

How to protect the electric installation of a residence for elderly

against the effects of lightning?



Customer needs

This health establishment including a sleeping area must comply with regulations for sites that require fire detection with an action indicator, consisting of:

- A system for **fire indication** with remote indication of information, a general selective **alarm** and low level siren (class A)
- A device with **fire barriers** for safety
- An **access control device for lift stopping** and **smoke removal**
- **Video monitoring** equipment Moreover, it is equipped with different premises for general use:
 - **Nurse station** with night call service, **pharmacy**
 - Restaurant, **kitchen** equipped with **freezers**
 - An office with **computer** equipment (PC, printer)
 - A **television** room.

Environment

- Located in the suburbs of a large city, this establishment may be subjected to atmospheric voltage surges from direct or indirect lightning strokes (building is equipped with a lightning conductor).
- The local lightning density is moderate ($0.5 < N_g < 1.6$)
- It is supplied via a low voltage three-phase + neutral overhead line
- It has a TN-S earthing system
- The equipment to be protected:
 - is expensive,
 - has a high impulse withstand voltage ($U_{choc} \geq 4 \text{ kV}$) for **ventilation** and **lighting** devices,
 - a normal impulse withstand voltage ($U_{choc} \geq 2.5 \text{ kV}$) for the **dishwashers**, **ovens**, **refrigerators**, **freezers**,
 - a reduced impulse withstand voltage ($U_{choc} \leq 1.5 \text{ kV}$) for **computer equipment**, the **television**, the **alarm** and **telecommunication devices**,
- telecommunication devices and **building PLCs** (fire detection and technical building management - TBM), require protection against lightning of the iPRI type.



How to protect the electric installation of a residence for elderly against the effects of lightning?

Proposed solution

The protection against fire and the continuity of supply of electric loads is particularly important in this type of establishment that houses persons with reduced mobility.

To ensure better continuity of supply:

- power distribution is carried out with redundancy thanks to the use of a back-up power supply (generator set)
- to prevent nuisance tripping, RCBOs of the A-SI type are to be implemented.

To ensure protection against atmospheric voltage surges:

- since the building is fitted out with lightning conductors to protect against direct lightning strokes, a surge arrester located on the incoming end of the electric distribution and secondary surge arresters located near electric equipment are to be foreseen.

Customer benefits

- Protection against direct and indirect lightning
- Reinforced safety of person and equipment
- Protection against nuisance tripping.

