INTER PLANT STANDARD – STEEL INDUSTRY		
IPSS	**SPECIFICATION FOR dc MILL/CRANE DUTY MOTORS** (800 SERIES) (*Fourth Revision*)	**IPSS:1-03-002-08**
	Corresponding IS does not exist	Formerly: IPSS:1-03-002-94

0. FOREWORD

0.1 This Interplant Standard (*fourth revision*) has been prepared by the Standards Committee on Rotating Electrical Machinery, IPSS 1:3 with the active participation of representatives of steel plants, reputed consulting organizations and established manufacturers of dc Motors; and was adopted in June 2008.

0.2 This Interplant Standard was originally published in 1978.

0.3 This Inter plant standard should be read in conjunction with IPSS:1-03-016-03 `Standard information for enquiry and order for electric motors (*first revision*) and IPSS:1-03-005-03 Specification for dc mill/crane duty motors (600 series).

0.4 This IPSS has been published after updating the relevant things.

1. SCOPE

1.1 This Interplant Standard specifies mechanical and electrical requirements, tests and dimensions of 800 series dc motors suitable for reversible duty with Class H insulation for heavy duty service on cranes and other equipment in steel plant. It covers series, separately excited, shunt, compound and shunt with series stabilization winding motors with rated voltages of 230 V and 460 V. It also provides comparative fixing dimensions of 600 series motors with 800 series in Table-2A to facilitate replacement whenever necessary.

2. TERMINOLOGY

2.1 For the purpose of this standard, definitions given in IS 1885 (Part 35):1995 `Electro-technical vocabulary:Part 35 Rotating machinery (*first revision*)' shall apply.

3. SITE CONDITIONS

3.1 The following shall constitute the normal site conditions for the purpose of this standard:

a) *Ambient Temperature* - The ambient temperature or the cooling medium temperature not exceeding 40°C.

NOTE: For using the motors at a higher ambient temperature, the guidance given in clause 6 shall be applicable.

b) *Relative Humidity* - The maximum relative humidity shall be 100%. However, maximum ambient temperature and 100% relative humidity may not occur simultaneously.

c) *Ambient Air* - The ambient air may contain fair amount of conductive dust & corrosive fumes.

d) *Altitude* - The altitude shall not exceed 1000m.

4. TYPE OF ENCLOSURE

4.1 The type of enclosure and the degree of protection to be provided by each type, in accordance with IS 4691:1985 'Degrees of protection provided by enclosures for rotating electrical machinery (*first revision*)', shall be as follows:

a) TENV type (that is, totally enclosed non-ventilated type) - degree of protection IP54 and

b) TEFV type (that is, totally enclosed forced ventilated type) - degree of protection IP54 except for the ventilation openings which may have IP23 degree of protection.

However, for outdoor use, the degree of protection IP55 may be supplied if specifically asked for by the purchaser.

4.2 TENV and TEFV type enclosures shall be mutually convertible by the addition or removal of the internal fan and replacement of proper covers. Spare fans and covers for mutual conversion shall be supplied whenever specified by the purchaser.

NOTE: It may be necessary to remove the internal fan provided on a TENV type motor, when converting it to TEFV type motor with cooling air inlet from drive end side.

4.3 The motors shall be designed to meet the TEFV ratings when supplied with air volume and pressure as shown in **Table-1**. Direction of air flow shall be from drive end to commutator end for centrally ventilated motors. For motors with forced ventilation units mounted directly on top of the motor, the air entry may be from commutator end.

5. METHOD OF COOLING

5.1 The method of cooling shall be IC 0041 for TENV type motors and IC 17 for TEFV type motors in accordance with IS 6362:1995 'Designation of methods of cooling for rotating electrical machines (*first revision*)'.

6. RATINGS

6.1 The ratings for dc mill/crane duty motors (800 series) at an ambient temperature of 40°C shall be as given in Table-1 corresponding to the various frame sizes given in **Table-2** and **Fig-1**. These ratings are based on a direct current supply having no appreciable ripple, such as those obtained from a generator source.

