



Structural lightning protection

Solutions for trapezoidal cladding systems

Furse earthing & lightning protection

Solutions for trapezoidal cladding systems

Today many buildings use trapezoidal cladding systems for their roofs and exterior elevations. Where this cladding is punctured by a lightning strike, the building and its contents below may be at significant risk of damage.

Repair costs to the roof and contents, as well as any unnecessary downtime incurred, would be considered unacceptable to companies and public service institutions.

Historically though, protecting metallic roofs against lightning has presented a challenge for lightning protection designers and installers. The need for protection, and how to secure protection measures to a metal roof, especially in hot and humid climates, has been much debated.

Lightning protection standard, IEC/BS EN 62305, identifies minimum thicknesses for metals which can be used as an air-termination, to avoid the risk of damage through puncture or hot spot, as per Table 1, right.

The vast majority of trapezoidal cladding systems do not meet these minimum thickness requirements, so would risk puncture or hot spot in the event of a lightning strike.

More so, trapezoidal cladding systems vary substantially in both profile shape and finish, and often include insulation beneath, making the

installation of traditional lightning protection systems difficult.

These challenges can be overcome by installing the new Furse range of holdfast assemblies specifically designed to help protect trapezoidal cladding systems.

This solution enables secure connection of air rods and conductors on to trapezoidal cladding systems using an innovative holdfast base and industry standard stitching screws.

Table 1. Minimum thickness of metal sheets in air-termination systems (extract from IEC/BS EN 62305-3 Table 3)

Class of lightning protection system	Thickness to prevent puncture or hot spot (mm)	
	Material	
I to IV	Lead	–
	Steel (stainless, galvanized)	4
	Titanium	4
	Copper	5
	Aluminium	7
	Zinc	–



The Furse trapezoidal holdfast range offers air rod bases, conductor clips and square clamps suitable for securing the most common conductor types, 25 x 3 mm tape and 8 mm diameter solid circular, to trapezoidal cladding systems.

01 Installation of Furse lightning protection components on to trapezoidal cladding.

All components are secured to a stainless steel holdfast base which is connected to the trapezoidal cladding via two stitching screws. These screws meet the general industry requirements for securing trapezoidal panels together. Additionally, the holdfast base includes synthetic seals which ensure a lasting weatherproof connection when these stitching screws are tightened.

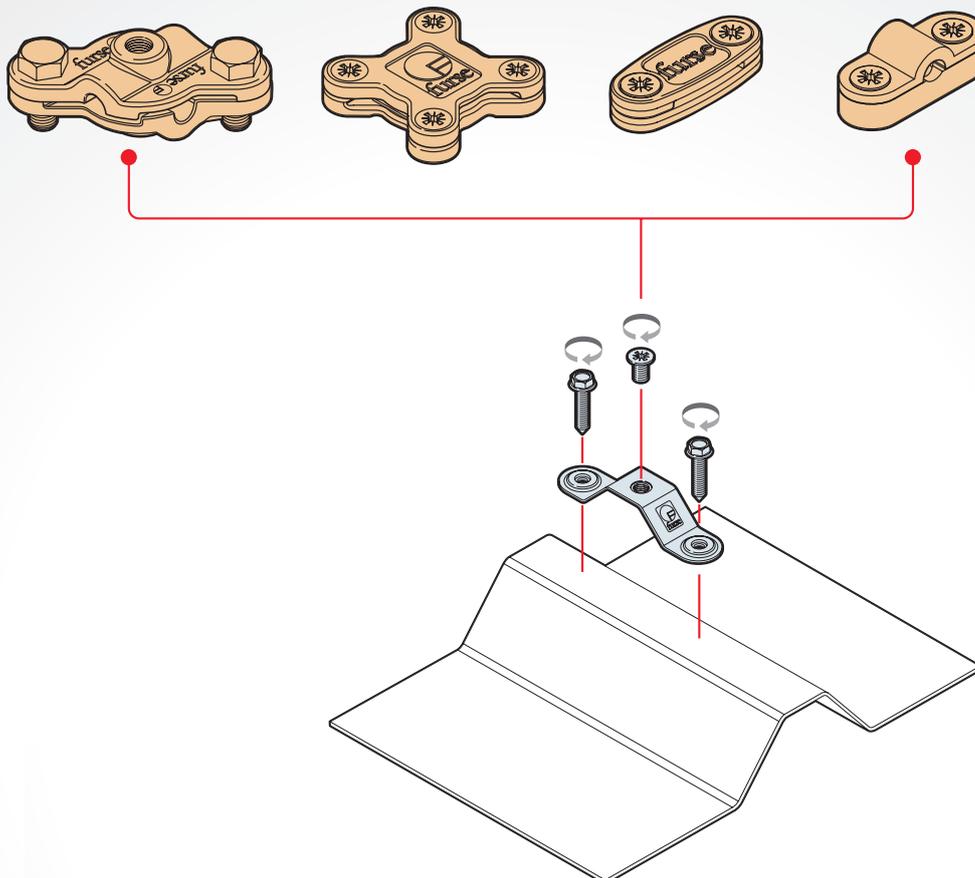
This approach is designed to maintain the ongoing integrity of the weatherproof nature of the trapezoidal cladding long after lightning protection system installation.

