Arthur Flury AG | Switzerland

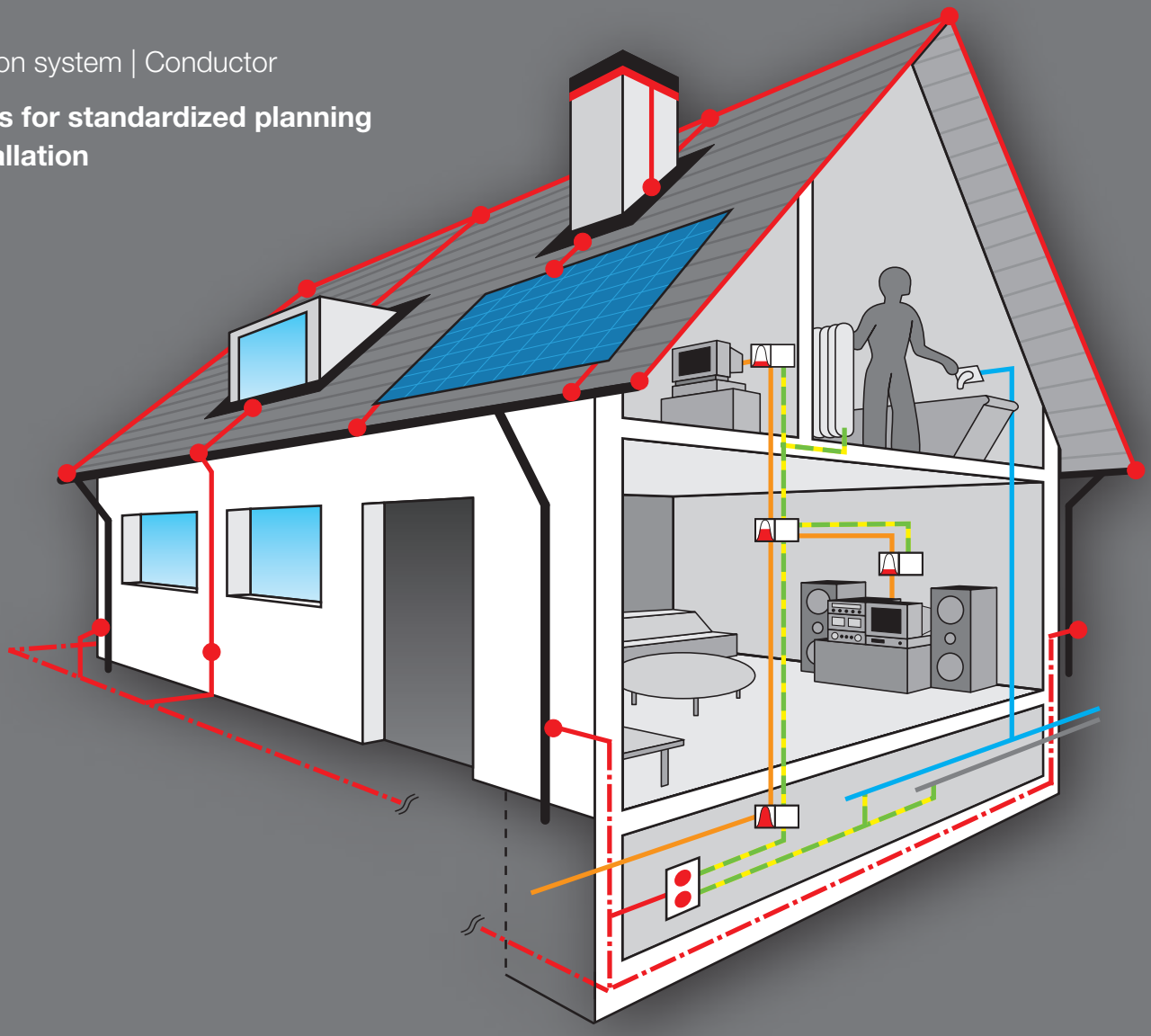
Earthing | Lightning protection | Overvoltage protection

Manual
Exterior lightning protection

Edition 2020

Interception system | Conductor

Examples for standardized planning and installation



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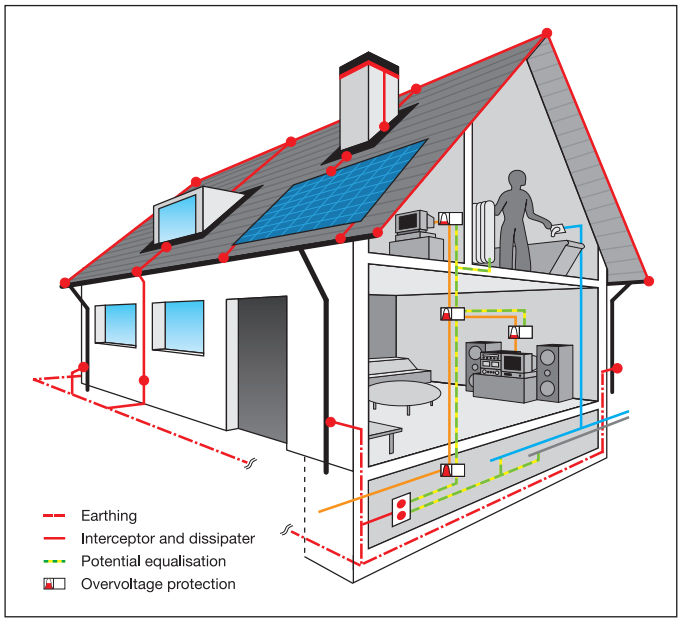
V1020

■ Interception system (see Page 5), Conductor (see Page 13)



General Requirements

*Lightning protection systems (LPS) must protect structures against physical damages and persons from potentially fatal dangers in a structure. Additional measures are necessary to protect furnishings.

*LPS must guide the lighting current into the ground along safe pathways. They consists of the exterior lightning protection (interception systems, conductors, earthing system) as well as the internal lightning protection (protective potential compensation, overvoltage protection). The measures to be taken are governed by the Type e of structure and its use.

*LPS must encompass the entire building. Buildings that have been combined must be protected as a whole or the buildings must be separated by a fire resistant barrier.

*The interface between the exterior and interior lightning protection must be carefully coordinated.

* All parts of an LPS must consist of suitable building materials and must be dimensioned, placed and mounted so that they resist all foreseeable electrical and electrodynamic effects of the lightning current, mechanical stresses and effects of weather.

*LPS must be state of the art and constructed, dimensioned, configured and maintained so that they are effective at all times.

*It must be possible to check *LPS must easily for any damages.

The basic principle behind a lightning protection system is that of the Faraday-cage with a meshed basic form.

This base form can be supplemented with lightning rods or tensioned wires. *The protective angle or lightning globe procedure conforming to EN62305 is applied for their configuration.

Please note that a lightning protection system is not just a fire protection system but a safety system.

The LPS is part of the technical fire protection system, such as a fire detector or sprinkler system, escape route signals or illumination.

Lightning protection Classes

*Depending on the Type e of object being protected, different requirements are placed on the interception systems and the conductors. The assignment of lightning protection classes to the objects is listed in the scope of the rules SNR 464022:2015.

Lightning protection class, LPS	Mesh width (m)	Radius of Lightning sphere (m)	Protection angle (a°)	Space between conductors (m)
I	5 x 5 m	20 m	see Diagram Page 13	10 m
II	10 x 10 m	30 m		10 m
III	15 x 15 m	45 m		15 m

*Maximum values for the mesh width, lightning sphere radius and the protection angle according to the matching lightning protection class of the LPS

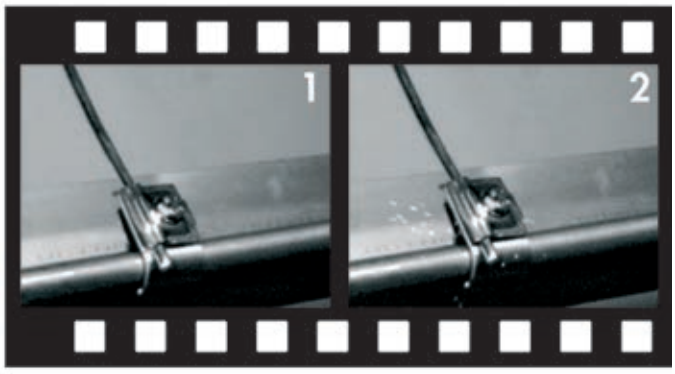
All texts marked with an (*) were taken directly from SNR 464022:2015.

