



LIST OF MATERIALS

**Approved for Use on Systems of
SARAWAK ENERGY BERHAD**

DISCLAIMER

Every effort has been made to ensure the accuracy of this document. However, in case of discrepancies, records of Asset Engineering Division are the authoritative source.

PREFACE

This list supersedes all preceding issues including revisions. Revised sheets reflecting changes in the list will be issued quarterly and should be inserted in order to keep your copy up to date.

The items shown in this publication include material and equipment for distribution facilities. Items not listed include office equipment, tools and work equipment, items of electric general plant and consumer owned wiring facilities.

In addition to items accepted on a general basis, this list also includes items accepted on a conditional basis. As one of the conditions in the acceptance of an item on a conditional basis, suppliers are required to obtain the company's concurrence prior to its use.

Any supplier/manufacturer who desire to have their items placed on the list, or any user believing an existing item should be removed from the list, or any communication calling attention to an error or omission in the list, such as a wrong catalog number, an obsolete item, etc, should address to:

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1.0 SUBSTATION EQUIPMENT

1.1 Pillar

1.1.1 7W6F Distribution Pillar

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Teknix Electrical & Electronic Sdn Bhd, Kuching	-	Malaysia
Spanners International, S'pore / Spanners Engineering, M'sia	-	Singapore / Malaysia
Tamco	-	Malaysia

1.1.2 LV 4-Way Mini Pillar (DIN)

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Spanners International, S'pore / Spanners Engineering, M'sia	-	Singapore / Malaysia
Tamco	-	Malaysia
Sun System Eng. Sdn Bhd, M'sia	-	Malaysia
Teknix Electrical & Electronic Sdn Bhd, Kuching	-	Malaysia
Tenaga Kenari	-	Malaysia

1.2 RMU

1.2.1 11 kV Oil RMU

(Obsolete and any new RMU shall be SF6 insulated)

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
CG Lucy	Trident	India
Lucy Switchgear FZE	Trident	Dubai, UAE
Lucy Switchgear	Trident	U.K.

1.2.2 11 kV SF6 RMU

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
⁽¹⁾ Schneider Electric Ltd & Schneider Electric (M) Sdn Bhd	Ringmaster C (21 kA version)	U.K & Malaysia
⁽¹⁾ Note: (a) Model with rated voltage of 13.8 kV shall be supplied in order to achieve the required BIL. (b) Pressure relief facility, mechanical trip push button and voltage present indicators (for ring switches) shall be provided.		

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
⁽²⁾ Schneider Electric (M) Sdn Bhd, Selangor	RM6	France & Malaysia
⁽²⁾ Note: (a) Model with rated voltage of 13.8 kV shall be supplied in order to achieve the required BIL (b) Gas tank shall be manufactured by Schneider (France) (c) Restricted to indoor substations (with enclosure) and compact substations (d) Screened type separable connectors shall be used for the connection to the cables.		
⁽³⁾ Tamco	GR1	Malaysia
⁽³⁾ Note: (a) Stainless steel gas tank and internal arc explosion valve shall be provided. (b) Restricted to 2 models, ie. GR1-21 & GR1-31.		
⁽⁴⁾ Lucy Switchgear	15.5 kV SF6 RMU Sabre	Dubai, UAE & Malaysia
⁽⁴⁾ Note: (a) Only accept 15.5 kV RMU instead of 12 kV RMU for achieving 95kV BIL. (b) Dual ratio CT (100/50/5) shall be provided in order to cater for transformer size ranging from 200 kVA to 1500 kVA. (c) Voltage indicator and temperature compensated pressure gauge shall be provided. (d) For Malaysia factory, the RMU shall be manufactured by Sun Systems Engineering(SSE) under license by Lucy Switchgear		
⁽⁵⁾ Cooper Edison (Pingdingshan) Electronic Technologies Co. Ltd	RVAC	China
⁽⁵⁾ Note: (a) Approved modules are: i. 11kV SF6 RMU, Non-Extensible (Type KKT) ii. 11kV SF6 RMU, Extensible (Type KKT with side extension options on K panels) iii. 11kV SF6 Ring Switch, Extensible (Type K) iv. 11kV SF6 Switch-fuse, Extensible (Type T)		

1.3 Switchgear

1.3.1 11 kV AIS Switchgear

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Siemens (Partial GIS)	NX PLUS-C	Germany/China
ABB	Unigear ZS Series	Malaysia
Tamco	VH1H	Malaysia
Xiamen Huadian Switchgear Co Ltd	Gelpag AMS Series	China
Toshiba	HV12	Malaysia

1.3.2 33 kV GIS Switchgear

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Siemens	8D Series	Germany/China
ABB	ZX Series	Germany/ Malaysia
Schneider	WS Series	Germany/ Malaysia
Tamco	GV3	Malaysia

1.4 Transformer

1.4.1 11/433 kV Distribution Transformer

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
ABB	-	Singapore/ Vietnam
AICHI	-	Japan
Arab-Malaysia SGB	-	Malaysia
Charoenchai	-	Thailand
Ekarat	-	Thailand
Emo Ohrid	-	Yugoslavia
EWT	-	Malaysia
MTM	-	Malaysia
SESCO-Efacec	-	Malaysia
South Wales	-	U.K.
Thai Trafo	-	Thailand
Toshiba	-	Japan
Tirathai	-	Thailand
Shihlin	-	Taiwan
B&D	-	Indonesia
Toshiba Transmission & Distribution Systems	-	India
Remarks: Standard Ratings: 1 phase – 25kVA & 50kVA (11/.250kV) 3 phase – 50kVA, 160kVA, 300kVA, 500kVA, 1000kVA, 1500kVA		

