Our Ref: CMD-III/16:10001

13 12 2010

Subject: Implementation of Amendment No. 6, November 2010 to IS 10001:1981, Specification for Performance Requirements for constant speed compression ignition (diesel) engine for general purposes (up to 19 kW)

Amendment No. 6, November 2010 to IS 10001:1981, Specification for Performance requirements for constant speed compression ignition (diesel) engine for general purposes (up to 19 kW), has been published (copy enclosed). Through this Amendment, “up to 20 kW” has been replaced by “up to 19 kW” in the title and clause 1 of the specification.

After publication of above Amendment, the existing STI has been revised as Doc: STI/10001/6, December 2010. It has been decided to implement the above amendment as well as revised STI (Doc: STI/10001/6, December 2010) with immediate effect.

ROs/BOs are requested to inform the licensees of IS 10001:1981 under their jurisdiction about implementation as above.

(Ashok Narula)
Sc E (CMD-III)

Encl: As above.

Sc.F& H (CMD-III)

All ROs/BOs,
BIS LABS
ITSD - For hosting on the BIS Intranet

CC to i) CMD-1
ii) TED for arranging gazette notification
SCHEME OF TESTING AND INSPECTION
FOR CERTIFICATION OF
CONSTANT SPEED COMPRESSION IGNITION (DIESEL) ENGINES FOR
GENERAL PURPOSES (UP TO 19 kW)
ACCORDING TO IS: 10001-1981
(Including Amendment No.1 to 6)

1. LABORATORY: A laboratory shall be maintained which shall be suitably equipped and
staffed where different tests given in the specification shall be carried out in accordance with the
methods given in the specification.

1.1 All testing apparatus/measuring instruments shall be periodically checked and calibrated and
records of such checks/calibration shall be maintained.

1.2 Production gauges, inspection gauges, master gauges (plug and gauges) shall be checked /
calibrated after every 5000 applications or three months whichever is earlier. Slip gauges, dial
gauges, thread gauges and bore gauges shall be got calibrated once in three years.

1.3 Pressure gauges and pyrometers shall be checked with master gauges once in 6 months or be
replaced whenever not found in working order. Other Instruments / equipments / gauges shall be
checked / calibrated at a frequency decided in consultation and approved by the Bureau.

2. The manufacturer shall maintain a system of works inspection at all stages of procurement and
manufacture to ensure that the individual working parts of engine are free from all manufacturing defects.

3. TEST RECORDS - All records of tests and inspections shall be kept in suitable forms approved by the
Bureau. For some tests and inspections, specimen Performas are given in Annexure I and IV. For other
tests and inspections, records shall be kept in suitable Performa approved by the Bureau.

3.1 Copies of any records or charts that may be required by the Bureau shall be made available at any time
on request.

3.2 QUALITY CONTROL - It is recommended that, as far as possible, statistical quality control (SQC)
methods may be used for controlling the quality during production as envisaged in this scheme.[see IS:397
(Part I) to IS 397(Pt. IV)

3.3 In addition, effort should be made to gradually introduce Quality Management system in accordance
with IS/ISO 9001

4. STANDARD MARK - The Standard Mark as given in Column 1 of the First Schedule of the licence
shall be applied on the data plate, provided always that each engine, so marked, conforms to every
requirement of the specification.

4.1 MARKING: In addition following shall be legibly and indelibly marked on the Engine:
   a) Serial number of the engine;
   b) Manufacturer name/Trade mark and code number;
   c) Type of Rating
   d) Rated speed in rev/min;
   e) Rated Output in kW
   f) Grades of oil & fuel to be used;
   g) Specific fuel consumption g/kWh;
h) Class of Governing; and  
i) Made in India.  
j) Licence No (CM/L ............)

