

ATEG



Lightning & Earthing Protection Partner

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Lightning, a common phenomenon happens in Malaysia, especially during the monsoon periods. But how much do we know about lightning? Lightning can actually be defined as the discharge produced when differences between ground and atmospheric electrical charges are large enough to overcome the insulating effect of the air. Lightning can occur within cloud, cloud to cloud, and between cloud and ground.

The destruction causes from lightning

Lightning can provide a spectacular display of light on a dark night. However, this awesome show of nature can bring fierce destruction than many other natural disasters. The destruction can either bring direct effects or indirect effects. The direct effects are from resistive (ohmic) heating, arcing and burning. Whereas, the indirect effects are more probable, which include capacitive, inductive and magnetic behaviour. Thus, lightning can induce fires, damage electrical installations, and more importantly it kills.

Installations where lightning protection is highly recommended to the following areas (summary) :

- a. Airports, shipping, hospitals, shopping mall and etc.
- b. Buildings containing computers and electronics.
- c. Explosives factories and storage areas.
- d. Flammable liquid or chemical storage.
- e. Factories and industrial plants - such as chemical, textile, paint and etc.
- f. Golf courses, race courses, sport arenas, stadiums, etc.
- g. Historic structures, mosques, and etc.
- h. High rise commercial buildings, complexes, apartments and etc.
- i. Mining areas.
- j. Military installations.
- k. Oil and gas storage and refinery.
- l. Power stations, sub-stations and transformer stations.
- m. Radio towers, telecommunication stations and etc.
- n. Universities, colleges - education facilities

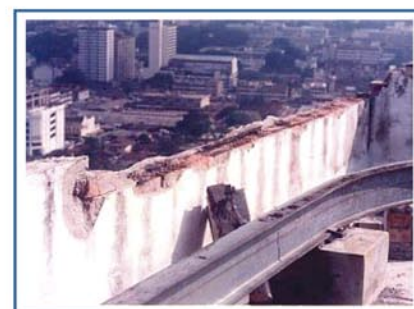


Figure 2.0
The shattering effect from a lightning strike
(www.thestar.com.my/special/online/hartono/default.html)

Malaysia - A Rainforest Country Rich Of Thunderstorm

Malaysia, a beautiful country that covered with rainforest, is opposed to 100 - 140 thunderstorm days per year (As refer to Figure 3.0). As dividing it, it would be approximately 8.3 - 11.6 thunderstorm days per month, which is very much than the thunderstorm days per annum in Antarctica and Arctic. According to Malaysian Meteorological Service's analysis from 1951 to 1998, the highest number of days with lightning being recorded was 329 days per annum (www.kjc.gov.my/people/klim/interest.html). This record was recorded at its Subang station, Selangor. Thus, it would be a need for us to install a proper lightning protection system because lightning strikes all exposed things on the ground, such as buildings, storage tanks, trees, hilltops and etc.

