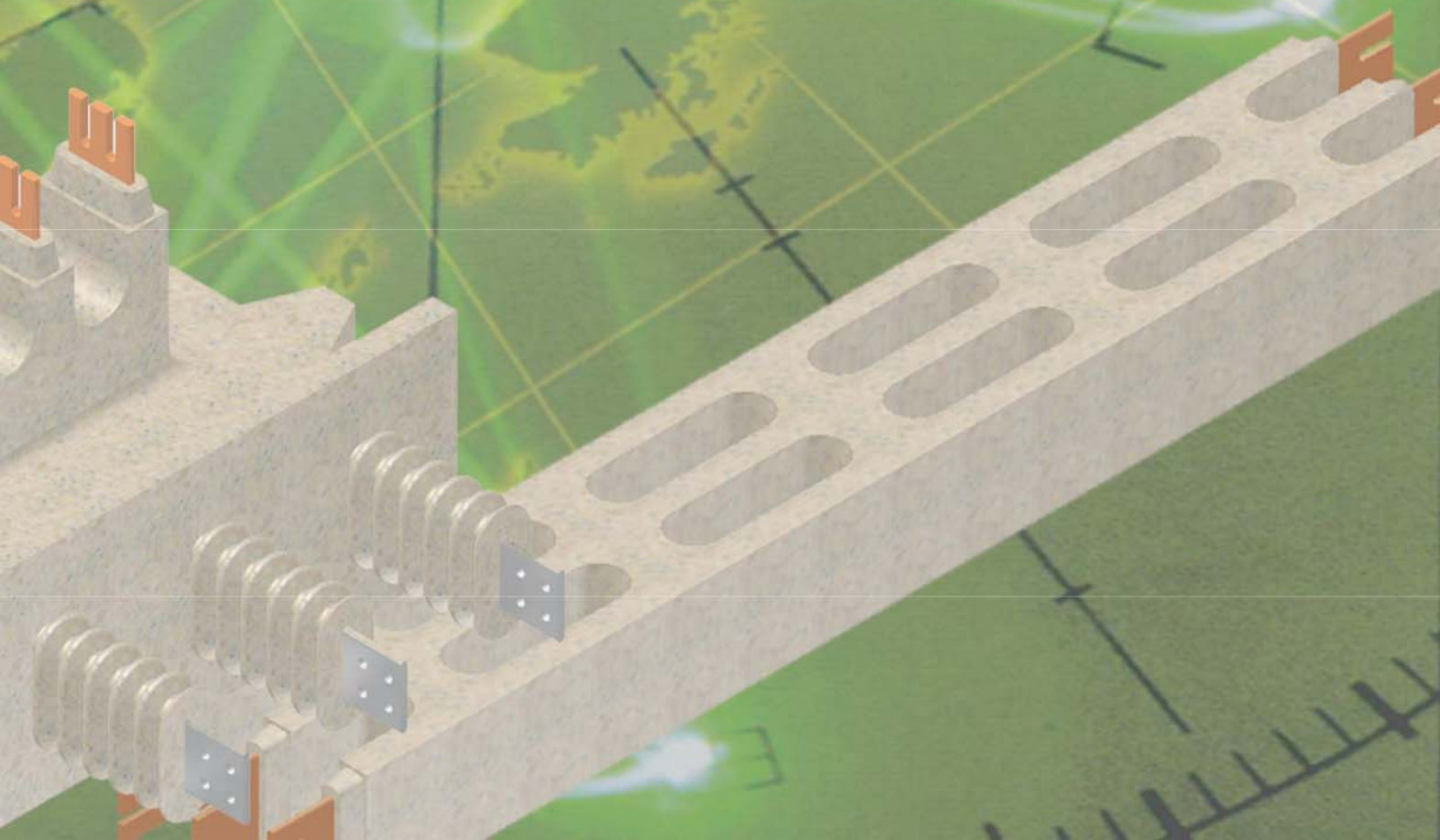




# **CAST-RESIN INSULATED BUSWAY SYSTEMS**

***MEDIUM VOLTAGE***





# Content

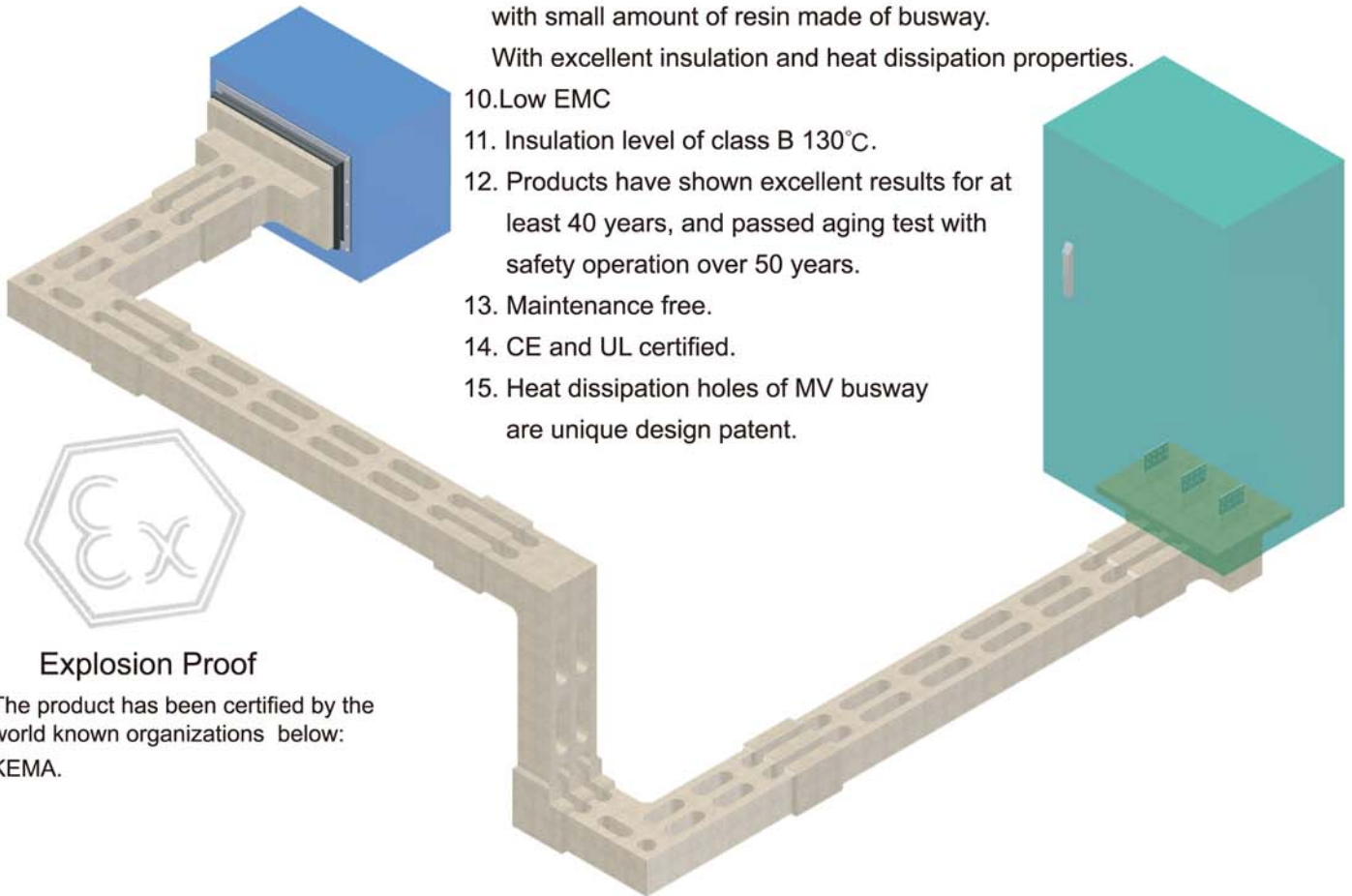
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# Excellence

1. Medium voltage products meet the standard of IEC 60694, IEC 62271-200, IEC 62771-201 IEC 62271-202 and IEEE C 37.23.
2. Compact, easy to install, no emission of toxic gas.
3. The purity of conductor is 99.9% for copper with conductivity above 98% IACS.
4. Voltage drop Low, high short circuit current withstand, carried out overload + 20% for 2 hours.
5. Degree of protection tested in accordance with IEC-60529, IP68. Mechanical Impacts IK10.
6. Fire-proof wall partitions meet S120 in accordance with IEC 60332-3 and meet NBN 713-020 add3.
7. Fire-proof partitions in the piping is in accordance with IEC 60332-3.
8. Anti-explosion certification meets EN 50028 no. EEx m II.
9. Mixing excellent material such as non-organic volcanic rock with small amount of resin made of busway. With excellent insulation and heat dissipation properties.
10. Low EMC
11. Insulation level of class B 130°C.
12. Products have shown excellent results for at least 40 years, and passed aging test with safety operation over 50 years.
13. Maintenance free.
14. CE and UL certified.
15. Heat dissipation holes of MV busway are unique design patent.



## Explosion Proof

The product has been certified by the world known organizations below:  
KEMA.

**IK10**  
Mechanical Impacts

**EMC**  
Electromagnetic compatibility

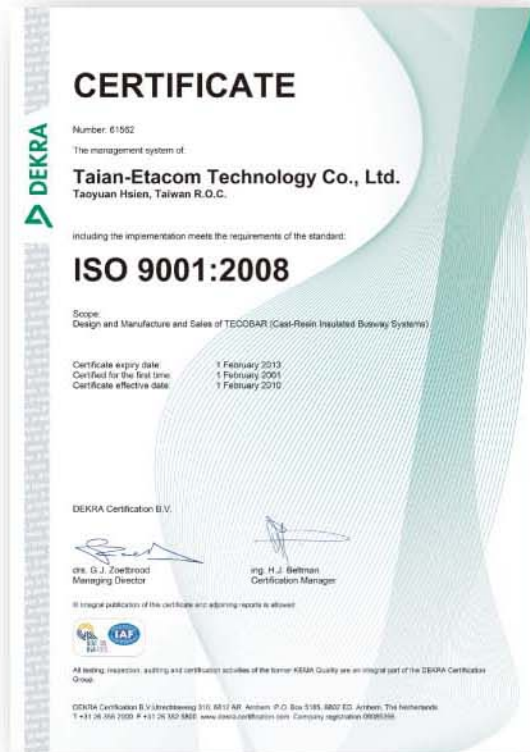
**IP67**  
Degree of protection

**S120**  
Fire Partitions

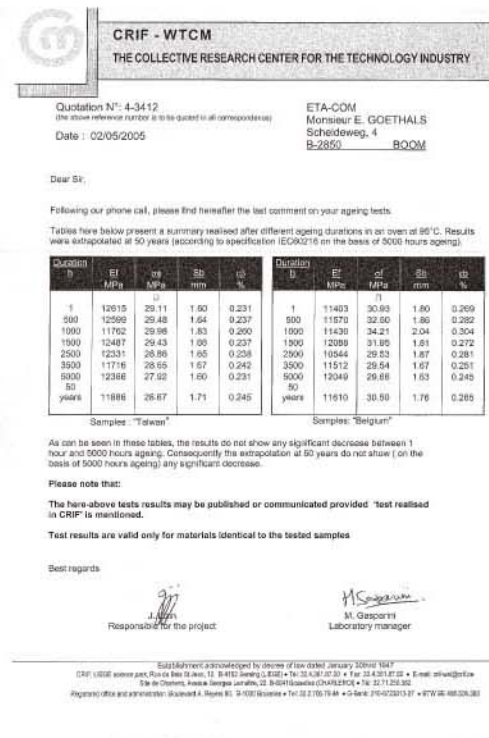
**E30**  
Fire Proof



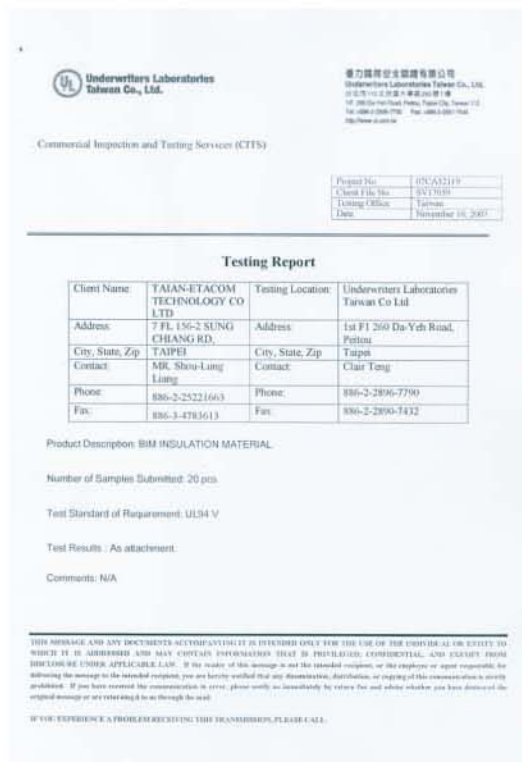
Patent Certificate of R.O.C - Cast-Resin Insulated Busway System (Medium Voltage)



ISO 9001:2008 Certificate



Aging test report



Fire withstand examined in accordance with UL 94V





**財團法人國家實驗研究院  
國家地震工程研究中心地震模擬實驗室**  
National Center for Research on Earthquake Engineering  
台北市中區南京路二段 200 號 200, Sec.2, Xinhai Rd., Taipei, Taiwan  
Tel: 886-2-6630-0888 Fax: 886-2-6630-0856  
http://www.nceer.org.tw 統一編號: 9491071

**地震模擬振動台  
測試報告**

報告編號: NCEE-LT-TQM-D-T1601  
2010004

報告日期: 2010 年 4 月 6 日

測試名稱: 全綫綫式中壓區流排 0.8G 三軸向地震模擬試驗  
測試件: 全綫綫式中壓區流排  
(編號: 安達康、型號: 中壓區流排全綫綫、序號: N/A)  
送測單位: 安達康科技股份有限公司  
地址: 桃園縣楊梅鎮新江路 158 號  
電話: 03-4883786 ext 210

上述設備經本實驗室測試, 結果如內文所述。  
本報告含附頁附件共 7 頁(不含本頁), 分離使用無效。

**張國鎮**  
國家地震工程研究中心主任

National Center for Research on Earthquake Engineering-0.8g in 3 - axis seismic simulation test.

