

# Penilaian Bahan/Barangan Elektrik: Pematuhan kepada Standard, Spesifikasi & FAT Bahan/Barangan Generator Sets

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## **Standards**

#### Main standards

- ISO 3046 : Reciprocating internal combustion engines (series – part 1, 3, 4, 5, 6, 7)
- ISO 8528 : Reciprocating internal combustion engine driven alternating current generating sets (series part 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12)
- IEC 60034 : Rotating electrical machines

RIC = Reciprocating Internal Combustions



#### **Three Phase Generator Set**





1.Intelligent control panel 4.Starter battery 7.Radiator 2.AC synchronous generator 5.Engine motor 8.Base frame

3.Air filter 6.Fuel filter. 9.Cushion

## Engine Components





## **Generator Set**

#### **Generator Set**

- A generator set consist of one or more RIC engines, one or more a.c alternators (generators) and the components necessary to couple them together as a whole
- The prime movers are RIC engines and prime movers may be two types such as;
  - i) Compression ignition engines (diesel engine)
  - ii) Spark-ignition engines (petrol or gas engine)
- Two types of alternators which may be used on generator sets such as;
  - i) synchronous
  - ii) asynchronous

## **Generator Set**

- Auxiliaries are items of equipment additional to those already installed/fitted on the generator set as supplied but essential to its proper and save operation such as;
  - i) Starting system
  - ii) Air intake and exhaust gas system
  - iii) Cooling system
  - iv) Lubricating oil system
  - v) Fuel system
  - vi) Auxiliary electrical power supply

 $kVA = \frac{The \ engine \ net \ (kWb) \ x \ alternator \ efficiency}{power \ factor}$ 

*kWe* = *kWb* x alternator efficiency

*kWb* : – *not include battery charging alternator power* - *radiator cooling fan power* 

# Engine (ISO 8528 -2)

- The power of the RIC engine shall be declared by the engine manufacturer in accordance with the requirement of ISO 3046-1.
- The main characteristics of the RIC engine to be used by the generator set manufacturer shall be given by the engine manufacturer and shall include at least;
  - i) The power in the conditions as per ISO 8528-1 and in the service conditions
  - ii) The declared speed
  - iii) The consumption of fuel and lubricating oil in the conditions as per ISO 8528-1

# Alternator (ISO 8528-3 & IEC 60034-1)

- The generator rating class shall be specified in accordance with the requirement of IEC 60034-1. In the case of alternators for RIC engine driven generator sets, the continuous rating (duty type S1) or rating with discrete constant loads (duty type S10) shall be specified.
- The maximum continuous rating based on duty type S1 is called the basic continuous rating (BR)
- For duty type S10, there is a peak continuous (PR) where the permissible alternator temperature rises are increased by a specific amount according to the thermal classification
- The alternator shall be capable of delivering its BR over the whole range of operating conditions (e.g. minimum to maximum coolant temperatures) with total temperatures not exceeding 40 °C plus the temperature rises specified in Table 7 of IEC 60034-1.

# **Standard Reference Conditions**

#### Engine (ISO 3046-1)

- Total barometric pressure = 100 kPa (1 bar)
- □ Air temperature =  $25 \degree C$
- $\Box$  Charge air coolant temp. = 25 °C
- $\square Relative humidity = 30\%$

#### Alternator (IEC 60034-1 & ISO 8528-3)

- □ Cooling air temperature < 40 °C
- Coolant temp. at cooler inlet < 25 °C
- Altitude = 1000m a.s.l

#### Generator Set (ISO 8528-1)

- Total barometric pressure = 100 kPa
- Air ambient temperature =  $25 \degree C$
- Relative humidity = 30 %

# **Site Operating Conditions**

#### **Operating Condition (L-S5)**

- □ Total barometric pressure = 750 mm Hg.
- ❑ Air ambient temperature = 40 °C
- $\square Relative humidity = 95\%$
- Note : 1) 750 mm Hg. = 100 kPa
  - 2) Where the site operating conditions **differ** from the standard reference conditions, any necessary adjustment to the generator set power shall be made in order to determine the site rated power of the generator set. (ISO 8528-1)

