INTER PLANT STANDARD IN STEEL INDUSTRY		
IPSS	**DESIGN PARAMETERS FOR IDLERS AND IDLER SETS**	**IPSS:2-03-004-20 *(*First *Revision)***
	Corresponding IS does not exist	Formerly: IPSS: 2-03-004-85

0. **FORWARD**

0.1 Interplant standardization activity in steel industry is being pursued under the aegis of the Indian Standards Institution (ISI) and the Steel Authority of India Limited (SAIL). This Inter plant Standard prepared by the Standards Committee on Conveyors, IPSS 2:3, with the active participation of the representatives of all the steel plants, reputed consultants and established manufacturers of idlers and idler sets, was adopted in 1985 and with first revision in **September, 2020**.

0.2 The Interplant Standard on design parameters for idlers and idler sets used in steel plants is intended to provide guidance to the steel plant engineers, consultants and manufacturers in their design activity.

0.3 This standard is one in the series of standards in the area of conveyors. The other standards are:

i) IPSS: 2-08-001-20 Design parameters for galleries and tunnels for belt conveyors in steel plants.

ii) IPSS: 2-03-002-20 General design features for junction houses for belt conveyors.

iii) IPSS : 2-03-003-20 Design considerations for provision of safety in belt conveyor system,

iv) IPSS: 2-03-005-20 Design considerations for lighting of junction houses, conveyor galleries and tunnels.

v) Specification for rubber conveyor belting, general purpose (under preparation),

vi) Design specifications for pulleys for belt conveyors in steel plants (under preparation), and

vii) Overall (design and fabrication) parameters for technological structures for belt conveyors (under preparation).

0.4 Assistance has been derived from the following Indian Standards in the preparation of this Interplant Standard:

IS: 2102 (Part 1)-1993 General tolerances for dimensions and form and position: Part 1 General tolerances for linear and angular dimensions (*second revision*)

IS : 4240-1984 Glossary of conveyor terms and definitions

IS : 4776 Specification for troughed belt conveyors:

IS: 4776 (Part 1)-1977 Troughed belt conveyors for surface installation

IS: 4776 (Part 2)-1977 Troughed belt conveyors for underground installation

IS: 8597-1977 Specification for flat belt conveyors

IS: 8598-1987 Specification for idlers and idler sets for belt conveyors

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1. SCOPE

This Interplant Standard covers the design parameters of idlers and idler sets. It also provides a procedure for determination of load rating of the idlers and idler bearings and other details, such as mounting arrangements and lubrication.

2. TERMINOLOGY

For the purpose of this standard, the following definitions shall apply, in addition to those given in IS: 4240-1984 :

a) **Idler** —It is a belt supporting roller.

b) **Carrying idler** —It is an idler upon which the load carrying portion of belting is supported.

c) **Troughing Idler** —It is a carrying idler consisting of two or more rollers so arranged as to turn the edges of the belt upwards to form the belt into a moving trough.

d) **Flat Belt Idler** — It is an idler consisting of one or more rollers supporting the belt in a flat position.

e) **Return idler** —t is the idler supporting the return run of the belt.

f) **Impact Idler** — It is a belt idler having the rollers fitted with rings of resilient material to absorb the shock of loading material at the loading point into the conveyor belt to prevent damage to belt and idlers.

g) **Belt Training idler** —it is an idler which by means of a belt actuated swivel mechanism controls the-side run-out of the belt within limits and aligns the belt properly.

h) **Guide Idler** — it is a roller free to rotate and is used to limit or guide the belt within the limits of a defined path of the belt conveyor.

i) **Troughing Angle** — it is the angle of inclination of the axis of the side idlers from the horizontal plane.

j) **Bulk Materials** — Bulk materials includes various lumpy, granular and powdery materials like ore, coal, coke, sand, etc.

3. TYPE OF IDLERS

The two basic types of belt conveyor idlers shall be (i) carrying idlers and (ii) return Idlers subdivided into the following (see Fig. 1).

a) **Troughing Carrying Idlers** — It shall consist of three rolls of equal length and may be either in-line or off-set type (see also Fig. 12).

b) **Flat Carrying Idlers** — The horizontal carrying idler for supporting flat loaded belt shall consist of one or more horizontal rollers.

c) **Impact Idlers (or Cushion Idlers)** — The rollers shall be fitted with rings of resilient material to take care of the impact of the falling materials on the belt. Load rating of impact idlers shall not be higher than those of the standard idlers.

d) **Transition Idlers** — Transition type troughing idler shall be used adjacent to the head and tail pulley and adjacent to plough on troughed belt for wide, high tension low stretch belts. This will prevent excessive stretch of the belt edges. The side idlers in each transition idler set shall preferably be of adjustable type. However, the supplier shall indicate the recommended spacing of the transition idler set and angle of inclination of side idler in each transition idler set.

e) **Training idlers (or Aligning Idlers)** — These idlers shall be used to train/ align the belt both on carrying as well as on return side to a central position in the event of conveyor belt getting displaced transversely. This is achieved by mounting the particular idler set on a central pivot. Small vertical guide rolls are attached at either end of these idler set for limiting the transverse movement of the belt. Fixed vertical guide rollers at both sides of the conveyor belt may also be used in exceptional cases but this arrangement accelerates the belt wear and reduces the useful life of the belt. Proper selection of guide rollers and arrangement of mounting of the training idlers shall be decided by supplier and details of the same shall be intimated to the purchaser.

