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Ordinance No. 24 of 2013 of the Ministry of Internal Affairs and Communications
Ministerial order to provide technical standards for electric leakage fire alarm

In accordance with the provision of Article 21-16 (3-1) of the Fire Service Act (Act No. 186 of 1948), the Ministerial order to revise all of the ministerial order to provide technical standards for electric leakage fire alarm (Ordinance of the Ministry of Home Affairs No. 15 of 1976) shall consist of the following parts.

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Chapter 1 General provisions

Purport

Article 1 This Ordinance covers the technical specifications applicable to the transformer and receiver of electric leakage fire alarm.

Definitions of terms

Article 2 In this Ordinance, the meanings of the terms listed in the following items shall be as prescribed in the respective items.

(i) Electric leakage fire alarm

A facility that detects a leaking current of a monitored electric circuit with a voltage of 600 V or less, alarms those who are concerned at the fire prevention target, and consists of a transformer and a receiver.

(ii) Current transformer

A device that automatically detects a leaked current in the monitored electric circuit and transmits it to the receiver.

(iii) Receiver

A device that receives signals from the current transformer to alarm the occurrence of electric leakage to those who are concerned at the fire prevention target.

(iv) Integrated receiver

A receiver that is used in the combination of two or more current transformers and consists of a set of devices such as power supplies and acoustic devices.

Type of current transformer

Article 3 Current transformers are categorized into the outdoor type and the indoor type depending on the structure.

General structure

Article 4 Each part of the electric leakage fire alarm shall be made of materials of fine quality, and its wiring and installation shall be properly and securely implemented.

- (2) The electric leakage fire alarm shall be durable.
- (3) The electric leakage fire alarm shall not generate a significant level of noise or electromagnetic interference.
- (4) The components in the electric leakage fire alarm shall be used within the range of ratings.
- (5) That charging part of the electric leakage fire alarm which is likely to be touched easily by people from outer area shall be sufficiently protected.
- (6) The parts of the electric leakage fire alarm other than its terminals shall be stowed in a sturdy enclosure case.
- (7) The terminals of the electric leakage fire alarm shall be easily and securely connected to electric wiring, including the earthing.
- (8) The terminals of the electric leakage fire alarm, excluding the built-in terminals in the earthing terminals and distribution panels, among others, shall have appropriate covers.
- (9) Earthing terminals shall be provided in the metal enclosure case of the current transformer or receiver whose rated voltage is greater than 60 V (including the metal enclosure cases where the outside of a non-metal, insular case attached with a decorative name plate, among others, with the insulation distance between the part and the charge part (only the ones whose voltage is greater than 60 V) of less than 4 millimeters in air clearance and less than 6 millimeters in creeping distance).

Structure and function of device or parts

Article 5 The device or parts in the electric leakage fire alarm in each of the following items shall have the structure and function as stipulated in each of the following items, or above the same level.

- (i) The acoustic device shall satisfy the requirements listed from (a) to (e) below:
 - (a) The acoustic device shall generate the sound at 90% of the rated voltage.
 - (b) The acoustic pressure of the acoustic device at the rated voltage shall be 70 dB or more at a point which is 1 meter in distance from the center of the acoustic device installed at a fixed location in an anechoic chamber (and in the case of the acoustic device installed inside a receiver, the location under that condition).
 - (c) For the acoustic device with an intermittent alarm sound, the interval of alarm sound shall be 2 seconds or less, and the beeping time shall be the interval or more.
 - (d) The insulation resistance between the charging part and the non-charging part shall be 5 megohms or more for the value measured with an insulation resistance meter of 500 V DC.
 - (e) The acoustic device shall continue to have the functions listed from (a) to (d) after 8 hours of continuous beeping at the rated voltage, and that the acoustic device shall not fail in structure.
- (ii) The electromagnetic relay shall comply with the requirements from (a) to (c) below:

- (a) The electromagnetic relay shall have the structure where dust and other foreign objects do not enter easily;
 - (b) The materials used in the contact shall meet the requirements from 1. to 5. below:
 - 1. Gold and silver alloy
 - 2. Gold, silver, and platinum alloy
 - 3. Platinum, gold, palladium, silver palladium alloy or rhodium
 - 4. For the contact point whose contact pressure is 0.35 newton or more, silver, silvering, silver plating, or silver cadmium oxide
 - 5. Spread, attachment, clad, or plating of one of the materials listed from 1. to 3.
 - (c) The contact point shall not be concurrently used with an external load. Note, however, that this does not necessarily apply to an external acoustic device contact point.
- (iii) The power transformer shall meet the requirements as stipulated in (a) and (b) below:
- (a) The performance of the power transformer shall comply with the insulation resistance, withstand voltage, voltage deviation, temperature increase in coil, and the voltage fluctuation rate as set forth in the Japanese industrial standards (as stipulated in Article 17(1) of the Industrial Standardization Act, Law No. 185 of 1949, hereinafter referred to as “JIS”) C 6436.
 - (b) The capacity shall withstand the continuous imposition of the maximum load current or the maximum load current by design at the rated voltage.
- (iv) The indicator lamp shall comply with the requirements from (a) to (c) below:
- (a) The light bulb, excluding discharge lamp and light-emitting diode (LED), shall not have cable disconnection, significant change in luminous flux, darkening, or significant decrease in current after 20 hours of continuous imposition of AC voltage at 130% of the rated voltage in the circuits in use.
 - (b) Two or more light bulbs shall be connected in parallel. Note, however, that this does not necessarily apply to discharge lamp and light-emitting diode.
 - (c) Under the condition of luminous intensity of 300 lux in the surroundings, the indicator lamp shall be able to be clearly recognized as lit up from 3 meters in distance in the front.
- (v) The switch shall meet the requirements from (a) to (c) below:
- (a) The switch shall function easily and securely, and the halting point shall be clear.
 - (b) The capacity of the contact point shall withstand the maximum usage current.
 - (c) The materials of the contact point (printed contact, conductive layer contact, among others, and treated with anti-corrosion measure) shall be one of the materials listed from 1. to 6. below:
 - 1. Gold and silver alloy
 - 2. Gold, silver, and platinum alloy
 - 3. Platinum, gold, palladium, silver palladium alloy or rhodium
 - 4. For the contact point whose contact pressure is 0.35 newton or more, or the contact point whose contact pressure is a pressing force by a finger such as when pressing a keyboard switch, silver, silvering, silver plating, or silver cadmium oxide
 - 5. In the case of a contact point whose contact pressure is 3 newtons or more, phosphor bronze, brass, or nickel silver.
 - 6. Spread, attachment, clad, or plating of one of the materials listed from 1. to 4.

- (vi) Indication electric meters shall meet the requirements for intrinsic error, insulation, and voltage examination as stipulated in JIS C 1102-1 and JIS C 1102-2.
- (vii) Fuse shall meet the requirements in (a) or (b) below:
 - (a) JIS C 8352
 - (b) JIS C 6575-1 and JIS C 6575-2

Attachment device

Article 6 The electric leakage fire alarm shall not have an attachment device that could impose harmful effects on its functions.

Value of nominal operating current

Article 7 The value of nominal operating current of the electric leakage fire alarm (refers to the value of required leaking current that the manufacturer has set for the electric leakage fire alarm to operate, hereinafter the same) shall be 200 mA or less.

- (2) The stipulations in the previous paragraph shall be applied on the minimum value of the adjustment scope for electric leakage fire alarms that have a sensitivity adjustment device.

Sensitivity adjustment device

Article 8 The maximum value of adjustment for electric leakage fire alarms that have a sensitivity adjustment device shall be 1 ampere or less.

Display

Article 9 The current transformer shall have a display of items in each of the following items at an easily seen place in the way the display items do not easily become erased.