# **Derating Factor**

- Operating site conditions which may affect the power rating of generator set such as;
- i) Altitude
- ii) Temperature (site barometric pressure, max. and min air temperatures, highest and lowest engine room temperature, relative humidity, max. min cooling water temperatures)

Altitude (m)	1000	1500	2000	2500	3000	3500	4000
Derating factor	1	0.975	0.949	0.922	0.894	0.866	0.837

Ambient T °C	25	40	45	50	55	60 (*)
Class H	1.076	1	0.973	0.946	0.918	0.889
Class F	1.095	1	0.966	0.931	0.894	0.856
Class B	1.140		0.949	0.894	0.837	0.775

(\*) External AVR if ≥ 56 °C

e.g. - Leroy Somer Alternator

Rated Output Generator Set (kW) = kWe X Derating Factor

#### Continuous Power (COP)

- The maximum power which the generator set is capable of delivering continuously while supplying a **constant electrical load** when operated for an **unlimited number of hours per year** under the agreed operating conditions with the maintenance intervals and procedures being carried out as prescribed by the manufacturer.



#### Prime Power (PRP)

- The maximum power which the generator set is capable of delivering continuously while supplying a **variable electrical load** when operated for an **unlimited number of hours per year** under the agreed operating conditions with the maintenance intervals and procedures being carried out as prescribed by the manufacturer.
- The permissible average power output (P<sub>pp</sub>) over 24 hours of operation **shall not exceed 70%** of the PRP unless otherwise agreed by the RIC engine manufacturer.
- It can be necessary to provide additional electrical power for transient load conditions and sudden applied load. This additional power is usually 10% of the rated power of the generator set for a period of one (1) hour with or without interruptions within 12 hours of operation.
- When determining the actual average power output (P<sub>pa</sub>) of a variable power sequence, power of less than 30% of the PRP **shall be taken as 30%** and time at standstill shall not be counted.

- The actual average power output (Ppa ) is calculated as shown in formula below;

$$P_{\text{pa}} = \frac{P_1 t_1 + P_2 t_2 + P_3 t_3 + \dots + P_n t_n}{t_1 + t_2 + t_3 + \dots + t_n} = \frac{\sum_{i=1}^n P_i t_i}{\sum_{i=1}^n t_i}$$

where  $P_1, P_2 \dots P_i$  is the power at time  $t_1, t_2 \dots t_i$ .



Key

time

power

a Prime power (100 %).

Permissible average power during a 24 h period (Ppp).

Actual average power over a 24 h period (Ppa).

Stop.

NOTE  $t_1 + t_2 + t_3 + \dots + t_n = 24 \text{ h}.$ 



#### Limited-time running power (LTP)

- The maximum power available, under the agreed operating conditions, for which the generator set is capable of delivering for up to **500 hours of operation per year** with the maintenance intervals and procedures being carried out as prescribed by the manufacturer.



#### Emergency standby power (ESP)

- The maximum power available during a variable electrical power sequence, under the stated operating conditions for which a generator set is capable of delivering in the event of a utility power outage or under test conditions for up to 200 hours of operation per year with the maintenance intervals and procedures being carried out as prescribed by the manufacturer.
- The permissible average power output (P<sub>pp</sub>) over 24 hours of operation **shall not exceed 70%** of the ESP unless otherwise agreed by the RIC engine manufacturer.
- The actual average power output ( $P_{pa}$ ) shall be **below or equal** to the permissible average power output ( $P_{pp}$ ) defined for ESP.
- When determining the actual average power output (P<sub>pa</sub>) of a variable power sequence, power of less than 30% of the ESP **shall be taken as 30%** and time at standstill shall not be counted.

- The actual average power output (Ppa) is calculated as shown in formula below;

$$P_{\text{pa}} = \frac{P_1 t_1 + P_2 t_2 + P_3 t_3 + \dots + P_n t_n}{t_1 + t_2 + t_3 + \dots + t_n} = \frac{\sum_{i=1}^n P_i t_i}{\sum_{i=1}^n t_i}$$

where  $P_1, P_2 \dots P_i$  is the power at time  $t_1, t_2 \dots t_i$ .



