

KES

Electrical Type Frost Switch

KES D – C455

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Quoted standard

Attached document

Explanation

1. Scope of application

This standard document shall regulate an electric frost switch (It shall be referred as frost switch below).

2. Purpose

The purpose of this standard is to guarantee appropriate quality by standardizing specification.

Remark : This standard shall transmit specification of our company with drawings.

3. Report of evaluation result

From developing stage to mass production stage, quality evaluation result at each step should be submitted to KIA according to indication in attached document.

4. Terminology

(1) Performance

Quantitative expression of ability required for satisfying applying purpose (Including accuracy).

Example : Buzzer alarming time 3.0 ± 0.5 second

(2) Function

Qualitative expression of ability required for satisfying applying purpose (Including accuracy).

Example : Buzzer shall alarm if one press the key.

(3) Operation

Function denoted in drawing should be satisfied.

(4) Performance guarantee scope

Environmental conditions that guarantee the performance indicated in the drawing.

(5) Operation guarantee scope

Environmental conditions that guarantee the operation indicated in the drawing.

(6) Storage guarantee scope

Temperature condition that guarantees performance, function and operation in the predetermined environmental condition without applying power source after storage.

(7) Mounting state in real car

State in which a connector is mounted in the direction indicated in the drawing.

(8) Assigned test circuit

Test circuit that simulates connection between a power source and a load according to the system diagram indicated in the drawing.

(9) Malfunction

Operation not indicated in the drawing.

(10) Heating element

Heat generating device like power transistor or resistance

(11) Fuming and fire

State of frost switch, under which smoke and fire leak out from case when a cigarette light

(12) Noise

Unexpected sound.

(13) Abbreviation

T1 : Minimum temperature that guarantee storage.

T2 : Minimum temperature that guarantee operation.

T3 : Minimum temperature that guarantee performance.

T4 : Maximum temperature that guarantee performance.

T5 : Maximum temperature that guarantee operation.

T6 : Maximum temperature that guarantee storage.

V1 : Minimum voltage that guarantee operation.

V2 : Minimum voltage that guarantee performance.

V3 : Maximum voltage that guarantee performance.

V4 : Maximum voltage that guarantee operation.

VOF : Power source voltage when engine stop 12V system → 12.0V
24V system → 24.0V

VON : Power source voltage when engine run 12V system → 14.5V
 24V system → 28.3V

Tolerance of temperature T1-T6 and voltage V1-V4, VOF and VON is respectively
 $\pm 2^{\circ}\text{C}$ and $\pm 0.5\text{V}$.

5. Specification indicated in the specification drawing

(1) Rated voltage

(2) Rated load and load type

(3) Performance and function

Indicate performance and function as following:

Example : (a) Guaranteed performance when engine ignite.
 (b) Guaranteed performance excluding engine ignition.

(4) System diagram

System diagram including fuse capacity and valve capacity

(5) Input signal

Input signal for each sensor and actuator

(6) Name of each terminal

(7) Change in setup value of operating temperature

(8) Operating temperature in thermo-sensor

(9) Response from thermo-sensor

(10) Distinct application in passenger car or truck

(11) Diameter of a conducting wire

- (12) Voltage drop at output terminal
Voltage drop between each output terminal and power source (or earth terminal)

- (13) Waveform type of power source
Waveform type of power source at engine ignition

- (14) Feature, external appearance and mounting direction

- (15) Durability
Endurance load

- (16) Necessity of performance evaluation after power is connected inverse.

