



PRODUCT STANDARD

POWER MEASUREMENT SYSTEM USING TORQUE FLANGE

1. APPLICATION:

The Power Measurement System using Torque Flange is required for accurate measurement of Drive Motor shaft output during testing of Turbogenerator.

2. SCOPE OF SUPPLY:

The Torque Measurement System consists of the following:

- Torque Measuring Flange (with in-built transducer/sensor)
- Integral Speed measurement system
- Signal Conditioner
- Receiver
- Cables & connectors
- Associated software for determination of torque and power
- Display and Control Unit
- Ethernet/Modbus interface for Central DCS
- Any other accessories required

3. TECHNICAL REQUIREMENTS OF THE SYSTEM:

a) Torque Measuring Flange: The torque measuring flange should be based on strain gauge principle and should be capable of measuring torques:

- up to 50 kNm at 3000 RPM
- up to 40 kNm at 3600 RPM

The system shall be designed for a maximum ambient temperature of 50°C and should give accurate measurement of torque/power in temperature range of 0 to 50°C. The measuring flange should be compact and its axial length should be kept to the minimum possible. The torque flange should have contact-less signal transmission between the fixed and the moving elements.

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			अनुवादक TRANSLATED BY		
			निर्माणकर्ता WORKED BY	R.C.Sharma	<i>R.Sharma</i> 19.1.06
			जांचकर्ता CHECKED BY	S.D.Nagar	<i>S.D.Nagar</i> 19.1.06
सहमत विभाग AGREED DEPTT.	नाम NAME	दिनांक एवं हस्ताक्षर DATE & SIGNATURE	पर्यवेक्षणकर्ता SUPERVISED BY	KR Gupta	<i>KR Gupta</i> 13-02-06
			स्वीकृति : APPROVED : DEVRAJ	<i>Devraj</i>	
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			EME	EME	13.02.06



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PRODUCT STANDARD

पृष्ठ 5 का 2

Page 2 of 5

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इस दस्तावेज में दी गई सूचना भारत हीवी इलेक्ट्रिकल्स की संपत्ति है। इसका प्रयोग एवं प्रकाशना अन्य किसी भी तरह प्रयोग, जो कि, कंपनी के हित में हानिकारक हो न सिका जाए।

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- b) Speed Measurement System: The system should have provision for measuring rotational speeds up to 3600 RPM.
- c) Display Unit: The system should have a display unit for giving direct readings of Torque, Speed and Power in metric units. Display of these parameters should be smooth and free from fluctuations.
- d) The system should be operable with 240V AC $\pm 10\%$, 50 Hz Power Supply. Other power supplies, if required, shall be derived internally by the vendor. Output signal shall be made available in 4-20 mA.
- e) Immunity from Disturbance: The power supply to Drive Motor shall be from inverter containing harmonics. The system should be capable of correctly measuring the power in presence of torque pulsations. The telemetry signals in torque flange must be immune to presence of external electromagnetic interference/noise so as to have the desired accuracy. The system as a whole should be protected from electromagnetic disturbance
- f) Protection: Degree of protection of system shall be IP54 according to EN60529.

4. MOUNTING ARRANGEMENT:

One end of the torque flange is to be coupled to the drive motor flange. The other end is to be coupled with an intermediate / stub shaft. The stub shaft is in turn coupled to the generator. Tentative outline sketch of the setup showing the positions of drive motor, stub shaft, Turbogenerator, etc. where the Torque Flange is to be mounted is shown in Figure-1. Details of the flanges of Drive Motor Coupling and Stub Shaft Coupling are also shown in the Figure-2 and 3 respectively. These details are provisional and shall be confirmed at the time of placement of order. Adaptor/intermediate flanges, fasteners, etc. required for mounting of the Power Measurement System are to be provided by the supplier.