1.4.2 33/433 kV Distribution Transformer

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
ABB	-	Singapore / Australia / Vietnam
AICHI	-	Japan
Arab-Malaysia SGB	-	Malaysia
Charoenchai	-	Thailand
Ekarat	-	Thailand
EWT	-	Malaysia

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
MTM	-	Malaysia
Tirathai	-	Thailand
Shihlin	-	Taiwan
Toshiba Transmission & Distribution Systems	-	India
Remarks: Standard Ratings: 50kVA, 160kVA, 300kVA, 500kVA, 1000kVA		

1.4.3 33/11 kV Distribution Transformer

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
ABB	-	Australia / Singapore / Vietnam
Charoenchai	Up to 2.5 MVA	Thailand
Ekarat	Up to 1 MVA	Thailand
MTM	-	Malaysia
Tirathai	-	Thailand
EWT	Up to 2.5 MVA	Malaysia
Shihlin	-	Taiwan
Tatung	-	Taiwan
Remarks: Standard Ratings: 1 MVA, 2.5 MVA, 5 MVA		

1.4.4 33/11 kV ONAN / ONAF Power Transformer c/w OLTC

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
ALSTOM	-	Turkey
ABB	-	Australia / Sweden/ Turkey/ Thailand/ Vietnam
AICHI	-	Japan
Daihen	-	Thailand
MTM	-	Malaysia
Tirathai	-	Thailand
Meidensha/Hitachi/Fuji	-	Japan
Mitsubishi/Toshiba	-	Japan
Takaoka	-	Japan
SGB	-	Germany
Efacec	-	Portugal
Areva	-	Turkey
BEST	-	Turkey
Hyundai	-	Korea
New Korea	-	Korea
Xian	-	China

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Koncar	-	Croatia
Shihlin	-	Taiwan
Tatung	-	Taiwan
PT Elsewedy Electric	-	Indonesia
Remarks: Standard Ratings: 5MVA, 10/15 MVA, 20/25 MVA		

1.5 Neutral Earthing Resistor (NER)

1.5.1 11kV Neutral Earthing Resistor (NER)

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Any Ohm Sdn. Bhd.	AO1116/ AO1108	Malaysia
Pestech Sdn Bhd	RES	Malaysia
M.S. Resistances S.A.S.	11kV-1600A-4 Ohm- 10 Sec/ 11kV-800A-8 Ohm-10 Sec	France
HEINE Resistors GmbH	EWD Series	Germany

2.0 UNDERGROUND EQUIPMENT

2.1 Termination Kits

2.1.1 LV Termination Kit, Indoor/Outdoor

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Sucofit/Tyco	Heat Shrink	Switzerland
Raychem/Tyco	Heat Shrink	U.S.A./ Germany
Cellpack	Heat Shrink	Switzerland/ Germany
Nexans	Heat Shrink	Italy
Changyuan Group (CYG)	Heat Shrink	China
3M	Heat Shrink	India
Hongshang Heat Shrinkable	Heat Shrink	China
Gala Shrink Fit	Heat Shrink	India

2.1.2 11 kV Termination Kit, Indoor/Outdoor

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Cellpack	Hybrid Heat- Shrinkable	Switzerland/ Germany
Sucofit/Tyco	Heat Shrink	Switzerland
Raychem/Tyco	Heat Shrink	U.S.A./ Germany
3M	Cold Shrink	Malaysia
Nexans	Heat Shrink	Italy
Nexans	Cold Shrink	France
Prysmian	Cold Shrink	France

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Changyuan Group (CYG)	Heat Shrink	China
Changyuan Group (CYG)	Cold Shrink	China

2.1.3 33 kV Termination Kit, Indoor/Outdoor

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Raychem/Tyco	Heat Shrink	U.S.A./ Germany
3M	Cold Shrink	Malaysia
Cellpack	Hybrid Heat- Shrinkable	Switzerland/ Germany
Nexans	Heat Shrink	Italy
Prysmian	Cold Shrink	France
Changyuan Group (CYG)	Cold Shrink	China

2.1.4 11/33 kV Straight Through and Transition Joint Kits

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Raychem/Tyco	Heat Shrink	U.S.A./ Germany
Cellpack	Resin/Tapping	Switzerland/ Germany
⁽¹⁾ ABB Kabeldon	Resin/Tapping	Sweden
⁽¹⁾ Note: Only accept ABB Kabeldon GHL 1500 two-component polyurethane based resin complete with approved type fibre box.		
3M	Cold Shrink (Premoulded with Resin)/Tape-Resin	Malaysia
Cellpack	Hybrid Heat- Shrinkable	Switzerland/ Germany
Nexans	Heat Shrink	Italy
⁽²⁾ Nexans	Cold Shrink	France
⁽²⁾ Note: Only for 11kV.		
Prysmian	Cold Shrink	France
⁽³⁾ Changyuan Group (CYG)	Heat Shrink	China
⁽³⁾ Note: Only for 11kV.		
Changyuan Group (CYG)	Cold Shrink	China

2.1.5 11kV Separable connector

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Cooper Electronic Technology Shanghai Co.	DTS*, DTB* & DT400	China
Cellpack	-	Malaysia
Nexans - Euromold	-	Belgium
CYG	CJB10-630 & CJB10-200	China
Raychem/Tyco	RSTI	Germany

