

KES

Brake Master Cylinder

KES D-B056

(EST.) 1991-12-23

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Appendix



1. Purpose

This standard aims at securing proper quality by standardizing specifications.

Remark : This standard and a drawing communicate together our requirements.

2. Scope of Application

This standard specifies the brake master cylinder for automobiles (hereinafter referred to as the "cylinder").

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) Names of main parts (show in Fig. 1)

(2) Capacity of reservoir

① Max. level : Upper limit of brake fluid level [(a) in Fig. 1]

② Working level : Working level of level sensor [(b) in Fig. 1]

③ Min. level : Lower limit of brake fluid level [(c) in Fig. 1]

④ Partition level : Partition level between the primary side fluid chamber and the secondary side fluid chamber

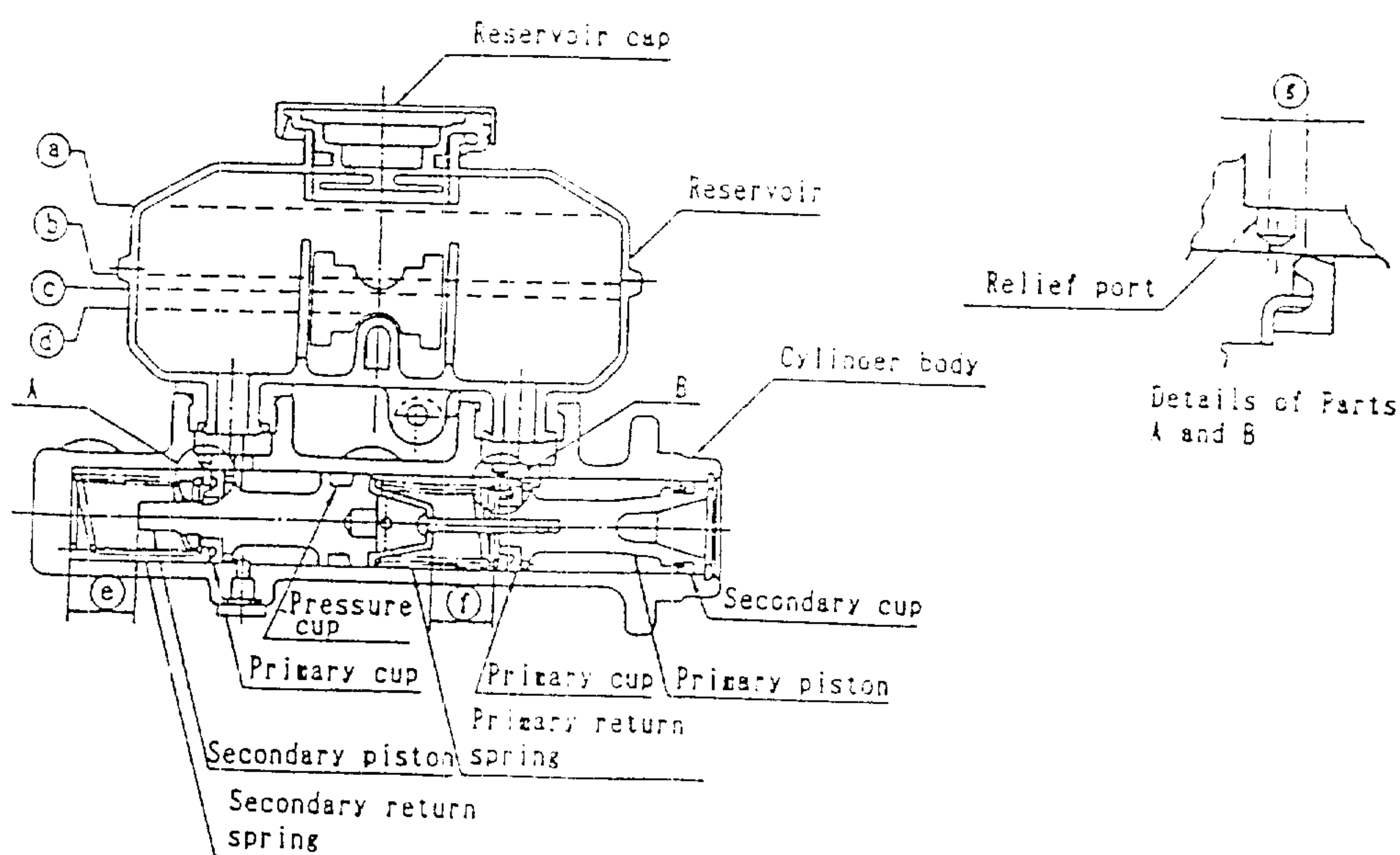
(3) Piston stroke

① Primary stroke [(f) in Fig. 1]