f) **Return Idlers** — These may consist of a single idler or a set of idlers. In case of a set of idlers, the idlers are of equal length and are placed inclined to the horizontal to form a ‘V’. The angle of inclination of the idler is kept at 10° to the horizontal in

this case. The latter arrangement is applicable to belt conveyors with belts at least 800 mm wide.

g) **Self Cleaning Return Idlers** — These idlers are used to clean the belt carrying sticky materials, whose abrasive action wear the shell of the return idler roll. A large build up of the sticky materials may cause misalignment of the return run of the belt. Metal cage, rubber disc and helical roils used for this purpose present very narrow surfaces for adhesion.

4. CONSTRUCTIOM

The carrying and return idlers shall consist of cylindrical shells mounted in such a way as to rotate about their longitudinal axis with diametrical run out not more than 0°8 mm. The idlers shall be properly designed for strength, rigidity and accuracy for the load and duty conditions to which these shall be subjected to and to keep the out of balance forces to a minimum value (see 10).

The slot to be provided at both ends of the idler spindle. Idlers with added end cap are preferred.

5. MATERIALS

The idler shall be manufactured from electric resistance welded (ERW) or seamless steel tubes conforming to IS: 9295-1983 ‘Specification for steel tubes for idlers for troughed belt conveyors (first revision)’.

5.1 The rubber used for the impact idlers shall have a Shore-A hardness of 65-70 and tensile strength of 100 to 125 kgf/ mm^2.

6. DIMENSIONS

6.1 External Diameter of idler — The external diameter ‘d,' in mm of carrying and return idlers shalt be selected from the following read with Fig. 2, 5 and 8:

101°6, 108, 114°3, (120), 127, 133

139°7, 152°4, 159, (165'1), (168°3), (193°7)

Note — Bracketed values are non-preferred.

6.2 **Lengths of Carrying Idlers** – Length of individual carrying idlers for (a) troughing and (b) flat Idlers shall be selected from Table-1 read with Fig. 2, 3 and 4.

TABLE 1 LENGTHS OF CARRYING IDLERS

All dimensions in millimeters

Belt Width, b	**Lengths l_3 of Carrying Idlers**	
	For Troughed Belt Conveyor, having three Idlers of Equal Length	For Flat Idlers

500	200	600
650	250	750
800	315	950
1000	380	1150
1200	455	1400
1400	530	1600
1600	600	1800

Note — Length '/3 ' of Idler other than those indicated in Table-1 may be used in case of existing belt conveyor, if mutually agreed upon between the purchaser and the supplier.

6.3 **Length of Return Idlers** — The lengths of the return idlers single and in a set of two shall be selected from Table-2 read with Fig. 5 and 8.

TABLE 2 LENGTHS OF RETURN IDLERS

Alt dimensions in millimetres,

Belt Width b	**Return Idler, Length *ls***	
	One Idlers	Two Idlers
500	600	-
650	750	-
800	950	465
1000	1150	600
1200	1400	700
1400	1600	800
1600	1800	900

6.4 **Impact Idlers** — These shall consist of impact rings of elastic material mounted on steel tube. The main dimensions of the impact rings for carrying idlers shall be taken from Table-3 read with Fig. 10. The outer ring diameter D_2 in case of impact troughing idlers shall be kept same as the external diameter d_1, shown in Fig. 2 and 8. Dimension D_1 of the impact ring shall be so chosen that they can be securely mounted on the tube.

TABLE-3 DIMENSIONS OF IMPACT RINGSS

(Clause 6.4)

Alt dimensions in millimetres,

D_1	51	63.5	76.1	88.9	114.3	133
D_2	101.6, 108	114.3, (120), 127	127,133, 139.7,152.4	139.7, 152.4,	(165.1) (168.3)	193.7

				159, (165.1)	(193.7)	
B_1	25	30		35	40	45
B_2	0.75 B_1					

Note 1 — Diameter D_1 shall be so chosen that the Impact ring can be securely fixed on the idler.

Note 2— Dimensions B_1 and B_2 and profile shown in Fig. 10 are indicative only.

Note 3—Bracketed values are non-preferred,

6.5 **Cleaning Disk on Return Idler** — The cleaning disc on return idlers shall be mounted in those cases where the material being carried on the belt conveyor is sticky in nature. The main dimensions of this disc which shall be made of elastic material will be taken from Table-4 read with Fig.-11. The outer ring diameter D_2 in case of self cleaning return idler shall be kept same as the external diameter D_1, shown in Fig. 5 and 8. Diameter D_1 of the impact ring shall be so chosen that they can be securely mounted on the tube.

TABLE-4 DIMENSIONS OF CLEANING DISCS ON RETURN IDLERS

All dimensions in millimetres,

D_1	51	63.5	76.1	88.9	114.3	133
D_2	101.6, 108	114.3, (120), 127	127,133, 139.7,152.4	138.7, 152.4, 159, (165.1)	(165.1) (168.3) (193.7)	(193.7)
B_1		25	30		35	40
B_2	40					

Note 1 — Diameter B_1 and B_2 and profile shown in fig. 11 are indicative only.

