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KES

Heater Unit

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1. Scope of Application

This standard specifies the heater unit for automobiles.

2. Purpose

This standard aims at securing proper quality by standardizing specification.

Remark: This standard and a drawing communicate together Kia's requirements.

3. Report of Evaluation Result

The quality evaluation results at each stage from development to mass production shall be submitted to Kia according to the Appendix.

4. Specifications Indicated in Drawings

- (1) Heat radiation amount
- (2) Airflow volume V_1 V_2 V_3 V_4
- (3) Air flow resistance
- (4) Airflow distribution
- (5) Temperature controllability (Temperature control)
- (6) Temperature controllability (Temperature difference between high and low)
- (7) Warm water pressure drop
- (8) Operating stroke (Discharge mode control) L_1 L_2 L'_2 L_3 L_4
- (9) Operating stroke (Temperature control) L_5 L_6 L'_6 L_7 L_8
- (10) Operating speed V_1 V_2
- (11) Case part color

5. Evaluation standard

The evaluation standard of the heater unit shall conform to Table 1.

Remark 1. The way of reading evaluation items and methods in Table 1 shall conform to the following example.

Evaluation Item		Evaluation Method	
Dura- bility	Vibration resistance	1st evaluation	7.5.1 — First evaluation method
	Operating force of slider	2nd evaluation (Evaluation item tested after evaluating vibration resistance)	7.3.1 — Second evaluation method
	Noise		7.3.7 — Third evaluation method
		3rd evaluation (Evaluation item tested after evaluating the operating force)	

Remark 2. The quality rank shall be represented by A, AR, B or C.

The definitions shall conform to KMS Q410001(Determination and Procedure of Quality Ranking).

Table 1

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method
Appear- ance	Case part color	To be indicated in specification drawing.	C	Visual inspection
	Dent of fins	The dent of fins of 5 crests or more at one side and 10 crests or more in all shall not be permissible.	C	↑
	Appearance	No flaw, tearing, rusting nor dirt.	C	↑
	Production record	Manufacturing No., manufacturing root symbol and manufacturing date shall be marked somewhere.	C	↑
Perfor- mance	Heat radiation performance	To be indicated in specification drawing.	AR	6.2.1
	Airflow resistance	To be indicated in specification drawing.	C	6.2.2
	Airflow distribution	To be indicated in specification drawing.		
	Temperature control-lability	To be indicated in specification drawing.	B	6.2.4
	Temperature control-lability between highest and lowest temperature	To be indicated in specification drawing.		

Table 1 (Continued)

Evaluation Item			Evaluation Standard	Quality Rank	Evaluation Method
Performance		Temperature difference between left and right	The mean discharge temperature difference between right and left shall be within 5℃.		
		Temperature difference at outlet	The temperature difference at one outlet shall be within 5℃		
		Warm water pressure drop	To be indicated in specification drawing.	C	6.2.5
		Mode door	To be 2.5m/s M or less.	B	6.2.6
		Air mix door	1. In case of full hot: 10m ³ /h or less. 2. In case of full cold: $\Delta T_1 - \Delta T_2 \leq 1^\circ\text{C}$		
		Case joint	1. Max. leak air speed shall be 5m/s or less. 2. Total leak amount shall be 10m ³ /h or less	C	
	Operating force		To be indicated in specification drawing.	B	6.2.7
	Operating feeling		No feeling of unhandiness when operating.	C	6.2.8
	Operating noise		No noise	C	6.2.9
	Operating stroke		1. The discharge mode controllability shall be indicated in specification drawing. 2. Temperature controllability shall be indicated in specification drawing.	C	6.2.10
	Retaining strength of door		No self-movement	C	6.2.11
	Water flow noise		No noise	B	6.2.12
	Smell		1. No unfamiliar smell(mold, dust, chemical) 2. The evaluation point for smell strength shall be 2 point or less.	C	6.2.13
Strength	Core airtightness		No gas leak	B	6.3.1
	Core pressure resistance		No break	A	6.3.2
	• Core airtightness		No gas leak	B	6.3.1
	Core negative pressure resistance		No abnormal deformation nor break	B	6.3.3
	• Core airtightness		No gas leak	B	6.3.1
	Strength of attachment part		1. After removing attachment part, no deformation nor break of attachment part. 2. No deformation nor break. 3. No trouble in the operation of each door and no deformation nor break. 4. No deformation nor break of each part.	B	6.3.4

