TEST REPORT
NMX-J-521/1-ANCE-2005
HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES-SAFETY
PART 1: GENERAL REQUIREMENTS

Test Report No.

Applicant:

Address:

Sample:

Trademark:

Model:

Serial Number: Engineering sample without serial number

Representative:

Standard Applied: NOM-003-SCFI-2000
(NMX-J-521/1-ANCE-2005)
Safety Requirements of Household
and similar electrical appliances

Reception Date:

Termination Date:

Product category:

INDEX

1.- EQUIPMENT

DESCRIPTION	TRADEMARK	MODEL	Date of next Calibraton	SERIAL NUMBER

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Clause	Requirement - Test	Result - Remark	Verdict
6	CLASSIFICATION		
6.1	Protection against electric shock: Class 0, 0I, I, II, III:		
7	MARKING AND INSTRUCTIONS		
7.1	Rated voltage or voltage range (V):		
	Nature of supply:		
	Rated frequency (Hz):		
	Rated power input (W)::		
	Rated current (A):		
	Manufacturer's or responsible vendor's name, trademark or identification mark:		
	Model or type reference:		
	Symbol 5172 of IEC 60417, for Class II appliances		
	Information related to battery compartments that could be change by the user		
7.2	Warning for stationary appliances for multiple supply		
	Warning placed in vicinity of terminal cover		
7.3	Range of rated values marked with the lower and upper limits separated by a hyphen		
	Different rated values marked with the values separated by an oblique stroke		
7.4	Appliances adjustable for different rated voltages, the voltage setting is clearly discernible		
7.5	Appliances with more than one rated voltage or one or more rated voltage ranges, marked with rated input or rated current for each rated voltage or range, unless		
	the power input is related to the mean value of the rated voltage range		
	Relation between marking for upper and lower limits of rated power input or rated current and voltage is clear		
7.6	Correct symbols used		
7.7	Connection diagram fixed to appliances to be connected to more than two supply conductors and appliances for multiple supply		

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Clause	Requirement - Test	Result - Remark	Verdict
7.8	Except for type Z attachment, terminals for connection to the supply mains indicated as follows:		
	- marking of terminals exclusively for the neutral conductor (N)		
	- marking of protective earthing terminals (symbol 5019 of IEC 60417)		
	- marking not placed on removable parts		
7.9	Marking or placing of switches which may cause a hazard		
7.10	Indications of switches on stationary appliances and controls on all appliances by use of figures, letters or other visual means:		
	The figure 0 indicates only OFF position, unless no confusion with the OFF position		
7.11	Indication for direction of adjustment of controls		
7.12	Instructions for safe use provided		
	Appliance powered by rechargeable batteries, rechargeable procedures must be indicated.		
7.12.1	Sufficient details for installation supplied		
7.12.2	Stationary appliances not fitted with means for disconnection from the supply mains having a contact separation in all poles that provide full disconnection under overvoltage category III, the instructions state that means for disconnection must be incorporated in the fixed wiring in accordance with the wiring rules		
7.12.3	Insulation of the fixed wiring in contact with parts exceeding 50 K during clause 11; instructions stating that the fixed wiring must be protected		
7.12.4	Instructions for built-in appliances:		
	- dimensions of space		
	- dimensions and position of supporting means		
	- distances between parts and surrounding structure		
	- dimensions of ventilation openings and arrangement		
	- connection to supply mains and interconnection of separate components		
	- plug accessible after installation, unless		

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	a switch complying with 24.3		
7.12.5	Replacement cord instructions, type X attachment with a specially prepared cord		
	Replacement cord instructions, type Y attachment		
	Replacement cord instructions, type Z attachment		
7.12.6	Caution in the instructions for heating appliances with a non-self-resetting thermal cut-out		
7.12.7	Instructions for fixed appliances stating how the appliance is to be fixed		
7.12.8	Instructions for appliances connected to the water indicate max. and min. inlet water pressure (Pa)		
	Instructions concerning new and old hose-sets for appliances connected to the water mains by detachable hose-sets		
7.13	Instructions and other texts in an official language		
7.14	Marking clearly legible and durable		
7.15	Marking on a main part		
	Marking clearly discernible from the outside, if necessary after removal of a cover		
	For stationary appliances, name, trademark or identification mark and model or type reference visible after installation		
	For fixed appliances, name, trademark or identification mark and model or type reference visible after installation according to the instructions		
	Indications for switches and controls placed on or near the components. Marking not on parts which can be positioned or repositioned in such a way that the marking is misleading		
7.16	Marking of a possible replaceable thermal link or fuse link clearly visible with regard to replacing the link		
8	PROTECTION AGAINST ACCESS TO LIVE PARTS		
8.1	Adequate protection against accidental contact with live parts		
8.1.1	Requirement applies for all positions, detachable parts removed		
	Insertion or removal of lamps, protection against contact with live parts of the lamp cap		
	Use of test probe B of IEC 61032: no contact with live parts		

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Clause	Requirement - Test	Result - Remark	Verdict
8.1.2	Use of test probe 13 of IEC 61032 through openings in class 0 appliances and class II appliances/ constructions: no contact with live parts		
	Test probe 13 also applied through openings in earthed metal enclosures having a non-conductive coating: no contact with live parts		
8.1.3	For appliances other than class II, use of test probe 41 of IEC 61032: no contact with live parts of visible glowing heating elements		
8.1.4	Accessible part not considered live if:		
	- safety extra-low a.c. voltage: peak value not exceeding 42.4 V		
	- safety extra-low d.c. voltage: not exceeding 42.4 V		
	- or separated from live parts by protective impedance		
	If protective impedance: d.c. current not exceeding 2 mA, and		
	a.c. peak value not exceeding 0.7 mA		
	- for peak values over 42.4 V up to and including 450 V, capacitance not exceeding 0,1 μF		
	- for peak values over 450 V up to and including 15 kV, discharge not exceeding 45 μC		
	Any energized part is considered to be a live part (IEC60335-2-60:2002)		
8.1.5	Live parts protected at least by basic insulation before installation or assembly:		
	- built-in appliances		
	- fixed appliances		
	- appliances delivered in separate units		
8.2	Class II appliances and constructions constructed so that there is adequate protection against accidental contact with basic insulation and metal parts separated from live parts by basic insulation only		
	Only possible to touch parts separated from live parts by double or reinforced insulation		
9	STARTING OF MOTOR-OPERATED APPLIANCES		
	Requirements and tests are specified in part 2 when necessary		
	This clause of part 1 not applicable (IEC60335-2-60:2002)		