All air rod bases, clips and clamps are supplied ready assembled to a holdfast base, using an M6 countersunk screw, and all packs include stitching screws to enable installation.

Additional key features of this trapezoidal holdfast range of lightning protection products include:

- The holdfast base fits on to all commonly available trapezoidal profiles over 20 mm width
- Manufactured from stainless steel, the holdfast base eliminates risk of galvanic corrosion, whilst being used with both copper or aluminium Furse components
- Stitching screws equivalent to those recommended by roofing manufacturers ensure comparable fixings are used as would be installed to fix the cladding itself
- Through combining a stainless steel holdfast base with our quality lightning protection components, the resulting solution has high mechanical strength to withstand the force of lightning strikes
- Bonding the lightning protection system across the trapezoidal cladding system improves current sharing across conductors

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Solutions for trapezoidal cladding systems

Installation design considerations

Conductor network

The first choice faced by the designer of a structural lightning protection system is the type of conductor system to be used. Choose the material required, i.e. copper or aluminium taking into consideration compatibility with the roofing material. Choose the type of conductor required, i.e. flat tape or solid circular. Conductor layout need not conform to mesh system dimensioning as the layout of the conductor system will be governed by the placement and interconnection of the air rods.

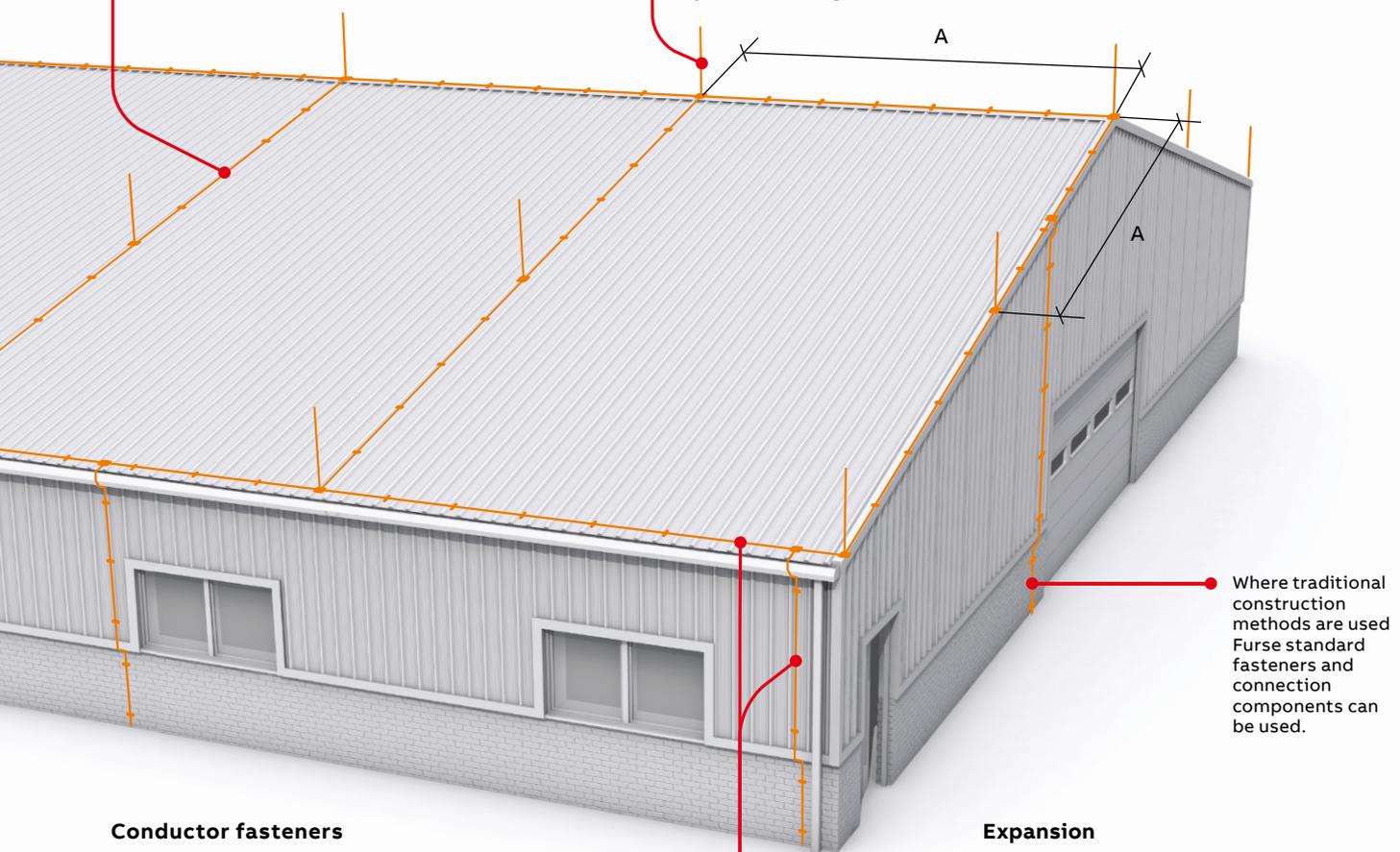
Air rods