- (i) The characters that state “current transformer for electric leakage fire alarm”
- (ii) Application number
- (iii) Type of device, either indoor type or outdoor type
- (iv) Rated voltage and rated current
- (v) Rated frequency
- (vi) Single-phase or three-phase, whichever is applicable
- (vii) Design output voltage
- (viii) Manufacturing year
- (ix) Manufacturer name, trademark, or marketer name
- (x) For terminals with polarity, the sign for that polarity
- (2) The receiver shall have a display of items in each of the following items, in accordance with the categorizations in each of the following items, at an easily seen place in the way the display items do not easily become erased.
 - (i) Receiver body
 - (a) The characters that state “receiver for electric leakage fire alarm”
 - (b) Application number
 - (c) Rated voltage
 - (d) Power supply frequency
 - (e) Value of nominal operating current

- (f) Working input voltage
- (g) Manufacturing year
- (h) Manufacturer name, trademark, or marketer name
- (i) For integrated receivers, the number of monitored circuits
- (j) Terminal signs for terminal plates (for terminals for power supply, terminal signs and the type of current, either AC or DC), and rated voltage and rated current
- (k) For parts, part number (excluding cases where part number is displayed nearby)
- (l) For the control parts, such as the switch, “on,” “off,” and other display, as well as usage instructions
- (m) For the fuse holder, the rated current of the fuse in use
- (n) Application number for the connectable current transformers
- (o) Other cautions for handling
- (p) Acoustic device
- (q) Type of current, AC or DC
- (r) Rated voltage and rated current
- (s) Manufacturing year
- (t) Manufacturer name or trademark
- (u) For terminals with polarity, the sign for that polarity

Test conditions

Article 10 The tests as stipulated from the next article to Article 23, as well as from Article 27 to Article 36, shall be performed under the condition at the surrounding temperature of 5 degrees centigrade or more and 35 degrees centigrade or less, with the relative humidity of 45% or more and 85% or less, unless otherwise stipulated in each article.

- (2) In the tests as stipulated in the next article and Article 13, the voltage or the frequency of the monitored circuits shall use the voltage or the frequency of the current transformer, and the load used in the connection to the monitored circuits shall use the net load resistance.
- (3) In the tests as stipulated in Article 14 and Article 15, the frequency of the circuit installed in the monitored circuits or the circuit where one of its wires is connected to the current transformer, shall use the rated frequency of the monitored circuits.
- (4) In the tests as stipulated from Article 27 to 32, as well as Article 36, a voltage of the receiver or the frequency of the receiver shall use the receiver’s rated voltage or rated frequency.

Chapter 2 Current transformer

Functions of current transformer

Article 11 The current transformer shall meet the requirements in each of the following items under the condition where current is not present in the monitored circuits in the test circuits as shown in Figure 1, or under the condition where the rated current of the current transformer is present at the rated frequency of the current transformer. In these cases, the measurement of output voltage value for the current transformer shall be implemented by connecting the output terminals with the impedance which is the equivalent of the input impedance of the receiver connected to the current transformer through the input terminal (hereinafter referred to as “the load resistance”).

- (i) In the case where the test current is flown from 0 mA to 1,000 mA, the output voltage value shall change proportionately to the test current value.
- (ii) In the case the nominal operating current value of the receiver connected to the current transformer is flown as the test current, the variation range of the output voltage value shall stay within the scope from 75% to 125% of the design output voltage value that meets the nominal operating current value.
- (iii) In the case the test current that is 42% of the nominal operating current value of the receiver connected to the current transformer is flown, the output voltage value shall be 52% or less of the design output voltage value that corresponds with the nominal operating current value.
- (2) For current transformers that have the wires of the monitored circuits pierce through the transformers themselves, the functions as stipulated in the previous paragraph shall be retained under the condition where each wire of the monitored circuits pierce through the transformer in the way the electromagnetic coupling strength toward the transformer of the wires does not achieve equilibrium.

Surrounding temperature test

Article 12 The indoor-type current transformer shall not fail in its structure and the functions as stipulated in the previous article after being left under the surrounding temperatures of 10 degrees Celsius below zero and 60 degrees Celsius for 12 hours each.

- (2) The outdoor-type current transformer shall not fail in its structure and the functions as stipulated in the previous article after being left under the surrounding temperatures of 20 degrees Celsius below zero and 60 degrees Celsius for 12 hours each.

On/off test for circuits

Article 13 The output voltage value of the current transformer shall stay below 52% of the design output voltage value that corresponds with the nominal operating current value for the connected receiver in the case where a load resistance is connected to the output terminal, and under the condition of flowing 150% of the rated current of the current transformer in the monitored circuit, the switch of the monitored circuits shall be turned on and off for five times in 1 minute.