Contact Clamp Universal AV 48

Article-No.	E-Number	H					mm Ø				
275.050.000	156 831 550	H	Cu		M8x30		6.0 – 10.0				
270.048.000	156 831 560	H	Inox A2		M8x30		6.0 – 10.0				
270.046.037	156 831 490		STvZn		M10x40		8.0 – 10.0				

Arthur Flury AG focuses on the manufacture of Class H tested quality products. In this catalogue and on www.aflury.ch are the class-H (100 kA/10/350) tested connecting components with the H-Signet mark. These products ensure the required protection of a professionally installed lightning protection system without restriction in all lightning protection classes.

Arthur Flury AG manufactures these products in compliance with National Lightning Protection Guidelines SNR 464022 and the international standard EN 62305. Arthur Flury AG products are tested to EN 62561-1.



What is the class-H test according to EN 62561-1?

For different applications, for example the combination of different materials or conductors, the following approval has to be done:

1. The class H component is subjected to 14 days of an aggressive, saline atmosphere - exposed to an artificial aging process

2. It is further subjected to three lightning current surges of 100 kA (10/350).

3. The class H test is passed when the component achieves steps 1 and 2, above, without electrical or mechanical failure.

The components of AF are class H approved

Figure 1-3: AF connection clamp to the gutter is repeatedly charged with 100 kA lightning surge current. Some glowing dust or metal particles are the only visible sign of this extreme stress test!

Conductors and Connectors

The most-used conductor materials with the matching connectors and holders

1


4


7


2


5


8


3

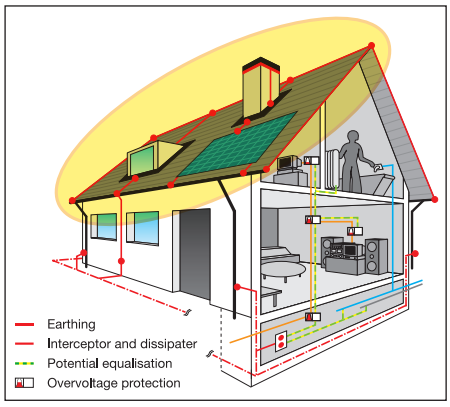

6

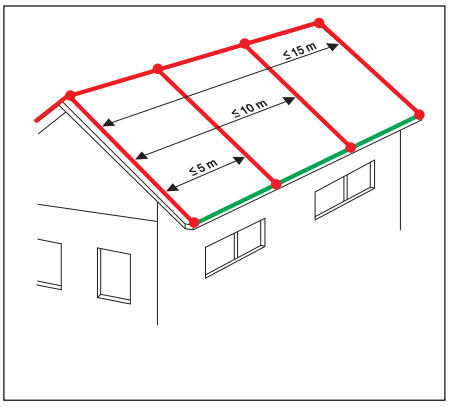

9


1	Cu bare 6 mm	4	Cu bare	7	Cu bare with Quadro Inox A2 black
2	Cu tin coated 6 mm	5	Inox A2	8	156 840 140
3	Aluminium 8 mm	6	Alu or Inox A2	9	Inox A2

In specifying the conductor material, both corrosion resistance and aesthetic considerations have an influence on selection.
Rule of thumb:
Grey metal: «grey» conductors and connectors (e.g.CU tin coated, stainless steel V2A)
Copper metal: «red» conductors and connectors (copper bare)

Interception





General

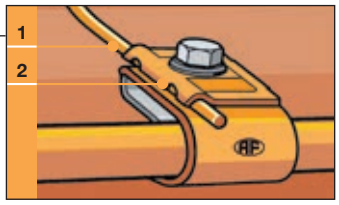
*The interception system encompasses all parts of the building in the roof area that are exposed to lightning strikes.

*All protruding edges on building components in the roof section are to be protected with an interception system, especially the roof ridge and the roof edges.

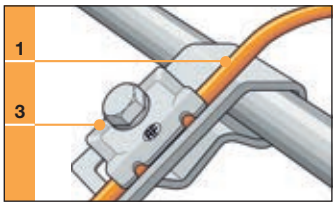
*For buildings with pitched roofs whose slope is greater than 6°, parallel lightning conductors can be used instead of meshes, to the extent that their distance is not greater than the required mesh width.

Interception

General



*In the roof area, all metal parts like sheet metal profiles, sheet metal frames, sheet metal cladding and covers, as well as gutters, snow guards, fall protection barriers, ventilation ports, overflow pipes, balustrades and the like are to be used as interception systems («natural interception systems»). The exception is when a local isolated LPS is required. (see Page 9)



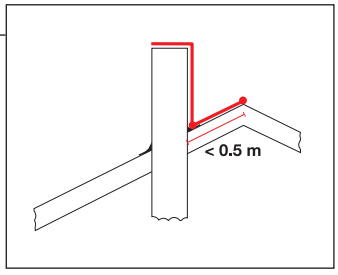
*In the roof area, any vertical attachments that contain an electrical installation such as protective hoods for fans, weather stations, smoke and heat extraction systems, antennas, sirens or search-lights and the like must be integrated into the LPS. Ideally these systems must be protected against direct lightning strikes with a locally separated LPS. (see Page 9)

	AF-Type	AF-Art. Number	E-Number	
1	Cu bare 6 mm	215.002.002	100 032 160	
2	FL 83 Cu	285.102.000	156 840 140	H
3	FL 14	280.103.000	156 822 000	H

*In the roof area, all parts that are not made of conductive materials (e.g. PVC-ventilation pipes, lighting domes, etc.) must be protected with an interception system, to the extent that they rise above the roof surface by more than 0.5 m.

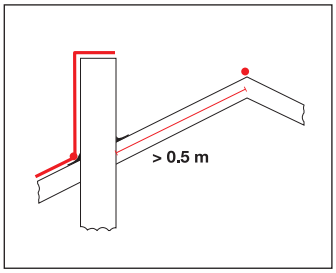
Light domes will be ideally protected with a locally isolated LPS against direct lightning strikes. (see Page 9)

Chimneys



*On chimneys, the interception system is to be arranged so that it does not lie in the range of the smoke stream if at all possible.

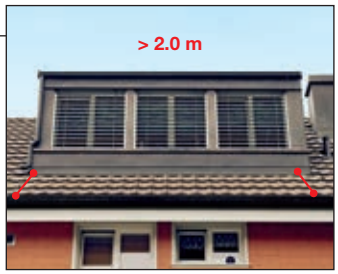
*The LPS on chimneys is different if they consist of conducting or non-conducting materials. Chimneys made of conducting materials must be integrated into the LPS and also connected at the base point (inside the building) with the protection potential. Chimneys made of non-conducting material must be equipped with an LPS.



To the extent that the chimney is not further than 0.50 m from the ridge line, it can be connected «upward». If the distance is greater than 0.50 m from the ridge line it will be connected «down-ward» to the roof gutter.

Interception

General

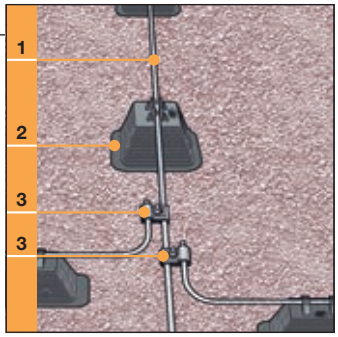


*vertical structures on the roof that exceed the height of the roof by more than 0.5 m or have horizontal dimensions of more than 2 m x 2 m such as balustrades, dormers, lift mechanisms, light domes and the like must be integrated into the LPS.

*If a distance of 10 mm between the interception system (lightning rod) and flammable parts of the building cannot be maintained, the minimum cross section of these conductors must Cu 50 mm² or Ø 8 mm.

If line holders are used, allowing the distance of 10 mm to be maintained, the lightning conductor may be made of Cu 6 mm.

