LS ELECTRIC

MV MCSG

(Medium Voltage Metal Clad Switchgear)

FUTURING SMART ENERGY

CONTENTS

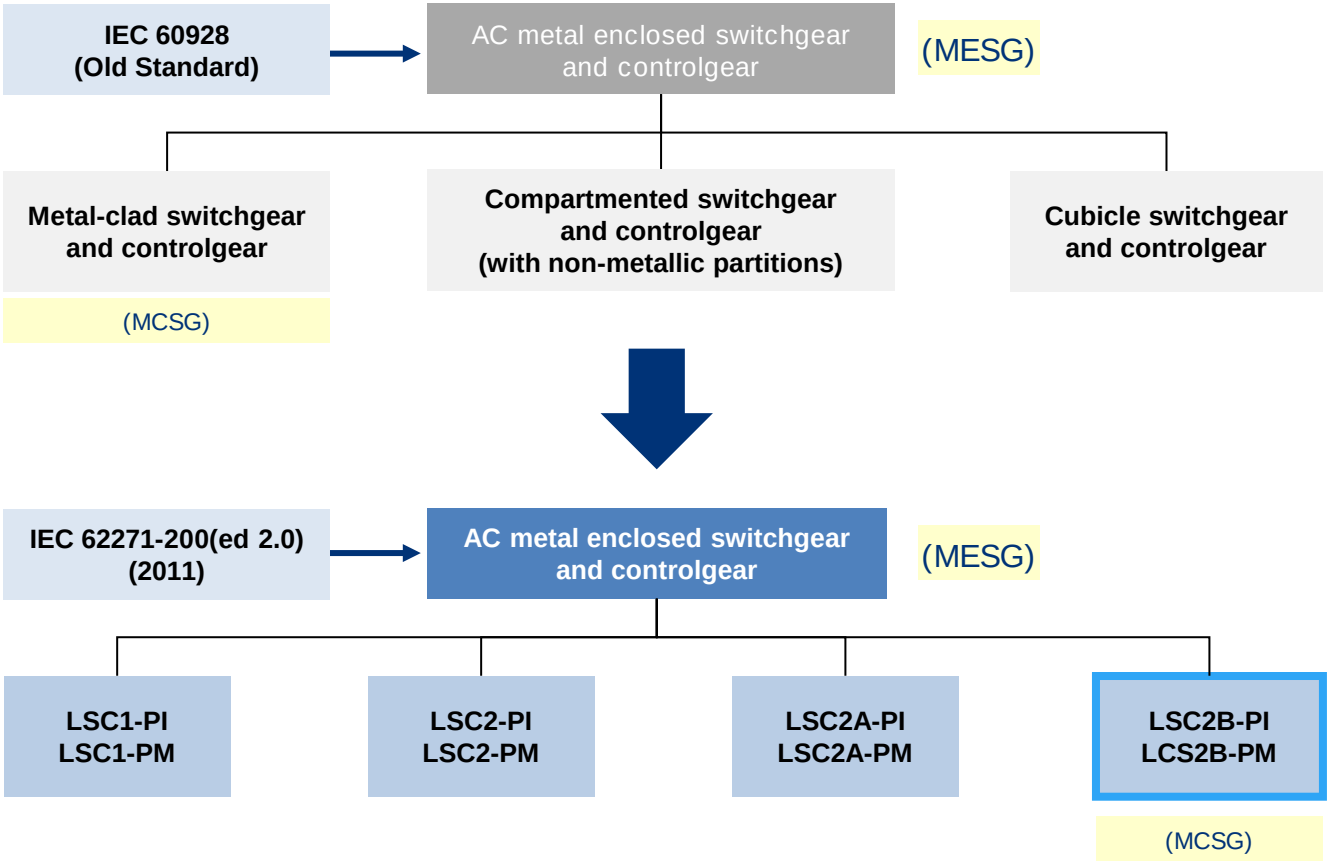
1. Definition of MCSG (IEC Standard)

MESG Switchgear completely surrounded by earthed metal enclosures

MCSG IEC 60298 (Old Std.) : Each compartment isolated with earthed metal partition is called MCSG
IEC 62271-200 (New Std.) : Generally, switchgear with the structure of LSC2B is called MCSG

Loss of Service Continuity

Partition class (PI,PM)



2. MCSG Features and Benefits

- LS ELECTRIC's MCSG Application : Power generation and Transmission facilities, Industrial plants, large complex buildings, and Computer centers.
- Optimal solutions, improves performance and design, and secure user safety with digital devices.
- Convenient maintenance and Internal Arc Protection as well.