NOTE: For higher ambient temperatures up to 60°C, a derating factor of 1.5% per degree centigrade for the temperature above 40°C shall be applied to the rated output. The calculated output shall be rounded off to the first decimal place to determine the derated output.

6.2 Two individual motor ratings suitable for voltage supplies of 230 V and 460 V shall be available for each frame size. Motor for 230 V ratings shall be suitable for operation on voltages up to 550 V. Maximum operating voltage level of motors for 460 V ratings shall be as agreed to between the manufacturer and the purchaser.

6.3 For motors operating at voltage levels above the nominal rated value, the maximum running torques shown in **Table-1** may be reduced.

6.4 Similar motors of 230 V ratings shall permit series connection of two motors across 460 V supply.

7. CONSTRUCTIONAL DETAILS

7.1 Dimensions and Tolerances - The mounting dimensions and tolerances of dc mill/crane duty motors (800 series) shall be as given in **Table-2, Table-2A** and **Fig-1**.

7.2 Mounting - The position of mounting shall be horizontal foot-mounted of B3 construction in accordance with IS 2253:1974 `Designations for types of construction and mounting arrangements of rotating electrical machines (*first revision*)'.

7.3 Frames - Frames shall be made of steel and horizontally split, unless otherwise specified, in such a manner as to allow removal of armature by a straight vertical lift after the top half of the frame is removed.

NOTE: Non-split type of construction for the frames is also available.

7.4 Shafts

7.4.1 The motors shall be manufactured with identical shaft extensions on either side. A shaft extension key, a lock washer and a nut shall be provided on both the ends and a shaft guard (thimble) shall be provided on the non-drive (commutator) end. Bent locking plates shall be provided in place of lock-washers whenever specified.

7.4.2 Taper of the shaft end shall be :

a) 1 : 10 with two keyways both parallel to axis & parallel to taper, spaced at 90 deg circumferrentially.

b) 1 : 9.6 with keyway parallel to the taper

7.4.3 A single-ended shaft may be supplied on specific request from the purchaser.

7.4.4 Shaft dimensions for 1 : 10 taper shall be as given in **Table-3**.

7.4.5 Shaft dimensions for 1 : 9.6 taper (with keyway parallel to the taper) shall be as given in **Table-4**.

7.5 Commutator

7.5.1 It is desirable to have a construction of armature which would facilitate repair/replacement of commutator without disturbing/damaging the armature windings.

NOTE: Moulded commutators are not acceptable as these are not amenable to repairs.

7.5.2 Commutators shall be of fabricated design only.

7.5.3 Rigid risers shall be provided.

7.6 Bearings

7.6.1 Motors shall be provided with bearings as given in **Table-2**. The bearings shall be enclosed in cartridges provided with suitable tapped holes for fixing eye bolts for lifting purposes.

7.6.2 Provisions shall be made for lubricating the bearings on both sides without dismantling any part through grease nipple of size AM 16 x 1.5 as specified in IS 4009 (Part 1 & 2):1981 `Specification for grease nipples (*first revision*)'. For lower frame sizes, grease nipple of size AM 10 x 1 as specified in IS 4009:1981 shall be provided. Drain plugs shall be provided at the bottom of each bearing housing to remove excess grease.

7.7 Terminals - Terminal leads of minimum 300 mm projection from the body of the motor shall be provided of copper lugs suitable for direct connection with aluminium cables of proper sizes. The terminals shall be brought out to the left side of the motor viewed from commutator end. However, the location can be decided between the supplier and the purchaser.The leads shall be marked in accordance with IS 4728:1975 `Terminal marking and direction of rotation for rotating electrical machinery (*first revision*)'.

7.7.1 Inter coil connection shall be of bolted design fixed with two bolts.

7.7.2 Pole face winding (compensating winding) preferably also have the bolted design connections.

7.7.3 The leads emerging out of the field shall be provided with glands made of suitable material so as to prevent oil and grease entry into the motor. The gland material, should be immune to chemical reaction with oil and grease. The gland should be easily replaceable.