Flat Roof



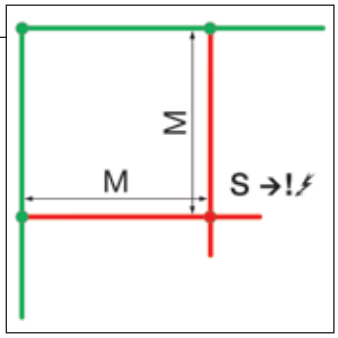
So that the lightning conductor does not lie in substrate or in gravel, it must be spaced using flat roof conductor holders. The conductor holders on flat roofs may only be laid on the substrate or gravel.

If water can collect on the flat roof, the interception system should be arranged above the highest possible water level.

For constructing mesh nets on buildings with flat roofs, one must distinguish between versions with and without risk of disruptive discharge.

	AF-Type	AF-Art. Number	E-Number	
1	Cu verzinnt 6 mm	215.004.002	100 034 160	
2	FL 70	226.017.005	156 950 110	
3	AV 48	270.048.000	156 831 560	H

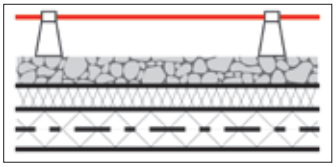
Flat roof with risk of disruptive discharge



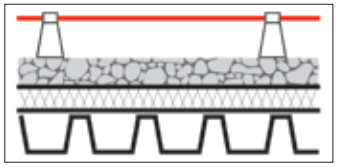
*A lightning conductor net with the mesh width specified in the table on page 2.

In the case of reinforced or metallic sub-structure, a disruptive discharge through the roof cladding must not be excluded since the spacing is too small.

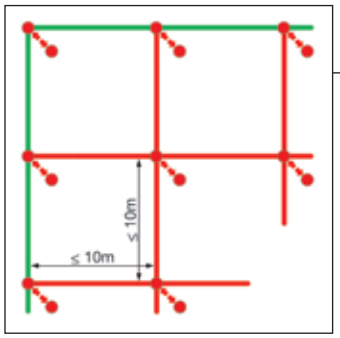
Reinforced sub-structure



Metallic sub-structure



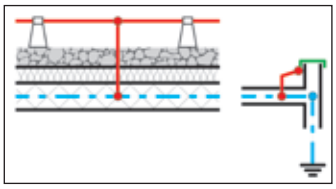
Interception

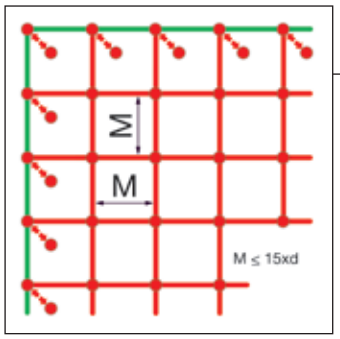


Flat roof without risk of disruptive discharge with flat roof transits

*A lightning conductor net with a mesh width of 10 x 10 m, that is connected with the sub-structure at all of the nodal points.

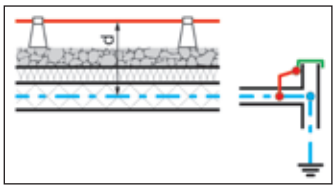
For this Type e of installation, flat roof transits are used in the surface of the roof and along the edge of the roof.





Flat roof without risk of disruptive discharge with with tight-meshed lightning conductor net

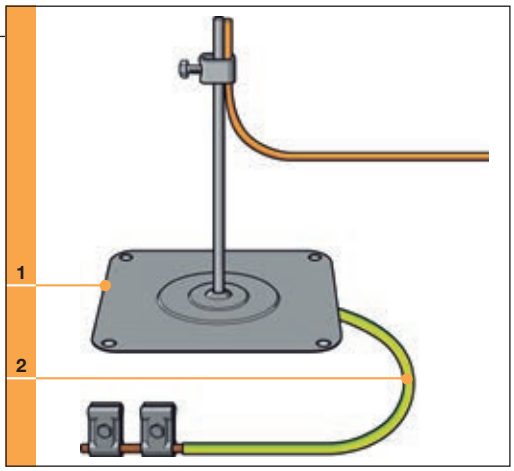
*A lightning conductor net with a mesh width of at most 15-times the minimum distance between the lightning rods and the metal components of the sub-structure. Connection of all nodal points on the edge of the roof with the sub-structure.



Flat Roof Transits

Flat roof transits are needed in order to guarantee norm Compliant transits through the roof cladding.

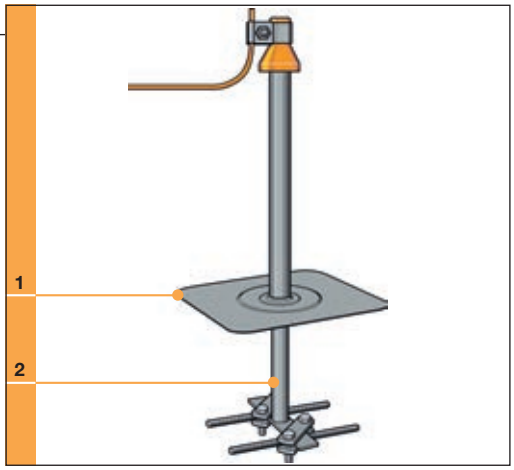
With Arthur Flury AG there are two set versions to select from: With Arthur Flury AG there are two set versions to select from: Naturally the top and bottom part can be ordered separately. For the sealant lining of poured asphalt or plastic; Including 650 mm T-line 50 mm² and two parallel clamps.



The FL 82 is used in post-war construction, renovations and retrofits.

	AF-Type	AF-Art. Number	E-Number
	FL 82 Set complete	220.023.000	156 940 450
1	FL 82b Top part	220.023.003	156 941 450
2	FE 82b Bottom part	220.023.002	156 941 460

For sealing lining of poured asphalt or plastic; includes two clamps of Type FE 43



The more stable FL 76 is used primarily in new (post-war) construction.

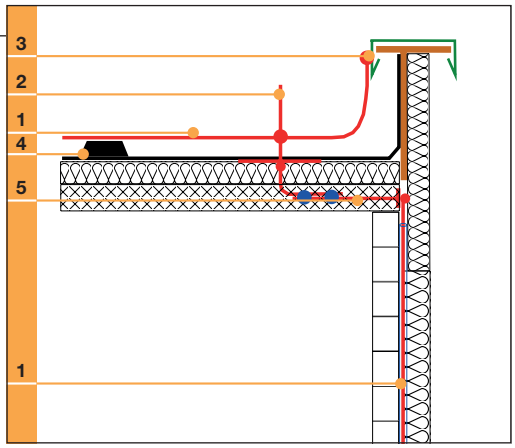
	AF-Type	AF-Art. Number	E-Number
	FL 82 Set complete	220.018.726	156 940 440
1	FL 82b Top part	220.018.728	156 941 440
2	FE 82b Bottom part	220.018.729	156 941 430

Interception

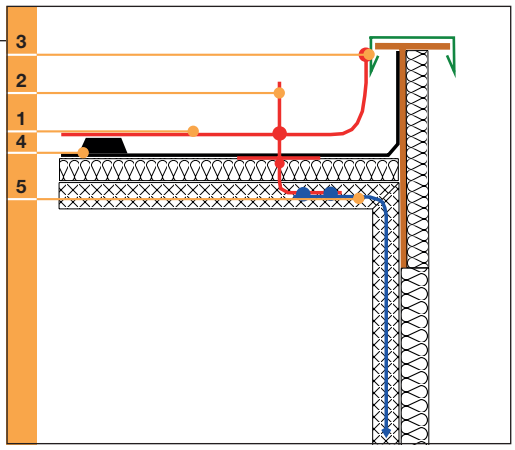
Wooden parapet with concealed drain

The “path” through the balustrade is often a problem. Especially if the balustrade structures are made of wood.

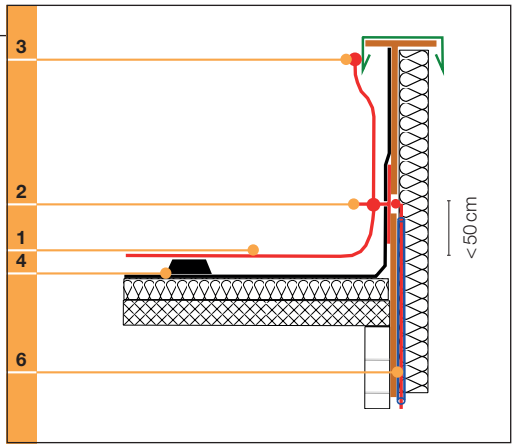
To the right are some detail/solution ideas.



