

**HYDRO TURBINE ENGINEERING DIVISION**

SPECIFICATION NO.

**TITLE : SPECIFICATION OF HYDRO
MECHANICAL CABINET (ø 100 MDV)**

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PROJECT: KISHANGANGA HEP

1. **QUANTITY:** (Refer Annexure-I)
2. **TYPE OF GOVERNOR:** (Refer Annexure-I)
3. **DRAWINGS:**(Refer Annexure -I)

Hydro Mechanical Cabinet (HMC, ø100 MDV) for Pelton type governor as per hydro mechanical scheme Drg. No. [Refer Annexure-I](#), Wiring Scheme of GOV Hydro Mechanical Cabinet Drg. No. [Refer Annexure-I](#), Installation of GOV HMC for Deflector Control Drg No. [Refer Annexure-I](#), & Pedestal Drg.No. [Refer Annexure-I](#). All sub-Assembly and component Drgs. already available with all the regular suppliers. However, modifications as per sketches/ drgs. already available with supplier have to be carried out by the supplier in this project.

The Non standard component, Limit according to head cam, dial drawing and wiring diagram shall be supplied by BHEL after placement of order to the successful bidder.

[For Port Size \(Refer Annexure-I \)](#)

4. GENERAL:

- 4.1 All the internal surfaces of parts like main distributing valve, oil filter, oil pipe line, pilot valves etc. shall be flushed with turbine oil (ISO VG-46) before dispatch. All the internal unmachined surface of castings shall be painted with oil resistance paint.
- 4.2 The various governor openings shall be blanked by blank flanges having min. thickness of 27 mm along with 'O' Rings before despatch.
- 4.3 The Transducer & Balance indicator shall be wired up to terminal board by using screened cable only.
- 4.4 The material of various "O" seal ring used in governor cabinet shall be oil resisting nitrile rubber.
- 4.5 The outer surfaces of the cabinet to be sprayed with transparent removable protective coating of phirol compound.

REV.NO 00

PRD:

CKD:

APPD:

DATE:

DISTRIBUTION.

QTY.

APPROVED :

(PKB)

HTE

01

PREPARED

CHECKED

ISSUED

DATE

MM(H)

04

YS**SPS****MS****14.08.13**

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- 4.6 All cabinets shall be provided with name plate as per our Drg. No. 32083949040 available with all the suppliers. Name Plates shall be provided on front of cabinet at left top corner.
- 4.7 Mounting arrgt. for Rotary Pot (free issue) on Deflector Opening & Limiter Indicator (Transmitter) Drg. No. 59133000 to be provided by supplier with extended shaft Item No. 10 of the same drg.
- 4.8 Door operated switch to be provided for tube lights in the cabinet.
- 4.9 Rating plate Drg. No. 12083749020 ITEM No. 1 shall be fixed below the name plate of supplier. This rating plate shall be under supplier's scope.
- 4.10 Standard Frame assy. of Deflector Limiter/ Position indicator must be provided as per Drg. No. 32083949013 #6 (for Francis) & # 7(for Pelton) identical to other meters frame.
- 4.11 Supplier to carry out all modifications in HMC as per sketch/ drgs. Previous Supplied is already available with supplier.
- 4.12 QA Plan & Testing procedure should be approved by purchaser before start of testing.
- 4.13 One number switch cam assembly to be mounted inside the governor cabinet, suitably wired upto terminal board. This switch cam assembly is to be connected to feed back shaft by wire rope. This assembly would be supplied on free issue basis.
- 4.13 Governor Instruction Plate Drg. No. 22083949060 shall be mounted inside HMC under / above Rating Plate. This Instruction plate shall be under Supplier's scope.
- 4.14 Pin as per Drg. 42083949114 Rev. 00 & Screw as per Drg. 42083949008 Rev.00 variant 03 to be supplied by supplier.
- 4.15 Over Laps of MSV spool and sleeve as per Drg.No. 32083949181 (Available with all the supplier)
- 4.16 Modified sub plate drawing No. 32083949233 Rev. 01 (Drawing enclosed) for mounting auto manual solenoid valve to be used

**4.17 For List of Spare Refer Table - II****5. FREE ISSUE MATERIALS:**

Free issue material would be issued after placement of order as per **Table – I**.

6. METERING INDICATION:

The HMC shall be fitted with the following meters / pressure gauge on the front face which is under scope of supplier.