**KEMA**

**TEST REPORT**

Report no. 70670048-HVL 06-1173  
Client TAIAN-ETACOM Technologies (TET)  
Taiwan

Concerning tests  
Date 10 February until 7 June 2008  
Place KEMA High-Voltage Laboratory, Arnhem, the Netherlands  
Object a three-phase epoxy-encapsulated busbar system 7.2 kV  
Type Busbar: SH1 3x720 mm<sup>2</sup>  
Manufacturer TET (TAIAN-ETACOM Technologies), Taiwan

**REQUIREMENTS**  
The requirements as specified in the standard IEC 60694 (2001), IEC 60439-2 (2000), ANSI C37.23 (2003) and client's instructions. As the conductors and the joints were fully encapsulated by the epoxy polymer concrete, the requirements as specified in ANSI C37.23 (2003) table 5 were not applicable. In this case the client's specification (maximum temperature rise of 50 K) was applied.

**TEST PROGRAMME**  
The programme was specified by the client and was as follows:  
1. temperature-rise test at the current corresponding to a maximum temperature rise of 50 K,  
2. determination of the electrical characteristics on a phase-to-neutral basis of the busbar system by calculations from measurements.

**SUMMARY AND CONCLUSION**  
See page 2 of this report.

Authors P.J. Hokenberg  
KEMA Nederland B.V.

This report consists of 12 pages  
1 appendix  
KEMA T&D Testing Services  
Managing Director  
Arnhem, 11 August 2008

SH1 Temperature-rise test

**KEMA**

**REPORT OF PERFORMANCE** TDT 1554-10

OBJECT A three-phase cast resin busway system (insulated conductor)

TYPE PH10 3-1200 SERIAL No. HV 101; HV 102; HV 103  
17.5 kV - 2600 A - 100 kA 1 s - 260 kA peak 0.3 s - 3 x 1200 mm<sup>2</sup> Cu

MANUFACTURER TAIAN-ETACOM TECHNOLOGY Co. Ltd., Yang-Mei, Taoyuan County, Taiwan

CLIENT TAIAN-ETACOM TECHNOLOGY Co. Ltd., Yang-Mei, Taoyuan County, Taiwan

TESTED BY KEMA HIGH-VOLTAGE LABORATORY Arnhem, the Netherlands

DATE(S) OF TESTS 31 August until 2 September 2010

TEST PROGRAMME Temperature-rise tests with resistance measurements at different current levels, based on IEC 60439-2 (2000), IEC 62271-200 (2003) and client's specifications.

SUMMARY AND CONCLUSION The temperature-rise tests at current levels of 700, 1400, 2140 and 2750 A have passed the test. The temperature rise test at 3400 A exceeded the maximum allowed temperature-rise.  
The AC resistance measurements are for information only.

This Report of Performance applies only to the object tested. The responsibility for conformity of any object having the same designations with that tested rests with the Manufacturer.

This report consists of 31 pages in total.

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KEMA Nederland B.V.  
P.J. Hokenberg  
KEMA T&D Testing Services  
Managing Director  
Arnhem, 24 November 2010

PH10 Temperature-rise test

**KEMA**

**TEST REPORT**

Report no. 70670048-HVL 06-1171  
Client TAIAN-ETACOM Technologies (TET)  
Taiwan

Concerning tests  
Date 8 February until 7 June 2008  
Place KEMA High-Voltage Laboratory, Arnhem, the Netherlands  
Object a three-phase epoxy-encapsulated busbar system 17.5 kV  
Type Busbar: PH16 3x1820 mm<sup>2</sup>  
Manufacturer TET (TAIAN-ETACOM Technologies), Taiwan

**REQUIREMENTS**  
The requirements as specified in the standard IEC 60694 (2001), IEC 60439-2 (2000), ANSI C37.23 (2003) and client's instructions. As the conductors and the joints were fully encapsulated by the epoxy polymer concrete, the requirements as specified in ANSI C37.23 (2003) table 5 were not applicable. In this case the client's specification (maximum temperature rise of 50 K) was applied.

**TEST PROGRAMME**  
The programme was specified by the client and was as follows:  
1. temperature-rise test at the current corresponding to a maximum temperature rise of 50 K,  
2. determination of the electrical characteristics on a phase-to-neutral basis of the busbar system by calculations from measurements.

**SUMMARY AND CONCLUSION**  
See page 2 of this report.

Authors P.J. Hokenberg  
KEMA Nederland B.V.

This report consists of 12 pages  
1 appendix  
KEMA T&D Testing Services  
Managing Director  
Arnhem, 11 August 2008

PH16 Temperature-rise test



**KEMA**

**TEST REPORT**

Report no. 70670206-HV, 06-1308  
Client TAIWAN-ETACOM Technologies (TET), Taiwan

Concerning tests  
Date 25 October 2008 up to and including 27 October 2008  
Place KEMA High-Voltage Laboratory, Arnhem, the Netherlands  
Object a three-phase epoxy-encapsulated busbar system, 17.5 kV  
Type Belstar system PH20 3x3000 mm<sup>2</sup>  
Manufacturer TAIWAN-ETACOM Technologies (TET), Taiwan

**REQUIREMENTS**  
The requirements as specified in the standard IEC 60894 (2001), IEC 60438-2 (2000), ANSI C37.23 (2003), and client's instructions. As the conductors and the joints were fully impregnated by the epoxy polymer concrete, the requirements as specified in ANSI C37.23 (2003) table 5 were not applicable. In this case the client's specification (maximum temperature rise of 50 K) was applied.

**TEST PROGRAMME**  
The programme was specified by the client and was as follows:  
1. temperature-rise tests at 2500 A, 4000 A and 5500 A (50 Hz)  
2. temperature-rise test at the specified current of 2000 A (50 Hz)  
3. determination of the electrical characteristics on a phase-to-neutral basis of the busbar system by calculations from measurements.

**SUMMARY AND CONCLUSION**  
See page 2 of this report.

Authors: P.J. Hilkenberg  
KEMA Nederland B.V.  
P.J. Hilkenberg  
KEMA T&D Testing Services  
Managing Director  
Arnhem, 22 December 2008

This B-report consists of 15 pages  
1. appendix

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KEMA Nederland B.V.  
P.O. Box 8000  
KEMA T&D Testing Services  
Managing Director  
Arnhem, 19 May 2009

PH20 Temperature-rise test

**KEMA**

**REPORT OF PERFORMANCE** 09-1247

**OBJECT** 3-phase, 24 kV cast resin busway system (insulated conductor)

**TYPE** TET/TECO power busway PE16 3x1920 SERIAL No./s HV 102, HV 103, HV 105  
24 kV, 3 x 1920 mm<sup>2</sup> Cu

**MANUFACTURER** Taitan Etacom Technology Co., Ltd., Yang-Mei, Taoyuan Hsien, Taiwan

**CLIENT** Taitan Etacom Technology Co., Ltd., Yang-Mei, Taoyuan Hsien, Taiwan

**TESTED BY** KEMA HIGH-VOLTAGE LABORATORY Arnhem, the Netherlands

**DATE OF TESTS** 9 February 2009 until 19 February 2009

**TEST PROGRAMME** Selected type tests based on IEC 60438-2 (2000), IEC 62271-200 (2003), IEC 62271-202 (2006) and customer specifications (see page 2).

**SUMMARY AND CONCLUSION** The tests were passed.

This Report of Performance applies only to the object tested. The responsibility for conformity of any object having the same designations with that tested rests with the Manufacturer.

This report consists of 58 pages in total.

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KEMA Nederland B.V.  
P.O. Box 8000  
KEMA T&D Testing Services  
Managing Director  
Arnhem, 19 May 2009

PE16 Temperature-rise test

**KEMA** 83-06

**TYPE TEST CERTIFICATE OF SHORT-CIRCUIT PERFORMANCE**

**APPARATUS** A three-phase epoxy-encapsulated busbar system

**DESIGNATION** Belstar-SH1 3x720

Rated voltage 7.2 kV Rated normal current 1400 A  
Rated short-time withstand current 50 kA Rated frequency 50/60 Hz

**MANUFACTURER** TAIWAN-ETACOM TECHNOLOGY Co., Ltd., Yang-Mei, Taoyuan Hsien, Taiwan, ROC

**TESTED FOR** TAIWAN-ETACOM TECHNOLOGY Co., Ltd., Yang-Mei, Taoyuan Hsien, Taiwan, ROC

**TESTED BY** KEMA HIGH-POWER LABORATORY Utrechtseweg 310 - 6812 AR Arnhem - The Netherlands

**DATE(S) OF TESTS** 17 February 2009

The apparatus, constructed in accordance with the description, drawings and photographs incorporated in this Certificate, has been subjected to the series of proving tests in accordance with:

**IEEE Std C37.23** subclause 9.2.4

The results are shown in the record of Proving Tests and the oscillograms attached hereto. The values obtained and the general performance are considered to comply with the above Standard and to justify the ratings assigned by the manufacturer as listed on page 4.

The Certificate applies only to the apparatus tested. The responsibility for conformity of any apparatus having the same designations with that tested rests with the Manufacturer.

This Certificate consists of 20 sheets in total.

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KEMA Nederland B.V.  
P.O. Box 8000  
KEMA T&D Testing Services  
Managing Director  
Arnhem, 3 August 2008

SH1 Short-circuit test

**KEMA**

**REPORT OF PERFORMANCE** TDT 2588-10

**APPARATUS** A three-phase cast resin busway system (insulated conductor)

**TYPE** PH10 3-1200 SERIAL No./s HV 101, HV 102, HV 103  
17.5 kV - 2500 A - 100 kA 1 s - 280 kA peak 0.3 s - 3 x 1200 mm<sup>2</sup> Cu

**CLIENT** TAIWAN-ETACOM TECHNOLOGY Co., Ltd., Yang-Mei, Taoyuan County, Taiwan

**MANUFACTURER** TAIWAN-ETACOM TECHNOLOGY Co., Ltd., Yang-Mei, Taoyuan County, Taiwan

**TESTED BY** KEMA HIGH-POWER LABORATORY Utrechtseweg 310 - 6812 AR Arnhem - The Netherlands

**DATE(S) OF TESTS** 1 October 2010

**TEST SPECIFICATION** The tests have been carried out in accordance with the client's instructions. Test procedures and test parameters were based on IEC 62271-201 and IEEE Std C37.23.

This report applies only to the apparatus tested. The responsibility for conformity of any apparatus having the same designations with that tested rests with the Manufacturer.

This report consists of 16 sheets in total.

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KEMA Nederland B.V.  
P.O. Box 8000  
KEMA T&D Testing Services  
Managing Director  
Arnhem, 24 November 2010

PH10 Short-circuit test



**KEMA** 81-06

**TYPE TEST CERTIFICATE OF SHORT-CIRCUIT PERFORMANCE**

**APPARATUS** A three-phase epoxy-encapsulated busbar system

**DESIGNATION** Barloze r PH16 3x1920

|                                       |         |                      |          |
|---------------------------------------|---------|----------------------|----------|
| Rated voltage                         | 17.5 kV | Rated normal current | 3750 A   |
| Rated short-circuit withstand current | 85 kA   | Rated frequency      | 50/60 Hz |

**MANUFACTURER** TAIAN ETACOM TECHNOLOGY Co., Ltd.  
Yang-Mei Taoyuan Hsien, Taiwan, ROC

**TESTED FOR** TAIAN ETACOM TECHNOLOGY Co., Ltd.  
Yang-Mei Taoyuan Hsien, Taiwan, ROC

**TESTED BY** KEMA HIGH-POWER LABORATORY  
Utrechtseweg 310 - 6812 AR Arnhem - The Netherlands

**DATE(S) OF TESTS** 17 February 2006

The apparatus, constructed in accordance with the description, drawings and photographs incorporated in this Certificate, has been subjected to the series of proving tests in accordance with

**IEEE Std C37.23** subclause 6.2.4

The results are shown in the record of Proving Tests and the oscillograms attached hereto. The values obtained and the general performance are considered to comply with the above Standard and to justify the ratings assigned by the manufacturer as listed on page 4.

The Certificate applies only to the apparatus tested. The responsibility for conformity of any apparatus having the same designations with that tested rests with the Manufacturer.

This Certificate consists of 22 sheets in total.

This Certificate falls under the scope of the accreditation certificate L1020 of the Dutch Council for Accreditation. See information sheet page 21.

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**KEMA Nederland B.V.**  
P.O. Box 800  
KEMA T&D Testing Services  
Managing Director  
Arnhem, 3 August 2006

PH16 Short-circuit test

**KEMA** 468-06

**REPORT OF PERFORMANCE**

**APPARATUS** A three-phase epoxy-insulated busduct

**TYPE** PH205 3x3000mm<sup>2</sup>

17.5 kV - 5000 A - 100 kA - 50/60 Hz

**CLIENT** Taiwan - ETACOM Technologies,  
Yang-Mei, Taiwan

**MANUFACTURER** Taiwan - ETACOM Technologies,  
Yang-Mei, Taiwan

**TESTED BY** KEMA HIGH-POWER LABORATORY  
Utrechtseweg 310 - 6812 AR Arnhem - The Netherlands

**DATE(S) OF TESTS** 26 September 2006

**TEST SPECIFICATION** The tests have been carried out in accordance with the client's instructions. Test procedure and test parameters were based on IEC 62271-201 and IEEE Std C37.23

This report consists of 16 sheets in total.

This report falls under the scope of the accreditation certificate L1020 of the Dutch Council for Accreditation. See information sheet page 21.

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**KEMA Nederland B.V.**  
P.O. Box 800  
KEMA T&D Testing Services  
Managing Director  
Arnhem, 23 January 2007

PH20 Short-circuit test

**KEMA** 58-09

**TYPE TEST CERTIFICATE OF SHORT-CIRCUIT PERFORMANCE**

**APPARATUS** A three-phase epoxy-encapsulated busbar system

**DESIGNATION** TET/TECO power busway PE16 3x1920

|                                       |        |                      |          |
|---------------------------------------|--------|----------------------|----------|
| Rated voltage                         | 24 kV  | Rated normal current | 3900 A   |
| Rated short-circuit withstand current | 100 kA | Rated frequency      | 50/60 Hz |

**MANUFACTURER** TAIAN ETACOM TECHNOLOGY Co., Ltd.  
Yang-Mei Taoyuan Hsien, Taiwan

**TESTED FOR** TAIAN ETACOM TECHNOLOGY Co., Ltd.  
Yang-Mei Taoyuan Hsien, Taiwan

**TESTED BY** KEMA HIGH-POWER LABORATORY  
Utrechtseweg 310 - 6812 AR Arnhem - The Netherlands

**DATE(S) OF TESTS** 1 April 2006

The apparatus, constructed in accordance with the description, drawings and photographs incorporated in this Certificate, has been subjected to the series of proving tests in accordance with

**IEC 60466,** subclause 6.5  
**IEEE Std. C37.23,** subclause 6.2.4

The results are shown in the record of Proving Tests and the oscillograms attached hereto. The values obtained and the general performance are considered to comply with the above Standard and to justify the ratings assigned by the manufacturer as listed on page 4.

