

# DUVAL MESSIEN

## Lightning control

A know how famous since more than one century



THE INDISPENSABLES



Certified ISO 9001

QUALIFOUDRE

MASE

QUALIFELEC





## FOREWORD

Since 1835 our company builds its image with its quality products and services.

With more than one century of experience in the fields of lightning protection and earthing systems, Duval Messien offers a global solutions from study to supply and installation of the protection system.

Duval Messien is :

- A staff of engineers and technicians trained regularly on standards evolution;
- A range of technological products always more elaborated and efficient;
- A Quality Safety policy still improving with the ASN (French Authority on Nuclear Safety ) authorization to remove, dismantle and pack in radioactive lightning conductors barrels.



SATELIT3 LIGHTNING CONDUCTOR

SATELIT + G2 LIGHTNING CONDUCTOR



# INSTALLATION PRINCIPLES

Aim of the lightning conductors is to protect buildings against direct lightning strikes by capturing the descending tracer and flowing the lightning current to the earth, avoiding then to damage the structure.

Four types of lightning conductors:

- According to NF EN 62305-3 standard
- Lightning conductors with simple rod (also named passive rods)
  - Lightning conductors with meshed cage
  - Lightning conductors with tight strand

According to NF C 17-102 standard

- Early Streamer Emission lightning conductors named also ESE (with a radius protection more important than a simple rod)

## INSTALLATION GUIDELINES

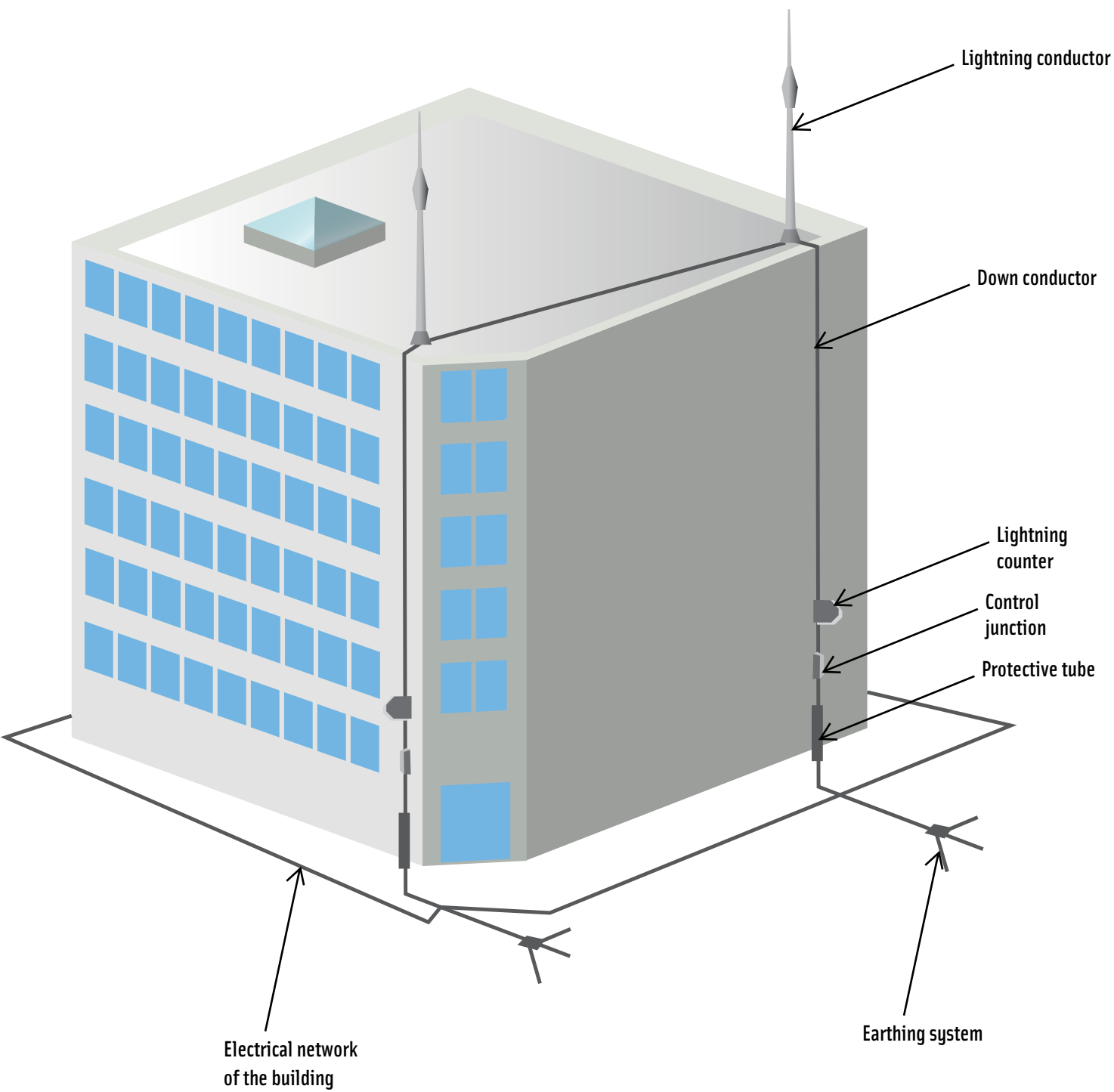
3 main components are part of a lightning protection system.

