



Passenger's Air Bag Modules

KES D-C217

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Remark



1. Purpose

This standard aims at securing proper quality by standardizing specifications.

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

2. Scope of Application

This standard specifies air bag module (hereinafter referred to as the "module assembly") for automobiles.

3. Report of Evaluation Result

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

4. Definition of Terminology

(1) Module assembly

A unit inside an air bag protection system that consists of a bag to protect the passenger, an inflator generating gas to inflate the bag, a container to hold gas, bag cover that contains and holds the bag, and a deployment door.

(2) Deployment

Inflation of the bag

(3) Vent hole

A container or hole at the bag that controls exhaustion of gas to control deceleration of the passenger.

(4) Ignitor

An ignition device that operates the inflator.

(5) Bridge wire

Heating wire that is inside an ignitor. It operates the inflator with resistance heat caused by the current.

(6) Bag retainer

A device to be used to distribute deployment forces between the bag attachment points, maintaining inlet through which gas flows into the bag, and preventing excessive loss of gas.

(7) Inflator

A device that generates gas to inflate the bag.

(8) Bag

A flexible membrane that forms an enclosed volume. It receives gas from the inflator, and provides restraining force to the passenger.

(9) Reaction can

A container inside the module assembly which contains a bag assembly, a bag cover, an inflator and a deployment door, and can be attached to the vehicle.

(10) Deployment door

A visible device with appearance requirements inside the module assembly which opens at the moment of deployment, and contains and protects the bag prior to deployment.

(11) Tether

Bag retaining device that is used to guide the direction of the volume of bag or to shape an inflated bag.

(12) Ignition

The time at which the ignitor begins to receive electrical deployment signal first.

(13) Propellant

A part composing the inflator. Propellant turns into gas when the inflator blows up the bag.

(14) Short-circuit bar connector

A connector that has two or more terminals, which is short-circuited when the connection is disconnected and is insulated when the connection is connected.

