INTERPLANT STANDARD – STEEL INDUSTRY		
	SPECIFICATION FOR HORIZONTAL GEAR BOXES FOR CRANES	**IPSS:1-08-014-18 (Second Revision)**
	Corresponding IS does not exist	Formerly: IPSS:1-08-014-14 (First Revision)

0. FOREWORD

0.1 This Interplant Standard has been prepared by the Standards Committee on Lifting and Hoisting Equipment, IPSS 1:8 with the active participation of the representatives of all the steel plants, established manufacturers of crane hooks and leading consultants and was first adopted in March, 1997. Thereafter standard was first revised in January 2014 and This Standard discussed again in presence of experts from SAIL, RINL, TATA STEEL, ESSAR, JSPL and Consultants of MECON, HEC & DASTURCO and revised with second revision in **August, 2018**.

0.2 Interplant Standards for steel industry primarily aim at achieving rationalization and unification of parts and assemblies used in steel plant equipment and provide guidance in indenting stores for existing equipment (or while placing orders for additional requirements) by individual steel plants. For exercising effective control on inventories, it is advisable to select a fewer number of sizes/ types from those mentioned in this standard. These limited sizes/ types can be adopted as Plant Standards for an individual steel plant. It is not desirable to make deviations in technical requirements.

1. SCOPE

1.1 This Interplant Standard covers the requirements of Two stage horizontal helical / spur gear boxes used for the different motions of EOT Cranes.

1.2 Any requirement not mentioned in this standard shall be as per IS 4137:1985 `Code of practice for heavy duty EOT cranes including special service machines for use in steel works (*first revision*)' for steel duty cranes and IS:3177:1999 `Code of practice for EOT cranes and gantry cranes other than steel work cranes *(first revision)*' for General Purpose Cranes.

2. DIMENSIONS

2.1 Dimensions of Two stage horizontal gearboxes shall be as given in **Table-1** (to be read with **Fig-1**).

3. kW RATING

3.1 The kW rating of the Two stage horizontal gear boxes shall be as given in **Table-2A**, 2B & 2C used for different duty classes of the cranes.

4. CONSTRUCTION

4.1 The gearbox housings shall be made of cast steel grade 280-520 W, IS 1030:1998 `Carbon steel castings for general engineering purposes' and annealed or of fabricated construction out of structural steel as per IS 2062:2011 `Steel for general structural purposes ' and stress relieved. Minimum thickness of plate should be 8 mm. Gear and shaft materials shall be selected as per design requirement. Small cover at input stage shall be preferred.

4.1.1 The gearbox shall have at least two lifting lugs / eye bolts on each of the upper housing and the lower housing suitably located for handling.

4.1.2 Breathers, oil level indicator with min / max marking, drain out plugs and dowel pins shall be provided at conveniently accessible locations.

4.1.3 Oil tight inspection covers shall be provided near the mesh lines with perpendicular flats welded on the inner surface to avoid oil splashing and leakage. Inspection covers shall also be provided for inspection of ratchet assembly. Inspection covers shall have bolts with flynuts.

4.1.4 The joints of the housings shall be oil tight, dust proof and water proof suitable for outdoor duty. Lower flanges shall have grooves cut in them and these grooves shall be connected back to the inside of the housing. Oil deflector shall be provided on top cover to eliminate oil leakage.

4.2 **Bearings** - Antifriction bearings based on duty requirement shall be used.

4.3 **Oil Seals** – Suitable oil seals as per IPSS:1-02-013-81 specification for rotary shaft oil seal units shall be provided.

5. DESIGN REQUIREMENTS

5.1 Direction of Rotation – All gearboxes shall be capable of working in either direction.

5.2 Type of Assembly – Type of assembly shall be selected from **Fig-2.**

5.3 Shaft Ends – Shaft ends shall be selected from **Fig-3**.

5.4 The keys and keyways shall be as per IS 2048:1983.

5.5 Special requirement, if any, shall be specified by the Purchase while ordering.

5.6 This standard specifies the overall dimensions, kW rating and other details of gearbox. Material specification, hardness, backlash, etc of internal components shall be as agreed to between the purchaser and the supplier.