- a Emergency standby power (100 %).
- Permissible average power during a 24 h period (Ppp).
- Actual average power over a 24 h period (Ppa).
- d Stop.

Key

time power

NOTE  $t_1 + t_2 + t_3 + \dots + t_n = 24 h$ 

## **JKR** Specification

#### L-S5 : Specification for Three Phase Generator Set

Description	Requirement
General	<ul> <li>Diesel engine directly coupled to a three phase alternator</li> <li>415 v, three phase, 4 wire, 50 Hz, 0.8 lagging power factor</li> <li>Supplied by the supplier registered with JKR</li> <li>Engine and alternator must provided with name plate</li> </ul>
Generator Set	<ul> <li>Designed for cold starting and be capable of supplying the rated kVA specified in not more than 15 seconds from initiation of the starting procedure</li> <li>Performance class G2 (ISO 8528-5) (Table 4)</li> <li>Configured and mounted on a base frame</li> <li>Spring type vibration damper shall be installed and supplied together with generator set by the registered generator set supplier/manufacturer</li> </ul>
Engine	<ul> <li>Multi cylinder, vee/in line configuration, four stroke, direct injection, naturally aspirated or turbo charged, water cooled with fan and radiator, instant starting.</li> <li>Engine speed shall be 1500 rpm</li> <li>Capable to meet any transient load requirements caused by motor starting and/or any load profile</li> <li>Able to withstand an overload of 10% at rated speed for one (1) hour in any period of twelve (12) hours consecutive running</li> </ul>

# **JKR Specification**

Description	Requirement
Fuel System	- Capable of operating on Class A fuel
Engine Governing	<ul> <li>Comply with ISO 3046-4 (Speed governing)</li> <li>Performance class G2</li> <li>Governor shall be of proportional integral differential (PID) electronic type for parallel operation or rated at or more than 1000 kVA</li> </ul>
Engine Instrumentation	- Complete with all instruments and gauges necessary such as elapsed hours running meter, lubricating oil pressure gauge, cooling water temperature gauge, tachometer, etc.
Alternator and exciter	<ul> <li>415 v, three phase, 4 wire, 50 Hz, duty type S1</li> <li>Screen protected, drip-proof, revolving fields, self regulating, brushless, salient pole type</li> <li>Insulation class H and temperature rise limits class F</li> <li>Fitted with winding heaters c/w automatic thermostat control for alternator of rated capacity at and exceeding 1000 kVA</li> </ul>

# **JKR Specification**

Description	Requirement
Voltage Regulations and Waveform	<ul> <li>AVR shall be of three phase sensing electronic type equipped with radio frequency interference (RFI) compliance and encapsulated to provide protection against moisture and salt-spray</li> <li>AVR shall be mounted on anti-vibration mounts</li> </ul>

## Anti-Condensation Heaters / Winding Heaters / Space Heaters

- For alternator of rated capacity at **exceeding 1000 kVA**, the alternator shall be fitted with winding heaters to prevent moisture in the winding.
- Type of winding heaters such as;
  - i) Flexible pad type heater
  - ii) Cartridge type heater
  - iii) Two circular ring tubular heater





## Anti-Condensation Heaters / Winding Heaters / Space Heaters



## Anti-Condensation Heaters / Winding Heaters / Space Heaters









### **Insulation Class and Temperature Rise**





# Performance Class (ISO 8528-1 & ISO 8528-5)

Class	Description
Class G1	<ul> <li>This applies to generating set applications where the connected loads are such that only basic parameters of voltage and frequency need to be specified.</li> </ul>
	(e.g. general-purpose applications, lighting and other simple electrical loads).
Class G2	<ul> <li>This applies to generating set applications where its voltage characteristics are very similar to those for the commercial public utility electrical power system with which it operates. When load changes occur, there may be temporary but acceptable deviations of voltage and frequency.</li> <li>(e.g. Lighting systems, pumps, fans and hoists).</li> </ul>
	This applies to applications where the connected equipment makes severe
Class G3	<ul> <li>This applies to applications where the connected equipment makes severe demands on the stability and level of the frequency, voltage and waveform characteristics of the electrical power supplied by the generating set.</li> </ul>
	(e.g. Telecommunications and thyristor-controlled loads. It should be remembered that both rectifier and thyristor-controlled loads may need special consideration with respect to their effect on generator set voltage waveform.)
Class G4	- This applies to applications where the demands made on the stability and level of the frequency, voltage and waveform characteristics of the electrical power supplied by the generating set are exceptionally severe.
	(e.g. Data processing equipment or computer system)