2.1.6 Plug In Termination for 33kV GIS

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Pfisterer	-	Germany/Italy
Sudkabel	-	Germany
NKT GmbH	-	Germany
Tyco Electronics Raychem GmbH	-	Germany

2.2 **Underground Cable**

2.2.1 LV XLPE Cable

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Central Cable (M) Bhd, Melaka.	-	Malaysia
Fujikura Federal Cables Sdn Bhd	-	Malaysia
FEC Cables (M) Sdn Bhd, Selangor	-	Malaysia
Olympic Cable Co. Sdn Bhd, Melaka	-	Malaysia
Universal Cable (M) Sdn Bhd, Johor	-	Malaysia
Universal Cable (S) Sdn Bhd/ Sarawak Cable Sdn Bhd	-	Malaysia
Wonderful Wire & Cable Bhd, Johor	-	Malaysia
Mitti Power Cables Sdn. Bhd, Johor	-	Malaysia
Leader Cable Industry Bhd	-	Malaysia
Tai Sin Electric Cables (M) Sdn Bhd	-	Malaysia
Southern Cable	-	Malaysia
Power Cables Malaysia Sdn Bhd	-	Malaysia
Mega Kabel Sdn Bhd	-	Malaysia
Master Tec Wire & Cable Sdn Bhd	-	Malaysia
Draka (Malaysia) Sdn. Bhd.	-	Malaysia
Hi-Essence Cable Sdn. Bhd.	-	Malaysia
Tonn Cable Sdn. Bhd.	-	Malaysia

2.2.2 11 kV XLPE Cable

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Central Cable (M) Bhd, Melaka.	-	Malaysia
Federal Power Sdn Bhd, Selangor	-	Malaysia
Fujikura Federal Cables Sdn Bhd	-	Malaysia
FEC Cables (M) Sdn Bhd, Selangor	-	Malaysia
Leader Cable Industry Bhd, Penang	-	Malaysia
Olympic Cable Co. Sdn Bhd, Melaka	-	Malaysia
Power Cables Malaysia Sdn Bhd	-	Malaysia
Tenaga Cable Industries Sdn Bhd	-	Malaysia
Universal Cable (M) Sdn Bhd, Johor	-	Malaysia
PT VOKSEL Electric Tbk	-	Indonesia
Southern Cable	-	Malaysia
Hi-Essence Cable Sdn. Bhd.	-	Malaysia

2.2.3 33 kV XLPE Cable

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Central Cable (M) Bhd, Melaka	-	Malaysia
Federal Power Sdn. Bhd, Selangor	-	Malaysia
Fujikura Federal Cables Sdn Bhd	-	Malaysia
FEC Cables (M) Sdn Bhd, Selangor	-	Malaysia
Leader Cable Industry Bhd, Penang	-	Malaysia
Power Cables Malaysia Sdn Bhd	-	Malaysia
Olympic Cable Co. Sdn Bhd	-	Malaysia
Universal Cable (M) Sdn Bhd, Johor	-	Malaysia
Southern Cable	-	Malaysia
Tenaga Cable Industries Sdn Bhd	-	Malaysia

2.2.4 11 kV and 33 kV Submarine Cable

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
LS Cable	-	Korea
Sumitomo Electric Industries (SEI)	-	Japan
OLEX Australia Pty Ltd	-	Australia
SWCC Showa Cable Systems Co., Ltd	-	Japan
Leader Cable Industry Bhd, Penang	-	Malaysia
Power Cables Malaysia Sdn Bhd	-	Malaysia
Zhongtian Technology Submarine Cable Co. Ltd	-	China
Hengtong Optic-Electric Co. Ltd	-	China
LS HongQi Cable & System	-	China
Taihan Electric Wire Co., Ltd.	-	Korea

2.3 **Link Boxes**

2.3.1 33kV 3+1 Way Link Box c/w SVL

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
AK POWER SOLUTION	-	Australia
Evergrow Electrical Engineering Sdn Bhd	-	Malaysia
⁽¹⁾ Team Force Engineering	-	Malaysia
⁽¹⁾ Note: Approved for ground-mounted link box only.		
Pfisterer	-	Italy

3.0 **OVERHEAD EQUIPMENT**

3.1 **ABI and Switches**

3.1.1 11 kV 400A 3-Phase Outdoor ABI Switch (On Load/Off Load)

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
ABB	R3808D	Australia
Lucy Switchgear	Rapier RX	Dubai
S & C	Alduti Rupter	Canada
Lucy Switchgear	Rapier AX	Dubai
AB GEVEA	GEVEA	Sweden
S&C Electric Company	Omni-Rupter	China
ABB	NPS	Poland

3.1.2 33 kV 400A 3-Phase Outdoor ABI Switch (On Load/Off Load)

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
ABB	R10508D-P	Australia
Lucy Switchgear	Rapier RX	Dubai
S & C	Alduti Rupter	Canada
AB GEVEA	GEVEA	Sweden
ABB	NPS	Poland

3.2 Conductor

3.2.1 Simalec Conductor (AAAC)

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Consolidated Cable	-	Malaysia
Federal Power Sdn Bhd, Selangor	-	Malaysia
Fujikura Federal Cables Sdn Bhd	-	Malaysia
Tenaga Cable Industries Sdn Bhd	-	Malaysia
Universal Cable (M) Sdn Bhd, Johor	-	Malaysia
Universal Cable (S) Sdn Bhd/ Sarawak Cable Sdn Bhd	-	Malaysia
Power Cables Malaysia Sdn Bhd	-	Malaysia
Southern Cable	-	Malaysia
Leader Cable Industry Bhd, Penang	-	Malaysia
Central Cable (M) Bhd, Melaka	-	Malaysia