- (17) Evaluation condition under special environment

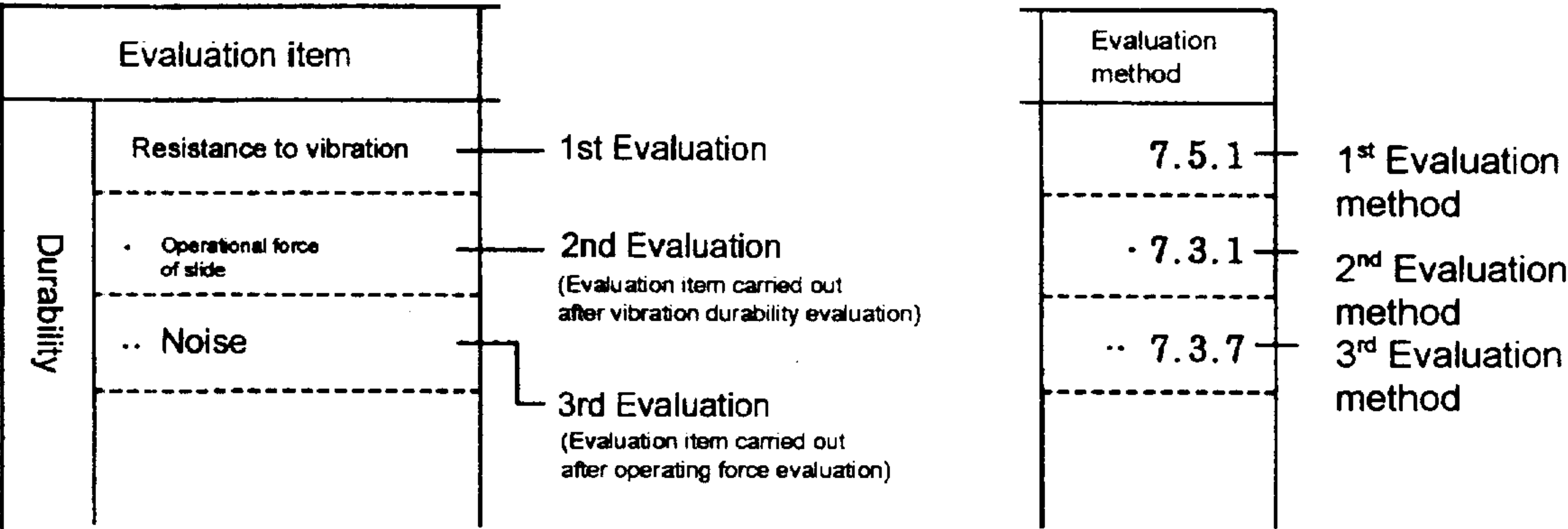
- (18) Mounting place

- (19) Operating mode

6. Evaluation criteria

Evaluation criteria of frost switch shall follow the Table 1.

Remark 1. How to read evaluation item and method in Table 1 is shown in the following example.



Remark 2. Rank of quality is indicated as A, AR, B or C.
The definition shall refer to KMS Q410001 (Applying guideline of quality rank).

Table 1

Evaluation items		Evaluation standard	Quality rank	Evaluation method
Performance Function	Operating Temperature	Follow the spec in the drawing.	B	7.2.1
	Reactivity	Follow the spec in the drawing.	C	7.2.2
	Anti-shock performance (Only sample that has relay in its control unit)	• No noise louder than 5 m/sec at relay on-off operation. • No noise at steady on-off state.	B	7.2.3
	Insulating resistance	Minimum 1M Ω	C	7.2.4
Temperature rising		Follow the evaluation criteria 7.4 (Temperature rising) in KES D-C457 (Control unit).	C	7.4 in KES D-C457
Malfunction due to power source deviation	Sample that ACC and IG2 are not connected at engine ignition (A)	Follow the evaluation criteria 7.5.1 (At engine ignition (A)) in KES D-C457 (Control unit).	B	7.5.1 in KES D-C457

Table 1 (continued)