② Secondary stroke [(e) in Fig. 1]

(4) Play stroke [(g) in Fig. 1]

Fig. 1



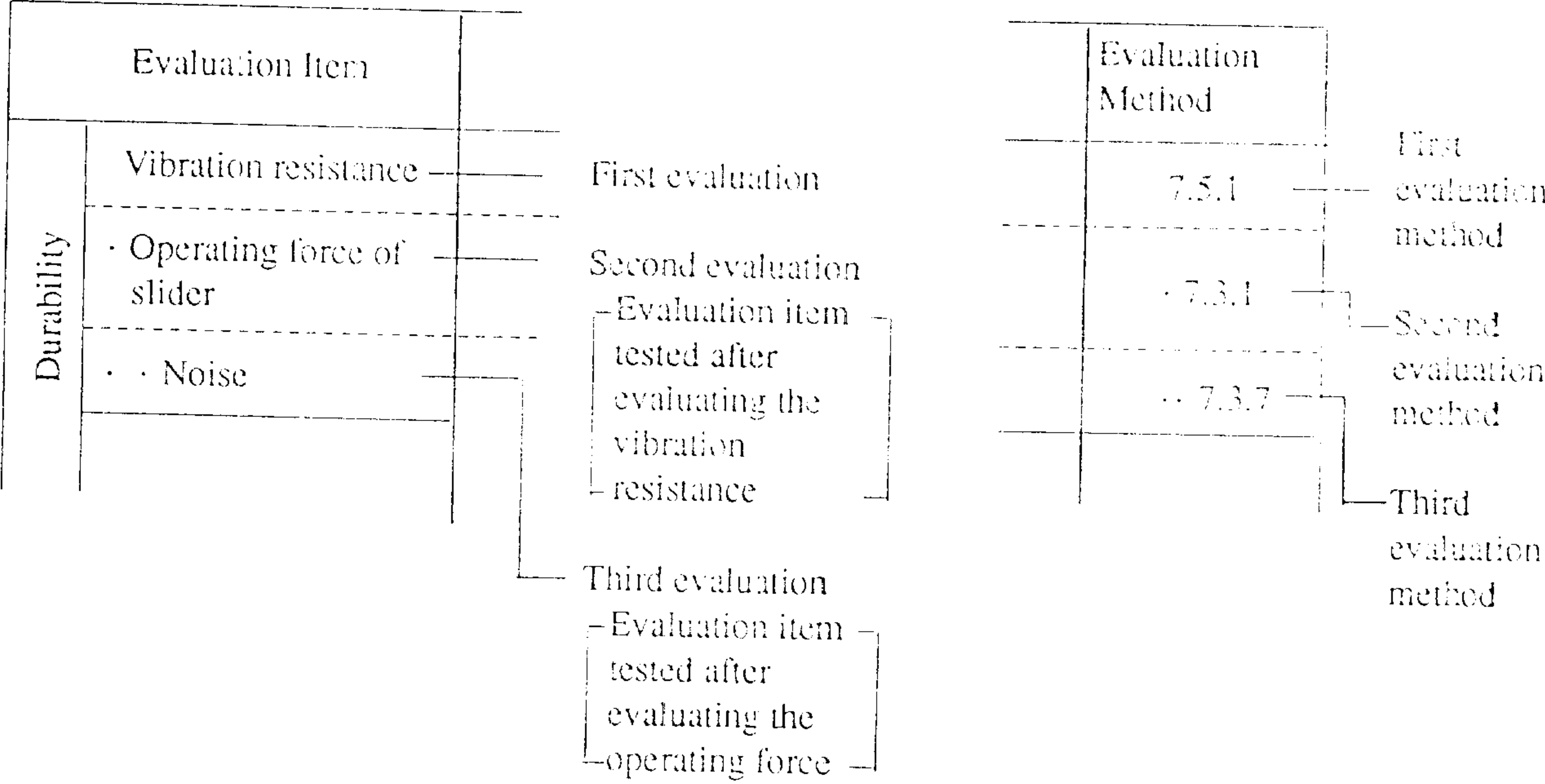
5. Specification Indicated in Drawings

- (1) Type of cylinder (e.g. Portless, conventional)
- (2) Cylinder size
- (3) Attaching angle to vehicle θ
- (4) Material and surface treatment of cylinder body
- (5) Shape of cylinder (overall length, shape of discharge portion, shape of mating hole)
- (6) Piston stroke
 - ① Full stroke
 - ② Primary piston stroke
 - ③ Secondary piston stroke
- (7) Shape of push rod hole of piston or its mating hole
- (8) Presence of brake fluids level sensor
- (9) Capacity of reservoir
 - ① Total capacity (replacement capacity until the pad and lining fully wears)
 - ② Capacity between max. level and working level (Indicated as the replacement capacity which is 70% or more of the brake fluid capacity gotten by multiplying the thickness of the pad whose remaining thickness is 1 mm by the piston area.)
- (10) Presence of reservoir filter and mesh size
- (11) Presence of labelling reservoir (and its letters when it exists)
- (12) Shape of reservoir
- (13) Presence of application of vacuum bleeding method
- (14) Presence of residual pressure holding mechanism
- (15) Specified max. tightening torque value and specified min. tightening torque value of flare nut threaded portion and connector bolt threaded portion
- (16) specified max. tightening torque value and specified min. tightening torque value of bleeder valve portion

6. Evaluation Standard

The evaluation standard of the cylinder shall conform to Table 1.

Remark 1. The way of reading evaluation items and methods in Table 1 shall conform to the following example.



Remark 2. The quality rank shall be represented by A, AR, B or C.
The definitions shall conform to MES K01-002 (Determination and Procedure of Quality Ranking).

Table 1

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method						
Basic characteristics	Rubber cup	To satisfy the standard of Class 2 in *1 KS R 2016	A	7.2.1						
	Play stroke	To satisfy the following standard values. <table><tr><td>Cylinder bore in. {mm}</td><td>Standard value of play stroke mm</td></tr><tr><td>Less than 1 {25.4}</td><td>0.7 to 1.5</td></tr><tr><td>1 {25.4} or more</td><td>0.6 to 1.8</td></tr></table>	Cylinder bore in. {mm}	Standard value of play stroke mm	Less than 1 {25.4}	0.7 to 1.5	1 {25.4} or more	0.6 to 1.8	A	7.2.2
