KES

Power Steering Hose and Hose Assemblies for Automobiles

KES T – I871

(EST.) 1991 – 01 – 23

Contents

KIA MOTORS

1. Scope of Application

This standard shall be applied for power steering hose and hose assemblies for power steering for automobiles.

Remark : As a reference the units and numbers indicated in { } are SI.

2. Purpose

This standard is to have proper quality by standardization of hose and hose assemblies.

3. Terminology

Terms used in this standard mean as following.

(1) High Pressure

One used for the circuits from the oil pressure hose to gearbox.

(2) Low Pressure

One used for the others than high pressure.

(3) High Expansion

One whose contents' change is big when compressing for high pressure.

(4) Low Expansion

One whose contents' change is small when compressing for high pressure.

(5) Rubber Pipe

Soft rubber pipe that is not enhanced by fiber or wire, etc.

4. Types

Hose and hose assembly types shall be classified by its usage and structure as table 1.

5. Performance

Follow item 8 testing method for performance of hose and hose assembly, and it shall satisfy table 2.

Table 2

Items		Types		Performance	Main Test Conditions		Testing Method Item No.
Durability of Hose and Hose assem-blies	Water Pressure Test	1 type #1	80	There shall be no problem with water leakage expansion.	160kg f / cm^2 {15.69Mpa}	Maintain for 3 minutes in this condition.	8.3.1(1)
			90		180kg f / cm^2 {17.65Mpa}		
			105		210kg f / cm^2 {20.59Mpa}		
		1 type #2	70		140kg f / cm^2 {15.69Mpa}		
			80		160kg f / cm^2 {15.69Mpa}		
			90		180kg f / cm^2 {17.65Mpa}		
		1 type #3	105		210kg f / cm^2 {20.59Mpa}		
		2 type #1	18		36kg f / cm^2 {3.53Mpa}		
		2 type #2	3		6kg f / cm^2 {5.88Mpa}		
	Length Change Test	1 type #1	80	-6 ~ 2 %	80kg f / cm^2 {7.85Mpa}		8.3.1(2)
			90		90kg f / cm^2 {8.83Mpa}		
			105		105kg f / cm^2 {10.30Mpa}		
		1 type #2	70	-4 ~ 2%	70kg f / cm^2 {6.87Mpa}		
			80		80kg f / cm^2 {7.85Mpa}		
			90		90kg f / cm^2 {8.83Mpa}		
		1 type #3	105		105kg f / cm^2 {10.33Mpa}		
		2 type #1	18	-8 ~ 2%	18kg f / cm^2 {1.77Mpa}		
		2 type #2	3		3kg f / cm^2 {0.29Mpa}		

Items		Types	Performance			Main Test Conditions	Testing Method Item No.
Joint strength	Tension test	2 type #1	Arc diameter 6	150kg f {1471N}	It shall be break at these loads.	Tense with 30 ± 2 mm / min speed.	8.3.2
			Arc diameter 9	205kg f {2010N}			
			Arc diameter 10				
			Arc diameter 16				
			Arc diameter 19	250kg f {2452N}			
		2 type #2	—			—	—
Low tempera-ture character of hose	Low tempera-ture test	1 type #1 #2 #3	Less than arc diameter 25	There shall not be any breakage, tiny cracks, other defects, water leakage, partial expansion.		Leave it for 24 hours at –40 ± 2 °C.	8.3.3
		2 type #1					
		2 type #2	More than arc diameter 25	There shall not be tiny cracks		Leave it for 24 hours at –30 ± 2 °C.	
Ozone resista-nce of hose	Ozone aging test	1 type	No cracks occurring			Leave it for 24 hours at –40 ± 2 °C, 50 ± 5 PPhm.	8.3.4
		2 type					
Gluing strength between hose layers	Flaking test	1 type	More than 1.8kg f / cm {17.7N / cm}			Tension speed shall be 30 ± 2 mm / min.	8.3.5
		2 type	1.5kg f / cm {14.7N / cm}				

6. Dimensions

(1) Arc diameter, inside diameter and tolerance

It shall be as table 3.

Table 3

Unit : ㎜

Types		Arc diameter	Contens		Max. outside diameter (Remark)
			Dimension	Tolerance	
Type 1	# 1	8	8.0	±0.5	22
		9	9.5		24
		10	10.0		25
	# 2	8	8.0	±0.5	22
		9	9.5		24
		10	10.0		25
	# 3	9	9.5	±0.5	23
		10	10.0		23
		11	11.0		24
		12	12.7		26
		19	19.0	±0.6	34
Type 2	# 1	6	6.3	±0.5	19
		9	9.5		22
		10	10.0		23
		16	16.0	±0.6	30
		19	19.0		36
	# 2	5	4.8	±0.5	15
		6	6.3		16
		7	7.5		17
		9	9.5		18
		10	10.0		23
		11	11.0		24
		11.5	11.5		25
		12	12.7		26
		14	14.0	±0.6	28
		15	15.9		30
		17	17.0		32
		19	19.0		34
		21	21.0		37
		25	25.4		40
		27	27.0		43

8. Measurement and Testing Method

8.1 General Conditions for the Measurement and Test

It shall follow JASO M 319 (Principle of Hose Test) item 4 (General Conditions for Test), 4.1 (Standard of Laboratory), 4.2 (Standard of Sample).

