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JAPANESE INDUSTRIAL STANDARD

Tumbler Type Electric Clothe Dryers

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In the event of any doubt arising,
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Tumbler Type Electric Cloth Dryers

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1. Scope

This Japanese Industrial Standard specifies tumbler type electric cloth dryers equipped with motor and electric heating device, intended for household use, having a standard drying capacity not exceeding 5 kg and a rated power consumption not exceeding 5 kW, hereinafter referred to as the "dryers".

Remark: The units and numerical values shown in { } in this Standard are based on the customary units and are appended for informative reference.

2. Definitions

For the purpose of this Standard the following principal definitions shall apply:

- (1) drying capacity The mass (kg) of the washing which can be dried in one operation, expressed in the dry condition. The washing means the mock washing specified in Appendix, hereinafter referred to as the "washing".
- (2) standard drying capacity The maximum drying capacity.
- (3) standard drying time The time (min) required of a dryer to dry the washing of the standard drying capacity.
- (4) tumbler type electric cloth dryer An appliance in which the cloth is introduced in a rotating container, hereinafter referred to as the "tumbler", and dried by air blow. It is classified into those stated in (5) and (6).
- (5) exhaust-type tumbler electric cloth dryer An appliance in which the cloth is introduced in the tumbler, dried by air blow, and the air is directly exhausted outside of the appliance.
- (6) condensation-type tumbler electric cloth dryer An appliance in which the cloth is introduced in the tumbler, dried by air blow, and a dehumidifier to remove moisture is accommodated in the appliance.

3. Classification

Dryers are classified as follows:

- (1) Exhaust-type tumbler electric cloth dryer
- (2) Condensation-type tumbler electric cloth dryer

Applicable Standards and Corresponding International Standards: See page 26.

4. Rated Voltage and Rated Frequency

The rated voltage of dryer shall be single phase a.c. 100 V or 200 V, the rated frequency shall be 50 Hz, 60 Hz or 50/60 Hz (in common). However, the rated voltage of dryers for export is exempted from the above requirement.

5. Performances

5.1 Drying Efficiency The drying efficiency shall be not less than 45% when tested in accordance with the procedure specified in 8.1.

5.2 Drying Time The time spent until the drying rate attains 97% shall be within the standard drying time when a dryer is tested in accordance with the procedure specified in 8.2.

5.3 Dehumidification Rate The dehumidification rate of a condensation-type tumbler electric cloth dryer shall be not less than 45% when tested in accordance with the procedure specified in 8.3.

5.4 Noise The noise level shall be not more than 60 dB when tested in accordance with the procedure of 8.4.

5.5 Power Consumption The deviation of power consumption from the rated power consumption shall be within the appropriate tolerances given in Table 1, when a dryer is tested in accordance with procedure specified in 8.5.

Table 1

Rated power consumption W	Tolerances %
1000 and under	±15
Over 1000	±10

Remark: This table is based on the reference ambient temperature of 30°C.

5.6 Temperature

5.6.1 Normal Temperature When the normal temperature is tested in accordance with the procedure of 8.6.1, the temperature of any part shall not exceed the appropriate value given in Table 2 and no abnormal heat shall be produced in other parts.

Table 2

Unit: °C

Position of measurement		Temperature
1. Winding	Class A insulation	100
	Class E insulation	115
	Class B insulation	125 (120)
	Class F insulation	150 (140)
	Class H insulation	170 (165)
2. Brand of power supply wire		90
3. Enclosure (accessible enclosure during use, except the exhaust hole or outlet.)		85
4. Knob and push bottom of switch	Made of metal Made of ceramics Made of glass	65
	Others	80
5. Handle operated by a man during use	Made of metal Made of ceramics Made of glass	55
	Others	70

Remarks 1. The numerical values in parentheses are applicable for windings of rotating machinery.

2. This table is based on the reference ambient temperature of 30°C.

5.6.2 Abnormal Temperature When the abnormal temperature is tested in accordance with the procedure of 8.6.2, the dryer and the wooden base will not burn, the temperatures shall not exceed the respective values given in Table 3, and the insulation resistance between live parts and dead metal parts liable to be earthed measured with a 500 V insulation resistance tester shall be not less than 0.1 MΩ.

Table 3

Unit: °C

Position of measurement	Temperature
Wooden base and legs in contact with base	150
Enclosure (accessible enclosure during use, except the exhaust hole and outlet.)	150

Remark: This table is based on the premise that the upper limit of reference ambient temperature is 30°C.

5.7 Switch and Time Switch The switch and time switch shall comply with the following requirements when subjected to the test of 8.7:

- (1) Making and Breaking Property No abnormalities shall appear in any part.
- (2) Temperature Rise When the temperature of the contact tips of the switch and the time switch is measured after the test specified in (1), the temperature shall not exceed the appropriate value given in Table 4.

Table 4

Unit: °C

Material of contact tip	Temperature
Copper or copper alloys	70
Silver or silver alloys	95

Remark: This table is based on the premise that the upper limit of reference ambient temperature is 30°C.

