

KES

Cooling Unit

KES D – C454

(EST.) 1992 – 03 – 08 

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1. Scope of Application

This standard shall be applied to cooling unit for cars.

2. Purpose

This standard shall make it target to assure adequate quality by intending to standardize specifications.

Remark : This standard shall transfer requirements of our company with specific drawing.

3. Report of Evaluation Result

Should submit quality evaluation result for each step from development to mass production to KIA according to instruction of appended document

4. Definition of Terms

(1) Air flow rate (Dry type core)

Air flow rate that coolant doesn't pass through evaporator core but passes through core with surface of evaporator surface dried.

(2) Air flow rate (Wet type core)

Air flow rate that coolant passes through evaporator core but passes through core with condensed water attached to surface of evaporator surface.

5. Indicative Specification on Drawing

(1) Air flow rate (Dry type core) : $V_D \text{ m}^3/\text{h}$

Air flow rate (Dry type core) : $V_D \text{ m}^3/\text{h}$

(2) Air-conditioned capacity

(3) Air flow resistance

(4) Coolant flow resistance

(5) Coolant flow connection (At transient state, stable state)

(6) At state attached to car

(7) Classification of trucks and passenger cars

(8) Adiabatic clothing part of high pressure pipe

(9) Specification of expansion valve (Evaluation method of following items shall conform to MES PA 61J14.)

① Rated capacity

② Setting value of over heat

③ Time integer

④ Installation position (Classification of inner part of engine room and interior.

⑤ Method of pressure unification

- ⑥ Entering method
- (10) Specification of orifice pipe (minimum inner diameter)
- (11) Specification of thermostat (Evaluation method of following item shall conform to KES D-C 458.)
 - ① Operational temperature of contact point
 - ② Rated voltage
 - ③ Rated current
 - ④ Current load
 - ⑤ Fuse capacity of car
- (12) Case color

6. Standard of Evaluation

Evaluation standard of cooling unit shall conform to table 1.

Remark 1. Method to read evaluation item and evaluation method of table 1 shall be same as following examples.

Evaluation item				Evaluation method	
Durability	Resistance to vibration	1st Evaluation		7.5.1	1st Evaluation method
	• Operational force of slide	2nd Evaluation (Evaluation item carried out after vibration durability evaluation)		• 7.3.1	2nd Evaluation method
	.. Noise	3rd Evaluation (Evaluation item carried out after operating force evaluation)		.. 7.3.7	3rd Evaluation method

Remark 2. Quality rank shall be represented with A, AR, B or C.
The definition shall conform to KMS Q410001
(Applicable instructions of determining quality rank)

Table 1

Evaluation items		Evaluation standard	Quality rank	Evaluation method
Performance	Air-conditioned capacity	Clarified at the drawing	B	7.2.1
	Air flow resistance	Clarified at the drawing	C	7.2.2
	Coolant flow resistance	Clarified at the drawing	C	7.2.3
	Outlet surface of core	Temperature difference between highest and lowest part should be less than 4 °C	C	7.2.4
	Air sealing quality (Air leakage)	· Speed of air leakage should be less than 2.5 m/s · Total leakage should be less than 10 m³/h	C	7.2.5
	Water flyout characteristics	· Should be no water flyout for first 30 minutes · Water flyout quantity at the moment that air blower switch is low→high, OFF→ON should be less than 3 cc {3 cm}.	C	7.2.6
	Water sealing quality (Water leakage) Drain water	Exterior case except for drain part should be no water leakage	C	7.2.7
		Exterior case except for drain part should be no water leakage	C	7.2.8
	Dew condensation	Dew of case and pipe surface should not be dropt.	C	7.2.9
	Degree of preventing frost	Should be no frost	B	7.2.10
	Interior clearness	Should be less than 50 mg per 1 m² of evaporator interior area	C	7.2.11
	Coolant flow noise	Clarified at the drawing	C	7.2.12
	Connection (Sound of banging)	Should be no connection	C	7.2.13