- The capturing device with its supporting mast and fixings.
- The down conductor composed of one or several tinned copper tape with section in compliance with standards in force, designed to flow the lightning current of the lightning conductor to the earthing system. This conductor will usually run outside the structure. Each fixing should allow an eventual conductor dilatation. Bend radius have to be inferior to 0.2 meters. Metallurgical masses situated in the zone of separation calculated beforehand will be interconnected equipotentially to the lightning conductor. Each down conductor will be equipped at the bottom with a control junction and a 2 meter-high mechanical protective tube.
- The earthing system with an adapted form in compliance with standards in force has for aim to diffuse the lightning current to the ground. An inspection pit will be installed to do the equipotential connection with the nearest electrical earth network of the building.

Installation quality of a lightning system is an important element for the efficiency of a lightning protection system.

For each installation and in most of cases it will be better to start with the installation of the earthing systems, then as direct as possible channels of each down conductor, then finish with the lightning conductor and roof circuit installation.

# INSTALLATION DESIGN





# AIR TERMINALS

## LIGHTNING CONDUCTOR WITH SIMPLE ROD

DESIGNATION	REFERENCE
Passive simple rod in inox diam. 20mm X 500MM	TIGSIN500
Passive simple rod in inox diam. 20mm X 1000MM	TIGSIN1000
Passive simple rod in inox diam. 20mm X 2000MM	TIGSIN2000

## STRIKE POINT FOR MESHED CAGE

DESIGNATION	REFERENCE
Strike point inox diam. 18MM X 300MM	PCI300
Strike point inox diam. 18MM X 500MM	PCI500

## EARLY STREAMER EMISSION SYSTEM

DESIGNATION	REFERENCE
Lightning conductor inox SATELIT 3-25 (25µs) can be tested	PDASAT3-25E
Lightning conductor inox SATELIT 3-45 (45µs) can be tested	PDASAT3-45E
Lightning conductor inox SATELIT 3-60 (60µs) can be tested	PDASAT3-60E
Lightning conductor inox SATELIT + G2-2500 (25µs)	PDASAT+G2-2500
Lightning conductor inox SATELIT + G2-4500 (45µs)	PDASAT+G2-4500
Lightning conductor inox SATELIT + G2-6000 (60µs)	PDASAT+G2-6000
Excitation devices integrated in the air terminal are designed to increase the excitation distance and thus generate the ascending tracer earlier (regarding to an ascending tracer naturally emitted by a simple rod). All of our early streamer emission systems are tested in compliance with NF C 17-102 standard.	

