

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

Unofficial Translation  
**TIS 366-2547 (2004)**  
**Thai Industrial Standard**  
**for**  
**Electric irons : Safety requirement**

### 1. Scope

This standard specifies the safety requirements of electric dry irons and steam irons, including those with a separate water reservoir or boiler having a capacity not exceeding 5 l , for household and similar purposes, their rated voltage being not more than 250 V.

Electric irons not intended for normal household use, but which nevertheless may be a source of danger to the public, such as electric irons intended to be used by laymen in shops, in light industry and on farms, are within the scope of this standard.

As far as is practicable, this standard deals with the common hazards presented by electric irons which are encountered by all persons in and around the home.

However, in general, it does not take into account

- the use of electric irons by young children or infirm persons without supervision;
- playing with the electric iron by young children.

**NOTE 101** *Attention is drawn to the fact that*

- *for electric irons intended to be used in vehicles or on board ships or aircraft, additional requirements may be necessary;*
- *additional requirements are specified by the national health authorities, the national authorities responsible for the protection of labour and similar authorities;*
- *additional requirements for pressure vessels may be specified by the national authorities responsible for the safety of pressure vessels.*

**NOTE 102** *This standard does not apply to*

- *Ironers (IEC 60335-2-44);*
- *Electric irons designed exclusively for industrial purposes;*
- *Electric irons intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas).*

## 2. Normative references

This clause of Safety of household electrical appliance : General requirements TIS 1375 clause 2. is applicable.

## 3. Definitions

This clause of TIS 1375 clause 3. is applicable except as follows.

### 3.1.9 *Replacement:*

#### **Normal operation**

Operation of the electric iron (mension as iron) under the following conditions.

The iron is placed on its **stand** and is operated with its **thermostat** at the highest setting.

If the iron does not have a **thermostat**, the surface temperature at the mid-point of the centre line of the **soleplate** is maintained at  $250\text{ °C} \pm 10\text{ °C}$  by switching the supply on and off, or at the highest temperature if it is lower.

**Steam irons** with a separate water reservoir or boiler are operated with the water reservoir or boiler filled with water.

**Pressurized steam irons** incorporating the boiler are operated with or without water, whichever is more unfavourable.

Other **steam irons** are operated empty

### 3.101 **Steam iron**

Iron having means to produce and supply steam to the textile material during ironing

**NOTE** *Steam irons may incorporate a means for blowing steam onto clothes.*

### **3.102 Vented steam iron**

**Steam iron** in which steam is produced when the water contacts the **soleplate**, the water reservoir being at atmospheric pressure

*NOTE The water reservoir may be incorporated in the iron or is connected to the iron by a hose.*

### **3.103 Pressurized steam iron**

**Steam iron** in which steam is produced in a boiler at a pressure exceeding 50 kPa

*NOTE The boiler may be incorporated in the iron or is connected to the iron by a hose.*

### **3.104 Instantaneous steam iron**

**Steam iron** in which small quantities of water are pumped from the water reservoir and in which steam is produced when the water contacts the walls of the boiler, the water reservoir and the boiler being at atmospheric pressure

*NOTE The water reservoir and the boiler are connected to the iron by a hose.*

### **3.105 Cordless iron**

Iron that is connected to the supply only when placed on its **stand**

*NOTE Cordless irons may be directly connected to the supply mains during ironing by a detachable part to which the supply cord is fixed.*

### **3.106 Soleplate**

Heated part of the iron which is pressed against the textile material while ironing

### **3.107 Stand**

Heel of the iron or a separate part provided with the iron, on which the iron is placed when at rest

*NOTE The separate water reservoir or boiler may serve as the stand.*

#### 4. General requirement

This clause of TIS 1375 clause 4. is applicable .

#### 5. General conditions for the tests

This clause of TIS 1375 clause 5. is applicable except as follows.

##### 5.2 *Addition:*

**NOTE 101** *If a **protective device** becomes open circuit during the tests of 21.101, the test is continued on a separate iron.*

**NOTE 102** *The additional test of 25.14 is carried out on a separate iron.*

##### 5.3 Addition:

For irons with a thermostat, the test of 21.101 is carried out before the test of Clause 11.

