

Unofficial Translation

In the event of any doubt or misunderstanding arising from this translation, the standard in Thai will be held to be authoritative

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.

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

Table1 Type and rating of accessories
(clause 6.1)

TYPE		Rated Voltage V	Rated Current A
Socket-outlet	2P + 	250	16
Rewirable plugs	2P	250	16
	2P + 		
Non-rewireable plugs	2P	250	2.5
	2P + 		6 10 16

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.

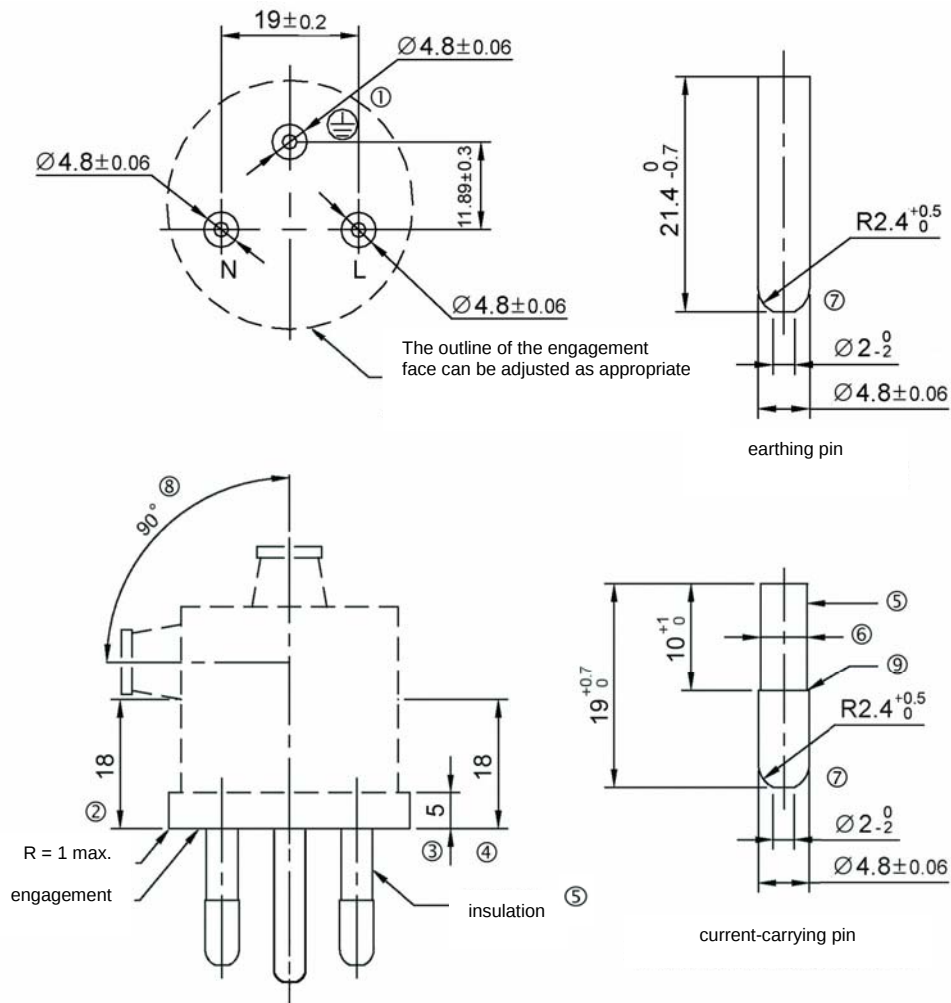
- (2) Two poles plugs for equipment of class II

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.