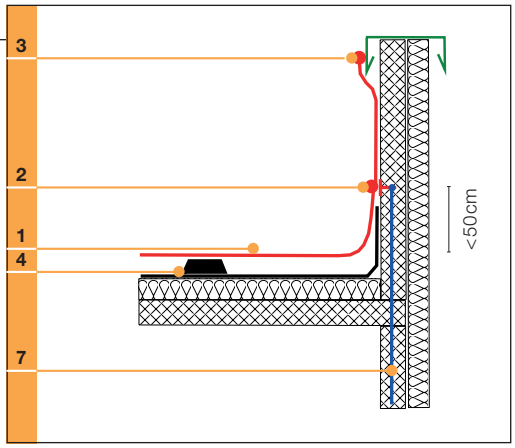
Wood balustrade with conductor cast in concrete.



Wooden parapet with concealed drain.



Concrete parapet with drain embedded in concrete.



	AF-Type	AF-Art. Number	E-Number	
1	Cu bare 6 mm	215.002.002	100 032 160	
2	FL 82	220.823.000	156 940 450	H
3	AV 7 Inox	270.092.000	156 831 610	H
4	FL 70	226.017.005	156 950 110	
5	FE 70	260.074.000	156 940 040	
6	LR 5	215.002.120	100 030 160	
7	Steel cable 75 mm²	261.031.020	156 990 640	

Interception

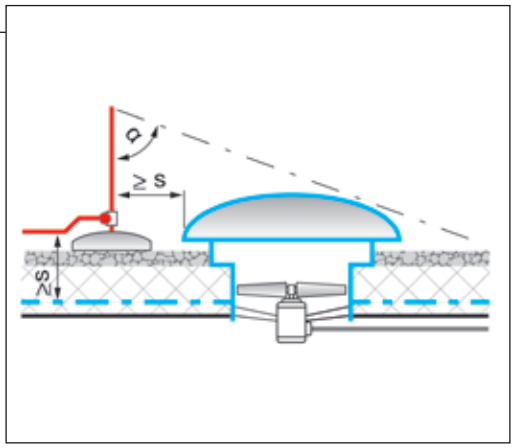
Locally Separated Lightning Protection System with Lightning Rods

*If a locally separated LPS (e.g. lightning rods) is installed with vertical attachments to the roof, spacing distances must be observed..

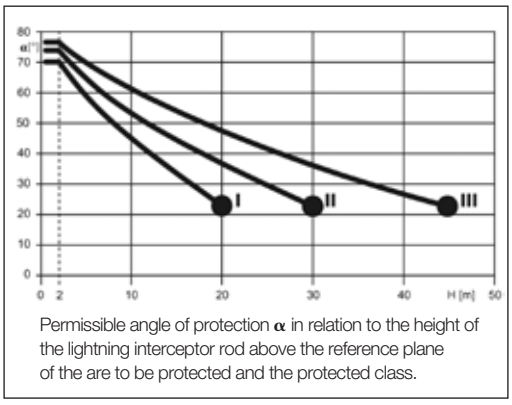
A locally separated LPS is preferred to a direct connection since this means no partial surge current from a lightning strike can flow into the building.

If a lighting dome is protected with a single lightning rod, the spacing distance must be observed and the length of the lightning rod can be determined by means of the angle of protection procedure. See the calculation programme on Page 11.

If multiple lightning rods are installed, the angle of protection procedure will be mixed with the lightning sphere procedure. See next page.



*In the diagram to the right one can see the angle of protection in relation to the height of the lightning rod above the reference plane of the object to be protected and the protection class.



Permissible angle of protection **α** in relation to the height of the lightning interceptor rod above the reference plane of the are to be protected and the protected class.

Source: SNR 464022:2015

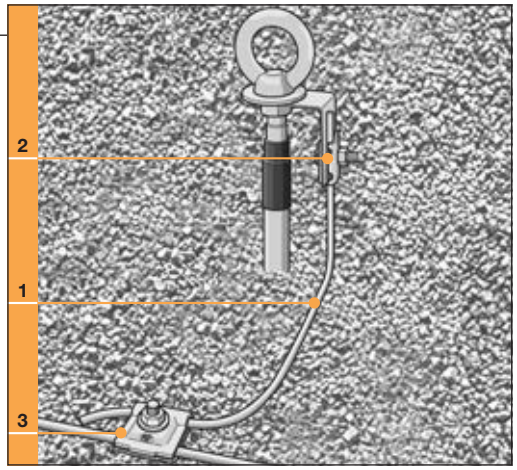
Notes

*a) Beyond the values marked with • the angle of protection procedure is no longer applicable. For cases like these only the mesh or the lightning sphere procedure should be used. (see EN 62305-3 [3])
*b) H is the height of the interception system above the reference plane of the area to be protected.
*c) For objects with H under 2.0 m, the protected angle does not change.

Fall Protection

The integration of individual attachment points or anchor points into the lightning protection system must be constructed with tested material or they will be protected from direct lightning strikes with a locally separated LPS by means of lightning rods.

	AF-Type	AF-Art. Number	E-Number	
1	Cu tin coated 6 mm	215.004.002	100 034 160	
2	AV 25 Inox A2	270.055.002	156 801 300	H
3	AV 48 Inox A2	270.048.000	156 831 560	H



Cable Fall Protection System

The cable connector set FL15 is quite well-suited for creating a connection at the junctures of the cable fall protection system and the lightning conductor that provides lightning protection and is tested flexible and can be rolled over.

The cable connector set FL 15 can be used as a cable fall protection system with any 6 mm or 8 mm chrome steel lines.

	AF-Type	AF-Art. Number	E-Number	
1	FL 15	280.103.010	156 940 500	N

Interception

Locally separated lightning protection system with lightning rods in the lighting sphere procedure

If multiple lightning rods are installed around a monoblock are to be locally separated and protected from a direct lightning strike, the depth of penetration or overhand of the lightning sphere is to be taken into account. The decisive thing here is the greatest distance between the lightning rods. The depth of penetration can be seen on the table to the right between the greatest distance between two rods.

The lengths of lightning rods is determined by the height of the vertical attachments as well as the depth of penetration and the rounding to the closest conventional mass for lightning rods. If, for example, it is determined that the total lightning rod length will be 1.75 m, a conventional mass for the lighting rod of 2.0 m will be used.

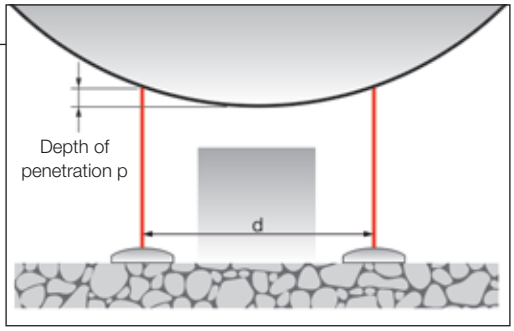
The length of the lightning rod must be selected such that the lightning sphere does not touch the object to be protected.

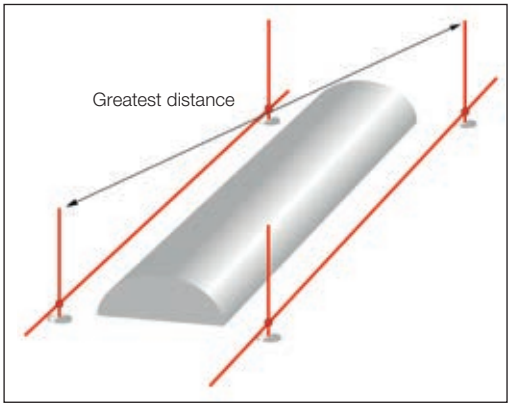
d	Depth of penetration of lightning sphere		
Distance between lightning rods [m]	Prot. Class with lightning sphere radius [m]		
	I (20 m)	II (30 m)	III (45 m)
2	0.03	0.02	0.01
4	0.10	0.07	0.04
6	0.23	0.15	0.10
8	0.40	0.27	0.18
10	0.64	0.42	0.28
12	0.92	0.61	0.40
14	1.27	0.83	0.55
16	1.67	1.09	0.72
18	2.14	1.38	0.91
20	2.68	1.72	1.13
23	3.64	2.29	1.49
26	4.80	2.96	1.92
29	6.23	3.74	2.40
32	8.00	4.62	2.94
35	10.32	5.63	3.54

Depth of penetration of the lightning sphere with two lightning rods or two parallel conductors.