6. LUBRICATION

6.1 Lubrication for gears and bearings shall be such that the temperature of lubricating oil does not exceed 25degree C over the ambient temperature. In case grease is used for lubricating the bearings, provisions shall be made to avoid mixing of grease with oil.

7. SELECTION OF GEAR BOXES

7.1 The gear boxes shall be selected in line with the method laid down in IPSS:1-01-024-86 (Code of Practice for selection of Gear Box).

8. DESIGNATION OF GEAR BOXES

8.1 A gearbox shall be designated by the following:

a) Type — As per **Table-1**

b) Type of Assembly — As per **Fig-2**

c) Shaft Endings — As per **Fig-3**

d) Nominal Ratio — As per **Table-2A**, **2B & 2C**

e) Standard No. — IPSS:1-08-014-97

Example: A Two stage horizontal gearbox of 750 mm centre distance (Type DHR-750) with nominal ratio 20:1, assembly type 4B as shown in Fig-2 with input shaft end of type 1A and output shaft end of OD shall be designated as:

Type	Assembly Type	Input Shaft end	Output Shaft end	Nominal Ratio	IPSS NO.
DHR- 750	4B	IA	OD	20	IPSS NO. 1-08-014-

9. MARKINGS

9.1 Every gearbox shall have a name plate indelibly marked with the following information:

i) Manufacturer’s name, trade mark, year of manufacture and serial number
ii) Designation of gearbox
iii) kW rating and input rpm

iv) Weight of gear box in kg

10. Inspection of gearboxes shall be carried out as laid down in IPSS:1-08-020-94 (Acceptance Norms for Crane Gear Box).

11. TECHNICAL INFORMATION

11.1 Every gearbox shall be accompanied with a maintenance manual containing the following:

i) Specification and quantity of lubricant
ii) Designation of bearings and oil seals used
iii) (GD * GD) value
iv) Maximum permissible overhung load for input and output shafts
v) General arrangement drawing

11.2 Detailed drawings of all the internal components shall be supplied.

12. PAINTING

12.1 Painting shall be as follows:

i) Gear boxes shall have minimum one coat of suitable primer (inside and outside)

ii) Inside surfaces shall be painted with minimum two coats of oil resistant paint

iii) Outside surface shall be painted with minimum two coats of anti-corrosive paint

13. GUARANTEE

13.1 The gearbox shall be guaranteed by the manufacturer for satisfactory service for a minimum period of 18 months from the date of receipt or one year after commissioning, whichever is earlier. The manufacturer shall replace the unit / components free of charge to the satisfaction of purchaser in case of failure due to material flow, poor workmanship or design defect during the guarantee period.

13.2 However different plants/ Units might have different norms for guarantee/ Warrantee clause. Keeping in view of this practice, each plant unit mention the Guarantee/ Warrantee clause as per their own standard Practice Norms.

DOUBLE STAGE HORIZONTAL GEAR BOX (TYPICAL)
(Clause 2.1)