Evaluation items		Evaluation standard	Quality rank	Evaluation method
Malfunction due to power source deviation	Sample that ACC and IG2 are connected at engine ignition (B)	Follow the evaluation criteria 7.5.2 (At engine ignition (B)) in KES D-C457 (Control unit).		7.5.2 in KES D-C457
	Ripple of power source	Follow the evaluation criteria 7.5.3 (Ripple of power source) in KES D-C457 (Control unit).	B	7.5.3 in KES D-C457
	Voltage difference	Follow the evaluation criteria 7.5.4 (Voltage difference) in KES D-C457 (Control unit).	B	7.5.4 in KES D-C457
	Rattle sound of ignition key	Follow the evaluation criteria 7.5.5 (Rattle sound of ignition key) in KES D-C457 (Control unit).	B	7.5.5 in KES D-C457
	Suspension of instant power	Follow the evaluation criteria 7.5.3 (Suspension of instant power) in KES D-C457 (Control unit).	B	7.5.6 in KES D-C457
Voltage drop of output terminal		Follow the evaluation criteria 7.6 (Voltage drop of output terminal) in KES D-C457 (Control unit).	C	7.6 in KES D-C457
Connection		Follow the evaluation criteria 7.7 (Connection) in KES D-C457 (Control unit).	B	7.7 in KES D-C457
Anti-electrical surrounding characteristics	Surge-proof characteristics	Satisfy performance and function regulated in the drawing.	B	7.3.1
	•Operating temperature	Follow the spec in the drawing.	B	•7.2.1
	•Reactivity	Follow the spec in the drawing.	C	•7.2.2
Anti-electrical surrounding	•Anti-shock performance	No rattling noise louder than 5m/sec at relay on-off operation. No rattling noise at steady on-off state.	B	•7.2.3

Table 1 (continued)

Evaluation items		Evaluation standard	Quality rank	Evaluation method
Anti-electrical surrounding		No rattling noise at steady on-off state.		
	•Insulating resistance	Minimum 1M Ω	C	•7.2.4
	•Voltage drop at output terminal	Follow the evaluation criteria 7.6 (Voltage drop at output terminal) in KES D-C457 (Control unit).		7.6 in KES D-C457
	•Inverse connection resistance of power source	Follow the evaluation criteria in KES D-C457 (Inverse connection resistance of power source).		7.9.2
	•Insulating resistance	Minimum 1M Ω	C	•7.2.4
	Overvoltage resistance (A)	1. Satisfy performance and function regulated in the drawing. 2. No fuming and fire	A	7.3.3
	•Operating temperature	Follow the spec in the drawing.	B	•7.2.1
	•Reactivity	Follow the spec in the drawing.	C	•7.2.2
	•Anti-shock performance	No rattling noise louder than 5m/sec at relay on-off operation. No rattling noise at steady on-off state.	B	•7.2.3
	•Insulating resistance	Minimum 1M Ω	C	•7.2.4
	•Voltage drop at output terminal	Follow the evaluation criteria 7.6 (Voltage drop at output terminal) in KES D-C457 (Control unit).	C	7.6 in KES D-C457
	Overvoltage resistance (B)	Follow the evaluation criteria in KES D-C457 (Over voltage (B)).	A	7.9.4 in KES D-C457
	Over current resistance	Follow the evaluation criteria in KES D-C457 (Over current resistance).		7.9.5 in KES D-C457

Table 1 (continued)

Evaluation items		Evaluation standard	Quality rank	Evaluation method
	Float earth resistance	Follow the evaluation criteria 7.9.6 (Float earth resistance) in KES D-C457.	B	7.9.6 in KES D-C457
	Float power source resistance	Follow the evaluation criteria 7.9.6 (Float power source resistance) in KES D-C457.	B	7.9.7 in KES D-C457
Strength	Strength of mounting part	Follow the evaluation criteria 7.10.1 (Strength of mounting part) in KES D-C457.	B	7.10.1 in KES D-C457
	Wire strength for sample that have extruding wire)	Follow the evaluation criteria 7.10.2 (Wire strength) in KES D-C457.	B	7.10.2 in KES D-C457
	Lock strength for sample that have extruding J connector	Follow the evaluation criteria 7.10.3 (Float earth resistance) in KES D-C457.	B	7.10.3 in KES D-C457
	Wire strength from thermo sensor	No damage, loose junction, degrade and repair on soldering part.	C	7.4.1
Durability	Shock endurance	No damage, deformation and looseness	B	7.5.1
	•Operating temperature	Follow the spec in the drawing.	B	•7.2.1
	•Reactivity	Follow the spec in the drawing.	C	•7.2.2
	•Anti-shock performance	No rattling noise louder than 5m/sec at relay on-off operation. No rattling noise at steady on-off state.	B	•7.2.3
	•Insulating resistance	Minimum 1M Ω	C	•7.2.4
	•Voltage drop at output terminal	Follow the evaluation criteria (Voltage drop at output terminal) in KES D-C457.	C	•7.6 in KES D-C457