Note 3— Bracketed values are non-preferred,

6.6 **Spindle Ends** — Spindle ends of idlers shall be selected from Table-5 for new installations. However, in case of modification of existing conveyor, spindle ends with end cap may also be used and Table 6 shall be used in such a case.

TABLE 5 DIMENSIONS OF SPINDLE END (WITHOUT ADDED END CAP) IDLERS, TYPE A READ WITH FIG. 6

All dimensions in millimetres,

d_2	d_3	b_1	m	N (minimum)
20	24	14	4	9

25	29	18	4	12
30	34	22	4	12
35	39	28	4	12

Note — For return idlers n +10 Is permissible.

TABLE 6 DIMENSIONS OF SPINDLE END WITH ADDED END CAP FOR IDLER TYPE B READ WITH FIG. 7

(Clause 6.6)

All dimensions in millimetres,

d_2	d_3	b_1	m	N (minimum)
35	20	30	4	10
40	25	32	4	12
45	30	38	4	12

Note 1 — For return idler n +10 is permissible.

Note 2 — The values of dimensions b_1, m and n may be taken different from the ones Indicated in Tables 5 and 6, in case of existing conveyor, it mutually agreed between the purchaser and the supplier. Dimension d_2 in Tables 5 and 6 are Indicative only.

7. MOUNTING OF IDLER SETS

Carrying and return idlers shall be mounted in conformity with dimensions and arrangement shown in Table 7 and Fig. 8.

TABLE 7 MOUNTING OF IDLER SET

All dimensions in millimetres.

Belt Width, *b*	***l_1***	***l_2***	**e**	**D**
400	690	755		
500	740	790	115	M 12
650	940	1000	115	M 16
800	1090	1090	115	M 16
1000	1290	1290	115	M 16
1200	1490	1500	115	M 16
1400	1690	1700	115	M 16

Belt Width, *b*	l_1	l_2	e	D
1600	1900	1950	115	M 20
1800	2100	2150	115	M 20
2000	2300	2350	115	M 20

Note — If required, the values of e, l_1 and l_2 may be altered subject to agreement between the purchaser and the manufacturer.

7.1 The vertical clearance between the top of the return idlers and bottom of the cross member of the conveyor stringer shall not be less than 75 mm.

7.2 Troughed carrying idler in-line shall be mounted with the height of belt line 'h' and clearance 'm' as given in Table 8.

7.3 **Troughing Angle**—The values of the angle of inclination (λ) shall be 20° or 30° or 35° or 45° (see Fig. 9). Tolerances on λ shall be according to Table 2 of 1S: 2102-1993.

7.4 Angle of Tilt (ψ) of Side Idlers — The angle of tilt of side idlers shall be as small as possible commensurate with the application, and shall not be more than 3° in any case (see Fig. 9). No side tilt shall be given in impact idlers.

Note 1— The angle of tilt of side idlers shall be in the direction of the belt run for the un-directional conveyors and it shalt be 0° for reversible conveyors,

Note 2— It is not obligatory to provide angle of tilt unless specifically desired by the purchaser. Angle of tilt on the side idlers may be eliminated by using training idlers or guide rollers.

7.5 **Arrangement of In-Line and Staggered Carrying Idler Sets**

7.5.1 Troughing carrying idler sets built up from three idlers may be arranged with the idlers in line or staggered in the plan view as shown in Fig. 12.

7.5.1.1 When staggered, the displacement of the axis of the centre idler from the adjacent axis of the side idlers shall not exceed the diameter of the idlers.

7.5.2 Staggered staging of idler sets shall be arranged with 'adjacent onto of the side idlers and the centre idlers overlapping by a minimum of 10 mm when measured as indicated in Fig. 13.

7.5.3 The gap between the adjacent ends of the centre and side idler of an in-line 3 idler set shall not be greater than 10 mm when measured as indicated in Fig. 13.

Note — It may be necessary in certain cases to adopt minor modifications in design such as rounding or chamfering of spindle ends or to reduce dimension 'n' (Refer Fig. 6 and 7}, The value of 'n' shall not be less than 4mm in-any case.

8. IDLER BEARINGS

The minimum rated life for the idler bearing shall be 40,000 hours.

8.1 The bearings shall be provided according to the recommendations of the reputed bearing manufacturers for the specific load capacity and application of the bearing.

8.2 For the purpose of bearing selection, two-thirds of the unit load per idler set shall be considered as acting vertically upon the middle idler of a 3-idier set. Due regard shall be given to any axial load which may be imposed. Only ball or roller bearings shalt be provided.

9. BEARING LUBRICATION

Bearings lubricated for life together with appropriate sealing shall be provided, to prevent ingress of dust and other extraneous matter.

10. ECCENTRICITY OF IDLERS

For belt conveyors the diametral run out (eccentricity) of idler shall not exceed 0°8 mm at any point along the shell (roll) of the idler.