7.8 Connection Diagram - A diagram of connections with marking of leads as specified in clause 7.6.3 shall be clearly and indelibly marked on the inside of the terminal box cover.

7.9 Brush Gear - Brushes of standard dimensions as specified in IS 13446:1992 `Specification for brushes of electrical machines (superseding IS 3003 Pt 3 &4) shall be used. There shall be free and direct access to all brush-holders for ease of maintenance. The brush-holders shall be of constant pressure type.

7.9.1 Neutral position for the brush gear assembly shall be clearly marked on the motor at a suitable location.

7.10 Proper provision shall be made for fixing balancing weights.

7.11 Rocker rings should be positively locked to prevent rotation on its own.

8. MOTOR SUPPLIED FROM RECTIFIED POWER SUPPLIES

8.1 Motor shall be suitable for satisfactory operation at the rated outputs listed in **Table-1** when supplied from a variable voltage rectified power source, i.e. thyristor converter. The harmonic ripple content of this power source should not exceed that derived under similar circumstances from 3 phase 50 Hz, six phase controlled pulses (300 Hz predominent ripple frequency) and with the phase control of the rectifier not exceeding 15% of the free firing condition, i.e. 460 V mean dc level from 415 V ac, rms line voltage.

NOTE: When motors are operated from a rectified ac supply, the performance may differ materially from that of similar motors when operated from a generator or battery source having the same effective value of voltage. In case of the former, at the same rated loads the temperature-rise, speed regulation and noise level may increase and commutation could be adversely affected. The degree of difference shall depend upon the level of harmonic currents circulated in the motor circuit and is likely to be more significant when the rectifier pulse number is low (<6) and the amount of phase control is high (>15%).

When motors are operated from rectified power supplies, bearing currents may become evident due to high frequency harmonic currents being transmitted through the capacitive coupling between the armature winding and core, and returned through the earth path to the transformer secondary. While these harmonic current levels are normally small in magnitude, they may result in long term damage to the bearing surface under certain conditions. This aspect should be kept in mind while designing the motor.

9. TEMPERATURE RISE

9.1 **For Winding** - The permissible temperature-rise of armature winding and field windings, at an ambient temperature of 40°C shall not be greater than 110°C. The temperature-rise shall be measured by resistance method.

9.2 The rated temperature rise of armature iron and commutator over an ambient temperature of 40°C shall not be greater than 110 and 100°C respectively as measured by thermometer method.

9.3 The temperature-rise of other parts, such as brush holders and pole tips, may attain such values as shall not detract from either the operational performance or life expectancy in any respect.

9.4 The one hour and thirty minutes ratings given in **Table-1** are based on a load test which shall commence only when the windings and other parts of the machine are within 5^0C of the ambient temperature.

10. FIELD VOLTAGE

10.1 Shunt field voltage rating shall be 230 V. On specific request from the purchaser, shunt field winding rated for 460 V may be supplied, having two field coils of 230 V each to be connected in series for 460 V operation and in parallel for 230 V operation.

11. FIELD HEATING AT STANDSTILL

11.1 When supplied at the rated voltage, the separately excited shunt field windings of shunt and compound wound motors shall be capable of full continuous excitation at standstill without exceeding the temperature-rise limits as specified in clause 9.

12. SPEED

12.1 **Speed Regulations for Adjustable Speed Motors** - The regulation of adjustable speed motors from no load to the basic one hour rating (for totally enclosed non-ventilated motors) or at the continuous rating (for totally enclosed forced-ventilated motors) shall not exceed the value given below as appropriate:

Base Speed (%)	*Regulation* (%, Max)
100	15
200	20
300	25

NOTE: Base speeds for different frame sizes are given in **Table-1**.

12.2 **Degree of Compounding** - At the one hour rating (in the case of TENV motors) or at the continuous rating (in the case of TEFV motors) the excitation shall be 50% shunt and 50% series to within the nearest whole number of series turns.

12.3 **Variation in Speed Due to Heating** - The variation in speed from full load cold to full load hot during a run of rated duration shall not exceed 20% of the rated speed for TENV type motors and 15% of rated speed for TEFV type motors.