Safety & Convenience & Compact

▣ IEC 62271- 200 LSC2B- PM Class Structure

- Each device is isolated as compartment
- Each partition consists of grounded continuous metal partition and shutter.
- Easy maintenance structure

▣ Various Interlock

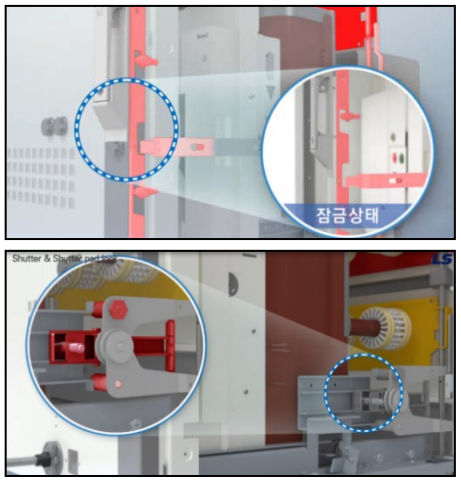
- VCB Input/Output, VCB Shutter, Earthing S/W etc.

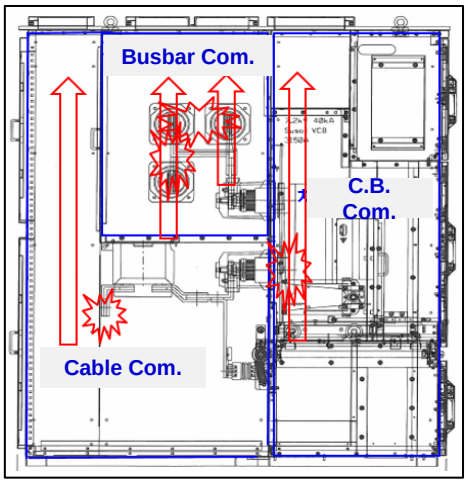
▣ Internal Arc Protection Structure(IAC AFLR)

- Structure that withstands arc explosion(up to 50kA/1s)
- Arc relief structure in Each Compartment
- Rear Door Type (No bolting) Internal Arc Protection structure

▣ Compact Design

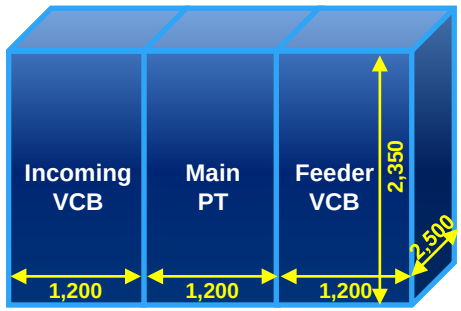
- Incoming and PT section are combined to 1 section
- Optimal design through insulation and temperature analaysis

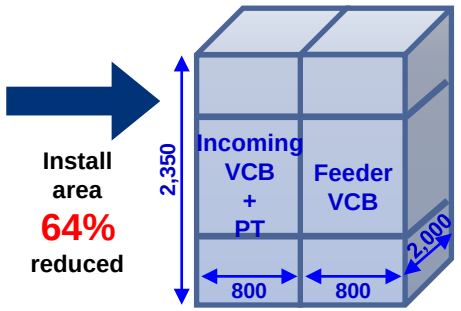




Standard Switchgear(MESG)