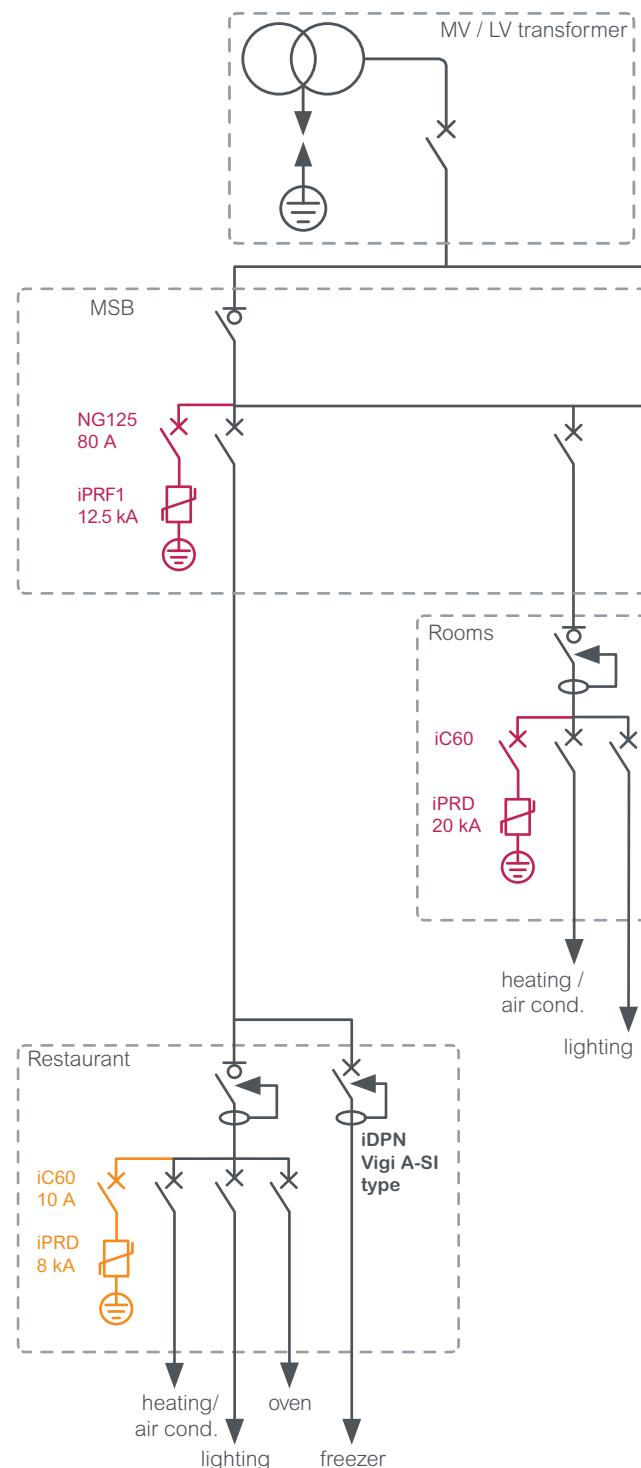
Recommendations

- Make sure that building frames and earths are equipotentially bonded
- Reduce loop surfaces of supply cables
- To protect generator, install Type 1+2 surge arrester with an $I_{imp} = 25 \text{ kA}$, $I_{max} = 40 \text{ kA}$
- In the MSB install Type 1+2 surge arrester with $I_{imp} = 12.5 \text{ kA}$, $I_{max} = 50 \text{ kA}$
- Foresee a disconnection circuit-breaker to be associated with each surge arrester
- A surge arrester iPRI 48 V to protect the building's PLCs and fire detection system is installed in series on them.