11. DESIGN/ SELECTION OF IDLERS

The design of the belt conveyors starts with the finalization of basic parameters like capacity of the conveyor, belt width, belt speed, troughing angle of the idlers and service conditions. These parameters are made use of in selection of idler and idlers set.

11.1 Selection of proper idlers plays an important role in satisfactory performance of the belt conveyor. The selection of the proper roller diameter size of bearing and roller shaft is based on the type of service, operating condition, load carried and the belt speed.

11.2 The severity of the operating conditions under which the idlers are to be used greatly influences the selection of idlers. The operating conditions include the hours of operation per day, the overall life expectancy of the conveyor system and the environment in which the idler is to operate.

11.3 The characteristics of the material to be handled have a direct bearing on the idler selection. The weight of the material governs the idler load and spacing, and lump size modifies the effect of weight by introducing an impact factor. For the most severe abrasive conditions covered/ lagged idler rollers shall give longer wear life. Rubber or other special material may be used under these circumstances.

TABLE 8 MOUNTING DIMENSIONS OF TROUGHED CARRYING IDLERS

(Clause 7.2 read with Fig. 8)

All dimensions in millimetres.

Belt	Carrying Diameter, *(d1)*

Width												
	101.6	108	114.3	120*	127	133	139.7	152.4	158	165.1*	168.3*	193.7*
	Minimum Clearance, *m*											
	30	30	30	30	30	30	40	40	40	40	40	50
	Height, *h*											
500	200	200	225	225	225	225	-	-	-	-	-	-
650	200	200	225	225	225	225	275	272	275	290	290	-
800	200	200	225	225	225	225	275	275	275	290	290	-
1080	200	200	225	225	225	225	275	275	275	290	290	-
1200	215	215	240	240	240	240	275	275	275	290	290	-
1400	215	215	240	240	240	240	275	275	275	290	290	-
1600	-	-	240	240	240	240	275	275	275	290	290	350

Note 1-— The value of height ‘h’ may be taken different from the one indicated in Table 9 in case of modification of existing conveyor subject to mutual agreement between the purchaser and the supplier.

Note 2— Tolerance on dimension ‘h' shall be selected from Table-1 of IS = 2102-1993 (Part-2) for coarse grade.

* Non-preferred carrying diameters (d_1),

11.4 The belt speed determines the rotational speed of idler based upon the diameter of the roller. Belt speed has a direct bearing on wear of idler roller surface.

11.5 The design load for an idler set shall be based on the full cross-sectional capacity of the conveyor belt having due regard to the belt troughing angle, surcharge angle, density, nature and size of the material handled, together with pitch of the idler set used on the conveyor installation. The design load shall also take into account any impact conditions when conveying material containing heavy constituent pieces.

11.6 Proper selection of return belt idler is just as important as the selection of carrying idlers. The return belt idler contacts the ‘dirty’ side of the belt, resulting in abrasion and wear of the idler roller surface. Material build-up on the roller increases its effective diameter. The build-up is usually less at the belt edges. Hence, the clear surface of the return roller travels at a slower surface speed than that of the belt. This results in relative slippage, thereby accelerating wear of both the belt cover and the surface of the roller. Thus the life of roller shell is usually shorter on return belt idlers than on carrying belt idlers.

11.7 In case of return belt idlers, only the material handled is the belt itself. Weight of material carried on the conveyor belt is not to be considered in this case. Belt weight depends on the type of carcass, number of plies, thickness of covers, etc. Hence, belt weight should be taken from catalogue of reputed belt manufacturers for the actual duty and tension requirements.

12. IDLER SELECTION PROCEDURE

The idler shall be selected on the basis of its load rating. The load rating of the idler shall be determined after determining the idler adjusted load, which is the load handled by the idler having due regard to the lump size, environment, service factor, etc.

12.1 The actual idler load *IL* in newton shall be computed using the following formula:

$$IL = (Wb + Wm) \times Si$$

Where, *Wb* = weight of belt in N/metre.

Wm = weight of material carried on the conveyor belt in N/metre.

Si = idler Spacing in metres.

12.2 Adjusted load *AL* in newton shall be computed using the following formula. If the value of *AL* becomes less than that of actual idler load*, IL* then AL shall be made equal to *IL*.

Adjusted load in newton = $AL = IL \times k_1 \times k_2 \times k_3 \times k_4$

where k_1 = Lump adjustment factor (see Table 9)

k_2 = environment and maintenance factor (see Table 10)

k_3= service factor (see Table 11)

k_4 = belt speed correction factor (see Table 12)

12.3 Now with the help of Tables 13 to 17 category of idlers shall be determined and then with the help of Table 18 the roll diameter shall be finalized. The roll diameters to be supplied by the supplier shall not be less than the one calculated by above method.

Note — Idler diameter 63.5, 76.1 and 88.9 are generally not used in steel plants as external diameters of carrying/ return idlers except for guide rollers.