MCSG





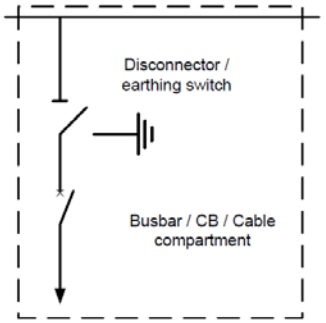
3. Switchgear Essential Standards

LSC (Loss of service continuity)

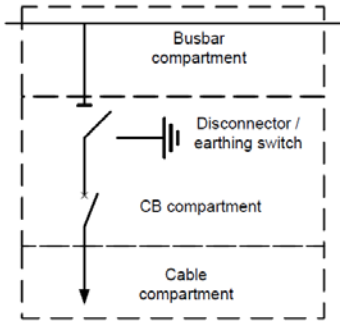
The extent to which other high-voltage compartments and/or functional units may remain energized when a main circuit compartment of this functional unit is opened.

LSC1	Not intended to provide continuity of service during maintenance ⇒ Complete disconnection before opening any compartment.
LSC2	Allowing maximum continuity of service while accessing compartments inside the switchgear. ⇒ When compartment is opened, keeping busbar live and keeping other functional unit energized is possible.

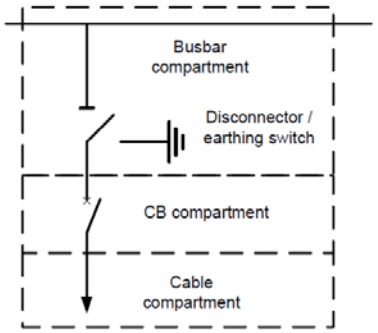
LSC1



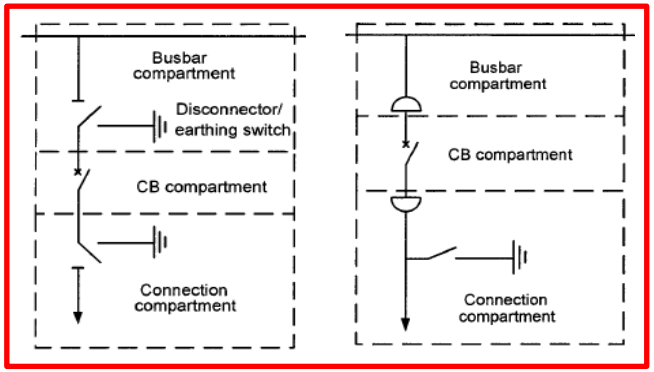
LSC2



LSC2A



LSC2B



Partition class

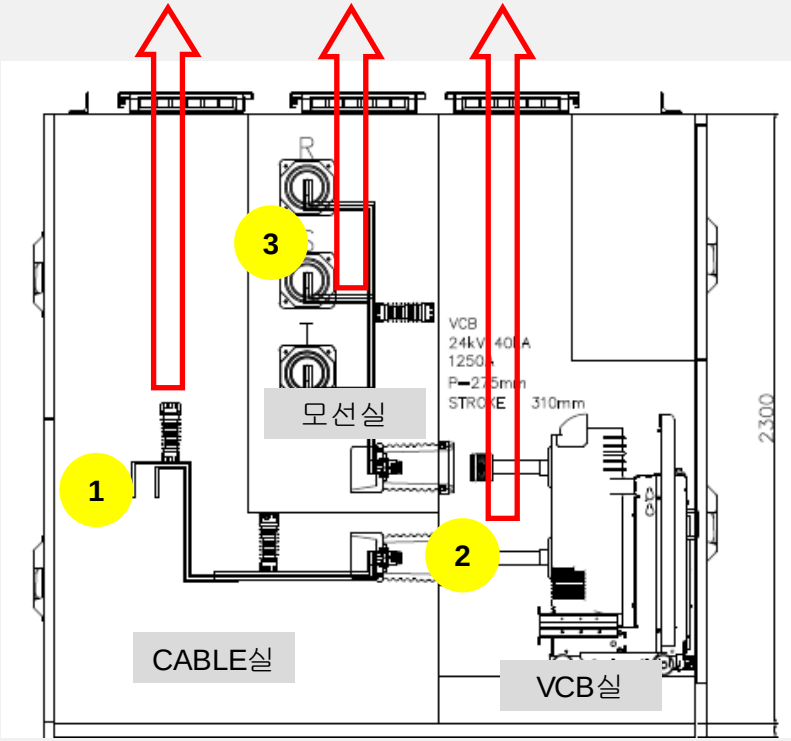
The material of Partition that prevents contact with live parts