(15) Both side standard and single side standard

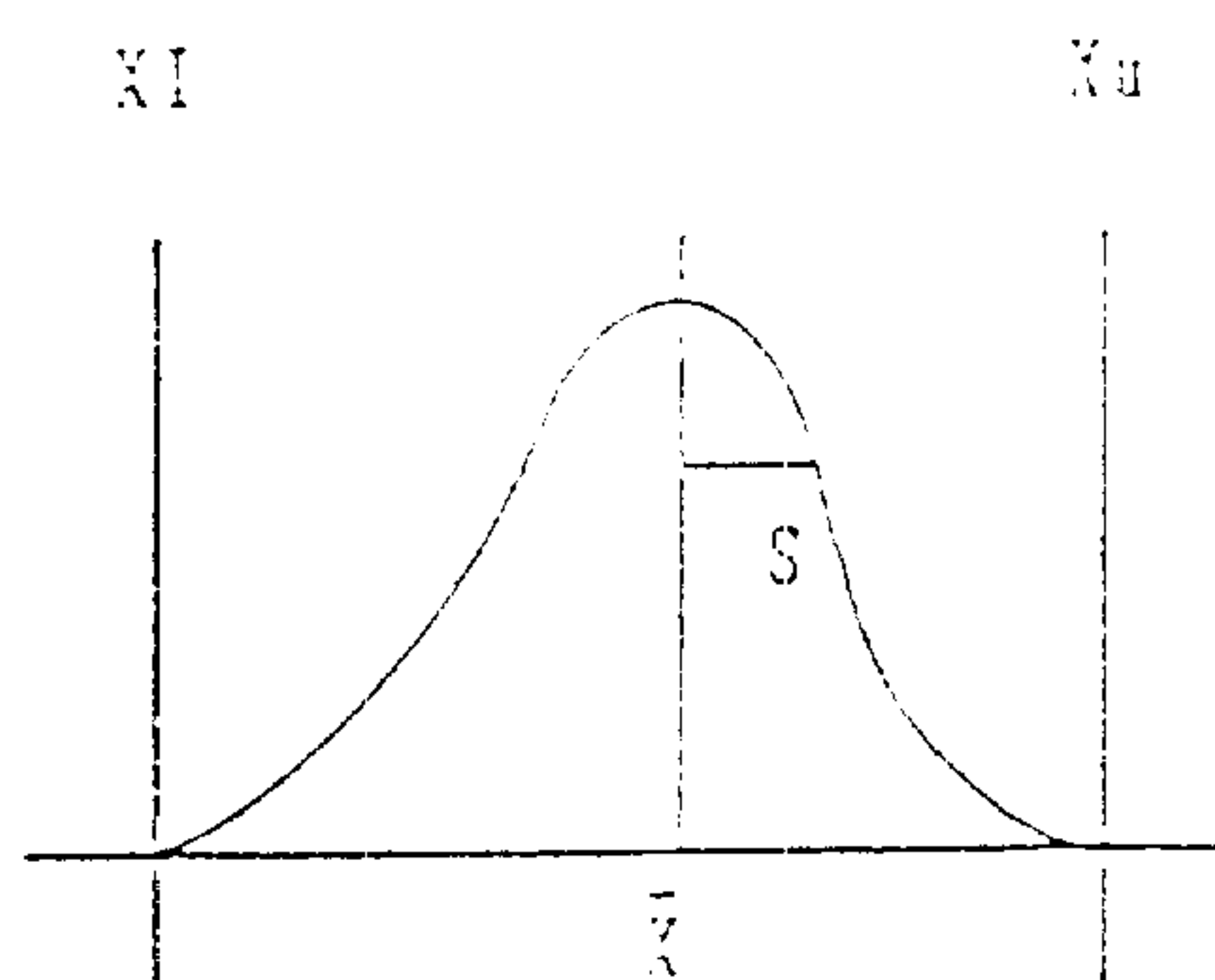


Fig. 1 Both side standard

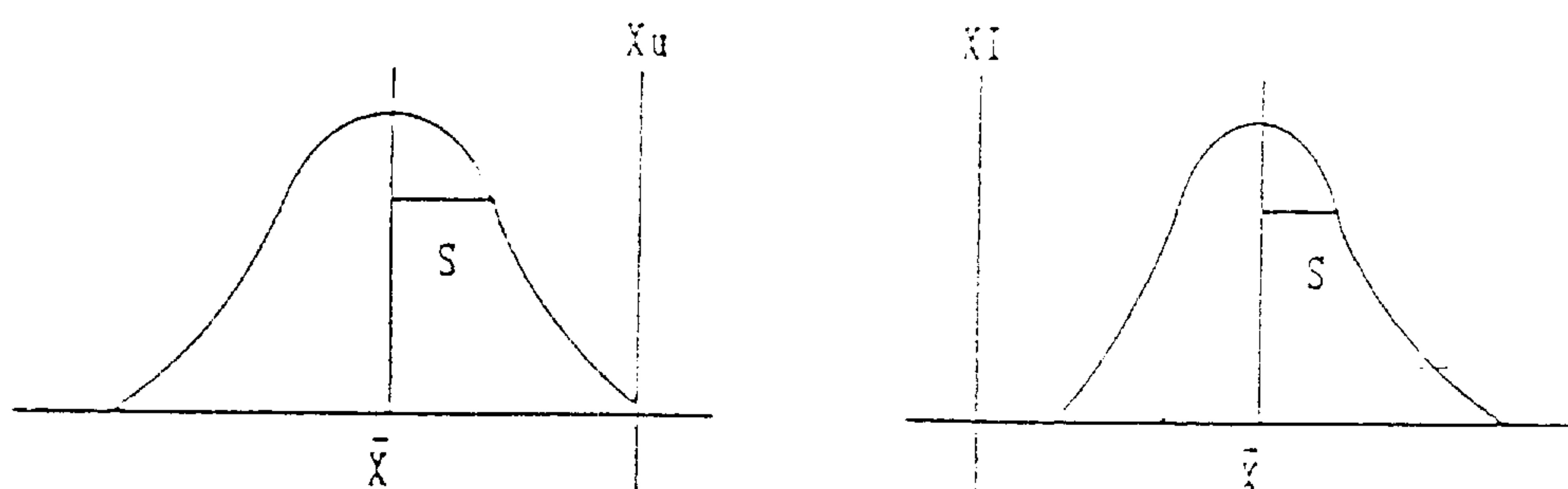


Fig. 2 Single-side standard

* Description for each symbol is given in 7.8.1.

