Surge Protective Device (SPD)

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Rujukan

- Spesifikasi SPD
  - Tarikh : Januari 2008
  - Ada header dan footer (format tak sama dengan Spec L-S1 asal)
- Addendum L-S1 (April 1999)
- Pekeliling Pengarah CKE bertarikh 11.01.2008

SPD (L-S1)

- For power system only
- Not for ELV system (where copper cable is used for signaling)
- Not for telephone system

Standards

1. MS IEC 61643-1
2. MS IEC 61643-12
3. MS IEC 62305-1
4. MS IEC 62305-2
5. MS IEC 62305-3
6. MS IEC 62305-4
7. MS IEC 60364

Why do we install SPD?

- Protection against Overvoltages (Surge)

Causes of Overvoltages/Surge

- Lightning
- Switching

Function of SPD

- To divert the surge to ground as fast as possible
- Hence, sensitive electronics equipments installed such as computers, printers, cameras, modem etc are protected
- The designer must know the withstand voltage of the electronics equipment then only he/she may select the correct SPD according to the installation

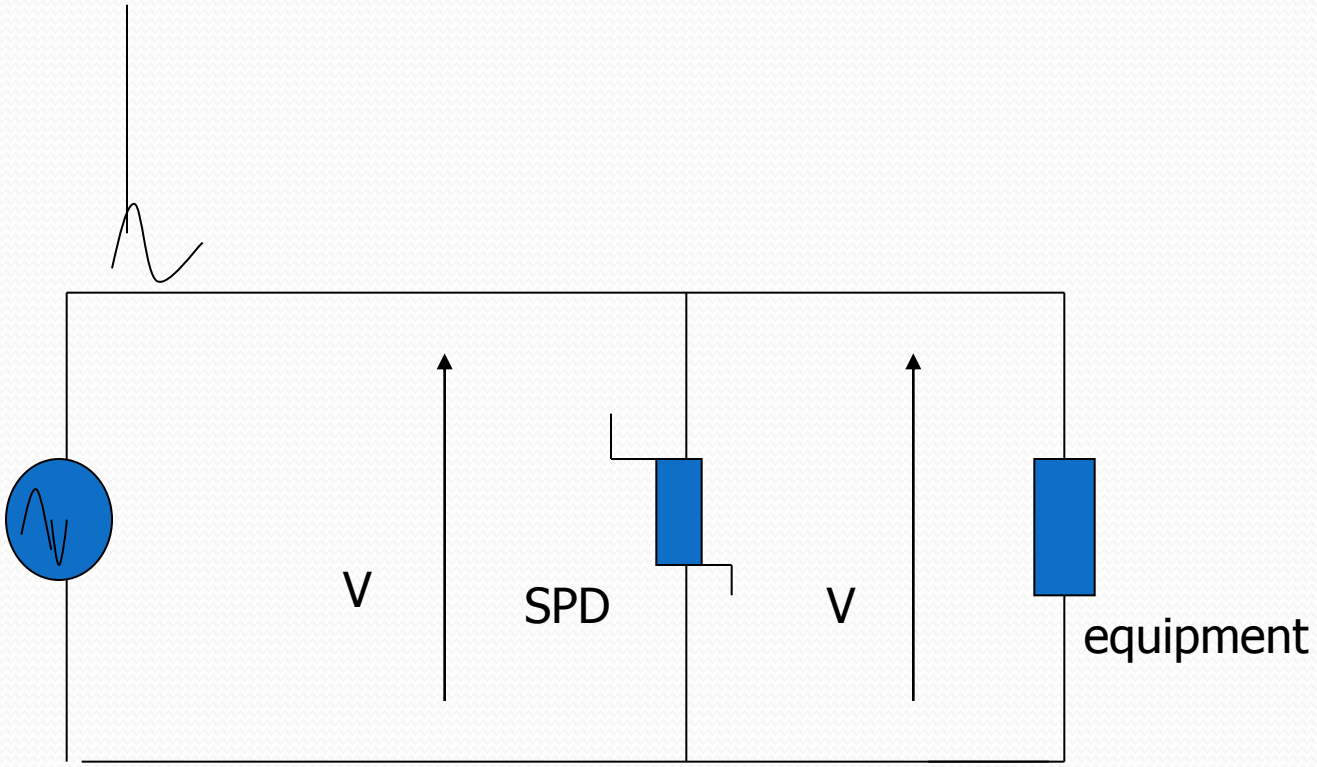
Effect

- Electronics equipments :-
  - Degrade
  - Burn down
- It depends on severity of the surges

Lightning Waveforms

- Waveform 10/350 µs
- Waveform 8/20 µs
- Waveform 1.2/50 µs

Equivalent Circuit



Terminology

- Common terminologies :-
  - Class/Type : I/II/III
  - Impulse Current, I_{imp}
  - Maximum Discharge Current, I_{max}
  - Nominal Discharge Current, I_n
  - Voltage Protection Level, U_p
  - Open Circuit Voltage, U_{oc}
  - Etc..

Technology of SPD

- Metal Oxide Varistor (MOV)
- Spark Gap/Gas Discharge Tube (GDT)

SPD in Electrical Engineering Industry

- 7 MOVs
  - Mono Block Type
  - Modular Type
- ‘ 3+1 ’ (3 MOVs + 1 SG/GDT)
  - Modular Type
- Photo

Connection

- Parallel or shunt
- Series :-
  - the rated ampere is low i.e 5 or 10A
  - Not recommended if the ampere is high – problems after installation

Modes of Protection

- Phase to earth, phase to neutral and neutral to earth
  - 7 MOVs (3ø)