Lightning sphere procedure compliant with EN 62305

For LPS that are constructed according to the lightning sphere procedure, you can find comprehensive information in EN 62305-1 to 4.





Spacing distance

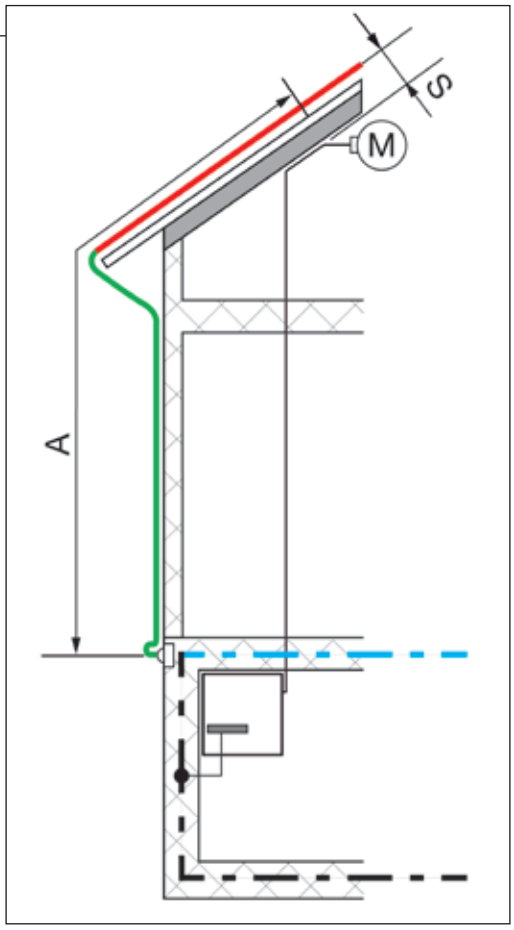
*** Spacing distances can be determined as follows:**

$$s = k \cdot \frac{n_0}{n} \cdot A$$

* The spacing distances between parts of the LPS (arresters and conductors) and metal parts and electrical installations inside the building to be protected must be taken as targets in every case.

* In the following structures, areas and systems, the spacing distances must be observed as follows:
– areas subject to significant fire risk
– areas subject to significant explosion risk
– technically sensitive equipment (e.g. systems in IT, fire detection systems, security systems, etc.).

* The spacing distance to the interior given above do not need to be observed in the following building structures to the extent that they are used as natural conductors:
– Buildings made of reinforced concrete
– Steel skeleton structures
– in areas of conducting through-connected metal facades.



s	Spacing distance in metres
n	Number of conductors present
k	Factor according to the table below
X_n	Distance between conductors according to table below
N_0	$= \frac{\text{Building perimeter in m}}{X_n}$
A	Length along the interception system or the conductor from the point at which the spacing distance should be calculated to the next point of potential equalization

*** Factor k for calculating the spacing distance in Relation to the lightning protection Class I to III**

Lightning protection class of the LPS	k	X_n
I	0.08	10
II	0.06	10
III	0.04	15

Calculation Program

On our homepage there are Excel-based calculation programs you can download.

They are:

- Calculation of lightning rod lengths using the protection angle procedure
- Calculation of spacing distances acc. to SNR 464022.2015

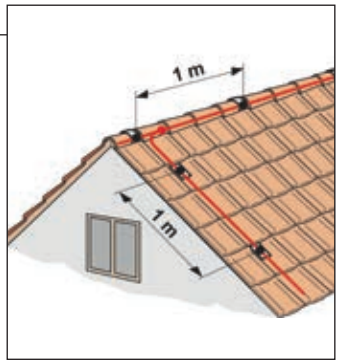
Interception System and Conductor

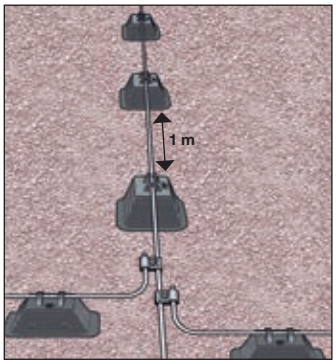
Conductor mounting

*Conductors must be adequately mechanically fastened to the building structure.The mounts must hold up to the requirements for resistance to weather influences (e.g. vibrations, heat expansion, etc.) and the electrodynamic effects.

In the midlands a conductor holder will be used every 1 m. this applies to rods and conductors as well as for pitched and flat roofs.

In alpine or high alpine regions these distances must be reduced.





«Natural» Conductors and their Connections

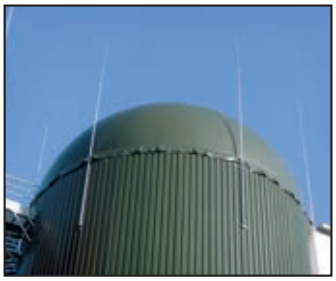
*«Natural» conductors are components like metal profiles, Metal frames, roof gutters or downpipes, etc. They can in principle replace parts of the interception system or conductors.

*Thin, insulating coatings like paint, 1 mm bitumen or 0.5 mm PVC are also considered conductive in the sense of lightning protection.

*«Natural» conductors are deemed electrically conductively connected if a contact surface of 100 cm^2 is achieved by rebates or insertions. Overlap of profiles of pipes must equal at least 5 cm.

Special Facilities

For «special» facilities such as fermenters or biogas plants or distanced lightning conductor grids, we will be glad to provide you with on-site support. Contact the right technical consultant in our field service.



Conductor

General

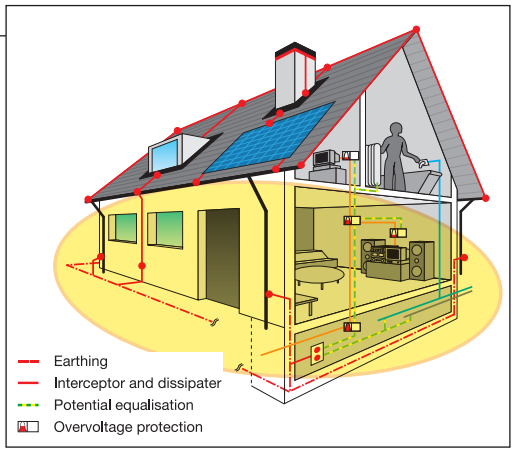
*The conductors must be installed if at all possible such that
a) They are connected with the earthing system via the shortest possible route;
b) They are distributed as evenly as possible along the exterior of the building;
c) They form a direct continuation of the interception systems.

*The number of conductors is derived from the permitted distances between the conductors depending on their protection class. (see table on Page 2)

*If possible a conductor should be installed at every unprotected corner of the building.

*Whereby in this case at least two conductors must be made.

*Church towers, high chimneys and the like must also be equipped with at least two conductors.
The conductors should be evenly distributed around the perimeter.



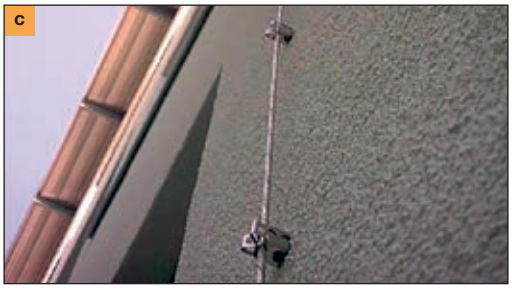
Note
*A variation in the distances between the conductors of ± 20 % is permissible as long as the average distance matches the table. The number of conductors may not be reduced.

Conductor Variants

«Natural» Conductors
*Natural conductors are used as conductors but were installed mainly for some other purpose.Electrically conductive structural elements of the façade construction can be used as natural conductors.
In any case, these must be integrated into the protective potential equalization. This is especially the case for metal facades, rainwater drain pipes, steel supports, substructures of façade cladding running in a vertical direction, fire ladders and the like.