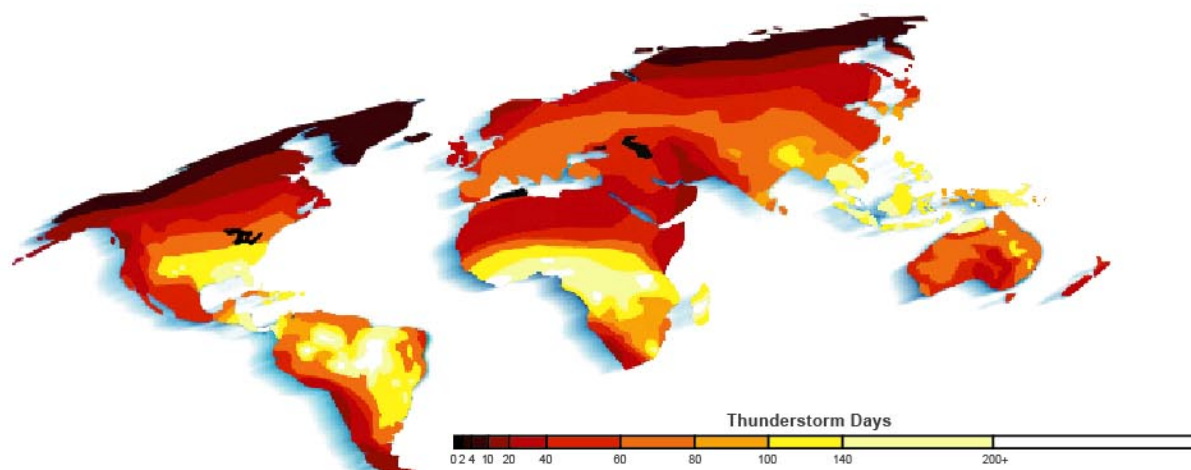


Figure 3.0 - World Thunderstorm Days Per Year

Structural Lightning Design Consideration As Accordance To BS 6651:1990

The principal components of a lightning protection system are as below (summary) :

Air Termination Network

Air termination networks can either be vertical or horizontal conductors or the combination of both. For most of the common structures, an air termination network mesh of approximately 10mtr x 20mtr with provision of no part of the roof should be more than 5mtr from the closest horizontal conductor are considered efficient for protection from lightning strikes.

However, for structures contain highly flammable or explosive contents, the horizontal conductor mesh should be 5mtr x 10mtr, with no part of the roof should be more than 2.5mtr from an air termination conductor.

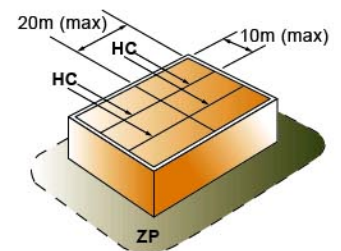


Figure 3.0
Normal Structure Network Mesh

Down Conductors

Generally, down conductor is used to provide a low impedance path from the air termination direct to the earth electrode in order the lightning current can be safely conducted to the earth. The down conductor should be routed as directly as possible between the air termination network and the earth termination network.

As according to BS 6651:1990, it recommended one down conductor is to be used for every 20mtr or part thereof of the perimeter at the roof level or ground level, whichever is greater. However, if the building structure is above the height of 20mtr or of an abnormal risk, the distance between one to another should be reduced to 10mtr.

* Test Joint

(It should be recommended that each down conductor should require a test joint as convenience for test purposes.)

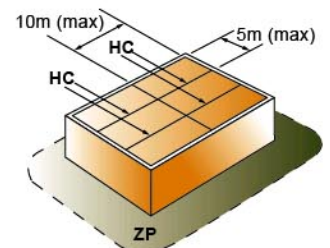


Figure 4.0
Explosive/Flammable Structure Network Mesh

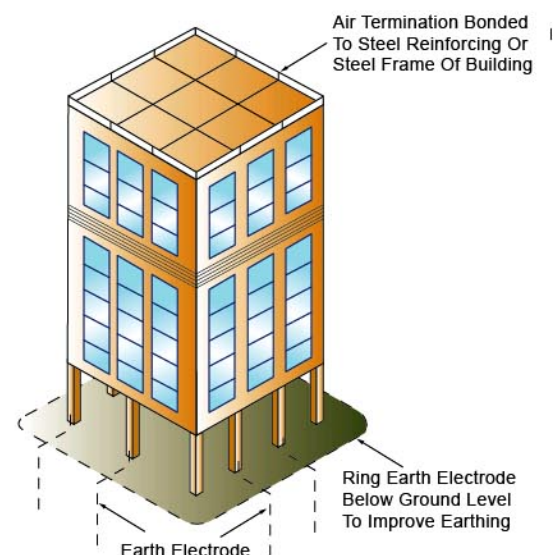


Figure 5.0
Ring Earth Electrode

Earth Termination Network

Every earth electrode should connect with a separate down conductor. Each of the earth electrodes should have a resistance (ohm) not more than 10 times the total of earth electrodes to be provided. Moreover, the total resistance of the complete earth termination network should not exceeding 10 ohms.

However, if the resistance of the complete lightning protection system more than 10 ohms, the resistance can be reduced by implementing the ring earth electrode. It is important to understand that a reduction in resistance below 10 ohms can lowered the risk of side flashing as well as reduce the potential gradient around the earth electrodes when discharging lightning current.