  - 3 MOVs (1ø)
- '3 + 1'
  - 3 MOVs + 1 SG/GDT

How do we select SPD according to L-S1 spec?

- Incomer of MSB ≤ 600A
  - '3+1' or
  - 7 MOVs
- Incomer of MSB > 600A
  - 7 MOVs
- The same type of SPD shall be used for the rest of the installations

How do we select SPD according to L-S1 spec? – ..cont

- MCCB
  - 4P (if it is not specify in the drawing)
  - TPN (if specified)
  - The rated current shall be recommended by SPD's manufacturer
- CPC
  - Do not specify the size
  - SPD installed at floor mounted switchboards, the length of the lives conductor + the CPC shall not be more than 0.5m
- The SPD compartment shall be totally

Single Line Schematic Wiring Diagram

- Switchboards
- DB

On Site Installation

- Switchboard
- DB

Label

AMARAN

1. Pemasangan ini dilindungi oleh Surge Protective Device (SPD)
2. SPD tidak lagi berfungsi apabila “petunjuk” bertukar warna
3. Sila buat pemeriksaan pada SPD secara bulanan dan setiap kali selepas berlaku kejadian kilat/petir
4. Sila hubungi ‘orang kompeten’ untuk penggantian SPD
5. Pastikan juga ‘circuit breaker’ ke SPD sentiasa berada dalam keadaan ON (I)

Withstand Voltage

- Withstand voltage as mentioned in standard :-

Electronics Equipment	Withstand voltage (kV)
Computer, printer, camera etc	1.5
Sensitive electronics equipments i.e modem	1.0

Case Study 1

- How to apply Table 1 – Classification of SPDs in L-S1 Spec?
- 2 blocks :- Block A & Block B
- Block A – computers and cameras
- Block B – computers and modem
- Schematic
  - Alt 1
  - Alt 2

Case Study 2

- The selection of SPD in traffic light controller
- Assumed the withstand voltage for the electronics cards ≤ 900V
- Schematic

Conclusion

- The design may varies but the selection of SPD must be correct in order to protect electronics equipments
- It depends on the budget of the project
- As an overall, the SPD selected in the electrical installation design shall be :-
  - cost effective
  - meet the technical requirements

Thank You