	Cylinder bore in. {mm}	Standard value of play stroke mm								
	Less than 1 {25.4}	0.7 to 1.5								
1 {25.4} or more	0.6 to 1.8									
Piston stroke	To satisfy the indicated value in a drawing.	AR	7.2.3							
	Vacuum retaining performance	(1) Without vacuum bleeding method: vacuum retaining performance of cup shall be 450 mmHg {-60 kPa} or more. (2) With vacuum bleeding method: ① Vacuum value shall be 758 mmHg {-101.1 kPa} or more. ② Vacuum drop shall be 1 mmHg {-0.13 kPa} or less.	A	7.2.4						

*1 JIS D 2605

Table 1 (Continued)

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method																																
Basic characteristics	Piston resistance	<p>It shall be the following standard value or less.</p> <table><tr><th rowspan="2">Cylinder bore in. (mm)</th><th colspan="2">Standard value of piston slide resistance kgf [N]</th></tr><tr><th>Without vacuum bleeding method</th><th>With vacuum bleeding method</th></tr><tr><td>11/6 {17.46}</td><td>6.5 {64}</td><td>-</td></tr><tr><td>3/4 {19.05}</td><td>7.5 {74}</td><td>11.5 {113}</td></tr><tr><td>13/16 {20.64}</td><td>7.5 {74}</td><td>-</td></tr><tr><td>7/8 {22.22}</td><td>8 {78}</td><td>12 {118}</td></tr><tr><td>15/16 {23.81}</td><td>-</td><td>14.5 {142}</td></tr><tr><td>1 {25.4}</td><td>15 {147}</td><td>-</td></tr><tr><td>11/16 {26.99}</td><td>15 {147}</td><td>-</td></tr><tr><td>11/13 {28.58}</td><td>15 {147}</td><td>-</td></tr><tr><td>13/16 {30.16}</td><td>15 {147}</td><td>-</td></tr></table>	Cylinder bore in. (mm)	Standard value of piston slide resistance kgf [N]		Without vacuum bleeding method	With vacuum bleeding method	11/6 {17.46}	6.5 {64}	-	3/4 {19.05}	7.5 {74}	11.5 {113}	13/16 {20.64}	7.5 {74}	-	7/8 {22.22}	8 {78}	12 {118}	15/16 {23.81}	-	14.5 {142}	1 {25.4}	15 {147}	-	11/16 {26.99}	15 {147}	-	11/13 {28.58}	15 {147}	-	13/16 {30.16}	15 {147}	-	B	7.2.5
	Cylinder bore in. (mm)	Standard value of piston slide resistance kgf [N]																																		
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Retaining performance of residual pressure	Residual pressure shall be within 0.5 to 1.0 kgf/cm ² {49 to 98 kPa}.	B	7.2.6																																	
Piston return (I)	Within 0.5 seconds.	A	7.2.7																																	