5. Specifications Indicated in Drawings

- (1) Attachment method to a vehicle, shape of attached part, and tightening torque when necessary
- (2) Inflator being used (manufacturer's name, type and output characteristics)
- (3) Ignitor being used (manufacturer's name and type)
- (4) Shape and volume of inflated bag as needed
- (5) Diameter, number, and position of vent holes, minimum sewing diameter around the vent hole
- (6) Length, number and position of tether as needed
- (7) Folding method of the bag
- (8) Permeability of the bag ($\text{cm}^3/\text{cm}^2 \cdot \text{S}$)
- (9) Attachment position and angle of module assembly to an automobile
- (10) Positional relationship of hip-point
- (11) Ignitor test specifications
- (12) Limit size appropriate to mating part
- (13) Shape of deployment door
- (14) Evaluation standard for attachment and finishing of deployment door and instrument panel, after an environment test
- (15) Vibration fixture specifications (material, shape and mounting method)
- (16) Vibration detections of module assembly (TL, BL, WL)
- (17) Time taken from ignition to deploying the bag full
- (18) Size and position of inflator mounting hole
- (19) External shape of inflator
- (20) Evaluation standard of inflator tank output
- (21) Specification of wire harness (length, color, connector, etc.)
- (22) Tank volume for a ballistic test

6. Evaluation Standard

The evaluation standard of the module assembly 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 — 1st evaluation method
	• Operating force of slider	2nd evaluation (Evaluation item tested after evaluating the vibration resistance)	• 7.3.1 — 2nd evaluation method
	•• Noise		•• 7.3.7 — 3rd 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. Module Assembly

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method												
Basic performance	Amount of scattered particle	Broken pieces of deployment door, etc. that are scattered by deploying the bag shall not, in any area, exceed the values in the following table. In any area, metal pieces shall not be scattered.	A	7.2.4 —												
		<table><tr><td>Area (Refer to Fig. 5)</td><td>Weight of total particles</td><td>Mass of max. particle</td></tr><tr><td>A: near the eye</td><td>5.0</td><td>0.5</td></tr><tr><td>B: near the face</td><td>50.0</td><td>10.0</td></tr><tr><td>C: others</td><td>5000.0</td><td>1000.0</td></tr></table>			Area (Refer to Fig. 5)	Weight of total particles	Mass of max. particle	A: near the eye	5.0	0.5	B: near the face	50.0	10.0	C: others	5000.0	1000.0
		Area (Refer to Fig. 5)			Weight of total particles	Mass of max. particle										
		A: near the eye			5.0	0.5										
		B: near the face			50.0	10.0										
C: others	5000.0	1000.0														

Table 1. Module Assembly (continued)

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method
Basic Performance	Electrical Resistance	(1) Electrical resistance between every terminal shall satisfy the standards in the drawing. (2) If the standard is not indicated in the drawing, the electrical resistance shall be within the following range: ① Ignition circuit (circuit including bridge line) $1 \pm 0.15 \Omega$ ② Circuit between short-circuit ignition circuit and inflator (ground terminal) 200 k Ω Min.	A	7.2.6
	Heat resistance	(1) After performing the test in 7.3.1, module assembly shall be free from flaw, crack, or deformation. (2) However, deformation approved by Kia is allowed.	A	7.3.1
Heat resistance	• Looseness of screw	(1) There shall be no loose nor damaged revet. (2) There shall be no loose or damaged screw. (including tightening screw on the attachment surface) (3) Tightening torque shall be 40% or more of the minimum value indicated in the drawing, and also 2 N·m(19.6 kgf·m) or more.	B	• 7.2.5
	•• Normal temperature deployment performance	(1) Time taken from ignition to deploying the bag full shall satisfy the standard in the drawing. (2) There shall be no damage of bag assembly nor scattering of deployment door during deployment. (3) However, broken pieces with the size approved by Kia is allowed. (4) Material shall not be melted by the gas during deployment. (5) There shall be no crack, remarkable deformation, etc. in any parts during deployment.	AR	•• 7.2.1
	Heat resistance	(1) After performing the test in 7.3.1, module assembly shall be free from flaw, crack or deformation. (2) However, deformation approved by Kia is allowed.	A	7.3.1

Table 1. Module Assembly (continued)

