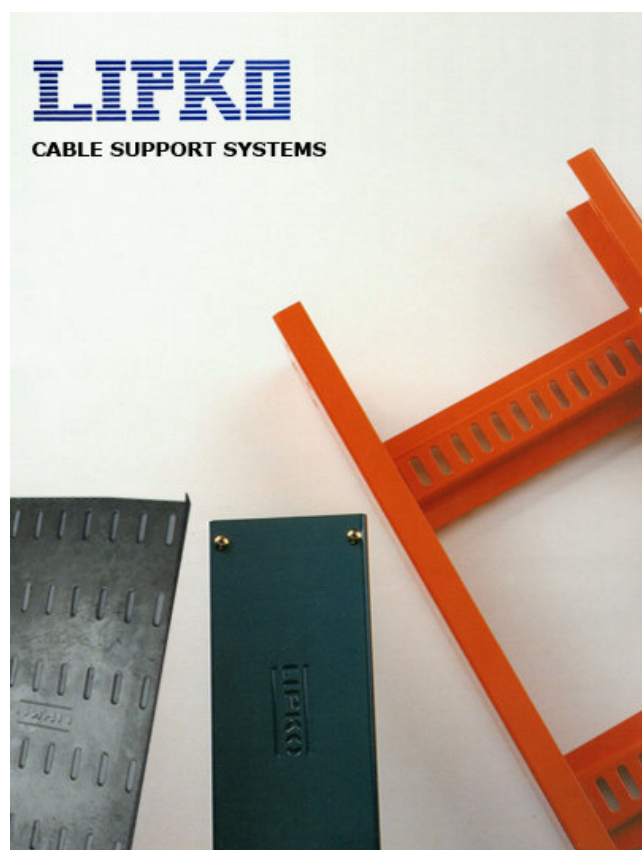


CABLE SUPPORT SYSTEMS

LIPKO

CABLE TRUNKING
CABLE TRAY
CABLE LADDER
& ACCESSORIES



| PROJECTS | CONSULTANTS |
|------------------------------------|------------------|
| Harbour Front | PSA |
| Tuas Check Point | CPG |
| Highoaks Condominium | Meinhardt |
| King's Centre Building | Squire Mech |
| Aspen Height Condominium | JRP |
| Bank of China | PCR |
| West Mall Shopping Centre | Aipha Engineers |
| Pasir Laba Camp | Parsons |
| Hillview Garden Condominium | DMS |
| Mobile One Building | Regional |
| Bukit Panjang Plaza | H Y M&E |
| Central Square Building | UPC |
| Roxy Square Building | J M Pang |
| Existing MRT 29 Station Up-Grading | LTA |
| Southaven Condominium | Bescon |
| SMU | Beca Carter |
| Greatworld City | PCR |
| Lane Crawford | Wong & Owyang |
| NUS Admin & Hall | Hyder Consultant |



Tan Teck Seng Electric Co. (Pte) Ltd

137 Kaki Bukit Avenue 1,

Shun Li Industrial Park, Singapore 416003

ELECTRIC

ttselect@singnet.com.sg

Tel: 6747-8833 Fax: 67470370

All product dimension and material specification is as accurate as possible at time of publication.

Tan Teck Seng Electric Co. Pte. Ltd. reserves the right to change the design or specification of its products without notification.

Whilst utmost care has been taken to maintain accuracy in the data, the company does not hold any responsibility for errors and accepts no liability for the use or interpretation of this data.

SS249 CABLE TRUNKING



TURN BUCKLES
TYPE



STANDARD TYPE



HOT-DIPPED
GALVANIZED

| AVAILABLE FINISHES | CODE |
|-----------------------|------|
| Epoxy Coated | ST |
| Hot Dipped Galvanized | HDST |

| | |
|-----------------|---------------|
| STANDARD LENGTH | 2.44m or 8 ft |
| WIDTH | 50mm - 600mm |
| HEIGHT | 25mm - 200mm |

LIPKO SS249 cable trunking is manufactured from high quality electro galvanized steel sheet to JIS 3313 SECC (Phosphated) and zinc coated on each side. It is finished with epoxy powder coating. Minimum film thickness 45 Micron. Both the body and the cover are press brake formed to a close tolerance to facilitate easy assembly. Each length is supplied complete with a coupling joint, copper earth continuity link, self tapping screws, bolts and nuts.

