





Winner of BrandLaureate SME Corporate Best Brand Award 2016-2017

Earthing & Lightning Protection (E&LP) Product Catalogue



Advancing Safety, Protecting Critical Assets









Offering Comprehensive And TOTAL SOLUTIONS

The lightning protection industry has been evolving with great speed over the years and will continue to evolve, as will Tokai into the future. **BS EN 62305 and MS IEC 62305** has come into force effectively in August 2008, as the new Standard for the Protection of Structure against Lightning replacing the decades old BS 6651.

The new standard will bring about fundamental changes in the planning and design of the lightning protection schemes with a shift in emphasis to risk assessment and an integrated approval to structure and system protection. Tokai, as your market leader in Malaysia is fully geared for this new standard and with over 20 years of expertise in the business, we are well prepared in providing you with lightning protection systems that is complemented by our clear, concise and comprehensive technical support.

I am confident that Tokai is uniquely placed to offer you the Total Integrated Lightning and Earthing Solutions for all your Lightning Protection needs. Our exceptional track record and client portfolio will further solidify our commitment to better serve you and make this world a safer place.

Dato' Ir Jimmy Lim Lai Ho (D.S.D.K, JP) This new National and International Earthing and Lightning Protection Standards might seem daunting, and confusion and misinterpretation can easily lead to budget overruns and costly extra time on site. For this we remain at your service, Tokai is here to offer you our highest range of Design Assistance together with a complete range of Professional Services to you, our customers:-

- 1. Structural Lightning and Transient Over Voltage Protection System Design
- 2. Earthing Design
- 3. Lightning Risk Assessment
- 4. Soil Resistivity Survey
- 5. Earth Resistance Measuring
- 6. Lighting and Earthing Audit on existing and new sites

TOKAI'S TOTAL LIGHTNING & EARTHING SOLUTIONS

Fully complies to IEC 62305 & BS EN 62305-2007, tested in accordance to *BS 50164-1 and 50164-2 *100KA of Lightning Currents





Quality Earthing & Lightning Protection Solutions

An Overview of BS EN / IEC 62305:2007 Protection Against Lightning

IEC 62305 consists of the following parts, under the general title Protection against lightning:

Part 1 : General Principles

Part 2 : Risk management

Part 3 : Physical damage to structures and life hazard

Part 4 : Electrical and electronic systems within structures

BS EN / IEC 62305-1 : 2007 (Part 1 – General Principles)

This part of IEC 62305 provides the general principles to be followed in the protection against lightning of;

- · structures including their installations and contents as well as persons
- · services connected to a structure

Lightning protection levels (LPL)

Four lightning protection levels (I to IV) are introduced. For each LPL a set of maximum and minimum lightning current parameters is fixed.

LPL	Max kA	Min kA	Rolling Sphere Radius (m)
1	200	3	20
II	150	5	30
III	100	10	45
IV	100	16	60

Lightning protection zones (LPZ)

Protection measures such as Lightning protection system (LPS), shielding wires, magnetic shields and Surge Protective Device (SPD) determine lightning protection zones (LPZ). With respect to the threat of lightning, the following LPZs are defined;

- LPZ 0_A : zone where the threat is due to the direct lightning flash and the full lightning electromagnetic field
- LPZ $0_{\rm B}$: zone protected against direct lightning flashes but where the threat is the full lightning electromagnetic field
- LPZ 1: zone where the surge current is limited by current sharing and by SPDs at the boundary
- LPZ 2: zone where the surge current may be further limited by current sharing and by additional SPDs at the boundary



Fully complies to MS IEC 62305 & BS EN 62305:2007

BS EN / IEC 62305-2 : 2007 (Part 2 – Risk Management)

This part of IEC 62305 is applicable to risk assessment for a structure or for a service due to lightning flashes to earth. Its purpose is to provide a procedure for the evaluation of such a risk. Once an upper tolerable limit for the risk has been selected, this procedure allows the selections of appropriate protection measures to be adopted to reduce the risk to or below the tolerable limit.