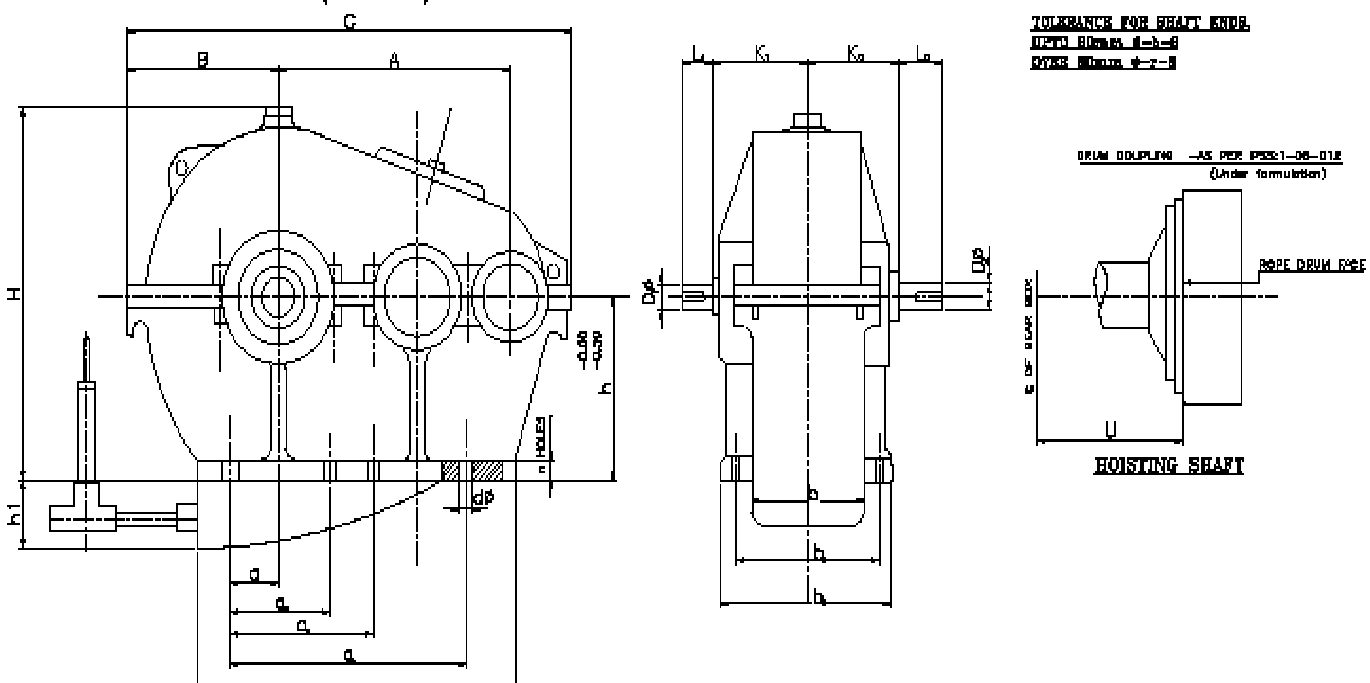
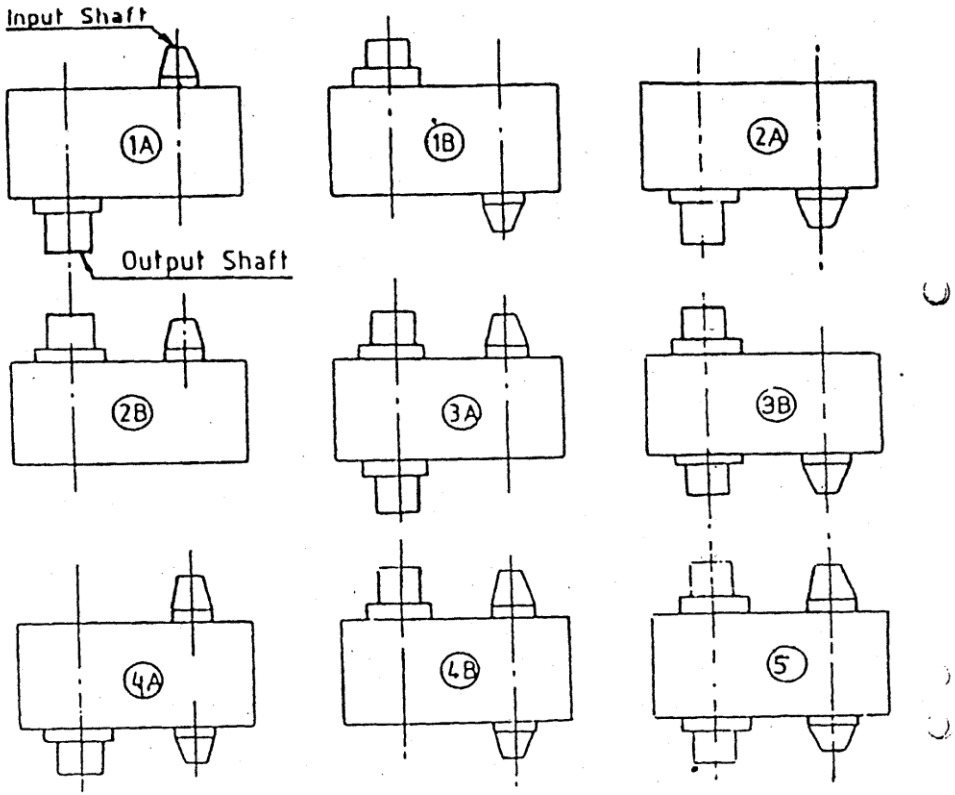