This Certificate applies only to the apparatus tested. The responsibility for conformity of any apparatus having the same designations with that tested rests with the Manufacturer.

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**KEMA Nederland B.V.**  
P.O. Box 800  
KEMA T&D Testing Services  
Managing Director  
Arnhem, 30 June 2006

PE16 Short-circuit test





**1. Title: TECOBAR Medium Voltage Cast-Resin Insulated Busway.**

**2. Product Description:**

TECOBAR Medium Voltage Cast-Resin Insulated Busway is developed for power systems between 3.6kV~24kV. The product has features of safety and compact. It is designed to using insulation material to perform cast resin sealing to the copper (aluminium) conductor. The insulation material is cast resin containing non-organic volcanic rock and has excellent insulation characteristics and mechanical strength, humidity-proof, non-combustible, and self-extinguishing features.

**3. Applicable Scope:**

TECOBAR medium voltage busway is manufactured in accordance with, IEC 60694, IEC 62271-200, IEC 62271-201, IEC 62271-202 and IEEE C37.23 standards. The elements included as below:

3.1 Straight elements, Elbow elements, T-elements and Terminal elements, etc.

**4. Condition of Use:**

TECOBAR medium voltage busway is composed of the parts listed in item 3.1. The elements are connected through junction units on site before cast molding with insulation mix to complete the medium voltage busway. Conditions for TECOBAR:

4.1 Altitude: below 2000m, indoor or outdoor site.

4.2 Ambient temperature: -45°C~65°C

4.3 Ambient humidity: 0%~100%

**5. Technical Specifications:**

**5.1 Rated Voltage**

| Model   | SH    | HCB    | PH     | PE   |
|---------|-------|--------|--------|------|
| Voltage | 7.2kV | 15.5kV | 17.5kV | 24kV |

5.2 Frequency Hz: 50/60

5.3 System Type: 3 $\phi$  3w.

5.4 Conductor Material : Copper (E-Cu57).

Purity : 99.9% Conductivity : Above 98% IACS.

According to standards : JIS H3140 , DIN 1787, DIN 1759, DIN 40500.

5.5 Electrical characteristics of each TECOBAR element:

Partial discharge : ◎ Partial discharge coulomb value less than 20pC.

Protection degree : ◎ In accordance with IEC 60529 IP67.

Mechanical impacts : ◎ In accordance with IEC 62262 IK10.

Insulation capabilities : ◎ Max 50kV/1min.





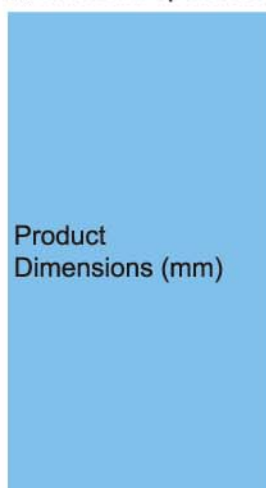
## Copper

| Type                                |        |        |         |         |          |          |
|-------------------------------------|--------|--------|---------|---------|----------|----------|
| Model                               | SH1    | SH1    | SH1     | SH2     | SH2      | SH2      |
| Conductor Section(mm <sup>2</sup> ) | 300    | 480    | 720     | 800     | 1000     | 1200     |
| Conductor Dimensions (mm)           | w60xt5 | w60xt8 | w60xt12 | w100xt8 | w100xt10 | w100xt12 |

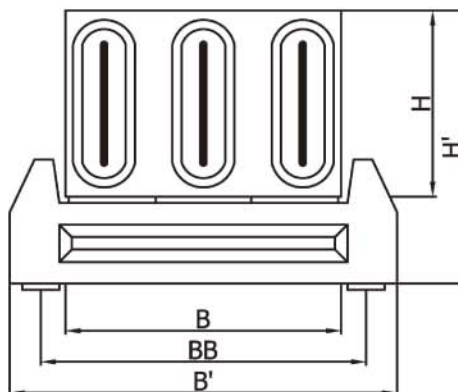
| Conductor Material         | purity copper 99.9% , above 98% IACS |      |      |      |      |      |
|----------------------------|--------------------------------------|------|------|------|------|------|
| Rated Current A (35/40 °C) | 1040                                 | 1295 | 1500 | 1710 | 1880 | 2018 |
| Rated Voltage V            | 7.2kV                                |      |      |      |      |      |
| Frequency Hz               | 50/60                                |      |      |      |      |      |

| Electrical Characteristics   |           |       |       |      |      |      |
|------------------------------|-----------|-------|-------|------|------|------|
| R at 20 °C $\mu \Omega / m$  | 57.7      | 36.1  | 24.1  | 21.7 | 17.3 | 14.4 |
| R at 85 °C $\mu \Omega / m$  | 73.6      | 47.6  | 35.5  | 30.1 | 24.9 | 21.6 |
| X $\mu \Omega / m$<br>f:60Hz | 128.7     | 126.5 | 124.3 | 89.9 | 88.3 | 87.0 |
| I <sub>cw</sub> kA / 1Sec    | 50        | 50    | 50    | 80   | 80   | 80   |
| I <sub>peak</sub>            | 130       | 130   | 130   | 208  | 208  | 208  |
| P <sub>loss</sub> W / m      | 239       | 239   | 239   | 264  | 264  | 264  |
| IP/IK                        | IP67/IK10 |       |       |      |      |      |

※Technical specifications may change without any further notice.



Product Dimensions (mm)



|                       |         |    |    |         |    |    |
|-----------------------|---------|----|----|---------|----|----|
| Width (B) / Height(H) | 160x100 |    |    | 160x140 |    |    |
| BB                    | 200     |    |    | 200     |    |    |
| B'xH'                 | 250x155 |    |    | 250x195 |    |    |
| Product Weight kg/m   | 48      | 51 | 56 | 74      | 77 | 81 |

※Please contact us for specific layouts and connection details.

※SH type has no protection cover required. However, SH type is advised to add aluminum cover for outdoor use. For detail please contact us or local dealers.

※Please refer to the temperature correction coefficient of rated current on page 2-27 while ambient temperature exceeds 40°C.



## Copper

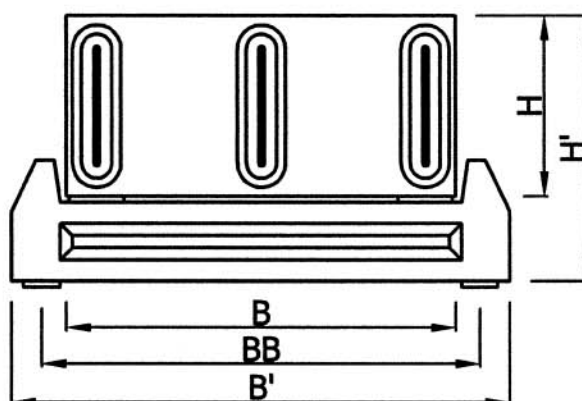
| Type                                |         |         |          |          |
|-------------------------------------|---------|---------|----------|----------|
| Model                               | PH10    | PH10    | PH10     | PH10     |
| Conductor Section(mm <sup>2</sup> ) | 600     | 800     | 1000     | 1200     |
| Conductor Dimensions (mm)           | w100xt6 | w100xt8 | w100xt10 | w100xt12 |

|                            |                                      |      |      |      |
|----------------------------|--------------------------------------|------|------|------|
| Conductor Material         | purity copper 99.9% , above 98% IACS |      |      |      |
| Rated Current A (35/40 °C) | 2070                                 | 2308 | 2560 | 2800 |
| Rated Voltage V            | 17.5kV                               |      |      |      |
| Frequency Hz               | 50/60                                |      |      |      |

| Electrical Characteristics |           |       |       |       |
|----------------------------|-----------|-------|-------|-------|
| R at 20 °C $\mu\Omega / m$ | 28.9      | 21.7  | 17.3  | 14.4  |
| R at 85 °C $\mu\Omega / m$ | 39.9      | 32.1  | 26.1  | 21.8  |
| X $\mu\Omega / m$ f:60Hz   | 157.8     | 154.9 | 152.1 | 149.4 |
| I <sub>cw</sub> kA / 1Sec  | 100       | 100   | 100   | 100   |
| I <sub>peak</sub>          | 260       | 260   | 260   | 260   |
| P <sub>loss</sub> W / m    | 513       | 513   | 513   | 513   |
| IP/IK                      | IP67/IK10 |       |       |       |

※Technical specifications may change without any further notice.

Product Dimensions (mm)



|                       |         |    |    |    |
|-----------------------|---------|----|----|----|
| Width (B) / Height(H) | 322x150 |    |    |    |
| BB                    | 340     |    |    |    |
| B'xH'                 | 415x225 |    |    |    |
| Product Weight kg/m   | 78      | 80 | 83 | 90 |

※Please contact us for specific layouts and connection details.

※PH type is advised to add aluminum cover for outdoor use and rated voltage greater than 12kV.

For detail please contact us or local dealers.

※Please refer to the temperature correction coefficient of rated current on page 2-27 while ambient temperature exceeds 40°C.





# Product Specifications PH

## Copper

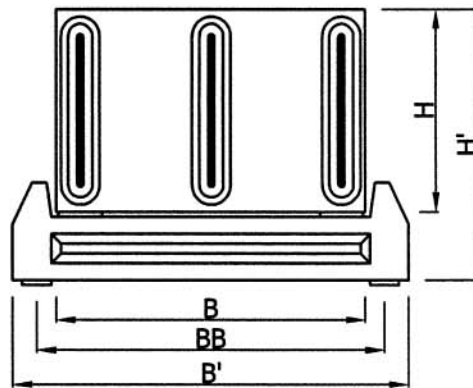
| Type                                |         |          |          |            |            |            |
|-------------------------------------|---------|----------|----------|------------|------------|------------|
| Model                               | PH16    | PH16     | PH16     | PH20       | PH20       | PH20       |
| Conductor Section(mm <sup>2</sup> ) | 1280    | 1600     | 1920     | 2000       | 2400       | 3000       |
| Conductor Dimensions (mm)           | w160xt8 | w160xt10 | w160xt12 | 2-w100xt10 | 2-w100xt12 | 2-w100xt15 |

|                            |                                      |      |      |      |      |      |
|----------------------------|--------------------------------------|------|------|------|------|------|
| Conductor Material         | purity copper 99.9% , above 98% IACS |      |      |      |      |      |
| Rated Current A (35/40 °C) | 3215                                 | 3525 | 3711 | 4208 | 4535 | 5000 |
| Rated Voltage V            | 17.5kV                               |      |      |      |      |      |
| Frequency Hz               | 50/60                                |      |      |      |      |      |

| Electrical Characteristics   |           |       |       |      |      |      |
|------------------------------|-----------|-------|-------|------|------|------|
| R at 20 °C $\mu \Omega / m$  | 13.5      | 10.8  | 9.1   | 8.7  | 7.2  | 5.8  |
| R at 85 °C $\mu \Omega / m$  | 21.4      | 17.8  | 16.1  | 14.4 | 12.4 | 10.2 |
| X $\mu \Omega / m$<br>f:60Hz | 123.8     | 122.9 | 121.7 | 85.7 | 84.9 | 83.8 |
| I <sub>cw</sub> kA / 1Sec    | 80        | 80    | 80    | 100  | 100  | 100  |
| I <sub>peak</sub>            | 208       | 208   | 208   | 260  | 260  | 260  |
| P <sub>loss</sub> W / m      | 665       | 665   | 665   | 765  | 765  | 765  |
| IP/IK                        | IP67/IK10 |       |       |      |      |      |

※Technical specifications may change without any further notice.

Product Dimensions (mm)



|                       |         |     |     |         |     |     |
|-----------------------|---------|-----|-----|---------|-----|-----|
| Width (B) / Height(H) | 322x210 |     |     | 322x260 |     |     |
| BB                    | 340     |     |     | 340     |     |     |
| B'xH'                 | 415x285 |     |     | 415x335 |     |     |
| Product Weight kg/m   | 113     | 120 | 128 | 149     | 159 | 173 |

※Please contact us for specific layouts and connection details.

※PH type is advised to add aluminum cover for outdoor use and rated voltage greater than 12kV.

For detail please contact us or local dealers.

※Please refer to the temperature correction coefficient of rated current on page 2-27 while ambient temperature exceeds 40°C.



## Copper

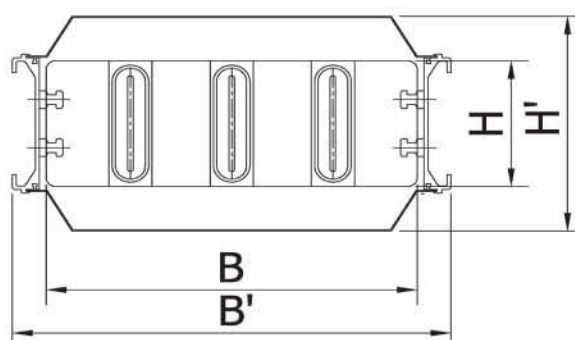
| Model                               | PE10    | PE10    | PE10     | PE16     | PE16     | PE16     |
|-------------------------------------|---------|---------|----------|----------|----------|----------|
| Conductor Section(mm <sup>2</sup> ) | 600     | 800     | 1200     | 1600     | 1920     | 2400     |
| Conductor Dimensions (mm)           | w100xt6 | w100xt8 | w100xt12 | w160xt10 | w160xt12 | w160xt15 |

|                            |                                      |      |      |      |      |      |
|----------------------------|--------------------------------------|------|------|------|------|------|
| Conductor Material         | purity copper 99.9% , above 98% IACS |      |      |      |      |      |
| Rated Current A (35/40 °C) | 1950                                 | 2174 | 2637 | 3203 | 3500 | 4019 |
| Rated Voltage V            | 24kV                                 |      |      |      |      |      |
| Frequency Hz               | 50/60                                |      |      |      |      |      |

| Electrical Characteristics |           |       |       |       |       |       |
|----------------------------|-----------|-------|-------|-------|-------|-------|
| R at 20 °C $\mu\Omega / m$ | 28.9      | 21.7  | 14.4  | 10.8  | 9.3   | 7.4   |
| R at 85 °C $\mu\Omega / m$ | 48.5      | 39.0  | 26.5  | 23.3  | 19.5  | 14.8  |
| X $\mu\Omega / m$ f:60Hz   | 138.9     | 136.3 | 131.4 | 108.3 | 107.0 | 105.2 |
| I <sub>cw</sub> kA / 1Sec  | 100       | 100   | 100   | 100   | 100   | 100   |
| I <sub>peak</sub>          | 260       | 260   | 260   | 260   | 260   | 260   |
| P <sub>loss</sub> W / m    | 553       | 553   | 553   | 717   | 717   | 717   |
| IP/IK                      | IP67/IK10 |       |       |       |       |       |

※Technical specifications may change without any further notice.