PM	Metal partition and shutter that can be earthed between the open compartment and high voltage energizer
PI	One or more non metallic partition and shutter between the open compartment and the high voltage energizer

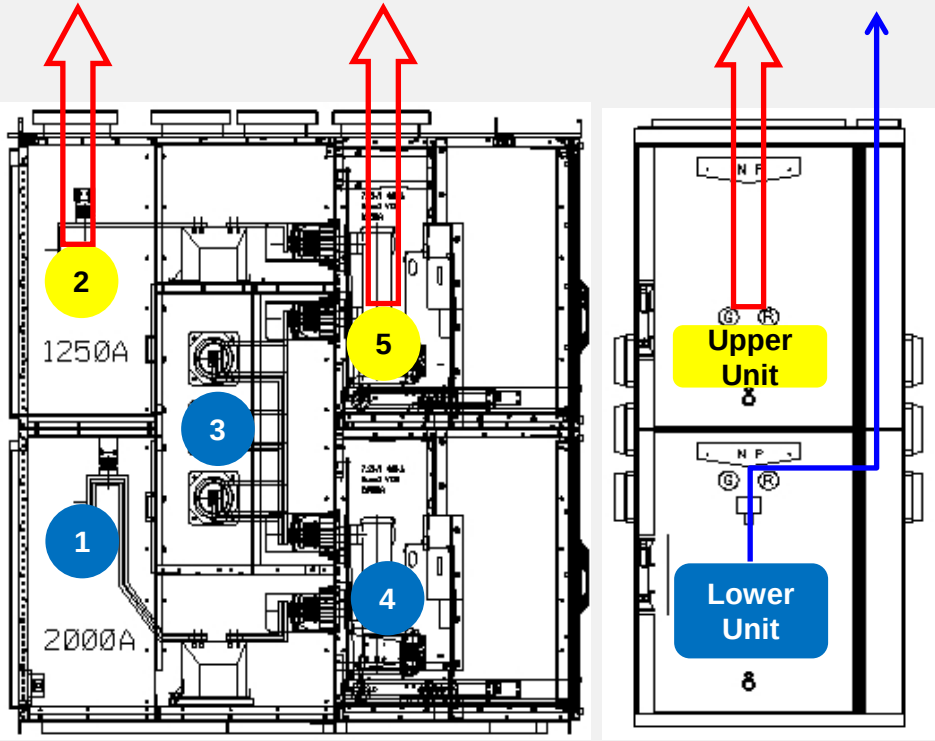
4. Internal Arc Protection Design

- Circuit Breaker compartment, Main Cable compartment, Cable compartment are separated by metal partitions with a door
- This structure withstand an arc explosion. Also each compartment is installed with Arc relief valve to release the generated arc.