# AIR TERMINALS FIXINGS

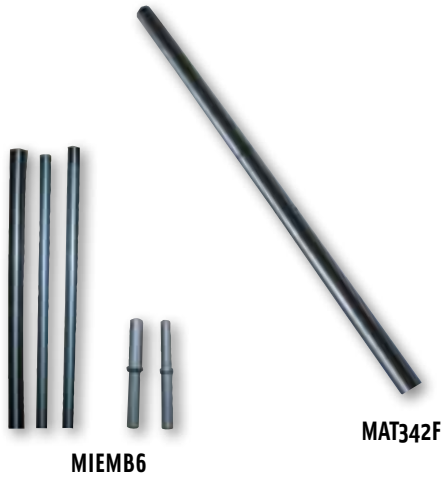
DESIGNATION	REFERENCE
Clamp SATELIT + G2 / MAT diam. 34MM	MANG2-16/34
Clamp SATELIT + G2 / MAT diam. 42MM	MANG2-16/42
Adaptation clamp SATELIT + G2 on church cross	MANADAPT
Plate support for simple rod	PLATIGSIM
Plate for strike point stainless steel	PLAPOICHOC
Connection collar inox conductor to passive simple rod diam. 20MM	RACONPTE
Connection collar conductor to lightning conductor	PDA2RAC
Water deflecting cone in rubber	CONECAOUT
Water deflecting cone in zinc	CONEZINC



# AIR TERMINALS ACCESSORIES

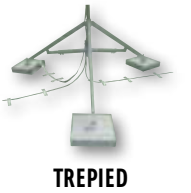
## TUBULAR MASTS

DESIGNATION	REFERENCE
Elevation rod - Galvanized steel - Diam. 34mm - Length 2M threaded	MAT342F
Elevation rod - Galvanized steel - Diam. 34mm - Length 3M threaded	MAT343F
Nesting elevation rod - Stainless steel - 4M (Diam. 34/34mm) - Element of 2M	MIEMB4
Nesting elevation rod - Stainless steel - Reinforced - 4M (Diam. 42/34mm) - Element of 2M	MIEMB4R
Nesting elevation rod - Stainless steel - 6M (Diam. 42/34/34mm) - Element of 2M	MIEMB6
Nesting elevation rod - Stainless steel - 8M (Diam. 42/34/34/34mm) - Element of 2M - Guying kit to be anticipated	MIEMB8
2 fixings are necessary for a lightning rod instalation on a 2 to 4 m mast. 3 fixings are necessary for a lightning rod instalation on a 5 to 6 m mast.	



## MAST FIXING BRACKETS

DESIGNATION	REFERENCE
Horizontal bolting bracket - Length 200MM	ATTHMAT200
Horizontal bolting bracket - Length 300MM	ATTHMAT300
Vertical bolting bracket - Length 200MM	ATTVMAT200
Vertical bolting bracket - Length 300MM	ATTVMAT300
Wall fixings for mast - Length 200MM	FIXMATD200
Wall fixings for mast - Length 400MM	FIXMATD400
Wall fixings for mast - Length 500MM	FIXMATD500
2 fixings are necessary for a lightning rod on a 2 to 4 m mast. 3 fixings are necessary for a lightning rod on a 5 to 6 m mast.	
Tie-down strapping chimney (set of 2) with 5M strip	CERCLCHEM
This strapping allows a supporting mast to be fixed on right angled chimney.	
Horizontal plate for mast (Diam. 34mm)	PLATMAT34
Horizontal plate for mast (Diam. 42mm)	PLATMAT42
Cross fixing collar	COLLRMATC
Fixing collar	COLLRMATX
2 collars are necessary for a lightning rod on a 2 to 4 m mast. 3 collars are necessary for a lightning rod on a 5 to 6 m mast.	
Guying kit - 3 points for mast (Diam. 42mm max)	HAUBKIT3P
Guying kit - 4 points for mast (Diam. 42mm max)	HAUBKIT4P
Three feet saddles with ballast for mast (Diam. 50mm max)	TREPIED
Additional ballast for three feet saddles (quantity depending on wind power)	DALLETTE



## CONDUCTOR FIXINGS ON MASTS

DESIGNATION	REFERENCE
Clamping collar - Stainless steel - Length 360mm	COLSER360
Clamping collar - Stainless steel - Length 520mm	COLSER520
Clamping collar - Stainless steel - Length 838mm	COLSER838