Product Dimensions (mm)



|                       |         |     |     |         |     |     |
|-----------------------|---------|-----|-----|---------|-----|-----|
| Width (B) / Height(H) | 550x150 |     |     | 550x210 |     |     |
| B'xH'                 | 650x360 |     |     | 650x360 |     |     |
| Product Weight kg/m   | 100     | 105 | 110 | 145     | 148 | 153 |

※Please contact us for specific layouts and connection details.

※For safety concern, aluminum cover is the standard design for PE type protection.

For detail please contact us or local dealers.

※Please refer to the temperature correction coefficient of rated current on page 2-27 while ambient temperature exceeds 40°C.





# Product Specifications PH

## Aluminum

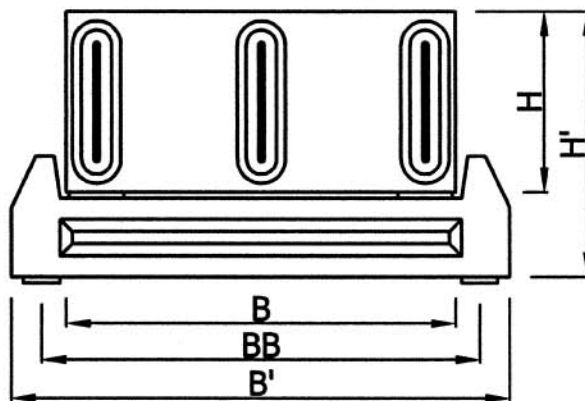
| Type                                |         |         |          |          |
|-------------------------------------|---------|---------|----------|----------|
| Model                               | PH10    | PH10    | PH10     | PH10     |
| Conductor Section(mm <sup>2</sup> ) | 600     | 800     | 1000     | 1200     |
| Conductor Dimensions (mm)           | w100xt6 | w100xt8 | w100xt10 | w100xt12 |

|                            |         |      |      |      |
|----------------------------|---------|------|------|------|
| Conductor Material         | AL:1070 |      |      |      |
| Rated Current A (35/40 °C) | 1607    | 1815 | 2030 | 2223 |
| Rated Voltage V            | 17.5kV  |      |      |      |
| Frequency Hz               | 50/60   |      |      |      |

| Electrical Characteristics  |           |       |       |       |
|-----------------------------|-----------|-------|-------|-------|
| R at 20 °C $\mu\Omega / m$  | 47.2      | 35.4  | 28.3  | 23.6  |
| R at 85 °C $\mu\Omega / m$  | 66.2      | 51.9  | 41.5  | 34.6  |
| X $\mu\Omega / m$<br>f:60Hz | 157.8     | 154.9 | 152.1 | 149.4 |
| I <sub>cw</sub> kA / 1Sec   | 65        | 85    | 100   | 100   |
| I <sub>peak</sub>           | 260       | 260   | 260   | 260   |
| P <sub>loss</sub> W / m     | 513       | 513   | 513   | 513   |
| IP/IK                       | IP67/IK10 |       |       |       |

※Technical specifications may change without any further notice.

Product Dimensions (mm)



|                       |         |    |    |    |
|-----------------------|---------|----|----|----|
| Width (B) / Height(H) | 322x150 |    |    |    |
| BB                    | 340     |    |    |    |
| B'xH'                 | 415x225 |    |    |    |
| Product Weight kg/m   | 67      | 69 | 71 | 74 |

※Please contact us for specific layouts and connection details.

※PH type is advised to add aluminum cover for outdoor use and rated voltage greater than 12kV.

For detail please contact us or local dealers.

※Please refer to the temperature correction coefficient of rated current on page 2-27 while ambient temperature exceeds 40°C.



## Aluminum

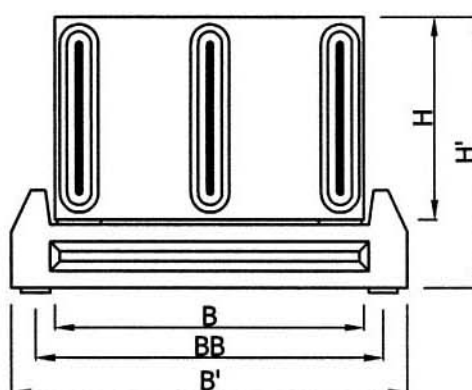
| Type                                |         |          |          |            |            |            |
|-------------------------------------|---------|----------|----------|------------|------------|------------|
| Model                               | PH16    | PH16     | PH16     | PH20       | PH20       | PH20       |
| Conductor Section(mm <sup>2</sup> ) | 1280    | 1600     | 1920     | 2000       | 2400       | 3000       |
| Conductor Dimensions (mm)           | w160xt8 | w160xt10 | w160xt12 | 2-w100xt10 | 2-w100xt12 | 2-w100xt15 |

| Conductor Material         | AL:1070 |      |      |      |      |      |
|----------------------------|---------|------|------|------|------|------|
| Rated Current A (35/40 °C) | 2502    | 2736 | 2897 | 3332 | 3580 | 4005 |
| Rated Voltage V            | 17.5kV  |      |      |      |      |      |
| Frequency Hz               | 50/60   |      |      |      |      |      |

| Electrical Characteristics  |           |       |       |      |      |      |
|-----------------------------|-----------|-------|-------|------|------|------|
| R at 20 °C $\mu\Omega / m$  | 22.1      | 17.7  | 14.7  | 14.2 | 11.8 | 9.4  |
| R at 85 °C $\mu\Omega / m$  | 35.4      | 29.6  | 26.4  | 23.1 | 19.9 | 15.9 |
| X $\mu\Omega / m$<br>f:60Hz | 123.8     | 122.9 | 121.7 | 85.7 | 84.9 | 83.8 |
| I <sub>cw</sub> kA / 1Sec   | 80        | 80    | 80    | 100  | 100  | 100  |
| I <sub>peak</sub>           | 208       | 208   | 208   | 260  | 260  | 260  |
| P <sub>loss</sub> W / m     | 665       | 665   | 665   | 765  | 765  | 765  |
| IP/IK                       | IP67/IK10 |       |       |      |      |      |

※Technical specifications may change without any further notice.

Product Dimensions (mm)



|                       |         |     |     |         |     |     |
|-----------------------|---------|-----|-----|---------|-----|-----|
| Width (B) / Height(H) | 322x210 |     |     | 322x260 |     |     |
| BB                    | 340     |     |     | 340     |     |     |
| B'xH'                 | 415x285 |     |     | 415x335 |     |     |
| Product Weight kg/m   | 105     | 110 | 116 | 143     | 152 | 164 |

※Please contact us for specific layouts and connection details.

※PH type is advised to add aluminum cover for outdoor use and rated voltage greater than 12kV.

For detail please contact us or local dealers.

※Please refer to the temperature correction coefficient of rated current on page 2-27 while ambient temperature exceeds 40°C.





# Product Specifications PE

## Aluminum

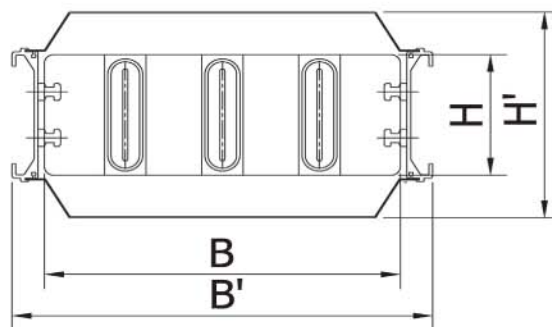
| Type                                |         |         |          |          |          |
|-------------------------------------|---------|---------|----------|----------|----------|
| Model                               | PE10    | PE10    | PE10     | PE16     | PE16     |
| Conductor Section(mm <sup>2</sup> ) | 600     | 800     | 1200     | 1600     | 2400     |
| Conductor Dimensions (mm)           | w100xt6 | w100xt8 | w100xt12 | w160xt10 | w160xt15 |

|                            |         |      |      |      |      |
|----------------------------|---------|------|------|------|------|
| Conductor Material         | AL:1070 |      |      |      |      |
| Rated Current A (35/40 °C) | 1438    | 1660 | 2004 | 2667 | 3210 |
| Rated Voltage V            | 24kV    |      |      |      |      |
| Frequency Hz               | 50/60   |      |      |      |      |

| Electrical Characteristics  |           |       |       |       |       |
|-----------------------------|-----------|-------|-------|-------|-------|
| R at 20 °C $\mu\Omega / m$  | 47.2      | 35.4  | 23.6  | 17.7  | 11.8  |
| R at 85 °C $\mu\Omega / m$  | 89.2      | 66.9  | 45.9  | 33.6  | 23.2  |
| X $\mu\Omega / m$<br>f:60Hz | 138.9     | 136.3 | 131.4 | 108.3 | 105.2 |
| I <sub>cw</sub> kA / 1Sec   | 65        | 80    | 100   | 100   | 100   |
| I <sub>peak</sub>           | 260       | 260   | 260   | 260   | 260   |
| P <sub>loss</sub> W / m     | 553       | 553   | 553   | 717   | 717   |
| IP/IK                       | IP67/IK10 |       |       |       |       |

※Technical specifications may change without any further notice.

Product Dimensions (mm)



|                       |         |    |    |         |     |
|-----------------------|---------|----|----|---------|-----|
| Width (B) / Height(H) | 550x150 |    |    | 550x210 |     |
| B'xH'                 | 650x360 |    |    | 650x360 |     |
| Product Weight kg/m   | 89      | 91 | 94 | 115     | 122 |

※Please contact us for specific layouts and connection details.

※For safety concern, aluminum cover is the standard design for PE type protection.

For detail please contact us or local dealers.

※Please refer to the temperature correction coefficient of rated current on page 2-27 while ambient temperature exceeds 40°C.



## Copper

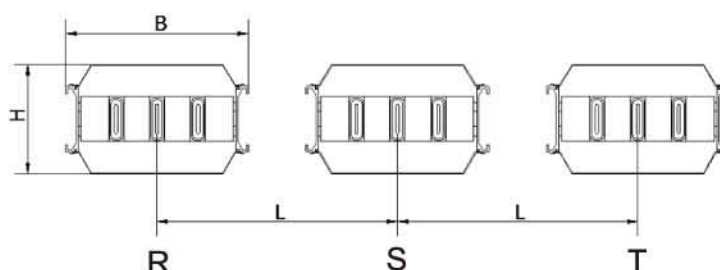
| Type                                |           |            |           |            |
|-------------------------------------|-----------|------------|-----------|------------|
| Model                               | HCB10     | HCB10      | HCB16     | HCB16      |
| Conductor Section(mm <sup>2</sup> ) | 2400      | 3000       | 3840      | 4800       |
| Conductor Dimensions (mm)           | 3-w100xt8 | 3-w100xt10 | 3-w160xt8 | 3-w160xt10 |

|                            |                                      |      |      |      |
|----------------------------|--------------------------------------|------|------|------|
| Conductor Material         | purity copper 99.9% , above 98% IACS |      |      |      |
| Rated Current A (35/40 °C) | 5409                                 | 6055 | 7587 | 8491 |
| Rated Voltage V            | 15.5kV                               |      |      |      |
| Frequency Hz               | 50/60                                |      |      |      |

| Electrical Characteristics   |           |      |      |      |
|------------------------------|-----------|------|------|------|
| R at 20 °C $\mu \Omega / m$  | 7.2       | 5.8  | 4.5  | 3.6  |
| R at 85 °C $\mu \Omega / m$  | 18.8      | 15.0 | 11.9 | 9.5  |
| X $\mu \Omega / m$<br>f:60Hz | 45.6      | 43.5 | 37.8 | 36.1 |
| I <sub>cw</sub> kA / 1Sec    | 100       | 100  | 120  | 100  |
| I <sub>peak</sub>            | 260       | 260  | 312  | 312  |
| P <sub>loss</sub> W / m      | 1650      | 1650 | 2055 | 2055 |
| IP/IK                        | IP67/IK10 |      |      |      |

※Technical specifications may change without any further notice.

### Product Dimensions (mm)



|                                |             |     |         |     |
|--------------------------------|-------------|-----|---------|-----|
| Width (B) / Height(H)          | 610x360     |     | 610x420 |     |
| Distance between each phase(L) | 800mm above |     |         |     |
| Product Weight kg/m            | 315         | 331 | 409     | 435 |

※Please contact us for specific layouts and connection details.

※For safety concern, aluminum cover is the standard design for HCB type protection.

For detail please contact us or local dealers.

※Please refer to the temperature correction coefficient of rated current on page 2-27 while ambient temperature exceeds 40°C.

# Product Specifications (HCB Series Isolated Phase Busway)





# Product Specifications (HCB Series Isolated Phase Busway)

## Copper

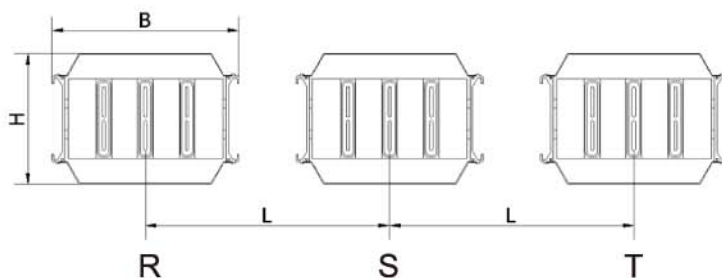
| Type                                |           |            |            |            |
|-------------------------------------|-----------|------------|------------|------------|
| Model                               | HCB20     | HCB20      | HCB24      | HCB24      |
| Conductor Section(mm <sup>2</sup> ) | 4800      | 6000       | 7200       | 8640       |
| Conductor Dimensions (mm)           | 6-w100xt8 | 6-w100xt10 | 6-w120xt10 | 6-w120xt12 |

| Conductor Material            | purity copper 99.9% , above 98% IACS |       |       |       |
|-------------------------------|--------------------------------------|-------|-------|-------|
| Rated Current A<br>(35/40 °C) | 9024                                 | 10315 | 12259 | 14116 |
| Rated Voltage V               | 15.5kV                               |       |       |       |
| Frequency Hz                  | 50/60                                |       |       |       |

| Electrical Characteristics  |           |      |      |      |
|-----------------------------|-----------|------|------|------|
| R at 20 °C $\mu\Omega / m$  | 3.6       | 2.9  | 2.4  | 2.0  |
| R at 85 °C $\mu\Omega / m$  | 9.8       | 7.5  | 6.1  | 4.6  |
| X $\mu\Omega / m$<br>f:60Hz | 30.4      | 29.1 | 23.4 | 22.8 |
| I <sub>cw</sub> kA / 1Sec   | 120       | 120  | 120  | 120  |
| I <sub>peak</sub>           | 312       | 312  | 312  | 312  |
| P <sub>loss</sub> W / m     | 2394      | 2394 | 2750 | 2750 |
| IP/IK                       | IP67/IK10 |      |      |      |

※Technical specifications may change without any further notice.