The test of 22.102 is carried out during the test of Clause 11.

**5.101** Irons are tested as **heating appliances** even if they incorporate a motor.

**5.102** If a **cordless iron** can also be directly connected to the supply mains during ironing, the relevant tests are applicable for both modes of operation.

#### 6. Classification

This clause of TIS 1375 clause 6. is applicable.

#### 7. Marking and instructions

This clause of TIS 1375 clause 7. is applicable except as follows.

##### 7.1 *Modification:*

Irons shall be marked with their **rated power input**.

##### *Addition:*

Separate **stands** shall be marked with

- name, trademark or identification mark of the manufacturer or responsible vendor;

- model or type reference of the **stand**.

**Stands of cordless irons** shall be marked with their

- **rated voltage or rated voltage range**
- **rated power input or rated power range**

**7.12** *Addition:*

The instructions shall contain the substance of the following:

- the iron must not be left unattended while it is connected to the supply mains
- the plug must be removed from the socket-outlet before the water reservoir is filled with water (for **steam irons** and irons incorporating means for spraying water)
- the filling aperture must not be opened during use. Instructions for the safe refilling of the water reservoir shall be given (for **pressurized steam irons**)
- the iron must only be used with the stand provided (for **cordless irons**)
- the iron is not intended for regular use (for travel irons).

**7.15** *Addition:*

For **steam irons** with a separate water reservoir or boiler, the total **rated power input** shall be marked on the part containing the supply terminals or **supply cord**.

## **8. Protection against access to live parts**

This clause of TIS 1375 clause 8. is applicable except as follows.

**8.1.2** *Addition:*

*NOTE 101* *Connecting devices in stands of cordless irons are not considered to be socket-outlets.*

## **9. Starting of motor-operated appliances**

This clause of TIS 1375 clause 9. is not applicable.

## 10. Power input and current

This clause of TIS 1375 clause 10. is applicable.

## 11. Heating

This clause of TIS 1375 clause 11. is applicable except as follows.

### 11.2 *Replacement:*

Irons are placed on their **stands** on the floor of a test corner and away from the walls. However, the separate water reservoir or boiler **of steam irons** is placed as near to the walls as possible. Dull black painted plywood approximately 20 mm thick is used for the test corner.

**Vented steam irons** with a separate water reservoir, **pressurized steam irons** and **instantaneous steam irons** are tested with the water reservoir empty and filled but without steam emission.

Irons, other than **cordless irons**, are also tested with the **soleplate** in the horizontal position placed on three pointed metallic supports that have a height of at least 100 mm. **Vented steam irons** with a separate water reservoir, **pressurized steam irons** and **instantaneous steam irons** are operated with the water reservoir or boiler filled.

For irons provided with an automatic cord reel, one-third of the total length of the cord is unreeled. The temperature rise of the cord sheath is determined as near as possible to the hub of the reel and also between the two outermost layers of the cord on the reel. However, if the cord reel is incorporated in a part that is moved during ironing, the cord is completely unreeled.

For cord storage devices, other than automatic cord reels, that are intended to partially accommodate the **supply cord** while the iron is in operation, 50 cm of the cord is unwound. However, for cord storage devices on parts that are moved during ironing, the cord is completely unwound. The temperature rise of the stored part of the cord is determined at the most unfavourable place.

### 11.4 *Addition:*

If the temperature rise limits are exceeded in irons incorporating motors, transformers or **electronic circuits** and the power input is lower than the

**rated power input**, the test is repeated with the iron supplied at 1,06 times **rated voltage**.

**11.7** *Replacement:*

Irons are operated until steady conditions are established.

When **vented steam irons** with a separate water reservoir, **pressurized steam irons** and **instantaneous steam irons** are tested with the iron placed on the pointed supports, steam is emitted in cycles, each cycle having a period of 10 s with steam emission and a period of 10 s with the steam emission interrupted.