12.4 **Variation from Rated Speed** - At normal operating temperature, rated load and voltage, and at rated field voltage across its terminals, the variation above or below the rated full field speed shall not be more than 7.5%.

12.5 **Maximum Speeds** - The maximum safe operating speeds shall be as shown in **Table-1**.

13. MOMENT OF INERTIA

13.1 The maximum value of the moment of inertia of the armature (Wk2) shall be as given in **Table-1**.

14. EARTHING

14.1 Two earthing terminals of proper size suitable to receive galvanized iron conductor shall be provided on the bottom half of the motor body. In addition to the two outside earthing terminals, provision for one more earthing terminal inside the terminal box is to be kept. Size of earthing terminal shall conform to clause 12.2.2.2 of IS 3043 :1987 `Code of practice for earthing (*first revision*)'.

15. LIMITS OF NOISE LEVEL

15.1 The noise level shall not exceed the limits specified in IS 12065:1987 `Permissible limits of noise level for rotating electrical machines', if required by the user.

16. LIMITS OF VIBRATION

16.1 Limits of vibration intensity shall be in accordance with normal class of Table-1 of IS 12075:1987 `Mechanical vibration of rotating electrical machines with shaft heights 56 mm and higher - measurement, evaluation and limits of vibration severity (*superseding IS 4729:1968*)'.

NOTE: The manufacturers shall indicate in the test certificate whether the rotor is balanced, with or without the coupling fixing key in the shaft.

17. TESTS

17.1 Tests shall be conducted in accordance with the relevant provisions of IS 4722:2001 `Specifications for rotating electrical machines (*third revision*)'. In addition, the following type tests shall also be carried out:

a) Determination of zone of sparkless commutation (best commutation),

b) **Overspeed Test** - The motor at no load shall withstand without any deformation the maximum speeds indicated in **Table-1** for a duration of two minutes, and

c) **Vibration Test** - This test shall be carried out in accordance with IS 12075:1987 `Mechanical vibration of rotating electrical machines with shaft heights 56 mm and higher-measurement, evaluation and limits of vibration severity'.

18. MANUFACTURER'S RESPONSIBILITY

18.1 **Test Certificates** - The manufacturer shall furnish technical particulars for each motor as specified in **Appendix A**. The manufacturer shall also furnish characteristic curves for torque vs speed in every case and characteristic curves for time-on vs load whenever asked for by the purchaser.

19. DESIGNATION OF MOTORS

19.1 The designation of motors conforming to the requirements of this standard shall consist of two parts. The first part identifying the application, i.e. metallurgical mill/crane duty dc motors and is denoted by `MMDC', and the second part indicating the series and frame size.

Example - A mill/crane duty dc motor of 800 series and of frame size 810 shall be denoted as follows:

MMDC - 810

20. RATING PLATE

20.1 A legible and indelibly marked rating plate shall be fixed on the upper half of the motor body and shall give the following information:

a) Manufacturer's name with trade-mark;
b) Type
c) Frame size
d) Reference to this standard, i.e. IPSS:1-03-002-08;

e) Rated voltage;
f) Rated output in kW at 40°C;
g) Duty type;
h) Class of insulation;
j) Current at rated outputs at 40°C;
k) Speed at rated outputs at 40°C;
m) Excitation voltage and type of excitation, i.e. straight shunt, stabilized shunt, compound or series;
n) Bearing designation and lubrication details;
p) Serial number and year of manufacture; and
q) Mass of motor in kg.