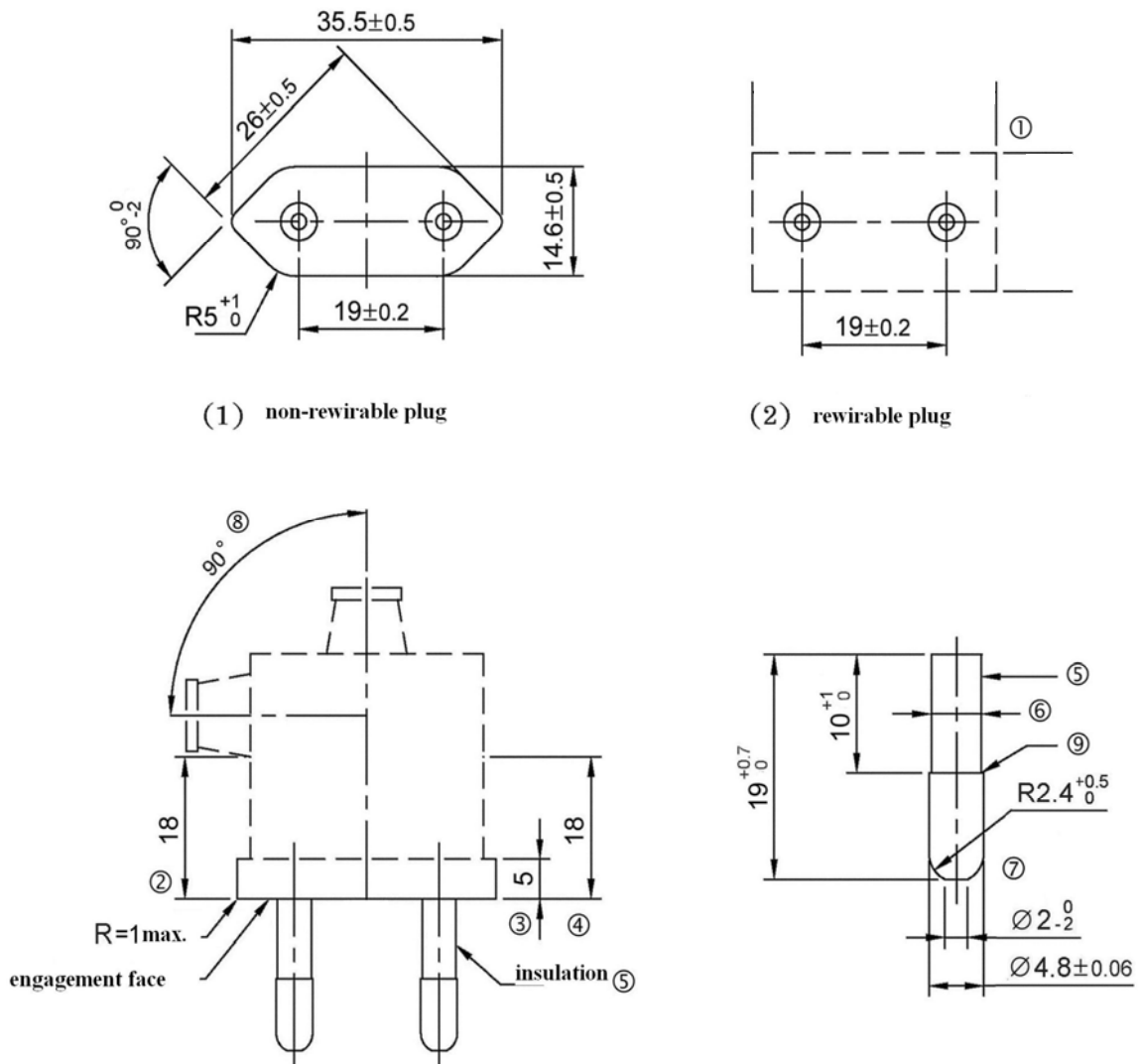
Dimensions in millimeters

Figure explanation

- ① The symbol ⏏ (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 the engagement face.

- ⑤ 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 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))**



Dimensions in millimetres

Figure explanation

- ① The outline of the engagement face of rewirable plugs may be adjusted as appropriate.
- 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 equal to be the outline of the the engagement face.
- ④ Within 18 millimetres, measured from the engagement face, the outline shall not be larger than outline of the engagement face.
- ⑤ 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))**