3.2.2 HV Aerial Bundle Cable

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Central Cable (M) Bhd, Melaka.	-	Malaysia
Federal Power Sdn Bhd, Selangor	-	Malaysia
Fujikura Federal Cables Sdn Bhd	-	Malaysia
FEC Cables (M) Sdn Bhd	-	Malaysia
Leader Cable Industry Bhd, Penang	-	Malaysia
Olympic Cable Co Sdn Bhd, Melaka	-	Malaysia
Tenaga Cable Industries Sdn Bhd	-	Malaysia
Universal Cable (M) Sdn Bhd, Johor	-	Malaysia
Power Cables Malaysia Sdn Bhd	-	Malaysia
Southern Cable	-	Malaysia

3.2.3 LV Aerial Bundled Cable

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Central Cable (M) Bhd, Melaka.	-	Malaysia
Federal Power Sdn Bhd, Selangor	-	Malaysia
Fujikura Federal Cables Sdn Bhd	-	Malaysia
FEC Cables (M) Sdn Bhd	-	Malaysia
Leader Cable Industry Bhd, Penang	-	Malaysia
Olympic Cable Co Sdn Bhd, Melaka	-	Malaysia
Tenaga Cable Industries Sdn Bhd	-	Malaysia
Universal Cable (M) Sdn Bhd, Johor	-	Malaysia
Power Cables Malaysia Sdn Bhd	-	Malaysia
Southern Cable	-	Malaysia
Master Tec Wire & Cable Sdn Bhd	-	Malaysia
Hi-Essence Cable Sdn. Bhd.	-	Malaysia

3.2.4 LV PVC Covered Aluminium Conductor

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Universal Cable (M) Sdn Bhd, Johor	-	Malaysia
Universal Cable (S) Sdn Bhd/ Sarawak Cable Sdn Bhd	-	Malaysia
Leader Cable Industry Sdn Bhd, Penang	-	Malaysia
Olympic Cable Co Sdn Bhd, Melaka	-	Malaysia
Tai Sin Electric Cables (M) Sdn Bhd	-	Malaysia
Power Cables Malaysia Sdn Bhd	-	Malaysia
Southern Cable	-	Malaysia
Master Tec Wire & Cable Sdn Bhd	-	Malaysia
Hi-Essence Cable Sdn. Bhd.	-	Malaysia

3.3 **EDO or ABFI**

3.3.1 11 kV ABFI 100A 150 MVA with Arc Shortening Rod

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
ABB	Series V, P/No.7502523	Australia
ABB	ICX 27 kV Interchangeable	USA/China
Joongwon Electric Corp.	J&W 80442	Korea
S&C Electric Company	Type XS	U.S.A./China
Gunkul Engineering Public Company Limited	FC2710012	Thailand
Cooper Electronics Technologies (Shanghai) Co. Ltd	L9CAP1A	China

3.3.2 33 kV ABFI 100A 150 MVA with Arc Shortening Rod

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
ABB	Series V, P/No.7502520	Australia
ABB	ICX 38 kV Interchangeable	USA/China
Joongwon Electric Corporation	J&W 80445	Korea
S&C Electric Company	Type XS	U.S.A./China
Gunkul Engineering Public Company Limited	FC3810010	Thailand
Cooper Electronics Technologies (Shanghai) Co. Ltd	L9EAP1A	China

3.4 Insulator

3.4.1 11 kV Pin Insulator, Brown, Glazed

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
NGK	HRAA-168N	Japan
⁽¹⁾ Shandong-Zibo	DK10023	China
⁽²⁾ TE Connectivity	-	China
⁽³⁾ Dalian Insulator (Fujian) Co. Ltd	DK10023	China
⁽¹⁾⁽²⁾⁽³⁾ Note: Tracking number (TP No.) is required before production and each batch of insulators shall be subjected to FAT.		

3.4.2 33 kV Pin Insulator, Brown, Glazed

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
NGK	HRAA-302Q	Japan
⁽¹⁾ Shandong-Zibo	DK10025	China
⁽²⁾ TE Connectivity	-	China
⁽³⁾ Dalian Insulator (Fujian) Co. Ltd	DK10025	China
⁽¹⁾⁽²⁾⁽³⁾ Note: Tracking number (TP No.) is required before production and each batch of insulators shall be subjected to FAT.		

3.4.3 Shackle/Spool Insulator

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Dalian Ceramic Technic Co Ltd	CTC	China
Shandong Zibo	-	China
TE Connectivity	-	China
Fujian Hoshing Proper Electrical Porcelain Co Ltd	-	China
Bonle Mingqing	-	China

3.4.4 Suspension Insulator

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
⁽¹⁾ Dalian Porcelain Insulator Works	XP-70 (52-3)	China
NGK	Cat.No.CA-515BB	Japan
NGK	Cat.No.CA-515BB & CA-515B7	China
⁽²⁾ Shandong Zibo	XP-70 (52-3)	China
⁽³⁾ TE Connectivity	-	China
⁽⁴⁾ Suzhou Porcelain Insulator Works Co Ltd	-	China
⁽⁵⁾ Dalian Insulator (Fujian) Co. Ltd	XP-70	China
⁽¹⁾⁽²⁾⁽³⁾⁽⁴⁾⁽⁵⁾ Note: Tracking number (TP No.) is required before production and each batch of insulators shall be subjected to FAT.		