### **Transient Characteristics**



Typical transient characteristics when applying or removing loads

#### Transient frequency response



#### Transient voltage response



#### **Operating Limit of Performance Class G2 (ISO 8528-5)**



**Transient Frequency Response** 

#### **Operating Limit of Performance Class G2 (ISO 8528-5)**



#### ISO 8528-5: Table 4 – Performance Class Operating Limit Values

Performance Class	G1	G2	G3	G4
Voltage:				
Steady-state voltage deviation	± 5%	± 2.5%	± 1.00%	AMC
<i>Transient Voltage deviation (Max. voltage dip – max. load increase)</i>	≤ - 25%	≤ - 20%	≤ - 15%	AMC
<i>Transient Voltage deviation (Max. voltage rise – 100%. load decrease)</i>	≤ + 35%	≤ + 25%	≤ + 20%	AMC
Voltage recovery time	≤ 10%	≤ 6%	≤ 4%	AMC

Performance Class Operating Limit Values (Voltage)

**NOTE** : AMC = Agreement between Manufacturer and Customer

#### ISO 8528-5: Table 4 – Performance Class Operating Limit Values

Performance Class	G1	G2	G3	G4
Frequency:				
Steady-state frequency band	≤ 2.5%	≤ 1.5%	≤ 0.5%	AMC
Transient frequency deviation (Max. frequency dip – max. load increase)	≤ - 15%	≤ - 10%	≤ - 7%	AMC
Transient frequency deviation (Max. frequency rise – 100%. load decrease)	≤ + 18%	≤ + 12%	≤ + 10%	AMC
Frequency recovery time	≤ 10%	≤ 5%	≤ 3%	AMC

Performance Class Operating Limit Values (Frequency)

**NOTE** : AMC = Agreement between Manufacturer and Customer

#### ISO 8528-5: Table 4 – Performance Class Operating Limit Values (Overall)

						0	perating lin	nit values		
#		Par	ameter	Symbol	Unit		Performan	ce Class		Notes
						G1	G2	G3	G4	
1	Frequency	ls	ochronous	δf.,	04	0	0	0	AMC	(1)
1	droop	D	roop mode	Uis	70	(≤ - 8)	(≤ - 5)	(≤ - 3)	AMC	(-)
2	Steady-stat	e frequ	uency band	βf	%	≤±2.5	≤±1.5	≤±0.5	AMC	
3	Related ran	ige of a	downward frequency	δírda	%		> 2.5		AMC	(1)
<u> </u>	setting			UIS,00	~	(> 10.5)	(> 7.5)	(> 5.5)	AMC	(-)
4	Related ran	ige of u	upward freq. setting	δ <sub>fs,up</sub>	%		> + 2.5		AMC	
5	Rate of cha	nge of	frequency setting	Vf	%/s		0.2 to 1		AMC	
	Transient		100% load decrease			≤+18	≤+12	≤+10	AMC	
6	difference 1	from	BMEP load increase	δfa	%	≤-15	≤ - 10	≤-7	AMC	(1)
	initial frequ	iency	DIVIET TOdd Increase			(≤ - 23)	(≤-15)	(≤ - 10)	AMC	(1)
	Transient		100% load decrease			≤+18	≤+12	≤+10	AMC	
7	frequency deviation fr	om	PMED load increase	δf <sub>dyn</sub>	%	≤-15	≤ - 10	≤-7	AMC	
	rated frequ	ency	BIVIEP load Increase			≤-25	≤ - 20	≤-15	AMC	(2)
	<b>F</b>		a shine a	t <sub>f,in</sub>		<. 10	<. F	<i>z</i> . 2	AMC	
8	Frequency	recove	ry time	t <sub>f,de</sub>	s	5+10	7+2	2+3	AMC	
9	Related fre	quency	recovery band	α <sub>f</sub>	%	3.5	2	2	AMC	
10	Stoody stat	o volta	and deviation	811	0/	≤±5	≤±2.5	≤±1	AMC	
10	Sleduy-slat	evoita	ige deviation	OUst	70	≤±10	≤±10	≤±1	AMC	(3)
11	Voltage up	halance		۸u	04	1	1	1	1	
11	voitage uni	Jaianco	-	002,0	70	0.5	0.5	0.5	0.5	(4)
12	Related ran	ige of v	oltage setting	δU₅	%	≤±5	≤±5	≤±5	AMC	
13	Rate of cha	nge of	voltage setting	νυ	%/s		0.2 to 1		AMC	
	Transient	100%	load decrease			≤+35	≤+25	≤+20	AMC	
14	deviation	BME	load increase	OUdyn	%	≤ - 25	≤ - 20	≤ - 15	AMC	
11	Voltago rog		time	t <sub>U,in</sub>	s	≤+10	≤+6	≤+4	AMC	
15	voltage rec	overy	ume	t <sub>U,de</sub>	s	≤+10	≤+6	≤+4	AMC	
16	Voltage mo	dulatio	on	Ûmod,s	%	AMC	0.3	0.3	AMC	
17	Active	betw the n	een 80% and 100% of ominal rating	AD	0,2	-	≤+5	≤+5	AMC	
1/	sharing	betw the n	een 20% and 80% of ominal rating	ΔF	70	-	≤+10	≤+10	AMC	
18	Reactive power sharing	betw the n	een 20% and 100% of ominal rating	ΔQ	%	-	≤+10	≤+10	AMC	