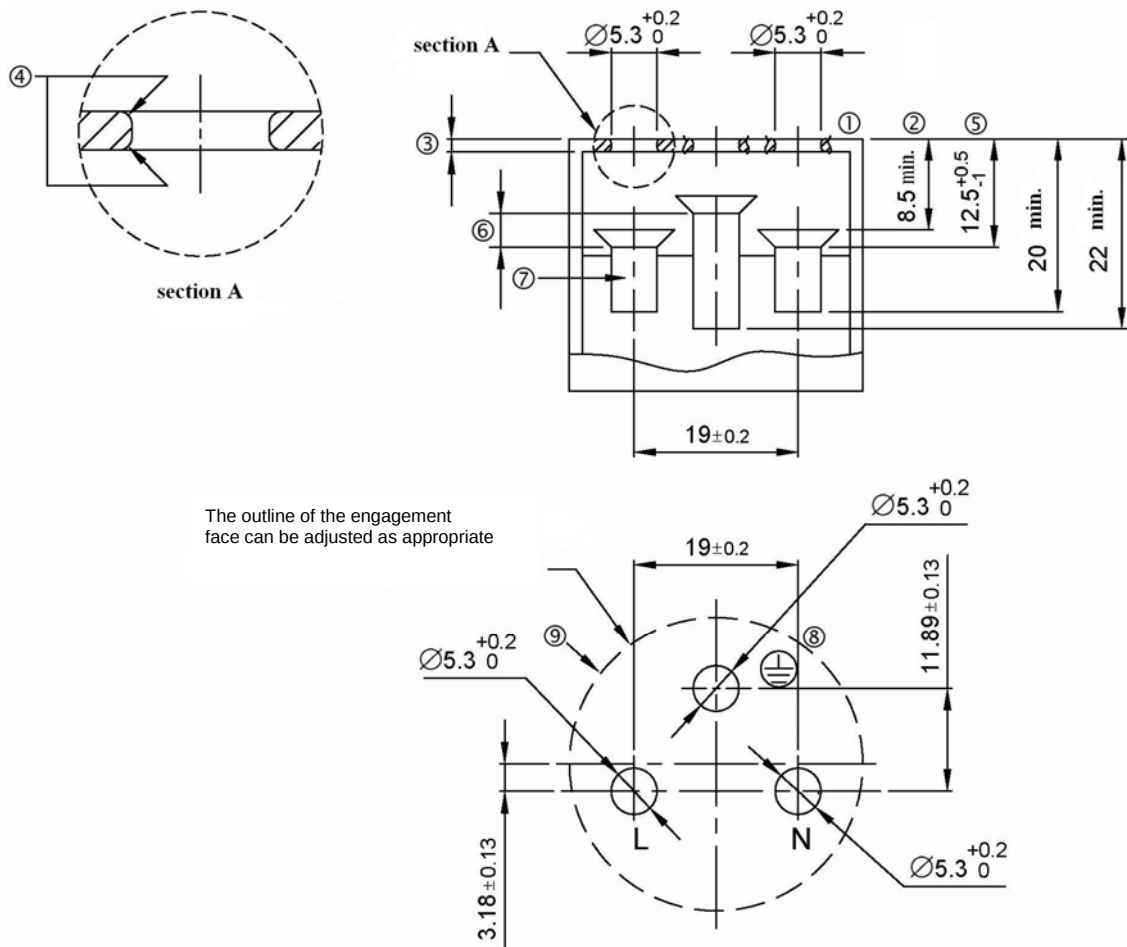
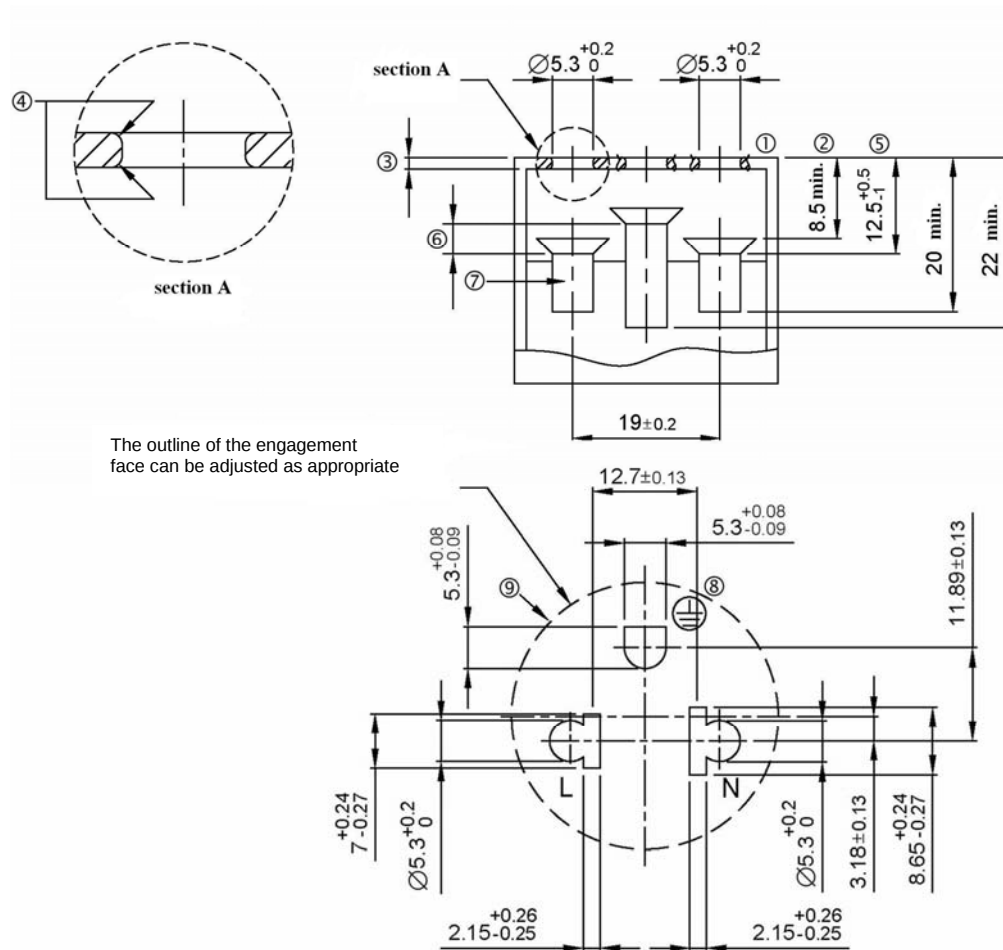