«Artificial» Conductors
*Artificial conductors are installed exclusively for this purpose.

*Artificial conductors include:
a) In reinforced concrete, bare conductors surrounded by poured concrete and connected with the reinforcing steel. Anchor points must be constructed in conformity with the Swiss regulations for «Foundation Earthing» SNR 464113.
b) Concealed conductors (those inserted under plaster, behind or inside insulation/facades).
c) Visible, bare conductors.



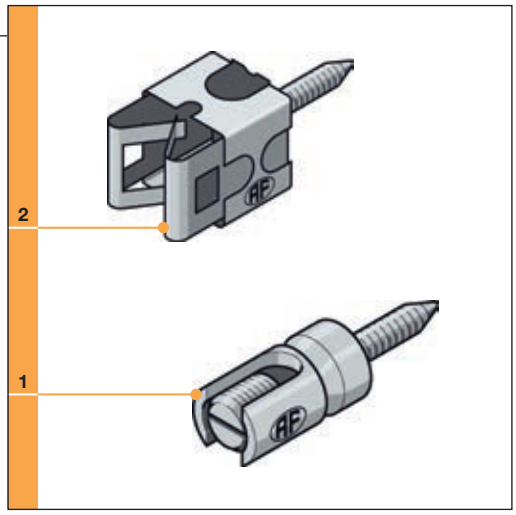
Conductors

Artificial Conductors AP on Wood

*If a Cu-wire of 6 mm is used, it must be installed with a distance of at least 10 mm from flammable building components.

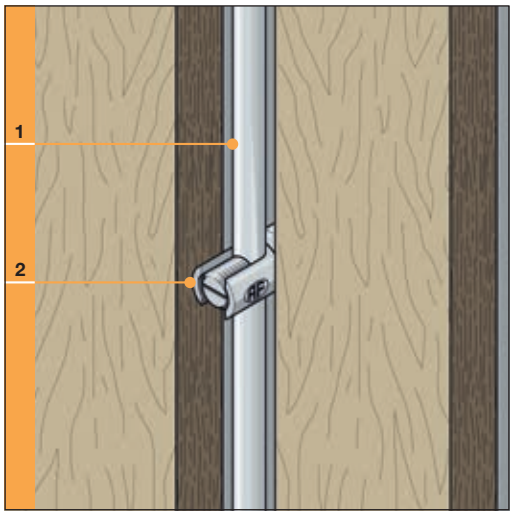
This is assured using the conventional «Line Holder Quadro» or «Line Holder for Wire».

If necessary one an increase the minimum distance with the accessory base plate and distancing spacer.



	AF-Type	AF-Art. Number	E-Number
1	AV 20	245.027.011	156 811 010
2	AV 59	240.005.000	156 950 220
	AV 61 Base plate	247.001.000	156 950 720
	AV 61 Distancing spacer	247.002.000	156 950 730

*If the distance of 10 mm between the conductor and the flammable components of the building cannot be maintained, the minimal cross-section of this conductor must be 50 mm^2 on copper or 8 mm.



	AF-Type	AF-Art. Number	E-Number
1	Cu tin coated 8 mm	265.022.027	100 034 180
2	AV 20	245.027.011	156 811 010

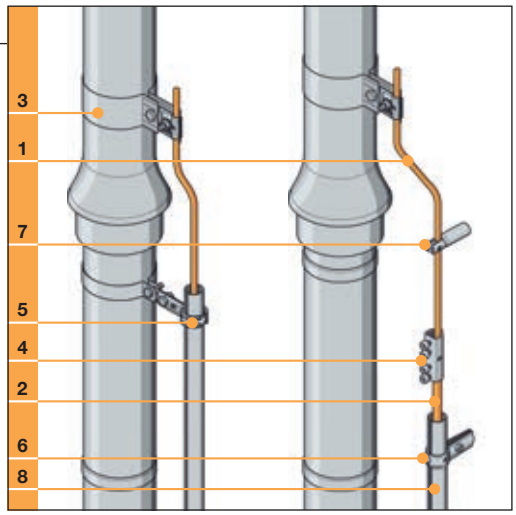
Measurement Points

General

*An easily accessible measurement point is required at every connecting point to the earthing system.

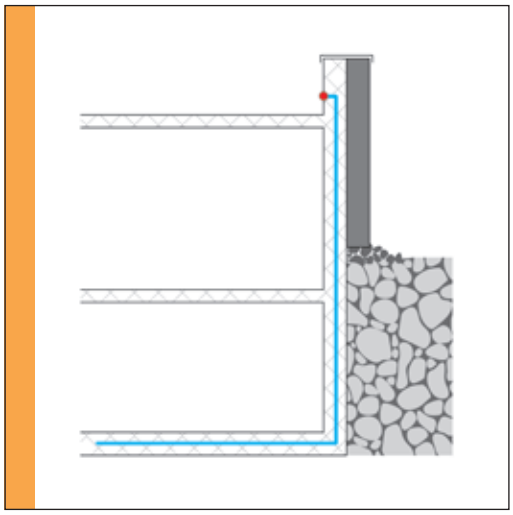
Maximum height is 1.70 m.

In most Cantons the contact bridge (3) is considered a measurement point.

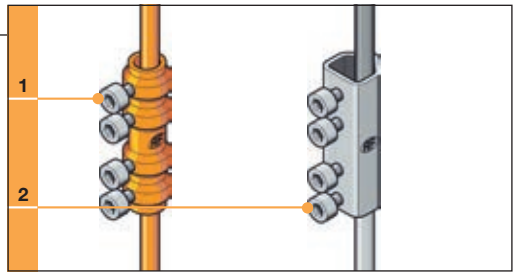


	AF-Type	AF-Art. Number	E-Number	
1	Cu bare 6 mm	215.002.002	100 032 160	
2	Cu bare 8 mm	265.021.027	100 032 180	
3	AL 3 Inox	280.101.000	156 831 170	H
4	AL 7 Inox	270.025.003	156 831 220	H
5	AL 59	250.017.000	156 900 180	
6	AL 55	250.016.000	156 900 170	
7	AV 20	245.036.000	156 813 010	
8	AL 53	250.002.000	156 900 150	

*For conductors encased in poured concrete the exit point is the measurement point, on the roof, for example (see page 7 bottom).



Measurement points

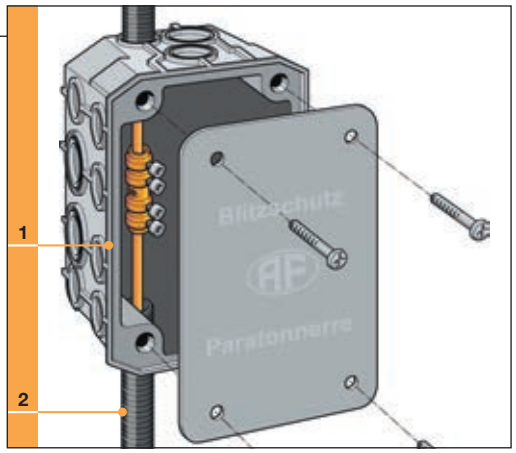


Artificial Conductor AP

Make sure that there is enough room to open the sectioning point so that the wires can be separated from each other.

	AF-Type	AF-Art. Number	E-Number	
1	AL 7 Cu	275.017.000	156 980 550	H
2	AL 7 Inox	270.025.003	156 831 220	H

Artificial Conductor in the Insulation



UP-receptacle with water splash resistant cover with Neoprene seal on the back.

The 6 mm round copper is now available drawn into the KRFW M20. Available in 20 m rolls.

Accessories:
240.000.000 Fastening clip M20 2-lobed StvZn

	AF-Type	AF-Art. Number	E-Number
1	AL 60	276.030.000	155 170 305
2	LR 5	215.002.120	100 030 160

Artificial Conductors in the Back Ventilation

Folding repair hatch for the sectioning point in the back ventilation.

