TIS 166-2549 (2006)
Thai Industrial Standard
for
PLUGS AND SOCKET-OUTLETS FOR HOUSEHOLD AND SIMILAR PURPOSES: PLUGS AND SOCKET-OUTLETS WITH RATED VOLTAGE NOT EXCEEDING 250 V

1. Scope

1.1 This standard applies to plugs and fixed socket-outlets or portable socket-outlets for a.c. only, with a rated voltage being not more than 250 V and a rated current not more than 16 A, intended for household and similar purposes, either indoors or outdoors, at ambient temperatures not normally exceeding 40° C.

1.2 This standard also applies to plugs incorporated in cord sets, to plugs and portable socket-outlets incorporated in cord extension sets and to plugs and socket-outlets which are components of an appliance, unless otherwise stated in the standard for the relevant appliance.

This standard does not apply to

- plugs, socket-outlets and couples for industrial purposes;
- appliance couplers;
- plugs, fixed and portable socket-outlets for(extra-low voltage; ELV)
- fixed socket-outlets combined with fuses, automatic switches; etc.
- requirements for flush mounting boxes: however, it covers only those requirements for surface-type mounting boxes which are necessary for the tests on the socket-outlet.

http://www.yunhuanelectric.com/ Power Cord Manufacturer
NOTE

1. Extra-low voltage values are specified in IEC 60364-4-41.

2. Pilot lights incorporated in the socket-outlets are allowed provided that the pilot lights comply with the relevant standard.

3. Socket-outlets complying with the standard are only suitable for incorporation in equipment in such a place that it is unlikely that the surrounding temperature exceeding 40 Celsius degree

In locations where special conditions prevail, such as in ships, vehicles and the like and in hazardous locations, for example where explosions are liable to occur, special constructions may be required.

2. References

This clause of TIS 2162 clause 2. is applicable

3. Definitions

This clause of TIS 2162 clause 3. is applicable

4. General requirements

This clause of TIS 2162 clause 4. is applicable

5. General notes on tests

This clause of TIS 2162 clause 5. is applicable

6. Ratings

This clause of TIS 2162 clause 6. is applicable, except as follows:

6.1 This clause of TIS 2162 is replace by :

Accessories shall be of a type, voltage and current rating as shown in table 1
Table 1  Type and rating of accessories (clause 6.1)

<table>
<thead>
<tr>
<th>TYPE</th>
<th>Rated Voltage V</th>
<th>Rated Current A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socket-outlet</td>
<td>250</td>
<td>16</td>
</tr>
<tr>
<td>Rewirable plugs</td>
<td>2P +</td>
<td>250</td>
</tr>
<tr>
<td>Non-rewireable plugs</td>
<td>2P</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>2P +</td>
<td>250</td>
</tr>
</tbody>
</table>

7. Classification

This clause of TIS 2162 clause 7. is applicable.

8. Marking

This clause of TIS 2162 clause 8. is applicable.

9. Checking of dimensions

This clause of TIS 2162 clause 9. is applicable, except as follows:

Dimensions of accessory are as follow.

9.101 Add the following subclauses:

1. Two poles plugs with grounding pin for equipment of class I
   Dimensions and pin configuration shall be as figure 1.

2. Two poles plugs for equipment of class II
   Dimensions and pin configuration shall be as figure 2.

3. Two poles socket-outlets with grounding pin
   Dimensions and pin configuration shall be as figure 3. and figure 4.

Compliance is checked by inspection and by applying the specified in annex A.
The symbol \(\text{No.5019a of IEC 60417}\) and the letter “L” and “N” shall be marked on the engagement face of the plug. The thickness of the symbol and character shall be between 0.2 and 0.4 mm. The terminal inside the body of the rewirable plugs shall also be indicated by the symbol.

The distance between the engagement face and the cord guard (if any) shall be at least 18 mm.

Within 5 millimetres, measured from the engagement face, the outline shall not be smaller than the outline of the engagement face.

Within 18 millimetres, measured from the engagement face, the outline shall not be larger than outline of the engagement face.