Table 1 (Continued)

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method
Strength	• Core airtightness	No gas leak	B	6.3.1
	Strength of link part	No deformation nor break in link, door or shaft	C	6.3.5
	Wire clamp strength	No displacement of out cable	C	6.3.6
	Fastener retaining strength	Y direction In case of (A): No coming-off of a rod. In case of (B): No coming-off of a fastener. Z direction No displacement of a rod.	C	6.3.7
	Retaining strength of wire connection part	1. Coming-off force shall be 5kg {49N} or more. 2. No coming-off of connection part.	C	6.3.8
Durability	Vibration durability	No break, deformation nor looseness.	B	6.4.1
	• Air leak 1. Mode door 2. Air mix door 3. Case joint	2.5m/s or less. 1. 10m ³ /h or less in case of full hot. 2. $\Delta T_1 - \Delta T_2 \leq 1^\circ\text{C}$ or less in case of full cold. Maximum air speed shall be 5m/s or less.	B	6.2.6
	• Operating force	Change in operating force shall be within $\pm 20\%$ of initial value	B	6.2.7
	• Core airtightness	No gas leak	B	6.3.1
	Resistance to repeated pressure	No break, deformation or looseness	B	6.4.2
	Core airtightness	No gas leak	B	6.3.1
	Operating durability	No break, deformation or looseness	B	6.4.3
	• Air leak 1. Mode door 2. Air mix door 3. Case joint	2.5m/s or less. 1. 10m ³ /h or less in case of full hot. 2. $\Delta T_1 - \Delta T_2 \leq 1^\circ\text{C}$ or less in case of full cold. Maximum air speed shall be 5m/s or less.	B	6.2.6

Table 1 (Continued)

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method
Dura- bility	• Operating force	Change in operating force shall be within $\pm 20\%$ of initial value.	B	• 6.2.7
	• Operating noise	No noise	C	• 6.2.9
	Waterproof durability of heater core	To be 900h or more. Or in case of taxi training car, specification shall be 1800h or more	B	6.4.4
Envi- ronmental resis- tance	Repeating cold/heat resistance	No break, deformation nor looseness.	C	6.5.1
	• Air leak 1. Mode door 2. Air mix door 3. Case joint	2.5m/s or less. 1. $10\text{m}^3/\text{h}$ or less in case of full hot. 2. $\Delta T_1 - \Delta T_2 \leq 1^\circ\text{C}$ or less in case of full cold. Maximum air speed shall be 5m/s or less.	B	• 6.2.6
	• Operating force	Change in operating force shall be within $\pm 20\%$ of initial value.	B	• 6.2.7
	• Operating noise	No noise	C	• 6.2.9
	• Core airtightness	No gas leak	B	• 6.3.1
	Low temperature operating resistance	No break, deformation nor looseness	C	6.5.2
	• Air leak 1. Mode door 2. Air mix door 3. Case joint	2.5m/s or less. 1. $10\text{m}^3/\text{h}$ or less in case of full hot. 2. $\Delta T_1 - \Delta T_2 \leq 1^\circ\text{C}$ or less in case of full cold. Maximum air speed shall be 5m/s or less.	B	• 6.2.6
	• Operating force	Change in operating force shall be within $\pm 20\%$ of initial value.	B	• 6.2.7
	• Operating noise	No noise	C	• 6.2.9
	• Core airtightness	No gas leak	B	• 6.3.1
	High temperature operating resistance	No break, deformation nor looseness	C	6.5.3
	• Air leak 1. Mode door 2. Air mix door 3. Case joint	2.5m/s or less. 1. $10\text{m}^3/\text{h}$ or less in case of full hot. 2. $\Delta T_1 - \Delta T_2 \leq 1^\circ\text{C}$ or less in case of full cold. Maximum air speed shall be 5m/s or less.	B	• 6.2.6