5. TECHNICAL DATA:

Detailed technical data sheet which includes followings parameters should be furnished along with the offer:

- 1) Rated Torque (kNm)
- 2) Safe Overload Capacity (kNm)
- 3) Breaking Torque (kNm)
- 4) Input Power Supply (V) / Power requirement for the complete system
- 5) Output signal
- 6) Speed measurement range (RPM)

निर्माणकर्ता Worked by	R.C. Sharma		19.1.06
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PRODUCT STANDARD

पृष्ठ 5 का 3

Page 3 of 5

दिनांक एवं हस्ताक्षर
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इस प्रतीक में की गई सूचना भारत हेवी इलेक्ट्रिकल्स की सम्पत्ति है इस्तेमाल प्रस्ताव एवं
अनुमति प्राप्त न की बिना इस सूचना को किसी भी तरह प्रयोग, जो कि कंपनी के हित में राखिकारक हो न किया जाए ।

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- 7) Rated Temperature Range (°C)
- 8) Accuracy
- 9) Torque Stiffness (Nm/rad)
- 10) Weight of the torque flange (kg)
- 11) Axial Load Limit
- 12) Lateral Load Limit
- 13) Shaft misalignment allowed (or required accuracy of shaft system)

6. **CALIBRATION:**

The complete system should be supplied in duly calibrated condition. Details of facilities / service provided for re-calibration should be mentioned in the technical offer.

7. **INSPECTION:**

Inspection shall be carried out by BHEL or their authorized representative at supplier's works.

8. **INSTALLATION & COMMISSIONING:**

Supplier to provide services for installation and commissioning at BHEL works. The supplier shall indicate well in advance any input, provision, components, etc. that are required from BHEL for installation of the system. Supplier shall also demonstrate functioning of the system and impart training to BHEL personnel.

9. **DOCUMENTS:**

Documents to be submitted along with the technical offer:

- a. Overall arrangement /scheme of the system
- b. Sketch showing the mounting arrangement
- c. Detailed catalogue
- d. Outline drawing of the torque flange
- e. Electrical circuit diagram
- f. Any provision which has to be provided by BHEL for installing the system
- g. List of organisations in India to whom high capacity Power Measurement Systems of similar design have been supplied
- h. Quality Plan outlining various tests/checks including final testing
- i. Operation & Maintenance Manual

निर्माणकर्ता Worked by	R.C. Sharma		19.01.06
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PRODUCT STANDARD

पृष्ठ 5 का 4

Page 4 of 5

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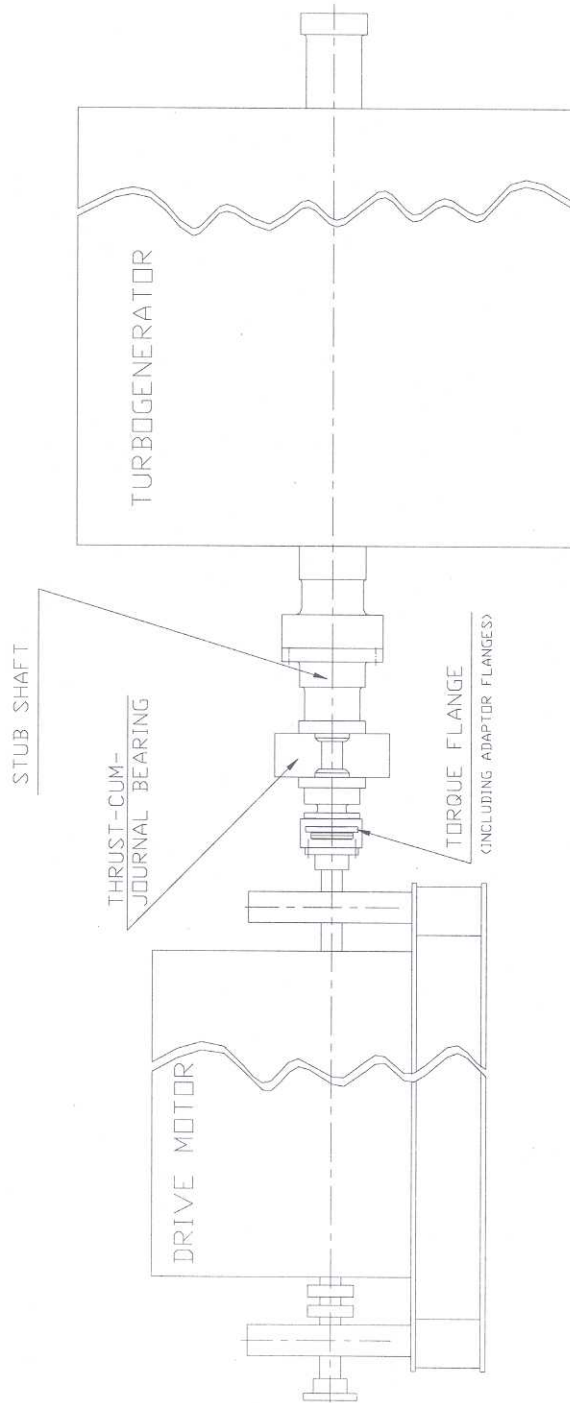