Lightning & Earthing Protection System Installation Drawing

A. Air Terminal Fixings

- A1. Taper Pointed Air Rod
- A2. Multiple Taper Pointed Air Rod
- A3. Air Terminal Base
- A4. Ridge Saddle

B. Roofing Conductor Fixings

- B1. HDG Roofing Mount Support Hook (N – Hook)
- B2. HDG Roofing Mount Support Hook (A – Hook)
- B3. Slate Holdfasts Support Hook
- B4. Slate Holdfasts Support Hook With L - Shape
- B5. Compound Type Roofing Support

Accessories

- B6. Teflon Block
- B7. Expandable Support Hook
- B8. Bolt & Nut

C. Conductor Fixings

- C1. DC Tape Clip
- C2. Tape Clips
- C3. Bi – Metallic Connector

D. Clamps Fixings

- D1. Square Tape Clamp
- D2. Plate Type Test Clamp

E. Bonds Fixings

- E1. B Bond
- E2. RWP Bond

F. Earthing Accessories

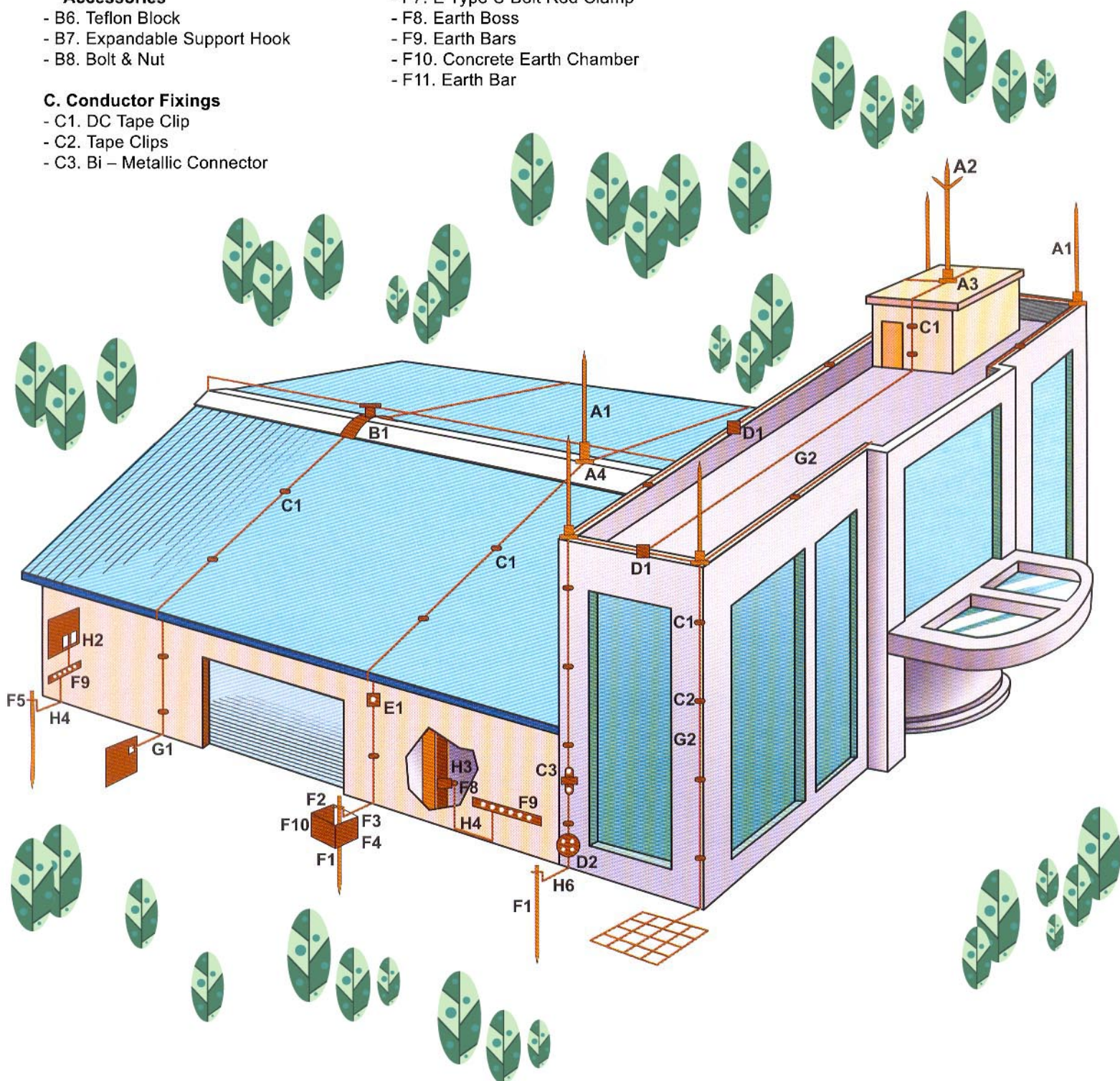
- F1. Copper Rod
- F2. Coupling
- F3. Driving Stud
- F4. Earth Rod To Tape Clamp (Type A)
- F5. GUV Type Rod To Cable Clamp
- F6. Earth Bonding Points
- F7. E Type U Bolt Rod Clamp
- F8. Earth Boss
- F9. Earth Bars
- F10. Concrete Earth Chamber
- F11. Earth Bar