BS EN / IEC 62305-3 : 2007 (Part 3 – Physical Damage to Structures and Life Hazard)

This part of IEC 62305 provides the requirements for protection of a structure against physical damage by means of a lightning protection system (LPS), and for protection against injury to living beings due to touch and step voltages in the vicinity of an LPS.

Lightning protection system (LPS)

The characteristics of an LPS are determined by the characteristics of the structure to be protected and by the considered lightning protection level.

Four classes of LPS (I to IV) are defined in this standard corresponding to lightning protection levels (I to IV).

LPL	Class of LPS	
I.	1	
II	11	
III		
IV	IV	

LPL Class	Mesh Size (m x m)	Down Conductor Spacing (m)	Rolling Sphere (m)
L I	5 x 5	10	20
II.	10 x 10	10	30
Ш	15 x 15	15	45
IV	20 x 20	20	60

The rolling sphere method is suitable in all cases. The protection angle method is suitable for simple-shaped buildings but it is subject to limits of air termination height. The mesh method is a suitable form of protection where plain surfaces are to be protected.

BS EN / IEC 62305-4 : 2007 (Part 4 – Electrical and Electronic Systems within Structures)

This part of IEC 62305 provides information for the design, installation, inspection, maintenance and testing of a LEMP protection measures system (LPMS) for electrical and electronic systems within a structure, able to reduce the risk of permanent failures due to lightning electromagnetic impulse.



Tokai E&LP Quality Earthing & Lightning Protection Solutions

















Quality Earthing & Lightning Protection Solutions

In order to gain compliance with BS EN 62305-2007, manufacturers must subject their components to thorough testing and performance measurement by certified independent testing laboratories. Tokai's range of Earthing & Lightning Protection Solutions fully comply to MS IEC 62305 & BS EN 62305-2007 and are tested in accordance to *BS 50164-1 and 50164-2.

1. The Tests

Tokai's range of E&LP products are subjected to pre-conditioning to simulate ageing process. Then, these products are subjected to three electrical impulse shots to simulate lightning discharge. Finally, Tokai's products are subjected to loosening torque test to confirm the component's suitability for its specific application.

2. Environmental Pre-Conditioning

Connection components above ground are subjected to salt mist treatment for 3 days, followed by exposure to a humid, sulphurous atmosphere for 7 days. For components made of copper alloy (copper content less than 80%), a further 1 day ammonia atmosphere treatment is added. For components that are buried in ground, the specimens are immersed in an aqueous solution containing chloride (CaCl₂) and a sulphate (Na₂SO₄) for 28 days.

3. Electrical Test

Without being cleaned in the interim, the specimens are subjected to three electrical impulse shots. The parameters of the test current are defined in the standard BS EN 50164-1:2008.



Characteristics of the test waveform

4. Passing The Test

The connection components passes the test if:-

- the resistance of the joints is less than or equal to $1m\Omega$
- there are no cracks, loose parts or deformations
- the loosening torque is greater than 0.25 and less than 1.5 times the tightening torque.







Fully complies to MS IEC 62305 & BS EN 62305:2007





TK220 Test Sequence





Exothermic T-joint TCCT 150/150 Test Sequence





* tested to 100KA of lightning currents



Quality Earthing & Lightning Protection Solutions

Square Tape Clamp

Conductor Size	Material	Product No.
25mm x 3mm	Copper	TK 220
25mm x 3mm	Aluminium	TK 221
25mm x 6mm	Copper	TK 222
25mm x 6mm	Aluminium	TK 224
50mm x 6mm	Copper	TK 230
50mm x 6mm	Aluminium	TK 231

Recommended fixing - countersunk woodscrew 1 $^{1/2^{\prime\prime}}$ x no. 10 and wall plug. For forming straight through, cross or tee joints in tape.

Tape Clip / Copper Saddle

Conductor Size	Material	Product No.
25mm x 3mm	Copperbonded	TK 255
25mm x 3mm	Aluminium	TK 256
25mm x 3mm	PVC	TK 257

Recommended fixing - round head woodscrew 1 $^{1}/_{2}$ x no. 10 and wall plug.