Figure explanation

- 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 chamfer.

- 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 chamfer 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))



Dimensions in millimetres

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 chamfer.
- ⑤ The points of first contact with current carrying socket contacts shall be checked by gauge of figure A.2.

- ⑥ 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.
- 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 chamfer 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” 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.
- 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 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

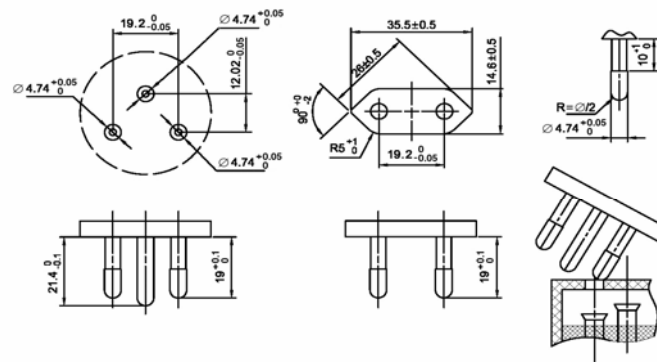
This clause of TIS 2162 clause 30. is applicable

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.

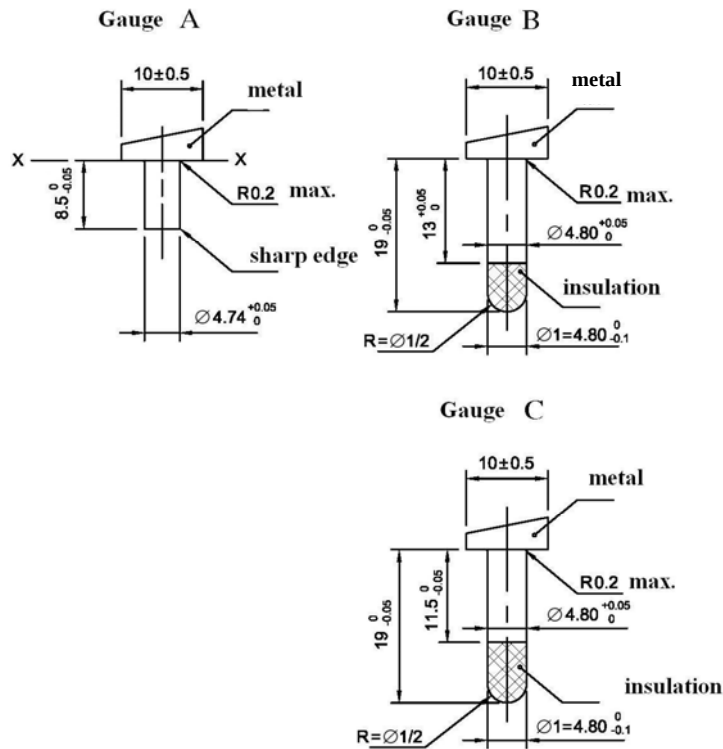
The gauge is applied in every possible positions. It shall not possible to tough a contact tube with one gauge pin only.

