Specification for Thermal Cutoff unified Heater D6X-215

1. **Scope**
The present specification is applied to thermal cutoffs unified heater, registered as "SEFUSE",D6X-215. In the case the entry differ from the figure of manufacture or not mentioned in the present specification, the figure of manufacture is priority.

2 2. **Rated Functioning Temperature and Other Rating.**
Rated functioning temperature and electrical ratings of thermal cutoffs are indicated in Table.1.

Table l

Product Name	Functioning Temperature Tf (℃)	Operating Temperature and Tolerance (℃)	Tm (℃)	Rated (D.C.)
D6X-215	139	136±3	180	12A,32V

Definition of Terms

•Rated Functioning Temperature
Rated functioning temperature is the operating temperature of the thermal cutoff, measured using the method specified in the safety standard.
In standards that comply with the IEC standard (such as UL, CSA, VDE, BEAB), it should operate within the prescribed temperature range of +0/-10℃.
It is represented by the symbol Tf.

•Operating Temperature and tolerance
Operating temperature and Tolerance are the operating temperature range when the thermal cutoff is made to operate inside a constant temperature oven whose temperature is raised at the rate of 1℃/min. while a detection current of 10mA or lower is applied. The operating temperature and tolerance are a standard set by our company and is not specified by a safety standard.

• Maximum Temperature Limit
Maximum temperature limit is the maximum temperature for which conductivity does not occur again after thermal cutoff operation.
It is represented by the symbol Tm.

3. **Form, Dimension and Wiring diagram**
Form, dimension and Wiring diagram of thermal cutoffs are based on attached drawing.

4. **Material and Plating**

Material and plating of thermal cutoffs are indicated in Table.2.

Table.2

	Material	Plating
Lead	Copper	Tin
Base	Ceramic	
Cap	Ceramic	
Sealing Resin	Epoxy resin	
Flux	Special Flux	
Fuse element	Low-melting point Alloy	

5. **Appearance**

5.1 The part of Sealing Resin

5.1.1 While the dimension is within it's accuracy, sticking resign on cap and base is permitted.

5.1.2 Sticking resign to the lead in 4 mm from the body is permitted.

5.1.3 While the dimension is within it's accuracy, protrusion or burr of resign is permitted.

5.2 The part of Base and Cap

5.2.1 The ceramic base and cap has no defects as spoil the appearance remarkably, for example, cracking or breaking etc.

5.2.2 Stain in appearance which has no influence on the characteristics is permitted.

5.3 The part of Lead

5.3.1 The leads should not have remarkable bends.

5.4 The heater resistance

5.4.1 Stain and scratch in appearance which has no influence on the characteristics are permitted.

6. Performance and Standard

6.1 Operating Performance

6.1.1 No-Load-Opening Temperature

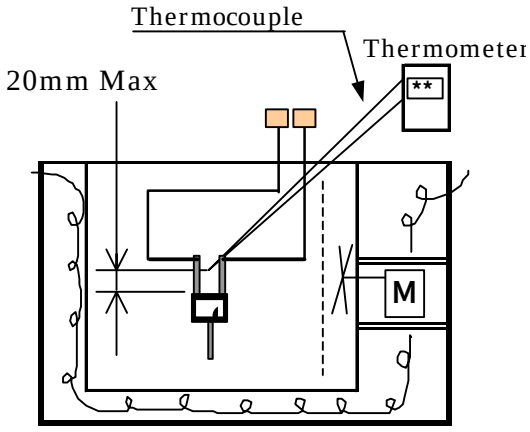
A thermal cutoff test sample is placed in the condition indicated in Fig.1, and the temperature of a thermostatic oven is raised until 124°C at optional raising speed.

After keeping for 2 hours, the temperature of the thermostatic oven is raised at the rate of 1°C / minute. The thermostatic oven temperature when the test sample operates shall be within 136±3°C.

At this time, the electric current flowing through the test sample for opening confirmation shall be less than 10mA.

Further, in case of the testing method indicated in Fig.1, the distance between a thermometer and a test sample shall be less than 20mm.

Fig.1



6.1.2 Keeping High Humidity

After the successive 250 hours conditioning in a thermostatic and constant humidity oven in the condition ; Temperature:65±3°C, Humidity: 90~95% R.H, test samples are taken out from the oven, water drops on the test samples are wiped off, and are subjected to the atmosphere in normal temperature and normal humidity for 2 hours. Then, the test samples shall meet the requirements specified in 6.2.1 and 6.2.2. Next these shall meet the requirements specified in 6.1.1, 6.2.3 and 6.2.4. But the opening temperature in 6.1.1 shall be in 136±5°C.