Table 1 (continued)

Evaluation items		Evaluation standard	Quality rank	Evaluation method
Surrounding proof characteristics	Cold-proof characteristics	Follow the evaluation criteria 7.9.6 (Float earth resistance) in KES D-C457.	B	7.6.1
	•Operating temperature	Follow the spec in the drawing.	B	•7.2.1
	•Reactivity	Follow the spec in the drawing.	C	•7.2.2
	•Anti-shock performance	No rattling noise louder than 5m/sec at relay on-off operation. No rattling noise at steady on-off state.	B	•7.2.3
	•Insulating resistance	Minimum 1M Ω	C	•7.2.4
	•Voltage drop at output terminal	Follow the evaluation criteria (Voltage drop at output terminal) in KES D-C457.	C	•7.6 in KES D-C457
	Heat-proof characteristics	Satisfy performance and function regulated in the drawing.	C	7.6.2
	•Operating temperature	Follow the spec in the drawing.	B	•7.2.1
	•Reactivity	Follow the spec in the drawing.	C	•7.2.2
	•Anti-shock performance	No rattling noise louder than 5m/sec at relay on-off operation. No rattling noise at steady on-off state.	B	•7.2.3
	•Insulating resistance	Minimum 1M Ω	C	•7.2.4
	•Voltage drop at output terminal	Follow the evaluation criteria (Voltage drop at output terminal) in KES D-C457.	C	•7.6 in KES D-C457
	Operation at low temperature	1. No malfunction 2. Satisfy performance and function indicated in the drawing.	C	7.6.3

Table 1 (continued)

Evaluation items		Evaluation standard	Quality rank	Evaluation method
Surrounding proof characteristics	•Operating temperature	Follow the spec in the drawing.	B	•7.2.1
	•Reactivity	Follow the spec in the drawing.	C	•7.2.2
	•Anti-shock performance	No rattling noise louder than 5m/sec at relay on-off operation. No rattling noise at steady on-off state.	B	•7.2.3
	•Insulating resistance	Minimum 1M Ω	C	•7.2.4
	•Voltage drop at output terminal	Follow the evaluation criteria (voltage drop at output terminal) in KES D-C457.	C	•7.6 in KES D-C457
	Operation at high temperature	1. No malfunction 2. Satisfy performance and function indicated in the drawing.	C	7.6.4
	•Operating temperature	Follow the spec in the drawing.	B	•7.2.1
	•Reactivity	Follow the spec in the drawing.	C	•7.2.2
	•Anti-shock performance	No rattling noise louder than 5m/sec at relay on-off operation. No rattling noise at steady on-off state.	B	•7.2.3
	•Insulating resistance	Minimum 1M Ω	C	•7.2.4
	•Voltage drop at output terminal	Follow the evaluation criteria (voltage drop at output terminal) in KES D-C457.	C	•7.6 in KES D-C457
	Short-term operation at extremely high temperature	Test result should be reported to related department and approved.	B	7.12.5 in KES D-C457
	Periodic test of temperature	1. No malfunction 2. Satisfy performance and function indicated in the drawing.	C	7.6.5