4.2 Approval of the data plate(s) before use shall be obtained from the Bureau.

5. LEVELS OF CONTROL - The tests as indicated in Table 1 and at the levels of control specified therein, shall be carried out on the whole production of the factory which is covered by this scheme and appropriate records and charts maintained in accordance with para 1.1 and 3 above. All the production which conforms to the Indian Standard and covered by this licence shall be marked with BIS standard Mark.

6. DESIGN, DRAWINGS, DECLARATIONS AND MEASUREMENTS

6.1 The manufacturer shall submit and obtain approval of the design details and drawing of critical components and flywheel(s) of each type and rating of engine from the Bureau in the beginning and whenever there is a change.

6.2 Drawings should be prepared according to SP 46 (Code of practice for General Engineering Drawings) and approval obtained from the Bureau. Drawings shall specify the material, hardness, tolerance, surface finish and all other necessary details. Drawings of critical components and flywheel(s) shall suitably be kept in the standards room for day today inspection and for reference when required.

6.3 Fuel consumption, rated power output (IS rating A (with overload), speed, lubricating oil consumption, Mechanical efficiency and Class of governing shall be declared according to Section 1 of IS: 10000 (Part IV) and Clause 4 of IS:10001:1981. Mechanical efficiency, in the absence of specific declaration based on tests, shall be assumed to be 80%.

6.3.1 The technical literature supplied with the engine shall have the following information:

a) Information given on the data plate (see Clause 4 of STI)
b) Accessories supplied with engine.
c) Operating instructions including operating temperatures and lubricating oil pressure(s)
d) Servicing schedule and information as per Clause 3 of IS: 10000 (Part XI)
e) Preferably exploded view of engine / sub-assemblies giving all the parts of engine would also be given.

6.4 The measuring instruments shall be of accuracy as indicated in IS:10000 (Part III). The units of measurement shall preferably be as per the IS: 10000 (Part III).

6.4.1 Observations and test results shall be recorded as per IS: 10000 (Part VI) and Clause 3 of this scheme. Performance curves shall be plotted in accordance with appendix D of IS: 10000 (Part VI).

6.4.2 Power of the engine shall be determined during the performance test. Specific Fuel Consumption (SFC) of an engine shall be the value reported from the fuel consumption test (Ref. Clause 3.5.3 of IS:10001:1981) and SFC observed during full load condition, during 8 hour rating test shall not exceed SFC at full load in fuel consumption test by more then 5%. Measured values shall be compared with the declared values given in the licence applying the adjustment factors and tolerances as per Section 1 of IS: 10000 (Part IV) and clause 4.1.1 and 4.2.2 of IS: 10001-1981.

7 RAW MATERIAL/COMPONENTS INSPECTION

7.1 RAW MATERIAL – All raw materials shall be according to company standards approved by the Bureau. Manufacturer’s test certificates should be procured for the raw materials. Checks for physical and chemical requirements shall be done on lot-wise basis.
7.2 COMPONENTS – For all components either purchased from outside sources or manufactured by licensee/vendor, the following details should be available: The vendor shall submit the test report of all the critical components, and will be supplied along with the engine.

a) Complete specification and drawing of each component will be supplied by the manufacturer to the vendor.

b) Inspection sheet for each component laying down the various characteristics to be checked along with their requirements according to drawings and the type of gauges to be used (a list of gauges, measuring instruments etc. is given in Annexure VI to VIII).

c) Sampling plan for each component – For critical components, as far as possible, inspection shall be 100% for critical dimensions whereas for non-critical dimensions of critical components and the other components sequential sampling method with an AQL between 1 to 4% be adopted by the vendor and supervised by manufacturer’s representatives.

d) Test certificates shall be obtained for physical and chemical properties for each lot of components received by the licensee. The material of Crank shaft, Connecting Rods and Valves shall also be periodically tested for chemical composition and where possible, for physical properties, as per the declaration in the drawings. Such testing may preferably be done for every lot of the components but at least once in three months at the vendors premises and countersigned by manufacturer’s representatives posted in vendor’s premises. However, the complete responsibility lies with the manufacturer (licensee).