	AF-Type	AF-Art. Number	E-Number	
1	AL 58	270.002.000	156 900 000	
2	AL 7	275.017.000	156 980 550	H
3	Cu 6 mm	215.002.002	100 032 160	
4	Cu 8 mm	265.021.027	100 032 180	

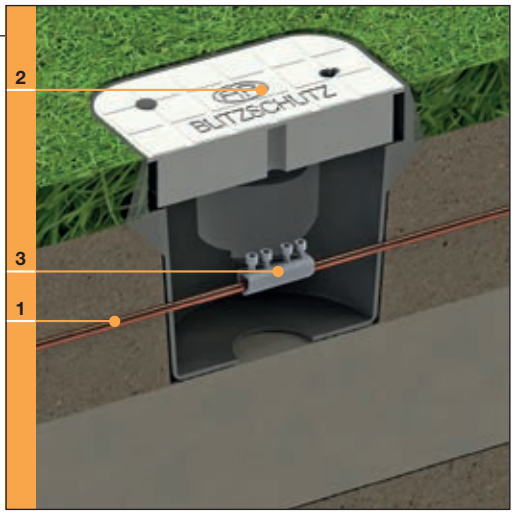
Conductor / Tall Structures

Measurement Points

For architectural reasons or in the case of isolated structures. That are grounded in the soil, a floor box can be used for installing the measurement sectioning points.

It must be capable of withstanding loads of up to 5000 kg depending on the subsurface / underlay.

	AF-Type	AF-Art. Number	E-Number	
1	Cu bare 8 mm	265.021.027	100 032 180	
2	AL 61	277.006.000	156 900 510	
3	AL 7	270.025.003	156 831 220	H



Tall Structures

*For all structures that are taller than the radius of the lightning sphere (r), lateral strikes can occur. However, the probability of a lateral strike is negligible in structures with a height of less than 60 m.

*In structures that are taller than 60 m, arrester systems against lateral strikes must be installed compliant with SN EN 62305-3.

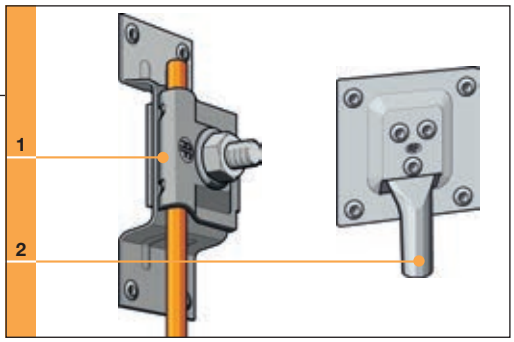
Conforming with SN EN 62305-3, an interception system will usually be installed in the top 20 % of the building height.

General Connections

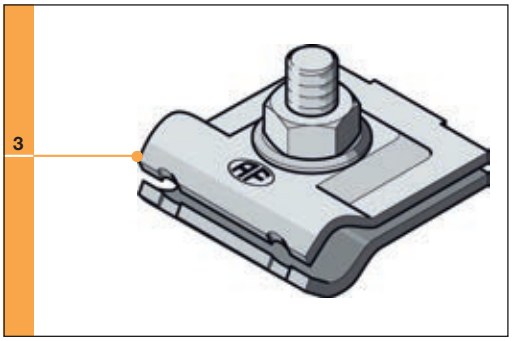
General Connections

In the following we present some options for tested Connections on thin sheet metal, steel supports or Construction elements.

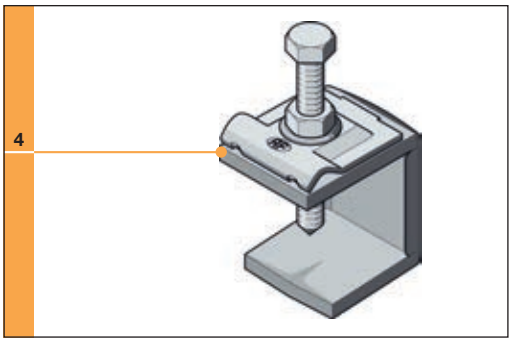
Thin sheet connection (<1.0mm) using «sheet connection with clamping plate» or «fastener set for sheet metal». All rivets are included.



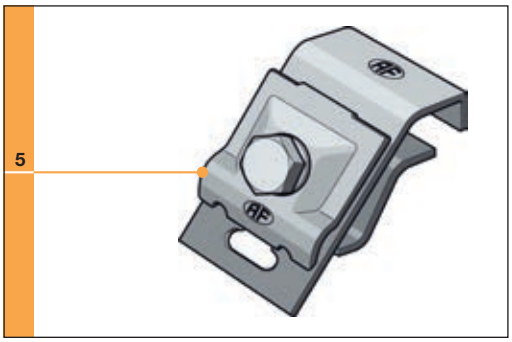
With the «universal contact clamp», one can connect constructions-elements of 1–3 mm thickness. Available in bare copper or as shown in stainless steel version Inox A2.



For steel girders one can chose from two different sizes of «connector clamp for steel girders». 3–12 mm as well as 10–30 mm.



With the snow guard/pipe clamp, one can connect round elements of 10–33 mm diameter.



This is just a small excerpt from our extensive range of products. Ask for our sales catalogue or visit our homepage.

	AF-Type	AF-Art. Number	E-Number	
1	AV 8	270.092.000	156 831 610	H
2	AV 7	270.081.000	156 833 520	H
3	AV 48	270.048.000	156 831 560	H
4	AV 89	270.050.000	156 826 100	H
5	FL 14	270.103.000	156 822 000	H

Recommended Materials and Dimensions

Material	Dimension wire or cable	Dimension band
Lightning conductor / Conductor		
Copper bare or tin coated	Ø 6 mm (28 mm^2) ; Ø 8 mm (50 mm^2)	20 x 2.5 mm (50 mm^2)
Aluminium	Ø 8 mm (50 mm^2)	25 x 3 mm (75 mm^2)
Inox A2	Ø 8 mm (50 mm^2)	20 x 2.5 mm (50 mm^2)
Earthing in ground		
Copper bare	Ø 8 mm (50 mm^2)	20 x 2.5 mm (50 mm^2)
Copper cable bare	50 mm^2 (wiret Ø ≥ 3 mm)	
Stainless steel A4	Ø 10 mm (75 mm^2)	50 x 2 mm (100 mm^2)
Foundation earthing in concrete [1)]		
Steel, bare or galvanised	Ø 10 mm (75 mm^2)	25 x 3 mm (75 mm^2)
Steel cable bare or galvanised	75 mm^2 (wire Ø ≥ 1.7 mm)	

[1)] Foundation earthing systems must be encased at least by 50 mm of concrete. Connecting points must be constructed using corrosion-resistant materials, e. g. stainless steel (Inox A4).

Material compatibility and galvanic corrosion[1)]

		Material for fasteners and fixing elements						
Ambient condition (Acts as an electrolyte)	**Material Head or construction material**	**Bare copper**	**Tinned copper**	**Stainless steel inox A2**	**Stainless steel inox A4**	**Galvanized steel**	**Bright steel**	**Aluminium**
In Air (facade sheets, lightning conductor, arrester)	Bare copper	OK	X	X	X			
	Tinned copper	X	OK	X	X	X		X
	Copper-titanium-zinc		X	X	X	OK		X
	Galvanized steel		X	X	X	OK		X
	Stainless steel (inox A2) [2)]	X	X	OK	OK	X		OK
	Aluminium		X	OK	OK	X		OK
In soil [3)] (Ring, radiation and deep earthing)	Bare copper	OK	X		X			
	Stainless steel(inox A4) [2)]	X	X		OK			
In concrete [4)] (Foundation)	Bare or galvanized steel	X		X	X	OK	OK	
	Bare copper	OK		X	X	X	X	

Legend for the determination of the material for fasteners and fixing elements.