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Clause	Requirement - Test	Result - Remark	Verdict
10	POWER INPUT AND CURRENT		P
10.1	Power input at normal operating temperature, rated voltage and normal operation not deviating from rated power input by more than shown in table 1		
10.2	Current at normal operating temperature, rated voltage and normal operation not deviating from rated current by more than shown in table 2		
11	HEATING		
11.1	No excessive temperatures in normal use		
11.2	Placing and mounting of appliance as described		
11.3	Temperature rises, other than of windings, determined by thermocouples		
	Temperature rises of windings determined by resistance method, unless		
	the windings makes it difficult to make the necessary connections		
11.4	Heating appliances operated under normal operation at 1.15 times rated power input:		
	Heating appliances operated under normal operation at 1,06 times rated power input when the temperature rise limits are exceeded in appliances incorporating motors, transformers or electronic circuits with a power input is lower than the rated power input		
11.5	Motor-operated appliances operated under normal operation at most unfavourable voltage between 0.94 and 1.06 times rated voltage:		
11.6	Combined appliances operated under normal operation at most unfavourable voltage between 0.94 and 1.06 times rated voltage:		
11.7	Operation duration corresponding to the most unfavourable conditions of normal use		
11.8	Temperature rises not exceeding values in table 3		
	Protective devices do not operate		
	Sealing compound does not flow out		
13	LEAKAGE CURRENT AND ELECTRIC STRENGTH AT OPERATING TEMPERATURE		
13.1	Leakage current not excessive and electric strength adequate		
	Heating appliances operated at 1.15 times rated power input:		

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Clause	Requirement - Test	Result - Remark	Verdict
	Motor-operated appliances and combined appliances supplied at 1.06 times rated voltage:		
	Protective impedance and radio interference filters disconnected before carrying out the tests		
13.2	Leakage current measured by means of the circuit described in figure 4 of IEC 60990		
	Leakage current measurements		
13.3	Electric strength tests according to table 4		
	No breakdown during the tests		
14	TRANSIENT OVERVOLTAGES		
	Appliances withstand the transient overvoltages to which they may be subjected		
	Clearances having a value less than specified in table 16 subjected to an impulse voltage test, the test voltage specified in table 6		
	No flashover during the test, unless of functional insulation		
	In case of flashover of functional insulation, the appliance complies with clause 19 with the clearance short circuited		
15	MOISTURE RESISTANCE		
15.1	Enclosure provides the degree of moisture protection according to classification of the appliance		
	Compliance checked as specified in 15.1.1, taking into account 15.1.2, followed by the electric strength test of 16.3		
	No trace of water on insulation which can result in a reduction of clearances and creepage distances below values specified in clause 29		
15.1.1	Appliances, other than IPX0, subjected to tests as specified in IEC 60529:		
15.1.2	Hand-held appliance turned continuously through the most unfavourable positions during the test		
	Built-in appliances installed according to the instructions		
	Appliances placed or used on the floor or table placed on a horizontal unperforated support		
	Appliances normally fixed to a wall and appliances with pins for insertion into socket-outlets are mounted on a wooden board		
	For IPX3 appliances, the base of wall mounted appliances is placed at the same level as the pivot axis of the oscillating tube		

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Clause	Requirement - Test	Result - Remark	Verdict
	For IPX4 appliances, the horizontal centre line of the appliance is aligned with the pivot axis of the oscillating tube		
	However, for appliances normally used on the floor or table, the movement is limited to two times 90° for a period of 5 min, the support being placed at the level of the pivot axis of the oscillating tube		
	Wall-mounted appliances, take into account the distance to the floor stated in the instructions		
	Appliances with type X attachment fitted with a flexible cord as described		
	Detachable parts tested as specified		
15.2	Spillage of liquid does not affect the electrical insulation		
	Appliances with type X attachment fitted with a flexible cord as described		
	Appliances incorporating an appliance inlet tested with or without an connector, whichever is most unfavourable		
	Detachable parts removed		
	Overfilling test with additional amount of water, over a period of 1 min (l):		
	The appliance withstands the electric strength test of 16.3		
	No trace of water on insulation that can result in a reduction of clearances and creepage distances below values specified in clause 29		
15.3	Appliances proof against humid conditions		
	Humidity test for 48 h in a humidity cabinet		
	The appliance withstands the tests of clause 16		
16	LEAKAGE CURRENT AND ELECTRIC STRENGTH		
16.1	Leakage current not excessive and electric strength adequate		
	Protective impedance disconnected from live parts before carrying out the tests		
16.2	Single-phase appliances: test voltage 1.06 times rated voltage:		
	Three-phase appliances: test voltage 1.06 times rated voltage divided by √3:		
	Leakage current measurements		

