### TECHNICAL INFORMATION ON THREE-PHASE GENERATOR SET

#### A. COMPANY

1. **Name of Company**: 
2. **Address**: 
   - 
   - 
   - 
   - 
3. **Telephone No**: 
4. **Fax No**: 

#### B. PRODUCT SPECIFICATION

1. **Brand Name**: 
2. **Model No**: 
3. **Approval Standard**: 
4. **Test Report No**: 

5. General

5.1 A diesel engine directly coupled to a 3-phase alternator with auxiliary equipment. □ Yes □ No  

5.2 Capable of delivering and maintaining a continuous power of not less than the kVA specified at 0.8 lagging power factor, 415 V, 3 phase, 4 wire and 50 Hz. □ Yes □ No  

5.3 The operating conditions shall be:

5.3.1 Total barometric pressure: 750mm Hg. □ Yes □ No  
5.3.2 Air temperature: 40° C □ Yes □ No  
5.3.3 Relative humidity: 95% □ Yes □ No  

5.4 The engine and alternator must be provided with nameplates bearing serial numbers, ratings, registered supplier's name and address and date of commissioning. □ Yes □ No  

5.5 The material, equipment and installation shall conform to the principles of the latest edition standards and codes of practice laid down by the MS, IEC, ISO and BS. □ Yes □ No  

5.6 Comply with:

5.6.1 ISO 3046 □ Yes □ No  
5.6.2 ISO 8528 □ Yes □ No  
5.6.3 IEC 60034 □ Yes □ No  
5.6.4 IEC 60034-22 □ Yes □ No  
5.6.5 IEC 60085 □ Yes □ No  
5.6.6 BS 4999-140 □ Yes □ No  
5.6.7 .................. (Please specify) □ Yes □ No  

6 Generator Set

6.1 Designed for cold starting and capable of supplying the rated kVA specified in not more than 15 sec. from initiation of the starting procedure. □ Yes □ No  

6.2 Performance class G2 of ISO 8528-5. □ Yes □ No  

6.3 Mounted on a base frame and the mounting shall be of fully resilient type. □ Yes □ No
6.4 The base frame shall be provided with lifting points for transportation. □ Yes □ No O

6.5 Spring type vibration damper shall be installed and supplied together with generator set. □ Yes □ No O

7. Engine

7.1 Multi cylinder, vee/in line configuration, 4 stroke, direct injection, naturally aspirated or turbo charged, water-cooled with fan and radiator and instant starting. □ Yes □ No O

7.2 Speed shall be 1500 r.p.m. □ Yes □ No O

7.3 Comply with relevant parts of ISO 3046 and ISO 8528-2 as minimum requirements. □ Yes □ No O

7.4 Capable to meet any transient load requirements caused by motor starting and/or any load profile as specified and/or shown in the drawings. □ Yes □ No O

7.5 Able to withstand an overload of 10% at rated speed for 1 hour in any period of 12 hours consecutive running. □ Yes □ No O

7.6 Capable of sustaining indefinitely without deterioration to run under low load condition. □ Yes □ No O

8. Fuel System

8.1 Capable of operating on Class A fuel to BS 2869. □ Yes □ No O

8.2 Fuel pump shall be of the gear type. □ Yes □ No O

8.3 Fuel filter of heavy duty, replaceable and paper element type. □ Yes □ No O

9. Lubrication System

9.1 Complete with enclosed force-feed lubricating system by gear type oil pump with full flow replaceable paper element type oil filter. □ Yes □ No O

9.2 Oil pan shall be of the sump type. □ Yes □ No O

10. Engine Governing

10.1 Speed governing of the engine shall comply with ISO 3046-4. □ Yes □ No O

10.2 The governing accuracy of the engine shall be of performance class G2 within the operating limit values in accordance with ISO 8528-2. □ Yes □ No O

10.3 The speed droop shall be less than 5% with steady-state speed band of less than 1.5%. □ Yes □ No O
10.4 Governor shall be of proportional integral (PI) type.

10.5 Governor shall be of proportional integral differential type (for parallel operation).

10.6 Generator set is rated at or more than 1000 kVA or for parallel operation of two or more generator sets, the governor shall be of proportional integral differential (PID) electronic type.

11. Engine Instrumentation

11.1 The instruments and gauges shall be of the flush mounting on the metal clad panel and shall include but not limited to the followings:

11.1.1 Elapsed hours running meter.

11.1.2 Lubricating oil pressure gauge.

11.1.3 Cooling water temperature gauge.

11.1.4 Tachometer.

12. Alternator and Exciter

12.1 Screen protected, drip-proof, revolving fields, self-regulating, brushless (excitation system), salient pole type, directly coupled to the engine and fitted with exciter compliance to relevant parts of IEC 60034 and IEC 60034-22.

12.2 Alternator shall be of 415V, 3 phase, 4 wire, 50 Hz and duty type S1 in accordance with IEC 60034-1.

12.3 Capable of delivering its basic continuous rating not less than the rated kVA specified at 0.8 power factor lagging.

12.4 Principal characteristics of the alternator shall comply with ISO 8528-3.

12.5 Insulation of Class ‘H’ conforming to IEC 60085.

12.6 Temperature rise limits of Class ‘F’ complying with IEC 60034-1.

12.7 For rated capacity at and exceeding 1000 kVA, the alternator shall be fitted with winding heaters.

12.8 Winding heaters shall complete with automatic thermostat control, maintaining the winding temperature at 5°C above ambient temperature when the alternator is at standstill.