The maximum distance between any two adjacent air rods is determined by the lightning protection level (LPL) being used to design the system and the height of the air rods being used. To provide a full zone of protection over the whole surface of the roof, air rods should not exceed the spacings given in the Table below:

Air rod height (mm)	Distance A (m)			
	LPL IV	LPL III	LPL II	LPL I
500	9.7	8.4	6.9	5.6
1,000	14.6	12.6	10.3	8.3

Maximum air rod spacings based on rolling sphere assessment providing minimum 100 mm clearance from plane being protected.

These maximum distance will ensure that the penetration of the rolling sphere contacting two diagonal air rods is not sufficient to touch the object being protected, i.e. the roof. The distances given in the Table above are maximum values. Protection may be achieved by other arrangements such as smaller closer air rods.



Conductor fasteners

Fasteners complete with Furse trapezoidal holdfasts should be used at intervals not less than those given in Table E.1 of IEC/BS EN 62305-3. These are typically 1,000 mm for horizontal conductors on horizontal surfaces and 1,000 mm for vertical conductors from ground level up to 20 m high. The use of metallic clips and bare conductor is recommended for air-termination network design to promote effective current sharing across the roof. Non-metallic clips and covered conductors may be used as part of the down-conductor system.

Expansion

Good installation design should take account of expansion and contraction of lightning conductors due to temperature variation. Typically in the UK an annual temperature variation of $-10\text{ }^{\circ}\text{C}$ to $+35\text{ }^{\circ}\text{C}$ would give the following conductor movement: Aluminium 1.03 mm per linear metre Copper 0.76 mm per linear metre.