| CODE | SIZE | | THICKNESS | |
|--------|-----------|--------|-----------|----------|
| | MM | INCHES | BODY MM | COVER MM |
| ST-21 | 50 X 25 | 2 X 1 | 1.0 | 1.0 |
| ST-22 | 50 X 50 | 2 X 2 | 1.0 | 1.0 |
| ST-32 | 75 X 50 | 3 X 2 | 1.2 | 1.2 |
| ST-42 | 100 X 50 | 4 X 2 | 1.2 | 1.2 |
| ST-62 | 150 X 50 | 6 X 2 | 1.4 | 1.2 |
| ST-82 | 200 X 50 | 8 X 2 | 1.6 | 1.4 |
| ST-102 | 250 X 50 | 10 X 2 | 1.6 | 1.4 |
| ST-122 | 300 X 50 | 12 X 2 | 1.6 | 1.6 |
| ST-142 | 350 X 50 | 14 X 2 | 1.6 | 1.6 |
| ST-43 | 100 X 75 | 4 X 3 | 1.2 | 1.2 |
| ST-63 | 150 X 75 | 6 X 3 | 1.4 | 1.2 |
| ST-83 | 200 X 75 | 8 X 3 | 1.6 | 1.4 |
| ST-103 | 250 X 75 | 10 X 3 | 1.6 | 1.4 |
| ST-123 | 300 X 75 | 12 X 3 | 1.6 | 1.6 |
| ST-44 | 100 X 100 | 4 X 4 | 1.4 | 1.2 |
| ST-64 | 150 X 100 | 6 X 4 | 1.4 | 1.2 |
| ST-84 | 200 X 100 | 8 X 4 | 1.6 | 1.4 |
| ST-124 | 300 X 100 | 12 X 4 | 1.6 | 1.6 |
| ST-66 | 150 X 150 | 6 X 6 | 1.4 | 1.2 |
| ST-86 | 200 X 150 | 8 X 6 | 1.6 | 1.4 |



TURN BUCKLE
(EXTERNAL)



TURN BUCKLE
(INTERNAL)

STANDARD CABLE TRUNKING



EOT - EPOXY COATED
TRUNKING (TURN BUCKLE)



EOT - EPOXY COATED
TRUNKING (STANDARD)



HDTK - HOT-DIPPED
GALVANIZED TRUNKING



SS - STAINLESS STEEL

| AVAILABLE FINISHES | CODE |
|-------------------------|----------------|
| Epoxy Coated | EOT |
| Hot Dipped Galvanized | HDTK |
| Stainless Steel 304 316 | 304TK 316TK |

| | |
|-----------------|----------------|
| STANDARD LENGTH | 2.44m or 8 ft |
| WIDTH | 50mm - 600mm |
| HEIGHT | 25mm - 200mm |
| THICKNESS | 0.8mm to 1.6mm |

LIPKO standard cable trunking are supplied with inturned flanged body and overlapping cover firmly by electro galvanized self tapping screws giving maximum rigidity throughout its full length. Both the body and the cover are press brake formed to a close tolerance to facilitate easy assembly. Multi compartment cable trunking is available upon request.

Each length is supplied complete with a coupling joint, copper earth continuity link, self tapping screws, bolts and nuts.

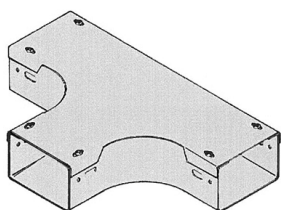
| SIZE | | 20 GAUGE | 18 GAUGE | 16 GAUGE |
|-----------|--------|-------------------------|-------------------------|-------------------------|
| MM | INCHES | CODE/SIZE/ THICKNESS | CODE/SIZE/ THICKNESS | CODE/SIZE/ THICKNESS |
| 50 X 25 | 2 X 1 | EOT/21/20 | EOT/21/18 | EOT/21/16 |
| 50 X 50 | 2 X 2 | EOT/22/20 | EOT/22/18 | EOT/22/16 |
| 75 X 50 | 3 X 2 | EOT/32/20 | EOT/32/18 | EOT/32/16 |
| 100 X 50 | 4 X 2 | EOT/42/20 | EOT/42/18 | EOT/42/16 |
| 100 X 75 | 4 X 3 | EOT/43/20 | EOT/43/18 | EOT/43/16 |
| 100 X 100 | 4 X 4 | EOT/44/20 | EOT/44/18 | EOT/44/16 |
| 150 X 50 | 6 X 2 | EOT/62/20 | EOT/62/18 | EOT/62/16 |
| 150 X 75 | 6 X 3 | EOT/63/20 | EOT/63/18 | EOT/63/16 |
| 150 X 100 | 6 X 4 | EOT/64/20 | EOT/64/18 | EOT/64/16 |
| 150 X 150 | 6 X 6 | - | EOT/66/18 | EOT/66/16 |
| 200 X 50 | 8 X 2 | - | EOT/82/18 | EOT/82/16 |
| 200 X 75 | 8 X 3 | - | EOT/83/18 | EOT/83/16 |
| 200 X 100 | 8 X 4 | - | EOT/84/18 | EOT/84/16 |
| 200 X 150 | 8 X 6 | - | EOT/86/18 | EOT/86/16 |
| 300 X 75 | 12 X 3 | - | EOT/123/18 | EOT/123/16 |
| 300 X 100 | 12 X 4 | - | EOT/124/18 | EOT/124/16 |



