

# **SANS 10142-1 : 2008 CODE OF PRACTICE THE WIRING OF PREMISES Part 1 : Low Voltage Installation**

## **4 Compliance**

### **Proof of Compliance (Sub clause 4.1.1)**

The SABS safety mark



The SABS approved performance mark



### **4.2.2 Table 4.1 SURGE ARRESTERS**

Applicable standards Surge arresters for LV systems --- SABS IEC 61643-1

SABS IEC 61643-1 - New since 1999  
SABS 171 - Withdrawn 2000

### **6.7.6 Surge protection**

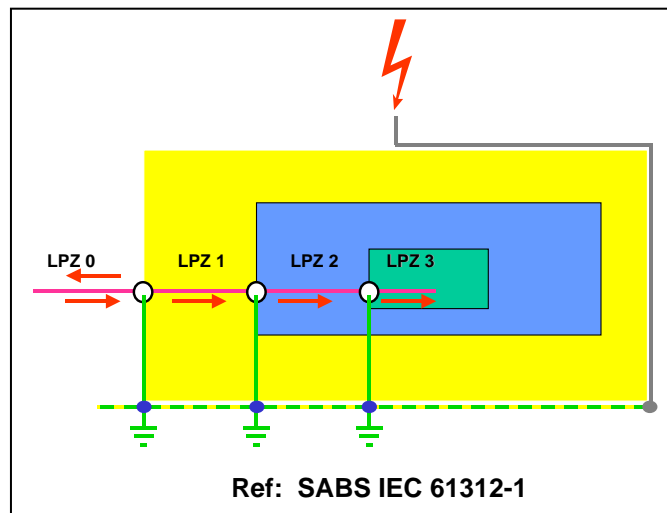
Surge protection devices (SPDs) may be installed to protect an installation against overvoltage surges such as those due to switching operations or those induced by atmospheric discharges (lightning). Amdt 1 See [annex L](#) for the installation of SPDs. Amdt 1

## Annex L

### Installation of surge protection devices (SPDs) into low-voltage system

**L.2.2** The volume to be protected is divided into LPZ in order to define the different levels of exposure due to lightning surge currents and voltages.

Conducting services that penetrate each zone shall be bonded at each crossover/penetration point.



**L.2.5** Transition from LPZ 0<sub>A</sub> to LPZ 1

**L.2.5.1** Services between LPZ 0<sub>A</sub> and LPZ 1 carry substantial lightning currents

**L.2.5.2** At the interface between LPZ 0<sub>A</sub> and LPZ 1, **Class I** lightning current SPDs are required.

**L.2.5.3** Parameters of such partial lightning currents, to which **Class I** SPDs will be exposed, are determined by the required protection level in accordance with Table L.2 and SANS IEC 61312-1