12.9 Winding heaters shall be arranged for automatic disconnection when the alternator is in operation.
12.10 Two winding heaters per phase shall be provided. One winding heater shall be connected for operation and the other is for replacement in case the first heater fails.

12.11 RTD of PT 100 shall be provided to monitor the winding temperatures during operation.

12.12 For parallel operation the voltage regulations shall comply with the requirements of BS 4999-140 and relevant parts of ISO 8528.

12.13 Voltage regulation shall be of solid-state transistor amplified type.

12.14 Voltage regulation conforming to performance class G2.

12.15 When driven at rated speed and operating with its normal excitation control system, shall be capable of maintaining the voltage under steady state conditions within ± 2.5 % (± 1 % for parallel operation) of rated voltage for all loads between no-load and rated load at rated power factor.

12.16 Transient changes the voltage shall restore to within these limits in less than 1.5 seconds.

12.17 When driven at rated speed and giving its rated voltage on no load under its normal excitation control system is switched on to a sudden load application, the initial voltage drop shall be limited to 20 % of rated voltage and the voltage shall recover to rated voltage in less than 1.5 sec.

12.18 Normal voltage shall be variable by means of voltage trimmer within ± 5 % of rated voltage.

12.19 AVR shall be of 3 phase sensing electronic type equipped with radio frequency interference (RFI) suppressor to EMC compliance and encapsulated to provide protection against moisture and salt-spray.

12.20 AVR shall be mounted on anti-vibration mounts for mechanical protection from engine vibrations.
SPECIFICATION CHECKLIST FOR THREE-PHASE GENERATOR SET

The generator set manufacturer/dealer is required to furnish the following information:

1. Manual to be provided:
   a) Operation manual for engine
   b) Operation manual for alternator
   c) Servicing manual for engine
   d) Servicing manual for alternator
   e) Spare parts manual for engine
   f) Spare parts manual for alternator

2. Spares and Stock position:
   a) Size of stores:

   ...................................................................................................
   ...................................................................................................
   ...................................................................................................
   ...................................................................................................

   b) Quantity and amounts of stocks:

   ...................................................................................................
3. Personnel:

Servicing staff: (set-up, nos. and including the grades)

4. Servicing centres:

Nos. and places of all servicing centers in Malaysia.

5. Load testing facilities in the factory:

a) Resistive load – maximum capacity that the generator set can be tested at unity power factor

b) Inductive load – maximum capacity that the generator set can be tested at 0.8 power factor lagging

6. To indicate the batteries capacity (Ah) for starting the generator set (refer to Lampiran 2). The batteries shall satisfy the requirements of Jabatan Bomba dan Penyelamat and Department of Environment.
7. To confirm whether the generator set can take care of thyristor load.

(Please submit the relevant detail documents).
### ENGINE
- **Jenama:** ................
- **Buatan:** ................
- **Speed:** ............ rpm

### ALTERNATOR
- **Jenama:** ................
- **Buatan:** ................
- **Fasa / Voltan:** ...... ph. / ...... V
- **Frekuensi:** .......... Hz
- **Insulation Class:** Class ............
- **Temperature Rise Class:** Class ............
- **Rating:** Continuous

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<thead>
<tr>
<th>NO</th>
<th>ENGINE</th>
<th>ALTERNATOR</th>
<th>GENERATOR SET</th>
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<tbody>
<tr>
<td></td>
<td>Model</td>
<td>Continuous Rating at Standard Reference Conditions (kW)</td>
<td>Deration Factor to ISO 3046-1*</td>
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* To submit the deration factor calculation

** N - Naturally Aspirated
** T - Turbo-Charged
** TA - Turbo-Charged After Cooled

** Reference Conditions: Total barometric pressure: ............ mm Hg
** Air temperature: ............ °C
** Relative humidity: ............ %

** Operating Conditions: Total barometric pressure: 750 mm Hg
** Air temperature: 40 °C
** Relative humidity: 95%
<table>
<thead>
<tr>
<th>No</th>
<th>Generator Set</th>
<th>Approximate Maximum Gen. Set Dimension</th>
<th>Approximate Maximum Weight of Gen. Set (kg)</th>
<th>Recommendation Plinth Dimension</th>
<th>Minimum Room Dimension Without Acoustic</th>
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<tbody>
<tr>
<td></td>
<td>Model</td>
<td>L (mm)</td>
<td>W (mm)</td>
<td>H (mm)</td>
<td>L (mm)</td>
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<tr>
<td></td>
<td>Capacity (kVA)</td>
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CONDITION OF APPROVAL

The approval for the use of the Generator Set is subject to the following conditions:

1. The manufacturer/dealer cannot refuse to service or repair any generator set which are supplied and installed in any part of the country.

2. The manufacturer/dealer must carry enough stock of spare parts and maintain servicing gang and workshop facilities.

3. The accepted output rating of the generator set is for condition where altitude is up to approximately 100 m above sea level. For generator set to be installed at higher altitude, different derating factor has to be separately determined.

4. The manufacturer/dealer has to show the Sole Agent letter from principal company (i.e. current company from overseas).
Saya ...................................................... dengan ini mengaku keterangan yang diberikan oleh saya bagi pihak Syarikat adalah betul dan benar.

Cop Syarikat:

......................................................   Tarikh: ...................................

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ULASAN (Untuk diisi oleh Pejabat JKR sahaja)

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NOTA:

Untuk diisi seperti berikut:

O – LULUS

O - KANDAS