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)



Dimension in millimeters

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.

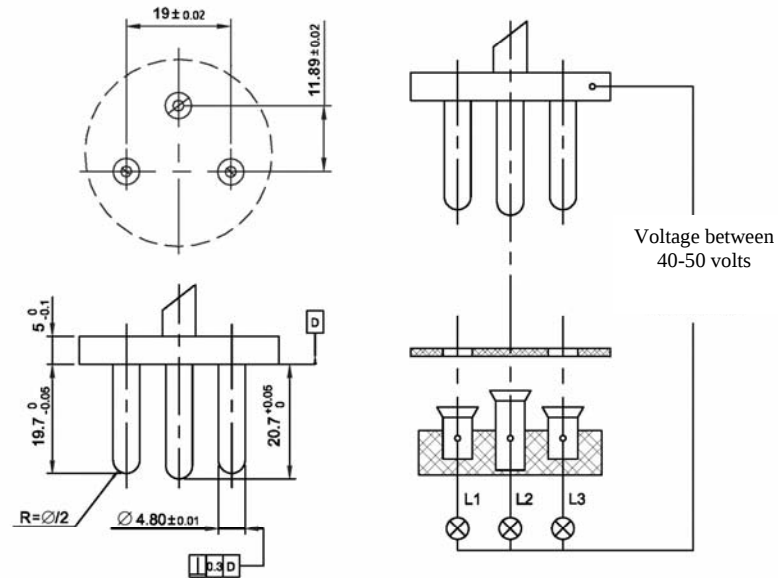
When gauge A is inserted completely into entry holes of the socket-outlet in every possible position until plane X-X contact to the engagement surface the socket-outlet. The indicator shall not light.

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.

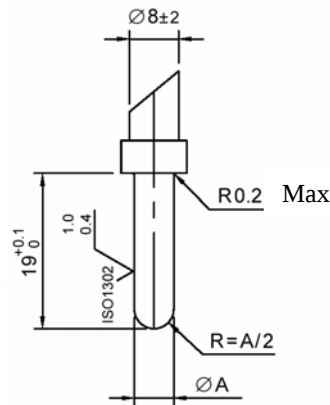
When the gauge is withdrawn from the socket-outlet the light L1 and L3 shall go out before lamp L2

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)

gauge	A mm	weight g
C1	4.95 ± 0.05	400 ± 5
C2	4.74 ± 0.05	200 ± 5
C3	4.0 ± 0.05	200 ± 5



Dimension in millimeters

The shutter is opened during the test.

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

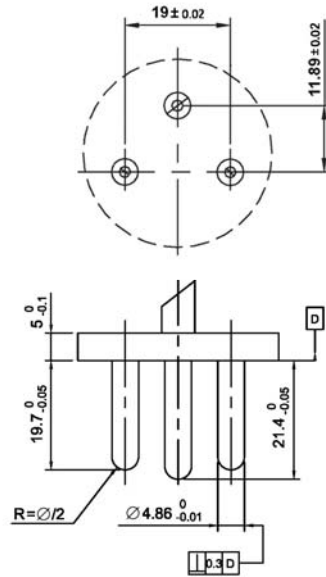
The gauge C1 is inserted into the socket-outlet with a maximum force of 50 N perpendicularly to the engagement face of the socket-outlet, the gauge shall not come out with its own weight. The socket-outlet is placed in most unfavorable position.

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.