3.4.5 Stay Insulator

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Dalian Insulator Co	-	China
Dalian Ceramic Technic Co Ltd	-	China
Shandong Zibo	-	China
TE Connectivity	-	China
Fujian Hoshing Proper Electrical Porcelain Co Ltd	-	China
Bonle Mingqing	-	China

3.4.6 33 kV Pin Post Insulator (200kV BIL)

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
NGK	-	Japan
⁽¹⁾ Suzhou Porcelain Insulator Works Co. Ltd.	-	China
⁽²⁾ Dalian Insulator (Fujian) Co. Ltd	-	China
⁽¹⁾⁽²⁾ Note: Tracking number (TP No.) is required before production and each batch of insulators shall be subjected to FAT.		

3.5 Overhead Connectors

3.5.1 Aluminium PG Clamp

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Karl Pfisterer Stuttgart	-	Germany
Max Hellstern GmbH	-	Germany
Yongjiu Electric Power Fitting Co Ltd	-	China
SICAME	-	China

3.5.2 Bi-metal PG Clamp

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Karl Pfisterer Stuttgart	-	Germany
Max Hellstern GmbH	-	Germany
Yongjiu Electric Power Fitting Co Ltd	-	China

3.5.3 Insulation Piercing Connector

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Karl Pfisterer Stuttgart	-	Germany
Max Hellstern GmbH (Tyco)	-	Germany
ENSTO	-	Finland
SICAME	-	France
Simel (Tyco)	-	France
Michaud	-	France

3.5.4 Insulating Shroud suitable for PG Clamp

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Karl Pfisterer Stuttgart	SP8 (Model 499-999-200)	Germany
ENSTO	SP 16	Finland
Wenhong Plastic Industry Sdn Bhd	-	Malaysia
Yongjiu Electric Power Fitting Co Ltd	-	China

3.6 Poles

3.6.1 Concrete Pole

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
PMW Concrete Industries Sdn Bhd, Perak	-	Malaysia
Smart Crete Sdn Bhd, Sarawak	-	Malaysia
Binaan Desjaya Sdn Bhd	For LV 9 meter pole only	Malaysia
PMW Industries (Sarawak) Sdn Bhd	-	Malaysia

3.6.2 Steel Poles

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Sarwaja Timur Sdn Bhd	-	Malaysia
KKB Engineering Bhd	-	Malaysia
Segenting Bersatu Sdn Bhd	-	Malaysia
Yixing Futao Metal Structure Unit Co Ltd	-	China

3.7 Street Lighting and Accessories

3.7.1 SON Ballast, 70W

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Philips (M)	BSN 70W	Malaysia
SE Everlast Sdn Bhd	SONLL 70W (LL-Low Loss)	Malaysia
SOLEX	DLS 70	Malaysia
Nikkon	HPS 70W	Malaysia
Amat Sinar Sdn Bhd	ASL 70S	Malaysia
Tridonic	OGLIS 70W	South Africa
ATCO	-	Australia
REFAS	RB70HS4A-P	Malaysia
ELT	VSI 7/22 3TG	Spain
Muarlite Industries Sdn Bhd	MLSL (B) 70W	Malaysia

3.7.2 SON Ballast, 100W

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Nikkon	HPS/MH 100W	Malaysia
Amat Sinar Sdn Bhd	ASL 100S	Malaysia
ELT	VSI 10/22-3T-G	Spain
REFAS	RB100HS4A-PF	Malaysia
Muarlite Industries Sdn Bhd	SURIA 100W	Malaysia

3.7.3 SON Ballast, 150W

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
SE Everlast Sdn Bhd	SONLL 150W (LL-Low Loss)	Malaysia
SOLEX	DLS 150	Malaysia
ATCO	OSM 150.00	Australia
Nikkon	HPS 150W	Malaysia
Philip (M)	BSN 150W	Malaysia
Amat Sinar Sdn Bhd	ASL 150S	Malaysia
Tridonic	OGLIS 150W	South Africa
REFAS	RB150HS4A-P	Malaysia
ELT	VSI 15 3TG SC	Spain
Muarlite Industries Sdn Bhd	MLSL (B) 150W	Malaysia

3.7.4 SON Ballast, 250W

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Philip (M)	BSN 250W	Malaysia
SE Everlast Sdn Bhd	SONLL 250W (LL-Low Loss)	Malaysia
SOLEX	DLS 250	Malaysia
Nikkon	HPS 250W	Malaysia
Amat Sinar Sdn Bhd	ASL 250S	Malaysia
Tridonic	OGLIS 250W	South Africa
ATCO	OG250	Australia
REFAS	RB250HS4A-P	Malaysia
ELT	VSI 25/22 3TG	Spain
Muarlite Industries Sdn Bhd	SURIA 250W	Malaysia

3.7.5 SON Lamp, 70W with Built-in Ignitor

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
OSRAM	NAV-E 70W/I	Germany
PHILIPS	SON-E 70W/I	China
EYE Iwasaki	NH 70F/I	Japan

3.7.6 SON Lamp, 150W

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
OSRAM	NAV-T 150W	Germany
OSRAM	NAV-T 150W	China
PHILIPS	SON-T 150W	China
EYE Iwasaki	NHT 150	Japan

3.7.7 SON Lamp, 250W

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
OSRAM	NAV-T 250W	Germany
OSRAM	NAV-T 250W	China
PHILIPS	SON-T 250W	China
EYE Iwasaki	NHT 250	Japan