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Dimensions in millimeters

**Figure explanation**

1. The symbol \(\text{(the symbol No.5019a of IEC 60417)}\) and the letter “L” and “N” shall be marked on the engagement face of the plug. The thickness of the symbol and character shall be between 0.2 and 0.4 mm. The terminal inside the body of the rewirable plugs shall also be indicated by the symbol.

2. The distance between the engagement face and the cord guard (if any) shall be at least 18 mm.

3. Within 5 millimetres, measured from the engagement face, the outline shall not be smaller than the outline of the engagement face.

4. Within 18 millimetres, measured from the engagement face, the outline shall not be larger than outline of the engagement face.
Insulation sleeves on the current-carrying pins are mandatory. If the insulating sleeves are separate parts, they shall enter the plug ≥ 3 mm measured from the engagement face.

The external diameter of the insulating sleeves shall not be larger than the diameter of the uninsulated part of the pins.

To avoid damage to the shutters, the end of the pins shall be smoothly rounds.

The angle of 90 ° represents the maximum permissible angle for the orientation of the cable entry of the axis of the plug.

The edge of the uninsulated part of the pins shall be smoothly rounds. The distance between the uninsulated part of the pin and the insulated sleeves may not more than 0.2 mm.

**Figure 1 Dimensions and configuration of two-pole plug with earthing contact for appliance class I**
*(clause 9.101(1))*
c. The outline of the engagement face of rewirable plugs may be adjusted as appropriate.

d. The distance between the engagement face and the cord guard (if any) shall be at least 18 mm.

e. Within 5 millimetres, measured from the engagement face, the outline shall equal to the outline of the engagement face.

f. Within 18 millimetres, measured from the engagement face, the outline shall not be larger than outline of the engagement face.

g. Insulation sleeves on the current-carrying pins are mandatory. If the insulating sleeves are separate parts, they shall enter the plug ≥ 3 mm (measured from the engagement face).
⑥ The external diameter of the insulating sleeves shall not be larger than the diameter of the uninsulated part of the pins.

⑦ To avoid damage to the shutters, the end of the pins shall be smoothly rounds.

⑧ The angle of 90° represents the maximum permissible angle for the orientation of the cable entry of the axis of the plug.

⑨ The edge of the insulated part of the pins shall be smoothly rounds. The distance between the uninsulated part of the pin and the insulated sleeves may not more than 0.2 mm.

Figure 2 Dimensions and configuration of two-pole plug without earthing contact for appliance class II (clause 9.101(2))
Figure explanation

① It shall not be possible to make a single-pole insertion.
   Note  Single-pole insertion may be prevented by the use of the at least one of the
      following means:
         - A sufficiently large cover or cover-plate;
         - Other means for example, shutters.
② If there is a shutter, this dimension is for the cover-plate, guidance of pins and for the
   shutter mechanism.
③ Within this thickness, the guidance for the pin shall be at least 1.5 millimeter.
④ The edge of the guidance for the pin shall be rounded 45 degree or the edges shall be
   slightly chamber.
5. The points of first contact with current-carrying contact tube shall be checked by
gauge of figure A.2.
6. The gauge in the figure A.3 is used to check when inserting the plug, the earth
connection is made before the current-carrying pins of the plugs become live,
When withdrawing the plug, the current-carrying pins shall separate from their
socket contacts before the earth connection is broken.
7. Socket contacts shall be resilient between 4.0 mm. and 5.0 mm. They may have shape
other than tubular.
A suitable shaped entry such as a chamber or radius of 45° is necessary to prevent
damage to the socket contacts when plug is introduced at its most unfavorable angle.
The resilient test and contact force of the socket is checked by the gauge in A.4
8. The symbol (the symbol No.5019a of IEC 60417) and the letter “L” and “N”
shall be marked on the engagement face of the socket-outlet, for the rewirable socket-
outlet this symbol shall be marked on the inner side of the body of the socket-outlet.
9. Within the area of a diameter of 39 millimeters there shall be no any projection from
their engagement face which may be create obstruction in normal uses except the
symbol and the letter in clause 8