7.2.1 Various critical components as given in Annexure V shall be procured from manufacturers whose quality has been established. A change in the material design / Size of the critical components should be brought to the notice of this Bureau immediately and used for ISI marked engines only after approval by ISI. In case components carry the ISI Mark no further approval is necessary but intimation to that effect shall be sent to the Bureau. The licensee shall ensure as far as possible that the components conform to the Indian Standard Specification, if any and through their periodic checking by the manufacturer (licensee).

7.3 Colour codes or any other suitable method shall be used to indicate the decision after inspection and testing (For example Reject – Red, Rework-Yellow, Accept-Green).

8. INSPECTION OF CASTING

8.1 FOUNDRY – Where a licensee is having his own foundry and he is casting important components like Cylinder head, Cylinder block, Cylinder liner and Crank case, the following controls are necessary:

a) There should be a control on the chemical composition of the melt. The firm must have arrangement of chemical testing. Samples for tensile strength and transverse strength shall be tested in licensee’s factory or in an outside laboratory if properties do not match with the licensee. For this purpose, separate test bars shall be cast and tested as per IS: 210 and IS: 6331 respectively. Chill test is normally carried out during casting.

b) Equipments for said testing like rapid moisture tester, strength tester (green and dry), permeability tester and core hardness tester shall be available for ensuring the use of good quality sand in the moulds.

c) A metallurgical microscope to check the micro structure of the casting is recommended.

d) The grade of the cast iron to be used for various components shall be specified. Minimum of grade FG-200 is recommended.
8.2 When castings are obtained from outside sources, test certificates for the physical and chemical properties should be obtained as per IS: 6331. For critical components like cylinder head, cylinder block, cylinder liner and crankcase test bars shall be obtained with each lot and tested at least once in three months or earlier whenever there is change of a manufacturer. If casting are not accompanied by test certificates the test bars received with the lot shall be tested. Test bars, mechanical test, sampling, retests shall be as given in IS: 210. Test results shall be as per Table 1 and A-1.1 of IS: 6331.

9. REJECTION - If an engine fails in any one or more of the requirements, if shall be considered as unfit for the purpose of marking. Such engine shall be given a suitable identification mark to distinguish from those passing.

9.1 The engines rejected as per 9 above may, however, be suitably repaired and defects rectified. Such repaired engine when tested again should conform to all the requirements of the specification for being fit for the purpose of ISI marking. Records for initial failure rework and retesting shall be maintained.

9.2 A separate record shall be maintained giving information relating to the rejection and the method of disposal of engines which do not conform to the specification even after reworking. Such engines shall not, in any case, be stored together with those conforming to the specification.

10 PACKING – The engines shall be suitably packed so as to avoid damage during transits.

11 SAMPLES - The licensee shall supply, free of charge, the samples required in accordance with the Bureau of Indian Standards (Certification) Regulations, 1988, as subsequently amended, from the factory or godowns. The Bureau shall pay for the samples taken by it from the open market.

12 REPLACEMENT - Whenever a complaint is received soon after the goods with Standard Mark have been purchased and used, and if there is adequate evidence that the goods have not been misused, defective goods are replaced free of cost by the licensee, in case the complaint is proved to be genuine and the warranty period (where applicable) has not expired. The final authority to judge the conformity of the product to the Indian Standard shall be with the Bureau. The firm shall have its own complaint investigation system as per IS/ISO 10002.

12.1 In the event of any damages caused by the goods bearing Standard Marks, or claim being filed by the consumers against BIS Standard Mark and not “conforming to” the relevant Indian Standard, entire liability arising out of such non-conforming product shall be of licensee and BIS shall not in any way be responsible in such cases.

13 STOP MARKING - The marking of the product shall be stopped under intimation to the Bureau if, at any time, there is some difficulty in maintaining the conformity of their product to the specification, or the testing equipment goes out of order. The marking may be resumed as soon as the defects are removed under intimation to Bureau.