TRUNKING END
CAP

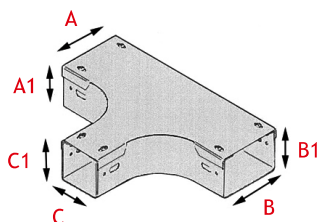
CABLE TRUNKING ACCESSORIES

TEES, CROSSES, ELBOWS



Flatwise Tee

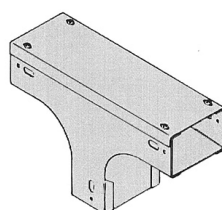
CODE FT



Flatwise Tee Reducer

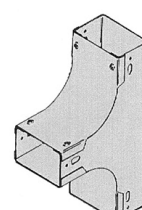
EXAMPLE:

A: 75 x A1 : 50mm to B: 75 x
B1: 50mm to C: 50 x C1: 50



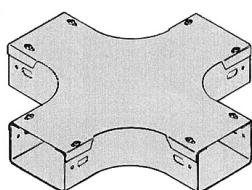
Horizontal Tee

CODE HT



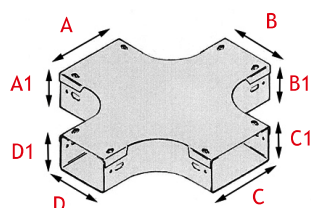
Vertical Tee

CODE VT



Flatwise Cross

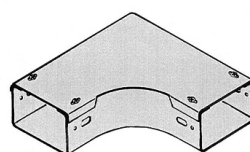
CODE FC



Edgewise Cross Reducer

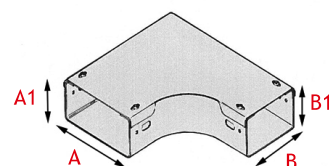
EXAMPLE:

A: 100 x A1 : 50mm to B: 100 x
B1: 50mm to C: 100mm x C1: 50mm
to D: 75mm x D1 : 50mm



Flatwise Elbow

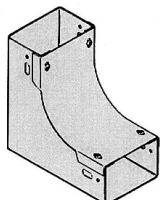
CODE FE



Flatwise Elbow Reducer

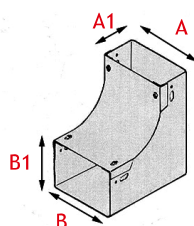
EXAMPLE:

A: 100 x A1: 50mm to
B: 75 x B1: 50mm



Edgewise Elbow
(inside cover)

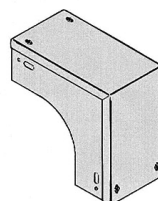
CODE EF



Edgewise Elbow
Reducer
(inside cover)

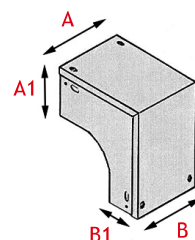
EXAMPLE:

A: 100 x A1: 50mm to
B: 100 x B1: 75mm



Edgewise Elbow
(outside cover)

CODE ET



Edgewise Elbow
Reducer
(outside cover)

EXAMPLE:

A: 100 x A1: 75mm to
B: 100 x B1: 50mm

| AVAILABLE FINISHES | CODE |
|-----------------------|------|
| Epoxy Coated | E |
| Hot Dipped Galvanized | HD |
| Stainless Steel 304 | SS |
| 316 | |

| | |
|-----------------|---------------|
| STANDARD LENGTH | 2.44m or 8 ft |
| WIDTH | 50mm - 600mm |
| HEIGHT | 25mm - 200mm |

ORDERING GUIDE

Please specify the type of fitting, width, height and finishing when ordering.

For unequal fittings, please indicate the dimension (width and height) in clockwise manner shown on the right.