- a. Tachometer
- b. Balance Indicator
- c. Speed Setting Indicator
- d. Output Setting Indicator
- e. Deflector Position / Limiter Indicator
- f. Pressure Gauge (as applicable)

6.1 ELECTRICAL METERS :

Square dial, size 96X96 mm and suitable for panel cutout of 92X92 mm dust proof, flush panel mounting type, back connecting in ABS moulded case are required. All meters should conform in general to IS:1248, 1983/84. The color of the scale plate to be unfading white and the plate shall be stoved with black graduation and numbers, pointer movement to be 240 °. **Mechanical stoppers should be provided on the dial at zero and span indication.** Accuracy for all the meters to be $\pm 1.0\%$. Detailed specification of the various meters are being given below :

Make shall be Mecor/Rishabh

6.1.1 Tachometer:

Milliampere , moving coil type taut band

- a. Input range : 4 – 20 mA or 0-10 V (**Refer Annexure-I**)
- b. Calibration : 0 to 100 Hz.
- c. Dial scale marking shall be 240°.

6.1.2 Balance Indicator :

D.C. Volt meter, moving coil type taut band

- a. Input range : (-) 5.5 – 0 – (+) 5.5 VDC(**Refer Annexure-I**)
- b. Calibration : (-) 100 to 0 to (+) 100 mA.
- c. Dial scale marking shall be 240°.

**6.1.3 Speed Setting Indicator :**

Miliammeter, moving coil type taut band

- a. Input range : 4 –20 mA or 0-10 V (**Refer Annexure-I**)
- b. Calibration : 45 - 50 - 55 HZ in step of one Hz.
- c. Dial scale marking shall be 240°

6.1.4 Output Setting Indicator :

Miliammeter, moving coil type taut band

- a. Input range : 4 –20 mA or 0-10 V (**Refer Annexure-I**)
- b. Calibration : 0 to 100 %
- c. Dial scale marking shall be 240°

6.2 MECHANICAL METERS :

6.2.1. Deflector position / Limiter Indicator dial marking shall be 250° & 0-100%. It shall be made as per Drg. Nos. 59133000 & 42083949021 which are already available with suppliers.

6.2.2. Pressure Gauge shall be of square dial, size 96 x 96 mm having accuracy of ±1% FSD .
For pressure range **Refer Annexure-I** and measuring unit shall be kg/cm².

7. PAINTING:

A. Finish paint for external surface Refer Annexure-I.

B. Finish paint for internal surface of cabinet shall be white enamel full glossy to RAL 1013

C. Finish paint for external surface of pipes shall be:

- i. Control Pipes - Yellow Orange - RAL 2000
- ii Pressure Pipes - Red - RAL 3020
- iii Drain/Leakage Pipes –mint Green - RAL 6029



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8. TOOL KITS:

One set of allenkeys and one set of spanners shall be supplied along with each cabinet. The size of alenkeys and spanners shall be as under. All the tools shall be supplied in leather pack/ raxin/ terpilon bag.

(i) Allenkeys Sizes: 1.5, 2, 2.5,3,4,5,6,8 and 10.

(ii) Spanners Sizes (metric):

6 X 7 14 X 15 21 X 23

8 X 9 16 X 17 24 X 27

10 X 11 18 X 19 30 X 32

12 X 13 20 X 22 36 X 41

iii) Screw Driver Taparia make No. 824 (One No.)

9. INSPECTION REQUIREMENT :

- A. Supplier should provide all the necessary facilities required for testing at Inspection of the HMC components/ sub-assemblies to BHEL engineers and their works.
- B. All the material/ components, test / inspection certificate should be maintained with Proper identification number so that they can be easily correlated with material/ components used in the cabinet.
- C. (3) three copies of test certificates in respect of the following are required. BHEL P.O. NO. should be mentioned in each test certificate.
- (i) Bought out items.
 - (ii) Hydraulic test of components and
 - (iii) Transducer testing

NOTE :

One copies of test certificates should be sent directly to indenter.

The cabinet and transducer testing would be inspected by BHEL engineers at suppliers works before despatch. We need 12 days clear notice for the same.

Supplier to follow customer (NHPC) approved quality assurance plan .

11. TESTS AT MANUFACTURES'S WORKS:

The tests at manufacturer's works shall include electrical, mechanical, and hydraulic tests in accordance with the appropriate clause of statutory regulation, relevant codes and standards and in addition any tests called for OWNER/PURCHASER to ensure that HMC being supplied fulfills the requirements of specifications. For item not covered by this specification, if considered necessary by purchaser shall be fully erected and tested in the works prior to despatch to the purchaser works.

**12. TEST CERTIFICATES:**

Test certificate including test records, performance curve and balancing certificate shall be supplied according to test schedule. All the test shall be carried out in accordance with the Q.A. plan and testing procedure. All test certificate must be endorsed with sufficient information to identify the material to which the certificate refer and must carry in the top right corner the name of OWNER/PURCHASER and the Project.