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method
Heat resistance	• Looseness of screw	(1) There shall be no loose nor damaged revet. (2) There shall be no loose nor damaged screw. (including tightening screw on the attachment surface) (3) Tightening torque shall be 40% or more of the minimum value indicated in the drawing, and also more than 2 N·m (19.6 kgf·m)	B	• 7.2.5
	• Low temperature deployment performance	(1) Time taken from ignition to deploying bag the bag full shall satisfy the standard in the drawing. (2) There shall be no damage of bag assembly nor scattering of deployment door during deployment. (3) However, broken pieces with the size approved by Kia is allowed. (4) Material shall not be melted by the gas during deployment. (5) There shall be no crack, remarkable deformation, etc. in any parts during deployment.	AR	• 7.2.2
	Heat resistance	(1) After performing the test in 7.3.1, module assembly shall be free from flaw, crack, or deformation. (2) However, deformation approved by Kia is allowed.	A	7.3.1
	• Looseness of screw	(1) There shall be no loose nor damaged revet. (2) There shall be no loose nor damaged screw. (including tightening screw on the attachment surface) (3) Tightening torque shall be 40% or more of the minimum value indicated in the drawing, and also 2 N·m(19.6 kgf·m) or more.	A	• 7.2.5
	• High temperature deployment performance	(1) Time taken from ignition to deploying bag the bag full shall satisfy the standard in the drawing. (2) There shall be no damage of bag assembly nor scattering of deployment door during deployment. (3) However, broken pieces with the size approved by Kia is allowed. (4) Material shall not be melted by the gas during deployment. (5) There shall be no crack, remarkable deformation, etc. in any parts during deployment.	AR	• 7.2.3
	Flame resistance	There shall be no scattering of metal parts of module assembly during the deployment.	A	7.3.3

Table 1. Module Assembly (continued)

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method
Durability	Vibration Resistance	After performing the test in 7.4.1, module assembly shall be free from flaw or deformation.	A	7.4.1
	• Thermal shock resistance	After performing the test in 7.3.2, module assembly shall be free from flaw or deformation.	A	• 7.3.2
	•• Looseness of screw	(1) There shall be no loose nor damaged rivet. (2) There shall be no loose nor damaged screw. (including set screw on the attachment surface) (3) Tightening torque shall be 40% or more of the minimum value indicated in the drawing, and also 2 N · m (19.6 kgf · m) or more.	B	•• 7.2.5
	••• Normal temperature deployment performance	(1) Time taken from ignition to deploying the bag full shall satisfy the standard in the drawing. (2) There shall be no damage of bag assembly nor scattering of deployment door during deployment. (3) However, broken pieces with the size approved by Kia is allowed. (4) Material shall not be melted by the gas during deployment. (5) There shall be no crack, remarkable deformation, etc. in any parts during deployment.	AR	••• 7.2.1
	Vibration resistance	After performing the test in 7.4.1, module assembly shall be free from flaw or deformation.	A	7.4.1
	• Thermal shock resistance	After performing the test in 7.3.2, module assembly shall be free from flaw or deformation.	A	• 7.3.2
	•• Looseness of screw	(1) There shall be no loose nor damaged rivet. (2) There shall be no loose nor damaged screw. (including set screw on the attachment surface) (3) Tightening torque shall be 40% or more of the minimum value indicated in the drawing, and also 2 N · m (19.6 kgf · m) or more.	B	•• 7.2.5

Table 1. Module Assembly (continued)

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method
Durability	Low temperature deployment performance	(1) Time taken from ignition to deploying bag the bag full shall satisfy the standard in the drawing. (2) There shall be no damage of bag assembly nor scattering of deployment door during deployment. (3) However, broken pieces with the size approved by Kia is allowed. (4) Material shall not be melted by the gas during deployment. (5) There shall be no crack, remarkable deformation, etc. in any parts during deployment.	AR	7.2.2
	Vibration resistance	After performing the test in 7.4.1, module assembly shall be free from flat or deformation.	A	7.4.1
	Thermal shock resistance	After performing the test in 7.3.2, module assembly shall be free from flat or deformation.	A	7.3.2
	Looseness of screw	(1) There shall be no loose nor damaged revet. (2) There shall be no loose nor damaged screw. (including set screw on the attachment surface) (3) Tightening torque shall be 40% or more of the minimum value indicated in the drawing, and also 2 N · m (19.6 kgf · m) or more.	B	7.2.5
	High temperature deployment performance	(1) Time taken from ignition to deploying bag the bag full shall satisfy the standard in the drawing. (2) There shall be no damage of bag assembly nor scattering of deployment door during deployment. (3) However, broken pieces with the size approved by Kia is allowed. (4) Material shall not be melted by the gas during deployment. (5) There shall be no crack, remarkable deformation, etc. in any parts during deployment.	AR	7.2.3
	Drop resistance	(1) There shall be no deployment of module assembly during being dropped. (2) After performing the test in 7.4.2, module assembly shall be free from flaw, crack, deformation. In addition, wires shall not be damaged	A	7.4.2