Strength test for short circuit current

Article 14 The current transformer shall not fail in its structure and the functions as stipulated in Article 11 when load resistance is connected to the output terminal as in Figure 2, where an overcurrent circuit breaker is set up on the power supply side of the monitored circuit, and the rated voltage of the current transformer (for current transformers that have the electric wires of the monitored circuits pierce through the transformer itself, random voltage which is less than the rated voltage of the transformer) is flown in the monitored circuits, with the short-circuit power factor from 0.3 to 0.4 at 2,500 A, with a two-minute interval for 0.02 second for twice.

Excessive leakage test

Article 15 The current transformer shall not fail in its structure and the functions as stipulated in Article 11 when a wire is connected to the current transformer as shown in Figure 3, where load

resistance is connected to the output terminal, to flow a current at 20% of the rated current as the current value in the wire for five minutes.

Aging test

Article 16 The current transformer shall not fail in its structure and the functions as stipulated in Article 11 after being left in the air at 65 degrees Celsius for 30 days.

Water-proof test

Article 17 The outdoor-type current transformer shall meet the requirements in each of the following items after repeating twice of the following set of procedure – to be soaked in clean water of 65 degrees Celsius for 15 minutes, to be soaked in a saturated solution made of sodium chloride at 0 degrees Celsius for 15 minutes.

- (i) The outdoor-type current transformer shall pass the test in Article 20 under the condition of being soaked in the saturated solution.
- (ii) The outdoor-type current transformer shall pass the test in Article 21 under the condition of being pulled out from the saturated solution, and it shall not fail in its structure and the functions as stipulated in Article 11.

Vibration test

Article 18 The current transformer shall not fail in its structure and the functions as stipulated in Article 11 when vibrations of 1,000 times per minute in random directions are imposed at total amplitude of 4 millimeters continuously for 60 minutes.

Impact test

Article 19 The current transformer shall not fail in its structure and the functions as stipulated in Article 11 when the impact that is 50 times the size of the standard gravitational acceleration in random directions is imposed 5 times.

Insulation resistance test

Article 20 The insulation resistance of the current transformer shall be 5 megohm or more in the measurement by a 500 V DC insulation resistance tester when measured between the primary winding and the secondary winding, and between the primary winding and/or the secondary winding and the external metal part.

Dielectric strength test

Article 21 The insulation resistance in the test part in the previous article shall withstand a one-minute imposition of an AC voltage with the effective voltage 1,500 V that is close to the sine wave at 50 Hz or 60 Hz (in the case the voltage in the monitored circuits exceeds 250 V, the value obtained by multiplying the voltage in the monitored circuits by 2, and then added with 1,000 V).

Shock wave withstand voltage test

Article 22 The current transformer shall not fail in its structure and the functions as stipulated in Article 11 when the impact wave voltage of 6 kilovolts in peak value, from the wave peak length of

0.5 microsecond to 1.5 microseconds, as well as the duration of wave tail from 32 microseconds to 48 microseconds, both positive and negative, is imposed between the primary winding (for the current transformers that have the electric wires of the monitored circuits pierce through the transformer itself, the monitored circuits) and the external metal part, as well as between each of the primary windings, for one time each.

Voltage drop prevention test

Article 23 The voltage drop of the monitored circuits of the current transformer (excluding the type where the electric wires of the monitored circuits pierce through the transformer itself), when the rated current is flown in the monitored circuits, shall be 0.5 V or less.

Chapter 3 Receiver

The structure of receiver

Article 24 The structure of the receiver shall meet the requirements in each of the following items:

- (i) The receiver shall have a device that displays the state of power supply. In this case, the power supply display shall be clearly distinguishable from the electric leakage display in color.
- (ii) The acoustic device in the receiver on the side of the power on and outside the receiver, and the circuit that is wired in the way to supply power directly to display lamps, among others, shall have effective protection in the case of short circuit in the external circuits.
- (iii) The sensitivity control, other than the sensitivity adjustment device, shall not be exposed on the external surface of the case.