OK = optimal X = usable = not permitted / not recommended

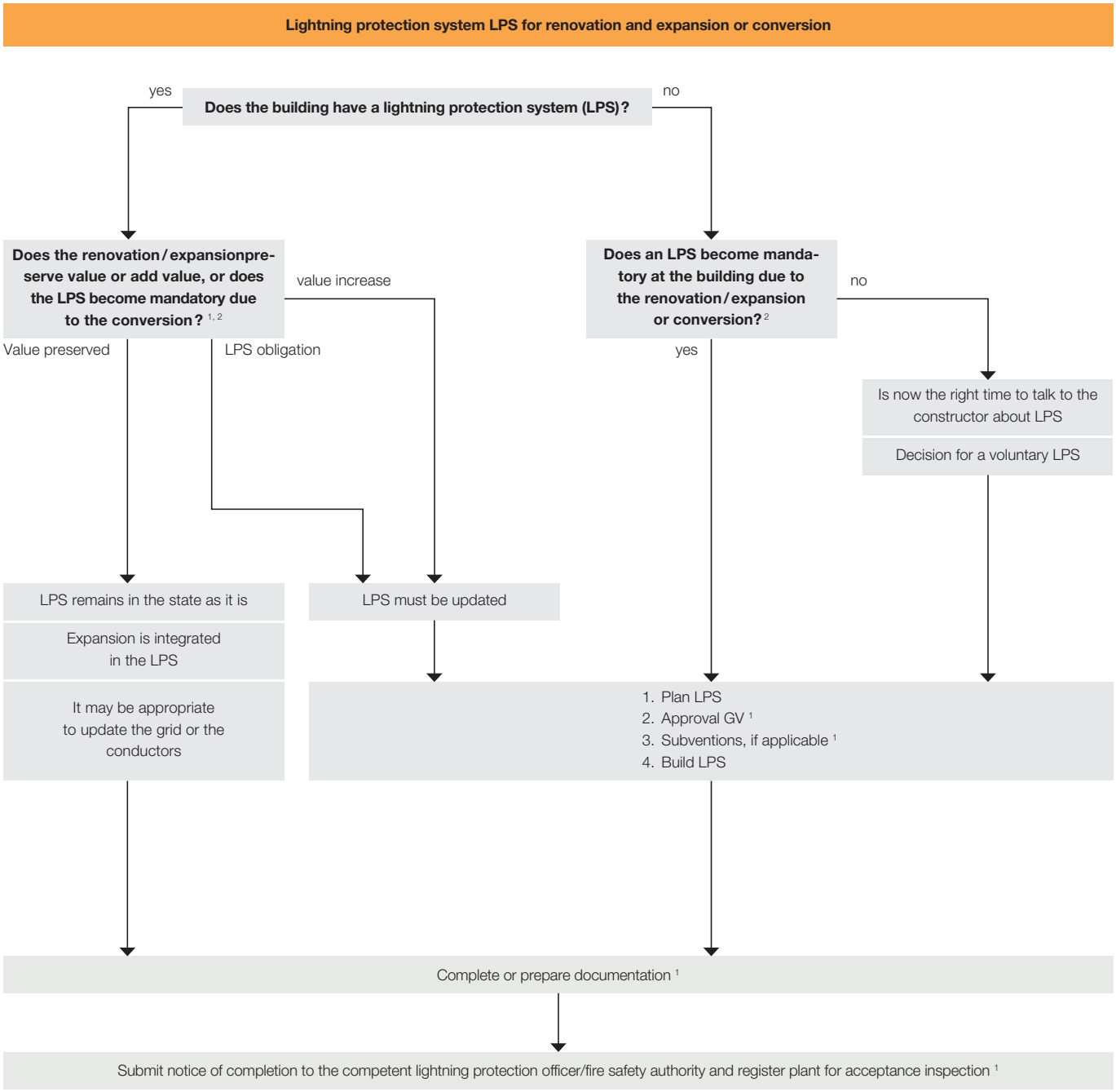
1) **Contact corrosion.** Galvanic corrosion occurs at the contact surface between different metals and under the influence of moisture (Electrolyte). By following the recommendation on compatibility,contact corrosion can be avoided.

2) **Conductivity of stainless steel (Inox).** Stainless steel has approximately 40 times less conductivity than copper.

3) **Grounding in the soil.** Copper material is preferred as grounding material (SNR 464022, Table 5.2.2.1) (SEV – Switzerland only).

4) **Grounding in concrete (foundation).** Steel ground wire and blank galvanized steel must be completely cast in concrete (minimum concrete cover 50 mm). Connections to the foundation grounding must be made of corrosion-resistant material (eg stainless steel / Inox A4 running).

Lightning protection system LPS for renovation and expansion or conversion



Grounding installation «sequence»

1. Foundation grounding
2. Sharpen reinforcement
3. Ring grounding
4. Ground rods with inserted bonding line
5. Ground rods at every conductor

[1] Observe cantonal regulations
[2] Observe building permit

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The whole program ONLINE

On www.aflury.ch you can find all information concerning our products and services. You always have access to our newest status of our product data, technical information, installation instructions and pictures.

On our website, you will find any information about activities, trainings and exhibitions.

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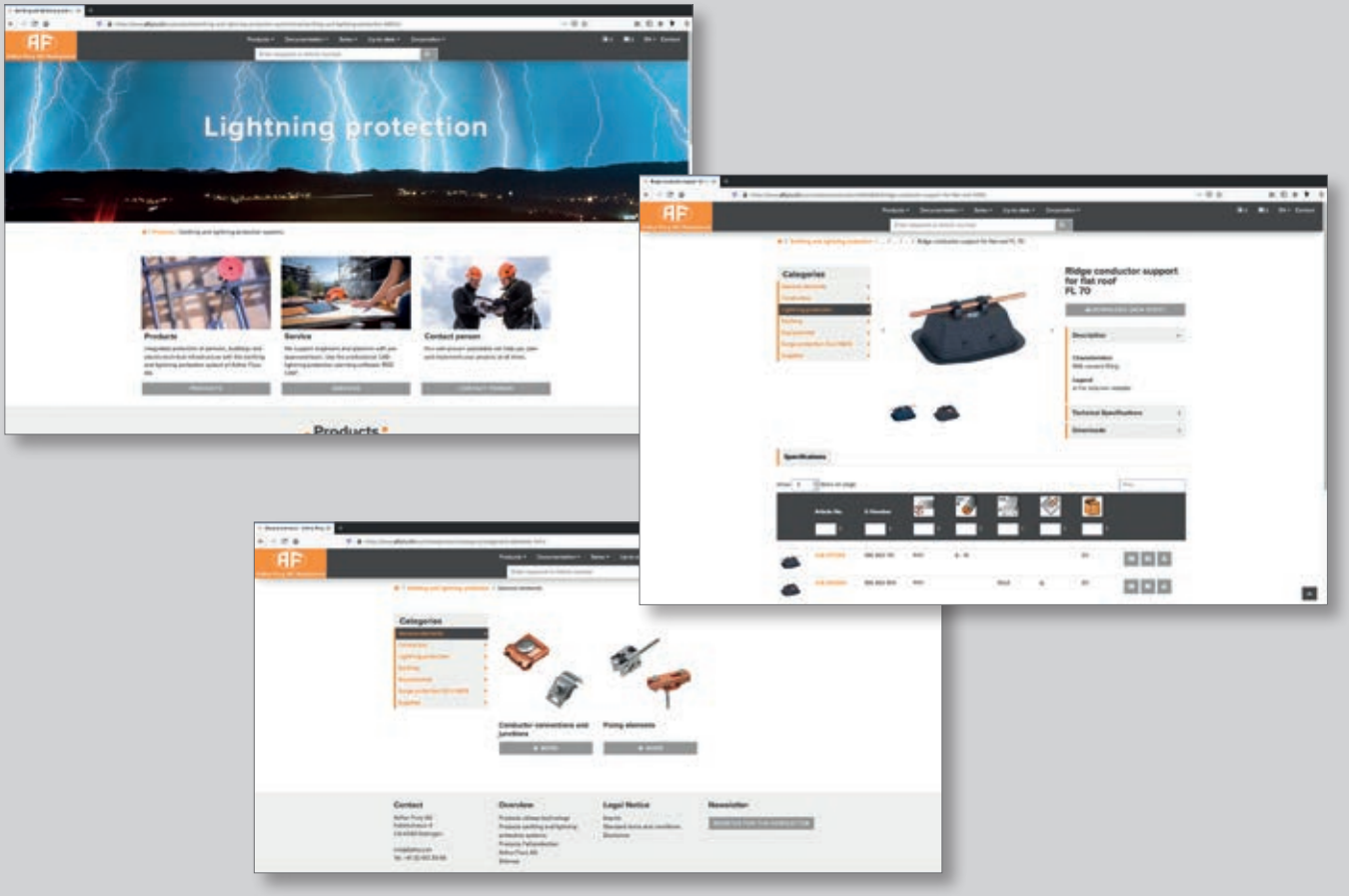

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