# **Rating Plate for Generator Set**

The rating plate shall indicate the following;

- Manufacturer name or Brand name
- ✓ Serial number
- Model number
- Year of manufacturer
- Rated Power (kW & kVA)
   with one of the prefixes
   (COP, PRP, LTP or ESP)
- Performance class
- Rated power factor
- Rated frequency (Hz)
- Rated Voltage (V)
- Rated Current (A)
- Mass (kg)
- Ambient temperature (°C)
- Altitude (m)

(	Gen	era	ıl set		
Manufacturer					
Serial No.				—	
Year of manufacture				—	
Rated power	[	]		kW	f.
Rated power factor					
Maximum site altitude installation	of			m	
Maximum ambient temperature				C	
Rated frequency				Hz	
Rated voltage			all and a second second	v	
Rated current				А	
Mass			ile.	kg	
Performance class		~		_	
		90			

#### ISO 8528-5

# **Rating Plate for Engine**

The rating plate shall indicate the following;

- Manufacturer name or brand name
- Model number
- ✓ Serial number
- ✓ Rated Power (kW)
- ✓ Rated speed (rpm)

Parkins Motores do Brasil Lida Berkins® Perkins®
Engine No. MEEETTA2811624X
Designation, 2506A-E15TAG4
Engine Rating. 495bk W 1800mpm For sparce quote Engine No www.SRPAmericas.com

# **Rating Plate for Alternator**

The rating plate shall indicate the following;

- Manufacturer name or Brand name
- ✓ Serial number
- Rated Power (kW/ kVA)
- Insulation class
- Temperature rise
- Rated power factor
- Rated frequency (Hz)
- ✓ Rated Voltage (V)
- Rated Current (A)
- Rated speed (rpm)
- Duty class
- Frame size

A	Contract in		
GT		AFOR	2D
SERIAL NUMBER	P141060650	DUTY	Continuous full
FRAME/CORE	1 VS1804X2	EXCITATION VOLTAGE	75
BASE RATING KVA	4285	EXCITATION CURRENT	3.7
DASE RATING KW	3428	INSULATION CLASS	CLASS H
AMPERES/BR)	5154.1	AMBIENT TEMPERATURE	40 C
AMPERECUENCY	so Hertz	TEMPERATURE RISE	120 C
FREQUENCY	1800	THERMAL CLASSIFICATION	180 C
NOU TACE	480	ENCLOSURE	IP23
VOLTAGE	400	STATOR WINDING	12
PHASE	3	STATOR CONNECTION	STAR
BS 5000,PART 3 ISO 8528-3	IEC EN 60034-1	INCS, PE9 2NB, UK	
BARNACK ROA	D, STAMFORD, L	INCO.	