3.7.8 SON Ignitor

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Amat Sinar Sdn Bhd	S1-2P/ASL SI-SP	Malaysia
BAG Turgi Electronic	Type N1 400NE	Switzerland
EVERLAST	SN1540C-T 70-400W	Malaysia
PHILIPS	SU-70400L	Belgium
THORN	ZRM4 5ES/B2-02	Australia
REFAS by EITA Tech	FCD-G400t ₂	Malaysia
NIKKON	SP9008T	Malaysia
ELT	AVS 400D	Spain
Muarlite Industries Sdn Bhd	MIG 14 (100-400W)	Malaysia

3.7.9 SON Lantern, 70W

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Amat Sinar Sdn Bhd	ASL AL 70W ASL-C20 70W	Malaysia
SCHREDER	Z1	Malaysia
NIKKON	S419-150/70W	Malaysia
Primelux Energy Sdn Bhd	CS5	Malaysia
Muarlite Industries Sdn Bhd	MIL 7-70W	Malaysia
Gruppe Lighting Solution Sdn Bhd	Arrol	Malaysia

3.7.10 SON Lantern, 100W

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Amat Sinar Sdn Bhd	ASL-C22 100W	Malaysia
SCHREDER	Z1	Malaysia
NIKKON	S419-150/100W	Malaysia
Muarlite Industries Sdn Bhd	MIL 10-100W	Malaysia
Gruppe Lighting Solution Sdn Bhd	Arrol	Malaysia

3.7.11 SON Lantern, 150W

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Amat Sinar Sdn Bhd	ASL AL 150W ASL-C22-150W ASL-C20 150W	Malaysia
SCHREDER	Z2	Malaysia
NIKKON	S419-150W	Malaysia
⁽¹⁾ THORN Lighting (Tianjin) Co Ltd	Alpha 2000 (150W)	China

(1) Note: The THORN Street Lighting Lantern shall incorporate a detachable point for unplugging and a set of appropriate control fuse for maintenance and safety purposes.		
Philips	Smartway	Malaysia
Primelux Energy Sdn Bhd	CS7	Malaysia
Muarlite Industries Sdn Bhd	MIL 15-150W	Malaysia
Oversea Lighting & Electric (M) Sdn Bhd	BMS-80 150W	Malaysia
Gruppe Lighting Solution Sdn Bhd	Arrol	Malaysia

3.7.12 SON Lantern, 250W

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Amat Sinar Sdn Bhd	ASL AL 250W ASL-C21-250W ASL-C34 250W	Malaysia
SCHREDER	Z2	Malaysia
NIKKON	S419-250W	Malaysia
⁽¹⁾ THORN Lighting (Tianjin) Co Ltd	Alpha 2000 (250W)	China
(1) Note: The THORN Street Lighting Lantern shall incorporate a detachable point for unplugging and a set of appropriate control fuse for maintenance and safety purposes.		
Philips	Smartway	Malaysia
Primelux Energy Sdn Bhd	CYGNUS P2	Malaysia
Muarlite Industries Sdn Bhd	MAL 16-250W	Malaysia
Oversea Lighting & Electric (M) Sdn Bhd	BMS-80 250W	Malaysia
Gruppe Lighting Solution Sdn Bhd	Arrol	Malaysia

3.7.13 Street Lighting Bracket

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
GVE Metal Sdn Bhd, Kuching	-	Malaysia
Sarwaja Timur Sdn Bhd	-	Malaysia
KKB Engineering Bhd	-	Malaysia
Segenting Bersatu Sdn Bhd	-	Malaysia
Yixing Futao Metal Structure Unit Co. Ltd	-	China

3.7.14 Street Lighting Column

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Sarwaja Timur Sdn Bhd	-	Malaysia
KKB Engineering Bhd	-	Malaysia
Lysaght Galvanised Steel Bhd	-	Malaysia
Galvapole Industries Sdn Bhd	-	Malaysia
Segenting Bersatu Sdn Bhd	-	Malaysia
Yixing Futao Metal Structure Unit Co. Ltd	-	China
Oversea Lighting & Electric (M) Sdn Bhd	-	Malaysia

3.8 **Surge or Lightning Arrester**

3.8.1 11 kV Lightning Arrester, 12 kV, 10 kA

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
ABB	-	Switzerland
Eaton Cooper Power System	-	Mexico
HUBBEL/OHIO BRASS	-	U.S.A./China (Wuhu)
ISOELECTRIC	-	Italy
DTR Corporation	-	Korea
Tridelta	-	Germany
Siemens Surge Arresters Ltd	3EK8 type 120	China

3.8.2 33 kV Lightning Arrester, 36 kV, 10 kA

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
ABB	-	Switzerland
Eaton Cooper Power System	-	Mexico
HUBBEL/OHIO BRASS	-	U.S.A./China (Wuhu)
ISOELECTRIC	-	Italy
DTR Corporation	-	Korea
Tridelta	-	Germany
Siemens Surge Arresters Ltd	3EK8 type 360	China

3.9 Auto Recloser

3.9.1 Auto Recloser 11 kV

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Whipp & Bourne Ltd	GVR 15/12	U.K.
⁽¹⁾ Schneider Electric Pty Ltd	N15 (12 kV)	Australia
⁽¹⁾ Note: Formerly known as Nu-Lec Pty Ltd (Australia).		
Noja Power Switchgear Pty Ltd	OSM 15-16-630-110- 200 c/w RC-10 controller	Australia
Cooper Electronics Technologies (Shanghai) Co. Ltd	NOVA 15i	China
Entec Electric & Electronic Co. Ltd	EPR-1 (Recloser) & EVRC2A-NT (Controller)	Korea
Switco & JinKwang Co., Ltd,	JK-REC	Korea