TABLE 1 (DIMENSIONS)

TYPE	A	a	a_1	a_2	a_3	a_4	B	b	b_1	b_2	C	D_1	D_2	dø	H	h	h_1	K_1	K_2	L_1	L_2	n	t	u	[illegible]	
																									[illegible]	[illegible]
[illegible]	250	345	45	–	–	235	345	–	190	340	595	[illegible]	[illegible]	17	325	160	–	110	110	110	115	4	30	–	[illegible]	[illegible]
[illegible]	300	470	60	–	–	310	[illegible]	–	200	[illegible]	735	[illegible]	[illegible]	17	400	[illegible]	–	135	135	140	115	4	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	450	[illegible]	60	–	–	370	375	–	270	[illegible]	910	[illegible]	[illegible]	17	405	260	–	[illegible]	[illegible]	140	165	4	25	310	[illegible]	[illegible]
[illegible]	500	[illegible]	110	340	–	480	450	–	310	[illegible]	1070	[illegible]	[illegible]	17	590	300	–	175	175	140	[illegible]	8	35	[illegible]	[illegible]	[illegible]
[illegible]	550	[illegible]	150	510	450	545	[illegible]	310	410	[illegible]	1300	[illegible]	110	20	700	[illegible]	100	[illegible]	[illegible]	160	[illegible]	8	30	[illegible]	[illegible]	[illegible]
[illegible]	750	1035	335	375	660	825	635	265	460	[illegible]	1485	[illegible]	110	28	750	280	150	[illegible]	[illegible]	195	[illegible]	8	35	[illegible]	[illegible]	[illegible]
[illegible]	850	1100	305	300	600	900	[illegible]	430	580	[illegible]	1550	[illegible]	130	38	870	400	105	290	290	315	[illegible]	8	40	400	[illegible]	[illegible]
[illegible]	1000	[illegible]	650	650	700	1050	645	475	580	[illegible]	1595	[illegible]	150	52	965	400	200	[illegible]	110	[illegible]	670	8	40	400	[illegible]	[illegible]

13.3

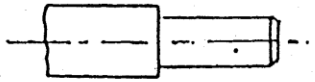


Shaft Arrangements or Types of Assemblies

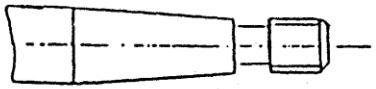
(Generally one of the nine types of assemblies shown above are used. These have been numbered here as 1A, 1B, etc).

