



Power Steering Pump

KES D-B202

(EST.) 1989-04-00

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1. Scope of Application

This standard specifies the power steering pump(hereinafter referred to as the “pump”) for automobiles.

2. Purpose

This standard aims at securing proper quality by standardizing specifications.

Remark This standard and a drawing communicate together our 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. Definition of Terminology

(1) Abbreviated symbols

- (a) $P_{m\ell}$: Minimum value of OFF $\rightarrow$ ON pressure indicated in drawings. kgf/cm² {MPa}
- (b) P_{mu} : Maximum value of OFF $\rightarrow$ ON pressure indicated in drawings. kgf/cm² {MPa}
- (c) P_{mon} : Actual pressure measured when OFF $\rightarrow$ ON. kgf/cm² {MPa}
- (d) P_{moff} : Actual pressure measured when ON $\rightarrow$ OFF. kgf/cm² {MPa}
- (e) P_{hmin} : Minimum value of hysteresis indicated in drawings. kgf/cm² {MPa}
- (f) P_{hmax} : Maximum value of hysteresis indicated in drawings. kgf/cm² {MPa}

5. Specification Indicated in Drawings

- (1) Relief pressure (P_o)
- (2) Number of revolution - Flow rate characteristics (N-Q characteristics) or vehicle speed
- flow rate characteristics (V-Q characteristics)
- (3) Characteristics of natural amount of discharge
- (4) Consumed horsepower

- (5) Weight
- (6) Mating parts for the pump brackets and mass production assembling torque
- (7) Required specifications of the pressure switches (working pressure P_{mon} , P_{moff} , Hysteresis, P_{hmin} , P_{hmax})
- (8) Driving method (belt tensile direction and belt tension)
- (9) Parts number of the pump brackets
- (10) Upper and lower, right and left positions of the pump attachment (including the incline which resulted from belt adjustment)
- (11) Oil used on the pump
- (12) Parts number of the pulley
- (13) Pulley attachment nut, washer and assembling torque
- (14) Surface treatment

6. Evaluation Standard

The evaluation standard of the pump shall conform to Table 2 to Table 12.

Remark Quality rank shall conform to Table 1.

Table 1

Quality Rank	Definition
A Rank	Parts that may cause loss of life or a fire in case of malfunction
AR Rank	Parts that may come under regulations of safe, pollution, etc.
B Rank	Commercial value diminished noticeably and the inherent properties of automobiles are lost by malfunction of this parts.
C Rank	Characteristics beside A, AR, B Rank shall be referred to as C Rank

6.1 Pressure of pump body

The evaluation standard of flow rate characteristics shall conform to Table 2.

Table 2

Evaluation Item	Evaluation Standard	Quality Rank	Evaluation Method
Pressure-flow rate characteristics (P-Q characteristics)	$r = \frac{\text{Amount of discharge when pressure is 50kgf/cm}^2 (5.88\text{MPa})}{\text{Amount of discharge when there is no-load}}$ When oil temperature is 55℃, $r \geq 0.85$ When oil temperature is 100℃, $r \geq 0.7$	A	7.2.1
Relief pressure characteristics	Shall be within the standard value indicated in drawings.	A	7.2.2
Number of revolution - flow rate characteristics or velocity-flow rate characteristics	Shall be within the standard value indicated in drawings.	A	7.2.3
Sliding characteristics of flow control valve	No feeling of locking at the valve	A	7.2.4

6.2 Temperature characteristics of the pump body

The evaluation standard shall conform to Table 3.

Table 3

Evaluation Item	Evaluation Standard	Quality Rank	Evaluation Method
Low-temperature starting characteristics	Shall reach the relief pressure indicated in drawings within 5 seconds (No air intake).	A	7.3.1

6.3 The evaluation standard of characteristics of noise, different temperature, and different temperature, vibration of the pump body shall conform to Table 4.