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Clause	Requirement - Test		Verdict
16.3	Electric strength tests according to table 7		
	No breakdown during the tests		
17	OVERLOAD PROTECTION OF TRANSFORMERS AND ASSOCIATED CIRCUITS		
	No excessive temperatures in transformer or associated circuits in event of short-circuits likely to occur in normal use		
	Appliance supplied with 1.06 or 0.94 times rated voltage and the most unfavourable short-circuit or overload likely to occur in normal use applied:		
	Temperature rise of insulation of the conductors of safety extra-low voltage circuits not exceeding the relevant value specified in table 3 by more than 15 K		
	Temperature of the winding not exceeding the value specified in table 8,		
	however limits do not apply to fail-safe transformers complying with sub-clause 15.5 of IEC 61558-1		
18	ENDURANCE		
	Requirements and tests are specified in part 2 when necessary		
19	ABNORMAL OPERATION		
19.1	Devises that could be supplied with rechargeable batteries shall subject to the test specified in 19.101, 19.102, 19.103		
19.101	Devises are supplied with rated tension for 148 h and rechargeable batteries are continuously charged.		
19.102	Devises with batteries that could dismount without the help of a tool, including covers and terminals that could shortcut connected using a thin rigid wire, batteries terminals connect in shortcut.		
19.103	Devises with batteries that could be replaced by the user are supplied to rated tension and makes works under normal conditions without the batteries mounted.		
19.2	Test of appliance with heating elements with restricted heat dissipation; test voltage (V): power input of 0.85 times rated power input:		
19.3	Test of 19.2 repeated; test voltage (V): power input of 1.24 times rated power input:		
19.4	Test conditions as in cl. 11, any control limiting the temperature during tests of cl. 11 short-circuited		

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Clause	Requirement - Test	Result - Remark	Verdict
19.5	Test of 19.4 repeated on Class 0I and I appliances with tubular sheathed or embedded heating elements. No short-circuiting, but one end of the element connected to the elements sheath		
	The test repeated with reversed polarity and the other end of the heating element connected to the sheath		
19.6	Appliances with PTC heating elements tested at rated voltage, establishing steady conditions. The working voltage of the PTC heating element is increased by 5% and the appliance is operated until steady conditions are re-established. The voltage is then increased in similar steps until 1.5 times working voltage or until the PTC heating element ruptures		
19.7	Stalling test by locking the rotor if the locked rotor torque is smaller than the full load torque or locking moving parts of other appliances Locked rotor, motor capacitors open-circuited or short-circuited, if required Locked rotor, capacitors open-circuited one at a time Test repeated with capacitors short-circuited one at a time, if required		
19.8	Three-phase motors operated at rated voltage with one phase disconnected		
19.9	Running overload test on appliances incorporating motors intended to be remotely or automatically controlled or liable to be operated continuously		
19.10	Series motor operated at 1.3 times rated voltage for 1 min:		
	During the test, parts not being ejected from the appliance		
19.11	Electronic circuits, compliance checked by evaluation of the fault conditions specified in 19.11.2 for all circuits or parts of circuits, unless they comply with the conditions specified in 19.11.1		
19.11.1	Before applying the fault conditions a) to f) in 19.11.2, it is checked if circuits or parts of circuit meet both of the following conditions:		
	- the electronic circuit is a low-power circuit, that is, the maximum power at low-power points does not exceed 15 W according to the tests specified		
	- the protection against electric shock, fire hazard, mechanical hazard or dangerous malfunction in other parts of the appliance does not rely on the correct functioning of the electronic circuit		

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Clause	Requirement - Test	Result - Remark	Verdict
19.11.2	The following fault conditions are considered and, if necessary, applied one at a time, consequential faults being taken into consideration:.		
19.12	If the safety of the appliance for any of the fault conditions specified in 19.11.2 depends on the operation of a miniature fuse-link complying with IEC 60127, the test is repeated, measuring the current flowing through the fuse-link; measured current (A); rated current of the fuse-link (A):		
19.13	During the tests the appliance does not emit flames, molten metal, poisonous or ignitable gas in hazardous amounts		
	Temperature rises not exceeding the values shown in table 9		
	Enclosures not deformed to such an extent that compliance with cl. 8 is impaired		
	If the appliance can still be operated it complies with 20.2		
	Insulation, other than of class III appliance, withstand the electric strength test of 16.3, the test voltage specified in table 4:		
	- basic insulation:		
	- supplementary insulation:		
	- reinforced insulation:		
	For appliances which are immersed in or filled with conducting liquid in normal use, the appliance is immersed in or filled with water 24 h before the dielectric strength test is made.		
	The devices should not present a dangerous malfunction, and no failure in protective electronic circuits should be if the device can still operate		
	Devices that are tested with an electronic switch in the off position or in standby, they should not operate		
20	STABILITY AND MECHANICAL HAZARDS		
20.1	Adequate stability		
	Tilting test through an angle of 10° (appliance placed on an inclined plane/horizontal plane); appliance does not overturn		
	Tilting test repeated on appliances with heating elements, angle of inclination increased to 15°		
	Possible heating test in overturned position; temperature rise does not exceed values shown in table 9		
20.2	Moving parts adequately arranged or enclosed as to provide protection against personal injury		

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Clause	Requirement - Test	Result - Remark	Verdict
	Protective enclosures, guards and similar parts are non-detachable		
	Adequate mechanical strength and fixing of protective enclosures		
	Self-resetting thermal cut-outs and overcurrent protective devices not causing a hazard, by unexpected reclosure		
	Not possible to touch dangerous moving parts with test probe		
21	MECHANICAL STRENGTH		
21.1	Appliance has adequate mechanical strength and is constructed as to withstand rough handling No damage after three blows applied to various parts of the enclosure, impact energy 0,5 ± 0,04 J If necessary, supplementary or reinforced insulation subjected to the electric strength test of 16.3		
21.2	Accessible parts of solid insulate shall have adequate resistance to prevent penetration of sliding objects.		
	Insulation warming up to the temperature measured in test of clause 11, then the scratch the surface with test finger nail pin reinforced with a 40 º cone side. Then with test finger nail pushing again to scratch surface with 10 N force, no damage shall occurred and insulation shall pass dielectric test in clause 16.3		
	The hardened steel pin is then applied perpendicularly with a force of 30 N ± 0,5 N to an unscratched part of the surface. The insulation shall then withstand the electric strength test of 16.3 with the pin still applied and used as one of the electrodes.		
22	CONSTRUCTION		
22.2	Stationary appliance: means to provide all-pole disconnection from the supply provided, the following means being available:		
	- a supply cord fitted with a plug		
	- a switch complying with 24.3		
	- a statement in the instruction sheet that a disconnection incorporated in the fixed wiring is to be provided		
	- an appliance inlet		
	Singe-pole switches and single-pole protective devices for the disconnection of heating elements in single-phase permanently connected class I appliances, connected in the phase conductor		