Product  
Dimensions (mm)



|                                |             |     |         |     |
|--------------------------------|-------------|-----|---------|-----|
| Width (B) / Height(H)          | 630x440     |     | 630x480 |     |
| Distance between each phase(L) | 900mm above |     |         |     |
| Product Weight kg/m            | 463         | 474 | 515     | 528 |

※Please contact us for specific layouts and connection details.

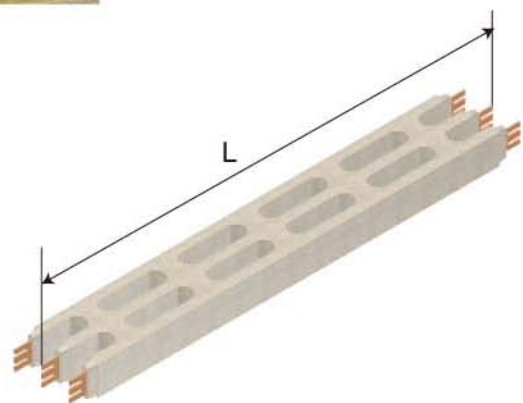
※For safety concern, aluminum cover is the standard design for HCB type protection.

For detail please contact us or local dealers.

※Please refer to the temperature correction coefficient of rated current on page 2-27 while ambient temperature exceeds 40°C.

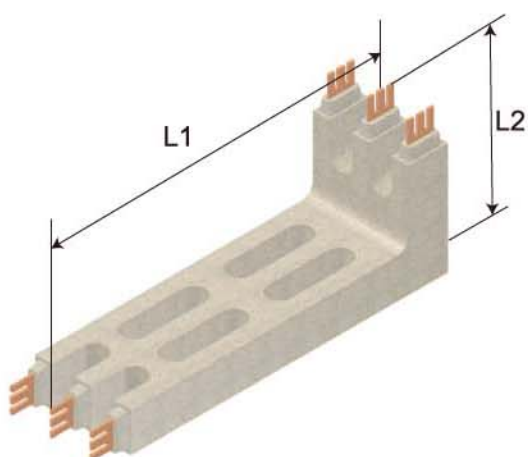


# Selection of Standard Parts



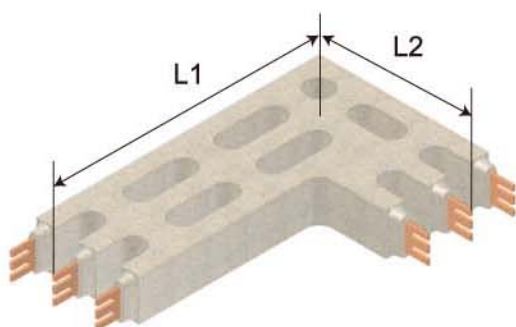
## Straight Element

| Model | Length                               |
|-------|--------------------------------------|
| RE    | L=1000mm 、 2000mm<br>3000mm 、 4000mm |



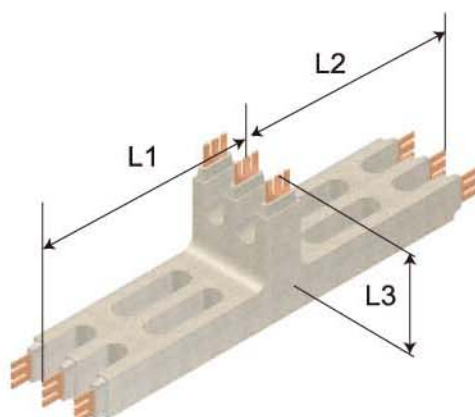
## Brazed Elbow Element

| Model | Length                              |
|-------|-------------------------------------|
| HL1   | $L1+L2=1000\text{mm}$               |
| HL2   | $L1+L2=2000\text{mm}$               |
| HL1   | $L1=550\text{mm}$ $L2=450\text{mm}$ |



## Bent Elbow Element

| Model | Length                              |
|-------|-------------------------------------|
| HB1   | $L1+L2=1000\text{mm}$               |
| HB2   | $L1+L2=2000\text{mm}$               |
| HB1   | $L1=550\text{mm}$ $L2=450\text{mm}$ |



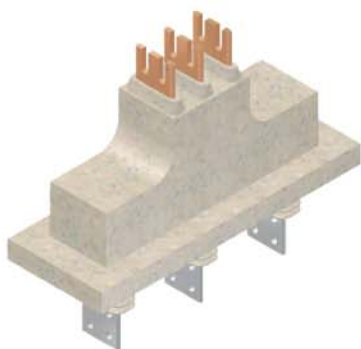
## Brazed T- Element

| Model | Length                  |
|-------|-------------------------|
| TL2   | $L1=L2=L3=500\text{mm}$ |





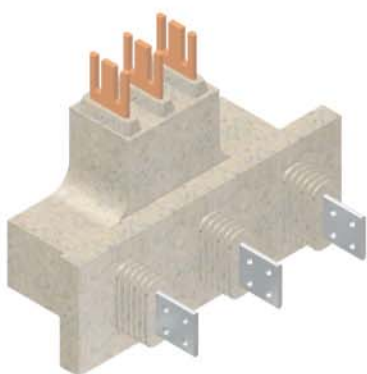
# Selection of Standard Parts



## SH series (7.2kV)

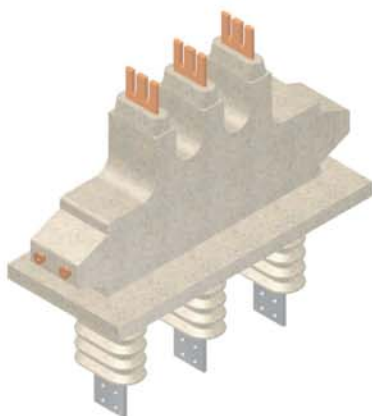
### AG Type Terminal Element

| Model | Length        |
|-------|---------------|
| AG1   | Refer to 2-22 |



### AO Type Terminal Element

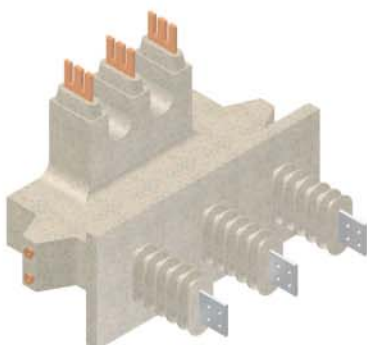
| Model | Length        |
|-------|---------------|
| AO1   | Refer to 2-23 |



## PH/PE series (17.5/24kV)

### AG Type Terminal Element

| Model | Length        |
|-------|---------------|
| AG1   | Refer to 2-22 |



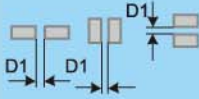
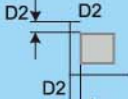
### AO Type Terminal Element

| Model | Length        |
|-------|---------------|
| AO1   | Refer to 2-23 |

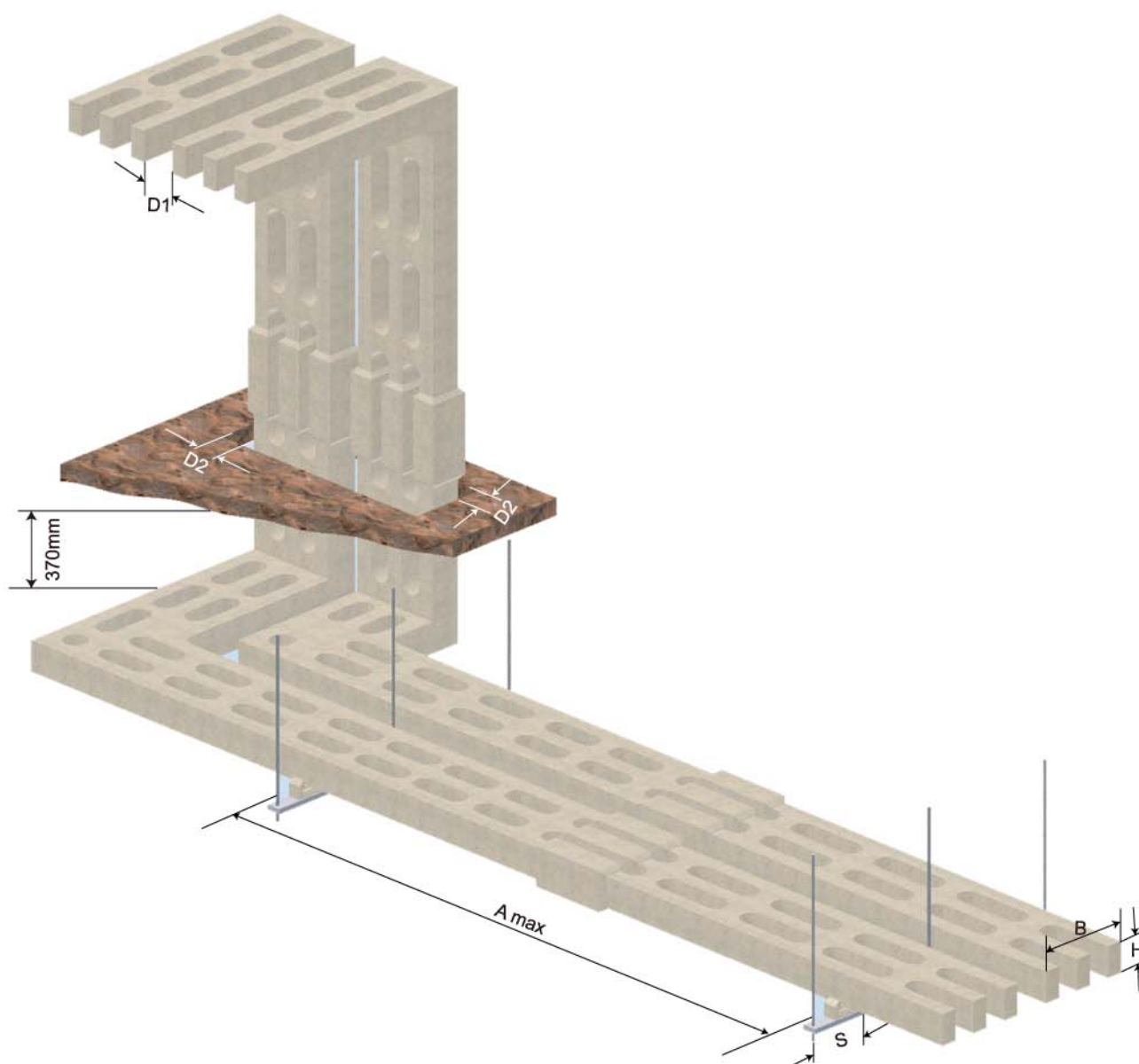


# Product Installation

單位:mm

| Type | External Size | Limit of Hanger Installation Pitch A |                       | Minimum pitch between busway                                                      |                                                                                     | S:<br>Distance between Hanger and Busway |
|------|---------------|--------------------------------------|-----------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------|
|      | B × H         | Horizontal Installation              | Vertical Installation | Layout of Busway arrangement                                                      | Distance between opening and busway                                                 |                                          |
| SH1  | 160 × 100     | 2000                                 | 3000                  |  |  | 55                                       |
| SH2  | 160 × 140     |                                      |                       |                                                                                   |                                                                                     |                                          |
| PH10 | 322 × 150     |                                      |                       | 150                                                                               | 100                                                                                 | 75                                       |
| PH16 | 322 × 210     |                                      |                       |                                                                                   |                                                                                     |                                          |
| PH20 | 322 × 260     |                                      |                       |                                                                                   |                                                                                     |                                          |
| PE10 | 550 × 150     |                                      |                       |                                                                                   |                                                                                     |                                          |
| PE16 | 550 × 210     |                                      |                       |                                                                                   |                                                                                     |                                          |

Note: Distance between hangers and busway are allowed to be adjusted on site while required.



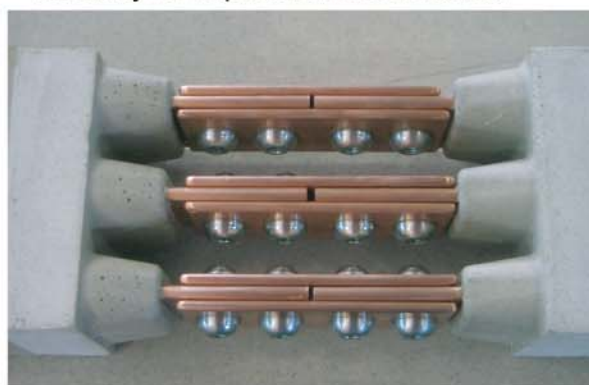




# Assembly Diagrams of Medium Voltage Busway Junction



- Distance between two elements are within 20mm (inclusive). The distance can be flexibly adjusted on site by the requirement of construction.



- The assembly bolt of Junction must be secured by torque wrench.

## Torque of bolt during work:

| Specs                     | M10 | M12 |
|---------------------------|-----|-----|
| Torque value (N-m) for Cu | 43  | 74  |
| Torque value (N-m) for Al | 30  | 60  |

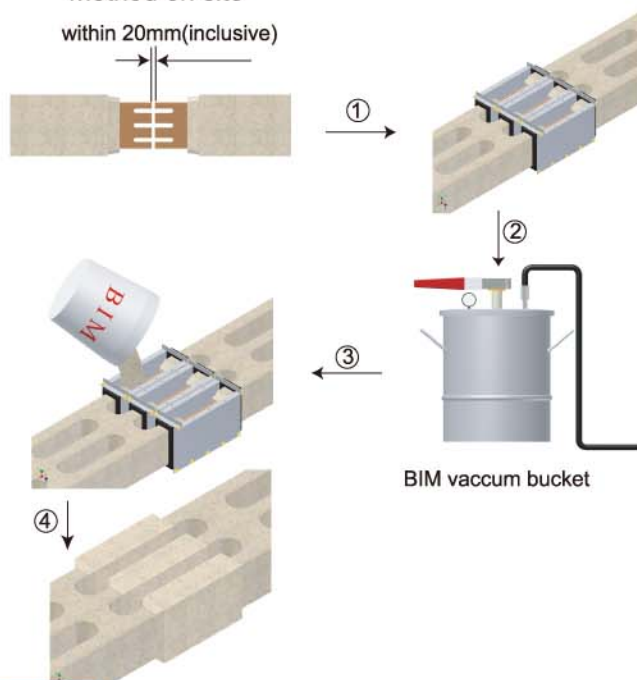


- Illustration of JUNCTION assembly.