5.8 Thermostat (automatic temperature control) The thermostat shall show no abnormalities in any part and shall comply with the following requirements when subjected to the test of 8.8.

- (1) In the test of 8.8 (2) carried out before the test of 8.8 (1), the average value of the average temperature when the thermostat opens and the average temperature when it closes shall be within $\pm 5^{\circ}\text{C}$ for the one with a temperature setting lower than 100°C , and $\pm 5\%$ for the one with a temperature setting 100°C or higher but not exceeding 200°C , from the respective setting.
- (2) In the test of 8.8 (2) carried out after the test of 8.8 (1), the average value of the average temperature when the thermostat opens and the average temperature when it closes shall not deviate from such average value measured before the test of 8.8 (1) by more than $\pm 5^{\circ}\text{C}$ for the one with a temperature setting lower than 100°C , and $\pm 5\%$ for other ones.

5.9 Thermal Protective Device (overheat protection)

5.9.1 Thermal Cut-out The thermal cut-out shall be such when subjected to the test of 8.8, that there shall be no abnormalities in any part, the average temperature when the cut-out opens in the test of 8.8 (2) carried out before the test of 8.8 (1) shall be within $\pm 15^{\circ}\text{C}$ from the set temperature, the average temperature when it opens in the test of 8.8 (2) carried out after the test of 8.8 (1) shall not deviate from such average temperature measured before the test of 8.8 (1) by more than $\pm 5^{\circ}\text{C}$ for the one with a temperature setting lower than 100°C , and more than $\pm 5\%$ for the one with a temperature setting 100°C or higher.

5.9.2 Thermal Fuse When the thermal fuse is tested in accordance with the procedure of 8.9, it shall operate within the tolerances on the rated operating temperature i.e. $\pm 7^{\circ}\text{C}$ for the one with rated operating temperature lower than 200°C , and $\pm 10^{\circ}\text{C}$ for the one with rated temperature 200°C or higher.

5.10 Semiconductor Heater When the semiconductor heater is tested in accordance with the procedure of 8.10, there shall be no abnormalities in any part, and the power consumption measured after the test of 8.10 (1) shall fall within $\pm 15\%$ from the power consumption measured before the test of 8.10 (1).

5.11 Insulation Resistance The insulation resistance shall be not less than $1\text{ M}\Omega$ when tested in accordance with the procedure of 8.11.

5.12 Dielectric Strength (power frequency withstand voltage) The specimen shall withstand the test voltage when subjected to the test of 8.12.

5.13 Leakage Current The leakage current shall be not more than 1 mA when tested in accordance with the procedure of 8.13.

5.14 Voltage Fluctuation Characteristic When the characteristic of dryer at supply voltage fluctuation is tested in accordance with the procedure of 8.14, the specimen shall be capable of continuing its operation without any trouble.

5.15 Starting Characteristic When the starting characteristic is tested in accordance with the procedure of 8.15, the motor shall start irrespective of the position of its motor.

5.16 Ability of Insulation under Damp, Heat When the ability of insulation under damp, heat is tested in accordance with the procedure of 8.16, the insulation resistance of specimen shall be not less than $0.3\text{ M}\Omega$.

5.17 Resistance to Shock of Synthetic-resin Component When a dryer consisting of synthetic-resin enclosure and tumbler is tested in accordance with the procedure of 8.17, the specimen shall not be damaged.

5.18 Resistance to Corrosion of Coated Enclosure Surface The resistance to corrosion of coated enclosure surface is tested in accordance with the procedure of 8.18, the width of corrosion shall not exceed 1 mm .

5.19 Endurance of Power-supply Wire The power-supply wire shall not cause short circuit and the relative broken component wires shall not exceed 30% , when tested in accordance with the procedure of 8.19.

6. Construction

6.1 Construction in General The construction of dryer shall comply with the following requirements:

- (1) The dryer shall have no possibility of causing any hazards under normal service conditions, be well finished in each part, and operate smoothly.
- (2) The dryer shall operate safely in use without remarkable vibration or noise.

- (3) The dryer shall be so constructed that any is not liable to cause mechanical or electrical failure, enough durable and does not cause hazards.
- (4) The dryer shall not tumble down when tilted through an angle of 15° under normal service conditions. However, such ones that the mass of body is exceeding 40 kg and the height of body bottom above the floor is not exceeding 5 cm, and that do not tumble down when a force of 98 N{10 kgf} is applied to any part (excluding the bottom), are exempted from the above requirement.
- (5) The dryer shall be so constructed that the cloth will not come in direct contact with blower blades and/or high temperature parts which may damage the cloth.
- (6) The dryer shall be so constructed that water will not splash the live parts under normal service conditions.
- (7) Moisture-proof treatment shall be applied to the parts moisture absorption of which might result in such hazards as burning of components and exposure of live parts.
- (8) The dryer which might cause such hazards as electric shock and fire under the conditions that the rated voltage is applied continuously (for the maximum operating time of the timer, if provided) to the heating device, the temperature control, if provided, being short circuited, shall be equipped with a thermal protective device (including thermal fuses). In this procedure the voltage shall be applied, with the thermal control, if provided, previously short-circuited. Also the thermal protective device shall not operate under the normal service conditions.
- (9) The dryer which might cause such hazards as electric shock and fire under the conditions that the rated voltage is applied continuously (for the maximum operating time of the timer, if provided) to the heating device, shall be equipped with an overload release. The overload release shall not operate under the normal service conditions.
- (10) The dryer shall be so constructed that rotation of the motor will not be disturbed under its normal service conditions. However, if the disturbance will not result in any hazard, such case is an exception.
- (11) The movable parts liable to be touched by a man(accessible) shall be protected with a framework or netting work from easy access. However, if there is no possibility of hazard where the movable part is touched, such case is an exception.
- (12) If a part of appliance body is attached or detached by the user, such operation shall be easy, sure and safe.
- (13) If a lamp or the like is attached inside of the appliance such thing shall not cause any hazard when such actions as introducing and taking out of materials, opening and closing of door are carried out.