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Clause	Requirement - Test	Result - Remark	Verdict
22.3	Appliance provided with pins: no undue strain on socket-outlets		
	Applied torque not exceeding 0.25 Nm	Torque:	
	A new sample of the appliance is firmly held so that the retention of the pins is not affected. The appliance is placed in a heating cabinet for 1 h at a temperature of 70 °C ± 2 °C.		
	Each pin subjected to a tork of 0.4Nm; the pins are not rotating unless rotating does not impair compliance with the standard		
22.4	Appliance for heating liquids and appliance causing undue vibration not provided with pins for insertion into socket-outlets		
22.5	No risk of electric shock when touching the pins of the plug		
22.6	Electrical insulation not affected by condensing water or leaking liquid		
	Electrical insulation of Class II appliances not affected in case of a hose rupture or seal leak		
22.7	Appliances containing liquids or gases during normal use or provided with steam producing devices, shall incorporate adequate safeguards against the risk of excessive pressure.		
22.8	Electrical connections not subject to pulling during cleaning of compartments to which access can be gained without the aid of a tool, and that are likely to be cleaned in normal use		
22.9	Insulation, internal wiring, windings, commutators and slip rings not exposed to oil, grease or similar substances		
	Adequate insulating properties of oil or grease to which insulation is exposed		
22.10	Location or protection of reset buttons of non-self-resetting controls is so that accidental resetting is unlikely		
22.11	Non-detachable parts which provide the necessary degree of protection against electric shock, moisture or contact with moving parts, shall be fixed in a reliable manner and shall withstand the mechanical stress occurring in normal use.		

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Clause	Requirement - Test	Result - Remark	Verdict
	Non-detachable parts which provide the necessary degree of protection against electric shock, moisture or contact with moving parts, shall be fixed in a reliable manner and shall withstand the mechanical stress occurring in normal use.		
	Push force test		
	Traction test		
	Torsion force test		
22.12	Handles, knobs etc. fixed in a reliable manner		
	Fixing in wrong position of handles, knobs etc. indicating position of switches or similar components not possible		
	Axial force 15 N applied to parts, the shape being so that an axial pull is unlikely to be applied		
	Axial force 30 N applied to parts, the shape being so that an axial pull is likely to be applied		
22.13	Unlikely that handles, when gripped as in normal use, make the operators hand touch parts having a temperature rise exceeding the value specified for handles which are held for short periods only		
22.14	No ragged or sharp edges creating a hazard for the user in normal use, or during user maintenance		
	No exposed pointed ends of self tapping screws etc., liable to be touched by the user in normal use or during user maintenance		
22.15	Storage hooks and the like for flexible cords smooth and well rounded		
22.16	Automatic cord reels cause no undue abrasion or damage to the sheath of the flexible cord, no breakage of conductors strands, no undue wear of contacts		
	Cord reel tested with 6000 operations, as specified		
	Electric strength test of 16.3, voltage of 1000 V applied		
22.17	Spacers not removable from the outside by hand or by means of a screwdriver or a spanner		
22.18	Current-carrying parts and other metal parts resistant to corrosion under normal conditions of use		
22.19	Driving belts not used as electrical insulation		
22.20	Direct contact between live parts and thermal insulation effectively prevented, unless material used is non-corrosive, non-hygroscopic and non-combustible		
	Compliance is checked by inspection and, if necessary, by appropriate test		
22.21	Wood, cotton, silk, ordinary paper and fibrous or hygroscopic material not used as insulation, unless impregnated		

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Clause	Requirement - Test	Result - Remark	Verdict
22.22	Appliances not containing asbestos		
22.23	Oils containing polychlorinated biphenyl (PCB) not used		
22.24	Bare heating elements adequately supported		
	In case of rupture, the heating conductor is unlikely to come in contact with accessible metal parts		
22.25	Sagging heating conductors cannot come into contact with accessible metal parts		
22.26	The insulation between parts operating at safety extra-low voltage and other live parts complies with the requirements for double or reinforced insulation		
22.27	Parts connected by protective impedance separated by double or reinforced insulation		
22.28	Metal parts of Class II appliances conductively connected to gas pipes or in contact with water: separated from live parts by double or reinforced insulation		
22.29	Class II appliances permanently connected to fixed wiring so constructed that the required degree of access to live parts is maintained after installation		
22.30	Parts serving as supplementary or reinforced insulation fixed so that they cannot be removed without being seriously damaged, or		
	so constructed that they cannot be replaced in an incorrect position, and so that if they are omitted, the appliance is rendered inoperable or manifestly incomplete		
22.31	Clearances and creepage distances over supplementary and reinforced insulation not reduced below values specified in clause 29 as a result of wear		
	Clearances and creepage distances between live parts and accessible parts not reduced below values for supplementary insulation, if wires, screws etc. become loose		
22.32	Supplementary and reinforced insulation designed or protected against deposition of dirt or dust		
	Supplementary insulation of natural or synthetic rubber resistant to ageing, or arranged and dimensioned so that creepage distances are not reduced below values specified in 29.2		
	Ceramic material not tightly sintered, similar material or beads alone not used as supplementary or reinforced insulation		
	Oxygen bomb test at 70 °C for 96 h and 16 h at room temperature		