# Factory Acceptance Test (FAT)

#### **Requirements**

- i. FAT shall be made at the manufacturer/supplier factory (as per EMAL registration)
- ii. Approved shop drawing
- iii. Calibration cert. for equipment
- iv. Country of Origin Cert. (shipping document for imported product)
- v. Custom cert. (imported product)
- vi. Existing test result from manufacturer (engine and alternator)
- vii. Visual inspection
  - Name plate (generator set, engine and alternator)
  - dimension
  - All parameter according to L-S5
  - etc.
- iv. Test according to Appendix B (L-S5)

Before commencement of any tests stated hereinafter, due advance notice not less than fourteen (14) days providing details of dates, times, location/place, types of tests, test methods/procedures and test records/formats and details of competent persons responsible for the tests shall be given to and agreed by S.O.'s Representative. All test methods/procedures and test records/formats other than those specified in this specification shall be approved by the S.O.'s Representative before tests being carried out.

# Factory Acceptance Test (FAT)

#### Appendix B (L-S5) : Generator Set Test Results

No	Test Item	Acceptance Criteria										
Routine	Routine Test											
1	Test Site Condition	Barometric pressure : 750 mmHg. Temperature : 40 °C Relative humidity : 95%										
2	Insulation Resistance Test (500 V, MΩ)	AlternatorArmature Insulation > 20MΩField Insulation > 20MΩExciterArmature Insulation > 20MΩField Insulation > 20MΩ(e.g : Leroy Somer)Nota: biasanya kalau produk baru akan dapat result tinggi.										
3	No load Voltage Range Test	Based on AVR maximum and minimum Set										

## Routine Test

No	Test Item	Acceptance Criteria							
Routine	Test								
4	Protective Device Test	Values for warning and shut down based on manufacturer recommendations							
5	Sudden Load Increase / Decrease Test	As per Table 4 ISO 8528-5							
6	Alternator Performance Test	<ul> <li>Technical specification data for alternator</li> <li>JKR specification (L-S5)</li> </ul>							
7	Engine Performance Test	<ul> <li>Technical specification data for engine</li> <li>JKR specification (L-S5)</li> </ul>							

#### JKR ELECTRICAL MATERIAL APPROVED LIST (EMAL) https://jmal.jkr.gov.my/emalv3

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-	6	MXB-E 250MA4	160.0	200.0	Turbscharged Aftercooled	TAD733GE	3BRMAN	250MA4	210.0	126.0										
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yang belah metanda negara a Malaysia dan selarah dunia, pejabat ini telah memperantakan SOP baru memperantakan	.0	TAD1341GE- B × M3B 3155D4	240.0	300.0	Turbocharged Aftercooled	TAD1345GE- B	SWEDEN	M38 3155/84	0.056	271.0			0.0	ETA//AA	JINUUUK	EU VADLIN	U DI DI ENI U/W	MOEL U	AN AROEOURI	17
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menghapang persisten samada melata errel atau tarat	1.1	TAD1344GE	320.0	400.0	Turbocharged	TAD1344GE-B	SWEDEN	M38 315M84	412.0	354.0		1			AUCESSOR	15		PENDAW	AIAN ICI	(C)
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#### Electrical Material Approved List EMAL

#### Pengenalan



bahan/barangan dibekalkan adalah TULEN dan MENEPATI kualiti seperti pendaftaran dengan CKE, JKR . Sekian, Harap maklum.