## Method of cast-resin work on-site.

Refer to installation guide for casting method on site

within 20mm(inclusive)



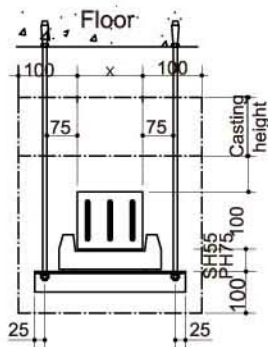
## Illustration of cast-resin after completion.



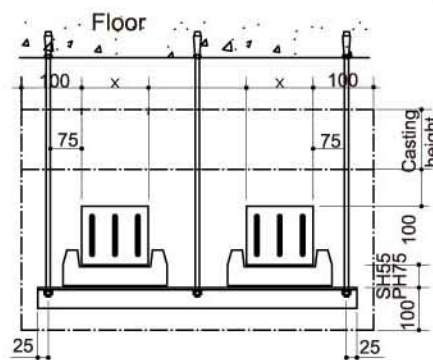


單位:mm

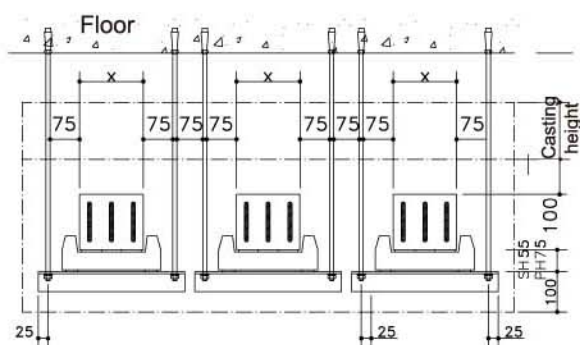
# Medium Voltage Busway Horizontal Hanger Standard



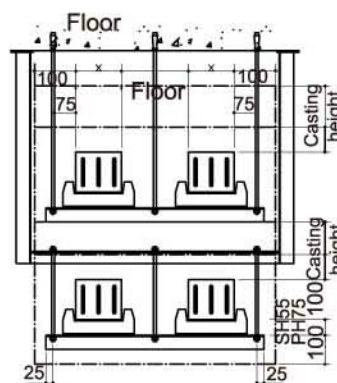
**Cross-sectional Diagram of Single-Busway**



**Cross-sectional Diagram of Dual-Busway**

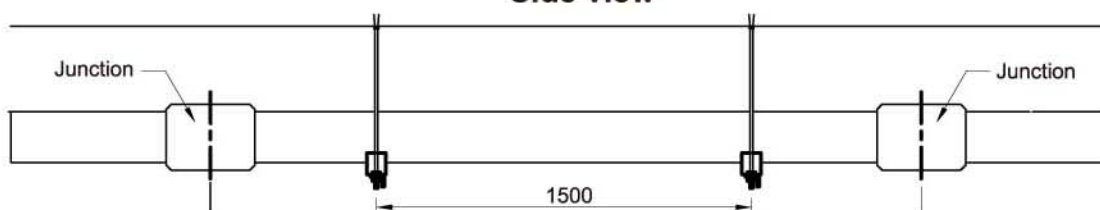


**Cross-sectional Diagram of Triple-Busway**

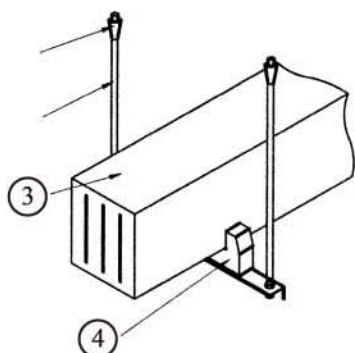


**Cross-sectional Diagram of Quadruple-Busway**

**Side view**



- 1.The installation pitch between each hanger has to comply with the standard as above. If the work condition can not meet the standard, it may be adjusted according to the condition on site. However, it must meet the requirement described in page 18 of the installation guide: minimum pitch requirement of the busway.
- 2.The space required for installing busway is shown in the diagram. The safety space above the busway should have 100mm + casting height of 270mm = 370 mm for clearance standard of installation space. In addition, the height of the floor should be within 5m above the ground to allow expansion of bolts, full-thread bolts, and channel, etc. to install at the bottom of the floor.
- 3.The installation distance of the hanger and corner iron should be in accordance with "x" dimension of busway and dimension listed in the diagram.
- 4.One set of L-shape stopping plate part.



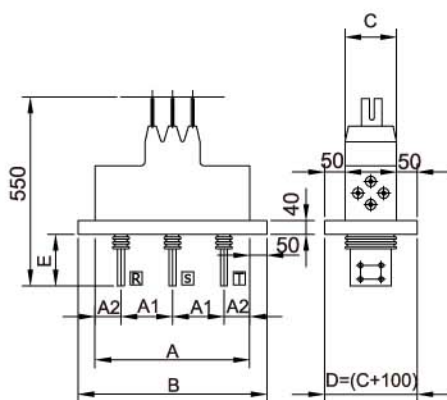
| No. | Name of Part                 | Specs                                | Remark            |
|-----|------------------------------|--------------------------------------|-------------------|
| ①   | Inner thread inflated screws | 1/2"*2"                              | Zinc-plated item. |
| ②   | Full thread bolts            | 1/2"                                 | Zinc-plated item. |
| ③   | BUSWAY                       |                                      | TECOBAR           |
| ④   | Insulation support           | BIM(Refer to Product Specifications) | TECOBAR           |



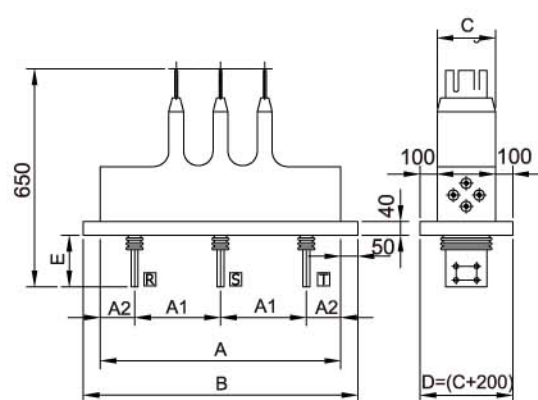


# Dimensions of Standard Terminal Elements for Medium Voltage Busway

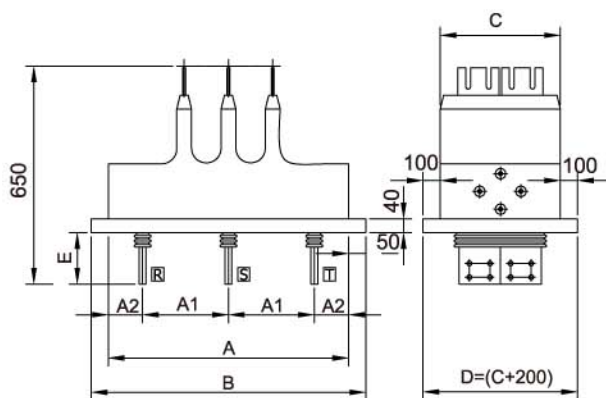
## AG Type Terminal Elements



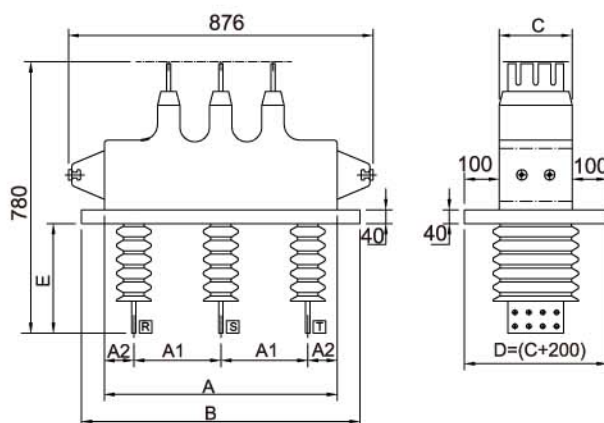
**Figure 1**



**Figure 2**



**Figure 3**



**Figure 4**

Unit:mm

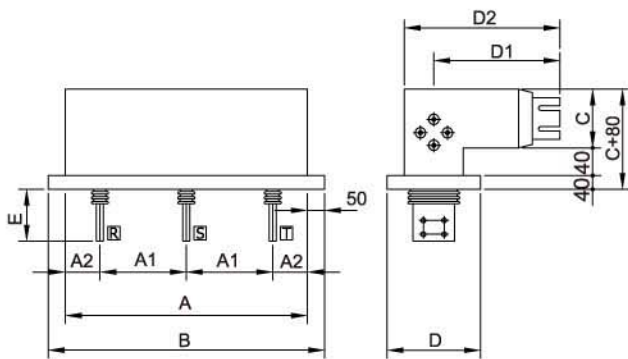
| Figure No. | Type | 3 $\Phi$ 3w |     |     |     |     |     |     |
|------------|------|-------------|-----|-----|-----|-----|-----|-----|
|            |      | A           | A1  | A2  | B   | C   | D   | E   |
| Figure 1   | SH1  | 450         | 150 | 75  | 550 | 100 | 200 | 150 |
|            | SH2  | 450         | 150 | 75  | 550 | 140 | 240 | 150 |
| Figure 2   | PH10 | 700         | 250 | 100 | 800 | 150 | 350 | 220 |
|            | PH16 | 700         | 250 | 100 | 800 | 210 | 410 | 220 |
| Figure 3   | PH20 | 700         | 250 | 100 | 800 | 260 | 460 | 220 |
| Figure 4   | PE10 | 670         | 250 | 85  | 800 | 150 | 350 | 312 |
|            | PE16 | 670         | 250 | 85  | 800 | 210 | 410 | 312 |

Note 1 : The design is in accordance with IEC-815 standard, pollution class is classified as class II.

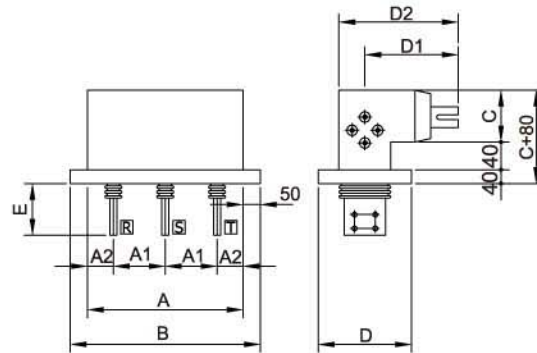
Note 2 : The design needs to be revised if require pollution class is greater than II.



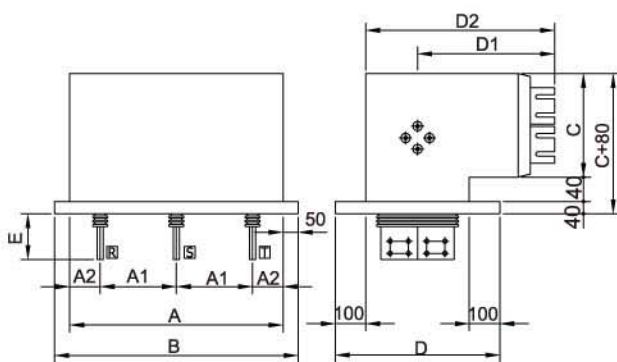
## AO Type Terminal Elements



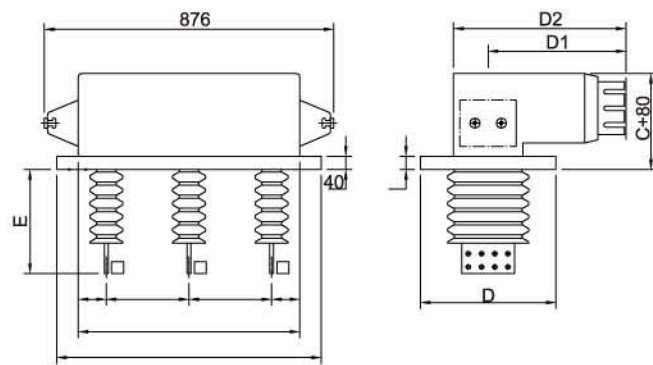
**Figure 1**



**Figure 2**



**Figure 3**



**Figure 4**

Unit:mm

| Figure No. | Type | 3 Φ 3w |     |     |     |     |     |     |     |     |
|------------|------|--------|-----|-----|-----|-----|-----|-----|-----|-----|
|            |      | A      | A1  | A2  | B   | C   | D   | D1  | D2  | E   |
| Figure 1   | SH1  | 450    | 150 | 75  | 550 | 100 | 200 | 450 | 500 | 150 |
|            | SH2  | 450    | 150 | 75  | 550 | 140 | 240 | 420 | 500 | 150 |
| Figure 2   | PH10 | 700    | 250 | 100 | 800 | 150 | 350 | 355 | 450 | 220 |
|            | PH16 | 700    | 250 | 100 | 800 | 210 | 410 | 385 | 510 | 220 |
| Figure 3   | PH20 | 700    | 250 | 100 | 800 | 260 | 460 | 410 | 560 | 220 |
| Figure 4   | PE10 | 670    | 250 | 85  | 800 | 150 | 350 | 355 | 450 | 312 |
|            | PE16 | 670    | 250 | 85  | 800 | 210 | 410 | 385 | 510 | 312 |

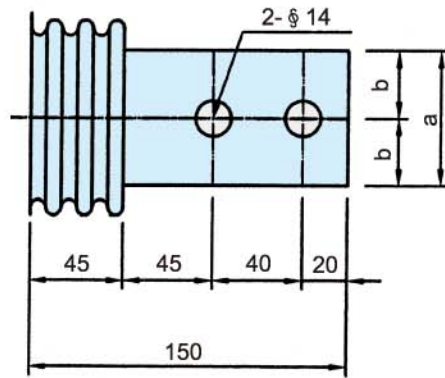
Note 1: The design is in accordance with IEC-815 standard, pollution class is classified as class II .

Note 2 : The design needs to be revised if require pollution class is greater than II .