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Clause	Requirement - Test	Result - Remark	Verdict
22.33	Conductive liquids that are or may become accessible in normal use are not in direct contact with live parts		
	Electrodes not used for heating liquids		
	For class II constructions, conductive liquids that are or may become accessible in normal use, not in direct contact with basic or reinforced insulation		
	For class II constructions, conductive liquids which are in contact with live parts, not in direct contact with reinforced insulation		
22.34	Shafts of operating knobs, handles, levers etc. not live, unless the shaft is not accessible when the part is removed		
22.35	Handles, levers and knobs, held or actuated in normal use, not becoming live in the event of an insulation fault		
	Such parts being of metal, and their shafts or fixings are likely to become live in the event of an insulation fault, they are either adequately covered by insulation material, or their accessible parts are separated from their shafts or fixings by supplementary insulation		
	This requirement does not apply to handles, levers and knobs on stationary appliances other than those of electrical components, provided they are either reliably connected to an earthing terminal or earthing contact, or separated from live parts by earthed metal		
22.36	Handles continuously held in the hand in normal use are so constructed that when gripped as in normal use, the operators hand is not likely to touch metal parts, unless they are separated from live parts by double or reinforced insulation		
22.37	Capacitors in Class II appliances not connected to accessible metal parts, unless complying with 22.42		
	Metal casings of capacitors in Class II appliances separated from accessible metal parts by supplementary insulation, unless complying with 22.42		
22.38	Capacitors not connected between the contacts of a thermal cut-out		
22.39	Lamp holders used only for the connection of lamps		
22.40	Motor-operated appliances and combined appliances intended to be moved while in operation, or having accessible moving parts, fitted with a switch to control the motor. The actuating member of the switch being easily visible and accessible		
22.41	No components, other than lamps, containing mercury		
22.42	Protective impedance consisting of at least two separate components		

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Clause	Requirement - Test	Result - Remark	Verdict
	Values specified in 8.1.4 not exceeded if any one of the components are short-circuited or open-circuited		
22.43	Appliances adjustable for different voltages, accidental changing of the setting of the voltage unlikely to occur		
22.44	Appliances are not allowed to have an enclosure that is shaped and decorated so that the appliance is likely to be treated as a toy by children		
22.45	When air is used as reinforced insulation, clearances not reduced below the values specified in 29.1.4 due to deformation as a result of an external force applied to the enclosure		
22.47	Appliances intended to be connected to the water mains shall withstand the water pressure expected in normal use.		
23	INTERNAL WIRING		
23.1	Wireways smooth and free from sharp edges		
	Wires protected against contact with burrs, cooling fins etc.		
	Wire holes in metal well rounded or provided with bushings		
	Wiring effectively prevented from coming into contact with moving parts		
23.2	Beads etc. on live wires cannot change their position, and are not resting on sharp edges or corners		
	Beads inside flexible metal conduits contained within an insulating sleeve		
23.3	Electrical connections and internal conductors movable relatively to each other not exposed to undue stress		
	Flexible metallic tubes not causing damage to insulation of conductors		
	Open-coil springs not used		
	Adequate insulating lining provided inside a coiled spring, the turns of which touch one another		
	No damage after 10 000 flexings for conductors flexed during normal use or 100 flexings for conductors flexed during user maintenance		
	Electric strength test, 1000 V between live parts and accessible metal parts		
23.4	Bare internal wiring sufficiently rigid and fixed		
23.5	The insulation of internal wiring withstanding the electrical stress likely to occur in normal use		

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Clause	Requirement - Test	Result - Remark	Verdict
	No breakdown when a voltage of 2000 V is applied for 15 min between the conductor and metal foil wrapped around the insulation		
23.6	Sleeving used as supplementary insulation on internal wiring retained in position by positive means		
23.7	The colour combination green/yellow used only for earthing conductors		
23.8	Aluminium wires not used for internal wiring		
23.9	No lead-tin soldering of stranded conductors where they are subject to contact pressure, unless		
	clamping means so constructed that there is no risk of bad contact due to cold flow of the solder		
23.10	The insulation and sheath of internal wiring, incorporated in external hoses for the connection of an appliance to the water mains, shall be at least equivalent to that of light polyvinyl chloride sheathed flexible cord.		
25	SUPPLY CONNECTION AND EXTERNAL FLEXIBLE CORDS		
25.1	Appliance not intended for permanent connection to fixed wiring, means for connection to the supply:		
	- supply cord fitted with a plug		
	- an appliance inlet having at least the same degree of protection against moisture as required for the appliance		
	- pins for insertion into socket-outlets		
25.2	Appliance not provided with more than one means of connection to the supply mains		
	Stationary appliance for multiple supply may be provided with more than one means of connection, provided electric strength test of 1250 V for 1 min between each means of connection causes no breakdown		
25.3	Connection of supply conductors for appliance intended to be permanently connected to fixed wiring possible after the appliance has been fixed to its support		
	Appliance provided with a set of terminals for the connection of cables or fixed wiring, cross-sectional areas specified in 26.6		
	Appliance provided with a set of terminals allowing the connection of a flexible cord		
	Appliance provided with a set of supply leads accommodated in a suitable compartment		

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Clause	Requirement - Test	Result - Remark	Verdict
	Appliance provided with a set of terminals and cable entries, conduit entries, knock-outs or glands, allowing connection of appropriate type of cable or conduit		
25.4	Cable and conduit entries, rated current of appliance not exceeding 16 A, dimensions according to table 10		
	Introduction of conduit or cable does not reduce clearances or creepage distances below values specified in 29		
25.5	Method for assemble supply cord with the appliance:		
	- type X attachment		
	- type Y attachment		
	- type Z attachment, if allowed in part 2		
	Type X attachment, other than those with a specially prepared cord, not used for flat twin tinsel cords		
25.6	Plugs fitted with only one flexible cord		
25.8	Nominal cross-sectional area of supply cords according to table 11; rated current (A); cross-sectional area (mm^2):	Number of cable conductors: Number of strands per conductor: Diameter of strands: D= mm Area(single strand) Ass= mm^2 Conductor cross sectional area for each conductor = mm^2 Rated current : A	
25.9	Supply cord not in contact with sharp points or edges		
25.10	Green/yellow core for earthing purposes in Class I appliance		
25.11	Conductors of supply cords not consolidated by lead-tin soldering where they are subject to contact pressure, unless		
	clamping means so constructed that there is no risk of bad contacts due to cold flow of the solder		
25.12	Moulding the cord to part of the enclosure does not damage the insulation of the supply cord		
25.13	Inlet opening so shaped as to prevent damage to the supply cord		
	Unless the enclosure at the inlet opening is of insulation material, a non-detachable lining or bushing complying with 29.3 for supplementary insulation provided		
	If unsheathed supply cord, a similar additional bushing or lining is required, unless		
	the appliance is class 0		
	Appliance powered by rechargeable batteries no any bushing or jacket is required on extra low voltage interconexion cables		