1- Stack Internal Arc Protection Structure



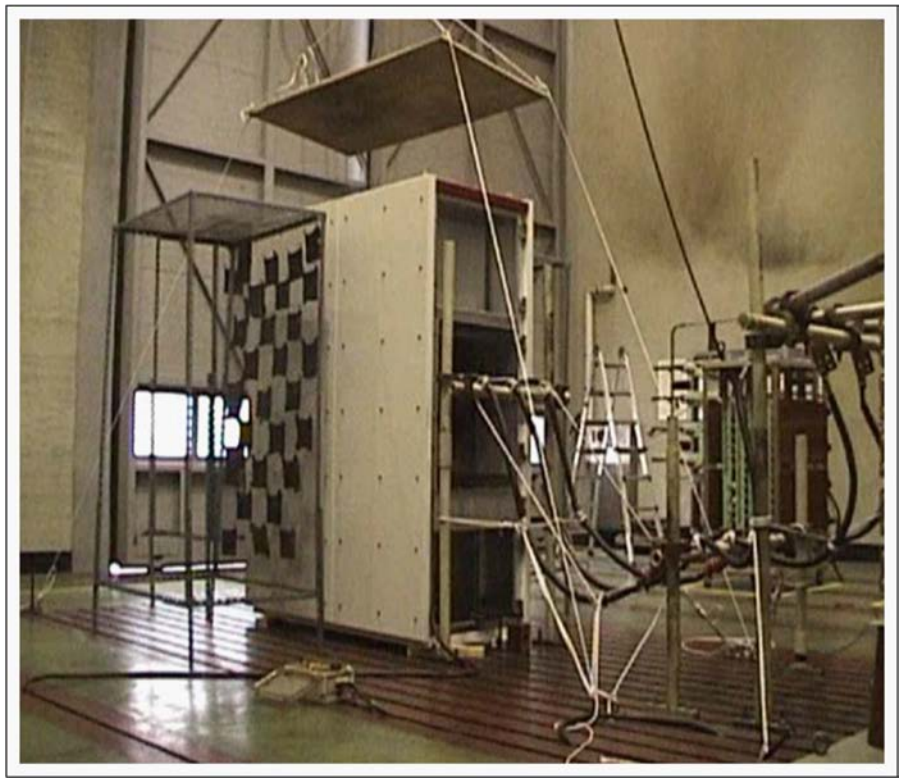
2- Stack Internal Arc Protection Structure (Side arc duct type)



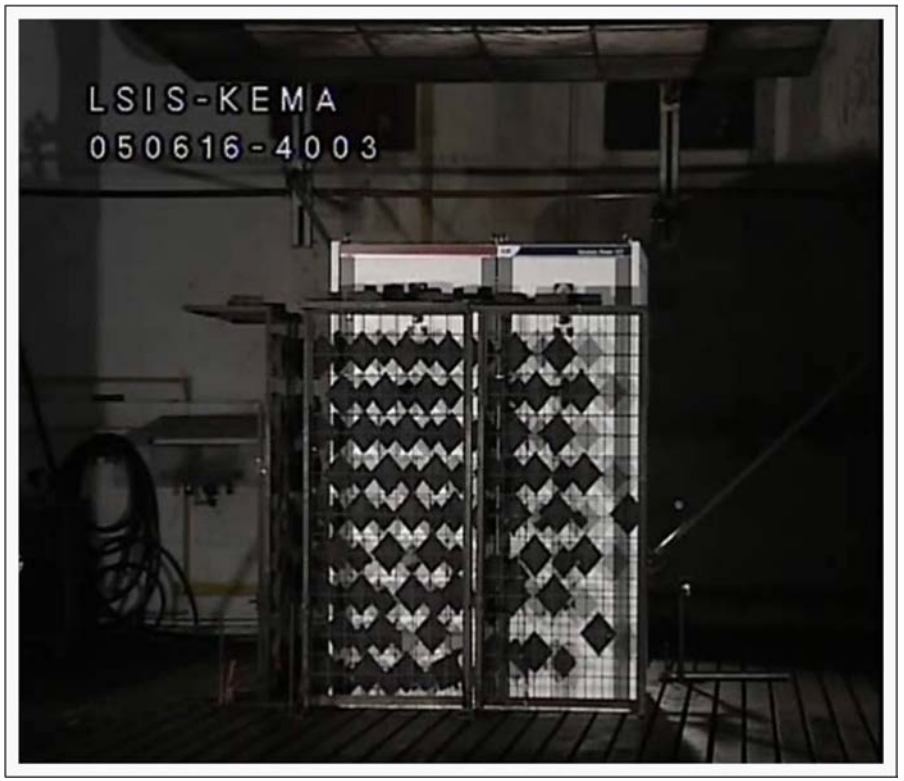
IEC 62271-200 Standard Internal Arc Protection Criteria