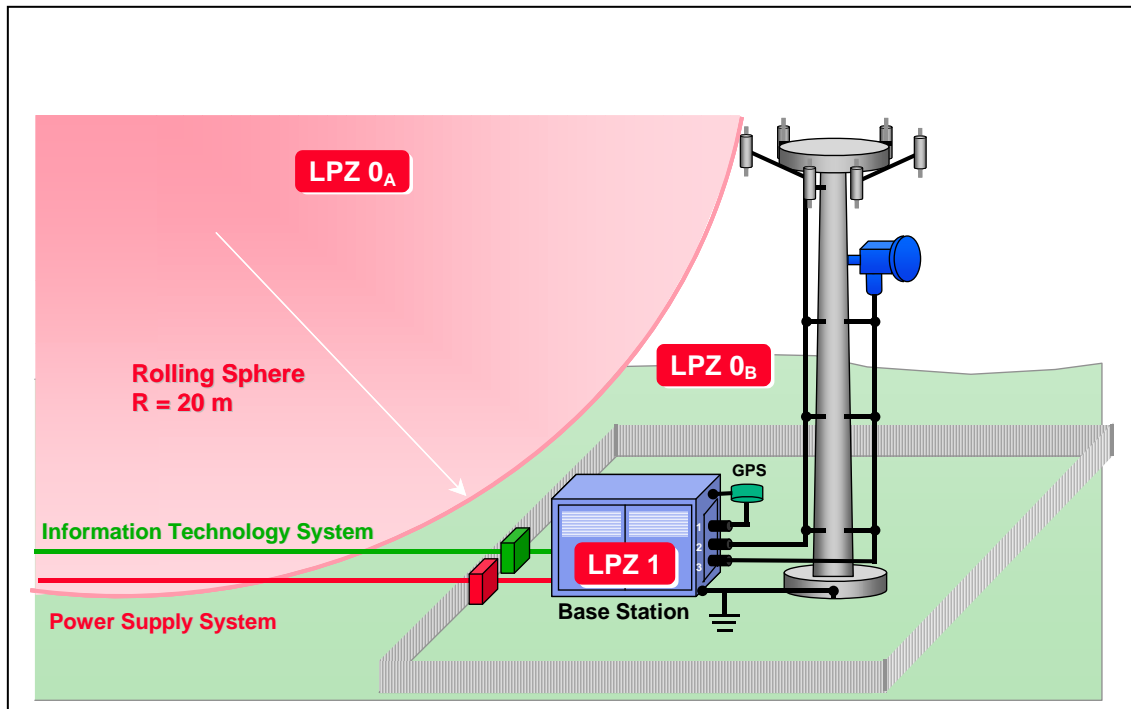
**L.2.6.** Transition from LPZ 0<sub>B</sub> to LPZ 1

**L.2.6.1** In **LPZ 0<sub>B</sub>**, electromagnetic fields caused by lightning currents are dominant.

**A direct stroke is excluded.**

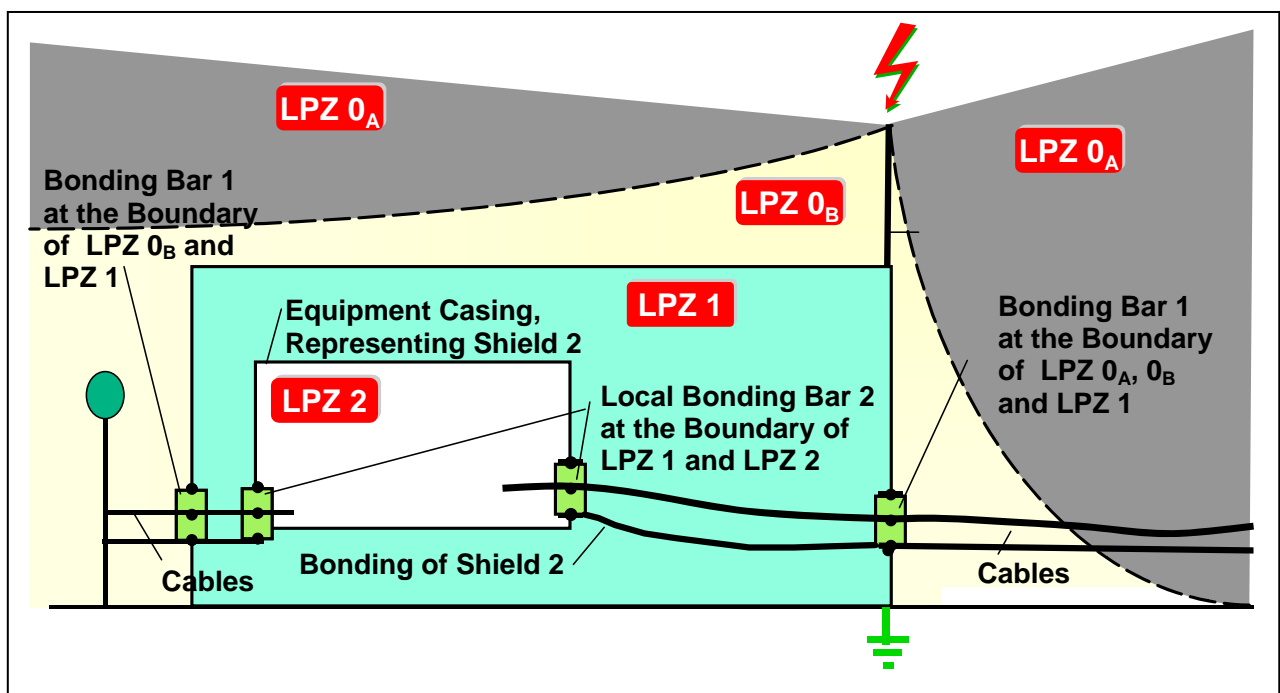
**L.2.6.2** At the interface between LPZ 0<sub>B</sub> and LPZ 1, **Class II** overvoltage SPDs are required. (Class II SPDs should be tested in accordance with SANS 61643-1/IEC 61643-1 (SABS IEC 61643-1).)