13.1 The marking of the product shall be stopped immediately if directed to do so by Bureau for any reason. The marking may then be resumed only after permission by the Bureau.

14 PRODUCTION DATA - The licensee shall send to BIS as per the enclosed proforma-1 to be authenticated by a Chartered Accountant, a statement of quantity produced, marked and exported by him and the trade value thereof at the end of each operative year of the licence.
<table>
<thead>
<tr>
<th>Cl.</th>
<th>Test Details</th>
<th>Test Method</th>
<th>Levels of Control</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1.1</td>
<td>Critical Components</td>
<td>As per Clause 6, 7 &amp; 8 of the Scheme</td>
<td>List of Critical Components is given in annexure-V. the components shall, as far as possible, conform to relevant Indian Standard specification, if any, In case components carry the ISI Mark, no further inspection may be necessary. If core engine is supplied by the vendor then critical component report duly inspected by the vendor and countersigned by the firm’s representative posted in the vendor’s premises shall be provided along with each engine dispatched to manufacturers final assembly unit</td>
<td></td>
</tr>
<tr>
<td>FLY SHEEL (s)</td>
<td>As per Approved Drawings</td>
<td>Fly wheel(s)</td>
<td>General conditions and adjustment factors shall be as per IS 1000 (Part II), IS 10000 (Part IV) &amp; Cl.3 of IS 10001:1981.</td>
<td></td>
</tr>
<tr>
<td>a) Size</td>
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<tr>
<td>b) Weight</td>
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<tr>
<td>c) Balancing</td>
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<td></td>
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<tr>
<td>TESTS</td>
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<tr>
<td>a) ROUTINE TESTS</td>
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<tr>
<td>i) Fuel Consumption</td>
<td></td>
<td></td>
<td>Each Engine: It shall be done in a manner to ensure that if the engine is tested as per IS: 10001-1981, it would meet the requirements.</td>
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<tr>
<td>ii) Output power</td>
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<tr>
<td>iii) Governing</td>
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</tr>
<tr>
<td>3.6</td>
<td>b) Routine Production Acceptance Test</td>
<td>IS 10000 (Part VIII) &amp; IS 10000 (Part-IV)</td>
<td>Diesel engines of each Rating once a week OR From a months production of each rating one engine out of every20 engines to be tested</td>
<td>Samples shall be selected from the production line and preferably from early production of the week / out of the first few of 20 engines, as applicable. Before starting the test, each engine (selected at random) shall be well run for the period and manner pre-declared by the licensee and running in period shall include 10% overloading (see Cl. 2.1 of IS: 10000 (Part-V).</td>
</tr>
<tr>
<td>i) Eight Hour Rating Test</td>
<td></td>
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<tr>
<td>ii) Fuel Consumption Test</td>
<td>-do-</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>iii) Governing Test</td>
<td>IS 10000 (Part – VII)</td>
<td></td>
<td>Fuel consumption test and governing test shall be carried out only after twelve hour rate test, however sequence of fuel consumption test governing test may be interchanged. In case any functional change in the design of the critical components mentioned under cl.3.1.1 of IS 10001:1981 is made, the test shall be carried out according to IS 10000 (Pt.3) only.</td>
<td></td>
</tr>
<tr>
<td>3.4</td>
<td>c) MEC H. EFF.</td>
<td>Cl.6 Sec.1</td>
<td>IS 10000 (Pt.IV)</td>
<td>Diesel engines of each type, design and rating once in a year</td>
</tr>
</tbody>
</table>
### TABLE 1 - LEVELS OF CONTROL

(Para 6 of Scheme of Testing and Inspection)