- Accessible doors and covers will not open
- No more than 60g of debris should be ejected
- Surfaces up to 2m in height will not have arc-induced holes
- Indicator will not ignite by arc
- Enclosure should remain grounded

Internal Arc Test – Standard Switchgear



Internal Arc Test – Internal Arc Protection Switchgear

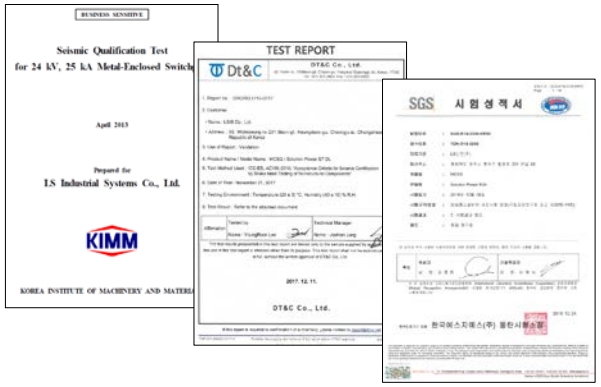


5. Seismic Design

Seismic Design MCSG

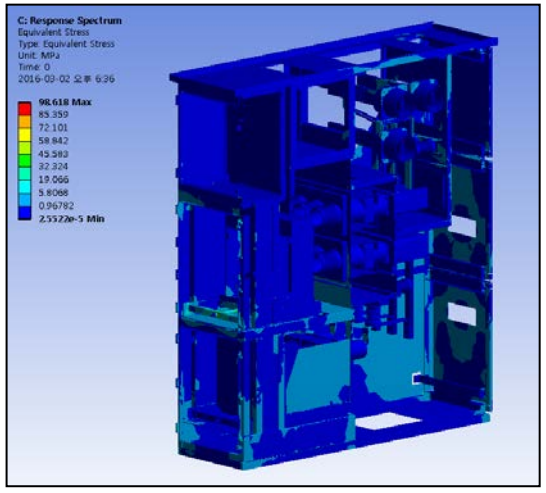
- LS ELECTRIC's MCSG implements seismic suitability :
  1) seismic analysis, 2) strong building design, 3) eismic testing
- Meeting various specifications such as earthquake-resistant switchgears

Switchgear Seismic Certificate ▶



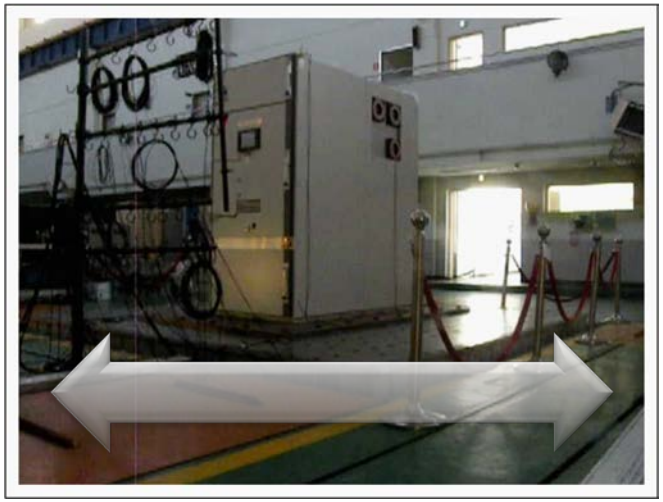
- ▣ Obtaining of Seismic Design Technology
- ▣ Securing Panel Strength through Seismic analysis/calculation

Seismic Analysis



Seismic Test (Vertical)