Test device

Article 25 The receiver shall be installed with a test device that is able to impose not more than 2.5 times the design output voltage that corresponds with the nominal operating current value onto its input terminal, as well as a test device that is able to examine whether disconnection has occurred or not in the external wiring that leads toward the current transformer.

- (2) The test devices as stipulated in the previous paragraph shall meet the requirements in each of the following items:
 - (i) The test device may be easily manually manipulated from the front of the receiver;
 - (ii) The test device shall have appropriate mechanisms where the test operator would not forget to bring back switches and connections to the original positions.
 - (iii) With regards to collective receivers, test shall be able to be performed for each circuit, in addition to the stipulations in Item 2 above.

Leakage display

Article 26 The receiver shall automatically display electric leakage by giving a red-color display and emitting an acoustic signal in the case the receiver receives signals from the current transformer.

Receiver functions

Article 27 The receiver shall not operate within 30 seconds when 52% of the receiver's design output voltage that corresponds with the nominal operating current value as shown in Figure 4 is imposed, and at the same time, the receiver shall operate within one second when 75% of the receiver's design output voltage that corresponds with the nominal operating current value is imposed.

- (2) The collective receiver shall meet the requirements in each of the following items, in addition to the requirements in the previous paragraph:
 - (i) The collective receiver shall have a display device which clearly identifies and displays the monitored circuit where the leakage has occurred.
 - (ii) The device as stipulated in the previous item shall be able to continuously identify and display the monitored circuit where the leakage has occurred even after the monitored circuit is shut down.
 - (iii) In the case leaking current has occurred concurrently in two monitored circuits, the device shall display leakage and monitored circuits.
 - (iv) In the case leaking current has occurred continuously in more than two monitored circuits, the device shall have the capacity that is able to withstand the maximum load.

Power supply voltage fluctuation test

Article 28 The receiver shall not fail in the functions as stipulated in the previous article in the case the receiver's power supply voltage is fluctuated between 90% to 110% of the rated voltage.

Surrounding temperature test

Article 29 The receiver shall not fail in its structure and the functions as stipulated in Article 27 after being left for at least 12 hours each under the surrounding temperatures of 10 degrees Celsius below zero and 40 degrees Celsius.

Excessive input voltage test

Article 30 The receiver shall display leakage and shall not fail in its structure and the functions as stipulated in Article 27 after a 50 V voltage is imposed on the signal input circuit, as shown in the test circuit in Figure 5, for five minutes via the insulation that is equivalent of the impedance of the current transformer.

Repeat test

Article 31 The receiver shall not fail in its structure and the functions as stipulated in Article 27 after 10,000 times of leak operations are imposed at the rated voltage of the receiver.

Vibration test

Article 32 The receiver shall not malfunction (the operation starts due to reasons other than the cause of leaking current) when vibrations of 1,000 times per minute in random directions are imposed at total amplitude of 1 millimeter continuously for 10 minutes.

- (2) The receiver shall not fail in its structure and the functions as stipulated in Article 27 when vibrations of 1,000 times per minute in random directions are imposed at total amplitude of 4 millimeters continuously for 60 minutes.

Impact test

Article 33 The receiver shall not fail in its structure and the functions as stipulated in Article 27 when the impact that is 50 times the size of the standard gravitational acceleration in random directions is imposed 5 times.

Insulation resistance test

Article 34 The insulation resistance of the transformer shall be 5 megohms or more in the measurement by a 500 V DC insulation resistance tester when measured between the charge part and its external metal case (including ones with an insulated case attached with a metal name plate and other parts).

Dielectric strength test

Article 35 The insulation resistance in the test part in the previous article shall withstand a one-minute imposition of an AC voltage with the effective voltage 500 V that is close to the sine wave at 50 Hz or 60 Hz (in the case the rated voltage (for the charge part on the primary side, the rated voltage of the primary side; for the charge part on the secondary side, the rated voltage of the secondary side, hereinafter the same in this article) exceeds 30 V but not more than 150 V, add 1,000 V, and in the case of exceeding 150 V, the value obtained by multiplying the rated voltage by 2, and then added with 1,000 V).