JKR

Pengumuman

BERTULIS

#### 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

Menu Utama Muka Depan Profil

Rujukan Download Borang

2 Maklumat Bahan/Barangan						
Carian						
Bahan/Barangan Yang Diluluskan						
Jenama						
Senarai Pembekal/Pengilang						
Bahan/Barangan Tamat Kelulusan						
Bahan/Barangan Di Gantung Kelulusan						
Bahan/Barangan Di Tarik Balik Kelulusan						
ᆋ Admin						
LOGIN						
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#### Pertanyaan Borang Pertanyaan

EMAL adalah laman web yang memaparkan senarai bahan/barangan elektrik yang diluluskan oleh Jawatankuasa Kelulusan Bahan, Cawangan Kejuruteraan Elektrik JKR Malaysia. Senarai bahan/barangan elektrik tersebut adalah digunakan oleh Cawangan Kejuruteraan Elektrik JKR sahaja dan tidak boleh digunakan untuk apa jua pengiklanan atau apa jua tujuan lain.

#### SENARAI KATEGORI

#### Nama Sub kumpulan KABEL DAN AKSESORI EE01100 CABLES Q PENDAWAIAN G.S CONDUITS & HIGH IMPACT PVC KABEL DAN AKSESORI 2 EE01110 Q CONDUITS PENDAWAIAN BUSDUCT TRUNKING SYSTEM / CABLE KABEL DAN AKSESORI 3 EE01120 P MANAGEMENT SYSTEM PENDAWAIAN KABEL DAN AKSESORI 4 EE01130 SWITCHES Q PENDAWAIAN KABEL DAN AKSESORI P 5 EE01160 EARTHING SYSTEM & ACCESSORIES PENDAWAIAN KABEL DAN AKSESORI 6 EE01170 LIGHTNING PROTECTION SYSTEM P PENDAWAIAN KABEL DAN AKSESORI EE01171 SOCKET OUTLETS 7 Q PENDAWAIAN FLUORESCENT LUMINAIRES 8 EE02160 KELENGKAPAN ELEKTRIK P 9 EE02170 EMERGENCY LIGHT & LUMINOUS SIGN KELENGKAPAN ELEKTRIK Q 10 EE02180 FANS KELENGKAPAN ELEKTRIK Q OUTDOOR LUMINAIRES KELENGKAPAN ELEKTRIK 11 EE02200 O 12 EE02210 INDOOR LUMINAIRES (LED) KELENGKAPAN ELEKTRIK Q 13 EE02212 TRAFFIC LIGHT SYSTEM KELENGKAPAN ELEKTRIK P 14 EE03100 L.V. SWITCHBOARD/CONSUMER UNIT SUIS GEAR DAN PAPAN SUIS Q 15 EE03110 SURGE PROTECTIVE DEVICE (SPD SUIS GEAR DAN PAPAN SUIS 0 16 EE03120 PROTECTION RELAYS SUIS GEAR DAN PAPAN SUIS Q 17 EE03130 POWER FACTOR CORRECTION SUIS GEAR DAN PAPAN SUIS Q 18 EE03140 CIRCUIT BREAKER (ACB, MCCB & MCB ) SUIS GEAR DAN PAPAN SUIS Q 19 EE03150 RESIDUAL CURRENT DEVICE (RCD) SUIS GEAR DAN PAPAN SUIS Q 20 EE03160 FUSE SWITCHGEARS SUIS GEAR DAN PAPAN SUIS Q SUIS GEAR DAN PAPAN SUIS 21 EE03170 **ISOLATORS** Q 22 EE03180 CONTACTORS SUIS GEAR DAN PAPAN SUIS P SUIS GEAR DAN PAPAN SUIS 23 EE03190 11KV METAL-ENCLOSED SWITCHGEAR Q PERALATAN MESIN GENERATORS SETS 24 EE04100 ρ ELEKTRIK PERALATAN MESIN 25 EE04110 TRANSFORMER Q ELEKTRIK STRUCTURED CABLING SYSTEM C/W KABEL DAN AKSESORI 26 ET01100 Q ACCESSORIES PENDAWAIAN ICT

#### Displaying 1-26 of 26 results



DETAIL BAHAN/BARANGAN YANG DILULUSKAN

#### Pengumuman

Adalah dimaklumkan bahawa 🔺 Cawangan Kejuruteraan Elektrik telah membuat ketetapan bagi pendaftaran Structure bahan/barangan Cabling System C/W Accessories bagi komponen Horizontal Cabling hendaklah merangkumi perkakasan hujung ke hujung (end-to-end solution) untuk setiap jenis/kategori kabel dan 3 6 16 20 21