CONDUCTORS

CABLES AND TAPES

DESIGNATION	REFERENCE
Flexible cable green/yellow H07 VK 50²X1 (per meter)	H07VK50V/J
Flexible cable green/yellow H07 VK 95²X1 (per meter)	H07VK95V/J
Bare copper cable 25mm² (Reel of 50M)	CABLETTE25
Bare copper cable 50mm² (Reel of 50M)	CABLETTE50
Aluminium tape 30X3MM (per meter)	RUBALU303
304L stainless steel 30X2MM (per meter)	RUBINX302
Tin-plated copper tape 30X2MM (per meter)	RUBCUE302
Preformed elbow of tin-plated copper tape (30X2MM)	COURUBCUE

BRAIDS AND SHUNTS

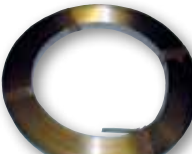
DESIGNATION	REFERENCE
Tin-plated copper flat braid 50MM² (per meter)	TREPLET50
Tin-plated copper flat braid shunt 50MM² - Length 200MM	STE50/200
Tin-plated copper flat braid shunt 50MM² - Length 500MM	STE50/500

FLAT CONDUCTOR FIXINGS (30MM WIDTH)

DESIGNATION	
Tin-plated fixing with U-shape for tile or slate roof	CERCLCHEM
Allow down conductors to be fixed on tile or slate roofs.	
Isolating fixing – Length 20MM	ATTISOPLAT
Lead plugs	CHEVPB
Galvanized steel plugs	CRAMPGALV
Stainless steel plugs	CRAMPINOX
Allow down conductors to be fixed on masonry, concrete, brick walls structure.	
Metal clip	CLIPINOX
Watertightness washers RUBBER/ALU diam. 14X2X8MM	RONDVULC
Aluminium pop rivet	RIVPOPALU
Copper pop rivet	RIVPOPCU
Stainless steel pop rivet	RIVPOPINO
Allow down conductors to be fixed on a structure with metallic components.	
Screw fixings	FIXAVIS
Heat cementing fixings	PATHERMO
Allow down conductors to be fixed on a flat waterproof roof terrace (heat cementing).	
Cement + PVC conductor support studs	PLOCIMATTA
Allow down conductors to be fixed on a roof when waterproofing cannot be touched.	
Tin-plated copper deck plate	PONTCUE
Allow down conductors to be fixed on tin roofing structure.	
Flat/flat stainless steel coupling	RACPLTPLT
Flat/round stainless steel coupling	RACPLTRND
Flat/flat stainless steel coupling with M10 screw	RACPRVIS
Cable brass dip	SERBARLAI
Couplings allow to ensure mechanical connection between several conductors	



CABLETTE50



RUBCUE302



TREPLET50



STE50/500



ATTISOPLAT



CHEVPB



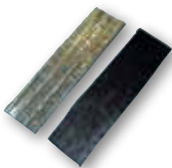
CRAMPGALV



RONDVULC

CLIPINOX

RIVPOPALU



PATHERMO



PLOCIMATTA



PONTCUE



RACPLTRND



SERBARLAI

AIR TERMINALS ACCESSORIES

MISCELLANEOUS

DESIGNATION	REFERENCE
Lightning counter CCF03	COMPTCCF03
Lightning counter with time report system	COMPTEURH
Lightning counters detect and count lightning strikes received by the lightning conductor.	
TV antenna surge divester	ECLATEUR
It is installed between the TV antenna and the roof lightning protection circuit to avoid important damages on the equipments.	
2M protective tube with 3 fixings	GAIPROPAR2
A protective tube has to be installed at the bottom of the down conductors to avoid mechanical impact on the installation.	
Control junction	JOINTCONTR
A control junction has to be installed above the protective tube to connect the down conductor and the earthing system.	
Aluminothermic welding kit	KITSOUDAL



COMPTCCF03



ECLATEUR



GAIPROPAR2



JOINTCONTR



TELETESTERS3

ESE REMOTE TESTERS

DESIGNATION	REFERENCE
SATELIT 3 remote tester	TELETESTERS3
SATELIT + G2 tester after removal	TESTERSAT+G2
For maintenance and checking operation, ESE system can be remote tested to ensure its efficiency.	