TABLE 9 LUMP ADJUSTMENT FACTOR (k_1)

(Clause 12.2)

MXIMUM Lump Size, mm	**Material Weight, N/m²**						
	7848	11772	15696	19620	23544	27468	31392
100	1.0	1.0	1.0	1.0	1.1	1.1	1.1
150	1.0	1.0	1.0	1.1	1.1	1.1	1.1
200	1.0	1.0	1.1	1.1	1.1	1.2	1.2
250	1.0	1.1	1.1	1.2	1.2	1.2	1.2
300	1.0	1,1	1.1	1.2	1.2	1.2	1.3

350	1.0	1.1	1.1	1.2	1.2	1.3	1.3
400	1.1	1.1	1.2	1.2	1.3	1.3	1.4
450	1.1	1.1	1.2	1.2	1.3	1.3	1.4

TABLE 10 ENVIRONMENT AND MAINTENANCE FACTOR (k_2)

(Clause 12.2)

Environmental Conditions	**Maintenance**		
	Good	Fair	Poor
Clear	1.0	1.08	1.11
Moderate	1.06	1.10	1.13
Dirty	1.09	1.12	1.15

TABLE 11 SERVICE FACTOR *(k_3)*

(Clause 12.2)

Operation	**Factor**
Less than 6 hours per day	0.8
From 6 up to 9 hours per day	1.0
From 9 up to 16 hours per day	1.1
Over 16 hours per day	1.2

TABLE 12 BELT SPEED CORRECTION FACTOR (k_4)

(Clause 12.2)

Belt Speed, m/s	**Correction Factor, k,**
Up to 1.0	0.8
Over 1.0 to 2.0	0.9
Over 2.0 to 3.0	1.0
Over 3.0 to 4.0	1.1
Over 4.0 to 5.0	1.2

TABLE 13 LOAD RATING FOR CLASS 1 IDLERS, IN N

(Clause 12.3)

Belt Width mm	Troughing			Return
	20 deg	30 deg	35 deg	
500	1334	1334	1334	667
650	1334	1334	1334	559
800	1334	1275	1246	412
1000	1224	1158	1138	265

TABLE 14 LOAD RATING FOR CLASS II IDLER, IN N

(Clause 12.3)

Belt Width mm	Troughing			Return
	20 deg	30 deg	35 deg	
500	1825	1825	1825	981
650	1825	1825	1825	824
800	1825	1825	1825	720
1000	1776	1727	1707	628

TABLE 15 LOAD RATING FOR CLASS II IDLER, IN N

(Clause 12.3)

Belt Width mm	Troughing			Return
	20 deg	30 deg	35 deg	
500	4002	4002	4002	1913
650	4002	4002	4002	1324
800	4002	3953	3034	1041
1000	3885	3679	3610	755
1200	3561	3375	3306	559
1400	3335	3169	3110	Use of Class IV Idler recommendation
1600	3120	2963	2894	-do-

TABLE 16 LOAD RATING FOR CLASS IV IDLERS, IN N

(Clause 12.3)

Belt Width mm	Troughing			Return
	20 deg	30 deg	35 deg	
650	5337	5337	5337	2668
800	5337	5337	5337	2668
1000	5337	5337	5337	2502
1200	5337	5337	5337	1893
1400	5297	5013	4925	1570
1600	5013	4738	4660	1128

TABLE 17 LOAD RATING FOR CLASS V IDLERS, IN N

(Clause 12.3)

Belt Width mm	Troughing			Return
	20 deg	30 deg	35 deg	
1000	8005	8005	8005	4454
1200	8005	8005	8005	4454
1400	8005	8005	8005	4051
1600	8005	8005	8005	3630

TABZE 18 IDLER CLASSIFICATION

(Clause 12.3)

Class of Idlers	Roll Diameter (mm)	* Shaft Diameter at Bearing (mm)	Duty of Idlers
Class I	101.5 to 127	20	Light duty
Class II	101.6 to 127	20	Light duty
Class III	101.6 to 152.4	20 or 25	Medium duty
Class IV	127 to 152.4	25 or 30	Medium duty
Class V	152.4 to 193.7	30 or 35	Heavy duty

* The shaft diameter of idler shall be selected with due regard to the size of bearing which shall be selected

13. SELECTION OF IDLER BEARING

The method described in 13.1 of selection of Idler bearing is for guidance of the supplier but is not binding on him.

13.1 Determination of Equivalent Load on Idler Bearings

13.1.1 **Troughing carrying idlers** — The load of central idler roller is the summation of loads due to weight of material and weight of belt. Two-thirds of the unit load per idler set shall be considered as acting vertically upon the central idler of a 3 idler set. Due regard shall be given to any axial load which may be imposed. Bearing selected on the above basis for central idler of 3 idler set may be equally applied to side idlers having due regard to axial load imposed.

$$\text{Load on idler} = Fl = 2/3\ (Wm+Wb) \times Si$$

Where, Fl = Load on central idler roller in N

Wm = Weight of material in N/M

Wb = Weight of belt in N/M

Si = Idler pitch in metres [to be selected from IS: 4776 (Parts 1 and 2)-1977]

The load on each bearing of the central idler roller shall be

F2=1/2 (FI+WR) in N,

Where WR=Weight of the rotating parts of the idler roller (Refer Table 19 for tentative value). Actual weight is to be taken from supplier's catalogue.