Figure 3 Two-pole socket-outlet with earthing contact (round pin)
(clause 9.101(3))
Figure explanation

① It shall not be possible to make a single-pole insertion.
   Note Single-pole insertion may be prevented by the use of the at least one of the following means:
   - A sufficiently large cover or cover-plate;
   - Other means for example, shutters.
② If there is a shutter, this dimensions is for the cover-plate, guidance of pins and for the shutter mechanism.
③ Within this thickness, the guidance for the pin shall be at least 1.5 millimeter.
④ The edge of the guidance of the pin shall be rounded 45 degree or the edges shall be slightly chamber.
⑤ The points of first contact with current carrying socket contacts shall be checked by gauge of figure A.2.
The gauge in the figure A.3 is used to check that when inserting the plug, the earth connection is made before the current-carrying pins of the plugs become live. When withdrawing the plug, the current-carrying pins shall separate from their socket contacts before the earth connection is broken.

Socket contacts shall be resilient between 4.0 mm. and 5.0 mm. They may have shape other than tubular. A suitable shaped entry such as a chamber or radius of 45° is necessary to prevent damage to the socket contacts when plug is introduced at its most unfavorable angle. The resilient test and contact force of the socket is checked by the gauge in A.4.

The symbol (the symbol No. 5019a of IEC 60417) and the letter “L” and “N” must be marked on the engagement face of the socket-outlet, for the rewirable socket-outlet this symbol shall be marked on the inner side of the body of the socket-outlet.

Within the area of a diameter of 39 millimeters there shall be no any projection from their engagement face which may be create obstruction in normal uses except the symbol and the letter in clause ⑥.

Figure 4 Two-pole socket-outlet with earthing contact (flat-round pin)
(clause 9.101(3))
10. Protection against electric shock
This clause of TIS 2162 clause 10. is applicable

11. Provision for earthing
This clause of TIS 2162 clause 11. is applicable

12. Terminals
This clause of TIS 2162 clause 12. is applicable

13. Construction of fixed socket-outlets
This clause of TIS 2162 clause 13. is applicable

14. Construction of plugs and portable socket-outlets
This clause of TIS 2162 clause 14. is applicable

15. Interlocked socket-outlets
This clause of TIS 2162 clause 15. is applicable

16. Resistance to aging, to harmful ingress of water and to humidity
This clause of TIS 2162 clause 16. is applicable

17. Insulation resistance and electric strength
This clause of TIS 2162 clause 17. is applicable

18. Operation of earthing contact
This clause of TIS 2162 clause 18. is applicable

19. Temperature rise
This clause of TIS 2162 clause 19. is applicable
20. **Breaking capacity**

This clause of TIS 2162 clause 20. is applicable

21. **Normal operation**

This clause of TIS 2162 clause 21. is applicable

22. **Force necessary to withdrawn the plug**

This clause of TIS 2162 clause 22. is applicable

23. **Flexible cable and their connection**

This clause of TIS 2162 clause 23. is applicable

24. **Mechanical strength**

This clause of TIS 2162 clause 24. is applicable

25. **Resistance to heat**

This clause of TIS 2162 clause 25. is applicable

26. **Screws, current-carrying parts and connections**

This clause of TIS 2162 clause 26. is applicable

27. **Creepage distances, clearances and distances through sealing compound**

This clause of TIS 2162 clause 27. is applicable

28. **Resistance of insulating material to abnormal heat, to fire and to tracking**

This clause of TIS 2162 clause 28. is applicable

29. **Resistance to rusting**

This clause of TIS 2162 clause 29. is applicable
30. Additional tests on pins provided with insulating sleeves

This clause of TIS 2162 clause 30. is applicable
Appendix A

Gauge

(clause 9.101)

The gauge in figure A.1 to A.5 are used to check dimensions of the socket-outlet and the gauge in figure A.6 to A.7 are used to check pulling force, in case of socket-outlet the gauge in Fig. 8 to Fig.10 are used additionally.

Dimension in millimeters

The test is made by mounting the engagement face in a horizontal plane and open the openings.