FIG-1

OUTLINE SKETCH SHOWING THE LOCATION FOR MOUNTING OF TORQUE FLANGE

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19.1.06

जांचकर्ता

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19-1-06

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Page 5 of 5

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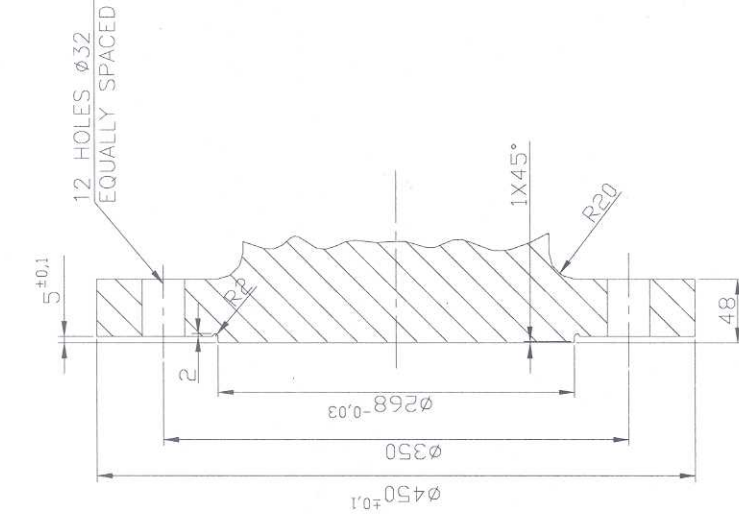


FIG-3
STUB SHAFT COUPLING
FLANGE DETAIL

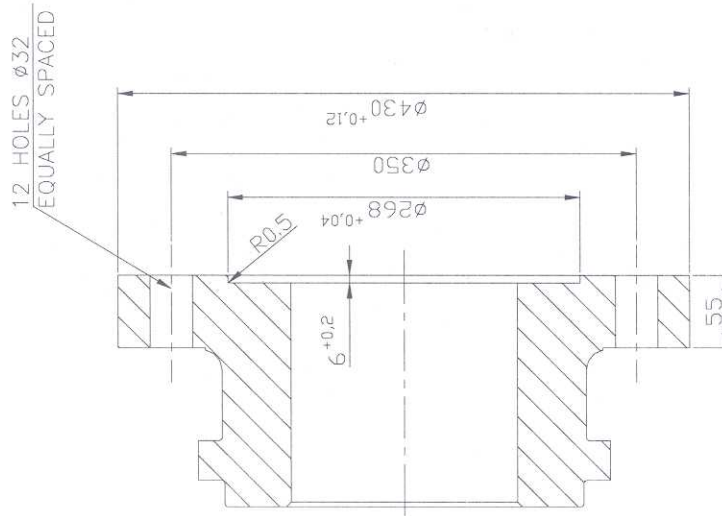


FIG-2
DRIVE MOTOR COUPLING
FLANGE DETAIL

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