EXAMPLE :

Edgewise Cross Reducer

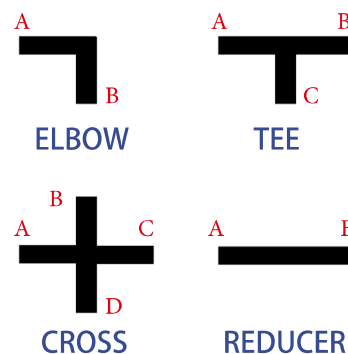
A & A1 Dimension : 100mm x 50mm

B & B1 Dimension : 100mm x 50mm

C & C1 Dimension : 100mm x 50mm

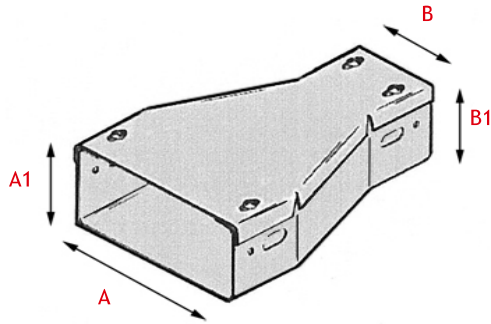
D & D1 Dimension : 75mm x 50mm

Other non-standard fittings can be manufactured upon order



CABLE TRUNKING ACCESSORIES

REDUCERS

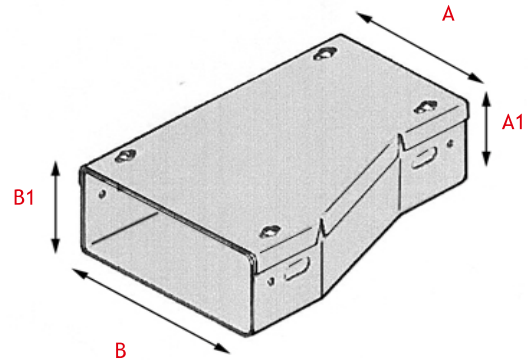


Reducer Width

CODE **RW**

EXAMPLE:

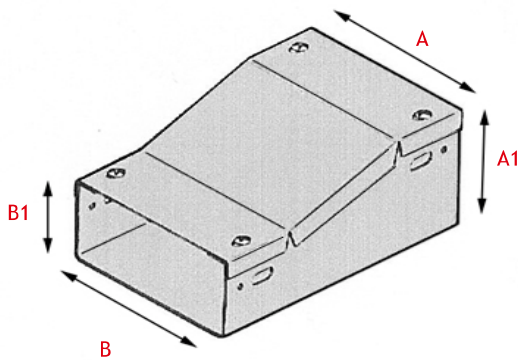
A:100 x A1:50mm to B:50 x B1:50mm



Reducer Width - Left

EXAMPLE:

A:75 x A1:50mm to B:100 x B1:50mm

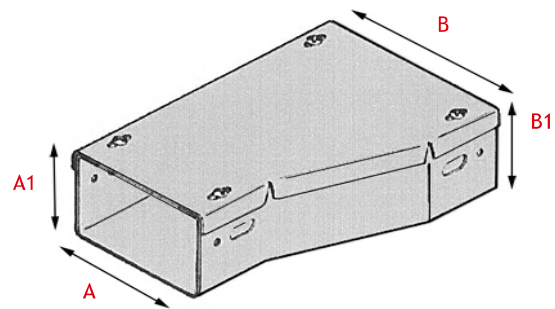


Reducer Height

CODE **RH**

EXAMPLE:

A:100 x A1:75mm to B:100 x B1:50mm



Reducer Width - Right

EXAMPLE:

A:100 x A1:50mm to B:75 x B1:50mm

| AVAILABLE FINISHES | CODE |
|-----------------------|------|
| Epoxy Coated | E |
| Hot Dipped Galvanized | HD |
| Stainless Steel 304 | SS |
| 316 | |

| | |
|------------------------|---------------|
| STANDARD LENGTH | 2.44m or 8 ft |
| WIDTH | 50mm - 600mm |
| HEIGHT | 25mm - 200mm |

ORDERING GUIDE

Please specify the type of fitting, width, height and finishing when ordering.

For unequal fittings, please indicate the dimension (width and height) in clockwise manner shown on the right.

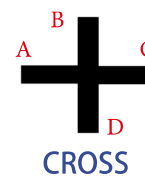
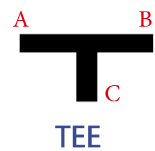
EXAMPLE :

Trunking Reducer Height

A & A1 Dimension : 100mm x 75mm

B & B1 Dimension : 100mm x 50mm

Other non-standard fittings can be manufactured upon order



Test Report No. 7191106583-EEC15/01-SYG_CR1
dated 11 MAR 2015



PSB Singapore

**Choose certainty.
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Note: This report is issued subject to the Testing and Certification Regulations of the TÜV SÜD Group and the General Terms and Conditions of Business of TÜV SÜD PSB Pte Ltd. In addition, this report is governed by the terms set out within this report.

