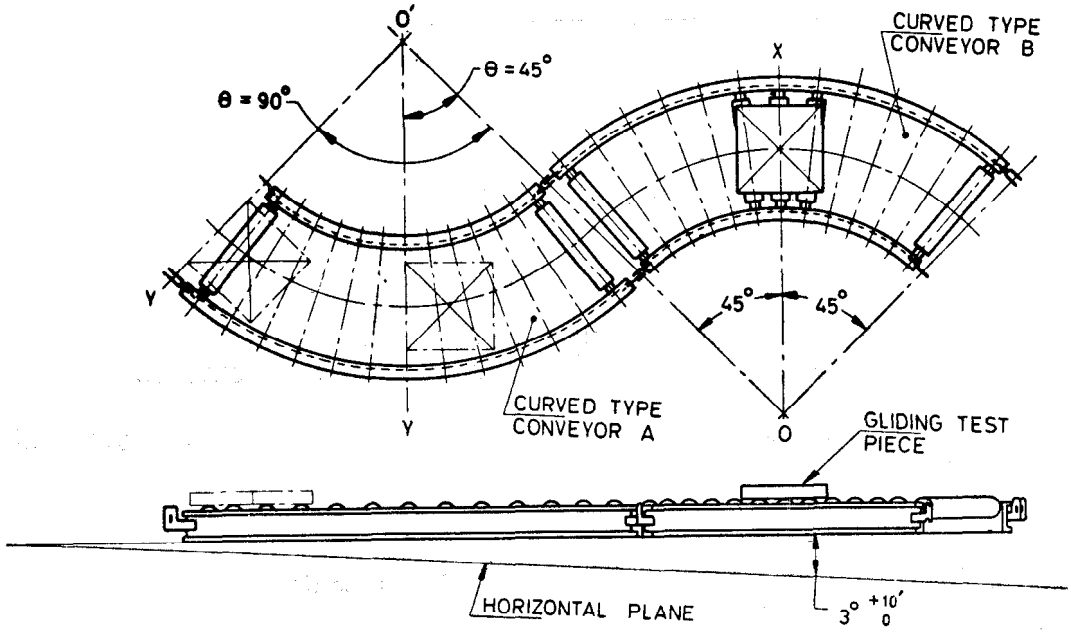


FIG. 10 GLIDING TIME FOR CURVED TRACK TYPE CONVEYOR

8. Marking — Roller conveyors shall be marked with manufacturer's identification mark, nominal size and any other information required by the purchaser, on a name plate provided on the conveyor at a suitable place.

9. Information to be Supplied with Enquiry or Order — At the time of enquiry or order, the purchaser shall provide the following information to enable the manufacturer to supply the most suitable equipment for the required duty:

a) Maximum and minimum sizes of loads* in millimetres;
b) Maximum and minimum mass of loads in kg;
c) Particulars of running surface of not flat or rigid;
d) Any special operational conditions;
e) Whether fixed or adjustable stands are required;
f) Maximum accumulating load per 2·5 m or 3·0 m length in kg;
g) Conditions of loading, that is, single load travel or batching; and
h) If possible, a sketch of the proposed layout, with such details as available clearance heights.

*First dimensions given to be that of the leading edge normal to the direction of travel.

10. Information to be Supplied by the Manufacturer — Following information shall be supplied by the manufacturer at the time of supply of equipment:

a) Maximum and minimum sizes of loads* in millimetres.
b) Maximum and minimum weights of loads in kilograms.
c) Maximum accumulating load capability per 2·5 m length, or 3·0 m length in kilograms.
d) Rollers:
   i) Length in millimetres,
   ii) Diameter in millimetres,
   iii) Thickness of tube in millimetres,
   iv) Pitch in millimetres,
   v) Spindle size in millimetres,
   vi) Type of bearing (including sealing arrangement, if applicable), and
   vii) Method of retaining spindle in frame.
e) Track:
   i) Type and arrangement of frame members,
   ii) Length in metres,
   iii) Overall width in millimetres, and
   iv) Height from bottom of track to top of roller in millimetres.
f) Connections: type of coupling between track sections.
g) Stands:
   i) Type,
   ii) Fixed (with fixing details) or free standing, and
   iii) Pitch in metres.
h) Guard rails:
   i) Type, and
   ii) Overall height from top of rollers in millimetres.

APPENDIX A

(*Clause* 3.2.5.2)

CLEARANCE AT BENDS

A-1. Minimum clearance between frame or guard at bends should be determined by the following formulae (*see* Fig. 11):

$$K = \sqrt{(r + w)^2 + \left(\frac{l}{2}\right)^2} + 50 - r$$

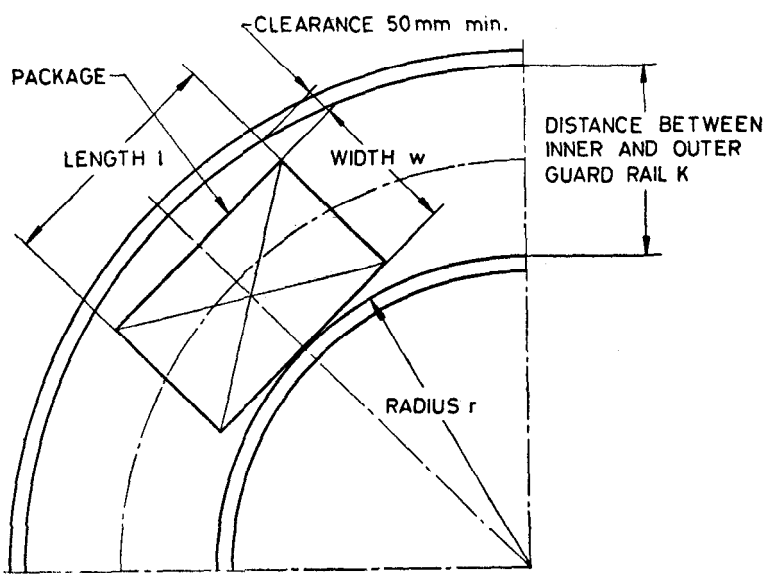


FIG. 11

*First dimensions given to be that of the leading edge normal to the direction of travel.

EXPLANATORY NOTE

This standard deals with unpowered roller conveyors for moving work. They consist of cylindrical or tapered rollers mounted in a fabricated frame. The rollers are free to revolve in the frame. These conveyors are not suitable for moving fragile work. The main purpose of this type of conveyor is to reduce the manual effort associated with the movement of heavy work pieces. In gravity roller conveyors, in which case the conveyor is at an inclination work pieces are moved along the conveyors by gravity. The work pieces less than 5 kg in weight require a gradient of 3 or more, while 2° is usually sufficient for work pieces exceeding 5 kg in weight.

This standard was first published in 1970 and is revised to take into account the technological advances made in the field.

In the preparation of this standard considerable assistance has been derived from BS : 2567-1972 'Specification for steel non-powered roller conveyors,' issued by British Standards Institute and JIS' B : 8804-1976 'Specification for steel roller conveyors', issued by Japan Industrial Standards Committee.

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