G. Conductors

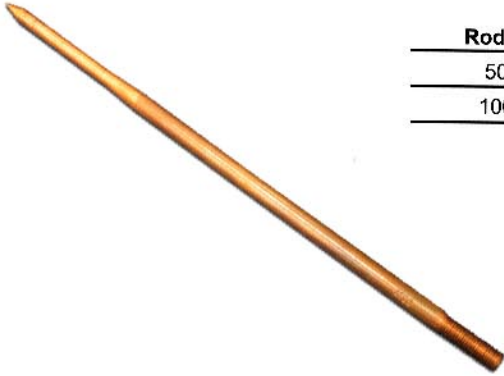
- G1. Bare Copper Tape
- G2. Bare Aluminum Tape
- G3. Bare Galvanized Steel Wire
- G4. Flexible Bare Copper Braid

H. Supporting Accessories

- H1. C Tap Connector
- H2. Surge Arrester
- H3. Cable Lug
- H4. Grounding Cable (Green-Yellow or Green)
- H5. Earthing Improvement Compound
- H6. Exothermic-Welding



A1. Taper Pointed Air Rod



Rod Length	Thread Diameter	Material	Product Code
500 mm	16 mm	Copper	ATG 050
1000 mm	16 mm	Copper	ATG 100

A2. Multiple Taper Pointed Air Rod



Thread Size	Height	Material	Product Code
M16	500 mm	Copper	MATG 050
M16	1000 mm	Copper	MATG 100

A3. Air Terminal Base



Thread Diameter	Maximum Conductor Width	Material	Product Code
16 mm	25 mm	Copper	ATBG 160