Subject

TYPE TESTING OF STEEL SURFACE CABLE TRUNKING AND ACCESSORIES

Client

Tan Teck Seng Electric Company (Pte) Ltd
137 Kaki Bukit Avenue 1
Shun Li Industrial Park
Singapore 416003

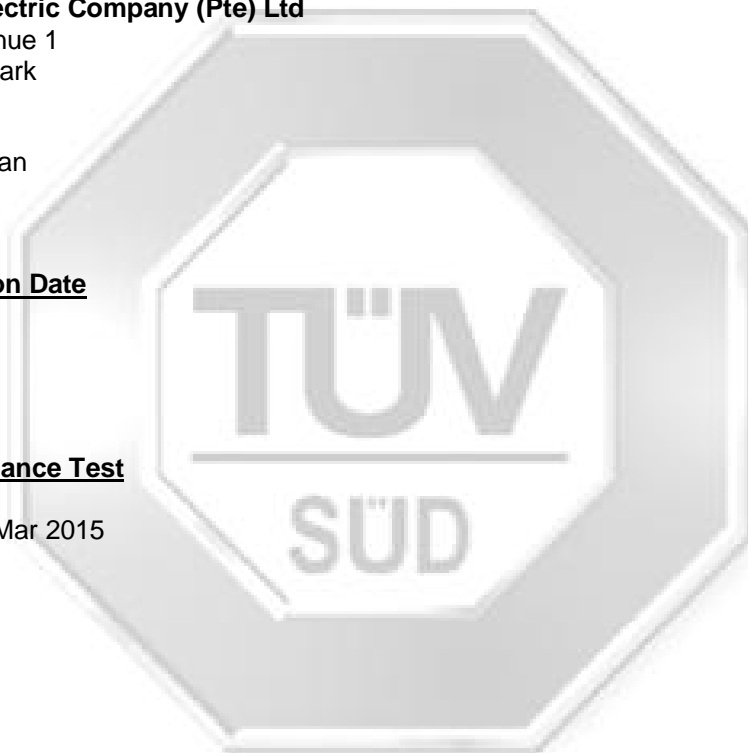
Attn: Ms Annie Tan

Sample Submission Date

11 Feb 2015

Date(s) of Performance Test

11 Feb 2015 to 11 Mar 2015



Laboratory:
TÜV SÜD PSB Pte. Ltd.
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Singapore 118221

Phone : +65-6885 1333
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E-mail: testing@tuv-sud-psb.sg
www.tuv-sud-psb.sg
Co. Reg : 199002667R

Regional Head Office:
TÜV SÜD Asia Pacific Pte. Ltd.
3 Science Park Drive, #04-01/05
The Franklin, Singapore 118223
TUV®



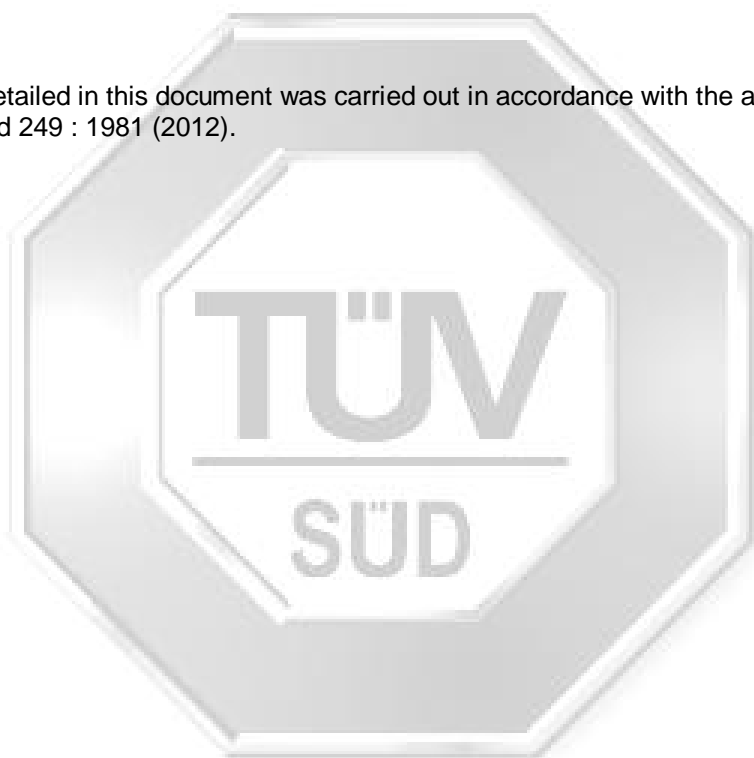
Description of Sample

Steel Surface Cable Trunking and Accessories

| | | |
|--------------------|---|------------------------------------|
| Brand | : | LIPKO |
| Model No. / Colour | : | a) ST-42 / Grey |
| | | b) ST-42-O / Orange |
| Size | : | 100mm (W) X 50mm (H) |
| Classification | : | Class 1 |
| Quantity | : | Ten (10) complete lengths |
| Manufacturer | : | Cable Support System (M) Sdn. Bhd. |
| Country of Origin | : | Malaysia |

Method of Test

The assessment detailed in this document was carried out in accordance with the appropriate clauses of Singapore Standard 249 : 1981 (2012).