25.14	Supply cords adequately protected against excessive flexing		
	Flexing test:		
	- applied force (N):		

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Clause	Requirement - Test	Result - Remark	Verdict
	- number of flexings:		
	The test does not result in:		
	- short circuit between the conductors		
	- breakage of more than 10% of the strands of any conductor		
	- separation of the conductor from its terminal		
	- loosening of any cord guard		
	- damage, within the meaning of the standard, to the cord or the cord guard		
	- broken strands piercing the insulation and becoming accessible		
25.15	Appliances provided with a supply cord shall cord anchorages such that the conductors are relieved from strain, including twisting, where they are connected within the appliance and that the insulation of the conductors is protected from abrasion.		
	The cord cannot be pushed into the appliance to such an extent that the cord or internal parts of the appliance can be damaged		
	A mark is made on the cord while it is subjected to the pull force shown in table 12, at a distance of approximately 20 mm from the cord anchorage or other suitable point. The cord is then pulled, without jerking, for 1 s in the most unfavorable direction with the force specified. The test is carried out 25 times. The cord, unless on an automatic cord reel, is then subjected to a torque that is applied as close as possible to the appliance. The torque is specified in table 10 and is applied for 1 min. Max. 2 mm displacement of the cord, and conductors not moved more than 1 mm in the terminals Creepage distances and clearances not reduced below values specified in 29.1	Mass of appliance: Pull force: Torque:	
25.16	Cord anchorages for type X attachments constructed and located so that:		
	- replacement of the cord is easily possible		
	- it is clear how the relief from strain and the prevention of twisting are obtained		
	- they are suitable for different types of cord		
	- cord cannot touch the clamping screws of cord anchorage if these screws are accessible, unless separated from accessible metal parts by supplementary insulation		
	- the cord is not clamped by a metal screw which bears directly on the cord		

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Clause	Requirement - Test	Result - Remark	Verdict
	- at least one part of the cord anchorage securely fixed to the appliance, unless part of a specially prepared cord		
	- screws which have to be operated when replacing the cord do not fix any other component, if applicable		
	- if labyrinths can be bypassed the test of 25.15 is nevertheless withstood		
	- for Class 0, 0I and I appliances: they are of insulating material or are provided with an insulating lining, unless a failure of the insulation of the cord does not make accessible metal parts live		
	- for Class II appliances: they are of insulating material, or if of metal, they are insulated from accessible metal parts by supplementary insulation		
25.17	Adequate cord anchorages for type Y and Z attachment		
25.18	Cord anchorages only accessible with the aid of a tool, or		
	so constructed that the cord can only be fitted with the aid of a tool		
25.19	Type X attachment, glands not used as cord anchorage in portable appliances		
	Tying the cord into a knot or tying the cord with string not used		
25.20	Conductors of the supply cord for type Y and Z attachment adequately additionally insulated		
25.21	Space for supply cord for type X attachment or for connection of fixed wiring constructed to permit checking of conductors with respect to correct positioning and connection before fitting any cover, no risk of damage to the conductors when fitting the cover, no contact with accessible metal parts if a conductor becomes loose, etc.		
	For portable appliances, the uninsulated end of a conductor prevented from any contact with accessible metal parts, unless the end of the cord is such that the conductors are unlikely to slip free		
25.22	Appliance inlet:		
	- live parts not accessible during insertion or removal		
	- connector can be inserted without difficulty		
	- the appliance is not supported by the connector		
	- is not for cold conditions if temp. rise of external metal parts exceeds 75 K, unless the supply cord is not likely to touch such metal parts		
25.23	Interconnection cords comply with the requirements for the supply cord, except as specified		

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Clause	Requirement - Test	Result - Remark	Verdict
	If necessary, electric strength test of 16.3		
25.24	Interconnection cords not detachable without the aid of a tool if compliance with the standard is impaired when they are disconnected		
25.25	Dimensions of pins compatible with the dimensions of the relevant socket-outlet. Dimensions of pins and engagement face in accordance with the relevant plug in IEC 60083	pin dimension: (thickness) x (width) x (length)	
26	TERMINALS FOR EXTERNAL CONDUCTORS		
26.1	Appliances provided with terminals or equally effective devices for connection of external conductors		
	Terminals only accessible after removal of a non-detachable cover		
26.2	Appliances with type X attachment and appliances for connection to fixed wiring provided with terminals in which connections are made by means of screws, nuts or similar devices, unless the connections are soldered		
	Screws and nuts serve only to clamp supply conductors, except		
	internal conductors, if so arranged that they are unlikely to be displaced when fitting the supply conductors		
	If soldered connections used, the conductor so positioned or fixed that reliance is not placed on soldering alone		
	Soldering alone used, barriers provided, clearances and creepage distances satisfactory if the conductor becomes free at the soldered joint		
26.3	Terminals for type X attachment and for connection to fixed wiring so constructed that the conductor is clamped between metal surfaces with sufficient contact pressure and without damaging the conductor		
	Terminals for type X attachment and those for connection to fixed wiring so fixed that when tightening or loosening the clamping means:		
	- the terminal does not loosen		
	- internal wiring is not subjected to stress		
	- clearances and creepage distances are not reduced below the values in 29		
	Compliance checked by inspection and by the test of subclause 8.6 of IEC 60999-1, the torque applied being equal to two-thirds of the torque specified. Nominal diameter of thread (mm); screw category; torque (Nm):		