Solutions for trapezoidal cladding systems

Conductors and air rods

Tape conductor



Part no.	ABB Order code	Conductor	Coil size (m)	Weight per metre (kg)	Certification / standards
TC030	7TCA083010R0081	25 x 3 mm bare copper tape	25	0.67	●
TC030/50	7TCA083010R0097	25 x 3 mm bare copper tape	50	0.67	●
TC115-FU	7TCA083020R0061	25 x 3 mm PVC covered copper tape, grey	25	0.77	● ●
TC115/50	7TCA083020R0062	25 x 3 mm PVC covered copper tape, grey	50	0.77	● ●
TA030	7TCA083040R0011	25 x 3 mm bare aluminium tape	50	0.21	●
TA115	7TCA083050R0015	25 x 3 mm PVC covered aluminium tape, grey	50	0.30	● ●

Certification / Standards: ● BS EN 13601 (copper) / ● BS EN 755-5 (aluminium) / ● BS 5252 (PVC colour).
 The use of bare conductor is recommended for air-termination systems. Down-conductors may be PVC covered for improved aesthetics. Every precaution has been taken to ensure the UV stability of PVC coverings, but as with all plastics, colour variation will occur over time. Tape conductor sold in full coil lengths only. Tinned copper variants available. Other PVC colours available on request.

Solid circular conductor



Part no.	ABB Order code	Conductor	Coil size (m)	Weight per metre (kg)	Certification / standards
CD035	7TCA083060R0000	Ø 8 mm bare copper solid circular	50	0.44	●
CD038	7TCA083060R0008	Ø 8 mm PVC covered copper solid circular, grey	50	0.49	● ●
CD080	7TCA083820R0000	Ø 8 mm bare aluminium solid circular	50	0.12	●
CD083	7TCA083820R0002	Ø 8 mm PVC covered aluminium solid circular, grey	50	0.18	● ●

Certification / Standards: ● BS EN 13601 (copper) / ● BS EN 755-5 (aluminium) / ● BS 5252 (PVC colour).
 The use of bare conductor is recommended for air-termination systems. Down-conductors may be PVC covered for improved aesthetics. Every precaution has been taken to ensure the UV stability of PVC coverings, but as with all plastics, colour variation will occur over time. Solid circular conductor sold in full coil lengths only. Tinned copper variants available. Other PVC colours available on request.

Air rod



Part no.	ABB Order code	Rod length (mm)	Rod diameter (mm)	Thread size	Conductor material	Weight each (kg)
RA400-FU	7TCA083430R0001	500	Ø 10	M10	Copper	0.33
RA402	7TCA083430R0002	1,000	Ø 10	M10	Copper	0.65
RA080	7TCA083440R0004	500	Ø 10	M10	Aluminium	0.11
RA085	7TCA083440R0005	1,000	Ø 10	M10	Aluminium	0.22

Manufactured from high conductivity hard drawn copper or aluminium, with rolled threads. Air rods up to 1 metre in height are recommended on trapezoidal roofs to avoid risk from excessive wind loading on the air rod. Supplied complete with locknut.

Solutions for trapezoidal cladding systems

Air rod bases and conductor fasteners

Air rod base



Part no.	ABB Order code	Conductor	Weight each (kg)	Certification / standards
TZ405	7TCA083540R0032	25 x 3 mm bare copper tape Ø 8 mm bare copper solid circular conductor	0.22	●
TZ407	7TCA083540R0033	25 x 3 mm bare aluminium tape Ø 8 mm bare aluminium solid circular conductor	0.10	●

Certification / Standards: ● IEC/BS EN 62561-1 Class H (air rod base).

Air rod base manufactured from high quality alloys of either copper or aluminium. Holdfast manufactured from stainless steel 304.

Designed for excellent corrosion resistance and high pull off loads. Provides secure clamping of either 25 x 3 mm bare tape or 8 mm diameter solid circular conductor.

Suitable for use on both straight runs and intersections of conductor. Simple to install to trapezoidal cladding systems using stitching screws provided.