## ELIMINATING SOME CONFUSION



- In 99% of all cases conducting services traverse from LPZ 0<sub>A</sub> through LPZ 0<sub>B</sub> to get to LPZ 1
- In very few cases will conducting services only traverse from LPZ 0<sub>B</sub> to LPZ 1

### Example of –Transition from LPZ 0<sub>B</sub> to LPZ 1



## The Modified Clause L.2.5

L.2.5 Transition from LPZ 0 to LPZ 1

L.2.5.2 At the interface between LPZ 0 and LPZ 1,

**Class I + Class II SPDs are required.**

## What do we need to Know about SPDs ?

### 1.0 The TYPE of SPD

There are basically TWO types of SPDs

1.1 **Lightning Current Arrester**

1.2 **Lightning Surge Arrester**

### 2.0 Classification Of SPD's

SPD's are divided into Classes as per SABS IEC: 61643-1 and 61312-1

**Class I - Lightning Current Arrester**

**Class II - Overvoltage Arrester**

**Class III - Overvoltage Arrester**

### 3.0 Minimum Requirements **Class I - Type SPD** (Ref: IEC 60364-5-534)

3.1 ... the value of  $I_{imp}$  for SPD's connected between **Phase** and **Neutral** shall not be less than **12.5 kA (10/350)**

3.2 ... for SPD's connected between **Neutral** and **PE**  
-  $I_{imp}$  shall not be less than **25 kA (10/350)**  
and **50 kA (10/350)** for **Three Phase systems**.

### 4.0 Minimum Requirements **Class II - Type SPD** (Ref: IEC 60364-5-534)

4.1 ... the value of  $I_{SN}$  for SPD's connected between **Phase** and **Neutral** shall not be less than **5 kA (8/20)**