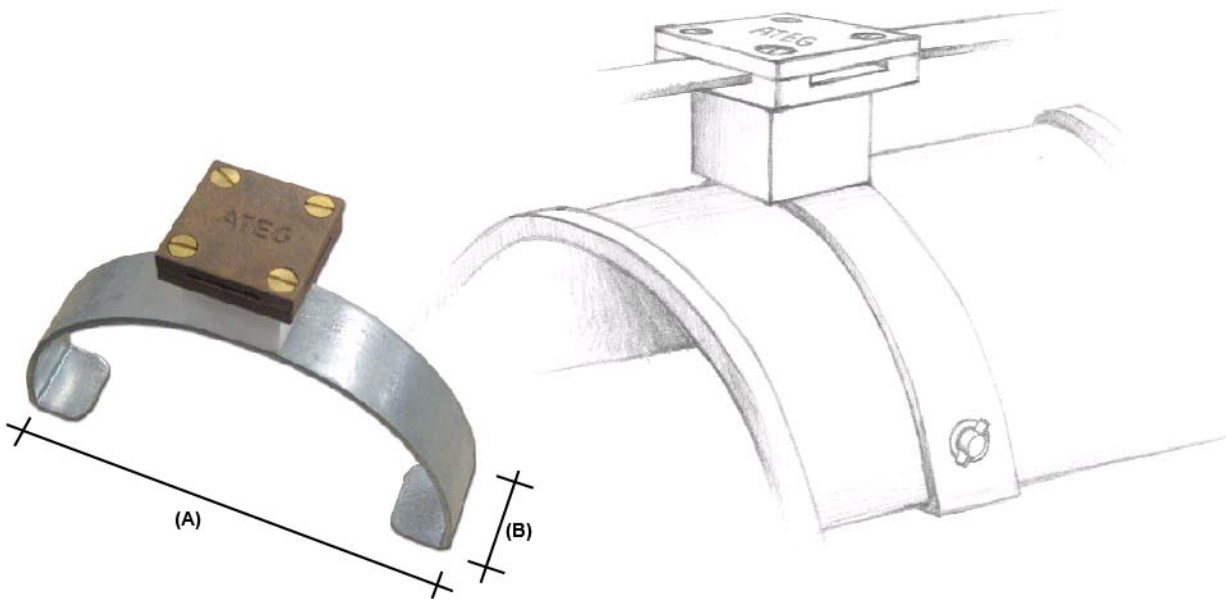
A4. Ridge Saddle



Thread Diameter	Maximum Conductor Width	Material	Product Code
16 mm	31 mm	Copper	RSBG 160

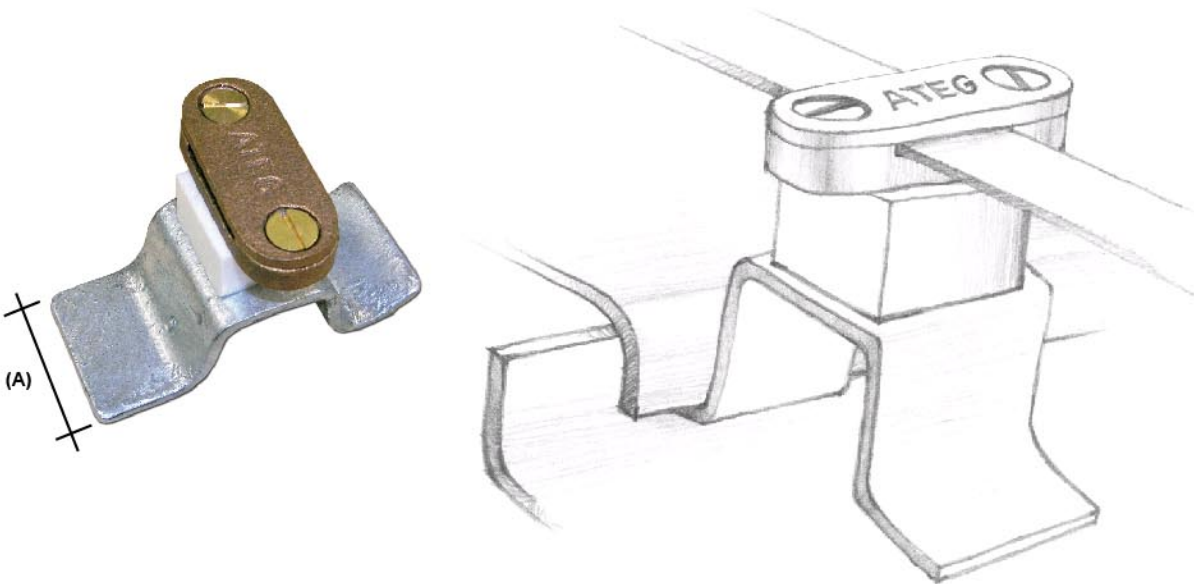
B1. HDG Roofing Mount Support Hook (N – Hook)

Width (A)	Width (B)	Height	Material	Product Code
200 mm	37 mm	100 mm	HDG Steel	NHG 2037



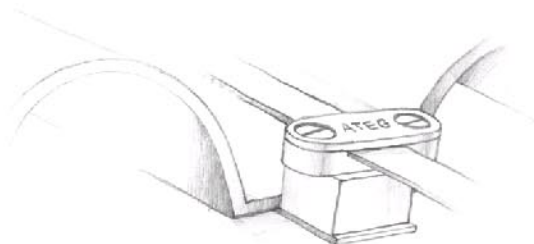
B2. HDG Roofing Mount Support Hook (A - Hook)

Width (A)	Length	Thickness	Material	Product Code
25 mm	250 mm	3 mm	HDG Steel	AHG 2525