FIG - 2
(Clause 8.1b)

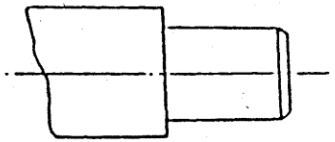
1. Input shaft - Cylindrical end - I_A



2. Input shaft - Tapered end - I_B



3. Output shaft - Cylindrical end - O_C



4. Output shaft - Toothed/Coupling end - O_D

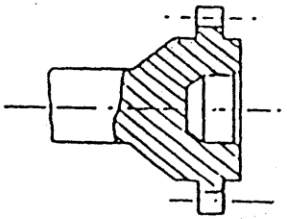


FIG 3
Shaft Endings
(Clause 8.1 c)

TABLE-2A
INPUT KW RATING OF CLASS - 2 DUTY DOUBLE STAGE HORIZONTAL GEAR BOX

(Clause 3.1)

TYPE	INPUT RPM	NOMINAL RATIO							
		8	12	16	20	24	31.5	40	48
DHR 250	600	5.64	4.26	3.56	2.88	2.53	1.84	1.38	1.15
	750	6.21	4.60	4.03	3.56	3.10	2.18	1.72	1.50
	1000	6.78	5.52	4.60	4.02	3.56	2.64	2.42	1.84
DHR 350	600	15.30	11.16	9.32	6.90	6.21	4.72	3.34	2.76
	750	17.48	13.11	11.16	8.16	7.48	5.75	4.14	3.45
	1000	21.39	16.10	13.92	10.58	9.54	7.48	5.52	4.60
DHR 400	600	19.09	14.26	11.96	10.70	9.32	6.32	5.75	4.48
	750	21.04	15.64	13.22	11.96	10.46	7.59	6.56	5.18
	1000	22.66	18.63	15.41	13.46	12.19	9.08	8.05	5.75
DHR 500	600	43.70	23.35	28.18	22.77	20.24	14.84	11.16	9.32
	750	48.88	36.80	31.05	27.60	24.15	17.36	13.80	11.62
	1000	52.90	43.12	35.65	31.62	28.18	20.82	18.06	14.60
DHR 650	600	86.25	65.55	54.62	48.30	41.98	29.32	25.88	20.58
	750	95.45	71.30	60.95	54.62	47.15	33.35	29.90	23.58
	1000	103.50	83.95	69.00	64.40	55.20	40.82	36.22	28.75
DHR 750	600	105.65	115.00	96.60	78.20	70.15	50.60	38.52	32.20
	750	167.90	126.50	106.95	95.45	83.95	59.80	47.15	39.68
	1000		149.50	121.90	108.10	97.75	72.45	62.10	50.60
DHR 850	600	241.50	172.50	143.75	108.10	94.30	72.45	52.90	44.28
	750	264.50	200.10	173.65	131.10	116.15	88.55	65.55	54.62
	1000		235.75	193.20	162.15	148.35	115.00	86.25	72.45
DHR 1000	600	356.50	270.25	227.70	185.15	165.60	121.90	90.85	74.75
	750		299.00	253.00	225.40	196.65	142.60	112.70	94.30
	1000			287.50	253.00	235.75	170.20	146.05	119.60

TABLE-2B
INPUT KW RATING OF CLASS - 3 DUTY DOUBLE STAGE HORIZONTAL GEAR BOX

(Clause 3.1)