6.1.3 Temperature Cycle

Test samples are subjected to -30°C for 15 minutes in a thermostatic oven, then the test samples are transferred to a thermostatic oven regulated at 60°C to be held for 15 minutes. Deeming such procedure as 1 cycle, 10 cycles conditionings are done repeatedly. After the above conditionings, the test samples shall meet the requirements specified in 6.1.1, 6.2.1, 6.2.2, 6.2.3 and 6.2.4. But the opening temperature in 6.1.1 shall be in 136±5°C.

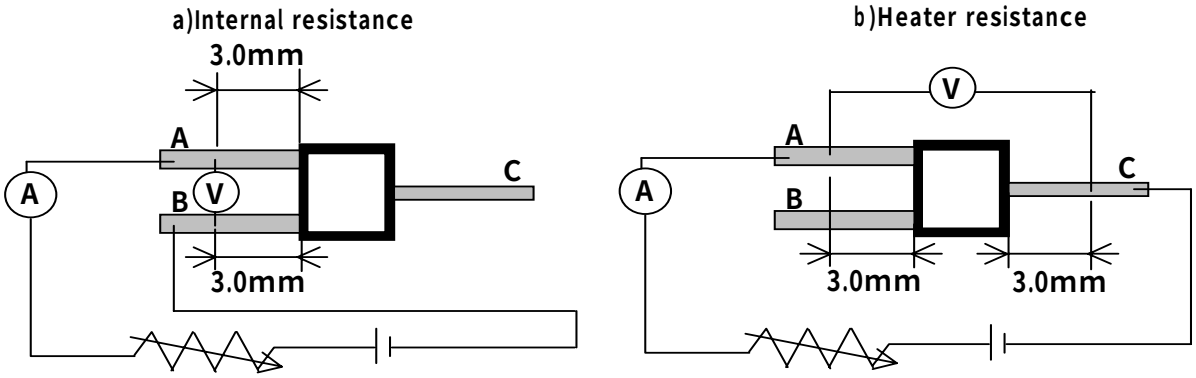
6.2 Electrical Performance

6.2.1 Internal Resistance of fuse

By a voltage drop measuring method as indicated in Fig.2, measured resistance between lead “A” and “B” connected at the distance of 3mm from the body to be free from contact resistance shall be less as 3 mΩ.

The electric current for the measurement shall be under 100mA.

Fig.2



6.2.2 Resistance of Heater

By a voltage drop measuring method as indicated in Fig.2, measured resistance between lead “A” and lead “C” connected at the distance of 3 mm from the body to be free from contact resistance shall be in 21.5Ω±30%.The electric current for the measurement shall be under 100mA.

6.2.3 Insulation after operation

After the test of 6.1.1, insulation resistance between lead “A” and lead “B” of test samples shall be more than 0.2MΩ when the test sample is measured by an insulation resistance tester applying a terminal voltage of D.C.100V.

The test samples for this test shall be maintained continuously in condition of 6.1.1 for 1 minute after operating, and shall be taken out from the thermostatic oven to a normal temperature atmosphere.

6.2.4 Withstand Voltage (between lead “A” and “C”)

After the test of 6.2.3, test samples shall withstand for 1 minute against an A.C. voltage of 100V, 60Hz (or 50 Hz) having almost sine wave from which is impressed between both leads of test samples. The sensitivity of breakdown current is set up at 5 mA.

6.3 Mechanical Strength

6.3.1 Lead Tension

The body casing of a test sample is fixed firmly, and after 9.8N tension is impressed for 10 seconds between both side leads to the axial direction, each lead shall not be snapped or loosened. Further, after the above tension test, the test sample shall meet the requirements specified in 6.1.1, 6.2.1, 6.2.2, 6.2.3 and 6.2.4. (1Kgf=9.8N)

6.3.2 Dropping Shock

A test sample is dropped spontaneously from the height of 1 meter to a concrete floor surface on condition that an axial direction of the body is set in horizontal line, then the test sample is dropped in the same manner on condition that the axial direction of the body is set perpendicular to the floor.

After the above procedure, the thermal cutoff shall not cause any apparent damage, and successively, the test sample shall meet the requirements specified in 6.1.1, 6.2.1, 6.2.2, 6.2.3 and 6.2.4.

6.4 Other Performance

6.4.1 Aging Performance (No Load)

After continuous 500 hours conditioning at 90±3°C by the same testing method in 6.1.2, the test samples shall meet the requirements specified in 6.1.1, 6.2.1, 6.2.2, 6.2.3 and 6.2.4. But the opening temperature in 6.1.1 shall be in 136±5°C.

7. Marking

A thermal cutoff shall be marked discriminatingly as indicated in Table.3 on the cap by not easily erasable means.

