



Bharat Heavy Electricals Ltd
Boiler Auxiliaries Plant
Ranipet-632 406

EDC / AIR PREHEATERS
TECHNICAL SPECIFICATION
Effective Date: 11.11.2016

Specification No : RAH 429

Rev. No : 04

Page No : 01 of 03

01 Item : Main Drive Speed Reducer 9APB (3 Input, Down Shaft Output, 3 ORC)

02 Application

Used for driving the rotor of Regenerative Air Preheater in coal fired power stations. Two input shafts are required to connect them to the main Electric Motor drive and to the standby Electric Motor. A third input shaft is also required to connect to the emergency compressed Air Motor drive. All the input shafts should have over-running clutch built-in as a part of the speed reducer. A pinion is mounted on the output shaft of the reducer, which engages to a Pin rack provided in the rotor of the air heater. All the drive motors are mounted in brackets, which are to be attached to the speed reducer casing.

03 Prime Movers

- a) Main / Standby - Electric motor 3 Ph, 50 Hz.
- b) Emergency - Air motor of lower speed & lower KW

04 Input RPM

1450

05 Output RPM

14.74

06 Transmitting Power

- a) Continuous - 37 KW
- b) Peak - 111 KW
- c) Motor Rating - 37 KW (Design condition)

07 Peak Input Torque

74 Kg-m

08 Conditions of service

- a) Duration : continuous - 24 hours daily
- b) Nature of load : smooth
- c) Starting torque : 50 Kg-m
- d) Momentary Max over load : 400 %
- e) Ambient Temperature : 55°C
- f) Environment : Dusty humid and outdoor installation.
- g) Direction of rotation of high speed shaft : Must be capable of rotating in either direction (clockwise or counter-clockwise)

09 Coupling method

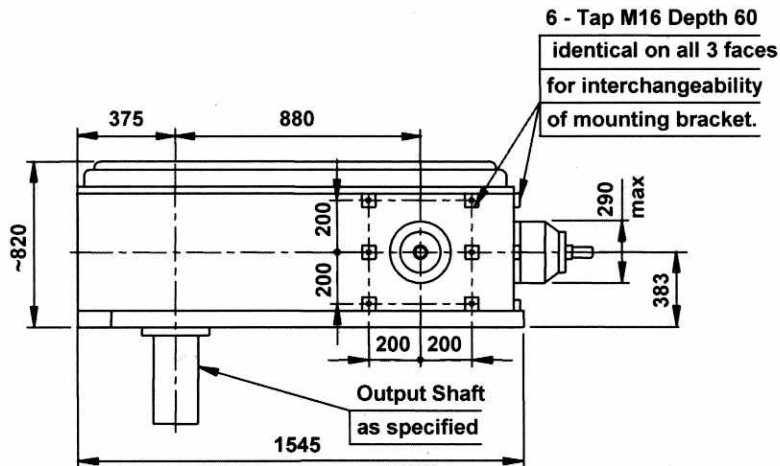
- a) High speed shaft - Electric motor by fluid coupling & Air motor by flexible coupling.
- b) Low speed shaft - Pinion mounted (Pitch circle dia of pinion - 1270 mm, Pressure angle - 20°)

04	11.11.16				In Plan view of the drawing (Page 03 of 03). *marked dimension are revised.
03	20.10.16	SB	KP	KP	12 Painting b) & c) dry film thickness updated in line with SQP APH 111/R02.
02	29.09.16	GA	KP	KP	Bracket mounting lug length added
01	16.10.15	SCH	KP	KP	Specification modified & updated. Page modified.
00	02.09.11	GA	KP	PPS	Fresh issue
Rev.No	Date	Prepared	Checked	Approved	Record of Revisions.