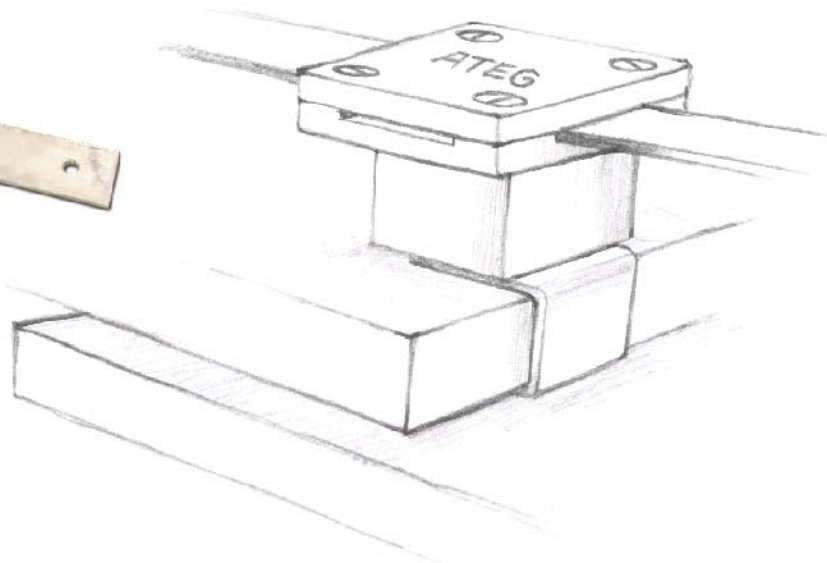
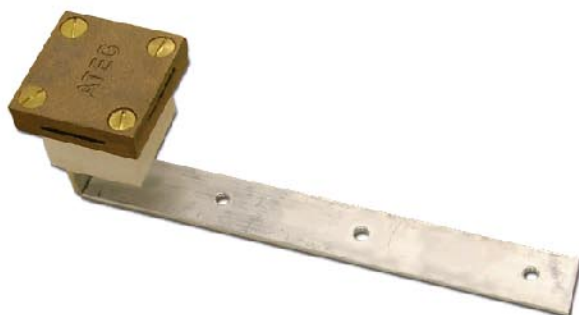
B3. Slate Holdfasts Support Hook

Width (A)	Length	Thickness	Material	Product Code
25 mm	160 mm	3 mm	Aluminum	SHG 253

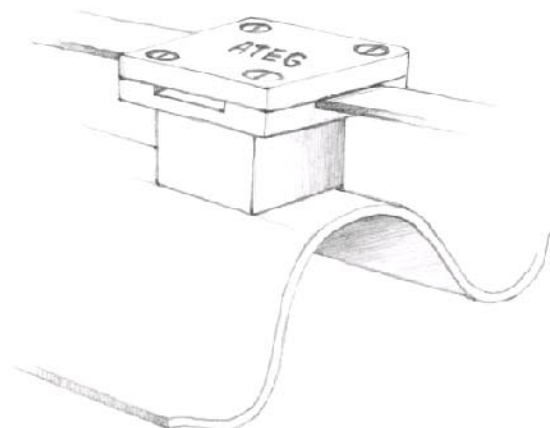


B4. Slate Holdfasts Support Hook With L - Shape

Width (A)	Length	Thickness	H	Material	Product Code
25 mm	160 mm	3 mm	20 mm	Aluminum	SLG 253



B5. Compound Type Roofing Support



B6. Teflon Block



Dimension	Thickness	Thread Size	Color	Material	Product Code
25 x 25 mm	15 mm	M6	White	Teflon	TFG 015
38 x 38 mm	25 mm	M6	White	Teflon	TFG 025

B7. Expandable Support Hook

Width	Length	Thread Size	Material	Product Code
25 mm	200 mm	M6	Aluminum	EGG 002

B8. Bolt & Nut

Product Type	Size	Material	Product Code
Hexagon Head Screw	M6 x 8 mm	Stainless Steel	HHG 068
Round Head Screw	M6 x 8 mm	Stainless Steel	RHG 068
Counter Sunk Set Screw	M6 x 8 mm	Stainless Steel	CSG 068
Butterfly Screw	M6 x 30 mm	Stainless Steel	BSG 068
Hexagon Nut	M6	Stainless Steel	SSG 006

C1. DC Tape Clip



Conductor Size	Material	Product Code
25 x 3 mm	Copper	DCG 253
25 x 6 mm	Copper	DCG 256
50 x 3 mm	Copper	DCG 503
50 x 6 mm	Copper	DCG 506