8.2 Dimension Measurement

(1) Inside Diameter Measurement

Follow the item A of JASO M 319 (dml 5. Inside Diameter Measurement).

(2) Length Measurement

Follow the item 55 (Length measurement) for hose or hose assembly.

8.3 Performance Test

8.3.1 Pressure Resistance Test

Test for water pressure, length change, rupture, negative pressure and expansion.

(1) Water Pressure Test

Follow the item 6.1.2(1), (a) of JASO M 319.

Maintain the pressure regulated by table 2, main test conditions for 3 minutes.

(2) Length Change Test

Follow the item 6.1.2(1), (b) of JASO M 319.

Maintain the pressure regulated by table 2, main test conditions for 3 minutes.

(3) Rupture Test

Follow the item 6.1.2(2) of JASO M 319.

Pressing speed shall be, for type 1, 1750 ± 700 kg f / cm^2 {1716 ± 68.70 Npa} / min, for type 2, 70 ± 15 kg f / cm^2 {6.87 ± 1.47 Mpa} / min. Press with more pressure than ones in performance column on table 2, and measure the pressure when it ruptures.

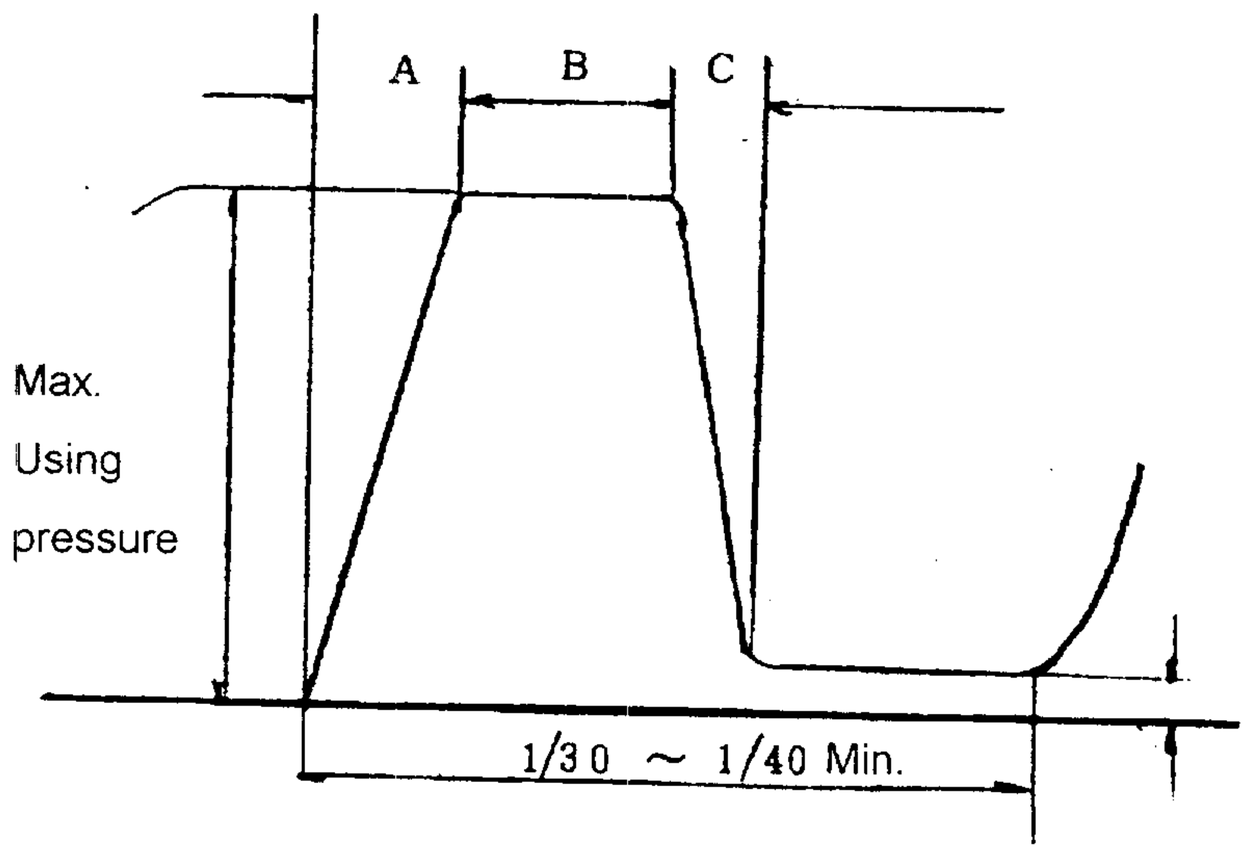
(4) Negative Pressure Test

It shall be done only for type 2 by item 6.1.2(4) of JASO M 319. For pressure

The sample's width shall be 25mm, and its tensional sensitivity shall be 25 ± 1.5 mm / min.

8.3.6 Pressure Repeating Test

Follow the item 6.10 of JASO M 319. For type 1 #1, #2, type 2 #1, the oil temperature shall be 135 ± 2 °C, for type 1 #3, 120 ± 2 °C. The environment temperature, cycle shall be 100 ± 10 °C, 30 ~ 40 times / min. For the pressure, repeat pressing with the maximum on table 1 with the pressing pattern for 225,000 times.



A : 0.2± 0.10 sec.

B : 0.65±0.20 sec.

C : 0.2 ± 0.10 sec.

Type 1 : 0 ~ 7 kg f / cm² {0 ~ 0.69 Mpa}

Type 2 : 0 ~ 1.8 kg f / cm² {0 ~ 0.18 MPa}

Remark : Testing oil and attaching method shall follow the agreement between the responsible representatives.

8.3.7 Alkali Water Spraying Test

Follow the item 6.9.2 of JASO M 319.

Alkali water's concentration shall be 5 ± 1%(Mass). Observe whether there is any

problem on the calculation assembly surface after leaving it for 24 $^{+1}_{0}$ hours at 35 ± 2 °C.

9. Verification

9.1 Verification Items

Do as following formation.

However, this can be ignored by the agreement between the responsible representatives.

(1) Dimensions

(2) External Appearance

(3) Performance

9.2 Verifying Method

It shall follow the agreement between the responsible representatives.