**11.8** *Modification:*

Instead of the temperature rise limit of 50 K for rubber or polyvinyl chloride insulation of internal and external wiring, including **supply cords** without T-marking, 60 K applies.

*Addition:*

During the test with the iron placed on the pointed supports, only the temperature rises of the insulation of internal wiring and flexible cords are measured. However, the temperature rise limits apply to the water reservoir and the hose of **pressurized steam irons** and **instantaneous steam irons**. The temperature rise of the **accessible surface** of the hose shall comply with the temperature rise limits for handles that are held for short periods only in normal use. However, if a non-metallic hose is covered by textile material, the temperature rise of the surface of the textile material shall not exceed 80 K.

The temperature rise limits of motors, transformers and components of electronic circuits, including parts directly influenced by them, may be exceeded when the iron is operated at 1,15 times **rated power input**.

## 12. Void

## 13. Leakage current and electric strength at operating temperature

This clause of TIS 1375 clause 13. is applicable.

#### **14. Transient overvoltages**

This clause of TIS 1375 clause 14. is applicable.

#### **15. Moisture resistance**

This clause of TIS 1375 clause 15. is applicable except as follows.

##### **15.2** *Modification:*

The test for **steam irons**, other than those with a separate water reservoir or boiler, is carried out as follows.

The iron is placed in the filling position according to the instructions and filled with water containing approximately 1 % NaCl. A further quantity of 0,1 l is steadily poured into the filling opening over a period of 1 min. The iron is then placed on its **stand** and subjected to the electric strength test of 16.3. The iron is left on its **stand** for 10 min after which the electric strength test is repeated.

The iron, while still filled, is operated at **rated power input** for 1 min under **normal operation**. It shall then withstand the electric strength test of 16.3.

**Cordless irons** are also filled with the saline solution while resting on their **stands**, if the iron can easily be filled in this position.

#### **16. Leakage current and electric strength**

This clause of TIS 1375 clause 16. is applicable.

#### **17. Overload protection of transformers and associated circuits**

This clause of TIS 1375 clause 17. is applicable.

#### **18. Endurance**

This clause of TIS 1375 clause 18. is not applicable.

## 19. Abnormal operation

This clause of TIS 1375 clause 19. is applicable except as follows.

### 19.1 *Modification:*

The tests of 19.2 and 19.3 are not carried out. The tests of 19.5 is carried out on the separate boiler of the steam iron.

*Addition:*

**Cordless irons** are also subjected to the tests of 19.101.

### 19.4 *Modification:*

The test is carried out at **rated power input**.

*Addition:*

**Steam irons** are tested with or without water, whichever is more unfavourable.

The test is only carried out with the iron resting on its **stand**.

Any control that limits the pressure during the test of Clause 11 is rendered inoperative.

### 19.7 *Addition:*

The test is carried out for 5 min unless the motor is kept switched on by hand.

**19.101 Cordless irons** are operated under **normal operation** at **rated power input** until the **thermostat** operates for the first time. The iron is then placed on its **stand** in the position that most adversely affects the material of the **stand**.

## 20. Stability and mechanical hazards

This clause of TIS 1375 clause 20. is applicable except as follows.

### 20.1 *Replacement:*

Irons shall have adequate stability.

Compliance is checked by the following test.

Irons incorporating a **stand** are placed on their **stand** on a plane inclined

at an angle of 10° to the horizontal the cord resting on the inclined plane in the most unfavourable position. Irons supplied with a separate **stand** are placed on the **stand** on a plane inclined at an angle of 15 to the horizontal.

Irons intended to be filled with liquid by the user in normal use are tested empty or filled with the most unfavourable quantity of water up to the capacity indicated in the instructions.

*NOTE 101 The **stand** may be tapped to overcome static friction between the iron and the **stand**.*

*NOTE 102 The iron is not connected to the supply mains.*

If the iron overturns or slips off the **stand** in one or more positions, it is tested as specified in Clause 11. in all these positions.

The temperature rise shall not exceed the values specified in Table 9.