DC Tape Clip

Conductor Size	Material	Product No.
25mm x 3mm	Copper	TK 240
25mm x 3mm	Aluminium	TK 241
25mm x 6mm	Copper	TK 242
25mm x 6mm	Aluminium	TK 243
25mm x 3mm	PVC	TK 245
50mm x 6mm	Copper	TK 250
50mm x 6mm	Aluminium	TK 251

Made from high quality copper and aluminium alloys. Recommended fixing - countersunk woodscrew 1 $^{1}\slash_{2}$ x no. 10 and wall plug.

Plate Type Test Clamp

Conductor Size	Material	Product No.
25mm x 3mm	Copper	TK 260

Recommended fixing - countersunk woodscrew 1 1/2" x no. 10 and wall plug.

Oblong Junction Clamp

Conductor Size	Material	Product No.
26mm x 8mm	Copper	TK 223

Copperbonded Earth Rod

Nominal Diameter	Length	Product No.
16mm (5/8")	1800mm (6')	TK 100
16mm (5/8")	1500mm (5')	TK 101
16mm (5/8")	2400mm (8')	TK 110
19mm (3/4")	1800mm (6')	TK 120
19mm (3/4")	2400mm (8')	TK 130
19mm (3/4")	3000mm (10')	TK 131

Solid Copper Earth Rod

Nominal Diameter	Length	Product No.
19mm (3/4")	2500mm	TK 132A

The copperbonded steel cored rod is made by molecularly bonding 99.9% pure electrolytic copper onto low carbon steel core. Its high tensile strength enables it to be driven by power hammers to great depths.

























Tokai E&LP Quality Earthing & Lightning Protection Solutions

Coupling

Description	Product No.
16mm (5/8")	TK 140
19mm (3/4")	TK 150

Rod couplings are by far one of the most important component for earthing. It is made from high copper content alloy. This ensures excellent resistance and high strength that can withstand high angular and vertical force during hammering without breaking yet ensures good connection between rods.

Rod To Tape Clamp (Type A)

Nominal Rod Diameter	Maximum Conductor Size	Product No.
16mm (5/8")	26mm x 12mm	TK 160
19mm (3/4")	26mm x 12mm	TK 170
16mm (5/8")	51mm x 8mm	TK 180
19mm (3/4")	51mm x 12mm	TK 190

Corrosion resistance, conductivity and mechanical strength are essential considerations in clamp design to ensure earthing system remains operative for many years. All Tokai rod clamps have high strength copper alloy bodies and screws.

Rod To Cable Clamp (Type G)

Nominal Rod Diameter	Maximum Conductor Size	Product No.
16mm (5/8")	16mm - 70mm ²	TK 200
19mm (3/4")	19mm - 95mm ²	TK 210
19mm (3/4")	120mm - 150mm ²	TK 211

Suitable for use with 8mm Ø solid circular copper conductor.

Rod To Tape Clamp (Type GUV / E)

Conductor Size	Nominal Rod Diameter	Material	Product No.
3mm - 10mm	16mm - 25mm	Copper	TK 162

Rod To Cable Clamp (Type GUV)

Conductor Size	Nominal Rod Diameter	Material	Product No.
70mm - 120mm	16mm - 25mm	Copper	TK 161
70mm - 300mm	16mm - 25mm	Copper	TK 165

Air Terminal (supplied with locknut)

Rod Length	Rod Diameter	Material	Product No.
500mm	15mm	Copperbonded	TK 300
500mm	15mm	Copper	TK 300A
500mm	15mm	Aluminium	TK 301
600mm	20mm	Copperbonded	TK 302
1000mm	15mm	Copperbonded	TK 310
1000mm	15mm	Copper	TK 310A
1000mm	15mm	Aluminium	TK 311
1500mm	15mm	Copperbonded	TK 320
1500mm	15mm	Copper	TK 320A
1500mm	15mm	Aluminium	TK 321
2000mm	15mm	Copperbonded	TK 330
2000mm	15mm	Copper	TK 330A
2000mm	15mm	Aluminium	TK 331

















Tokai E&LP Quality Earthing & Lightning Protection Solutions

Air Terminal Base

Rod Diameter	Material	Product No.
15mm	Copper	TK 340
20mm	Copper	TK 340A
15mm	Aluminium	TK 341

Recommended fixing - countersunk woodscrew 1 1/2" x no. 10 and wall plug.