Quoted Standard

JASO M 326-80

JASO M 319-80 (Principle of Hose Test)

resistance, maintain –400 mmHg {-53.33 Kpa} for 5 minutes.

(5) Expansion Test

Follow the item 6.11 of JASO M 319 for type 1 #1. For pressure resistance, measure the structural change when pressing with 1750 ± 700 kg f / cm² {1716 ± 68.70 Mpa} / min until the pressure regulated by the main test conditions column on table 2.

8.3.2 Tension Test

Follow the item 6.6 of JASO M 319. Here, the hose length shall be 200 ~ 400 stretch it with speed 30±2mm/min. However, it shall not be applied for type 2 #2.

8.3.3 Low Temperature Test

Follow the item 6.2 of JASO M 319. For type 1 #1, #2, #3 and type 2 #1, leave it for 24 $^{+1}_{0}$ hours at –40 ± 2 °C, for type 2, #2, for 24 $^{+1}_{0}$ hours at –30 ± 2 °C. For the hose whose arc diameter is below 25, do folding test within 4 seconds rolling on a circle bar whose outside diameter 8 times as much as the hose by the item 6.2.2(1)A. And, turn the temperature to the room temperature, and do water pressure test regulated by 8.3.1(1) again. Observe whether there is any problem.

Follow 6.2.2(2)B for the hose whose arc diameter is more than 25.

8.3.4 Ozone Aging Test

Follow the item 6.3 of JASO M319. For the hose whose arc diameter is below 12, follow 6.3.2(1)A or roll on a circle bar whose outside diameter 7 times as much as the hose. For the hose whose arc diameter is more than 12, sample the inside rubber, and stretch it 20% by 6.3.2(2) B method. After leaving it for 7C $^{+1}_{0}$ hours at 50 ± 5 pphm ozone concentration, and 40 ± 2 °C, observe with 7 times magnifier.

8.3.5 Flaking Test

Measure the flaking between the surface rubber layer and reinforcing layer by the item 6.4.2(1)A method.

Remark : 1. The diameter of calculation assembly shall follow the agreement between the responsible representatives.

2. Although the hose inside diameter doesn't match with the standard of hose, if it is in the tolerance, it shall be proper.

(2) Tolerance of Length

The tolerance of hose and hose assembly length shall be as table 4. However, the tolerance of hose of more than 500mm length shall be $^{+2}_{0}$ % of its length.

Table 4

Length	Tolerance
Less than 200	$^{+6}_{0}$
More than 200 less than 300	$^{+8}_{0}$
More than 300 less than 500	$^{+10}_{0}$

Remark : There is tolerance for hose assembly of straight pipe.