3.9.2 Auto Recloser 33 kV

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
⁽¹⁾ Schneider Electric Pty Ltd	N38 (38 kV)	Australia
⁽¹⁾ Note: Formerly known as Nu-Lec Pty Ltd (Australia).		
Whipp & Bourne Ltd	GVR 38/8	U.K.
Noja Power Switchgear Pty Ltd	OSM 38-12.5-630 c/w RC-10 controller	Australia
Cooper Electronics Technologies (Shanghai) Co. Ltd	NOVA 38i recloser with Form 6 / FXD Controller	China
Entec Electric & Electronic Co. Ltd	EPR-3 (Recloser) & EVRC2A-NT (Controller)	Korea
Switco & JinKwang Co., Ltd,	JK-REC	Korea

3.10 Overhead Assemblies

3.10.1 Stay Wire (7/8 SWG)

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Hangzhou Huixin Metal Product Co. Ltd.	-	China
Southern Wire Sdn Bhd	-	Malaysia
Bonisa Resources Sdn Bhd	-	Malaysia
Hebei Qitong Metals Products Co., Ltd.		China

4.0 MISCELLANEOUS EQUIPMENT

4.1 Cable Connectors

4.1.1 Copper Cable Connectors, Crimping Type

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Conway Terminals Manufacturer Sdn Bhd	-	Malaysia
Supreme & Company, West Bengal	-	India
Utilux	-	Australia
Cembre	-	Italy
Cabac	-	Australia
Simel (Tyco)	-	France
Yongjiu Electric Power Fitting Co Ltd	-	China

4.1.2 Aluminium and Bi-metallic Connectors

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Mosdorfer CCL System Ltd	-	England
Utilux	-	Australia
Cembre	-	Italy
Conway Terminals Manufacturer Sdn Bhd	-	Malaysia
Simel (Tyco)	-	France
Cabac	-	Australia
Yongjiu Electric Power Fitting Co Ltd	-	China

4.2 Pipes

4.2.1 HDPE Pipe

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Weidasar Sdn Bhd	-	Malaysia
Resintech Plastics (M) Sdn Bhd	-	Malaysia
Polyflow Pipes Sdn Bhd	-	Malaysia
Polyflow Teguh Sdn Bhd	-	Malaysia
Cew Sin Plastic Pipe Sdn Bhd	-	Malaysia
Dura-Mine Sdn Bhd	-	Malaysia

4.3 Earthing Accessories

4.3.1 Earthing Rod – 16 mm x 1830 mm (5/8” x 6’)

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Juan Kuang Electrical Accessories Manufacturer Sdn Bhd	-	Malaysia
⁽¹⁾ TAIPOLY Industries Sdn Bhd	-	Malaysia
⁽¹⁾ Note: Both ends of the rod shall be threaded with one end tapered.		
ERICO	-	USA
Furse	-	USA
Jinhua City Lightning Protection Equipment Manufacturer	-	China
LYTECH	-	Singapore
Lever E&E	STB	Malaysia
Raychem RPG Private Limited	RET-07	India
AXIS Electrical Components (India) Pvt. Ltd.	AXIS-CBR Series	India

4.4 Fuses

4.4.1 Single Pole House Service Cutout with/without HRC Fuse

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Lucy Switchgear	2286AL & ME60A HRC Fuse (60A) 2286AK & ME100A HRC Fuse (100A)	U.K.
WT Henley Ltd/SICAME	Series 7 Type IIa (60A) Series 7 Type IIb (100A)	U.K.
Lucy Switchgear	MK4 60A & 100A	China
Cooper Busmann	6080SP & 100SP	China
WT Henley Ltd/ SICAME (or SM-CI)	Series 7 Type IIa (60A) Series 7 Type IIb (100A)	China

4.4.2 Fuse link/Cartridge fuse for Service Cut Out

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Lucy Switchgear	2286AL, ME60A & ME100A	U.K.
WT Henley Ltd	Series 7 Type II	U.K.
Lawson	ME/MF 60/100A	U.K.
Cooper Bussmann	KR85 & LR85	India
Conway Terminals Manufacturer Sdn Bhd	FK-FRH (up to 60A)	Malaysia

4.4.3 100A Neutral Link (5-Way Connector Box)

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Lucy Switchgear	List MLNS	India/China
WT Henley Ltd/SICAME	Type II - 54347	U.K.
Cooper Busmann	Neutral-HS	China
WT Henley Ltd/ SICAME (or SM-CI)	Type II - 54347	China

4.4.4 250A Outdoor Dividing Box/MCCB Cabinet

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Lucy Switchgear	List 14018A/ 11515	U.K.
Powertech Engineering	-	Malaysia
Tenaga Kenari Sdn Bhd	-	Malaysia
LBF	-	Malaysia
Ching Hai Switchboard Manufacturer Sdn. Bhd.	-	Malaysia
Note: Approved MCCB are: Fuji Electric (China): Model BW250RAG L&T Electrical & Automation (India): Model DN2 LS Industrial System (Korea): Model ABH 203c		

4.4.5 400A Outdoor Dividing Box/MCCB Cabinet

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Lucy Switchgear	List No.14022/ 9212	U.K.
Powertech Engineering	-	Malaysia
Tenaga Kenari Sdn Bhd	-	Malaysia
LBF	-	Malaysia
Ching Hai Switchboard Manufacturer Sdn. Bhd.	-	Malaysia
Note: Approved MCCB are: Fuji Electric (China): Model BW400RAG L&T Electrical & Automation (India): Model DN3 LS Industrial System (Korea): Model ABH 403c		

4.4.6 LV HRC Fuse Link, Type JP, 40A to 400A

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Cooper Bussmann	MJ30-8 MJ30-7	U.K.
Conway Terminals Manufacturer Sdn Bhd	FNJ & FMJ	Malaysia
Lawson Fuse Ltd	-	U.K.