Shock wave withstand voltage test

Article 36 The receiver shall not fail in its structure and the functions as stipulated in Article 27 when the impact wave voltage of 6 kilovolts in peak value, from the wave peak length of 0.5 microsecond to 1.5 microseconds, as well as the duration of wave tail from 32 microseconds to 48 microseconds, both positive and negative, is imposed in the test circuit as shown in Figure 6, between the different pole terminals, as well as between the power supply terminal and the case, for one time each.

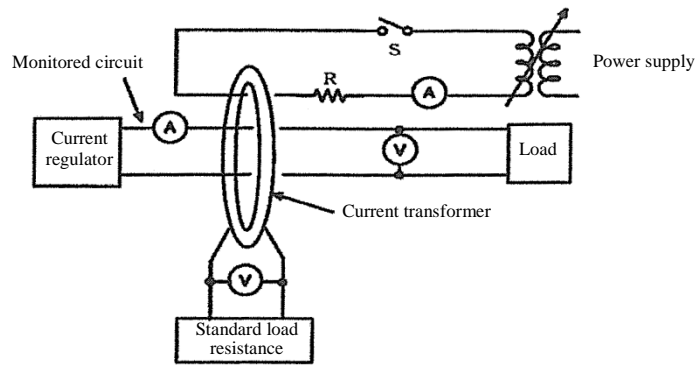
Chapter 4 Miscellaneous provisions

Exceptions to the standards

Article 37 For the current transformer and receiver that have been newly developed, for which the Minister of Internal Affairs and Communications deemed to have the equivalent to or better performance than the products that comply with the stipulations in this ministerial order, based on the form, structure, materials, and performance, may be deemed to have passed the technical standards set by the Minister of Internal Affairs and Communications, regardless of the stipulations in this ministerial order.

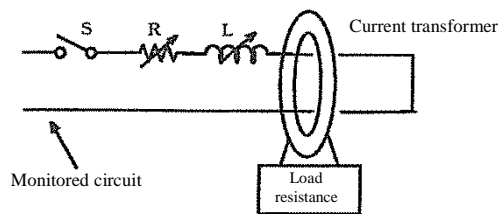
Supplementary Provisions

This ministerial order shall take effect on April 1, 2014.



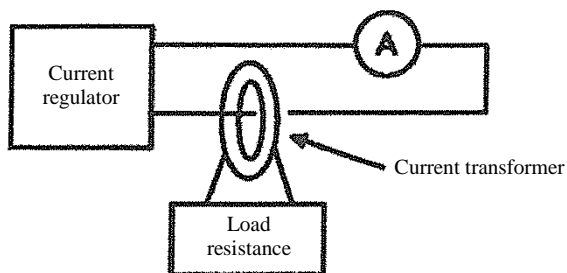
Note: The locations for the current transformer and the monitored circuit shall be determined by the installation method of the current transformer.

Figure 1 Functional test for current transformers (concerning Paragraph 1, Article 11)



Note: The locations for the current transformer and the monitored circuit shall be determined by the installation method of the current transformer.

Figure 2 Strength test for short circuit current (concerning Article 14)



Note: The locations for the current transformer and the monitored circuit shall be determined by the installation method of the current transformer.

Figure 3 Excessive leakage test (concerning Article 15)

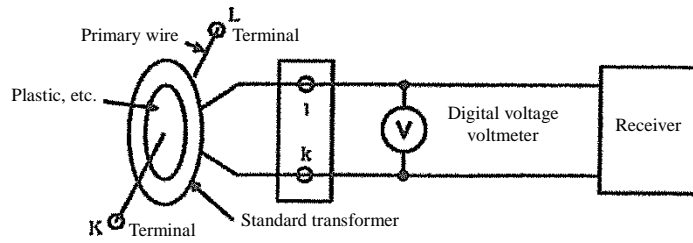


Figure 4 Receiver function test (concerning Paragraph 1, Article 27)