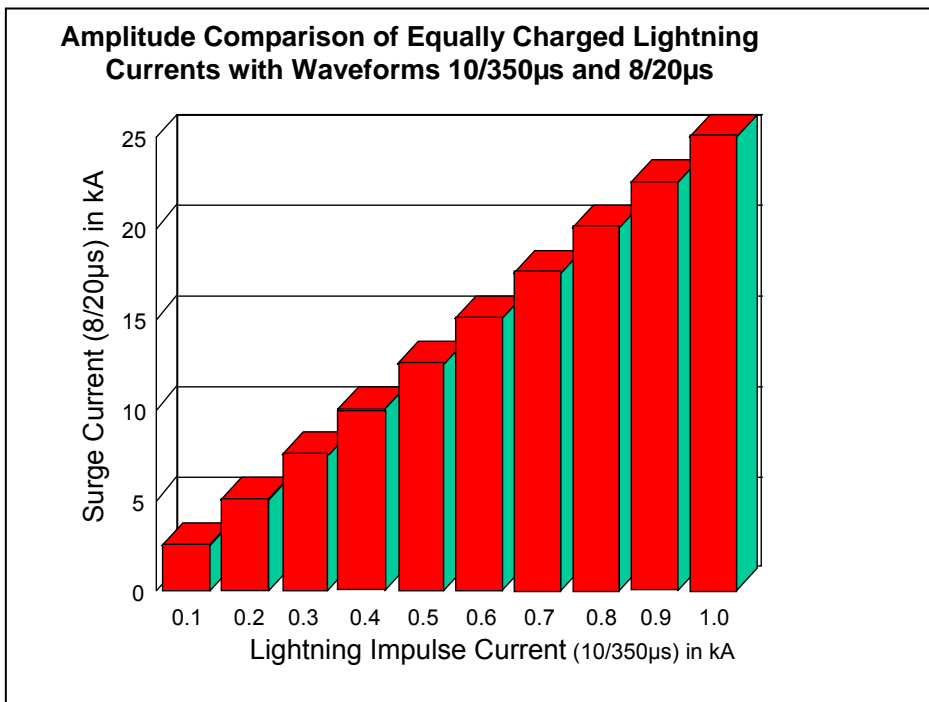
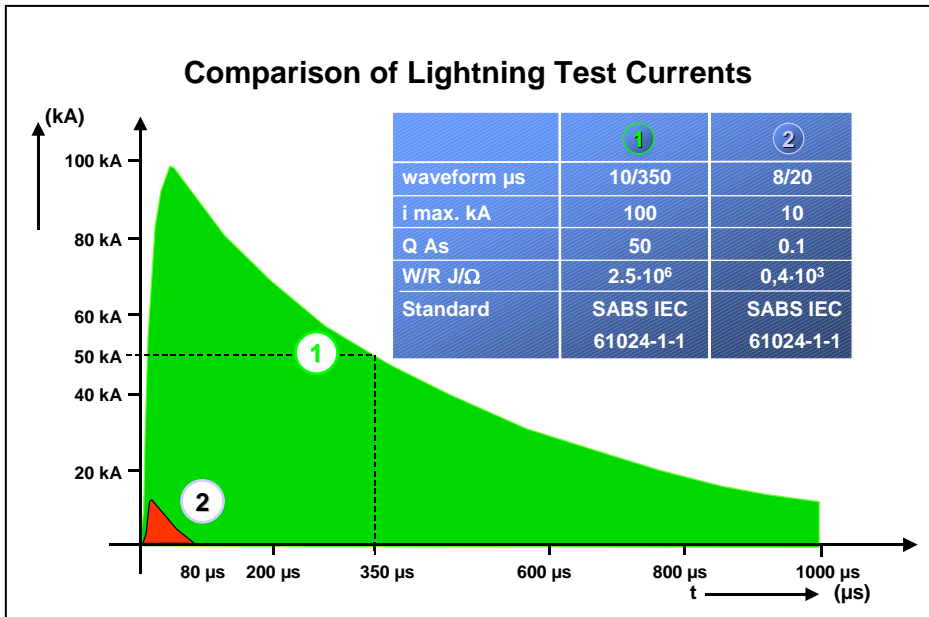
4.2 ... for SPD's connected between **Neutral** and **PE**  
-  $I_{SN}$  shall not be less than **10 kA (8/20)**  
and **20 kA (8/20)** for **Three Phase systems**

## 5.0 The WAVE SHAPES ?

5.1 Class I the Wave Shape is **10/350** micro seconds ( $\mu\text{s}$ )

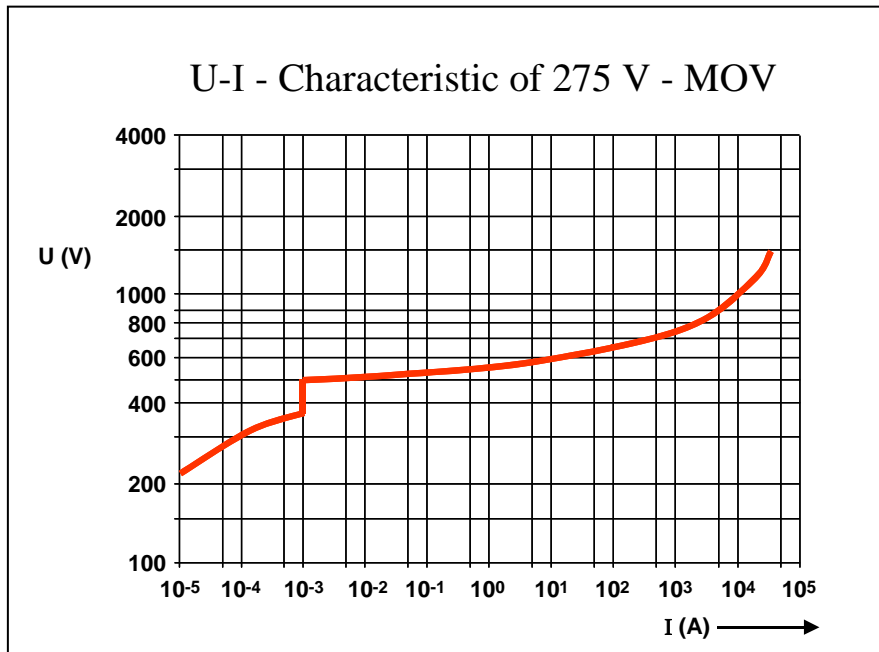
5.2 Class II the Wave Shape is **8/20** micro seconds ( $\mu\text{s}$ )