Test Report No. 7191106583-EEC15/01-SYG_CR1
dated 11 MAR 2015



Results

| Clause No. | Title / Description | Results | Permissible Limits |
|------------|---|----------|---|
| 6 | <u>Marking</u> | Complied | |
| 7 | <u>Details of Construction</u> | Complied | |
| 8 | <u>Dimensions</u> | | |
| | a) Average values of external dimensions (mm) | | |
| | i) Trunking - Width | 100.5 | 100mm + 5.0mm |
| | - Height | 50.6 | 50mm + 2.5mm |
| | ii) Connector - Width | 94.1 | - |
| | - Height | 40.6 | - |
| | b) Average thickness (mm) | | |
| | i) Trunking | 1.20 | 1.2mm ± 0.090mm |
| | ii) Cover | 1.20 | 1.2mm ± 0.090mm |
| | iii) Connector | 0.80 | - |
| | c) Length of each trunking (m) | 2.44 | Minimum : 2m Maximum : 3m Preferred Length : 3m |

Test Report No. 7191106583-EEC15/01-SYG_CR1
dated 11 MAR 2015



PSB Singapore

Results (cont'd)

| Clause No. | Title / Description | Results | Permissible Limits |
|------------|--|----------------------------|--------------------------|
| 9 | <u>Resistance to Corrosion</u> Salt spray test Paint thickness of the trunking = 60µm Type of steel of the trunking : Electro-galvanised steel | Complied (See Remark 1) | |
| 10 | <u>Electrical Continuity Test</u> Ambient temperature = 28°C Total length of the trunking = 24.4m Continuity between the ends from: i) body to body with covers removed (Ω/m) ii) body to body with covers fitted (Ω/m) | 0.0012 0.0016 |) Maximum 0.005Ω/m) |
| 11 | <u>Resistance to Scratches</u> Load : 800g | Complied (See Remark 1) | |
| 12 | <u>Paint Thickness</u> i) Trunking (µm) ii) Cover (µm) iii) Connector (µm) | 60 60 60 |) Minimum 45µm)) |
| 13 | <u>Coating Weight</u> | Not Applicable | |

Remarks:

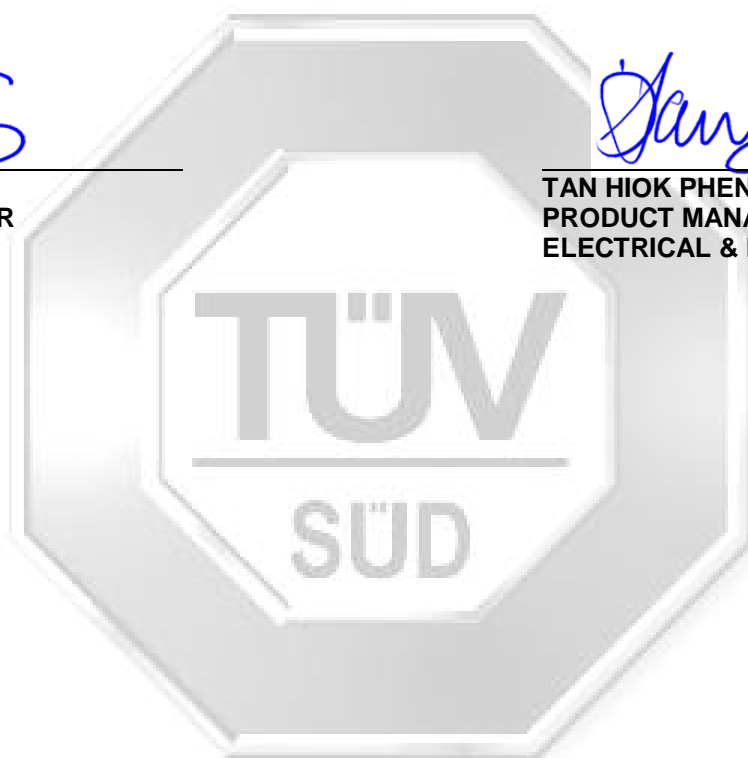
1. The tests of resistance to corrosion and resistance to scratches were conducted by Chemical & Materials Group (See TUV SUD PSB Test Report Reference No. : 7191106583-CHM15/02-PGK(EEC) dated 06 MAR 2015).
2. The steel surface cable trunking and accessories is deemed to comply with the Singapore Standard 249 : 1981 (2012).