13. PACKING INSTRUCTIONS :

Packing box must be reusable type. Before putting HMC into wooden box, panel shall be entirely covered with Polyethylene sheet after placing adequate quantity of silica gel packed in a cotton bag. Front side of HMC shall be properly covered by polyethylene air bubble film to avoid damages of indicating meters and flush panel mountings.

The base of the wooden case shall be of wooden batton and planks giving necessary reinforcement such that the bottom of the equipment is at a height of 200 mm minimum from ground level. Polyethylene coated bitumen hessian Kraft paper shall be fixed in position above the wooden planks over which HMC is to rest.

Polyethylene sheet of at least 100 micron thickness shall be laid over the base of polyethylene coated bitumen hessian Kraft paper. Four sides shall be lined from inside by polyethylene coated bitumen hessian Kraft paper. It is preferable to have a single piece of above Kraft paper fixed on the four sides. In case jointing is unavoidable, then it should be done by overlapping of approx. 200 mm.



Empty space in the box shall be filled with adequate cushioning material wherever necessary i.e. thermocol pieces, wood wool etc to avoid movements and shocks. The inner side of the top cover shall be lined with a polyethylene coated bitumen hessian Kraft paper. A polyethylene sheet of at least 100 micron thick, which shall project approximately 150 mm on all sides of the top cover shall be provided below the top cover. This projection, after nailing the top cover, shall be folded over, on the sides of the wooden box & tacked, to prevent ingress of water from the top.

The following details are to be marked on the packing cases.

- i) Address of Consignee.
- ii) P.O. No.
- iii) Description of item.
- iv) Case No.
- v) Net weight.
- vi) Gross weight.
- vii) Dimension of box.
- viii) Mark showing upright position.
- ix) Mark showing sling position wherever necessary.
- x) Mark showing umbrella (i.e. for item to be stored under covered storage)

14. GUARANTEE :

The equipment supplied shall be guaranteed for 24 months after commissioning. During the guarantee period the supplier shall remain liable for repair/ replacement for any parts that may fail due to manufacturing / material defects at Kishanganga site (J &K).

15. Following particulars to be punched on the rating plate Drg. No. 12083749020 Item No. 1 by the supplier before despatch of the HMC.

(a) Type of Turbine – (Refer Annexure-I)

(b) System Pressure -kg/cm² (Refer Annexure-I)

(c) W.O. No. -

PROJECT NAME
W.O. No.

 (Refer Annexure-I)

(d) Year - or as applicable

16. Spares shall to be supplied as per **Table-II**



TABLE - I TO P.I. 240230761
LIST OF FREE ISSUE MATERIALS
FOR GOVERNOR HMC (KISHANGANGA HEP)

S.NO.	DESCRIPTION/ MATERIAL CODE	QTY FOR 1 GOV.	QTY. FOR 1 SET OF SPARES & REJ.	TOTAL QTY.	EFC
1.	Beryllium copper strip 0.3 mm X 25 mm X 300 mm BP9093516159	2 Nos.	4 Nos.	8 Nos.	
2.	Emergency closing (ECV) BP9053516182 (220 VDC)	1 No.	-	3 Nos.	
3.	Switch cam assembly BP9043515310	1 No.	-	3 Nos.	
4.	Auto/ Manual Solenoid BP9053532919 (220 VDC)	1 No.	-	3 Nos.	
5.	Rotary double shaft Potentiometer BP9043515820	1 No.	-	3 Nos.	
6.	Shuttle valve BP9053515330	1 No.	-	3 Nos.	

**TABLE - II
LIST OF SPARES**

S. NO.	DESCRIPTION	Qty.
1.	Filter for throttle	4 Nos
2.	Pressure gauge	1 No.
3.1	Limit switch for contact device	2 Nos.
3.2	Limit switch for over speed	2 Nos.
4.	Filtering element	4 Nos.
5.	Membrane for the hydraulic amplifier	1 No
6.	Steel wire rope- 0.66 mm dia x 7 wires along with pin soldered on both end (each type)	1 Set
7.	Sealing ring for hydraulic amplifier	1 No
8.	“O” rings (six of each type)	1 Set
9.	Internal circlips (six of each type)	1 Set
10.	Spring for Deflector position/limit indicator	3 No.
11.	External circlips (six of each type)	1 Set
12.	Main slide valve sleeve & spool assembly	2 Sets
13.	Hydraulic amplifier & Electro hydraulic transducer assembly	1 No.
14	Bearing used in HMC (1 No. each type)	1 No.