TABLE 19 TENTATIVE WEIGHT OF ROTATING PARTS OF EACH ROLLER

(ACTUAL WEIGHT SHALL BE FURNISHED BY SUPPLIER)

(Clause 13.1.1)

Sl. No.	Belt Width mm	External Diameter of Idler, mm	Weight of Rotating Parts in N		
			Troughed Idler 3 Roll Set (Weight / Roll)	Troughed Idler 2 Roll Set (Weight / Roll)	Flat Idler
1	500	101.6	29	39	78
		114.3	38	53	90
		127	44	59	98
2	650	101.6	39	44	74
		114.3	46	63	94

Sl. No.	Belt Width mm	External Diameter of Idler, mm	Weight of Rotating Parts in N		
			Troughed Idler 3 Roll Set (Weight / Roll)	Troughed Idler 2 Roll Set (Weight / Roll)	Flat Idler
		127	49	69	101
3	800	114.3	76	83	151
		127	78	103	162
		139.7	75	115	178
		152.4	111	128	194
4	1000	114.3	86	89	181
		127	102	108	192
		139.7	114	118	207
		152.4	127	128	222
5	1200	114.3	96	100	213
		127	123	128	229
		139.7	132	137	247
		152.4	141	147	265
6	1400	139.7	142	180	260
		152.4	153	206	315
7	1600	139.7	158	198	312
		152.4	170	216	343

The equivalent load on each bearing of the idler is given by

$$F_{eg} = F_2 \text{ X } Ka \text{ in N}$$

Where, Ka is the application factor for the idlers and is given by

$Ka = K_1 \times K_2 \times K_3 \times K_4$ are to be selected from Tables 9 to 12.

13.1.2 Flat carrying idlers — Load on roller(s) shall be taken as equal to Si x (Wm + Wb) in this case. Other calculations shall be same as in 13.1.1.

13.1.3 Return idlers —In this case only W_b shall be taken as acting uniformly on the return idler. Hence Fi = Wb x Si for single return idler

= 1/2 (Wb x S/) for each of two return idlers in a set.

Other calculations shall be same as in 13.1.1.

13.2 The C/P ratio (that is the ratio of basic dynamic load rating for bearing and equivalent force on each bearing of the idler roll) required for selection of bearing according to bearing manufacturer's catalogue shall be suitably calculated. However the following formula may also be used in this regard:

$$C/P = \frac{\sqrt[3]{LH \times n \times 60}}{\sqrt{10^{6}}}$$

where

C = Basic dynamic load rating for bearing, N

P = F_{eq} = Environment force on each bearing of the idler, roller, in N (for F_{eg} refer 13.1.4)

LH = Required bearing life=30 000 hours

n= RPM of roller = $\frac{V \times 60}{\Omega \times D}$

Where, V = Belt speed, m/s

D = Roller diameter, m

Ω = 22/7

Basic dynamic load rating 'C' can be worked out as under

C = Feq x C/p

14. DESIGNATION

An idler shall be designated by its external diameter, length, type and size of spindle end.

Example — An idler of external diameter 133 mm having a length of 1150 mm and spindle end of type A of d_2 = 20 mm shall be designated as:

Idler 133 x 1150A x 20

———————————

FIG. 1 TYPES OF CONVEYOR IDLERS

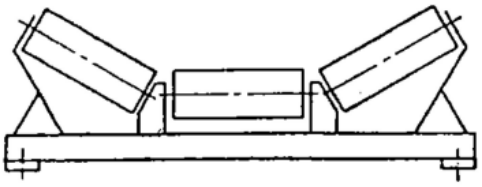


FIG. 1A PLAIN TROUGHING IDLERS

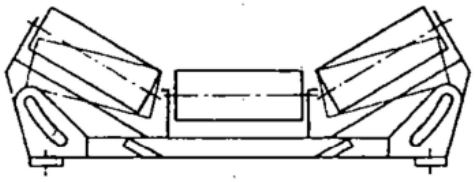


FIG. 1E ADJUSTABLE TRANSITION IDLERS

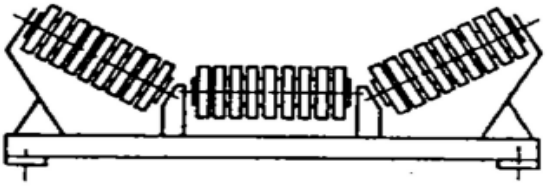


FIG. 1C IMPACT TROUGHING IDLERS

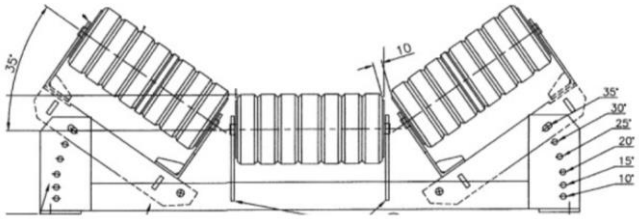


FIG.-1E ADJUSTABLE TRANSITION IDLERS

Belt width	Idler Mounting bracket size	Stiffener member size
upto 1200mm	75 X 8 mm (min)	6 mm (min)
1200 to 1800mm	formed channel 75 X75x6mm(min)	6 mm (min)
2000mm	formed channel 90x90x8mm	8 mm (min)