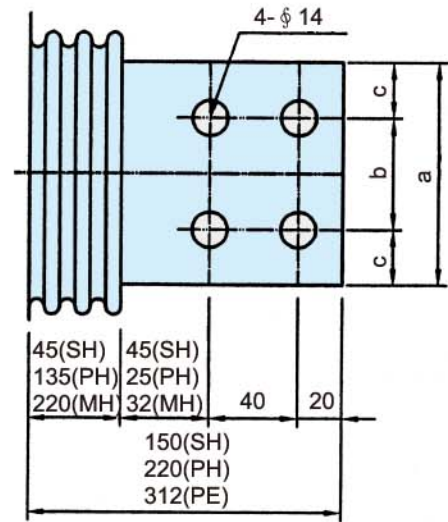




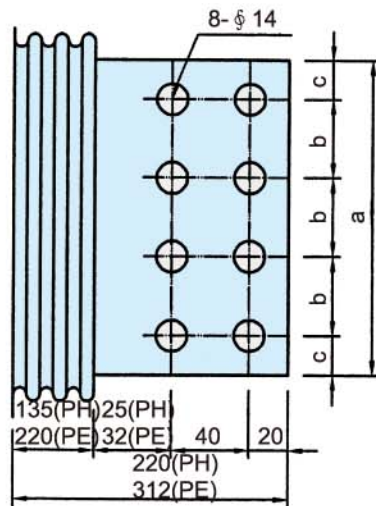
# Dimensions of Standard Terminal Elements Copper Plate for Medium Voltage Busway



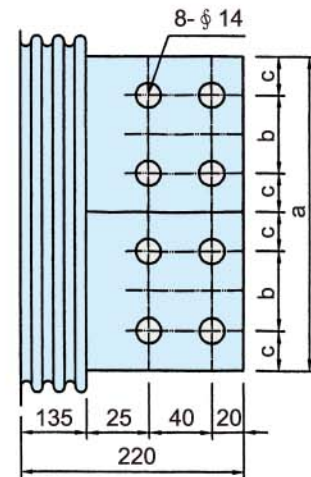
**Figure 1**



**Figure 2**



**Figure 3**

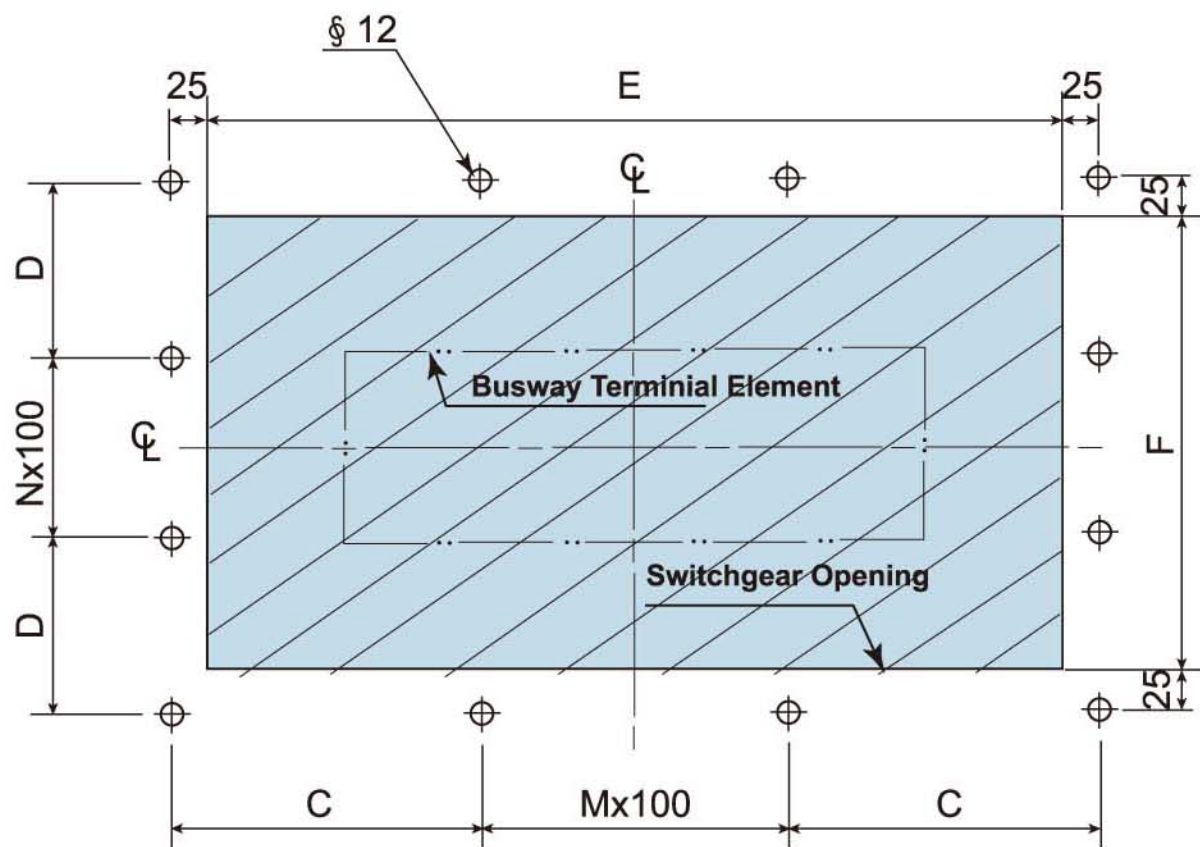


**Figure 4**

| Figure   | Type         | Type of Terminal Elements | Dimensions(unit:mm) |    |    |
|----------|--------------|---------------------------|---------------------|----|----|
|          |              |                           | a                   | b  | c  |
| Figure 1 | SH1          | AG/AO                     | 60                  | 30 | -  |
| Figure 2 | SH2          | AG/AO                     | 100                 | 40 | 30 |
|          | PH10<br>PE10 | AG/AO                     | 100                 | 40 | 30 |
| Figure 3 | PH16<br>PE16 | AG/AO                     | 160                 | 40 | 20 |
| Figure 4 | PH20         | AG/AO                     | 200                 | 40 | 30 |



# Opening Requirement of Standard Terminal Elements and Switchgear for Medium Voltage Busway



**Busway Terminal Elements Opening Dimensions**

Unit: mm

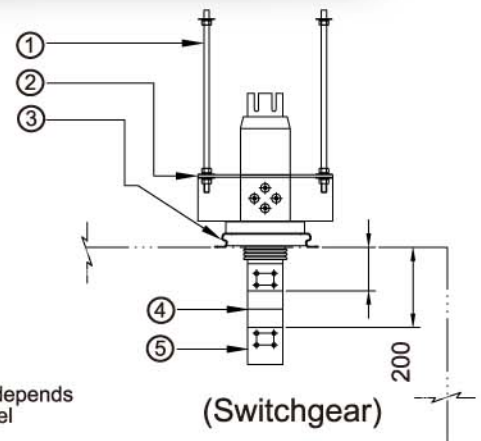
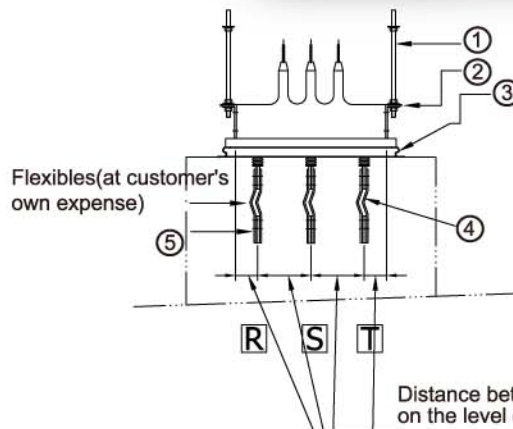
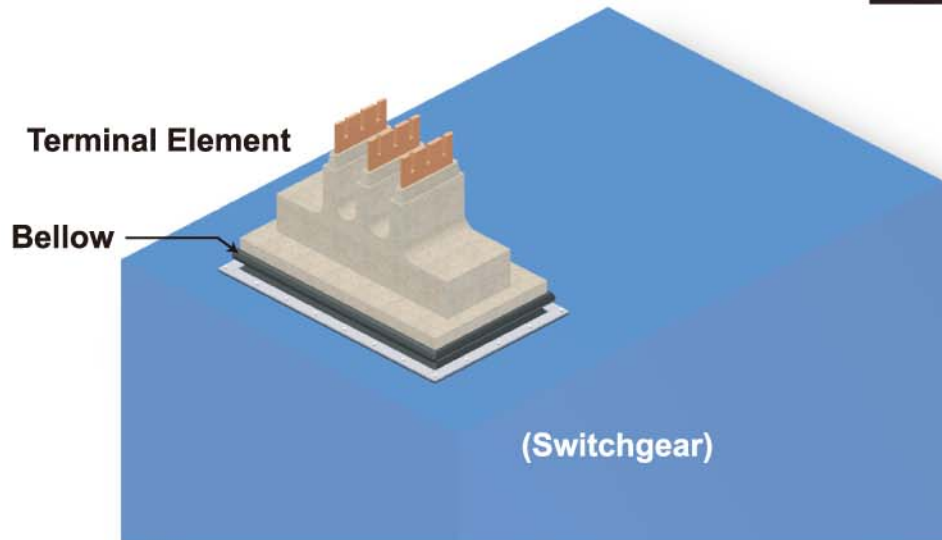
| Type      | AG Type Terminal Elements |     |     |     |   |   | AO Type Terminal Elements |     |     |     |   |   | Remark         |
|-----------|---------------------------|-----|-----|-----|---|---|---------------------------|-----|-----|-----|---|---|----------------|
|           | C                         | D   | E   | F   | M | N | C                         | D   | E   | F   | M | N |                |
| SH1       | 100                       | 75  | 450 | 100 | 3 | - | 100                       | 75  | 450 | 100 | 3 | - | with flange    |
|           | -                         | -   | 510 | 160 | - | - | -                         | -   | 510 | 160 | - | - | without flange |
| SH2       | 100                       | 95  | 450 | 140 | 3 | - | 100                       | 95  | 450 | 140 | 3 | - | with flange    |
|           | -                         | -   | 510 | 200 | - | - | -                         | -   | 510 | 200 | - | - | without flange |
| PH10/PE10 | 125                       | 100 | 700 | 150 | 5 | 1 | 125                       | 100 | 700 | 150 | 5 | 1 | with flange    |
| PH16/PE16 | 125                       | 130 | 700 | 210 | 5 | 1 | 125                       | 130 | 700 | 210 | 5 | 1 | with flange    |
| PH20      | 125                       | 105 | 700 | 260 | 5 | 2 | 125                       | 105 | 700 | 260 | 5 | 2 | with flange    |

Note 1: M + N=No. of Intervals among drillings.





# Medium Voltage Busway Terminal Element and Switchgear Standard Guideline



| No. | Name                                  | Specs                                                                                        | Remark                                                                                       |
|-----|---------------------------------------|----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| 1   | Full threaded screw                   | 1/2"                                                                                         | Zinc-plated product<br>(Included in installation work)                                       |
| 2   | Angle Steel                           | 6t×50×50mm                                                                                   | Zinc-plated product<br>(Included in installation work)                                       |
| 3   | Terminal element seal                 | t=5mm                                                                                        | M10 screws(Outdoor type)                                                                     |
| 4   | Flexibles                             | The 200mm reserved space between terminal element and switchgear are connected by flexibles. | Materials of this portion and connection work does not belong to the busway contractor.      |
| 5   | Connection copper plate of switchgear | Depends on Switchgear design.                                                                | The drillings on copper plate are designed, processed and connected by switchger contractor. |

Note: This diagram is the standard connection interface.  
Actual location of connection is determined case by case.

### 1. Temperature correction coefficient for rated current

|                                      |      |      |      |      |      |      |      |      |      |
|--------------------------------------|------|------|------|------|------|------|------|------|------|
| Maximum ambient temperature °C       | 20   | 25   | 30   | 35   | 40   | 45   | 50   | 55   | 60   |
| Daily average ambient temperature °C | 15   | 20   | 25   | 30   | 35   | 40   | 45   | 50   | 55   |
| Correction coefficient               | 1.18 | 1.14 | 1.09 | 1.05 | 1.00 | 0.94 | 0.88 | 0.82 | 0.75 |

### 2. Voltage drop calculation

$$\Delta U = \sqrt{3} \times I_s \times L \times (R \cos \theta + X \sin \theta) \times 10^{-6}$$

$\Delta U$  = Voltage drop (Volts)

$I_s$  = Load current (Amps)

$L$  = Line length (m)

$R$  = Resistance ( $\mu \Omega/m$ )

$X$  = Reactance ( $\mu \Omega/m$ )

$\cos \theta$  = Power factor

$\sin \theta = \sqrt{1 - \cos^2 \theta}$

### 3. Product model identification

|    |    |   |   |   |   |      |
|----|----|---|---|---|---|------|
| PH | 10 | E | C | 3 | - | 1000 |
|----|----|---|---|---|---|------|

|    |                                       |                                               |                                              |
|----|---------------------------------------|-----------------------------------------------|----------------------------------------------|
| PH | Product series code                   | SH: 7.2kV<br>PE: 24kV                         | PH: 17.5kV<br>HCB: isolated phase bar 15.5kV |
| 10 | Copper bar width                      | 08 w=80mm, 10 w=100mm, 16 w=160mm, 20 w=200mm |                                              |
| E  | Single/Double conductor of each phase | E Single line                                 | D Double line                                |
| C  | Conductor type                        | C Copper conductor                            | A Aluminium conductor                        |
| 3  | No. of conductors                     |                                               |                                              |

1000 Cross sectional area of conductor(mm<sup>2</sup>) 1000mm<sup>2</sup>

**4. For calculation of general product data or technical information, please contact with manufacturer or local agency.**





### A. Medium voltage busway dielectric tests: Insulation resistance test and power frequency voltage withstand test

| Electrical tests |                       | Insulation resistance test | Power frequency voltage withstand |
|------------------|-----------------------|----------------------------|-----------------------------------|
| Standards        |                       | IEC 60060                  | IEC 60270                         |
| Type             | Ur                    | Ud<br>at 60 Hz             | q<br>at 1.1 Ur                    |
|                  | kV                    | kV /1min                   | pC                                |
| SH series        | 7.2                   | 20                         | $\leq 20$                         |
| PH series        | 17.5                  | 38                         | $\leq 20$                         |
| PE series        | 24                    | 50                         | $\leq 20$                         |
| HCB series       | 15.5<br>(IEEE C37.23) | 50<br>(IEEE C37.23)        | $\leq 20$                         |

Ur : Rated voltage    Ud : Power frequency voltage  
q : Volume of partial discharge(pico-Coulomb)

### B. Appearance inspection

The appearance of each element must be inspected. Result to be mentioned in final inspection report.

### C. Dimension inspection

All dimensions are to be compared with customer's order sheet. Result to be mentioned in final inspection report.

### D. Outgoing test report

Medium voltage parts shall be tested prior to shipment and attached with outgoing test report.