#### Displaying 1-25 of 25 results Negara Nama Kod Barang Nama Pengeluar Jenama Barano Pengeluar SWEDEN VOLVO PENTA **JERMAN** GENERATOR VPM POWER SDN EE041001.ME1.A1 (ENGINE), MARELLI MALAYSIA Q SET BHD (ALTERNATOR) MALAYSIA UNITED HATAN GENERATOR KINGDOM LISTER PETTER (ENGINE) & EE041001.ME44.A491 2 ENGINEERING 2 SET MARELLI (ALTERNATOR) ITALI SDN.BHD UNITED LISTER PETTER (ENGINE) HATAN GENERATOR KINGDOM EE041001.ME44.A167 ENGINEERING MECC ALTE SPA 2 SET ITALI SDN.BHD (ALTERNATOR) UNITED KINGDOM SIME DARBY PERKINS(ENGINE) GENERATOR EE041001.ME154.A162 INDUSTRIAL INDIA P SET MARELLI(ALTERNATOR) POWER SDN BHD ITALI SWEDEN **JERMAN** CHINA GENERATOR VPM POWER SDN VOLVO PENTA (ENGINE). EE041001.ME1.A379 INDIA 5 2 SET BHD MECCALTE (ALTERNATOR) ITALI MALAYSIA INDIA UNITED GENERATOR BNC POWER (M) EE041001.ME456.A395 GREAVES 6 2 SET KINGDOM SDN BHD UNITED GENERATOR FG GENERATOR KINGDOM EE041001.ME464.A402 FG WILSON 2 SET SDN BHD PERANCIS UMW INDUSTRIAL SDEC (GENERATOR SET). GENERATOR CHINA POWER EE041001.ME499.A445 SDEC(ENGINE), KAIJIELI Q SET SERVICES SDN. (ALTERNATOR) BHD

Menu Utama Muka Depan Profil Rujukan Download Borang

Bahan/Barangan Yang Diluluskan Jenama Senarai Pembekal/Pengilang

Carian

Bahan/Barangan Tamat Kelulusan

Bahan/Barangan Di Gantung Kelulusan Bahan/Barangan Di Tarik Balik

45



#### Pengumuman

Mesyuarat Jawatankuasa Kelulusan Bahan Bil 5/2020 tolah menetapkan 📥 nilai efficacy minimum bagi Road Lighting Luminaires (LED) dan Amenities Lighting Luminaires (LED) adalah 100 m/W, Ketetapan ini mula berkualkuasa pada 15 Ogos 2021 atau tamat tempoh kelulusan sedia ada (yang mana terdahulu). Tuanhuian - spiaku pengilang/pembekai berdaftar hendaklah memastikan bahawa bahan/barangan yang didaftarkan mematuhi perkara ini.

Adalah dimaklumkan bahawa Cawangan Kejuruteraan Elektrik 📥 telah membuat ketetapan bagi pendattaran. bahan/barangan Structure Cabling System C/W Accessories bagi komponen Horizontal Cabling hendaklah merangkumi perkakasan hujung ke hujung (end-to-end solution) untuk setiap jenis/kategori kabel dan disertakan sampel bahan/barangan yang berkenaan. Laporan pengujan makmal (Channel Testing) perlu menyatakan bahan kabel, patch cord, modular jack dan patch panel dalam satu laporan.

Adalah dimaklumkan bahawa Cawangan Kejuruteraan Elektrik 📥 akan mendaltarkan bahan/barangan TB Luminaires (LED) di bawah kategori Indoor Luminaires (LED). Sehubungan dengan itu, tuan/puan adalah dijemput mengemukakan permohonan pendaftaran bahan/barangan tersebut dengan pejabat ini berdasarkan keperluan di Lampiran A surat kami bil (41) dim. PKR/LI 5/2/27 di Bahagian Rujukan



Boleh melakukan FAT di salah satu syarikat yang terdapat di dalam pendaftaran ini



# Thank You I

mzamrir@jkr.gov.my