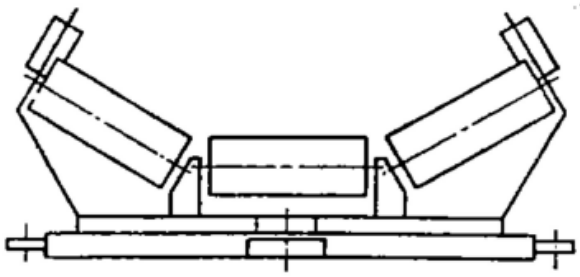
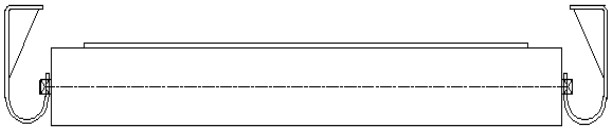


FIG. 1B TRAINING TROUGHING IDLERS

Belt width	Base plate size
upto 1200mm	ISMC 125
1200 to 2000mm	ISMC 150



PLAIN RETURN IDLER WITH BRACKET

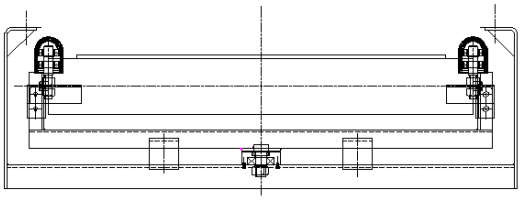


FIG.-1H ARRANGEMENT OF SELF ALIGNING RETURN IDLER BRACKET

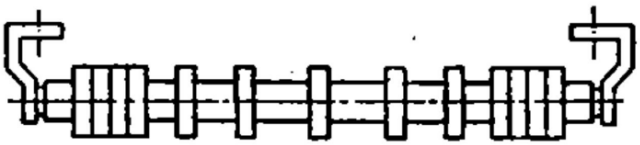


FIG. 1G SELF CLEANING RUBBER DISC RETURN IDLERS

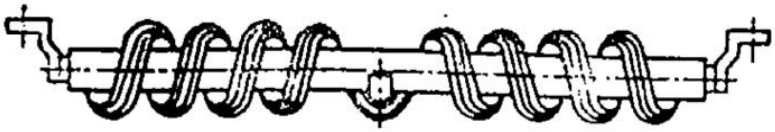


FIG. 1D SELF CLEANING HELICAL RETURN IDLERS

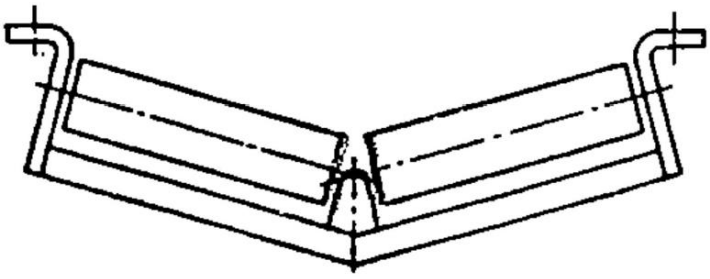


FIG. 1J VEE RETURN IDLERS

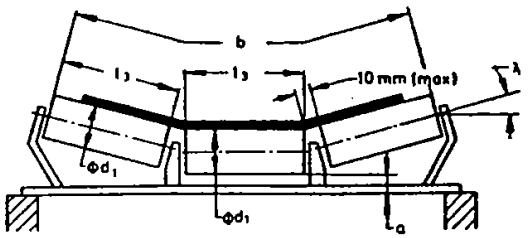


FIG. 2 TROUGHED CARRYING IDLERS

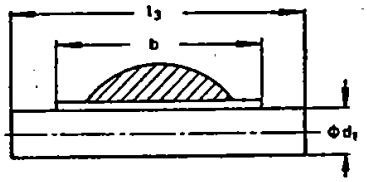


FIG. 3 FLAT CARRYING IDLERS

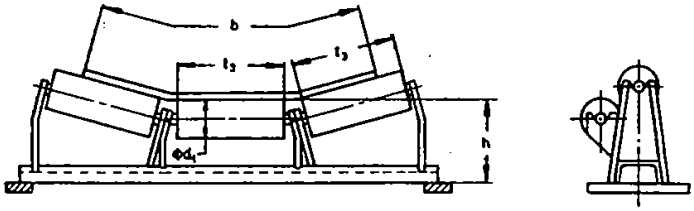


FIG. 4 TROUGHED CARRYING IDLERS (OFF-SET)