Table.3

SEFUSE	Trademark
D6X ○○○	Product Name Lot Number

8. Quality Assurance

8.1 Inspection Item and Quality Assurance
The inspection item and quality assurance are indicated in Table.4.

Table.4

Inspection Item	Ingoing Inspection	Surveillance Inspection (See Notes1)	Quality of certified level	
			Sampling Number	Acceptance Number
Dimension • Construction	○		20	0
Appearance • Marking	○		50	0
No-Load-Opening Temperature	○		5	0
Keeping High Humidity		○	20	0
Temperature Cycle		○	20	0
Internal Resistance of fuse	○		20	0
Resistance of Heater	○		20	0
Insulation after operation	○		20	0
Withstand Voltage	○		5	0
Lead Tension		○	5	0
Dropping Shock		○	5	0
Aging Performance(No Load)		○	20	0
Aging Performance(Rated Load)		○	5	0

Notes:1. Surveillance inspection test shall be done once every year to decide whether the quality level of product meets the requirement or not.
Accordingly, the surveillance inspection is different from regular ingoing test.
2. A circular marking in Table.4 indicates the item that the test shall be done.

9. Lot No.

9.1 Lot number marked on thermal cutoffs carries the following meaning.
Ex)

0	6	A
a	b	c

Item a ; Final digit of the year
Item b ;Month, but X means October, Y means November and Z means December.
Item c ; Distribution in month.

2 9.2 Lot No. printed on a smallest unit package carries the following meaning.
Ex)

(Japan)	4	6	02	-	2	-	2	(Thai)	04	7	08	1	02	00
	a	b	c		d		e		a	b	c	d	e	f

Item a ; Final digit of the year (Japan : one number, Thai : two number)
Item b ; Month, but X means October, Y means November and Z means December.
Item c ; Date
Item d ; Welding lot number
Item e ; 1-99 digit means lot distinction
Item f ; Distinction for changing specifications

10. Package

10.1 400 pieces of D6X-215 covered with air cushion should be sealed in a Polypropylene tray. The tray must be put a label specified trademark, UL mark, product name, lot. number, quantity, rated current and rated voltage.
A corrugated fiberboard box is filled with these trays (max. 16 trays).
If a corrugated fiberboard box is not filled with, the air cushion replace the space for trays. The corrugated fiberboard box must be put a label specified product name, lot. number, quantity.

10.2 “Thermal Cut-off Inspection Sheet” and “Application Instructions of Thermal Cut-offs” should be enclosed.

11. Cautions

11.1 Design Caution

11.1.1 The customer should judge the propriety of mounting location and mounting method for each application. The body temperature of the thermal cutoff becomes higher as current passes through, and might rise higher than the ambient atmosphere temperature.
Therefore, after mounting the thermal cutoff under the same conditions you would use for the actual operation, please run the final product and confirm whether the thermal cutoff operate normally.
In case of mounting the side of HEATER directly, operating property when current passes through HEATER is influenced by the condition of heat radiation. Please confirm and test whether thermal cutoff dose not cause problem repeatedly, under normal conditions as well as under predicted maximum abnormal conditions.

11.1.2 Make designs so that the temperature of the body of the thermal cutoff does not exceed 90℃. If it should exceed on a regular using, the thermal cutoff might operate at the temperature lower than the normal operating temperature ,or the thermal cutoff might not operate at the operating temperature for the heat derived from the abnormality of the equipment.

11.1.3 Use the thermal cutoff with the voltage value and the current value lower than the rated ones. If the thermal cutoff is used with higher voltage or higher current , the body of thermal cutoff might be broken.

This product is DC rating specification

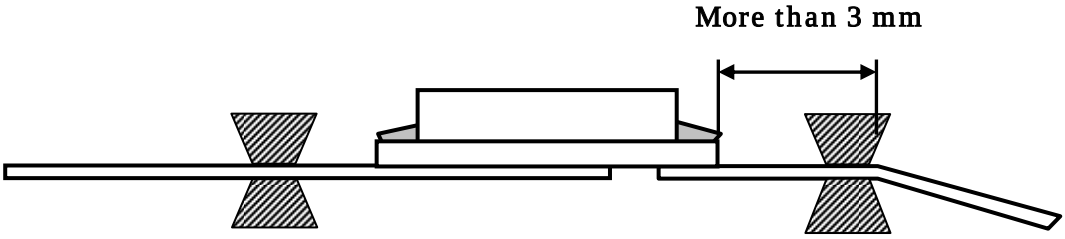
11.1.5 Do not use the thermal cutoff in the liquid as water or organic solvents, in the atmosphere as sulfurous acid gas, nitrogen oxide gas, or high humidity. For the deterioration of the sealing resin, the thermal cutoff may operate at the temperature lower than operating one, or the thermal cutoff may not operate at the temperature higher than the operating one.