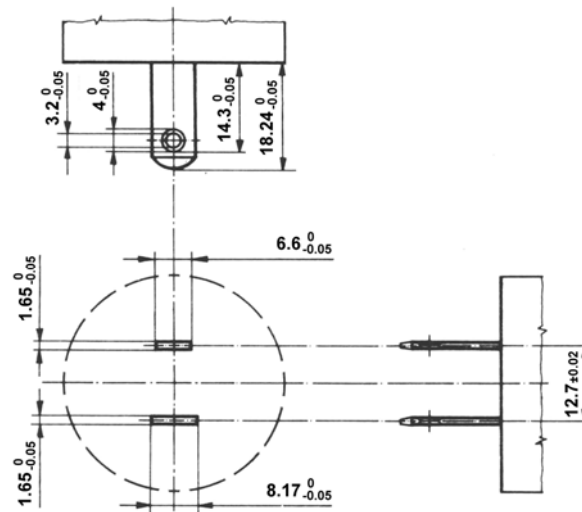
Figure A.4 Gauge for testing resilience test and contact force of the contact tube.

(clause 9.101)



Dimension in millimeters

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

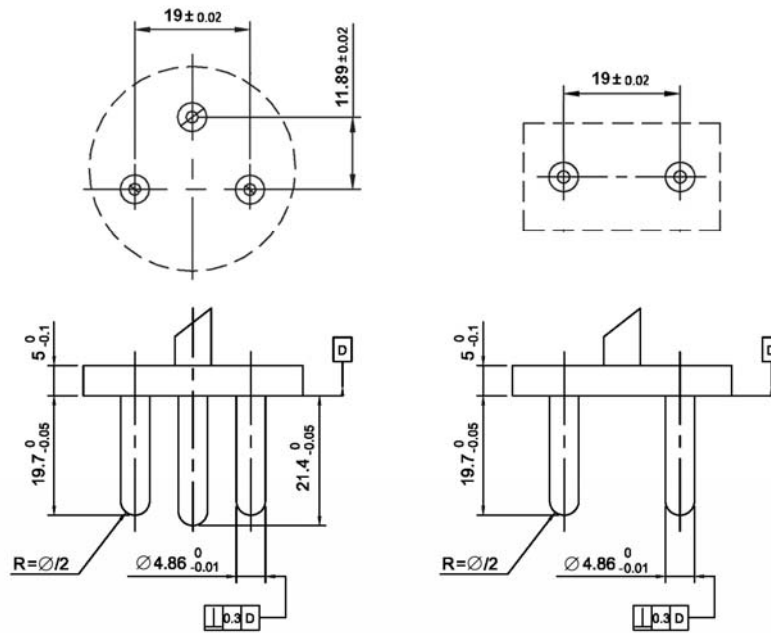


Dimension in millimeters

(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)**

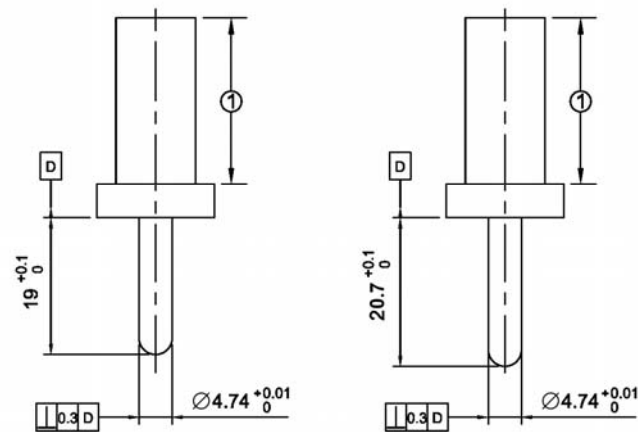


Dimension in millimeters

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

Figure A.6 Gauge for testing maximum withdrawal force

(clause 22.)