The case that uses bent pipe for hose or hose assembly shall follow the agreement between the responsible representatives.

7. External Appearance

The external appearance of hose or hose assembly shall satisfy following regulations.

(1) Its displacement character shall be big. There shall be no dents, air bubbles, and other defects in use.

(2) The inside diameter and thickness of hose shall be constant.

(3) The inside shall be clean and there shall be no other substance attached.

(4) For hose assembly, there shall be no rust, other harmful dents, and shape change.

Items		Types	Performance	Main Test Conditions	Testing Method Item No.
Intenti-onal durability of hose assembly	Pressure repeating test	1 type #1 #2	No oil leakage, hose breakage, and partial expansion.	Temperature : 135 ° ± 2 °C Environment temperature : 100 ± 10 °C Cycle : 30 ~ 40 times / min Pressure : Ones on table 1	8.3.6
		2 type #1			
		1 type #3		Temperature : 120 ° ± 2 °C Environment temperature : 100 ± 10 °C Cycle : 30 ~ 40 times / min Pressure : One max. on table 1	
		2 type #2	—	—	—
Rust resista-nce of hose assem-blies	Alkali water spraying test	1 type	No metal rust	Concentration of alkali water : 5 ± 1 % (mass)	8.3.7
		2 type			

Note ([2]) It is determined that it exists for the case that low pressure circuit becomes negative pressure.

([3]) It is determined that it has an effect that absorbs pulsation of oil pressure.

Remark : 1. Physical test for the rubber layer shall follow the agreement between the related representatives.

2. For the case that uses hose assemblies for type 2 #2, tension test shall follow the agreement between the responsible representatives.

Items		Types		Performance		Main Test Conditions	Testing Method Item No.
Durability of hose and hose assembly	Rupture test	1 type #1	80	320kg f / cm² {31.38Mpa}	It shall be break at these loads.	Pressing speed shall be 1750 ± 700 kg / cm² {171.6 ± 68.70 Mpa} per minute.	8.3.1(3)
			90	360kg f / cm² {35.30Mpa}			
			105	420kg f / cm² {41.19Mpa}			
		1 type #2	70	350kg f / cm² {34.32Mpa}			
			80	400kg f / cm² {39.23Mpa}			
			90	450kg f / cm² {44.13Mpa}			
		1 type #3	105	525kg f / cm² {51.49Mpa}			
		2 type #1	18	72kg f / cm² {6.96Mpa}		Pressing speed shall be 70 ± 15 kg / cm² {6.87 ± 1.47 Mpa} per minute.	
		2 type #2	3	12kg f / cm² {1.08Mpa}			
	Negative pressure test(2)	1 type		—		—	—
		2 type		There shall be no harmful defects such as flaking, becoming thin. The changing rate of outside diameter shall be less than 20%.		Maintain for 5 min. at –400 mmHg.	8.3.1(4)
	Expansi-on test	1 type #1	80	0.10 ~ 0.56 cm² / cm		80kg f / cm² {7.85Mpa}	8.3.1(5)
			90			90kg f / cm² {83Mpa}	
			105			105kg f / cm² {10.30Mpa}	
						Pressing speed shall be 1750 ± 700 kg / cm² {171.6 ± 68.70 Mpa} per minute.	
		1 type #2, 3		—		—	—
		2 type					
Joint strength	Tension test	1 type #1, 2	Arc diameter 8	400kg f {3923N}	It shall be break at these loads.	Tense with 30 ± 2 mm / min speed.	8.3.2
			Arc diameter 9				
			Arc diameter 10				
		1 type #3	Arc diameter 9	550kg f {5394N}			
			Arc diameter 10				
			Arc diameter 11				
			Arc diameter 12				
			Arc diameter 19	700kg f {6868N}			

Table 1

Types			Usage		Structure	
			Circuit	Max. Pressure Used		
Type 1	# 1	80	High pressure	High expansion	80kg f /cm² {7.85 MPa}	Fiber reinforcement	Hose ass'y (No ass'y)
		90			90kg f /cm² {8.83 MPa}		
		105			105kg f /cm² {10.30 MPa}		
	# 2	70		Low expansion	70kg f /cm² {6.87 MPa}		
		80			80kg f /cm² {7.85 MPa}		
		90			90kg f /cm² {8.83 MPa}		
	# 3	105			105kg f /cm² {10.30 MPa}	Wire reinforcement	
Type 2	# 1	18	Low pressure		18kg f /cm² {1.77 MPa}	Fiber reinforcement	
	# 2	3			3kg f /cm² {0.29 MPa}		Hose (1) (No ass'y)

Note(1) It can be used with hose assembly.

Remark : Discuss and decide with each other for the case that type 2 #2 rubber pipe is used.