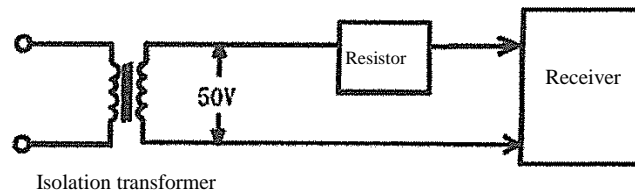
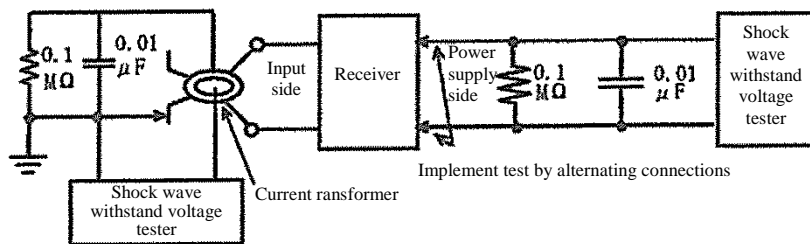


Figure 5 Excessive input voltage test (concerning Article 30)

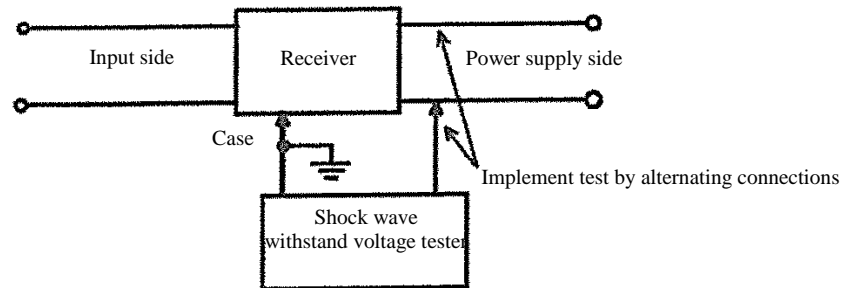
Figure 6 Shock wave withstand voltage test (concerning Article 36)

- (1) In the case of non-energized state
 - a. Between different power supply poles



Note: The locations for the current transformer and the monitored circuit shall be determined by the installation method of the current transformer.

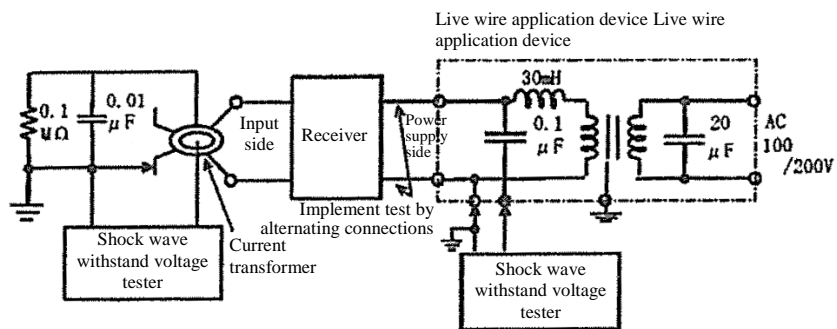
(b) Between the power supply terminal and the case



Note: In the case of a plastic case, place the receiver on a metal plate, and conduct the test between the metal plate and the power supply terminal.

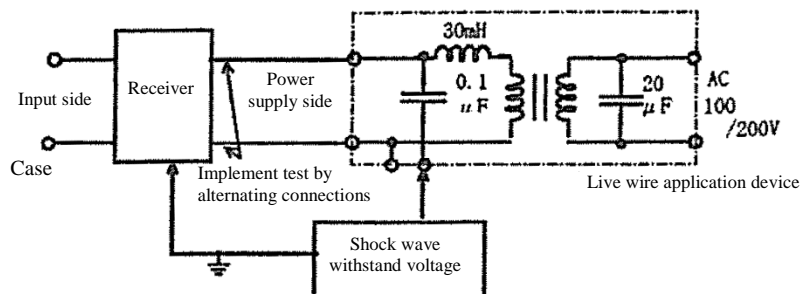
(2) In the case of energized state

a. Between different power supply poles



Note: The locations for the current transformer and the monitored circuit shall be determined by the installation method of the current transformer.

(b) Between the power supply terminal and the case



Note: In the case of a plastic case, place the receiver on a metal plate, and conduct the test between the metal plate and the power supply terminal.