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KLM Technology Group #03-12 Block Aronia, Jalan Sri Perkasa 2 Taman Tampoi Utama 81200 Johor Bahru Malaysia	SPECIFICATION FOR HIGH VOLTAGE SWITCHGEAR (PROJECT STANDARDS AND SPECIFICATIONS)	

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SCOPE

This Project Standard and Specification covers the requirements for design, construction, inspection and testing of high-voltage switchgears and combination starters connected to AC circuits of 13.8 kV or 6.6 kV nominal voltage.

REFERENCES

The high-voltage switchgear shall comply with the requirements of the following Codes and Standards:

1. ANSI — American National Standards Institute

ANSI/ NFPA 70	National Electrical Code
ANSI C2	National Electrical Safety Code
ANSI C37.04 (R1976)	Definition and Rating Structure for AC High-Voltage Circuit Breakers Rated on a Total Current Basis
ANSI C37.06	Schedules of Preferred Ratings and Related Required Capabilities of AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis
ANSI C37.072 (R1976)	Requirements for Transient Recovery Voltage AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis
ANSI 037.09	Test Procedure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis
ANSI C37.9 (RI 976)	Test Procedure for AC High-Voltage Circuit Breakers Rated on a Total Current Basis
ANSI C37.20	Switchgear Assemblies Including Metal Enclosed Bus
ANSI/IEEE C37.90	Relays and Relay System Associated with Electric Power Apparatus
ANSI C37.100	Definitions for Power Switchgear
ANSI C57.13	Definitions for Instrument Transformers
ANSI/IEEE C37.90	Relays and Relay Systems Associated with Electric Power Apparatus
ANSI Z55.1	Grey Finishes for Industrial Apparatus and Equipment

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2. NEMA - National Electrical Manufacturers Association

NEMA SG-4	Standards for Power Circuit Breakers
NEMA SG-5	Power Switchgear Assemblies
NEMA SG-6	Standards for Power Switching Equipment

3. IEEE - Institute of Electrical and Electronics Engineers

ANSI/IEEE28	Surge Arresters for Alternating-Current Power Circuits
ANSI/IEEE 472	Guide for Surge Withstand Capability Tests

4. UL - Underwriters Laboratories Inc.

UL 44	Electric Wires and Cables
IEC	International Electrotechnical Commission

Ratings

High-voltage switchgears and combination starters shall be rated as follows:

- Circuit System 3-phase, 3-wire
- Rated Voltage 13.8kV or 6.6kV
- Rated Frequency 60 Hz

The 13.8 kV Switchgear shall have a rated bus bar current of 2500 A and above. The rated short-time Withstand current of the bus bars and switchgears shall not be less than 31.5 kA for 1 second. The 6.6 kV switchgear shall be suitably rated to meet the load requirement and the short circuit current of the circuit but the rated bus bar current shall not be less than 1250 A and the rated short-time withstand current of the bus bars and switchgears shall not be less than 40 kA for 1 second.

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CONSTRUCTION

General

The switchgear shall be of an approved type-tested design and suitable for continuous operation and rated to withstand the short circuit current and arc fault capability. The switchgears are to be of metalclad, indoor extensible type construction, housing vacuum circuit breakers mounted on horizontally withdrawable trucks. The cubicles are to be of a robust steel construction, welded and bolted together to form rigid, free-standing assemblies. The switchgear shall be rodent and insect proof. The degree of protection to be provided by the enclosure shall be in accordance with applicable codes. Each cubicle is to be provided with a full width, adequately braced door, allowing access to the breaker truck, removable rear plates and bottom sheet plates.

When the truck is withdrawn, it should be possible to enter the cubicle without being endangered by exposed live terminals. Automatic shutters covering bus bar and connection sockets are to be provided. Rails are to be provided to ensure accurate registration of the circuit breaker plug contacts with the fixed bus bar connections.

Bus bar shall be of high conductivity tinned copper, fully insulated, and installed in a segregated compartment completely shielded and isolated from other circuits with sheet metal. Barriers are to be provided between adjacent panels. Bus bar shall be supported on non-hygroscopic material, braced and rated to withstand the short-circuit currents. They are to be drilled for future extensions at each end of the switchgear and insulated boots shall be fitted at the ends of the bus bars. Heaters suitable for operating at 230V, 60Hz, AC shall be provided to prevent moisture condensation on bus bars, current transformers, feeder/bus bar spouts and inside the switchgear enclosure.

The switchgear shall be provided with all small wiring, terminal boards, fuses, links, labels, cable sockets, foundation bolts test and earth connections.