SIM YEW GEE
TESTING OFFICER



TAN HIOK PHENG
PRODUCT MANAGER
ELECTRICAL & ELECTRONICS



Appendix I

Steel Surface Cable Trunking and Accessories

Model No. ST-42

Size : 100mm (W) X 50mm (H)



Appendix II

Steel Surface Cable Trunking and Accessories

Model No. : ST-42-O

Size : 100mm (W) X 50mm (H)



Appendix III

Product Marking



Appendix IV

Fixing Screw, Copper-Link, Bolt & Nut

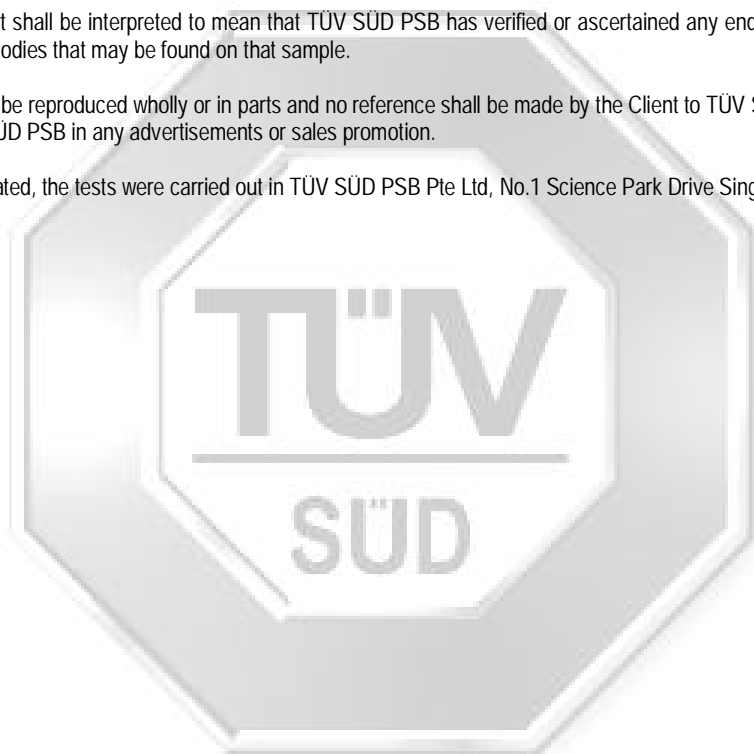




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2. The sample/s mentioned in this report is/are submitted/supplied/manufactured by the Client. TÜV SÜD PSB therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture, consignment or any information supplied.
3. Nothing in this report shall be interpreted to mean that TÜV SÜD PSB has verified or ascertained any endorsement or marks from any other testing authority or bodies that may be found on that sample.
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5. Unless otherwise stated, the tests were carried out in TÜV SÜD PSB Pte Ltd, No.1 Science Park Drive Singapore 118221.

July 2011



TEST REPORT: 7191106583-CHM15/02-PGK(EEC)

Date: 06 MAR 2015

Tel: +65 68851322 Fax: +65 67784301

Client's Ref:

Email: tai-hoe.lin@tuv-sud-psb.sg

Note: This report is issued subject to the Testing and Certification Regulations of the TÜV SÜD Group and the General Terms and Conditions of Business of TÜV SÜD PSB Pte Ltd. In addition, this report is governed by the terms set out within this report.



PSB Singapore

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SUBJECT

Type Testing on Steel Surface Cable Trunking

CLIENT

Tan Teck Seng Electric Co (Pte) Ltd
137 Kaki Bukit Avenue1
Shun Li Industrial Park
Singapore 416003

Attn: Ms Annie Tan

SAMPLE SUBMISSION DATE

11 Feb 2015

DATE TEST CONDUCTED

16 Feb to 18 Feb 2015

DESCRIPTION OF SAMPLE

Two samples of coated cable trunking comprising bodies, covers, connectors, screws, nuts and washers were submitted by the above client to the Electrical & Electronics Centre of TÜV SÜD PSB Pte Ltd.

| | | |
|--------|----------------|-------|
| Brand | LIPKO | |
| Colour | Orange | Grey |
| Model | ST-42-O | ST-42 |
| Size | 100 mm x 50 mm | |