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Clause	Requirement - Test	Result - Remark	Verdict
26.4	Terminals for type X attachment, except those with a specially prepared cord, and those for connection to fixed wiring, no special preparation of conductors required, and so constructed or placed that conductors prevented from slipping out		
26.5	Terminals for type X attachment so located or shielded that if a wire of a stranded conductor escapes, no risk of accidental connection to other parts that result in a hazard		
	Stranded conductor test, 8 mm insulation removed		
	No contact between live parts and accessible metal parts and, for class II constructions, between live parts and metal parts separated from accessible metal parts by supplementary insulation only		
26.6	Terminals for type X attachment and for connection to fixed wiring suitable for connection of conductors with required cross-sectional area according to table 13; rated current (A); nominal cross-sectional area (mm^2):		
	Terminals only suitable for a specially prepared cord		
26.7	Terminals for type X attachment accessible after removal of a cover or part of the enclosure		
26.8	Terminals for the connection to fixed wiring, including the earthing terminal, located close to each other		
26.9	Terminals of the pillar type constructed and located as specified		
26.10	Terminals with screw clamping and screwless terminals not used for flat twin tinsel cords, unless conductors ends fitted with a device suitable for screw terminals		
	Pull test of 5 N to the connection		
26.11	For type Y and Z attachment: soldered, welded, crimped and similar connections may be used		
	For Class II appliances: the conductor so positioned or fixed that reliance is not placed on soldering, welding or crimping alone		
	For Class II appliances: soldering, welding or crimping alone used, barriers provided, clearances and creepage distances satisfactory if the conductor becomes free		
27	PROVISION FOR EARTHING		
27.1	Accessible metal parts of Class 0I and I appliances, permanently and reliably connected to an earthing terminal or contact of the appliance inlet		
	Earthing terminals not connected to neutral terminal		

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Clause	Requirement - Test	Result - Remark	Verdict
	Class 0, II and III appliance have no provision for earthing		
	Safety extra-low voltage circuits not earthed, unless protective extra-low voltage circuits		
27.2	Clamping means adequately secured against accidental loosening		
	Terminals used for the connection of external equipotential bonding conductors allow connection of conductors of 2.5 to 6 mm², and		
	do not provide earthing continuity between different parts of the appliance		
	Conductors cannot be loosened without the aid of a tool		
	Class I appliances provided with a terminal for external equipotential conductors (IEC60335-2-60:2002)		
27.3	For appliances with supply cord, current-carrying conductors become taut before earthing conductor, if the cord slips out of the cord anchorage		
27.4	No risk of corrosion resulting from contact between metal of earthing terminal and other metal		
	Adequate resistance to corrosion of coated or uncoated parts providing earthing continuity, other than parts of a metal frame or enclosure		
	Parts of steel providing earthing continuity provided at the essential areas with an electroplated coating, thickness at least 5 µm		
	Adequate protection against rusting of parts of coated or uncoated steel, only intended to provide or transmit contact pressure		
	In case of aluminium alloys precautions taken to avoid risk of corrosion		
27.5	Low resistance of connection between earthing terminal and earthed metal parts		
	This requirement does not apply to connections providing earthing continuity in the protective extra-low voltage circuit, provided that clearances of basic insulation are based on the rated voltage of the appliance		
	Resistance not exceeding 0,1 Ω at the specified low-resistance test		
27.6	The printed conductors of printed circuit boards not used to provide earthing continuity in hand held appliances		

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Clause	Requirement - Test	Result - Remark	Verdict
	They may be used in other appliances if:		
	- at least two tracks are used with independent soldering points and the appliance complies with requirements of 27.5 for each circuit		
	- the material of the printed circuit board complies with IEC 60249-2-4 or IEC 60249-2-5		
28	SCREWS AND CONNECTIONS		
28.1	Fixings, electrical connections and connections providing earthing continuity withstand mechanical stresses		
	Screws not of soft metal liable to creep, such as zinc or aluminium		
	Diameter of screws of insulating material min. 3 mm		
	Screws of insulating material not used for any electrical connection or connections providing earthing continuity		
	Screws used for electrical connections or connections providing earthing continuity screw into metal		
	Screws not of insulating material if their replacement by a metal screw can impair supplementary or reinforced insulation		
	Type X attachment, screws to be removed for replacement of supply cord or for user maintenance, not of insulating material if their replacement by a metal screw can impair basic insulation		
	Screws and nuts with contact pressure that likely to be tightened during user maintenance or installation shall be tested as specified, The test is carried out by means of a suitable screwdriver, spanner or key and by applying a torque as shown in table 12, No damage over electric connections or fixation means.	Screw diameter: Torque:	
28.2	Electrical connections and connections providing earthing continuity constructed so that contact pressure not transmitted through insulating material liable to shrink or distort, unless shrinkage or distortion compensated		
	This requirement does not apply to electrical connections in circuits carrying a current not exceeding 0.5A		
28.3	Space-threaded (sheet metal) screws only used for electrical connections if they clamp the parts together		
	Thread-cutting (self-tapping) screws only used for electrical connections if they generate a full form standard machine screw thread		

Clause	Requirement - Test	Result - Remark	Verdict
	Such screws not used if they are likely to be operated by the user or installer unless the thread is formed by a swaging action		
	Thread-cutting and space-threaded screws may be used in connections providing earthing continuity, provided unnecessary to disturb the connection and at least two screws are used for each connection		N/A
28.4	Screws and nuts that make mechanical connection secured against loosening if they also make electrical connections or connections providing earthing continuity		N/A
	Rivets for electrical connections or connections providing earthing continuity secured against loosening if subjected to torsion		N/A
29	CLEARANCES, CREEPAGE DISTANCES AND SOLID INSULATION		
29.3	Solid insulation having a minimum thickness of 1mm for supplementary insulation,		
	and 2mm for reinforced insulation		
	This requirement does not apply if the supplementary insulation, other than mica or similar scaly material, consists of at least two layers, each of the layers withstands the electric strength test of 16.3		
	This requirement does not apply if the reinforced insulation, other than mica or similar scaly material, consists of at least three layers, any two layers together withstand the electric strength test of 16.3		
	This requirement also does not apply to inaccessible insulation and does not exceed the maximum permissible temperature values, or		
	if the insulation, after conditioning as specified, withstands the electric strength test of 16.3		
30	RESISTANCE TO HEAT AND FIRE		
30.1	External parts of non-metallic material, parts of insulating material supporting live parts including connections and parts of thermoplastic material providing supplementary insulation or reinforced insulation, the deterioration of which might cause the appliance to fail to comply with this standard, shall be sufficiently resistant to heat.		