THE AVAILABLE KITS

DESIGNATION	REFERENCE
ESE SAT+G2-2500 Kit + Counter	KITG2-2500
ESE SAT+G2-4500 Kit + Counter	KITG2-4500
ESE SAT+G2-6000 Kit + Counter	KITG2-6000
ESE SAT3-25 Kit + Counter	KITSAT3-25
ESE SAT3-45 Kit + Counter	KITSAT3-45
ESE SAT3-60 Kit + Counter	KITSAT3-60

# EARTHING SYSTEMS ACCESSORIES

## EARTH RODS

DESIGNATION	REFERENCE
Galvanized steel rods - Length 1M with clamp	PIQGALVA1M
Copper steel rods (Diam. 17mm) - Length 1M	PIQCUA1M
Copper steel rods (Diam. 17mm) - Length 2M	PIQCUA2M
Stainless steel rods (Diam. 16mm) - Length 1M	PIQINOX1M
Stainless steel rods (Diam. 16mm) - Length 2M	PIQINOX2M
Special steel strike for earth rods	POINTEACSP

## EARTH RODS ACCESSORIES

DESIGNATION	REFERENCE
Steel earth rod to tape clamp M10X60MM	GOUJONAC10
Stainless steel earth rod to tape clamp M10X47MM	GOUJONIN10
Steel or stainless steel clamp guide	GUIDGOUJON
Head for clamp guide - To knock the earth rods in	GUIDTETFRA
Rod/Screw tape connector	CONPIQRUB2

## EARTHING GRIDS AND PLATES

DESIGNATION	REFERENCE
Copper earthing grid 1X1M - Meshes 115X30X30MM	GRILTER1/1
Copper earthing grid 2X1M - Meshes 115X30X30MM	GRILTER2/1
Earthing grid 2X1M + 1 x 5m plate of copper tape CUE 30X2MM	GRILTER1/5
Earthing grid 2X1M + 2 x 5m plate of copper tape CUE 30X2MM	GRILTER2/5
Earthing grid 2X1M + 3 x 5m plate of copper tape CUE 30X2MM	GRILTER3/5

## EARTH PITS

DESIGNATION	REFERENCE
Square cast-iron inspection pit 300X300MM	REGCAFIFTE
Cast-iron inspection pit (Diam. 150MM)	REGFTED150
Inspection pit allow the earthing system and the nearest electrical earth network of the building to be interconnected.	



## ACCESSORIES

DESIGNATION	REFERENCE
Equipotential connection marker (TF/TE)	PLAQLEQUI
Lighthing earthing sytem marker « LIGHTNING EARTHING SYSTEM »	PLAQDMTER
Ground coil HF	SELFTERRE
Steel equipotentiality bar with 2 isolating pieces 50X5MM - Length 100MM	BAREQUI100
Steel equipotentiality bar with 2 isolating pieces 50X5MM - Length 150MM	BAREQUI150
Aluminium and copper plate 100X100MM	PLAQAL/CU
Black cold bitumen EF 2/4MM - 25 KG bucket	BITUMENOIR

## GROUND IMPROVING

DESIGNATION	REFERENCE
TEREC + (10 KG bag)	TEREC+SAC
TEREC (20 KG bag)	TEREC20
TEREC process is composed of several components accelerating the ionic circulation. Earthing system (even those in high resistance soil) can be efficiently treated by TEREC.	

## GROUND TESTER

DESIGNATION	REFERENCE
Ground tester kit	MDM20K
This autonomous ground tester can measure earthing system resistance and soil resistivity.	

## PREVENTION

### STORM DETECTION

DESIGNATION	REFERENCE
StormDetec storm detector	STORMDETEC™
StormDetec allows anticipating and implementing procedures and protection means to protect people and installation.	

## BEACONING

### OVERHEAD BEACONING

DESIGNATION	REFERENCE
Day and night white beaconing light	SPHERE610B
Device ensuring high visibility by day or night of an obstacle.	





INDIRECT EFFECTS

OVERVOLTAGE PRODUCTS

Surge protection devices are designed to flow the lightning current to the earth. They do limit overvoltage to acceptable level for installation equipments.

Equipments are not supposed to protect from high temporary overvoltage or neutral grounding interruption but these overvoltage have been considered to ensure a surge protection device lifetime with no danger.