# Anti-Corrosion Test

1. The results of the test carried out at 20°C and completely submerged for at least one year is shown in the table below.
2. For special environment use, please contact us.

| Chemical Agents                         |                                                                  | Result |   |   |
|-----------------------------------------|------------------------------------------------------------------|--------|---|---|
|                                         |                                                                  | E      | G | F |
| Boric acid                              | H <sub>3</sub> BO <sub>3</sub>                                   | O      |   |   |
| Hydrochloric acid 10%                   | HCl                                                              |        |   | O |
| Citric acid 10%                         | C <sub>3</sub> H <sub>4</sub> OH(CO <sub>2</sub> H) <sub>3</sub> |        |   | O |
| Lactic acid 10%                         | CH <sub>3</sub> -CHOH-CO <sub>2</sub> H                          |        |   | O |
| Alcohol (ethyl-)                        | C <sub>2</sub> H <sub>5</sub> OH                                 |        | O |   |
| Beer                                    |                                                                  | O      |   |   |
| Ketone (acetone)                        | H <sub>3</sub> CCOCH <sub>3</sub>                                |        |   | O |
| Calcium chloride 50%                    | CaCl <sub>2</sub>                                                | O      |   |   |
| Combustible solvent (gasoline, oil)     |                                                                  | O      |   |   |
| Water (distilled)                       | H <sub>2</sub> O                                                 | O      |   |   |
| Water (mineral)                         |                                                                  | O      |   |   |
| Esters                                  |                                                                  |        | O |   |
| Ether                                   | C <sub>2</sub> H <sub>5</sub> OC <sub>2</sub> H <sub>5</sub>     |        |   | O |
| Formalin 37%                            | HCOH                                                             |        | O |   |
| Glycerin                                |                                                                  |        | O |   |
| Lubricating grease and oil              |                                                                  | O      |   |   |
| Greases and oil                         |                                                                  | O      |   |   |
| Vegetable oil                           |                                                                  | O      |   |   |
| Aliphatic hydrocarbide (petroleumether) | C <sub>5</sub> H <sub>12</sub>                                   | O      |   |   |
| Aromatic hydrocarbide (toluene)         |                                                                  |        |   | O |
| Chloride carbon                         | CCl <sub>4</sub>                                                 |        |   | O |
| Ammonium Hydroxide 10%                  | NH <sub>4</sub> OH                                               |        | O |   |
| Ammonium Hydroxide 30%                  | NH <sub>4</sub> OH                                               |        |   | O |
| Milk(fresh or sour)                     |                                                                  |        |   | O |
| Soda-lime 10%                           | NaOH                                                             |        | O |   |
| Soda-lime 50%                           | NaOH                                                             |        | O |   |
| Blood                                   |                                                                  | O      |   |   |
| Soap and detergents                     |                                                                  | O      |   |   |
| Sugar (saturated solution)              |                                                                  | O      |   |   |
| Urine                                   |                                                                  | O      |   |   |

E= Excellent, suitable even for uninterrupted and prolonged exposure.

G= Good, suitable for prolonged exposure.

F= Fair, suitable for repeated but brief exposure.





# Projects Reference List

| No. | Project                                                          | Industry Type       | No. | Project                                                                                                                                                                                                                                                                              | Industry Type             |
|-----|------------------------------------------------------------------|---------------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| 1.  | Winbond Electronics Corp. MV                                     | Wafer Foundry       | 22. | Mega MV Project                                                                                                                                                                                                                                                                      | Power Plant               |
| 2.  | Vertex Precision Electronics, Inc., Chungli Factory              | Electronic industry | 23. | Wenzhou Power Plant Phase 2 - #02A High Voltage Substation Insulated Busway System Retrofitting Project                                                                                                                                                                              | Power Plant               |
| 3.  | Corning Incorporated                                             | Electronic industry | 24. | Wenzhou Power Plant Phase 2 V Unit 4 6kV Non-segregated Busway Retrofitting System                                                                                                                                                                                                   | Power Plant               |
| 4.  | Corning Incorporated V Central Taiwan Science Park, Phase 1      | Electronic industry | 25. | Zhanjiang Orimulsion Oil Power Plant 2*600MV Project of Replacement of Oil with Coal, 6kV Coal Conveying Section Insulated Busway System                                                                                                                                             | Power Plant               |
| 5.  | Corning Incorporated V Central Taiwan Science Park, Phase 2      | Electronic industry | 26. | Project of Replacement of Orimulsion with Coal - Switch Cabinet for the Technical Revolution Plan                                                                                                                                                                                    | Power Plant               |
| 6.  | Corning Incorporated V Central Taiwan Science Park, Phase 3      | Electronic industry | 27. | Guangzhou Xintang Bleaching & Dyeing Industrial Environment Protection - General Control and Management of Encouragement of Large Projects and Discouragement of Small Energy-inefficient Power Plants for Cogeneration of Heat and Power (Lixin) Wenzhou Power Plant Phase 2 - High | Power Plant               |
| 7.  | Taisil Electronic Materials Corp. V Bus Bar Construction Project | Electronic industry | 28. | Voltage Substation Insulated Busway Retrofitting System                                                                                                                                                                                                                              | Power Plant               |
| 8.  | Taisil Electronic Materials Corp. V Transformers                 | Electronic industry | 29. | Taishan Nuclear Power Plant Phase 1 - LOT11K 12kV Cast Resin Busway System                                                                                                                                                                                                           | Power Plant               |
| 9.  | United Microelectronics Corporation - A12 Additional Work        | Electronic industry | 30. | Wenzhou Power Plant Phase 3 - #03B High Voltage Substation 6kV Non-segregated Insulated Busway Retrofitting System                                                                                                                                                                   | Power Plant               |
| 10. | HannStar Display Corp.                                           | TFT-LCD Factory     | 31. | Hubei Xingrui Chemical Co., Ltd. - Energy Management Platform Project 10kV Cast Resin Insulated Busway System (Xingrui Cogeneration Plant)                                                                                                                                           | Power Plant               |
| 11. | Da-She Cogeneration Plant                                        | Power Plant         | 32. | Mingtian Hydroelectric Power Plant                                                                                                                                                                                                                                                   | Hydroelectric Power Plant |
| 12. | Sixth Naphtha Cracking Plant - Cogeneration Plant                | Power Plant         | 33. | Bihai Power Plant                                                                                                                                                                                                                                                                    | Hydroelectric Power Plant |
| 13. | China Petroleum & Chemical Corp., Tou-Fen Cogeneration Plant     | Power Plant         | 34. | Li-Yu Lake Hydroelectric Power Plant                                                                                                                                                                                                                                                 | Hydroelectric Power Plant |
| 14. | Hsin Yu Energy Development Co., Ltd. Cogeneration Plant          | Power Plant         | 35. | Gengda Hydroelectric Power Plant - 15kV 3-Phase Compact Betobar-R Busway System                                                                                                                                                                                                      | Hydroelectric Power Plant |
| 15. | Bihai Power Plant                                                | Power Plant         | 36. | Ying Xiu Wan Hydroelectric Power Plant, Ying Xiu Wan Substation V Post-disaster (8.13) Restoration & Recovery Project                                                                                                                                                                | Hydroelectric Power Plant |
| 16. | Datan Power Plant                                                | Power Plant         | 37. | Yang Jiang Nuclear Power Plant - 220kV Auxiliary Transformer 6.6kV Low Pressure Side Cast Resin Busway                                                                                                                                                                               | Nuclear Power Plant       |
| 17. | Suzhou Power Plant                                               | Power Plant         |     |                                                                                                                                                                                                                                                                                      |                           |
| 18. | Taizhou Power Plant                                              | Power Plant         |     |                                                                                                                                                                                                                                                                                      |                           |
| 19. | Taizhou Power Plant - Additional Work                            | Power Plant         |     |                                                                                                                                                                                                                                                                                      |                           |
| 20. | Dajia River Power Plant V Ku-Kuan Substation Recovery Work       | Power Plant         |     |                                                                                                                                                                                                                                                                                      |                           |
| 21. | Suzhou Power Plant                                               | Power Plant         |     |                                                                                                                                                                                                                                                                                      |                           |





# Projects Reference List

| No. | Project                                                                                        | Industry Type       | No. | Project                                                               | Industry Type          |
|-----|------------------------------------------------------------------------------------------------|---------------------|-----|-----------------------------------------------------------------------|------------------------|
| 38. | Kuosheng Nuclear Power Plant V Startup/ Standby Disconnecting Switch and Busway                | Nuclear Power Plant | 63. | Hsinchu Incinerator                                                   | Incinerator            |
| 39. | Yang Jiang Nuclear Power Plant Phase 1 - LOT73C Intermediate Pressure Cast Resin Busway System | Nuclear Power Plant | 64. | Kaohsiung Jen-Wu Incinerator                                          | Incinerator            |
| 40. | Biochemistry Laboratory of Academia Sinica                                                     | Office Building     | 65. | Nan-Hsien Corp. - EG1 Sixth Naphtha Cracking Project                  | Petrochemical industry |
| 41. | Taiwan Prosperity Chemical Corporation                                                         | Office Building     | 66. | Formosa Chemicals & Fibre Corp. - PTA2 Sixth Naphtha Cracking Project | Petrochemical industry |
| 42. | Taiwan Prosperity Chemical Corporation                                                         | Office Building     | 67. | Nan-Hsien Corp. V EG2 Sixth Naphtha Cracking Project                  | Petrochemical industry |
| 43. | LCY Chemical Corp                                                                              | Office Building     | 68. | Nan-Hsien Corp. V ASP Sixth Naphtha Cracking Project                  | Petrochemical industry |
| 44. | Kang-Hsi Water Treatment Plant                                                                 | Waterworks          | 69. | China Petrochemical Development Corp. Kaohsiung Hsiao-Kang Plant      | Petrochemical industry |
| 45. | Nan-Hua V Pei-Ling Pump                                                                        | Waterworks          | 70. | Polyester Fiber Division of Nan Ya Plastics Corp. V Lin-Kou Plant     | Petrochemical industry |
| 46. | Ping-Ting Water Pumping Station                                                                | Waterworks          | 71. | Oriental Petrochemical (Shanghai) Corp.                               | Petrochemical industry |
| 47. | Kao-Tan Water Treatment Plant                                                                  | Waterworks          | 72. | Formosa Chemicals & Fibre Corp. V Ningbo Plant                        | Petrochemical industry |
| 48. | Ping-Ting Water Pumping Station Phase 2                                                        | Waterworks          | 73. | UPC Group                                                             | Petrochemical industry |
| 49. | Chao-Ming Pump Station                                                                         | Waterworks          | 74. | Yen-Chang Petrochemical Corp.                                         | Petrochemical industry |
| 50. | Min-Sheng Pump Station                                                                         | Waterworks          | 75. | CNPC Fushun Petrochemical Plant - 6.3kV Busway System                 | Petrochemical industry |
| 51. | Pan-Nan Pump Station                                                                           | Waterworks          | 76. | Shanghai Coking & Chemical Corporation - Additional Project           | Petrochemical industry |
| 52. | Jenn An Steel Co., Ltd.                                                                        | Iron & Steel        | 77. | Fushun Petrochemical Plant V Large Ethylene Project                   | Petrochemical industry |
| 53. | Feng Hsin Iron & Steel Co., Ltd.                                                               | Iron & Steel        | 78. | Mai-Liao MA New Electrical Planning Project                           | Petrochemical industry |
| 54. | National Cheng Chi University                                                                  | School              | 79. | China Petrochemical Development Corp. (CPDC Tou-Fen Plant)            | Petrochemical industry |
| 55. | National Defense University, Shuai-Chen Sub-Project (MV)                                       | School              | 80. | San Fu Gas Co., Ltd. - Taichung Harbor Construction Project           | Petrochemical industry |
| 56. | Kaohsiung Southern District Incinerator                                                        | Incinerator         |     |                                                                       |                        |
| 57. | Kaohsiung Jen-Wu Incinerator                                                                   | Incinerator         |     |                                                                       |                        |
| 58. | Pa-Li Incinerator                                                                              | Incinerator         |     |                                                                       |                        |
| 59. | Taichung Hou-Li Incinerator                                                                    | Incinerator         |     |                                                                       |                        |
| 60. | Changhua Hsi-Chou Incinerator                                                                  | Incinerator         |     |                                                                       |                        |
| 61. | Taoyuan Southern District Incinerator                                                          | Incinerator         |     |                                                                       |                        |
| 62. | Wu-Jih Township Incinerator                                                                    | Incinerator         |     |                                                                       |                        |





# Projects Reference List

| No. | Project                                                                                                            | Industry Type             | No. | Project | Industry Type |
|-----|--------------------------------------------------------------------------------------------------------------------|---------------------------|-----|---------|---------------|
| 81. | San Fu Gas Co., Ltd.<br>V Shan-Hua Plant                                                                           | Petrochemical<br>industry |     |         |               |
| 82. | National Museum of Marine Biology<br>and Aquarium                                                                  | Museum                    |     |         |               |
| 83. | Yu-Yuan Co., Ltd., Chang-Pin Factory                                                                               | Factory                   |     |         |               |
| 84. | Cheng Loong Corp., Hou-Li Factory                                                                                  | Factory                   |     |         |               |
| 85. | Formosa Energy & Material Technology<br>Co. Ltd. - Lithium Iron Phosphate<br>Battery Project, Phase 2              | Factory                   |     |         |               |
| 86. | Taiwan Fertilizer Co., Ltd., Taichung<br>Harbor Factory New Construction<br>Project                                | Factory Building          |     |         |               |
| 87. | Taiwan Prosperity Chemical Corp.<br>V Lin-Yuan Factory                                                             | Factory Building          |     |         |               |
| 88. | New Pan-Chiao Station<br>(Co-construction<br>Project of MRT, Taiwan Railway<br>System, and High Speed Rail System) | TRA Station               |     |         |               |
| 89. | Songshan Station                                                                                                   | Songshan Station          |     |         |               |
| 90. | Nangang Station                                                                                                    | Nan Kang Station          |     |         |               |
| 91. | Nangang Public Housing                                                                                             | Residential<br>Building   |     |         |               |
| 92. | Northern Taiwan Liquefied Natural<br>Gas Receiving Terminal V Harbor<br>Plant Project                              | LNG Terminal              |     |         |               |
| 93. | Lan-Hai Gas Corp. - Taichung LNG<br>Air Separation Plant                                                           | LNG Terminal              |     |         |               |
| 94. | CPC Corporation, Taiwan V Taoyuan<br>Oil Refinery                                                                  | Oil Refinery              |     |         |               |
| 95. | Indonesia Surabaya Paper Mill                                                                                      | Paper Mill                |     |         |               |
|     |                                                                                                                    |                           |     |         |               |
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|     |                                                                                                                    |                           |     |         |               |
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