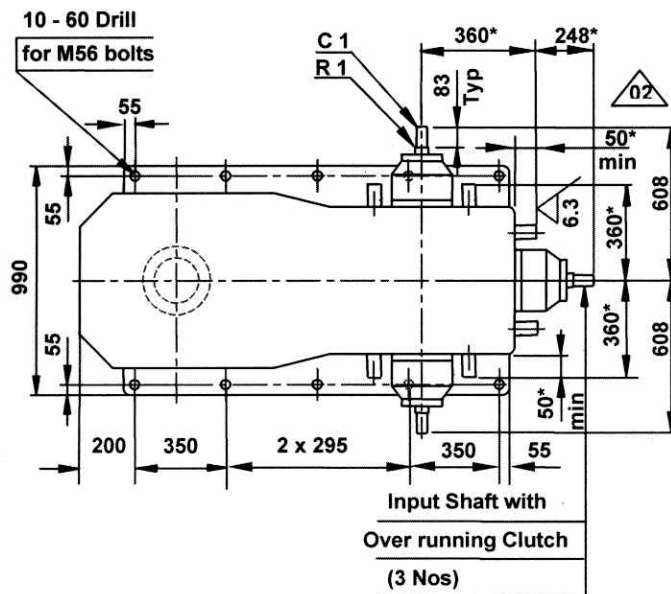
Specification No : RAH 429		Rev. No : 04	Page No : 02 of 03
10	General arrangement of Assembly, Input shaft details & Output Shaft details.	As per sketch in page 03 of 03	
11	General a) Reducer shall be designed with 4 stages of reduction and overall dimensions mentioned in the sketches are not to be exceeded. Reducer & Motor brackets mounting dimension, Shaft diameter/centerline/extension dimension and center distance shall be maintained as per sketch for interchangeability. b) Speed reducers have to satisfy AGMA specifications for durability of 120,000 hours life at rated KW. c) Service factor 1.25 d) Bearings to have minimum B-10 life of 50,000 hours at rated KW. All bearings shall be of 'SKF' or 'FAG' or 'TIMKEN' make only. e) Lubricating oil pump has to be provided to lubricate top bearings, gear meshing points above oil level and all over running clutches. f) At 400% of motor rating, tooth stress should not exceed 70% of yield point of tooth material. g) Over Running Clutches shall be mounted in all the input shafts such that when one input shaft is driven the other two input shafts shall not rotate. h) The Over Running Clutch shall be without Oil Seal and shall be suitable for Sump Oil Lubrication. It shall be of size FSO 600 or equivalent and shall be of 'Daido' or 'Formsprag' or 'Renold' or 'Ringspann' make only. i) Drywell arrangement shall be provided for output shaft and double seal is required at high speed shafts and at low speed shaft. j) In the event of first order on a vendor, the first lot of speed reducers will be subject to test at our works. The procedure before each starting is to obtain full backlash inside the reducer plus 1 degree backlash between the tooth of pinion on the low speed shaft and a stop. The motor is then turned on. This is to be done 500 times without fracture of speed reducer components. k) The casing of the speed reducer shall be of fine-grained Cast Iron per IS 210 FG 260 or equivalent. l) All input and output shafts shall be supplied with keys. m) Speed Reducer component shall be packed properly to avoid damage during transit. n) 3 copies of O & M manual to be supplied along with Reducer. o) Only latest revision shall be referred for all the standards specified.		
12	Painting a) All external surfaces, which require painting, shall be cleaned as per surface preparation standard SSPC – SP3 grade before applying paint. b) 2 coats of Red Oxide Zinc Phosphate (IS : 12744) primer paint shall be applied to have a dry film thickness of minimum 60 microns. c) Finally, applied with 3 coats of synthetic enamel (IS : 2932) finish paint of Grey shade no : 692 of IS : 5 to have a dry film thickness of minimum 60 microns. d) Total dry film thickness shall be minimum 120 microns after final coat.		
13	a) Vendor shall submit the Dimensional drawing indicating Materials of Construction of all the parts with weight, for our approval. b) In the event of first order on a vendor, the vendor shall submit (i) Gear calculations as per AGMA, (ii) Tooth stress calculations at 400% rated power and (iii) Quality Plan, for our approval.		
14	Inspection a) Inspection by BHEL. b) Necessary Material Compliance Certificate and No-load Run Test certificate (indicating Noise level, Vibration, and Temperature Rise) shall be submitted.		

Speed Reducer 9APB – 3 Input, Output Downshaft, 3 ORC

GENERAL ARRANGEMENT



ELEVATION



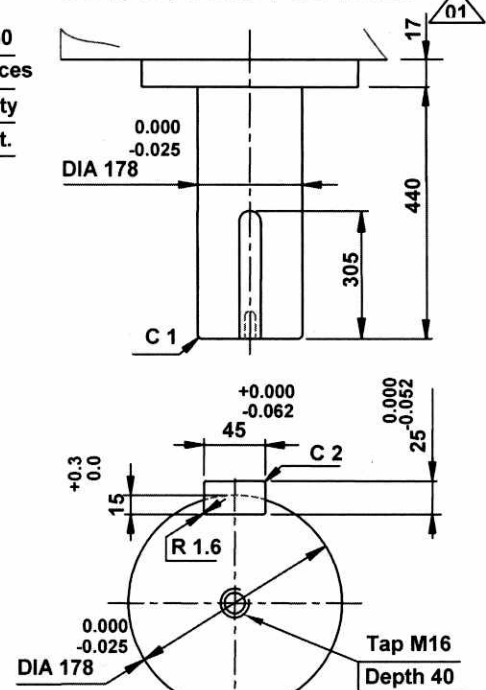
PLAN

* Marked dimensions are revised in revision 04.

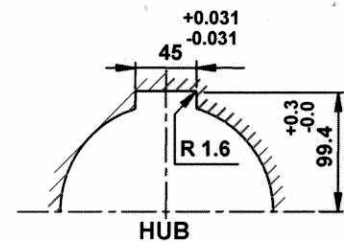
All dimensions are in mm.

Tolerance for untoleranced dimensions are as per Medium Class of IS 2102 Part I (Latest revision).

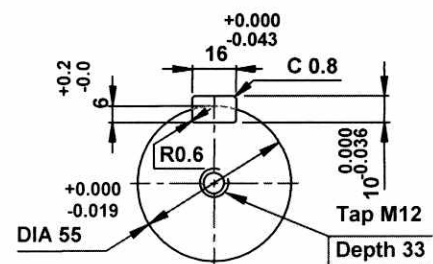
OUTPUT SHAFT DETAILS



OUTPUT SHAFT END



INPUT SHAFT DETAILS



INPUT SHAFT END