With no lightning strike surge protection devices have no significant influence on the installation features.

In case of lightning strike surge protection devices lower their own impedance by shunting the lightning current to limit overvoltage. Its capability to limit voltage on its terminals ensures the protection level.

Each low voltage surge protection device has to be manufactured and tested according to NF EN 61643-11 standard and suit to the neutral grounding type of the installation to protect.

Class 1 overvoltage products are defined by a 10/350 flowing current wave.  
Conventional current wave 10/350 is the most similar to direct lightning strike wave. This overvoltage product has thus high capacity to flow the energy.

Class 1 overvoltage products are used to reduce the potential differences between the lightning protection system and the electrical network while flowing the lightning current from the lightning conductor. It should comply with the lightning strike study protection level.

Class 2 overvoltage products are defined by a 8/20 flowing current wave.  
Conventional current wave 8/20 is the most similar to indirect lightning strike wave.

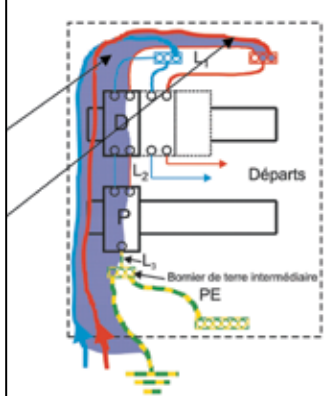
A FEW INSTALLATION RULES

Surge protection devices installation has to comply with UTE C 15-443 rules.

Connection conductors are the one linking the active conductors to the Surge protection device and linking the Surge protection device to the equipotential connection, to the protection conductor or to the PEN.  
A minimum section of 4mm² in copper is generally required; a section of 10mm² is needed if there is a lightning conductor in the installation.

A minimum distance between 2 surge protection devices is required. A good coordination between overvoltage products is necessary.

- Rule 1 : respect the L length ( $L_1+L_2+L_3$ )<0,50 m (7.4.2 and H annex) using intermediate connection terminals if necessary.
- Rule 2 : reduce the loop area generated by the phase cables mounting, neutral and PE by grouping together on the same side of the table.
- Rule 3 : separate supply lines (from the network) and outgoing cables (to the installation) to avoid to mix the disturbed and protected cables. These cables should not cross the loop (rule 2).
- Rule 4 : Flatten the cables against table metallic structures when there is one in order to minimize the mass loop and benefit of reducing the effects of disturbances.



First SPD (Surge Protection Device)			Second SPD (Surge Protection Device)			Maximum distance between the two SPDs (d)
$U_{p1}$ Level of protection	$I_{max1}$ Maximum current	$I_{n1}$ Nominal current	$U_{p2}$ Level of protection	$I_{max2}$ Maximum current	$I_{n2}$ Nominal current	
kV	kA	kA	kV	kA	kA	m
2,5	40	20	1,5	10	5	20
2,0	40	20	1,5	10	5	10
1,8	20	10	1,5	10	5	5
2,5	10	5	1,5	4	2	10
1,5	10	5	1,2	4	2	5



# LOW VOLTAGE SURGE PROTECTION DEVICE (SPD CLASS 1)

DESIGNATION	REFERENCE
SPD 1 pole    Class 1 50 KA Neutral system IT	DM1 50 IT 1
SPD 1 phase    Class 1 50 KA Neutral system TT	DM1 50 TT 2
SPD 1 pole    Class 1 35 KA Neutral system IT	DM1 35 IT 1
SPD 1 phase    Class 1 35 KA Neutral system TN	DM1 35 TN 1
SPD 1 pole    Class 1 25 KA Neutral system IT	DM1 25 IT 1
SPD 1 phase    Class 1 25 KA Neutral system TT	DM1 25 TT 4
SPD 3 phases    Class 1 25 KA Neutral system TN	DM1 25 TN 3
SPD 4 phases    Class 1 12 KA Neutral system IT	DM1 12 IT 4
SPD 3 phases    Class 1 12 KA Neutral system IT	DM1 12 IT 3
SPD 1 phase    Class 1 12 KA Neutral system IT	DM1 12 IT 2
SPD 4 phases    Class 1 12 KA Neutral system TT	DM1 12 TT 4
SPD 3 phases    Class 1 12 KA Neutral system TN	DM1 12 TN 3