Table 1 (Continue)

Evaluation items		Evaluation standard	Quality rank	Evaluation method
Performance	Smell	- Should be no smell (Mold, dust, chemical smell and etc) - Strength of smell should be less than 1.5 rank	C	7.2.14
Strength	Air sealing quality of core	Should be no gas leakage	B	7.3.1
	Resistance to pressure of core	Should be no deformation and damage	A	7.3.2
	· Air sealing quality	Should be no gas leakage	B	7.3.1
	Case attaching part	- Should be no damage - Should be no deformation of respective part except for nut fastening part	B	7.3.3
	Degree of preventing frost	Should be no deformation and damage	B	7.3.4
	· Air sealing quality	Should be no gas leakage	B	7.3.1
	Terminal strength	Should be no damage, gap, welding exfoliation.	C	7.3.5
Durability	Resistance to vibration	Should be no deformation, damage and gap	B	7.4.1
	· Air leakage	- Speed of air leakage should be less than 2.5 m/s - Total leakage should be less than 10 m³/h	C	7.2.5
	· Air sealing quality	Should be no gas leakage	B	7.3.1
	Pressure period	Should be no deformation, damage and gap	B	7.4.2
	· Air sealing quality	Should be no gas leakage	B	7.3.1
Resistance to environment	Resistance to heat impact	Should be no deformation, damage and gap	C	7.5.1
	· Air leakage	- Speed of air leakage should be less than 2.5 m/s - Total leakage should be less than 10 m³/h	C	7.2.5
	· Water sealing quality (Water leakage)	Exterior case except for drain part should be no water leakage	C	7.2.7

Table 1 (Continue)

Evaluation items		Evaluation standard	Quality rank	Evaluation method
Resistance to environment	· Air sealing quality	Should be no gas leakage	B	7.3.1
	Resistance to heat	Should be no gap, deformation, heat aging and damage	C	7.5.2
	· Air leakage	· Speed of air leakage should be less than 2.5 m/s · Total leakage should be less than 10 m³/h	C	7.2.5
	· Water sealing quality (Water leakage)	Exterior case except for drain part should be no water leakage	C	7.2.7
	· Air sealing quality	Should be no gas leakage	B	7.3.1
	Resistance to cold	Should be no gap, deformation, heat aging and damage	C	7.5.3
	· Air leakage	· Speed of air leakage should be less than 2.5 m/s · Total leakage should be less than 10 m³/h	C	7.2.5
	· Water sealing quality (Water leakage)	Exterior case except for drain part should be no water leakage	C	7.2.7
	· Air sealing quality	Should be no gas leakage	B	7.3.1
	Resistance to corrosion		C	7.5.4
	· Air sealing quality	Should be no gas leakage	B	7.3.1
	Resistance to pressure of core	Should be no deformation and damage	A	7.3.2
Appearance	Case part color	Clarified at the drawing	C	Naked eye inspection
	Depression of pin	Depression of pins more than 5 crests at a column of a side or 10 crests at the whole shall not permitted.	C	Naked eye inspection
	Flaw, crack, rust and damage	Should be nothing	C	Naked eye inspection
	Product record	Mark one out of serial No., lot mark and date of manufacture	C	Naked eye inspection

7. Evaluation Method

7.1 Common evaluation condition

7.1.1 Standard condition of test place

As far as no special assignment, make condition standard temperature 20 °C, rank 15 (20 ± 15 °C) and standard humidity 65 %, rank 20 (65 ± 20 %) of KS A 0006 (Standard condition of test place).