The gauge is applied in every possible positions. It shall not possible to tough a contact tube with one gauge pin only.

The use of electrical indicator with its voltage not less than 40 V and not more than 50 V in the contact test.

The gauge shall be made of non corrosive metal and have enough mechanical strength for example stainless steel and its mass shall be 200±5 g.

Figure A.1 Gauge for checking impossibility of single-pole insertion of plugs

(clause 9.101)
The shutter is opened during the test.

Metal parts of the gauge A, gauge B, and gauge C must be made of non-corrosive metal (for example stainless steel).

The use of electrical indicator with its voltage not less than 40 V and not more than 50 V in the contact test.

When gauge A is inserted completely into entry holes of the socket-outlet in every possible position until plane X-X contact to the engagement surface the socket-outlet. The indicator shall not light.

When gauge B and C are inserted completely into the socket-outlet.

- Gauge B, the lamp shall light.
- Gauge C, the lamp shall not light.

**Figure A.2 Gauge for testing the contact of the live contact tube**

*(clause 9.101)*
When the gauge is inserted completely into entry holes of the socket-outlet in any angle without using excessive force, Lamps L2 shall light before Lamps L1 and L3.

When the gauge is withdrawn from the socket-outlet the light L1 and L3 shall go out before lamp L2.

The gauge must be made of non corrosive metal (for example stainless steel)

**Figure A.3 Gauge for testing the contact of the earthing contact before live contact**

*(clause 9.101)*
The shutter is opened during the test.

Before the test the pin is wiped free from the grease.

The gauge C1 is inserted into the socket-outlet with a maximum force of 50 N perpendicularly to the engagement face of the socket-outlet, the gauge shall not come out with its own weight. The socket-outlet is placed in most unfavorable position.

After this, the gauge C2 is inserted into the socket-outlet, the gauge shall not come out with its own weight. The socket-outlet is placed in most unfavorable position.

After this, the gauge C3 is inserted into the socket-outlet, the gauge shall not come out with its own weight. The socket-outlet is placed in most unfavorable position.

**Figure A.4 Gauge for testing resilience test and contact force of the contact tube.**

*(clause 9.101)*
Dimension in millimeters

(1) Gauge for round pin socket-outlet and flat-round pin socket-outlet

(2) Gauge for flat-round pin socket-outlet

The gauge must be made of non corrosive metal (for example stainless steel)

Figure A.5 Gauge for initial testing dimensions of the socket-outlet
(clause 9.101)
The gauge must be made of non corrosive metal (for example stainless steel)

Figure A.6 Gauge for testing maximum withdrawal force

(clause 22.)
Dimension in millimeters

The length shall be enough for its weight equals the specified withdrawal force

The gauge must be made of non corrosive metal (for example stainless steel)

**Figure A.7 Gauge for testing minimum withdrawal force**

*(clause 22.)*
When the gauge is inserted completely and perpendicular to the engagement face of the socket-outlet. The L1, L2 and L3 lamps shall light.

When gauge is inserted completely into entry holes of the socket-outlet in any angle without using excessive force Lamps L2 shall light before Lamps L1 and L3.

When the gauge is withdrawn from the socket-outlet the light L2 and L3 shall go out before lamp L1.

The gauge must be made of non corrosive metal (for example stainless steel).

**Figure A.8 Gauge for testing earthing contact is made before the current-carrying contacts for flat-round pin socket-outlet**

*(clause 9.101)*
The length shall be enough for adding weight at 50 mm height.

This figure is intended for showing dimensions and configuration only.

The gauge must be made of non corrosive metal (for example stainless steel).

**Figure A.9 Gauge for testing maximum withdrawal force for flat-round pin socket-outlet.**

*(clause 22.)*
The length shall be enough for its weight which equals the specified withdrawal force.

This figure is intended for showing dimensions and configuration only.

The gauge must be made of non corrosive metal (for example stainless steel).

Figure A.10 Gauge for testing minimum withdrawal force of current-carrying pole for flat-round pin socket-outlet

(clause 22.)