4.4.7 LV DIN Fuse Link, 63A, 100A and 200A

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Cooper Bussmann	NH 000 / NH 00 NH 2	U.K./India
JEAN MULLER	NH 00 NH 2	Germany Slovenia France
SIBA	NH 00 NH 2	Germany

4.4.8 Type K Fuse Link, 11 kV, 5A to 100A

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Cooper Bussmann	15KBR	U.K./India
ABB	Type K	Australia
Cable & Power Supplies	FL8K	South Africa
Hawker Siddeley	Type K	U.K.
S & C Electric Company	Type K Positrol	U.S.A.

4.4.9 Type K Fuse Link, 33 kV, 1A to 100A

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Cooper Bussmann	46KBR	U.K./India
ABB	Type K	Australia
Brush & Switchgear	Type K	U.K.
Cable & Power Supplies	FL16K	South Africa
Hawker Siddeley	Type K	U.K.
S & C Electric Company	Type K Positrol	U.S.A.

4.4.10 11 kV Din Fuse Link (Air Type) 16A to 160A

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
SIBA	Air Type	Germany
Electricas SA (Mesa)	Fusarc CF 12	Spain
Cooper Bussmann	12TDLSJ	U.K./India
Cooper Xian	12TDLSJ	China
ABB	CEF	Poland
Inter Teknik	S1A series, S68A series, S9A series	Turkey

4.4.11 Insulated Pole Mounted Cut Out Fuse

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Zhejiang SMICO Electric Power Equipment Co., Ltd.	SMF-1 APDM400	China
Lucy Switchgear	MPC 400	UK
SM-CI Electrical Equipment	SM-CI 400A	China

4.5 **Insulating oil**

4.5.1 Transformer Oil

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Nynas	NYTRO Gemini X	Sweden
⁽¹⁾ SHELL	Shell Diala S4 ZX-I	Malaysia
⁽¹⁾ Note: Base oil in Qatar, branded in Hong Kong		
⁽²⁾ Hyrax Oil Sdn Bhd	HYPERTRANS HR	Malaysia
⁽²⁾ Note: Sample test maybe required for purchase made by SESCO or delivery under turnkey project.		
Ergon	Hyvolt II and Hyvolt III	U.S.A
Sinopec Lubricant Co. Ltd	SINOPEC Super Insulated Transformer Oil I-10°C	China
Petro-Canada Lubricants Inc	Luminol TR-i (Type II Inhibited)	Canada

4.6 **Earth Fault Indicator**

4.6.1 Earth Fault Indicator for Underground Cables

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
⁽¹⁾ Elektro-Mechanik GmbH	EASI-R/EASI-A	Germany
Schneider	Flair 279	France
Nortroll AS	CableTroll 23XX	Norway
Horstmann GmbH	Earth Zero	Germany
⁽¹⁾ Kries-Energetechnik GmbH & Co. KG	IKI-10light-W	Germany
⁽¹⁾ Xiamen Four-Faith Smart Power Technology Co., Ltd	DYO-FF	China
⁽¹⁾ Note: EFI with remote sensing capability		

4.6.2 Earth Fault Indicator for Overhead Line

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Schneider	Flite 110 SA	France
Nortroll AS	LineTroll LT110Eur	Norway
Elektro-Mechanik GmbH	FLA3	Germany
⁽¹⁾ Beijing InHand Networks Technology Co., Ltd	JYL-IH-C	China
⁽¹⁾ Note: LFI with remote sensing capability		

4.7 **Battery Charger**

4.7.1 Battery Charger

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
Sunpower Technologies	-	Malaysia
AEG	-	Singapore
Nimac	-	Malaysia
Berkat Insaf	-	Malaysia
PMI Elektrik	-	Turkey
STATRON	Single Phase: BDS Series Three Phase: BDTE Series	Malaysia

4.8 **Safety Glove**

4.8.1 Safety Gloves Size 0 (1kV)

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
W.H. Salisbury & Co	5-14B CL 0 T1 14" BLK	U.S.A
VOLTGARD / NORTH	E-014B	U.S.A
G.B. Industries Sdn Bhd	Novax	Malaysia
Ansell Industrial & Specialty Gloves Malaysia Sdn Bhd	-	Malaysia
Regeltex	-	France

4.8.2 Safety Gloves Size 2 (20kV)

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
W.H. Salisbury & Co	-	U.S.A
VOLTGARD / NORTH	-	U.S.A
G.B. Industries Sdn Bhd	Novax	Malaysia
Ansell Industrial & Specialty Gloves Malaysia Sdn Bhd	-	Malaysia
Regeltex	-	France

4.8.3 Safety Gloves Size 4 (36.5kV)

Manufacturer	Type/Catalogue/ Model No.	Country of Manufacture
W.H. Salisbury & Co	40-16B CL 4 T1 16" BLK	U.S.A
VOLTGARD / NORTH	E-416B	U.S.A
G.B. Industries Sdn Bhd	Novax	Malaysia
Ansell Industrial & Specialty Gloves Malaysia Sdn Bhd	-	Malaysia
Regeltex	-	France