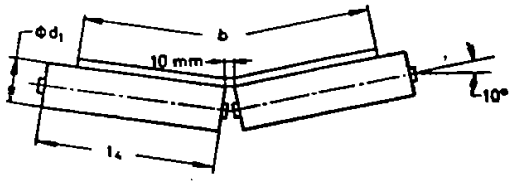


FIG. 5 TWO IDLERS IN 'V' FORM

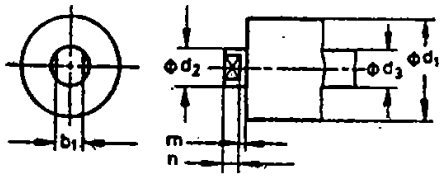


FIG. 6 SPINDLE END WITHOUT END CAP, TYPE A

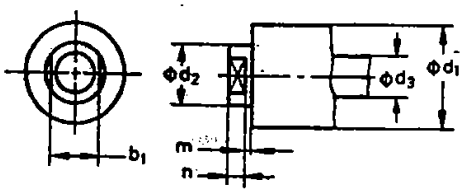


FIG. 7 SPINDLE END WITH ADDED END CAP, TYPE B

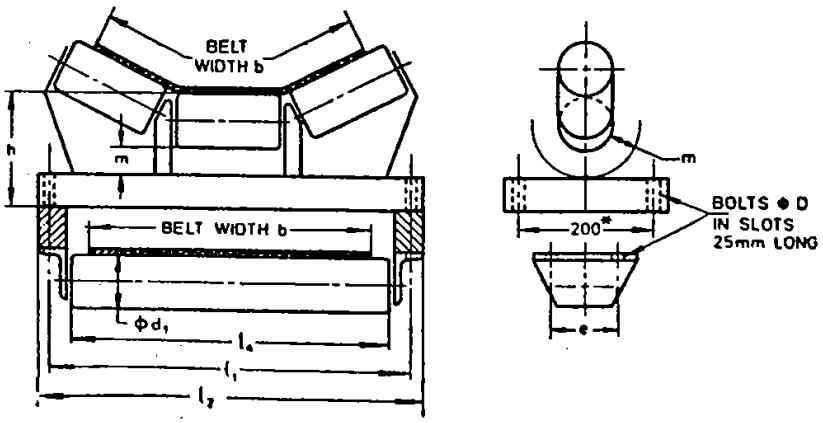


FIG. 8 MOUNTING OF IDLER SET

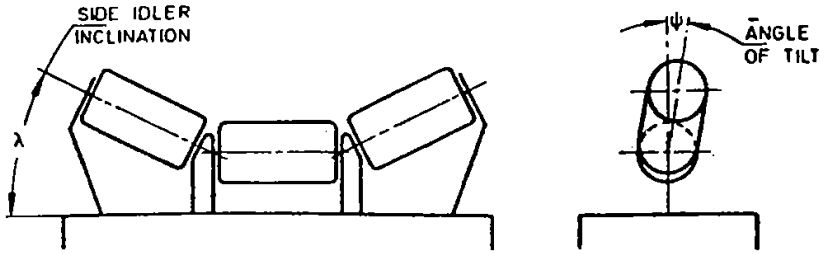


FIG. 9 ANGLE OF INCLINATIONS AND TILT FOR SIDE IDLERS

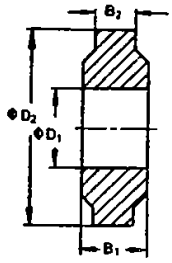


FIG. 10 IMPACT RINGS FOR CARRYING IDLERS

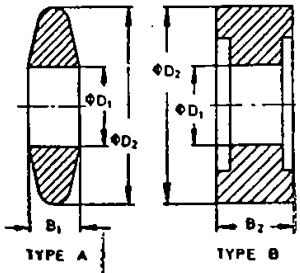


FIG. 11 CLEANING DISC FOR RETURN IDLERS

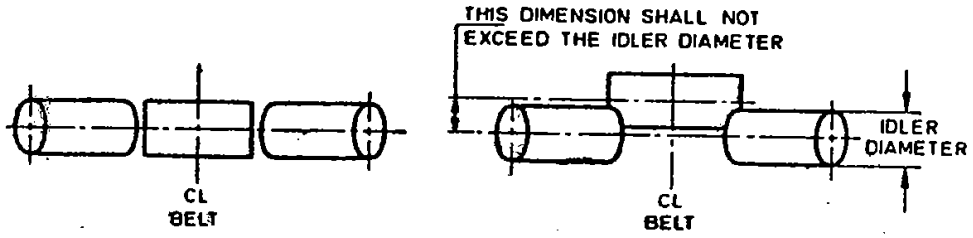


FIG. 12 PLAN VIEWS OF IN-LINE AND STAGGERED CARRYING IDLER SETS

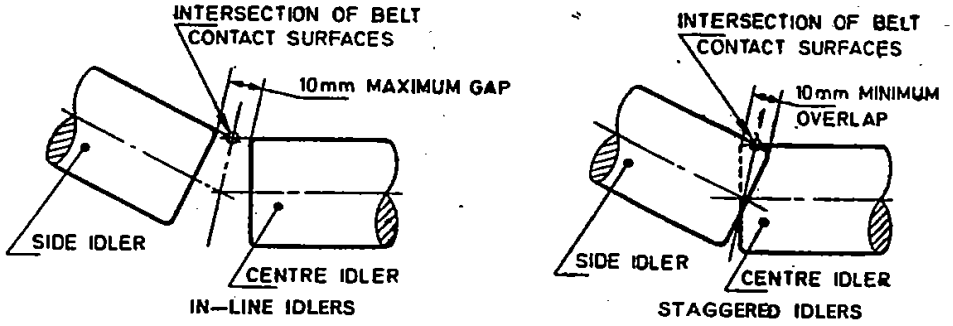


FIG. 13 ARRANGEMENT OF IDLER SETS VIEWED IN VERTICAL PLANE