Table 1. Module Assembly (continued)

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method
Durability	Normal temperature deployment performance	(1) Time taken from ignition to deploying bag the bag full shall satisfy the standard in the drawing. (2) There shall be no damage of bag assembly nor scattering of deployment door during deployment. (3) However, broken pieces with the size approved by Kia is allowed. (4) Material shall not be melted by the gas during deployment. (5) There shall be no crack, remarkable deformation, etc. in any parts during deployment.	AR	7.2.1

Table 2. Bag Assembly

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method
Basic performance	Permeability	Permeability of bag with its vent holes closed shall satisfy the value indicated in the drawing.	A	7.5.1
	Pressure resistance performance	(1) Bag shall burst at the pressure of 50 kPa {0.51 kgf/cm ² } or more. (2) Bag shall burst within 1 second from the start of pressure rise.	A	7.5.2
	Burst strength	Minimum burst strength shall be 1100 N {112.2 kgf} or more.	A	7.5.3
Durability	High temperature heat resistance	After performing the test in 7.6.1, the bag shall not be shrunk or melted.	A	7.6.1
	Permeability	Permeability of bag with its vent holes closed shall satisfy the value indicated in the drawing.	A	7.5.1
	Pressure resistance performance	(1) Bag shall burst at the pressure of 50 kPa {0.51 kgf/cm ² } or more. (2) Bag shall burst within 1 second from the start of pressure rise.	A	7.5.2
	Burst strength	Minimum burst strength shall be 1100 N {112.2 kgf} or more.	A	7.5.3
	Environmental resistance	After performing the test in 7.6.1, the bag should not be shrunk or melted.	A	7.6.2
	Permeability	Permeability of bag with its vent holes closed shall satisfy the value indicated in the drawing.	A	7.5.1

Table 2. Bag Assembly (continued)

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method
Durability	• Pressure resistance performance	(1) Bag shall burst at the pressure of 50 kPa {0.51 kgf/cm ² } or more. (2) Bag shall burst within 1 second from the start of pressure rise.	A	7.5.2
	• Burst strength	Minimum burst strength shall be 1100 N {112.2 kgf} or more.	A	7.5.3

Table 3. Deployment door

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method
Environment Resistance	Short term heat resistance	(1) Change in level and wrinkle on the surface shall satisfy the standards of A2 and C in Table 6 of KES D-G008. (2) Others except the above (1) shall satisfy the standard in Table 4 of KES D-G008.	B	Hs-06 of KES D-G008
	Long term heat resistance			Hl-I, 04 of KES D-G008
	Cold resistance			Cs-0, H of KES D-G008
	Appearance test Impact test			
	Thermal shock resistance			Th-04, D of KES D-G008 *Repeat 10 cycles
	Chemical resistance	The standard of Table 4 of KES D-G008 shall be satisfied.	C	Cr-I, 0 of KES D-G008
	Surface abrasion resistance	(1) Layer at a particular location shall not be exposed. (2) There shall be no loss of particles.	C	7.7.1
External quality	Light fastness	Level 4 grey scale or more in KS K 0911	C	7.7.2
	Uneven color/ Uneven grain/ Uneven luster Flow mark, welding, stagnant air	Shall be within the minimum allowable sample.	C	Visual
	Pinhole, shrinkage, fin, burr, edge, flaw	Shall be within the minimum allowable sample.	C	Visual and by a sence of fouch

Table 4. Inflator

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method
External quality		(1) There shall be no mistake in stamping, assembly, and welding. (2) No burr nor sharp corner	C	Visual
Durability	Heat aging resistance	(1) Inflator shall not operate while performing the heat aging test. (2) Inflator shall not be cracked or deformed after the heat aging test.	C	7.9.1
	• Inflator tank output (normal temperature)	(1) Inflator tank output shall be within the standard value indicated in the drawing. (Figure 3 shows an example.) (2) Max. pressure shall be within the range (both side standard) indicated in the drawing according to 7.8.1.	AR	• 7.8.1 • 7.8.2
	• Inflator tank output (min. temp)	(3) Inflator shall be operated at the Min. ignition signal value of ignitor.	AR	• 7.8.1 • 7.8.3
	• Inflator tank output (max. temp)	(1) Inflator tank output shall be within the standard value indicated in the drawing. (Figure 3 shows an example.) (2) Max. pressure shall be within the range (both side standard) indicated in the drawing according to 7.8.1. (3) Inflator shall be operated at the Min. ignition signal value of ignitor. (4) Max. surface temperature of ignitor shall be 250°C or less.	AR	• 7.8.1 • 7.8.4
	Terminal strength	There shall be no terminal breakage.	A	7.9.2
	• DC resistance	Within $1.0 \pm 0.15 \Omega$	A	• 7.8.6(1)
	• Insulation resistance	200 k Ω Min.		• 7.8.6(2)
	•• Inflator tank output (normal temperature)	(1) Inflator tank output shall be within the standard value indicated in the drawing. (Fig. 3 shows an example.) (2) Max. pressure shall be within the range (both side standard) indicated in the drawing according to 7.8.1.	AR	•• 7.8.1 •• 7.8.2
	•• Inflator tank output (minimum temp)	(3) Inflator shall be operated at the Min. ignition signal value of ignitor.	AR	•• 7.8.1 •• 7.8.3