Table 1 (Continued)

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method								
Basic characteristics	Piston return (Ⅱ)	Within 0.5 seconds.	A	7.2.8								
	Differential pressure	1.5 kfg/cm ² { 147 kPa } or less.	A	7.2.9								
	Efficiency of fluid pressure	It shall be the following standard value or more to the theoretical thrust. <table><tr><td>Temperature ℃</td><td>Standard value of efficiency of fluid pressure %</td></tr><tr><td>Standard temperature</td><td>95</td></tr><tr><td>120 ± 5</td><td>90</td></tr><tr><td>-40 ± 5</td><td>75</td></tr></table>	Temperature ℃	Standard value of efficiency of fluid pressure %	Standard temperature	95	120 ± 5	90	-40 ± 5	75	A	7.2.10
	Temperature ℃	Standard value of efficiency of fluid pressure %										
	Standard temperature	95										
	120 ± 5	90										
	-40 ± 5	75										
Bleeding performance	Residual amount of air shall be 0.1 cm ³ or less.	B	7.2.11									
Air suction	No air suction.	A	7.2.12									
Cavitation	Air generation shall be 0.1 cm ³ or less.	A	7.2.13									
Airtightness	Air pressure leakage	No air pressure drop.	A	7.3.1								
	Low pressure air leakage	No air leakage. (Including leakage from the reservoir)	A	7.3.2								
	Low pressure fluid leakage	No liquid leakage.	A	7.3.3								
	Rapid pressurizing air leakage	No harmful flaw.	A	7.3.4								
	Air pressure leakage	No air pressure drop.	A	7.3.1								
	Airtightness of flare nut threaded portion	No fluid leakage.	A	7.3.5								

Table 1 (Continued)

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method								
Airtightness	Airtightness of bleeder valve portion	No fluid leakage.	A	7.3.6								
Strength · durability	Normal temperature working durability (I)	(1) No fluid leakage nor cozing. (2) No harmful flaws on cylinder and piston. (Level 1 to 3) (3) Clearance between cylinder bore and piston shall be 150 μm or less. (4) No harmful flaws on primary cup and secondary cup. (Level 1 to 3) (5) Residual tightening allowance of secondary cup shall be the following standard value. <table border="1"><thead><tr><th>Cylinder bore in. (mm)</th><th>Residual tightening allowance (mm)</th></tr></thead><tbody><tr><td>3/4 {19.05} or less</td><td>0.30 or more</td></tr><tr><td>13/16 to 1 {20.64 to 25.4}</td><td>0.40 or more</td></tr><tr><td>1 1/16 to 1 1/2 {26.99 to 38.1}</td><td>0.51 or more</td></tr></tbody></table>	Cylinder bore in. (mm)	Residual tightening allowance (mm)	3/4 {19.05} or less	0.30 or more	13/16 to 1 {20.64 to 25.4}	0.40 or more	1 1/16 to 1 1/2 {26.99 to 38.1}	0.51 or more	A	7.4.1
	Cylinder bore in. (mm)	Residual tightening allowance (mm)										
3/4 {19.05} or less	0.30 or more											
13/16 to 1 {20.64 to 25.4}	0.40 or more											
1 1/16 to 1 1/2 {26.99 to 38.1}	0.51 or more											
	· Vacuum retaining performance	Vacuum retaining performance shall be 150 mmHg [-20 kPa.] or more.	A	· 7.2.4								

Table 1 (Continued)

