

## Annexure - I

### Engine Test Set up: For testing petrol and diesel engines of farm machinery

#### Specification of Engine test setup (Engine need to be tested from 1 to 15 kW)

##### 1. Eddy Current Dynamometer (Water Cooled)

- a) Rated absorption Power = more than 15 kW
- b) Peak Torque = 75 Nm or higher
- c) Maximum Torque at Speed = 1000 to 2500 RPM
- d) Maximum speed = 10000 RPM or higher
- e) Torque measurement Accuracy =  $\pm 0.25$  FS% or better
- f) Speed measurement Accuracy (Digital) =  $\pm 1$  rpm or better
- g) Direction of rotation both Clockwise & Anti Clockwise.
- h) Wheel with magnetic or PNP sensor to measure speed.
- i) Torque calibrating arms and weights must be provided
- j) Water passage with anti-corrosion coating
- k) Magnetic heavy duty Dynamometer water inlet strainer - filter
- l) Water Pressure Switch, (If applicable.) to ensure required cooling
- m) Dynamometer Mounting Stool (If applicable) and Hinge mounted Guard over Cardan Shaft.

##### 2. Dynamometer Controller: Digital Control System (Control Panel mounting stand on ground floor with SVS) Consisting of:

- a) Dynamometer Control Circuit
- b) Constant Speed Mode – N.
- c) Constant Torque Mode – T.
- d) N / T Mode Selector switch.
- e) Digital display for speed (RPM), torque (Nm), Mech. Power of Engine, Temp.
- f) Indicating Accuracy : Speed:  $\pm 0.1\%$  of FSD & Torque :  $\pm 0.25\%$  of FSD
- g) Manual Dynamometer controller with following controls:
  - Housing for wiring safety
  - Safety provision at low water pressure, high water out let temp

##### 3. PC based Data Acquisition system & Test Automation System

- a) Computer (RAM- 16 GB or more, Processor- intel core i5/ AMD Ryzen 5 or better, Storage- 512 GB SSD or more, Windows 10 or better)
- b) TFT Monitor (32" or bigger)
- c) Colour Printer cum Scanner
- d) Engine test software package (Facility for test creation, Test sequencing, Automatic calculation, Channel configuration, data logging with control)
- e) Audio-visual alarm for warning
- f) Report generation facility with printing, saving and export to excel options
- g) UPS (1kVA)
- h) No of available channel in DAQ (16 and more)

##### 4. Temperature sensor

- a) Engine lubricating oil temperature (1 no.)
- b) Engine water outlet temperature (1 No)
- c) Dynamometer water outlet temperature (1 No)

*[Handwritten signatures and notes at the bottom of the page]*

## Annexure - I

- d) Engine exhaust gas temperature (1 No) (0-1000 degree C)

### 5. Pressure sensors:

- a) Engine lubricating oil pressure sensor, (1 No)  
b) Barometric Pressure, (1 No)

### 6. Relative humidity sensor (01 No)

### 7. Signal conditioning module for transducer

### 8. Transducer box for sensor fitment with pressure houses

### 9. Header tank for fuel

Tank capacity (Min 15 litre)

### 10. Volumetric Fuel Consumption Measuring Unit

- a) A set of petrol and diesel measurement unit with suitable piping from fuel unit to engine  
b) Accuracy of fuel meter  $\pm 0.5\%$  or better  
c) Digital timer (1 no)  
d) Fuel measuring unit with calibration facility

### 11. Throttle actuator

- a) Engine cranking system through control panel  
b) Provision to facilitate changing of engine throttle position remotely

### 12. Exhaust gas analyser and smoke meter

Single instrument to measure emission from petrol as well as diesel engine to confirm ISO 3930 standard.

### 13. Universal test bed for engine mounting

- a) Bed having provision of X-Y-Z co-ordinate adjustment for centre line matching  
b) T-slotted bed (**650 x 550 mm or higher**)  
c) T-nut, bolt and spanner

### 14. Cardan shaft

Universal joint on both ends to connect dynamometer and engine output shaft

### 15. Starting operation of engine

Should facilitate engine cranking or starting operation

### 16. Installation, Commissioning and Demonstration:

The system is required to be installed, commissioned and demonstrated at the buyer's site (i.e. CSIR-CMERI, Durgapur) by factory trained engineer. Maintenance and training manuals should be supplied.

## Annexure - I

## 17. Warranty:

- a) One year comprehensive onsite warranty (including spares) from the date of installation.
- b) Product support and spares for period of warranty period, to be ensured by bidder.

## 18. Qualification criteria

- a) Manufacturer: Bidder/OEM ~~should~~ be manufacturer of Eddy Current Dynamometers for more than 03 Years.
- b) Bidder/OEM ~~should~~ have supplied at least 2 engine test set-up to research labs to any of the central/state government organizations, Institutions and laboratories or PSUs in India within last 10 years. Full contact details of end users (designation, department, email, phone no etc.) and/or PO copies are required to be enclosed along with the technical bid.
- c) Bidder/OEM ~~should~~ provide details/values of offered product against each of the specifications items in the compliance statement. Simply writing "Complied" without details of the offered item shall be treated as "non-compliance". Product specifications sheet/brochure should also be submitted with the technical bid.

~~Prave~~ Insan Susanto Himadhy Wan  
Burman Jay Sudip Samanta