## 21. Mechanical strength

This clause of TIS 1375 clause 21. is applicable except as follows.

*Addition:*

Compliance is also checked by the test of 21.101.

**21.101** The iron is operated under **normal operation** at **rated power input** and, except for **cordless irons**, the **soleplate** temperature is maintained under these conditions throughout the test.

The iron is then suspended by its handle with the **soleplate** in the horizontal position. It is dropped from a height of 40 mm onto a rigidly supported steel plate having a thickness of at least 15 mm and a mass of at least 15 kg. The test is carried out 1 000 times at a rate not exceeding 20 drops per min.

The test is conducted so that the iron rests on the steel plate for approximately 15 % of the time.

*NOTE The iron is suspended so that the impact energy is only influenced by its mass.*

After the test, the iron shall not be damaged to such an extent that

compliance with 8.1, 15.2 and Clause 29., is impaired. In case of doubt, **supplementary insulation** and **reinforced insulation** is subjected to the electric strength test of 16.3.

## 22. Construction

This clause of TIS 1375 clause 22. is applicable except as follows.

### 22.7 *Replacement:*

**Pressurized steam irons** and **instantaneous steam irons** shall incorporate adequate safeguards against the risk of excessive pressure.

If jets of steam or hot water are emitted through **protective devices**, the electrical insulation shall not be affected or the user exposed to a hazard.

Compliance is checked by inspection and by the following test.

For **pressurized steam irons**, the maximum pressure occurring during the test of Clause 11. with the boiler filled but without steam emission, is measured. All pressure-regulating devices that operated during the test are rendered inoperative and the pressure measured again. The pressure shall not increase by more than 200 kPa. Any pressure-limiting **protective device** is then rendered inoperative and the pressure in the boiler is raised hydraulically to five times the pressure measured originally or twice the pressure measured with the pressure-regulating device rendered inoperative, whichever is higher. There shall be no leakage from the water reservoir.

**Pressurized steam irons** in which the device regulating the steam supply is within the boiler are operated as specified in Clause 11 but with all pressure-regulating devices operating during the test of Clause 11 rendered inoperative. All vents in the **soleplate** are sealed and the device regulating the steam supply is opened. There shall be no leakage from the hose except at an intentionally weak place within the enclosure of the boiler. If this occurs, the test is repeated on another iron that shall also leak in the same way.

All vents in the **soleplate** of **instantaneous steam irons** are sealed and the pressure in the water reservoir is raised hydraulically until the pressure-limiting **protective device** operates. The pressure shall not exceed 50 kPa. The outlet through the **protective device** is then sealed

and the pressure is raised to 100 kPa and maintained at this value for 1 min. There shall be no leakage from the water reservoir.

**22.101** Irons shall be provided with a **stand**.

Compliance is checked by inspection.

**22.102 Steam irons** shall be constructed so that there is no spillage of water or sudden jets of steam or hot water likely to expose the user to a hazard when the iron is used in accordance with the instructions.

When removing the filling cap of boilers, the pressure shall be relieved in a controlled manner before the cap is removed completely, to avoid the emission of jets of steam or hot water in a manner likely to expose the user to a hazard.

Compliance is checked by inspection during the test of Clause 11. and by removing the filling cap at the end of the test.

**22.103** The water reservoir of **steam irons** with a separate boiler shall incorporate at least one **non-self-resetting thermal cut-out** that is only accessible by means of a **tool**.

Compliance is checked by inspection.

**22.104** Pressure-limiting **protective devices** that operate during the tests of 19.4 and 22.7 shall have an inlet aperture at least 5 mm in diameter or 20 mm<sup>2</sup> in area and a width of at least 3 mm. The area of the aperture at the outlet shall not be less than that of the aperture at the inlet.

Compliance is checked by measurement.

**22.105** The connection contacts of **cordless irons** shall be constructed so that any electrical or mechanical failure occurring in normal use will not give rise to a hazard.

Compliance is checked by the following test.

The two live pins of the iron are connected together and an external resistive load is connected in series with the supply. The external load is such that the current is 1,1 times **rated current** when the iron is supplied at **rated voltage**.