20.2 Manufacturer's serial number shall be punched on the armature also.

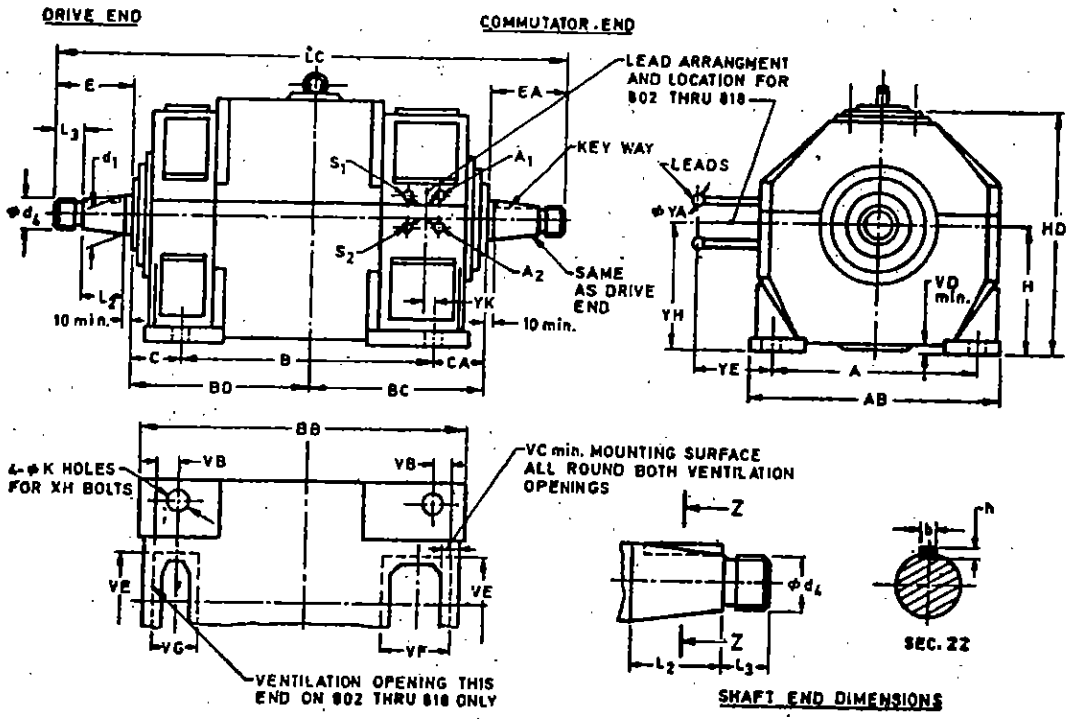

FIG.1 dc MILL/CRANE DUTY MOTORS (800 SERIES)

TABLE 1 RATINGS OF dc MILL/CRANE DUTY MOTORS (900 SERIES)

(Clauses 4.3, 6.1, 6.3, 8.1, 9.4, 12.1, 12.5, 13 and 17)