TYPE	INPUT RPM	NOMINAL RATIO							
		8	12	16	20	24	31.5	40	48
DHR 250	600	4.83	3.56	2.99	2.42	2.18	1.61	1.15	0.98
	750	5.29	3.91	3.45	2.99	2.64	1.84	1.50	1.26
	1000	5.75	4.72	3.91	3.45	2.99	2.30	2.07	1.61
DHR 350	600	13.00	9.54	7.94	5.86	5.29	3.91	2.88	2.42
	750	14.84	11.16	9.54	7.02	6.32	4.94	3.56	2.99
	1000	18.17	13.68	11.84	8.97	8.16	6.32	4.60	4.02
DHR 400	600	16.22	12.08	10.12	9.08	7.94	5.40	4.94	3.80
	750	17.82	13.34	11.27	10.24	8.86	6.44	5.64	4.37
	1000	18.74	15.87	13.11	10.92	10.35	7.70	6.78	4.94
DHR 500	600	37.38	28.18	23.58	19.32	17.25	12.54	9.43	7.94
	750	41.40	31.05	26.45	23.46	20.82	14.72	11.73	9.89
	1000	54.85	36.80	29.90	26.45	23.58	17.71	15.41	12.42
DHR 650	600	73.02	55.20	46.00	40.82	35.65	24.72	22.08	17.48
	750	80.50	60.38	51.18	46.58	40.25	28.18	25.30	20.01
	1000	87.40	71.88	58.65	54.05	46.58	34.50	30.48	24.15
DHR 750	600	127.65	97.75	81.65	66.70	59.80	43.12	32.78	27.02
	750	142.60	108.10	90.85	80.50	71.30	51.18	40.25	33.92
	1000		126.50	103.50	92.00	82.80	60.96	52.90	42.55
DHR 850	600	204.70	146.05	121.90	92.00	79.35	62.10	44.85	37.38
	750	224.25	170.20	147.20	111.55	98.90	74.75	55.78	46.58
	1000		200.10	164.45	138.00	126.50	97.75	73.60	62.10
DHR 1000	600	299.00	230.00	193.20	157.55	140.30	102.35	77.05	64.40
	750		235.00	216.20	190.90	165.75	120.75	95.45	79.35
	1000			247.25	216.20	198.95	144.90	124.20	101.20

TABLE-2C
INPUT KW RATING OF CLASS - 4 DUTY DOUBLE STAGE HORIZONTAL GEAR BOX

(Clause 3.1)

TYPE	INPUT RPM	NOMINAL RATIO							
		8	12	16	20	24	31.5	40	48
	600	2.53	1.72	1.38	0.98	0.86	0.63	0.46	0.40
	750	3.22	2.07	1.61	1.15	1.04	0.80	0.58	0.46
	1000	4.31	2.76	2.30	1.61	1.38	1.04	0.75	0.63
DHR 350	600	6.10	3.91	3.10	2.07	1.84	1.38	1.09	0.98
	750	7.48	4.94	3.91	2.64	2.30	1.72	1.26	1.09
	1000	10.00	6.56	5.29	3.56	3.10	2.30	1.72	1.44
DHR 400	600	11.73	7.70	6.10	4.48	3.91	2.88	2.18	1.84
	750	14.72	9.66	7.70	5.25	4.83	3.56	2.53	2.18
	1000	19.55	12.76	9.78	7.36	6.44	4.72	3.45	2.88
DHR 500	600	20.36	13.22	10.70	7.59	6.67	4.94	3.68	3.22
	750	25.42	16.56	13.22	9.54	8.40	6.21	4.37	3.80
	1000	30.82	22.08	17.71	12.65	11.16	8.28	5.98	4.94
DHR 650	600	48.30	31.62	25.30	18.17	15.87	11.84	8.86	7.70
	750	55.20	40.25	31.62	22.42	20.01	14.72	10.58	8.86
	1000	73.60	52.90	42.55	30.48	26.45	19.55	14.14	11.62
DHR 750	600	69.00	44.85	36.22	25.88	22.42	16.68	12.65	10.92
	750	78.20	55.78	44.85	32.20	28.18	20.93	15.06	12.65
	1000		67.85	59.80	43.12	40.25	27.37	20.12	16.68
DHR 850	600	95.45	61.52	49.45	35.65	31.62	23.00	16.90	15.06
	750	108.10	77.05	62.10	44.28	38.52	23.75	20.58	17.48
	1000		94.30	82.80	58.65	51.75	37.95	27.60	24.50
DHR 1000	600	148.35	105.80	85.10	60.95	54.05	40.25	29.90	25.88
	750		120.75	105.80	75.90	67.28	50.02	36.22	30.02
	1000			129.95	102.35	89.70	66.70	47.72	39.68