7.1.2 Type of test sample

- (1) As far as no special assignment, test sample shall be thing assembled as same as indication at drawing.
- (2) One for strength, durability, resistance to environment should be satisfied with the corresponding item after MES test of expansion valve and frost switch.
- (a) MES PA 61J14 7.4.2 Operational durability of expansion valve
- (b) KES D-C 458 7.6.2 Operational durability of frost switch

7.7.4 Temperature period

7.7.5 Resistance to humidity

7.7.6 Quality of preventing vibration, resisting vibration

7.1.3 Installation condition of test sample

As far as no special assignment, install test sample to test platform or fixing platform under condition same as real car.

7.2 Performance

7.2.1 Air-conditioned capacity

Respective parts should be same as state of installation to car. Air-conditioned capacity shall measure according to condition defined at table 3.

Table 3

Contents	Condition
Inlet air	27 °C 50 % RH
Air flow rate (Wet type)	Vw m³/h
Inlet pressure of expansion device	14 kgf/cm² {1.4 MPa}
Overcool	5 °C
Outlet pressure of evaporator	2 kgf/cm² {0.2 MPa}

Note : Report value of oil circulation rate (Mass ratio) at the moment of measure.

7.2.2 Air flow resistance

Measure flow resistance of unit of wet - dry type condition under measuring condition defined at table 3 (Measure air flow rate : V_w, V_D).

7.2.3 Coolant flow resistance

Measure differential pressure of inlet-outlet pipe of evaporator core under measuring condition defined at table 3 (Measure air flow rate : V_w).

7.2.4 Outlet surface of core

Divide evaporator case outlet into 9 parts like figure 1, measure temperature at center of respective part under measure condition (Measure air flow rate : V_w). Calculate difference of temperature between highest-lowest parts.

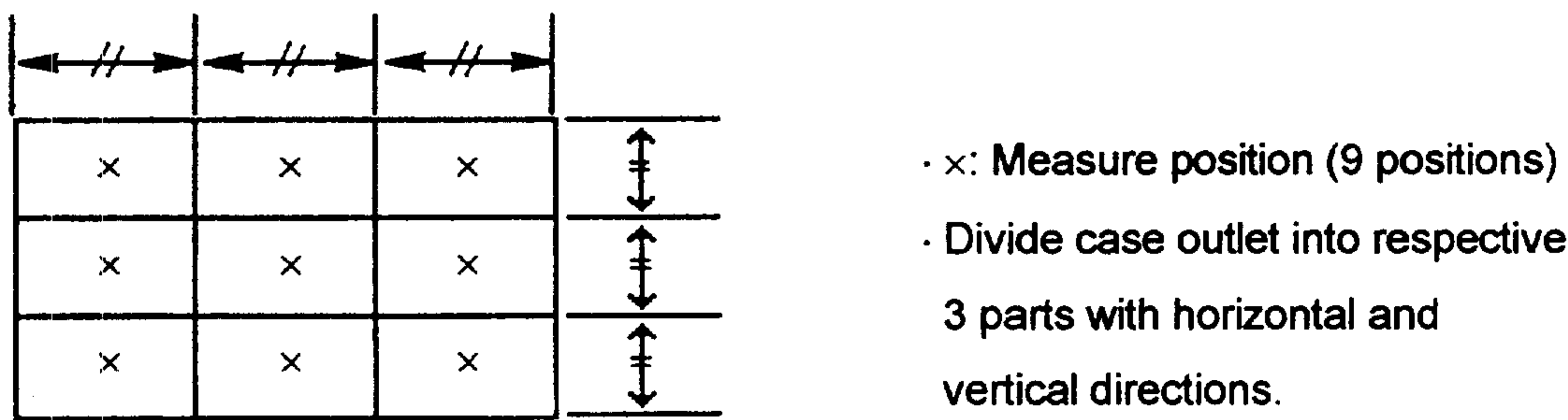


Figure 1

7.2.5 Air leakage

Seal case outlet drain part and measure speed of air leaked from case connection at position away 20 mm from leaking part when inner pressure is 50 mm Aq. Measure leakage from whole case.

7.2.6 Water flyout

Evaluate water flyout from case outlet under condition defined at table 4.