Table 1 (Continued)

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method
Environmental resistance	• Operating force	Change in operating force shall be within $\pm 20\%$ of initial value.	B	• 6.2.7
	• Operating noise	No noise	C	• 6.2.9
	• Core airtightness	No gas leak	B	• 6.3.1
Productivity	Setting force of wire clamp	To be 9kgf {88.3N} or less	C	6.6.1
	Setting force of fastener	To be 5kgf {43N} or less	C	6.6.2
	Setting force in wire connection ring	To be 2kgf {19.6N} or less	C	6.6.3
	Air leak of heater core	To be 6l/min or less	C	6.6.4

6. Evaluation Method

6.1 Common evaluation condition

6.1.1 Standard atmospheric conditions for testing

Unless otherwise specified, the standard atmospheric condition shall be a standard temperature condition of $20 \pm 15^\circ\text{C}$ and a standard humidity condition of $65 \pm 20\%$ specified in KS A 0006(Standard Atmospheric Conditions for Testing).

6.1.2 Type of test piece

Unless otherwise specified, it shall be assembled parts specified in the specification drawing.

6.1.3 Installation condition of test piece

If it is designated to be the vehicle condition or equivalent, install the test piece on the attachment base with sufficient rigidity in the same lay-out as the vehicle condition.

6.2 Performance

6.2.1 Heat radiation performance

The heat radiation performance at the air flow volume of V_2 m³/h specified in drawing shall be measured under the following (1)~(5).

- (1) Warm water flow volume: 6 l/min
- (2) Inlet warm water temperature: $85 \pm 3^\circ\text{C}$
- (3) Inlet air temperature: $20 \pm 3^\circ\text{C}$
- (4) Discharge mode: Heat
- (5) Position of air mix door: Full hot

6.2.2 Airflow resistance

Measure the airflow resistance of each discharge mode under the conditions in the following Table 2.

Table 2

Discharge mode	Position of air mix door	Air flow(m ³ /h)
Vent	Full Cold	V_1
Heat	Full Hot	V_2
Heat Defroster		V_3
Defroster		V_4

6.2.3 Airflow volume distribution

With the air duct(including rear air duct), discharge grill and blower unit approved by Kia in the vehicle condition, measure the airflow volume at each outlet in the measurement condition of Table 3. The airflow volume shall also be measured when the cooling unit approved by Kia is installed.

Table 3

Discharge mode	Position of temp. control	Vent outlet		Heat outlet		Defroster outlet	
		Center	Side	Front	Rear	Front	Side
Vent	Full Cold	○	○				
Bi-level	1/2 Cold	○		○		○	
Heat	Full Hot		△	○	○	○	
Heat/Defroster	Full Hot		△	○		○	
Defroster	Full Hot		△			○	○

Remark 1. ○, △ marks mean number of points where the measurement is performed.

Items marked with △ shall be measured in case side vent and side defroster are for common use.

2. Voltage applied to blower unit shall be 12V for 12V system and 24V for 24V system.

6.2.4 Temperature controllability

With the air duct (including rear air duct), discharge grill and blower unit approved by Kia in the vehicle condition, evaluate the temperature controllability, temperature difference between the highest and lowest points, between left and right, and difference in outlet temperature in the measurement condition below.

(1) Measurement condition

(a) Warm water flow

10 l /min

(b) Warm water temperature at inlet

85±3℃

(c) Air temperature at inlet

5±3℃

(d) Power supply voltage

4V for 12V system, 8V for 24V system

(e) Discharge mode and position of air mix door(refer to Table 4 and Fig. 1)

Table 4

Discharge mode	Position of air mix door(refer to Fig. 1)
Vent	A B C D E F
Bi - level	C D E
Heat	B C D E F G
Heat · Defroster	↑
Defroster	↑