11.1.6 If it is expected that the general consumers who are not aware of the usage cautions for the thermal cutoff handle it, please warn not to mount, remove or replace the thermal cutoff through the user's manual and other related material.

11.2 Lead wire process

11.2.1 When bending the lead wire, as shown in Fig.5, in order not to apply excessive pressure to the root of the lead wire, secure the lead wire close to the case and bend the part beyond the secured section. The lead wire should be bent at a distance 3 mm or more from the body of the thermal cutoff, and should not be twisted.

Fig.5



11.2.2 When also cutting the lead wire, cut as well as 11.2.1.

11.2.3 The tensile strength applied to the lead wire should be 9.8N or less.

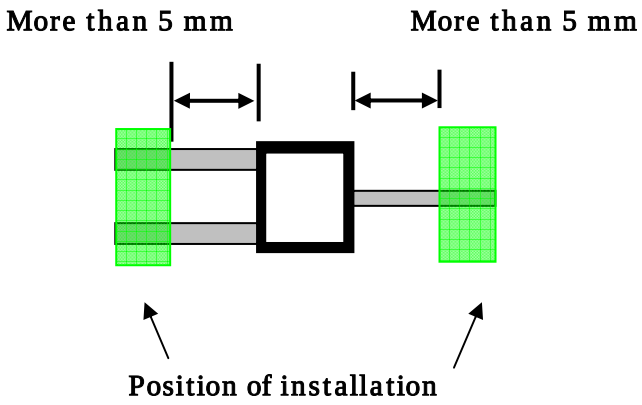
11.2.4 The force applied to the body of the thermal cutoff should be 4.9N or less. Please don't keep the force is applied to the thermal cutoff.

11.2.5 As for a marking of thermal cutoff, there is fear to vanish when alcohol or other organic solvent is used. Please confirm above before you use organic solvents for thermal cutoff.

11.3 Mounting

11.3.1 The thermal cutoff can be mounted by soldering, caulking, or welding. It is recommended that the position of installation is 5 mm or more from the body of the cutoff as shown in Fig.6.

Fig.6



11.3.2 In soldering, note that the thermal cutoff may not function or the shape of thermal element is not changed for the soldering heat. To prevent such malfunctions, the following are effective.

- Holding the lead near the case using a tool and solder for short intervals at a time, allowing the heat to escape.
- Using a lower soldering temperature
- Solder at a location that is distant from the case.
- Operating as blowing the cold blast to the thermal cutoff.

11.3.3 In caulking or welding, please be careful to keep the resistance value of the connecting section low. If the connecting section has a high resistance value, the passing current may generate an abnormally high temperature that will cause the thermal cutoff to operate(break the circuit). In caulking particularly, please test many times because heat-cycle and humidity cause a high resistant value.

11.3.4 In other mounting, please note that the thermal cutoff may not function or shape of thermal element is not changed. Confirm above before you mount for the thermal cutoff.

11.3.5 After mounting the thermal cutoff, please note that the force is not applied to the body and to the lead wire.

11.3.6 In case the force is applied to the bending direction of base after mounting of the thermal cutoff, big force is applied to the body of the thermal cutoff because the leads are pulled, which causes the crack of the thermal cutoff. After mounting to the PCB, you had better use not to add the stress to the base of thermal cutoff. If it is necessary to bend the PCB for modifying, you should check whether thermal cutoff is broken or not. And if you might worry about the damage of thermal cutoff, it is effective to form the lead for reducing the stress.

11.3.7 The HEATER resistance installed on the back of the thermal cutoff is covered with resin, and it is insulated.
Therefore, please be careful to handle because the break of insulation results from scratch of resin.

11.4 Disposal Considerations

11.4.1 The thermal cutoff corresponds to industrial waste, so dispose it according to the government, provincial regulations, or entrust the licensed disposal contractor.

12. Safety Standard

12.1 This product is complied with UL's applicable requirements, and filed in E71747.

12.2 This product is complied with VDE's applicable requirements, and filed in 677802-1171-0008.

Revision Table

Edition	Revised date	Revised reason	Revised description	Written
1	Aug.5,2004 MQT-04-3635	First issue		Maeda
2	May.19,2006 MQT-06-2815	Symbol is changed. Meaning of lot number is changed.	P.1 2. TF/TM is deleted. P.5 9.2.Line No. →Welding machine No. “Option” is deleted.	Maeda

Note)This page does not include the total page of specification.