C2. Tape Clips



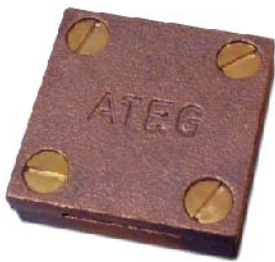
Conductor Size	Material	Product Code
25 x 3 mm	Copper	TCG 253
25 x 3 mm	Aluminium	ALTG 253

C3. Bi – Metallic Connector



Conductor Size	Material	Product Code
25 x 3 mm	Copper & Aluminium	BMG 253

D1. Square Tape Clamp



Conductor Size	Material	Product Code
25 x 3 mm	Copper	STG 253
25 x 6 mm	Copper	STG 256
50 x 6 mm	Copper	STG 506

D2. Plate Type Test Clamp



Conductor Size	Product Code
26 x 12 mm	PTCG 2612

E1. B Bond



Max Tape Width	Bolt Size	Material	Product Code
26 mm	M10	Copper	BBCG 2610

E2. RWP Bond



Max Tape Width	Bolt Size	Material	Product Code
26 mm	M10	Copper	RWPG 2610

F1. Copper Rod



Nominal Diameter	Dimensions Length	Thread Diameter 'X'	Shank Diameter 'Y'	Product Code
5 / 8"	1200 mm	5 / 8"	14.2 mm	CRG 1612
5 / 8"	1500 mm	5 / 8"	14.2 mm	CRG 1615
5 / 8"	1800 mm	5 / 8"	14.2 mm	CRG 1618
3 / 4"	1200 mm	3 / 4"	17.2 mm	CRG 2012
3 / 4"	1500 mm	3 / 4"	17.2 mm	CRG 2015

F2. Coupling



Nominal Rod Diameter	Product Code
5 / 8"	CPG 062
3 / 4"	CPG 075

F3. Driving Stud



Nominal Rod Diameter	Product Code
5 / 8"	CPG 062
3 / 4"	CPG 075

o Tape Clamp (Type A)



Nominal Rod Diameter	Conductor Size	Product Code
5 / 8" (16mm)	25 mm	ERG 1625
5 / 8" (16mm)	50 mm	ERG 1650
3 / 4" (20mm)	25 mm	ERG 2025
3 / 4" (20mm)	50 mm	ERG 2050

F5. GUV Type Rod To Cable Clamp



Nominal Rod Diameter	Conductor Range	Product Code
5 / 8"	16 - 95 mm ²	GUVG 1637
3 / 4"	16 - 70 mm ²	GUVG 2037

F6. Earth Bonding Points



Product Description	Conductor At Front Plate	Product Code
4 Holes	70 mm ²	EPG 004

F7. E Type U Bolt Rod Clamp



Nominal Rod Diameter	Hole Centres	Tape Width	Product Code
5 / 8"	37 mm	-	UBG 1637
5 / 8"	37 mm	25 mm	UBG 1637a
3 / 4"	37 mm	-	UBG 2037

F8. Earth Boss



Length	Diameter	Thread Size	Product Code
50 mm	50 mm	M10	EBG 3040

F9. Earth Bars

Terminations	Size (mm)	No Of Disc Links	Product Code
6	40(H) x 6(T) x 350(L)	-	EBBG 006
8	40(H) x 6(T) x 350(L)	-	EBBG 008
10	40(H) x 6(T) x 460(L)	-	EBBG 010
12	40(H) x 6(T) x 460(L)	-	EBBG 012
20	50(H) x 6(T) x 460(L)	-	EBBG 020
6	40(H) x 6(T) x 460(L)	1	EBBG 061
6	40(H) x 6(T) x 460(L)	2	EBBG 062



F10. Concrete Earth Chamber



Overall Dimensions	Product Code
282 x 282 x 195(H) mm	CIPG 282
328 x 328 x 220(H) mm	CIPG 328

F11. Earth Bar

Product Description	Product Code
5 Holes	EBG 005



G1. Bare Copper Tape



Conductor Size	Product Code
25 x 3 mm	BCG 253
25 x 6 mm	BCG 256
50 x 3 mm	BCG 503
50 x 6 mm	BCG 506

G2. Bare Aluminum Tape



Conductor Size	Product Code
25 x 3 mm	BAG 253

G3. Bare Galvanized Steel Wire



Nominal Strand Diameter	Stranding No.	Product Code
6.00 mm	7 / 2.00 mm ²	BGG 0600
7.95 mm	7 / 2.65 mm ²	BGG 0800
9.75 mm	7 / 3.25 mm ²	BGG 1000
12.0 mm	7 / 4.00 mm ²	BGG 1200

* Other sizes also available upon request.