Table 4. Inflator (continued)

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method
Durability	• Inflator tank output (max. temp)	(1) Inflator tank output shall be within the standard value indicated in the drawing. (Figure 3 shows an example.) (2) Max. pressure shall be within the range (both side standard) indicated in the drawing according to 7.8.1. (3) Inflator shall be operated at the Min. ignition signal value of ignitor. (4) Max. surface temperature of ignitor shall be 250°C or less.	AR	• 7.8.1 • 7.8.4
	Component of generated gas	(1) Concentration of each component of generated gas shall be less than the following values: ① CO 2915 ppm ② NOx 500 ppm ③ HCl 200 ppm ④ HCHO 80 ppm ⑤ C ₆ H ₆ 100 ppm ⑥ HCN 600 ppm (2) Particles ① Total amount of generated particles shall be less than 1.0g. ② Total amount of sodium azide shall be less than 0.42mg. ③ Total max. pH of inflator tank wash (Alkalinity read from sodium hydroxide concentration) shall be 11.0 Max.	A	7.8.5
	Life cycle test	(1) There shall be no depolyment during life cycle test. (2) Inflator shall not be cracked or deformed after the heat aging test.	A	-7.9.3
	• Inflator tank output (normal temperature)	(1) Inflator tank output shall be during the standard value indicated in the drawing. (Figure 3 shows an example.) (2) Max. pressure shall be within the range (both side standard) indicated in the drawing according to 7.8.1.	AR	• 7.8.1 • 7.8.2
	• Inflator tank output (min. temp)	(3) Inflator shall be operated at the Min. ignition signal of ignitor.	AR	• 7.8.1 • 7.8.3
	• Inflator tank output (max. temp)	(1) Inflator tank output shall be within the standard value indicated in the drawing. (Figure 3 shows an example)	AR	• 7.8.1 • 7.8.4

Table 4. Inflator (continued)

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method
Durability		(2) Max. pressure shall be within the range (both side standard) indicated in the drawing according to 7.8.1. (3) Inflator shall be operated at the Min. ignition signal value of ignitor. (4) Max. surface temperature of ignitor shall be 250°C or less.		
Others	Flame	(1) Inflator shall be operated by flame. (2) After cooling, no damage on the inflator.	A	7.10.1
	Ignitor	Ignitor shall satisfy the standard in KES D-C218.	A	KES D-C218
Manufacturing Quality Control	Material	Materials of parts used for inflator shall conform to inflator manufacturer's drawings.	A	Supplier's evaluation method
	Weight	(1) Inflator weight shall be within the limit. (2) Average weight and standard deviation shall be reported to Kia.	B	
	Propellant	Characteristics (amount of heat, amount of moisture, etc.) of propellant shall be checked before producing the 1st lot.	A	
	Completeness of equipment	Existence of parts used for inflator, as well as their positions, shall be checked through X-ray inspection.	A	
	Effectiveness of sealing	(1) Propellant inside the inflator and other reactive material shall be isolated from the outside. (2) Effectiveness of sealing shall be confirmed during the manufacturing process.	A	-
	Housing strength	The inflator housing shall sustain the pressure generated inside the housing as a result of operating the inflator at 85°C.	A	
	Electrical performance	Before shipping, confirm the following (1) and (2) through the inflator connector: (1) DC resistance shall be within $1 \pm 0.15 \Omega$. (2) Insulation resistance shall be at least Min. 200k Ω .	A	7.8.6
		Effectiveness of short-circuit bar on the short-circuit bar connector(if used)		Supplier's evaluation method