Laboratory:
TÜV SÜD PSB Pte. Ltd.
No.1 Science Park Drive
Singapore 118221

Phone : +65-6885 1333
Fax : +65-6776 8670
E-mail: testing@tuv-sud-psb.sg
www.tuv-sud-psb.sg
Co. Reg : 199002667R

Regional Head Office:
TÜV SÜD Asia Pacific Pte. Ltd.
3 Science Park Drive, #04-01/05
The Franklin, Singapore 118223
TÜV®

METHOD OF TEST

1. SS 249: 1981 (2012)
"Specification for Steel Surface Cable Trunking and Accessories"
2. SS 5 : Part G1 : 1989
"Methods of Test for Paints, Varnishes and Related Materials -
Part G1 : Determination of Resistance to Continuous Neutral Salt Spray"

Test conditions

| | |
|--------------------------------|--|
| Concentration of salt solution | : 50 ± 5 g/L NaCl |
| S.G. of condensate | : 1.033 |
| pH of condensate | : 6.5 – 7.2 |
| Volume of condensate | : 1.0 - 1.5 ml/hr/80 cm ² |
| Test chamber temperature | : 35 ± 2°C |
| Position of specimens | : Body, cover & connector - Inclined 15° from vertical. Screws - Horizontal Nuts – Hang freely |
| Exposure period | : 48 hours |
| Method of Cleaning | : |
| Before test | None |
| After test | Water-rinse and air-dry |

3. ASTM D610-08 (2012)
"Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces"
4. SS 5 : Part F2 : 1988
"Methods of test for Paints, Varnishes and Related Materials - Part F2 : Scratch Test"

TEST REPORT: 7191106583-CHM15/02-PGK(EEC)

06 MAR 2015



PSB Singapore

RESULTS

| Component | “LIPKO” Orange 100 mm x 50 mm Visual Appearance after 48 hours exposure to Continuous Neutral Salt Spray | | SS 249 : 1981 (2012) Requirements |
|---------------------|---|---|--|
| | Interior (1 unit) | Exterior (2 units) | |
| Body | No rusting on exposed surfaces | No rusting on exposed surfaces of both tested units | Screw threads, interior long bend edges and cut edges shall not show more than 15% (by area) of rusting. |
| Cover | No rusting on exposed surfaces | No rusting on exposed surfaces of both tested units | |
| Connector | No rusting on exposed surfaces | No rusting on exposed surfaces of both tested units | |
| Self-tapping Screws | No rusting on all ten tested units | | All other areas shall not show more than 0.1% (by area) of rusting. |
| Screws | No rusting on all ten tested units | | |
| Nuts | No rusting on all ten tested units | | |

| Component | “LIPKO” Orange 100 mm x 50 mm Resistance to Scratches | SS 249 : 1981 (2012) Requirements |
|-----------|--|---|
| Trunking | Passed | The sample shall withstand a load of 800g |

TEST REPORT: 7191106583-CHM15/02-PGK(EEC)

06 MAR 2015



PSB Singapore

RESULTS (Cont'd)

| Component | “LIPKO” Grey 100 mm x 50 mm Visual Appearance after 48 hours exposure to Continuous Neutral Salt Spray | | SS 249 : 1981 (2012) Requirements |
|---------------------|---|---|--|
| | Interior (1 unit) | Exterior (2 units) | |
| Body | No rusting on exposed surfaces | No rusting on exposed surfaces of both tested units | Screw threads, interior long bend edges and cut edges shall not show more than 15% (by area) of rusting. |
| Cover | No rusting on exposed surfaces | No rusting on exposed surfaces of both tested units | |
| Connector | Slight rusting on edges (<15% by area) | Slight rusting on edges of both tested units (<15% by area) | |
| Self-tapping Screws | No rusting on all ten tested units | | All other areas shall not show more than 0.1% (by area) of rusting. |
| Screws | No rusting on all ten tested units | | |
| Nuts | No rusting on all ten tested units | | |

| Component | “LIPKO” Grey 100 mm x 50 mm Resistance to Scratches | SS 249 : 1981 (2012) Requirements |
|-----------|--|---|
| Trunking | Passed | The sample shall withstand a load of 800g |

Remark : Characteristics tested on the above samples were found to have complied with SS 249 : 1981 (2012) Clause 9 and Clause 11 requirements.

MS PECK GEOK KHOON
TECHNICAL EXECUTIVE

MRS WONG-LIN TAI HOE
PRODUCT MANAGER
COATINGS
CHEMICAL & MATERIALS

TEST REPORT: 7191106583-CHM15/02-PGK(EEC)

06 MAR 2015



PSB Singapore

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July 2011