G4. Flexible Bare Copper Braid



Conductor Size	Product Code
6 x 1 mm	FCBG 0601
12 x 1.5 mm	FCBG 1215
16 x 2 mm	FCBG 1602
25 x 2 mm	FCBG 2502
35 x 3 mm	FCBG 3503

H1. C Tap Connector



Cable Size	Material	Product Code
35 mm ² : 4 - 25 mm ²	Copper	YC2 C4
50 - 70 mm ² : 16 - 35 mm ²	Copper	YC26 C2
50 - 70 mm ² : 35 - 70 mm ²	Copper	YC26 C26
95 mm ² : 95 mm ²	Copper	YC28 C28

* Other sizes also available upon request.

H2. Surge Arrester



Type 1 : Iimp (10/350 μs) / Imax (8/20 μs)

Iimp / Imax	Connection	Product Code
15 kA / 100 kA	Three phase (with reserve)	OVR HL 4L 15 440s P TS
15 kA / 100 kA	Single pole (with reserve)	OVR HL 4L 440s P TS

* Other ratings also available upon request.

Type 2 : Imax (8/20 μs)

Imax	Connection	Product Code
100 kA	Single pole (phase)	OVR 100 275s P TS
100 kA	Single pole (neutral)	OVR 100 N P
65 kA	Three phase (with reserve)	OVR 3N-65-275s P
40 kA	Three phase	OVR 3N-40-275 P
15 kA	Three phase	OVR 3N-15-275 P
65 kA	Single phase (with reserve)	OVR 1N-65-275s P
40 kA	Single phase	OVR 1N-40-275 P
15 kA	Single phase	OVR 1N-15-275 P

* Other ratings also available upon request.

H3. Cable Lug



Cable Lug Size	Product Code
50 mm ² x M8	CLG 5008
50 mm ² x M10	CLG 5010
50 mm ² x M12	CLG 5012
70 mm ² x M8	CLG 7008
70 mm ² x M10	CLG 7010
70 mm ² x M12	CLG 7012
95 mm ² x M8	CLG 9508
95 mm ² x M10	CLG 9510
95 mm ² x M12	CLG 9512

* Other sizes also available upon request.

H4. Grounding Cable (Green-Yellow or Green)



Cable Size
1C x 6 mm ²
1C x 25 mm ²
1C x 50 mm ²
1C x 70 mm ²
1C x 95 mm ²
1C x 120 mm ²
1C x 150 mm ²

* Other ratings also available upon request.

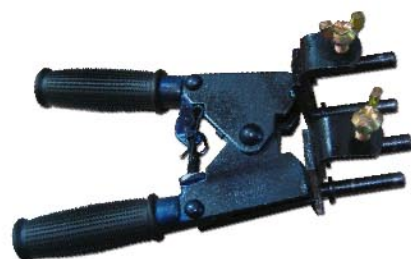
* Green Yellow Heat Shrink is available upon request.

H5. Earthing Improvement Compound



Weight (Kg)	Product Code
20	EMIX-20
25	EMIX-25

H6. Exothermic-Welding



Item	Description
Exothermic Welding Mould	Tape To Tape Joint Type
Exothermic Welding Mould	Tape To Cable Joint Type
Exothermic Welding Mould	Cable To Cable Joint Type
Exothermic Welding Mould	Cable To Grounding Rod Joint Type
Exothermic Welding Mould	Tape To Grounding Rod Joint Type
Welding Powder	65g
Welding Powder	90g
Welding Powder	115g
Welding Powder	150g
Ignitor Gun	To Ignite The Welding Powder
Mould Sealer	To Prevent Mould Leaking
Exothermic Welding Clamp	Small, Medium, Large Type

* Other range of products also available upon request.

* Please call for further clarification.



ATEG

Lightning & Earthing Protection Partner

Authorized Distributor :

* Any other types & sizes are available upon request. Kindly to contact with our technical person.