Evaluation Item		Evaluation Standard		Quality Rank	Evaluation Method
Strength · durability	· Piston resistance	It shall be the following standard value or less.		B	· 7.2.5
		Within 0.5 seconds.		A	· 7.2.7
		Within 0.5 seconds.		A	· 7.2.8
		No air suction.		A	· 7.2.12

Table 1 (Continued)

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method								
Strength · durability	· Air pressure leakage	No air pressure drop.	A	· 7.3.1								
	· Low pressure fluid leakage	No fluid leakage.	A	· 7.3.3								
	Normal temperature working durability (Ⅰ)	(1) No fluid leakage nor oozing. (2) No harmful flaws on cylinder and piston. (Level 1 to 3) (3) Clearance between cylinder bore and piston shall be 150 μm or less. (4) No harmful flaws on primary cup and secondary cup. (Level 1 to 3) (5) Residual tightening allowance of secondary cup shall be the following standard value. <table border="1"><thead><tr><th>Cylinder bore in. (mm)</th><th>Residual tightening allowance (mm)</th></tr></thead><tbody><tr><td>3/4 {19.05} or less</td><td>0.30 or more</td></tr><tr><td>13/16 to 1 {20.64 to 25.4}</td><td>0.40 or more</td></tr><tr><td>11/16 to 1 1/2 {26.99 to 38.1}</td><td>0.51 or more</td></tr></tbody></table>	Cylinder bore in. (mm)	Residual tightening allowance (mm)	3/4 {19.05} or less	0.30 or more	13/16 to 1 {20.64 to 25.4}	0.40 or more	11/16 to 1 1/2 {26.99 to 38.1}	0.51 or more	A	7.4.2
	Cylinder bore in. (mm)	Residual tightening allowance (mm)										
3/4 {19.05} or less	0.30 or more											
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· Vacuum retaining performance	Vacuum retaining performance shall be 150 mmHg { -20 kPa } or more.	A	· 7.2.4									

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Strength · durability	· Piston resistance	It shall be the following standard value or less. <table><tr><th rowspan="2">Cylinder bore in. {mm}</th><th colspan="2">Standard value of piston slide resistance kgf {N}</th></tr><tr><th>Without vacuum bleeding method</th><th>With vacuum bleeding method</th></tr><tr><td>11/6 {17.46}</td><td>6.5 {64}</td><td>-</td></tr><tr><td>3/4 {19.05}</td><td>7.5 {74}</td><td>11.5 {113}</td></tr><tr><td>13/16 {20.64}</td><td>7.5 {74}</td><td>-</td></tr><tr><td>7/8 {22.22}</td><td>8 {78}</td><td>12 {118}</td></tr><tr><td>15/16 {23.81}</td><td>-</td><td>14.5 {142}</td></tr><tr><td>1 {25.4}</td><td>15 {147}</td><td>-</td></tr><tr><td>11/16 {26.99}</td><td>15 {147}</td><td>-</td></tr><tr><td>11/18 {28.58}</td><td>15 {147}</td><td>-</td></tr><tr><td>13/16 {30.16}</td><td>15 {147}</td><td>-</td></tr></table>	Cylinder bore in. {mm}	Standard value of piston slide resistance kgf {N}		Without vacuum bleeding method	With vacuum bleeding method	11/6 {17.46}	6.5 {64}	-	3/4 {19.05}	7.5 {74}	11.5 {113}	13/16 {20.64}	7.5 {74}	-	7/8 {22.22}	8 {78}	12 {118}	15/16 {23.81}	-	14.5 {142}	1 {25.4}	15 {147}	-	11/16 {26.99}	15 {147}	-	11/18 {28.58}	15 {147}	-	13/16 {30.16}	15 {147}	-	B	· 7.2.5
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· Piston return (I)	Within 0.5 seconds.	A	· 7.2.7																																	
· Piston return (II)	Within 0.5 seconds.	A	· 7.2.8																																	
· Air suction	No air suction.	A	· 7.2.12																																	

Table 1 (Continued)