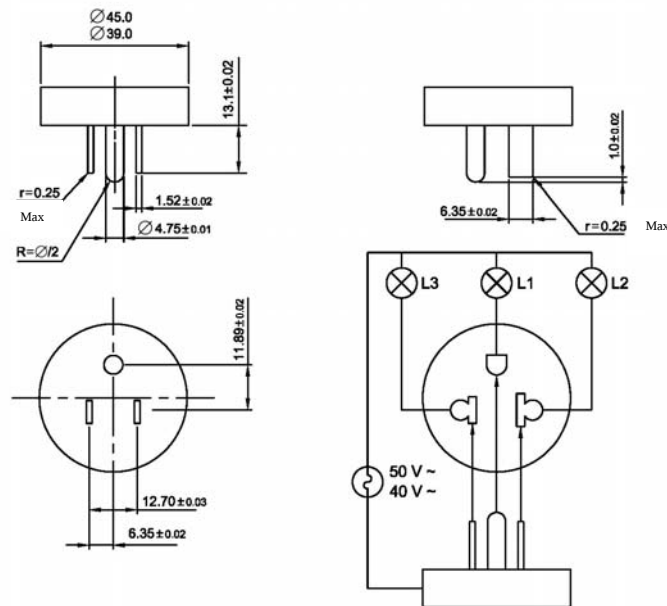
Dimension in millimeters

① 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.)



Dimension in millimeters

When the gauge is inserted completely and perpendicular to the engagement face of the socket-outlet. The L1 L2 and L3 lamps shall light.

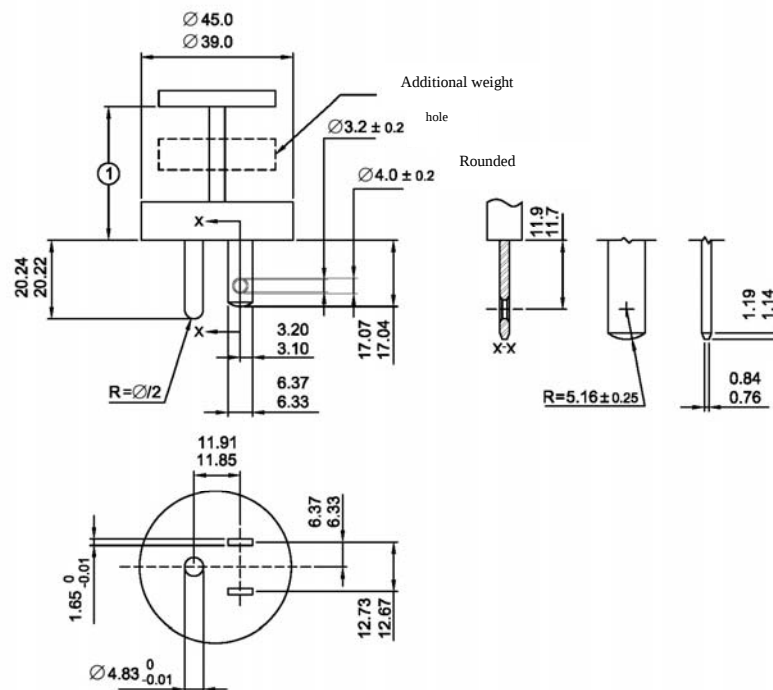
When gauge is inserted completely into entry holes of the socket-outlet in any angle without using excessive force Lamps L2 shall light before Lamps L1 and L3.

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)



Dimension in millimeters

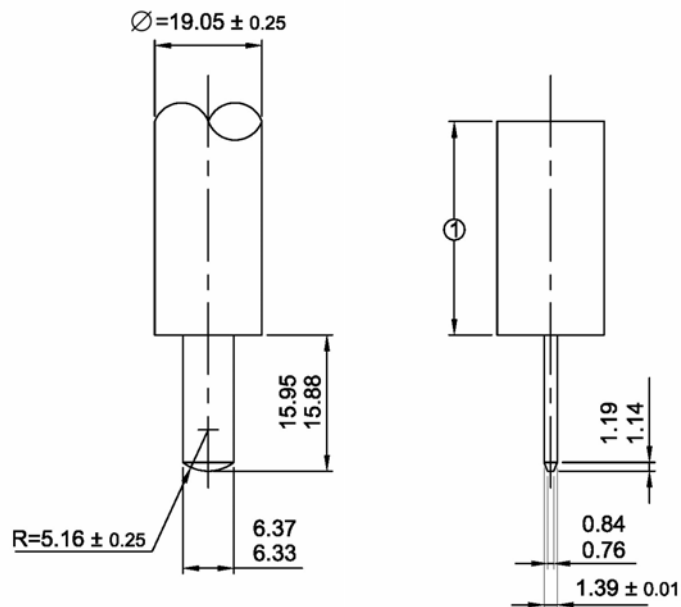
① The length shall be enough for adding weight at 50 mm height.

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.)



Dimension in millimeters

- ① 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.)