Role of surge arrester protection

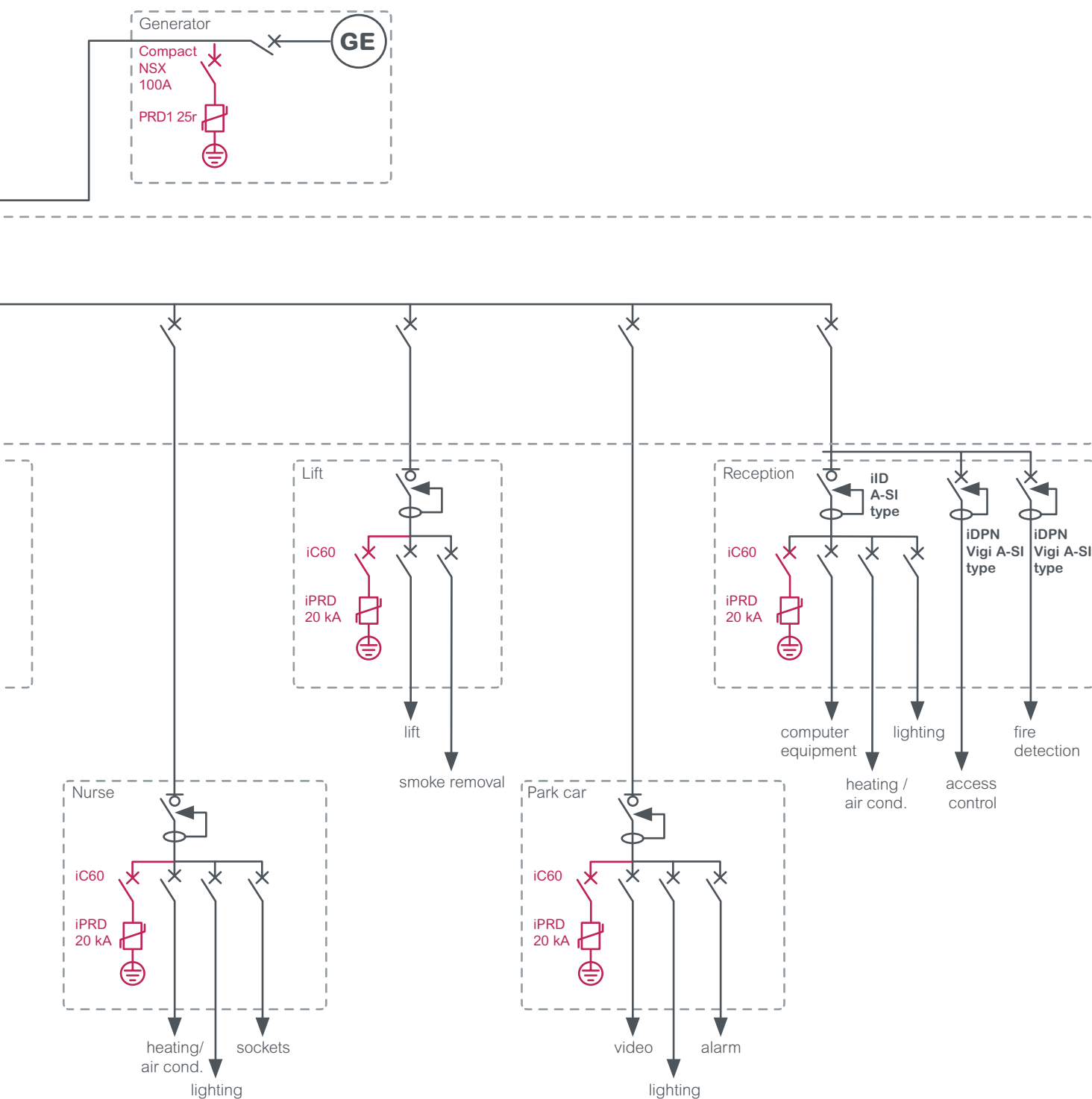
- Run off the lightning current to the ground, guaranteeing a level of protection Up that is compatible with the electric equipment to be protected
- Limit the rise in the earth's.

Solution diagram



How to protect the electric installation of a residence for elderly

against the effects of lightning?



How to protect the electric installation of a residence for elderly

against the effects of lightning?

Standards

- International installation standard IEC 60364-4-443 and 5-443 (09/2015)
- Electrical installation of buildings NF C 15 100 of 2002
- SPD are mandatory:
 - in case of overheadlines and if lightning density is $N_g \geq 2.5$
 - in case of presence of lightning rod (risk of direct impact).

Products used

Product	Description	Unity	Cat. no.
PRD1 25r	Type 1+2 surge protection device 25 kA	1	-
iPRF1 12.5	Type 1+2 surge protection device 12.5 kA	1	-
iPFK/iPRD20	Type 2 surge protection device 20 kA	5	-
iPRD8	Type 3 surge protection device 8 kA	1	-
Compact NSX	Moulded case circuit breaker 100 A	1	-
NG125N	Miniature circuit breaker 80 A	1	-
iK60N/iC60N	Miniature circuit breaker 20 A	5	-
iDPN Vigi A-SI type	Super-immunised residual current breaker	3	-
iID A-SI type	Super-immunised Residual current device	1	-

Note: number of poles of MCB should be the same as SPD.



More information:

For information concerning the protection of your electrical installation against lightning, please check our website or contact your local Schneider Electric office.

35, rue Joseph Monier - CS 30323
F-92506 Reuil-Malmaison - FRANCE
Tél : + 33 (0) 1 41 29 70 00
Fax : + 33 (0) 1 41 29 71 00
www.schneider-electric.com

Life Is On

Schneider
Electric