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method								
Strength · durability	· Air pressure leakage	No air pressure drop.	A	· 7.3.1								
	· Low pressure fluid leakage	No fluid leakage.	A	· 7.3.3								
	Normal temperature working durability (Ⅲ)	(1) No fluid leakage nor oozing. (2) No harmful flaws on cylinder and piston. (Level 1 to 3) (3) Clearance between cylinder bore and piston shall be 150 μm or less. (4) No harmful flaws on primary cup and secondary cup. (Level 1 to 3) (5) Residual tightening allowance of secondary cup shall be the following standard value. <table><tr><td>Cylinder bore in. [mm]</td><td>Residual tightening allowance (μm)</td></tr><tr><td>3/4 {19.05} or less</td><td>0.30 or more</td></tr><tr><td>13/16 to 1 {20.64 to 25.4}</td><td>0.40 or more</td></tr><tr><td>11/16 to 11/2 {26.99 to 38.1}</td><td>0.51 or more</td></tr></table>	Cylinder bore in. [mm]	Residual tightening allowance (μm)	3/4 {19.05} or less	0.30 or more	13/16 to 1 {20.64 to 25.4}	0.40 or more	11/16 to 11/2 {26.99 to 38.1}	0.51 or more	A	7.4.3
	Cylinder bore in. [mm]	Residual tightening allowance (μm)										
	3/4 {19.05} or less	0.30 or more										
13/16 to 1 {20.64 to 25.4}	0.40 or more											
11/16 to 11/2 {26.99 to 38.1}	0.51 or more											
· Vacuum retaining performance	Vacuum retaining performance shall be 150 mmHg [-20 kPa] or more.	A	· 7.2.4									

Table 1 (Continued)

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method																																
Strength · durability	· Piston resistance	It shall be the following standard value or less. <table><tr><th rowspan="2">Cylinder bore in. {mm}</th><th colspan="2">Standard value of piston slide resistance kgf {N}</th></tr><tr><th>Without vacuum bleeding method</th><th>With vacuum bleeding method</th></tr><tr><td>11/6 {17.46}</td><td>6.5 {64}</td><td>-</td></tr><tr><td>3/4 {19.05}</td><td>7.5 {74}</td><td>11.5 {113}</td></tr><tr><td>13/16 {20.64}</td><td>7.5 {74}</td><td>-</td></tr><tr><td>7/8 {22.22}</td><td>8 {78}</td><td>12 {118}</td></tr><tr><td>15/16 {23.81}</td><td>-</td><td>14.5 {142}</td></tr><tr><td>1 {25.4}</td><td>15 {147}</td><td>-</td></tr><tr><td>11/16 {26.99}</td><td>15 {147}</td><td>-</td></tr><tr><td>11/18 {28.58}</td><td>15 {147}</td><td>-</td></tr><tr><td>13/16 {30.16}</td><td>15 {147}</td><td>-</td></tr></table>	Cylinder bore in. {mm}	Standard value of piston slide resistance kgf {N}		Without vacuum bleeding method	With vacuum bleeding method	11/6 {17.46}	6.5 {64}	-	3/4 {19.05}	7.5 {74}	11.5 {113}	13/16 {20.64}	7.5 {74}	-	7/8 {22.22}	8 {78}	12 {118}	15/16 {23.81}	-	14.5 {142}	1 {25.4}	15 {147}	-	11/16 {26.99}	15 {147}	-	11/18 {28.58}	15 {147}	-	13/16 {30.16}	15 {147}	-	B	· 7.2.5
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	· Low pressure fluid leakage	No fluid leakage.	A	· 7.3.3								
	Normal temperature working durability (IV)	(1) No fluid leakage nor oozing. (2) No harmful flaws on cylinder and piston. (Level 1 to 3) (3) Clearance between cylinder bore and piston shall be 150 μm or less. (4) No harmful flaws on primary cup and secondary cup. (Level 1 to 3) (5) Residual tightening allowance of secondary cup shall be the following standard value. <table><tr><td>Cylinder bore in. {mm}</td><td>Residual tightening allowance (mm)</td></tr><tr><td>3/4 {19.05} or less</td><td>0.30 or more</td></tr><tr><td>13/16 to 1 {20.64 to 25.4}</td><td>0.40 or more</td></tr><tr><td>11/16 to 1 1/2 {26.99 to 38.1}</td><td>0.51 or more</td></tr></table>	Cylinder bore in. {mm}	Residual tightening allowance (mm)	3/4 {19.05} or less	0.30 or more	13/16 to 1 {20.64 to 25.4}	0.40 or more	11/16 to 1 1/2 {26.99 to 38.1}	0.51 or more	A	7.4.4
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Strength · durability	· Air pressure leakage	No air pressure drop.	A	· 7.3.1								
	· Low pressure fluid leakage	No fluid leakage.	A	· 7.3.3								
	High temperature working durability	(1) No fluid leakage nor oozing. (2) No harmful flaws on cylinder and piston. (Level 1 to 3) (3) Clearance between cylinder bore and piston shall be 150 μm or less. (4) No harmful flaws on primary cup and secondary cup. (Level 1 to 3) (5) Residual tightening allowance of secondary cup shall be the following standard value. <table><tr><td>Cylinder bore in. {mm}</td><td>Residual tightening allowance {mm}</td></tr><tr><td>3/4 {19.05} or less</td><td>0.30 or more</td></tr><tr><td>13/16 to 1 {20.64 to 25.4}</td><td>0.40 or more</td></tr><tr><td>11/16 to 1 1/2 {26.99 to 38.1}</td><td>0.51 or more</td></tr></table>	Cylinder bore in. {mm}	Residual tightening allowance {mm}	3/4 {19.05} or less	0.30 or more	13/16 to 1 {20.64 to 25.4}	0.40 or more	11/16 to 1 1/2 {26.99 to 38.1}	0.51 or more	A	7.4.5
	Cylinder bore in. {mm}	Residual tightening allowance {mm}										
3/4 {19.05} or less	0.30 or more											
13/16 to 1 {20.64 to 25.4}	0.40 or more											
11/16 to 1 1/2 {26.99 to 38.1}	0.51 or more											
· Vacuum retaining performance	Vacuum retaining performance shall be 150 mmHg { -20 kPa } or more.	A	· 7.2.4									