Frame Size	Continuous Duty Type S_1 — for TEFV or Short Time Duty Type S_2 — 60 Minutes for TENV						Short Time Duty Type S_2 — 30 Minutes for TENV — Series Motors		Intermittent Periodic Duty Type S_3 — 30 Percent for TENV*						Air Requirements for Continuous Forced Ventilated Ratings			Maximum Starting Torque (Nm)†			Maximum Running Torque (Nm)†			Maximum Armature Inertia kgm²‡	Maximum Safe Speed, rev/min
	Output kW	Speed at Rated Voltage rev/min					Output kW	Speed at Rated Voltage, rev/min at 40°C	Series		Compound		Shunt		Cubic Metres per Second	Static Pressure at Inlet mm WG		Series	Compound	Shunt	Series	Compound	Shunt		
		Series	Compound	Shunt/Separately excited					Output kW	Speed rev/min	Output kW	Speed, rev/min	Output kW At 40°C	Speed, rev/min		At Inlet drive end	Commutator end									
				Base Speed (Straight Shunt)	Adjustable Speed by Excitation Control§																					
		230 V	230 V	230 V	230 V	460 V	e																			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)
802A‖	3·7	900	1 025	1 025	1 025/ 2 050	1 025/ 2 050	5	730	4	840	3·7	1 080	3·7	1 130	0·052	19	13	198	157	125	158	123	102	0·25	3 600
802B‖	5·6	850	900	900	900/ 1 800	900/ 1 800	7·5	675	6	780	5·5	950	5·5	1 000	0·052	19	13	330	270	216	208	210	177	0·25	3 600
802C‖	7·5	800	900	900	900/ 1 800	900/ 1 800	10	675	7·5	800	7	940	5·7	1 000	0·076	25	13	450	360	240	360	280	220	0·25	3 600
803	11	725	800	800	800/ 2 000	800/ 1 600	14	629	11	725	11	840	10·5	880	0·094	32	13	740	616	400	600	470	350	0·50	3 300
804	18	650	725	725	725/ 1 800	725/ 1 450	20	580	15	650	14	775	13·0	800	0·12	32	13	1 100	880	590	880	685	530	1·30	3 000
806	22	575	650	650	650/ 1 950	650/ 1 300	30	500	22	575	21	690	16·5	715	0·16	38	19	1 870	1 500	980	1 490	1 170	880	2·10	2 500
808	37	525	575	575	575/ 1 725	575/ 1 150	49	450	30	570	28	625	26·0	630	0·20	38	19	3 400	2 800	1 860	2 700	2 150	1 650	3·8	2 300
810	52	500	550	550	550/ 1 650	550/ 1 100	67	440	45	550	39	615	34	600	0·25	44	25	5 000	4 000	2 700	4 000	3 100	2 450	6·1	2 200
812	75	475	515	515	515/ 1 300	515/ 1 050	100	420	64	525	55	580	45	565	0·35	50	25	7 450	6 250	4 150	6 000	4 900	3 750	9·2	1 900
814	112	460	500	500	500/ 1 250	500/ 1 000	150	400	85	515	82	565	64	560	0·42	57	25	11 600	9 600	6 400	9 300	7 500	5 800	16·3	1 700
816	150	450	480	480	480/ 1 200	480/ 950	200	400	110	500	104	540	82	535	0·57	64	32	15 000	13 300	8 900	12 600	10 400	8 000	25·2	1 600
818	186	410	435	435	435/ 1 100	435/ 870	240	360	133	485	123	490	97	470	0·75	75	38	21 700	18 400	12 300	17 400	14 400	11 600	46·0	1 500

*Suitable for continuous repeated periodic cycles of 5 minutes duration, with shunt fields continuously excited. Duty types specified therein are in accordance with IS : 4722 : 2001 Specification for rotating electrical machines (third revision)

†Maximum attainable values with respect to other specified performance limitations.

‡Limiting maximum values should not be used for application calculations.

§A light stabilizing field may be used to obtain these speed ranges.

‖Frame size 802 is assigned three ratings. Mounting dimensions are identical for each rating but electrical designs shall be different.

TABLE 2 DIMENSIONS OF FRAMES FOR dc MILL/CRANE DUTY MOTORS (800 SERIES)

(Clauses 6.1, 7.1 and 7.6.1)

All dimensions in millimetres.

Frame Size	Dimensions											Ventilation Duct Flange Surface						Motor Leads				Bearing No.
	AB	*BB*	*LC*	*H*	*A*	*B*	*C/CA*	*K*	*XH*	*BC/BD*	*HD*	*VB*	*VC*	*VD*	*VE*	*VF*	*VG*	*YA*	*YE*	*YH*	*YK*	
802	381	520	835	194—0·5	316	420	87·5	24	M 20	297·5	400	22	10	10	184	121	56	10	125	220	75	NJ 310
803	432	598	940	216—0·5	356	456	115	28	M 24	343	445	44	13	10	216	127	82	10	125	240	75	NJ 311
804	457	648	990	229—0·5	380	480	128	28	M 24	368	470	57	13	10	229	140	70	10	125	255	75	NJ 313
806	508	698	1 073	254—0·5	420	534	119·5	28	M 24	386·5	521	54	13	10	260	152	86	10	125	280	75	NJ 315
808	578	794	1 206	286—1·0	476	628	130	35	M 30	444	584	51	13	20	292	165	89	10	180	320	75	NJ 317
810	622	825	1 276	311—1·0	520	660	146	35	M 30	476	635	54	13	20	305	178	92	10	180	345	75	NJ 319
812	686	914	1 397	340—1·0	572	724	158·5	35	M 30	520·5	692	64	16	20	349	210	124	10	180	370	75	NJ 321
814	762	1 054	1 543	375—1·0	636	812	184·5	42	M 36	590·5	762	86	16	20	387	235	140	10	230	415	75	NJ 324
816	825	1 188	1 714	406—1·0	686	888	203	42	M 36	647	829	114	25	20	406	279	168	10	230	445	115	NJ 326
818	914	1 264	1 794	451—1 0	762	990	192	48	M 42	687	918	98	25	20	457	305	181	10	230	490	115	NJ 328