Ridge Saddle

Rod Diameter	Material	Product No.
15mm	Copper	TK 342

Recommended fixing - countersunk woodscrew 1 $^{1}/_{2}$ " x no. 10 and wall plug.

Cable Saddle

Rod Diameter	Material	Product No.
50mm	Copper	TK 710
70mm	Copper	TK 715
95mm	Copper	TK 720
120mm	Copper	TK 725
150mm	Copper	TK 730

Earth Points with Pre-Welded Tails

Description	Product No.
Four hole size M8 x 14mm	TK 261
Four hole size M8 x 14mm with 500mm pre-welded tail	TK 263
Two hole size M8 x 12mm	TK 262
Two hole size M8 x 12mm with 500mm pre-welded tail	TK 264

Isolating Spark Gap

Protection Level	Impulse Discharge Current	Product No.
<1.2kV	50kA - 100kA	S 123

Copper & Aluminium Tape

Conductor Size	Material	Product No.
25mm x 3mm	Copper	TK 350
25mm x 3mm	Aluminium	TK 351
25mm x 2mm	Copper	TK 355
25mm x 6mm	Copper	TK 360
25mm x 6mm	Aluminium	TK 361
50mm x 6mm	Copper	TK 370
50mm x 6mm	Aluminium	TK 371
25mm x 3mm	Tinned Copper	TK 372
25mm x 6mm	Tinned Copper	TK 373
50mm x 6mm	Tinned Copper	TK 374

High conductivity copper tape tested to BS EN 13601 and BS EN 50164-1:2008 (100KA).

PVC Insulated Copper & Aluminium Tape (Flame Retardant Insulator)

Conductor Size	Material	Product No.
25mm x 3mm	Copper	TK 350-PVC
25mm x 3mm	Aluminium	TK 351-PVC
25mm x 6mm	Copper	TK 360-PVC
25mm x 6mm	Aluminium	TK 361-PVC
50mm x 6mm	Copper	TK 370-PVC
50mm x 6mm	Aluminium	TK 371-PVC

Colour specification in black, green & yellow can be specified as per requirement.

Product no. for materials that are tinned shall be denoted by 'T' Certain items in our catalog would require a minimum order quantity or MOQ













Quality Earthing & Lightning Protection Solutions

Bimetallic Connector

Description	Product No.
25mm x 3mm aluminium tape to 25mm x 3mm copper tape	TK 270

For joining aluminium to copper. It is necessary where an aluminium lightning protection system needs to be earthed using copper.

Inspection Pit

Description	Product No.
Concrete inspection pit (big)	TK 380
(315 x 315 x 190)	
PVC lightweight inspection pit	TK 381
Concrete inspection pit (small)	TK 382
(265 x 265 x 175)	

This concrete inspection pit is load rated to 3000kg and is suitable for all types of earthing and lightning protection installations.

Earth Bars and Disconnecting Links

Description	Product No.
2-Way Earth Bar c/w 1 insulator (3 hole 50x6x90mm)	TK 389
8-Way Earth Bar c/w 2 insulator (10 hole 50x6x270mm)	TK 390
6-Way Earth Bar c/w 2 insulator (8 hole 50x6x270mm)	TK 390-6
6-Way Earth Bar c/w 3 insulator (9 hole 50x6x500mm)	TK 391
8-Way Earth Bar c/w 3 insulator (11 hole 50x6x500mm)	TK 391-8
10-Way Earth Bar c/w 3 insulator (13 hole 50x6x700mm)	TK 391-10
12-Way Earth Bar c/w 3 Insulator (15 hole 50x6x800mm)	TK 391-12
6-Way Earth Bar c/w 1 Disc. Link and 4 insulator (9 hole 50x6x500mm)	TK 392
8-Way Earth Bar c/w 1 Disc. Link and 4 insulator (11 hole 50x6x500mm)	TK 392-8
10-Way Earth Bar c/w 1 Disc. Link and 4 insulator (13 hole 50x6x700mm)	TK 392-10
12-Way Earth Bar c/w 1 Disc. Link and 4 insulator (15 hole 50x6x800mm)	TK 392-12
6-Way Earth Bar c/w 2 Disc. Link and 5 insulator (9 hole 50x6x500mm)	TK 393
4-Way Earth Bar c/w 1 insulator (5 hole 50x6x140mm)	TK 394-4