Table 1 (Continued)

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method																																
Strength · durability	· Piston resistance	It shall be the following standard value or less. <table><tr><th rowspan="2">Cylinder bore in. {mm}</th><th colspan="2">Standard value of piston slide resistance kgf {N}</th></tr><tr><th>Without vacuum bleeding method</th><th>With vacuum bleeding method</th></tr><tr><td>11/6 {17.46}</td><td>6.5 {64}</td><td>-</td></tr><tr><td>3/4 {19.05}</td><td>7.5 {74}</td><td>11.5 {113}</td></tr><tr><td>13/16 {20.64}</td><td>7.5 {74}</td><td>-</td></tr><tr><td>7/8 {22.22}</td><td>8 {78}</td><td>12 {118}</td></tr><tr><td>15/16 {23.81}</td><td>-</td><td>14.5 {142}</td></tr><tr><td>1 {25.4}</td><td>15 {147}</td><td>-</td></tr><tr><td>11/16 {26.99}</td><td>15 {147}</td><td>-</td></tr><tr><td>11/18 {28.58}</td><td>15 {147}</td><td>-</td></tr><tr><td>13/16 {30.16}</td><td>15 {147}</td><td>-</td></tr></table>	Cylinder bore in. {mm}	Standard value of piston slide resistance kgf {N}		Without vacuum bleeding method	With vacuum bleeding method	11/6 {17.46}	6.5 {64}	-	3/4 {19.05}	7.5 {74}	11.5 {113}	13/16 {20.64}	7.5 {74}	-	7/8 {22.22}	8 {78}	12 {118}	15/16 {23.81}	-	14.5 {142}	1 {25.4}	15 {147}	-	11/16 {26.99}	15 {147}	-	11/18 {28.58}	15 {147}	-	13/16 {30.16}	15 {147}	-	B	· 7.2.5
	Cylinder bore in. {mm}	Standard value of piston slide resistance kgf {N}																																		
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· Piston return (I)	Within 0.5 seconds.	A	· 7.2.7																																	
· Piston return (II)	Within 0.5 seconds.	A	· 7.2.8																																	
· Air suction	No air suction.	A	· 7.2.12																																	

Table 1 (Continued)