TABLE – 2A

COMPARATIVE FIXING DIMENSIONS FOR dc MILL/CRANE DUTY MOTORS (BOTH FOR 800 & 600 SERIES MOTORS)

Frame	H	A	B	C/CA	K	E/EA (1:10)	E/EA (1:9.6)
802	194-0.5	316	420	87.5	24	120	112.7
602	193.5	317	419	98	20	120	-
602	193.67	317.5	419.1	95.25	19.84	-	112.7
803	216-0.5	356	456	115	28	127	127
603	216	357	457	117.5	23	127	-
603	215.9	355.6	457.2	114.3	23.019	-	127
804	229-0.5	380	480	128	28	127	127
604	228	381	483	129.5	23	127	-
604	228.6	381	482.6	127	23.019	-	127
806	254-0.5	420	534	119.5	28	150	142.9
606	254	419	533	130	27	150	-
606	254	419.1	533.4	127	26.194	-	142.875
808	286-1.0	476	628	130	35	159	158.8
608	286	476	628	133	33	159	-
608	285.75	476.25	628.6	130.175	30.162	-	158.75
810	311-1.0	520	660	146	35	162	161.9
610	311	520	660	149	33	162	-
610	311.15	520.7	660.4	146.05	30.162	-	161.925
812	340-1.0	572	724	158.5	35	178	177.8
612	340	572	724	161.5	33	178	-
612	339.725	571.5	723.9	158.75	33.338	-	177.8
814	375-1.0	636	812	194.5	42	181	180.9
614	374.5	635	813	186.5	39	181	-
614	374.65	635	812.8	184.15	39.688	-	180.975
816	406-1.0	686	888	203	42	210	196.9
616	406	686	889	218.5	39	210	-
616	406.4	685.8	889	215.9	39.688	-	196.85
818	451-1.0	762	990	292	48	210	198.4
618	451	762	990	206	45	210	-
618	450.85	762	990.6	203.2	46.038	-	198.438

TABLE 3

DIMENSIONS OF SHAFT OF 1:10 TAPER

(Refer Fig 1)

All dimensions in millimetres

Frame Size	Conical Shaft End 1:10 Taper							
	Shaft Dimensions				Shaft Thread		Key	
	E/EA	Dia d_1	L_2	L_3	Dia d_4	Pitch of Thread	b	h
802	120	45	70	30	30	2	12	8
803	127	50	82	32	36	3	12	8
804	127	50	82	32	36	3	12	8
806	150	65	95	35	42	3	16	10
808	159	75	106	38	48	3	18	11
810	162	85	108	41	56	4	20	12
812	178	95	120	45	64	4	22	14
814	181	110	120	48	80	4	25	14
816	210	120	135	50	90	4	28	16
818	210	130	145	40	100	4	28	16

All letter symbols for dimensions are in accordance with IS 3688:1990 `Power Transmission-shafts-dimensions of cylindrical and 1/10 conical shaft ends (*second revision*)' except E/EA which is in accordance with IEC 72 (1971)

TABLE 4

DIMENSIONS OF SHAFT OF 1:9.6 TAPER

(Refer Fig-1)