<table>
<thead>
<tr>
<th>Clause</th>
<th>Test Details</th>
<th>Test Method</th>
<th>Levels of Control</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>Type Test</td>
<td>3.1</td>
<td>IS 10001:1981</td>
<td>Whenever there is functional change in type/design of the engines [See clause 3.1.2 of IS: 10001-1981] or change in any of the critical* components (see cls.3.1.1 of IS 10001:1981) or when asked by BIS for specific reasons at any time.</td>
</tr>
<tr>
<td>3.1 a)</td>
<td>i) Preparation for Test</td>
<td>IS 10000 (Part V)</td>
<td></td>
<td>The engine selected for type and performance test shall be from regular production line and already run in for a period and the manner declared by the manufacturer. All parts essentials for engine operation shall be included.</td>
</tr>
<tr>
<td>3.1 b)</td>
<td>ii) Preliminary Run</td>
<td>4</td>
<td>IS 10000 (Part V)</td>
<td>During performance tests sequence of governing test and fuel consumption test may be interchanged depending on the convenience of testing.</td>
</tr>
<tr>
<td>3.1 c)</td>
<td>iii) Initial Performance Test</td>
<td>Sec.1</td>
<td>IS 10000 (Part-VIII)</td>
<td></td>
</tr>
<tr>
<td>3.1 d)</td>
<td>iv) Governing Test</td>
<td>IS 10000 (Part VII)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1 e)</td>
<td>v) Endurance Test</td>
<td>Sec.1</td>
<td>IS 10000 (Part IX)</td>
<td></td>
</tr>
<tr>
<td>3.1 f)</td>
<td>vi) Governing Test</td>
<td>IS 10000 (Part VII)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1 g)</td>
<td>vii) Final Performance Test</td>
<td>Sec.1</td>
<td>IS 10000 (Part-VIII)</td>
<td></td>
</tr>
<tr>
<td>3.1 h)</td>
<td>viii) Final Inspection Test</td>
<td>6</td>
<td>IS 10000 (Part V)</td>
<td></td>
</tr>
<tr>
<td>3.1 i)</td>
<td>ix) Categories of Test</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Type Test</td>
<td>4.1</td>
<td>IS 10000 (Part XIII)</td>
<td></td>
</tr>
<tr>
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<td>Performance Test</td>
<td>4.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Endurance Cycle</td>
<td>4.3</td>
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</tr>
</tbody>
</table>

*Critical components refer to those components whose failure could result in severe damage to the engine.*
**ANNEXURE – I**

**PROFORMA FOR RECORDING OBSERVATIONS / RESULTS OF ROUTINE TESTS (See Table 1 of STI)**

Production Control Number: __________________________   kW ______________   Rev/Min __________________________

Dynamometer (Details: __________________________    Full Output Load (FOL) __________________________ Kg
(Constant: __________________________

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Time of Run (h)</th>
<th>Load (Kg)</th>
<th>% of FOL</th>
<th>Rev/min</th>
<th>Fuel Consumption (Sec/50 cc)</th>
<th>Water Temperature (Inlet)</th>
<th>Other Observations</th>
<th>Remarks (Including action taken incase engine found failing)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Specific Fuel Consumption at Full output load (g/kWh)

<table>
<thead>
<tr>
<th>Governing Test</th>
<th>Change in Load %</th>
<th>Temporary Change Ref/Min %</th>
<th>Permanent Change Rev/Min %</th>
<th>Result Pass/Fail</th>
<th>Action Taken in Case of Failed Engine</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

Note: 1. Steps of load may be suitably selected as per declaration by the licensee and shall necessarily include steps of 100% & 110% output power which is applicable for Engines of IS rating A (with overload).