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method								
Strength · durability	· Air pressure leakage	No air pressure drop.	A	· 7.3.1								
	· Low pressure fluid leakage	No fluid leakage.	A	· 7.3.3								
	Low temperature working durability	(1) No fluid leakage nor oozing. (2) No harmful flaws on cylinder and piston. (Level 1 to 3) (3) Clearance between cylinder bore and piston shall be 150 μm or less. (4) No harmful flaws on primary cup and secondary cup. (Level 1 to 3) (5) Residual tightening allowance of secondary cup shall be the following standard value. <table><tr><td>Cylinder bore in. (mm)</td><td>Residual tightening allowance (mm)</td></tr><tr><td>3/4 {19.05} or less</td><td>0.30 or more</td></tr><tr><td>13/16 to 1 {20.64 to 25.4}</td><td>0.40 or more</td></tr><tr><td>11/16 to 1 1/2 {26.99 to 38.1}</td><td>0.51 or more</td></tr></table>	Cylinder bore in. (mm)	Residual tightening allowance (mm)	3/4 {19.05} or less	0.30 or more	13/16 to 1 {20.64 to 25.4}	0.40 or more	11/16 to 1 1/2 {26.99 to 38.1}	0.51 or more	A	7.4.6
	Cylinder bore in. (mm)	Residual tightening allowance (mm)										
3/4 {19.05} or less	0.30 or more											
13/16 to 1 {20.64 to 25.4}	0.40 or more											
11/16 to 1 1/2 {26.99 to 38.1}	0.51 or more											
· Vacuum retaining performance	Vacuum retaining performance shall be 150 mmHg [-20 kPa] or more.	A	· 7.2.4									

Table 1 (Continued)

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method																																
Strength · durability	· Piston resistance	It shall be the following standard value or less. <table><tr><th rowspan="2">Cylinder bore in. {mm}</th><th colspan="2">Standard value of piston slide resistance kgf {N}</th></tr><tr><th>Without vacuum bleeding method</th><th>With vacuum bleeding method</th></tr><tr><td>11/6 {17.46}</td><td>6.5 {64}</td><td>-</td></tr><tr><td>3/4 {19.05}</td><td>7.5 {74}</td><td>11.5 {113}</td></tr><tr><td>13/16 {20.64}</td><td>7.5 {74}</td><td>-</td></tr><tr><td>7/8 {22.22}</td><td>8 {78}</td><td>12 {118}</td></tr><tr><td>15/16 {23.81}</td><td>-</td><td>14.5 {142}</td></tr><tr><td>1 {25.4}</td><td>15 {147}</td><td>-</td></tr><tr><td>11/16 {26.99}</td><td>15 {147}</td><td>-</td></tr><tr><td>11/18 {28.58}</td><td>15 {147}</td><td>-</td></tr><tr><td>13/16 {30.16}</td><td>15 {147}</td><td>-</td></tr></table>	Cylinder bore in. {mm}	Standard value of piston slide resistance kgf {N}		Without vacuum bleeding method	With vacuum bleeding method	11/6 {17.46}	6.5 {64}	-	3/4 {19.05}	7.5 {74}	11.5 {113}	13/16 {20.64}	7.5 {74}	-	7/8 {22.22}	8 {78}	12 {118}	15/16 {23.81}	-	14.5 {142}	1 {25.4}	15 {147}	-	11/16 {26.99}	15 {147}	-	11/18 {28.58}	15 {147}	-	13/16 {30.16}	15 {147}	-	B	· 7.2.5
	Cylinder bore in. {mm}	Standard value of piston slide resistance kgf {N}																																		
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· Air suction	No air suction.	A	· 7.2.12																																	

Table 1 (Continued)

Evaluation Item		Evaluation Standard	Quality Rank	Evaluation Method
Strength · durability	· Air pressure leakage	No air pressure drop.	A	· 7.3.1
	· Low pressure fluid leakage	No fluid leakage.	A	· 7.3.3
	Thermal shock resistance	No fluid leakage nor break and deformation of reservoir.	A	7.4.7
	· Vibration durability	No fluid leakage nor break and deformation of reservoir.	A	· 7.4.8
	Pressure strength	No fluid leakage nor break	A	7.4.9
	Compression strength	Total deformation of each part shall be 1mm or less.	A	7.4.10
	Strength of flare nut and connector bolt threaded portions	No break. Bore of the flare hole portion shall not be ϕ 1.5 or less.	A	7.4.11
	Strength of bleeder threaded portion	No break.	A	7.4.12
	Back pressurizing (I)	(1) No fluid leakage nor break and crack of reservoir. (2) No abnormality in the inside structure.	A	7.4.13
	Back pressurizing (II)	(1) No fluid leakage. (2) No abnormality in the inside structure.	A	7.4.14
Environmental resistance	Corrosion resistance (Salt spray)	Rust gathering area shall be 10% or less of the cylinder surface area (excluding the processed surface). No rust on the cylinder inner surface and the inner parts.	B	7.5.1
	Corrosion resistance (Rust mode)		A	7.5.2
	Storage corrosion resistance (I)		A	7.5.3
	Storage corrosion resistance (II)		A	7.5.4