- (14) Dryers to be fixed to a structure or built-in type dryers can be fixed firmly.
- (15) Dryers shall be so constructed that the currents passing through the driving motor and the heating device are interrupted when the door through which the washing is introduced is opened.
- (16) Dryers having synthetic resin enclosure (the parts which are required of translucency or transparency, or of flexibility, mechanical strength, etc. for their function, are excluded) shall be so designed that the flat square of 9 cm² or more on the surface of the enclosure (a square test specimen with one side length 3 cm cut out from the enclosure with its original thickness, if there is no flat square part of 9 cm² or more) shall not continue to burn when a tip of flame about 20 mm in length produced by burning town gas by means of a gas burner having a nozzle inside diameter 0.5 mm with its air inlet closed, is applied to the centre of the said test plane (or specimen) inclined from the horizontal plane by about 45° along the vertical line from below for 5 seconds and then removed.
- (17) The manual switch and the timer shall be marked by letter symbols or colours in an easily visible part to show the action or state of open and close. However, if such marking is difficult, such case is an exception.
- (18) Condensation-type dryers shall be capable of discharging the condensed water out of the appliance.

6.2 Live Parts The live parts shall comply with the following requirements:

- (1) The live parts shall not be touched by the test finger shown in Attached Figure under such conditions that all the easily removable parts except those given below are removed.

In this procedure, the force applied to the test finger shall be 9.8 N{1.0 kgf} for the bottom of table type, and for the rear surface and bottom surface (only the area consisting of twice the height from the outside edges for appliances which have a body mass exceeding 40 kg and a height not exceeding 5 cm above the floor) of floor type (stationary type only), and 29.4 N{3.0 kgf} for the outside faces and openings of other types.

- (a) The live parts on the bottom not easily accessible under insalled state.
- (b) The live parts on the bottom surface, excluding the area consisting of twice the height from the outside edges, of appliances which have a body mass exceeding 40 kg and a height not exceeding 5 cm above the floor.
- (c) Such exposed live part in an appliance the exposure of its live part is unavoidable due to its construction, that the live part as connected with secondary circuit of an insulating transformer where the voltage to the earth and the voltage between lines are not exceeding a.c. 30 V or d.c. 45 V, and that each of the currents flows through 1 kΩ

resistors connected between the live part and the earth and between the live part and another line is 1 mA or less, unless the current is at a frequency not less than power frequency and will not result in risk of electric shock.

- (2) The insulation distances (clearances and creepage distances are included) between live parts of different polarity, between live parts and dead metal parts, and between live parts and accessible surface of non-metallic parts shall have at least the appropriate values given in Table 5.

Table 5

Unit: mm

Insulation distance			Line voltage or voltage to earth		
			50 V and under	Over 50 V to 150 V incl.	Over 150 V to 300 V incl.
Mount of power supply wire	Between terminals connected by user.		—	6	6
	Between terminals connected by user and dead metal parts liable to be earthed or accessible non-metallic parts.		—	6	6
	Between terminals connected by manufacturer.		—	3	4
	Between terminals connected by manufacturer and dead metal parts liable to be earthed or accessible non-metallic parts.		—	2.5	3
Other parts	Between live parts of different polarity (including wire mount terminals of switching mechanism, if provided).	Fixed parts where ingress of dirt and deposition of metal powder are not anticipated.	1.2	1.5	2
		Other positions	1.5	2.5	3
	Between live parts and metal parts liable to be earthed or accessible non-metallic parts.	Fixed parts where ingress of dirt and deposition of metal powder are not anticipated.	1.2	1.5	2
		Other positions	1.2	2	2.5

Remark: The insulation distance means the distance measured when such force is applied to the said parts to minimize the distance that is 29.4 N{3.0 kgf} for external parts of appliance body and 1.96 N{200 gf} for internal parts.

- (3) The semiconductors, resistors, capacitors, electron tube sockets, printed wiring, etc. used in electronic circuits where decrease of insulation distance is unavoidable due to their construction, may not comply with (2), if they comply with the following requirements as the test results:

- (a) When the live parts of different polarity are short-circuited, the components connected to the shorted circuit shall not burn. However, if other components do not burn when a component burns, such case is an exception.