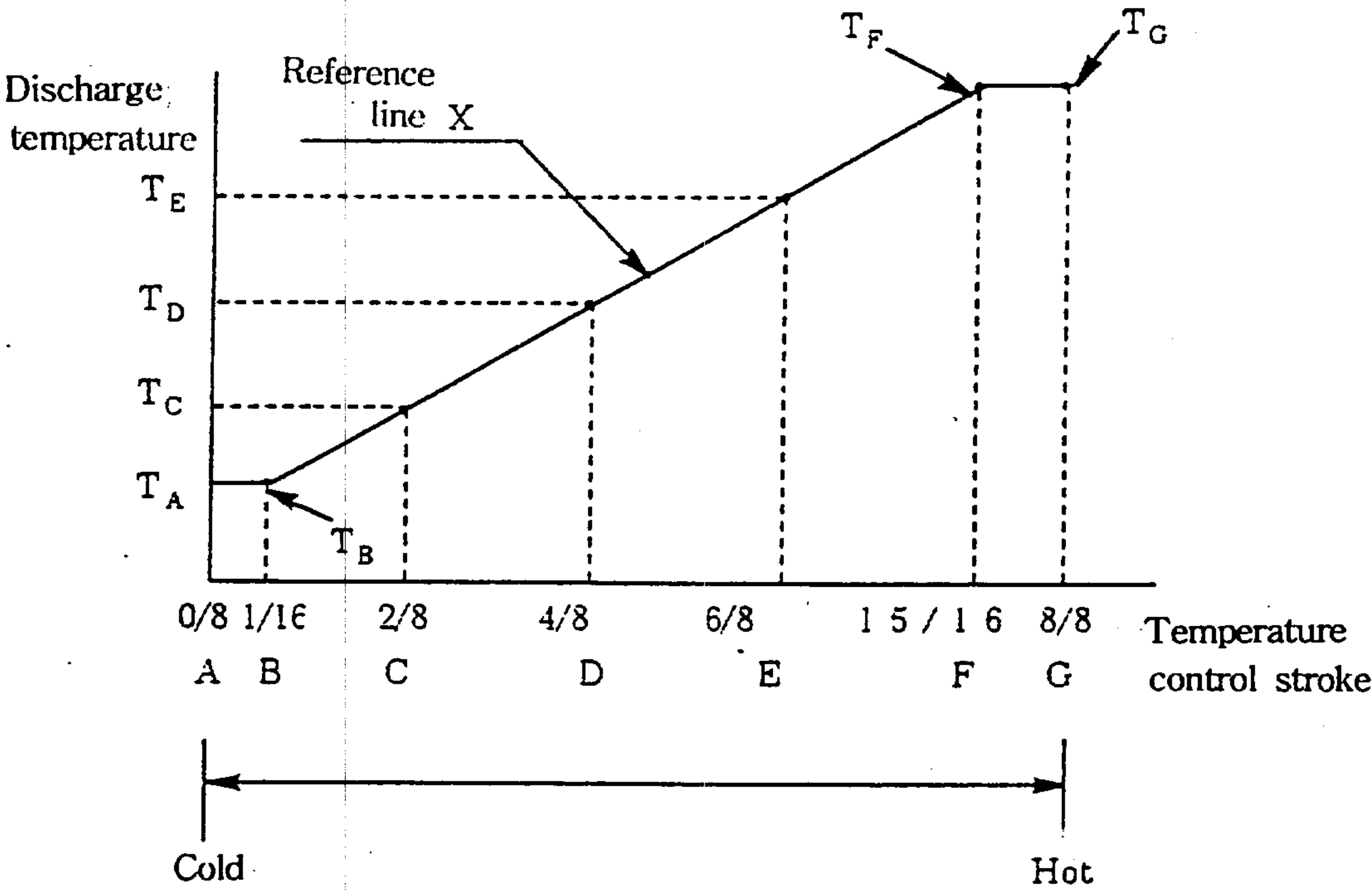


Fig. 1

- Remark Determining method of reference line
1. Calculate average value of each measurement temperature at the stroke positions of A and G, these points parallel to point B and F, shown in Fig. 1.
 2. Connect points B and F with a straight line.