Table 4

Evaluation Item	Evaluation Standard	Quality Rank	Evaluation Method
Noise characteristics	When r.p.m is 1,000 noise shall be as follows or less: · no-load 55dB(A) · 5kgf/cm ² {0.49MPa} 58dB(A) · 40kg/cm ² {3.92MPa} 70dB(A) · relief pressure 74dB(A)	B	7.4.1
Pulsation pressure characteristics	Alteration of pulsation pressure shall be as follows or less: when r.p.m is 600, 0.05kgf/cm ² {0.0049MPa} when r.p.m is 1000, 0.25kgf/cm ² {0.0245MPa}	B	7.4.2
Vibration characteristics	(1) No resonance between 0 and 220Hz (2) Acceleration of the pump shall be 30G{294m/s ² } or less.	B	7.4.3

6.4 The evaluation standard of the economical efficiency of the pump body shall conform to Table 5.

Table 5

Evaluation Item	Evaluation Standard	Quality Rank	Evaluation Method
Consumed horsepower	Shall be the consumed horsepower indicated in drawings or less.	B	7.5.1
Weight	Shall satisfy the weight indicated in drawings.	C	7.5.2

6.5 The evaluation standard of load resistance of the pump body shall conform to Table 6.

Table 6

Evaluation Item	Evaluation Standard	Quality Rank	Evaluation Method
Positive pressure resistance	No oil leakage when pressure reaches 200kgf/cm ² {19.6MPa} No failure when pressure reaches 300kgf/cm ² {29.42MPa}	A	7.6.1
Negative pressure resistance	No oil leakage	A	7.6.2
Torsional failure of the pump shaft	(1) The pulley shall not fail and be capable of rotation. (2) The failure part shall be close to the rotor side rather than the bearing.	A	7.6.3
Low-temperature starting strength	No leakage, no air intake, and no deformation in each part. Generated surge pressure shall be 150kfg/cm ² {14.7MPa} or less.	A	7.6.4
Failure in bolts and nuts tightening	(1) Failure torque shall be the double or of the mass produced tightening torque. (2) No leakage at the torque that is one and a half times larger than the maximum value of the mass produced tightening torque	A	7.6.5
Strength against relief pressure	No deformation nor leakage in each part	A	7.6.6

6.6 The evaluation standard of durability of the pump body shall conform to Table 7.

Table 7

Evaluation Item	Evaluation Standard	Quality Rank	Evaluation Method
Vibration durability 1	(1) No leakage, crack, or deformation (2) Decrease in bolt tightening torque shall be 20% or less. (3) Pressure switch Pmon & Pmoff shall satisfy the following conditions. $P_{m\ell} - 2 < P_{mon} < P_{mu} + 2$ $P_{hmin} - 2 < P_{mon} - P_{moff} < P_{hmax} + 2$ The voltage drop shall be 0.3V or less before testing 0.5V or less after testing.	A	7.7.1
Vibration durability 2	No failure	A	7.7.2
High speed durability	(1) The decrease of the flow rate shall be 5% or less. (2) No cavitation	A	7.7.3
Low pressure · high speed durability	↑	A	7.7.4
Pulse durability	(1) The decrease of the flow rate shall be 5% or less. (2) The decrease of the relief pressure shall be 5kgf/cm ² {0.49 MPa} or less. (3) The decrease of the bolt tightening torque shall be 20% or less. (4) No failure nor deformation in each part	A	7.7.5
Acceleration and deceleration durability	(1) The decrease of the flow rate shall be 5% or less. (2) The decrease of the relief pressure shall be 5kgf/cm ² {0.49 MPa} or less. (3) The decrease of the bolt tightening torque shall be 20% or less. (4) No failure nor deformation in each part	A	7.7.6

6.7 The evaluation standard of heat resistance of the pump body shall conform to Table 8.

Table 8

Evaluation Item	Evaluation Standard	Quality Rank	Evaluation Method
Repeating cold-heat resistance	(1) No failure nor deformation in each part (2) Pressure switch, Pmon, and Pmoff shall satisfy the following conditions, Pmℓ - 2 < Pmon < Pmℓ +2 Phmin -2 < Pmon - Pmoff < Phmax +2 The voltage drop shall be 0.3V or less before testing 0.5V or less after testing.	A	7.8.1
Oil temperature rising characteristics	Shall be 120℃ or less.	A	7.8.2

6.8 The evaluation standard of weatherability of the pump body shall conform to Table 9.

Table 9

Evaluation Item	Evaluation Standard	Quality Rank	Evaluation Method
Weatherability	No failure nor deformation in each part No leakage	B	7.9

6.9 The evaluation standard of attachment and detachment qualities of the reserve tank shall conform to Table 10.