2. Recording Water temperatures will be optional provided it is ensured that declared temperature are maintained.

Engine number allotted __________________________ Sign. Of Tester ______________
(After testing and found passing)
Brand Name ______________

Sign. Of Q. C. Engineer ______________

*Annexure – II ……*
### ANNEXURE - II

**LOG SHEET FOR FUEL CONSUMPTION AND 8 HR. RATING TESTS FOR CONSTANT SPEED INTERNAL COMBUSTION ENGINES FOR GENERAL PURPOSES.**

<table>
<thead>
<tr>
<th>Name of the Engine Manufacturer: _________________________</th>
<th>Sheet No. ______________ of ______________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type: ________________________________________________</td>
<td>Altitude (m) ______________________________</td>
</tr>
<tr>
<td>Model: ________________________________________________</td>
<td>Nominal Compression Ratio: __________________</td>
</tr>
<tr>
<td>No. of Cylinders: ______________________________________</td>
<td>Fuel Specification (According to IS: 1460 __________</td>
</tr>
<tr>
<td>Rated Speed (n) rev/min: _______________________________</td>
<td>(Including Calorific Value &amp; Specific Gravity) ________________</td>
</tr>
<tr>
<td>Rated Brake Power (Pa), kW: _____________________________</td>
<td>Manufacturer’s Recommended Grade of Oils _______________</td>
</tr>
<tr>
<td>Bore (mm): ___ Stroke (mm) __________________</td>
<td>Dynamometer: Type ____________________________</td>
</tr>
<tr>
<td>Cubic Capacity, Litres: ______________________________</td>
<td>Arm Length ________________________________</td>
</tr>
<tr>
<td>Mechanical Efficiency(m): _____________________________</td>
<td>Constant _________________</td>
</tr>
<tr>
<td>Place of Test: __________________ Date __________________</td>
<td>Production Control Number _________________</td>
</tr>
<tr>
<td>Testing Laboratory ___________________________</td>
<td>Engine Number Allotted (After engine has passed the test) ________</td>
</tr>
</tbody>
</table>

Observations:
<table>
<thead>
<tr>
<th>Sr No.</th>
<th>Time (s)</th>
<th>Barometer Reading (mm Hg)</th>
<th>Temperatures</th>
<th>Fuel Consumption</th>
<th>Cooling Water</th>
<th>Lubricating Oil</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>kPa</td>
<td>Wet Bulb K</td>
<td>Dry Bulb K</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Air Intake (Ta) K</td>
<td>Exh. Back Pressure (Peb) kPa</td>
<td>Rela Hum (Φ) %</td>
<td>Obs. Sp. rev/min</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

Signature of Tester

Signature of Q.C. Engineer

ANNEXURE – III...
ANNEXURE – III

Name of Licensee: _____________________________________________

PERIODICAL INSPECTION REPORT OF GAUGES

Number: ___________________________

Name / Type of Gauge / Instrument _______ Component _______________________

Make ______________________________ Drawing No. ______________________

Class of Tolerance _________________

Wear Limit of “G” Gauge _____________

<table>
<thead>
<tr>
<th>Size</th>
<th>Nominal</th>
<th>Required</th>
<th>Actual</th>
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<tbody>
<tr>
<td>Size of G Gauge</td>
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<td></td>
</tr>
<tr>
<td>Size of No-Go Gauge</td>
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</table>

PERIODICAL INSPECTION

<table>
<thead>
<tr>
<th>Date of Inspection</th>
<th>Temp. OK</th>
<th>Go Gauge</th>
<th>No-Go Gauge</th>
<th>Remarks</th>
<th>Sign. Of Inspector</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Size</td>
<td>Error</td>
<td>Size</td>
<td>Error</td>
</tr>
</tbody>
</table>

Annexure – IV …
# ANNEXURE - IV

**PRODUCTION AND TESTING REGISTER**

Name of Licensee: _____________________________________

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Date of Production</th>
<th>Rating kW</th>
<th>Rev/Min</th>
<th>Prod. Control No.</th>
<th>Date of Testing</th>
<th>Nature of Test</th>
<th>Result</th>
<th>Engine Number Allotted</th>
<th>ISI Marked or Not</th>
<th>Cumulative total of ISI Marked Engine</th>
<th>Brand</th>
<th>Remarks</th>
<th>Sign.</th>
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</thead>
<tbody>
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</tbody>
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Annexure – V …..