5.3 Class III the Wave Shape is **8/20** micro seconds ( $\mu\text{s}$ )



6.0 **Class I type SPD - The most commonly used types are Spark-Gaps**

7.0 **Class II type SPD - The mostly commonly used type are MOV (Metal Oxide Varistor)**



L.1.1.2

- a) **SPDs shall comply with the requirements of SANS IEC 61643-1 and shall have been tested as Class II devices**
- b) **SPDs in the main distribution board shall be at least Class II devices;**
- c) **except for voltage switching (gapped) type, each Class II voltage-limiting SPD shall be equipped with a thermal disconnecting mechanism and visual indication that shows end of life;**

5.4.3 **Surge protection**

**Where a surge protection device is installed, it shall be installed after the main switch (see [annex L](#)). Amdt 1**

L.1.1.3 **Power and telecommunication lines should enter the building or structure in close proximity and NOT on opposite sides of the building or structure.**

**NOTE For total protection, SPDs should be installed on all conductive services that enter or leave a building or a structure by the installer of such service.**

## What is the right protection level or value? (Clamping or Residual Voltage)

- L.1.1.4 According to the requirements of the insulation coordination in power installations (see IEC 60664-1) and the surge immunity of equipment to be protected, it is necessary to keep the voltage protection levels of the SPDs below a maximum value of the surge immunity level of the equipment. If the immunity against damage is not known, component immunity levels as in SANS 61000-4-5/IEC 61000-4-5 (SABS IEC 61000-4-5) shall be used.
- L.1.1.5 The impulse withstand levels are divided into categories as given in [table L.1](#) with overvoltage limits listed for standard 230/400 V three-phase four-wire systems as in IEC 60664-1.

Table L.1 – Impulse withstand categories for overvoltage limits

1	2	3	4	5
Voltage line to neutral derived from nominal voltages a.c. or d.c. up to and including  V	Rated impulse voltage			
	Overvoltage category			
	I	II	III	IV
50	330	500	800	1 500
100	500	800	1 500	2 500
150	800	1 500	2 500	4 000
300	1 500	2 500	4 000	6 000
600	2 500	4 000	6 000	8 000
1 000	4 000	6 000	8 000	12 000
The overvoltage categories given in this table are				
category I	which includes equipment such as pluggable devices with electronic circuits,			
category II	which includes equipment supplied from a fixed installation, such as pumps, motors and other appliances,			
category III	which includes equipment in fixed installations, such as distribution boards and motor control centres, and			
category IV	which includes equipment at the origin of the installation (point of control), such as electricity meters and primary overcurrent protection equipment.			

## Summary

- 1.0 All SPDs must be SANS 61643-1 approved
- 2.0 If external lightning protection is required you need Class I & Class II or combination SPDs
- 3.0 Use Class II SPDs with disconnection mechanism and indication
- 4.0 SPDs without disconnection device can only be used with ELCB
- 5.0 Use back-up fuse protection as per the manufactures instructions
- 6.0 Use wire sizes as per the manufactures instruction
- 7.0 Keep connecting wires as short as possible < 500 mm
- 8.0 Be mindful of down stream SPD co-ordination
- 9.0 Seek expert advise if you are unsure