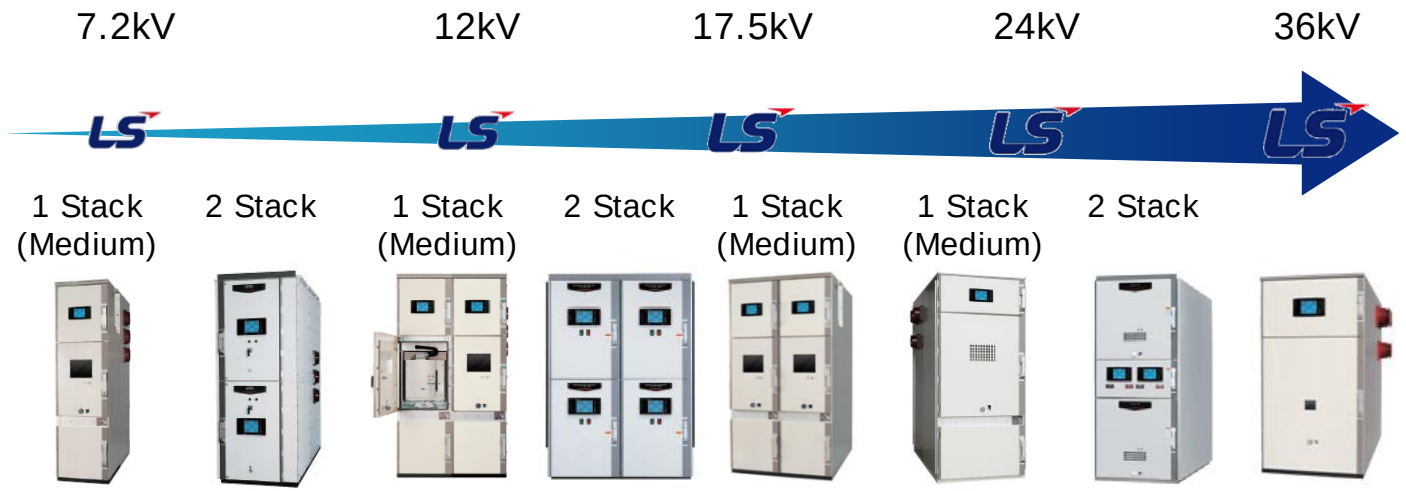
Seismic Test (Horizontal)



6. Product Line-up

MCSG Line-ups for IEC

Line-up from 7.2 kV to 36 kV, short circuit capacity up to 50 kA and internal arc protection performance up to 50 kA/1s is possible.



Rated voltage	[kV]	7.2	7.2	12	12	17.5	24	24	36
Rated current	[A]	~ 5000	~ 4000	~ 5000	~ 4000	~ 3150	~ 3150	~1250	~ 3150
Breaking capacity	[kA/sec]	~ 50/3	~ 50/3	~ 50/3	~40/3	~ 50/3	~ 40/3	25/3	~ 40/3
Internal arc current	[kA/sec]	~ 50/1	~ 50/0.5	~ 50/1	-	~ 50/1	~ 40/0.5	25/1	~ 40/1
AC withstand level	[kV]	20	20	28	28	38	50	50	70
Lighting impulse level	[kV]	60	60	75	75	95	125	125	170
Phase to Phase	[mm]	150, 210, 275	150, 210	150, 210, 275	150, 210	210, 254, 275	210, 275	275	300
Standard		IEC 62271-200							

MCSG Line-ups for ANSI

4.76/15kV and 38kV products available and currently securing UL certification for high breaking/large capacity product.

Rated voltage	[kV]	4.76/15	4.76/15	4.76/15	38	38
Rated current	[A]	1200, 2000	1200, 2000	1200, 2000,3000	1200, 2000	1200, 2000
Breaking capacity	[kA/sec]	~ 31.5/2	~ 31.5/2	~ 50/3	40/2	40/2
Internal arc current	[kA/sec]	31.5/0.2	-	-	40/0.5	-
AC withstand level	[kV]	36	36	36	80	80
Lighting impulse level	[kV]	60, 95	60, 95	60, 95	150	150
Phase to Phase	[mm]	150, 210	210	178,254	300	300
Certification & Standard		UL Listed, IEEE C37.09, IEEE C37.20.2, IEEE C37.20.7	UL Listed, IEEE C37.09, IEEE C37.20.2	UL Listed, IEEE C37.09, IEEE C37.20.2	IEEE/ANSI C37.20.2, IEEE C37.20.6, IEEE C37.20.7	

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