The iron is placed on its **stand** and withdrawn 50 000 times, at a rate of 10 times per minute. The test is continued for a further 50 000 times without current flowing.

After the test the iron shall be fit for further use and compliance with 8.1, 16.3, 27.5 and Clause 29, shall not be impaired.

**22.106 Cordless irons** which may be directly connected to the supply mains during ironing shall be constructed so that the force necessary to withdraw the connector from the iron is at least 30 N.

Compliance is checked by measurement.

*NOTE Any locking device is engaged before carrying out the test.*

### **23. Internal wiring**

This clause of TIS 1375 clause 23. is applicable.

### **24. Components**

This clause of TIS 1375 clause 24. is applicable except as follows.

#### **24.1.3 Addition:**

Switches that control steam or water emission are subjected to 50 000 cycles of operation.

#### **24.4 Addition:**

*NOTE 101 This requirement is not applicable to the connection between the iron and the **stand of cordless irons.***

**24.101** Any component incorporated in an iron for compliance with 19.4 shall not be self- resetting and only accessible by means of a **tool**.

Compliance is checked by inspection.

### **25. Supply connection and external flexible cords**

This clause of TIS 1375 clause 25. is applicable except as follows.

#### **25.5 Addition:**

**Type Z attachment** is allowed for travel irons and **cordless irons**.

*NOTE 101 **Type Z attachment** is not allowed for **cordless irons** that may also be directly connected to the supply mains during ironing.*

**25.7** *Addition:*

Braided cords may be used.

Polyvinyl chloride sheathed cords are only allowed as the supply cords for **stands** of **cordless irons** and for the separate water reservoirs or boilers of **steam irons**.

*NOTE 101 Polyvinyl chloride cords are not allowed for **cordless irons** that may also be directly connected to the supply mains during ironing.*

**25.14** *Modification:*

Instead of the load specified for the cord, the cord is loaded with a mass of 2 kg.

Instead of the number of flexings specified, the number of flexings is 20 000.

*NOTE 101 The test is not carried out on **cordless irons** unless the iron can also be directly connected to the supply mains during ironing.*

*Addition:*

For **steam irons** with a separate water reservoir or boiler, the test is made on the steam hose and the **interconnection cord** together. If they are contained in one sheath or otherwise attached to each other, the assembly is not turned through an angle of 90°.

The test shall not result in

- loosening of the hose;
- damage to the hose to such an extent that compliance with this standard is impaired;
- leakage from the hose.

Irons are also subjected to the following test while mounted on an apparatus similar to that of Figure 8. This test is carried out on a separate iron.

The **supply cord** is suspended vertically from the iron and loaded so that a force of 10 N is applied. The oscillating member is moved through an angle of 180° and back to the initial position. The number of flexings is 2 000, the rate of flexing being six per minute.

*NOTE 102* The iron is mounted so that the direction of flexing corresponds to that most likely to occur when the **supply cord** is wound around it for storage.

*NOTE 103* The test is not carried out if it is unlikely that the cord will be wrapped around the iron, for example **cordless irons** and irons with a separate water reservoir.

## **26. Terminals for external conductors**

This clause of TIS 1375 clause 26. is applicable.

## **27. Provision for earthing**

This clause of TIS 1375 clause 27. is applicable.

## **28. Screws and connections**

This clause of TIS 1375 clause 28. is applicable.

## **29. Clearances, creepage distances and solid insulation**

This clause of TIS 1375 clause 29. is applicable.

## **30. Resistance to heat and fire**

This clause of TIS 1375 clause 30. is applicable except as follows.

### **30.1** *Addition:*

For irons with **thermostats**, the temperature rises occurring during Clause 19 are not taken into consideration.

### **30.2.3** Not applicable.

## **31. Resistance to rusting**

This clause of TIS 1375 clause 31. is applicable.

### **32. Radiation, toxicity and similar hazards**

This clause of TIS 1375 clause 32. is applicable.

### **Annexes**

The annexes of TIS 1375 are applicable.