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Clause	Requirement - Test	Result - Remark	Verdict
32	RADIATION, TOXICITY AND SIMILAR HAZARDS		
	Appliances shall not emit harmful radiation or present a toxic or similar hazard		

TABLES

10.2	TABLE: Power input deviation				P
Input deviation of/at:	I rated (A)	I measured (A)	dP	Required dP	Remark

11.8	TABLE: Heating test, thermocouples		
	Ambient, t1 (°C) :		
	Ambient, t2 (°C) :		
	test voltage (V) : Estabilized elapsed time: Test time:		

Thermocouple locations	dT (K)	required dT (K)
Pins of appliance inlets		
Terminals, including earthing terminals, for external conductors of stationary appliances,unless they are provided with a supply cord		
Ambient of switches, thermostats and temperature limiters		
Rubber, polychloroprene or polyvinyl chloride insulation of internal and external wiring, including supply cords:		
Internal wire (hottest point)		
Power cord		
Cord sheaths used as supplementary insulation		
Sliding contacts of cord reels		
Points where the insulation of wires can come into contact with parts of a terminal block or compartment for fixed wiring, for a stationary appliance not provided with a supply cord.		
Rubber, other than synthetic, used for gaskets or other parts, the deterioration of which could affect safety		
Lampholders with T-marking		
Material used as insulation, other than that specified for wires and windings		
Test corner		
Outer surface of capacitors		
External enclosure of motor-operated appliances		
Surfaces of handles, knobs, grips and similar parts which are continuously held in normal use		
Surfaces of handles, knobs, grips and similar parts which are held for short periods only in normal use		
Surface of plug		
Parts in contact with oil having a flash-point of t °C t-50		

11	HEATING: resistance method					
	T1 (°C)					
	T2 (°C)					
	Test voltage (V) :					
	temperature rise dT of part/at:	R_1 (Ω)	R_2 (Ω)	dT (K)	Limit dT (K)	Insulation class
Main winding of motor						
Auxiliary winding of motor						

13.2	TABLE: Leakage current		
	Heating appliances: 1.15x rated input :		
	Motor-operated and combined appliances: 1.06 x rated voltage :		
	Tension used:		
Leakage current between			Max. Allowed I (mA)
L, N – enclosure(wrapped with metal foil)			
L, N – control area(switch area, wrapped with metal foil)			

13.3	TABLE: Electric strength	
Type of insulation:		
Test voltage applied between:	Voltage (V)	Breakdown (Yes/No)
L, N – enclosure(wrapped with metal foil)		
L, N – control area(switch area, wrapped with metal foil)		
L, N – power cord		

16.2	TABLE: Leakage current		
	Single phase appliances: 1.06 x rated voltage .....:		
	Three phase appliances 1.06 x rated voltage divided by √3:.....:		
Leakage current between		I (mA)	Max. Allowed I (mA)
L, N – enclosure(wrapped with metal foil)			
L, N – control area(switch area, wrapped with metal foil)			

16.3	TABLE: Electric strength	P

Test voltage applied between:	Voltage (V)	Breakdown (Yes/No)
L, N – enclosure(wrapped with metal foil)		
L, N – control area(switch area, wrapped with metal foil)		
L, N – power cord		

19.7	TABLE: Abnormal operation, locked rotor/moving parts		NA
	Test voltage (V) ..... :		
	Ambient, t_1 (°C)..... :		
	Ambient, t_2 (°C)..... :		

Temperature of winding of main motor	dT (° C)	required dT (°C)	insulation class
	High speed		
1) locked rotor			
2) locked rotor, capacitor opened circuit			
3) locked rotor, capacitor shorted circuit			

Test time elapsed:

1).

2).

3).

Temperature of winding	R_1 (Ω)	R_2 (Ω)	dT (k)	dT (° C)	required dT (°C)	insulation class
Main winding of low speed						
Auxiliary winding of low speed						

30.1	TABLE: ball pressure test	P

Tested part	temperature (°C)	Impression diameter (mm)
Push button swith		
Enclosure		

Annex EE

Christmas Lights and Decorative Figures Evaluation

Table EE.1.- Wire Type and interval of overcurrent protection for Christmas lights in series connected

	No polarized pins		**Polarized pins**	
	With Socket-outlet	**Without Socket-outlet**	**With Socket-outlet**	**Without Socket-outlet**
Minimum cross-section	mm²	mm²	mm²	mm²
Wire Type				
Minimum cable temperature				
Maximum current Interval (A)	(A)	(A)	(A)	(A)
Number of light series allowed to be inserted into a series				
Fuse interval (A)	(A)	(A)	(A)	(A)
Fuse location				
“on” / “off” switch and type				

Table 2. Wire Type and interval of overcurrent protective for Christmas lights parallel inserted

	With Socket-outlet		**Without Socket-outlet**	
Minimum cross-section	mm²	mm²	mm²	mm²
Cable Type				
Maximum cable Temperature				
Maximum current Interval (A)	(A)	(A)	(A)	(A)
Fuse interval (A)	(A)	(A)	(A)	(A)
Fuse location “on” / “off” switch and type				

Compliance is checked by measurement

OBSERVATIONS:

Elaborated by

_____
Eng.

Reviewed by

_____ _____
Eng.