Holdfast torque 2 Nm (aluminium cladding), 2.5 Nm (steel cladding). Boxed in 10's

Conductor fasteners for tape



Part no.	ABB Order code	Conductor	Weight each (kg)	Certification / standards
TZ210	7TCA083540R0027	25 x 3 mm bare copper tape	0.09	●
TZ110	7TCA083540R0026	25 x 3 mm bare aluminium tape	0.05	●
TZ040*	7TCA083550R0123	25 x 3 mm grey PVC covered tape	0.03	●

Certification / Standards: ● IEC/BS EN 62561-4 (clip).

Conductor clip manufactured from high quality copper alloy (TZ210) or aluminium alloy (TZ110), or grey high grade polypropylene (TZ040).

Holdfast manufactured from stainless steel 304. Metallic clips designed for excellent corrosion resistance and high pull off loads. Simple to install to trapezoidal cladding systems using stitching screws provided. For air-termination, the use of metallic clips with bare conductor is recommended for effective current sharing across the roof.

Holdfast torque 2 Nm (aluminium cladding), 2.5 Nm (steel cladding). Clips for use with other colour PVC covered down-conductors are available on request. Boxed in 25's.

* Non-metallic fasteners and fasteners for PVC covered conductor may be used as part of a down-conductor system.

Conductor fasteners for solid circular



Part no.	ABB Order code	Conductor	Weight each (kg)	Certification / standards
TZ805	7TCA083540R0028	Ø 8 mm solid circular bare copper conductor	0.11	●
TZ806	7TCA083540R0029	Ø 8 mm bare aluminium solid circular conductor	0.05	●
TZ815*	7TCA083540R0030	Ø 8 mm PVC covered copper solid circular conductor	0.12	●
TZ816*	7TCA083560R0031	Ø 8 mm PVC covered aluminium solid circular conductor	0.06	●
TZ871*	7TCA083550R0122	Ø 8 mm grey PVC covered solid circular conductor	0.03	●

Certification / Standards: ● IEC/BS EN 62561-4 (saddle).

Cast cable saddle manufactured from high quality copper alloy (TZ805, TZ815) or aluminium alloy (TZ806, TZ816), or grey high grade polypropylene (TZ871).

Holdfast manufactured from stainless steel 304. Metallic clips designed for excellent corrosion resistance and high pull off loads. Simple to install to trapezoidal cladding systems using stitching screws provided. For air-termination, the use of metallic clips with bare conductor is recommended for effective current sharing across the roof.

Holdfast torque 2 Nm (aluminium cladding), 2.5 Nm (steel cladding). Clips for use with other colour PVC covered down-conductors are available on request. Boxed in 25's.

* Non-metallic fasteners and fasteners for PVC covered conductor may be used as part of a down-conductor system.

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Conductor jointing clamps

Junction clamps for tape



Part no.	ABB Order code	Conductor	Weight each (kg)	Certification / standards
TZ105	7TCA083540R0023	25 x 3 mm bare copper tape	0.14	●
TZ005	7TCA083540R0031	25 x 3 mm bare aluminium tape	0.08	●

Certification / Standards: ● IEC/BS EN 62561-1 Class H (clamp).

Square tape clamp manufactured from high quality alloys of either copper or aluminium. Holdfast manufactured from stainless steel 304. Designed for excellent corrosion resistance and high pull off loads. Simple to install to trapezoidal cladding systems using stitching screws provided. Holdfast torque 2 Nm (aluminium cladding), 2.5 Nm (steel cladding). Boxed in 10's.

Junction clamps for solid circular conductor



Part no.	ABB Order code	Conductor	Weight each (kg)	Certification / standards
CS605	7TCA083640R0006	Ø 8 mm bare copper solid circular conductor	0.17	●
CS610	7TCA083640R0007	Ø 8 mm bare aluminium solid circular conductor	0.07	●

Certification / Standards: ● IEC/BS EN 62561-1 Class H.

Manufactured from high quality alloys of either copper or aluminium.

Designed for excellent corrosion resistance.

Permits cross and tee joints to be formed. Square clamp does not connect to cladding.



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