Low Resistivity Earthing Compound

Description	Product No.
TOKAI Marconite (25kg) - Pure	TK 500
TOKAI Marconite (10kg) - Pre-Mixed	TK 510-PM
TOKAI Marconite (20kg) - Pre-Mixed	TK 520-PM
TOKAI Marconite (25kg) - Pre-Mixed	TK 525-PM

"B" Bond (bolt size - M10)

Conductor Size	Material	Product No.
26mm	Copper	TK 290
26mm	Aluminium	TK 291

Puddle Flange

Material	Product No.
Copper	TK 105
Aluminium	TK 106





Fully complies to MS IEC 62305 & BS EN 62305:2007















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Quality Earthing & Lightning Protection Solutions

Strike Pad

Material	Product No.
Copper	TK 343

Earth Boss

Length	Diameter	Thread Size	Product No.
50mm	50mm	M10	TK 346

Flexible Braid Bond

Dimensions	Length	Material	Product No.
25mm x 3mm	0.5m	Copper	TK 600
25mm x 3mm	1.0m	Copper	TK 601
25mm x 3mm	2.0m	Copper	TK 602
25mm x 3mm	0.25m	Aluminium	TK 610

Earthing Mat

Size	Product No.
600 x 600 x 3mm	TK 400
900 x 900 x 3mm	TK 401
600 x 600 x 6mm	TK 402
900 x 900 x 6mm	TK 403

Static Earth Receptacle

Conductor Materials	Product No.
Copper	TK 410

Water Proof Earth Rod Seal

Description	Product No.
Single Flange	TK 450
Double Flange	TK 451
Triple Flange	TK 452

Anti Vandal Guard

Material	Length	Product No.
Galvanized Steel	2.0m	TK 002
Galvanized Steel	3.0m	TK 003

E-clips Universal Clamp

Material	Product No.
Galvanized Steel	TJM

Cable Clip

Conductor Size	Material	Product No.
150mm sq	Copperbonded	Clip 150
120mm sq	Copperbonded	Clip 120
95mm sq	Copperbonded	Clip 95
70mm sq	Copperbonded	Clip 70
16mm sq	Copperbonded	Clip 16

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Tokai E&LP TokaiWeld Connection Selector

Fully complies to MS IEC 62305 & BS EN 62305:2007

The TokaiWeld permanent connection process has been engineered to be an easy and efficient welding system. No outside power, bulky gas tanks or other equipment associated with welding are required with the TokaiWeld system. The weldmetal powder, consisting of powered aluminium and copper oxide, is poured into a graphite mould following by ignition powder and ignited by means of an ordinary flint gun. The resultant exothermic welding reaction produces high temperatures molten copper and aluminium oxide slag. The molten copper melts the steel retaining disc and flows down the Tap hole and over the conductors in the weld chamber, melting and welding them into a solid homogeneous joint. The whole process takes no more than a few seconds.



An Award Winning Company

with a solid track record and portfolio

As the nation's leading lightning protection and security solutions provider, TOKAI is proud to provide quality products and services that protects your homes, buildings, lives and businesses. We are the only ISO certified lightning and security solutions provider in the nation and our products are registered with Jabatan Kerja Raya. Tokai's Earthing & Lightning Protection Systems are in full compliance to IEC 62305 & BS EN 62305:2007 and are tested in accordance to *BS 50164-1 and 50164-2

Established in 1993, Tokai has grown from strength to strength, winning numerous projects that have become landmarks in the nation. Tokai is the dominant force in the field of lightning & surge protection as well as engineering security solutions.

Tokai Group of Companies is a 100% Malaysian owned entity. Our engineers and technicians are highly-trained with vast project experience to ensure total customer satisfaction. Tokai's name is synonymous with quality and excellence.

Please visit our website for more details.

* tested to 100KA of lightning currents

TOKAI'S TOTAL LIGHTNING & EARTHING SOLUTIONS

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v12a-31102019