All dimensions in millimetres

Frame Size	Conical Shaft End 1:9.6 Taper							
	Shaft Dimensions				Shaft Thread		Key	
	E/EA	Dia d_1	L_2	L_3	Dia d_4	Pitch of Thread	b	h
802	112.7	44.5	69.9	30.2	25.4	3.2	12.7	12.7
803	127.0	50.8	82.6	31.8	31.8	3.2	12.7	12.7
804	127.0	50.8	82.6	31.8	31.8	3.2	12.7	12.7
806	142.9	63.5	95.3	34.9	38.1	3.2	12.7	12.7
808	158.8	76.2	108.0	38.1	50.8	3.2	19.1	12.7
810	161.9	82.6	108.0	41.3	57.2	3.2	19.1	12.7
812	177.8	92.1	120.7	44.5	63.5	3.2	19.1	12.7
814	180.9	108.0	120.7	47.6	76.2	3.2	25.4	19.1
816	196.9	117.5	133.4	50.8	82.6	3.2	31.8	19.1
818	198.4	127.0	146.1	39.7	88.9	3.2	31.8	25.4

All letter symbols for dimensions are in accordance with IS 3688:1990 `Power Transmission-shafts-dimensions of cylindrical and 1/10 conical shaft ends (*second revision*)' except E/EA which is in accordance with IEC 72 (1971)

APPENDIX A

(Clause 18.1)

PROFORMA FOR
TECHNICAL PARTICULARS OF dc MILL/CRANE DUTY MOTORS (800 SERIES)

1.	Manufacturer's Name
2.	Serial number and Year of Manufacture of the Motor
3.	Rated Output in kW (see Table-1) at 40°C ambient
4.	Rated Voltage (see clause 1.1)
5.	Rated current in A corresponding to rated output at 40°C
6.	Torque in Nm (see Table-1) at: a) Full load b) Maximum c) Starting
7.	Excitation (field) [TYPE/VOLTAGE/CURRENT]
8.	Type of Enclosure (see clause 4)
9.	Method of cooling (see clause 5)
10.	Revolutions per Minute (see Table-1) at: a) Full load b) No load c) Maximum safe load
11.	Duty type
12.	Required Air for continuous Rating in: a) Quantity b) Pressure
13.	Efficiency at: a) 100% full load b) 75% full load c) 50% full load d) 25% full load
14.	Frame Size
15.	Mass in kg
16.	Class of Insulation (see clause 1.1)
17.	Designation of Steel for Shaft
18.	Details of Armature and Armature Winding: a) Core diameter in mm b) Core length in mm c) Number of slots d) Slot dimensions in mm e) Type of winding f) Commutator pitch in mm g) Coil pitch in mm h) Conductor size in mm i) Material of conductor insulation j) Number of conductors per slot k) Number of turns per coil l) Length of conductor in mm m) Mass of copper in kg n) Inertia in kgm^2 o) Mass of armature in kg p) Resistance in Ohms in hot condition (....deg C) q) Resistance in Ohms in cold condition (....deg C)

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19. Keyway dimensions in mm:
    a) Length
    b) Width
    c) Depth

20. Details of Field and Field Windings:

	Winding			
	Shunt continuous	Series	Compound	Interpole
a) Duty type				
b) Conductor size in mm				
c) Material for conductor Insulation				
d) Turns per coil				
e) Number of poles				
f) Number of coils per pole				
g) Coils connection				
h) Resistance in Ohms in hot condition (....deg C)				
i) Resistance in Ohms in cold condition (....deg C)				
j) Current in A in hot condition (....deg C)				
k) Current in A in cold condition (....deg C)				
l) Mass of copper in kg				

21. Details of Commutator:
    a) Number of segments
    b) Length in mm
    c) Diameter in mm
    d) Allowable wearing depth in mm
    e) Width of bar in mm
    f) Maximum permissible current in A

22. Air Gap Between Armature and Field Windings:
    a) For main poles in mm
    b) For Interpoles in mm

23. Details of Bearings:

	Drive End	Commutator End
a) Type		
b) Make		
c) Maker's number		

24. Details of Brushes:
    a) Number of arms
    b) Number of brushes per arm
    c) Make
    d) Grade of carbon
    e) Required pressure
    f) Length of brush in mm
    g) Width of brush in mm
    h) Thickness of brush in mm

25. Type of Grease Nipple to be used

26. Type of Grease to be used