DM1 25 IT 4



DM1 12 TT 4

# LOW VOLTAGE SURGE PROTECTION DEVICE (SPD CLASS 2)

DESIGNATION	REFERENCE
SPD 1 pole    Class 2 40 KA Neutral system IT	DM2 40 IT 1
SPD 4 phases    Class 2 40 KA Neutral system TT	DM2 40 TT 4
SPD 1 phase    Class 2 40 KA Neutral system TT	DM2 40 TT 2
SPD 3 phases    Class 2 40 KA Neutral system TN	DM2 40 TN 3



DM2 40 TT 4



DM2 40 TT 2







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## France References

### Atomic Energy Commission

- Fontenay aux Roses
- Cadarache
- Saclay
- Marcoule
- Vaujours
- Pierrelatte
- La Hague
- Tricastin...

### Army, Air Force, Navy

- Station of transmission
- Arsenals
- P.C. ducis
- Airplane Hangar
- Sensitive installations
- All buildings
- Ammunition dump
- DCN

### Chemical industry, Refineries

- Sanofi Aventis
- BP (Lavérat)
- Akzo-Nobel (Dourdan et Montataire)
- Great Lakes Chemical (Persan)
- Dorlyl (Le Havre)
- G.E. Plastics (Saint Souplet)
- Shell Chimie (Rouen)
- Chevron Chemical (Le Havre)
- Henkel Rubson (Chalon en Champagne)
- SCPO (Chalon / Saône)
- Shell (Rouen / Berre)
- Butagaz (Rennes)
- Nitro-Bickford
- S.M.C.A (Roissy et Orly)

- Yara France (Saint Nazaire)
- Beissier La-Chapelle-La-Reine
- TOTAL Lubrifiants (Usine de Rouen)
- GPN Grandpuits et GPN Grand-Quevilli
- Knauf Plâtres (Usine de Saint-Soupplets)
- ANDRA (Centres de stockages de l'Aube)
- Dépôt BP de Vitry-sur-Seine et de Gennevilliers
- NEXANS site de Bohain-en-Vermandois

### French Electricity Company

- Power plants of thermal production
- Nuclear power plants

### French Gas Company

- Station of recompression
- Station of storage
- Gas terminal
- Terminal methane carrier

### Research – Industry

- CNES
- CNET
- IRSID
- Thomson CSF
- SNECMA
- Aerospace

### Administration – Transport

- Paris Airports
- Crédit Lyonnais
- RATP
- Companies of Highway
- Social Security
- Bank of France
- Direction of the equipment
- Bordeaux Airport

## International references

### Dubai

- Burj Khalifa

### Greece

- Makedonia Airport, Thessalokini
- Kos Island Airport
- Rodos Island Airport
- Skyros Island Airport
- King's Tombs of Vergina, Vergina
- Olympic Bandmington Stadium, Athens
- Prefecture of Drama, Drama
- Prefecture of Chaldikidi, Poligiros
- Hospital « Papanikolaou », Thessalokini
- Hospital « Agios Pavlos », Thessalokini

### Mauritius

- New Warehouse & Luxshed

### India

- Reserve Bank Note Mudran PVT Ltd-Salboni
- Air force of India-Kalaikunda

### Indonesia

- PEGGI Cikarang warehouse

### Kazakstan

- Oilfields Nuraly

### Malaysia

- Malaysia Monorail, Step1
- Gated Bungalow Lot at Saujana Subang, Selangor

### Morocco

- Cement works of Oujda

### Dominican Republic

- National Insurance Company
- Presa Palomino
- Kesington Tower
- Altec Dominican
- BHD Bank
- Dominican beach hotel
- Hotel Melia
- Commercial Centre Plaza Lama (La Romana)

### Pakistan

- Lahore Airport
- Honda Motors Lahore

### Romania

- Biogas tanks

### Serbia

- "Izvor" Hotel, AranDelovac

### Sri Lanka

- Hospital of Asiri Surgical

### Turkey

- F1 Istanbul Park