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ANNEXURE – V

LIST OF CRITICAL COMPONENTS

1. Cylinder Head
2. Crank Case
3. Cylinder Block
4. Cylinder Liner
5. Inlet and Exhaust Valves
6. Valve Guides
7. Rocker Arm
8. Tappets
9. Pistons
10. Piston Rings
11. Gudgeon Pin
12. Connecting Rod
13. Crankshaft
14. Main Bearings
15. Big end Bearing and Small end Bearing, Bush for Connecting Rod
16. Connecting Rod Bolts and Nuts
17. Camshaft, Cams and Timing Gears
18. Valve Springs and Governor Springs (Whenever applicable)
19. Fuel Injection Equipments, such as Fuel Injection Pump, High Pressure Pipe, Injector / Nozzle & Nozzle Holder
20. Lubricating Oil Pump
21. Sealing gaskets and
22. Governor Weights
ANNEXURE VI
LIST OF INSTRUMENTS

1. Gauges:
   a) Go & No-Go Plug Gauges
   b) Go & No-Go Snap Gauges
   c) Ring Gauges
   d) Thread (Plug and Ring) Gauges

2. Inside Micro-Meters

3. Outside Micro-Meters

4. Vernier Calipers

5. Height Gauge(s)

6. V-Block & Magnetic Stand

7. Feeler Gauge(s)

8. Depth Gauge(s)

9. Dial Gauges

10. Slip Gauge Set

11. Comparator

12. Dial Bore Gauges and Master Rings

13. Surface Plates

ANNEXURE VII......
ANNEXURE VII
LIST OF EQUIPMENT FOR IN-PROCESS CONTROL

A.  1. Hardness Tester
2. Spring Tester
3. Crack Detector (recommendatory only)
4. Nozzle Tester
5. Lub-Oil Pump Tester
6. Fly-wheel Balancing Equipment(s)
7. Cam-Detail Checking Equipment
8. Hydraulic Pressure Testing Equipment
9. Connecting Rod Alignment & Twist Checking Rig
10. Crankshaft Alignment & Pin Parallelism Checking Rig
11. Balances (Preferably Self-indicating type)
12. High Pressure Fuel Pipe Flushing Equipment
13. Torque Wrenches
14. Compression Pressure Tester
15. Gear Marking Apparatus
16. Valve Timing Apparatus
17. Arrangement for Checking Bumping Clearance

B. Foundry Controls please see Cl. 9 of STI.

Annexure – VIII .....
ANNEXURE VIII

LIST OF TESTING EQUIPMENT

1. Test bed(s) with suitable dynamometer(s) and loading arrangements
2. Pressure Gauges
3. Barometer
4. Hydrometer / Humidity Indicator (or dry & wet bulb thermometers with humidity chart)
5. Tachometer / Stroboscope (instantaneous type)
6. Fuel Measuring Apparatus
7. Stop Watch
8. Thermometers / Pyrometer(s) temperature gauges
9. Hygrometer(s) for Specific Gravity of Fuel & Lub Oil.
10. Exhaust back pressure gauge / Manometer
11. Suitable water circulation arrangements for water cooled engine for rope brake drum (in case of rope brake dynamometer) / Hydraulic dynamometer etc. for maintaining consistency in working temperatures.
12. Equipment for governing test
13. Equipment for determination of mechanical efficiency (recommendatory)
15. Apparatus for determination of lubricating oil consumption.
AMENDMENT NO. 6 NOVEMBER 2010
TO
IS 10001 : 1981 SPECIFICATION FOR
PERFORMANCE REQUIREMENTS FOR
CONSTANT SPEED COMPRESSION IGNITION (DIESEL)
ENGINES FOR GENERAL PURPOSES
(UP TO 20 kW)

(Page 1, Title) — Substitute ‘(UP TO 19 kW)’ for ‘(UP TO 20 kW)’.

(Page 1, clause 1) — Substitute ‘up to 19 kW’ for ‘up to 20 kW’.

(TED 2)

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