

	TITLE:	IK.STD.NO
	استاندارد موتور دمنده سیستم تهویه BLOWER MOTOR SPECIFICATION	5410700014
		PAGE 2 OF 10

Article 1. Purpose

This standard aims to specify required quality and a test method of blower motor, which is used for automobile air conditioning system, and to secure quality of blower motor that is adopted newly.

Article 2. Applicable Extent

- 1) This standard shall be applied to blower motors which are developed and adopted newly among blower motors that are developed and manufactured by Sanden Corporation and used in air conditioning systems for automobile.
- 2) In case the customer designates, the customer's required specification shall be applied.

Article 3. Definition of Terms

1) Blower Motor

It is a centrifugal fan motor and cross flow fan motor that is used for a blower such as evaporator and heater core. It means an assembly of fan + motor.

2) Various load

① Blower assembly

This means an assembly of Fan + Motor + Blower case + Damper (+Air filter).

② Cooling assembly

This means an assembly of Evaporator + Cooling case (+Air filter).

③ Heater assembly

This means an assembly of Heater core + Heater case + Damper.

④ Air conditioning unit

This means the aforesaid ①+②+③.

⑤ Actual load

This means total ventilation circuits such as ④+ Duct + Louver.

3) P-Q characteristic (airflow characteristic)

This shows a variation of static pressure/revolutions/efficiency to the airflow with a graph.

4) T-N characteristic (torque characteristic)

This shows a variation of revolutions/output/current/efficiency to the motor torque with a graph.

5) Rear cover

This is a yoke at the side where a magnet of motor is fixed.

6) Rated operation

This is an operation condition under rated voltage/rated current/rated revolutions.

Article 4. Referencing Standards

Kindly refer to the standards attached.

- JIS D 0204 type 4
- JIS D1601
- JIS D0203 M1

	Change/Date	Approved By:	Definitions
0	2006/04/26	Nader Khosropour	First Issue
1			
2			
3			
4			
5			

	TITLE:	IK.STD.NO
	استاندارد موتور دمنده سیستم تهویه BLOWER MOTOR SPECIFICATION	5410700014
		PAGE 3 OF 10

Article 5. Standard Test Condition

- (1) This test condition shall be applied to ①rating ②basic performance test before and after a reliability test.
- (2) Surrounding temperature
It shall be 15 ~ 30°C.
- (3) Aging
The measurement shall be conducted with blower assembly or air-con unit when the characteristic become stable after impressing 12V specification by 12±0.5V
- (4) Fixing posture
Set the shaft to the direction of an actual posture unless the evaluating particular is specified. However, it is acceptable to set the shaft horizontally in case of a torque characteristic.
- (5) Load torque
Replace an actual load with a torque. (Fix the ventilation circuit to the actual vehicle and measure voltage/current. Replicate obtained value in the torque-measuring gauge and obtain torque.)

Article 6. Conditions on use

Particular	Specification
1 Fixing position	Blower assembly or air-con unit.
2 Using voltage	① 12V specification: 5 ~ 14V
3 Using temperature	-30 ~ +60°C.
4 Storing temperature	-30 ~ +80°C.
5 Using power source	① 12V specification: DC12V battery
6 Fixing environment	Basically interior (in the cabin).

Article 7. Rating

Particular	Specification	Remark
1 Model	Direct current magnet motor	
2 Revolving direction	CCW	it shall be a revolving direction viewed from the shaft side.
3 Rated voltage	① 12V specification: DC12 ② A tolerance shall be ±0.5V	It shall be a motor voltage.
4 Rated torque	It shall be a load torque.	As per standard test conditions
5 Rated current	Average value shall be less than ±10%	① As per standard test conditions. ② It shall be a rated voltage.
6 Rated revolutions	Average value shall be ±10%	① As per standard test conditions. ② It shall be a rated voltage.

	Change/Date	Approved By:	Definitions
0	2006/04/26	Nader Khosropour	First Issue
1			
2			
3			
4			
5			

	TITLE:	IK.STD.NO
	استاندارد موتور دمنده سیستم تهویه BLOWER MOTOR SPECIFICATION	5410700014
		PAGE 4 OF 10

Article 8. Basic performance

Particular		Standard	Test method
1	Torque characteristic	Indicate T-N characteristic with a graph. (see APPENDIX No.1)	① Measure a simple unit of motor with a torque gauge. ② As per standard test conditions. However, load torque is not applicable. ③ It shall be rated voltage.
2	Airflow characteristic	Indicate P-Q characteristic with a graph. (see APPENDIX No.2)	① By blower assembly or air-con unit. (By minimum unit assembly where the blower motor is fixed). ② It shall be rated voltage. ③ As per standard test conditions. However, load torque is not applicable.
3	Shaft vibration	Less than 30μm.	① Measure a simple unit of motor with a torque gauge. ② Measure an out diameter of circumference just before D-cut part of shaft edge.
4	Armature imbalance	Less than 0.3g-cm	① It shall be dynamic imbalance volume of armature simple unit measured by a balance gauge. ② Revolutions shall be 1000 ~ 2000 rpm.
5	Fan imbalance	Less than 0.85g-cm	① It shall be dynamic imbalance volume of fan simple unit measured by a balance gauge. ② Revolutions shall be 1000 ~ 2000 rpm.
6	Shaft end play	0.05 ~ 0.3mm	① Measure a simple unit motor with a dial gauge. ② Load shall be 39.2N {4kgf}.
7	Deflection on the surface	Less than 1mm	Measure a maximum circumference shaft direction of a fan of the blower motor with a dial gauge.
8	Deflection on the core	Less than 1mm	Measure a maximum circumference radial of a fan of the blower motor with a dial gauge.
9	Insulation resistance	More than 1MΩ	Measure with DC500V insulation resistance tester.
10	Vibration amplitude	It shall be less than 50μm at the body part.	Run a simple unit motor without load and measure.
11	Noise	Less than 43 dB (A)	Only motor (w/o fan) shall be used Measurement condition: - Voltage: 4V - Position of Microphone: 100mm from the outer edge of a motor

Change/Date	Approved By:	Definitions
0 2006/04/26	Nader Khosropour	First Issue
1		
2		
3		
4		
5		

	TITLE:	IK.STD.NO
	استاندارد موتور دمنده سیستم تهویه BLOWER MOTOR SPECIFICATION	5410700014
		PAGE 5 OF 10

12	Rattling sound	<p>① Rattling sound shall not be detected aurally.</p> <p>② Or, transient vibration factor in time waveform shall not exist.</p>	<p>① Conduct a sweep test at the unit assembly vibration test. (Run the motor with rated voltage). Agitation conditions are; Vibration acceleration: 1.5G (at the rear part of the motor). Vibration frequency: 10min (one way). To confirm the sound, close the ear to the motor as much as possible.</p> <p>② If rattling sound is detected in the aforesaid sweep test, confirm the existence of rattling sound with an actual vehicle and conduct a bench check basing on measured actual vehicle vibration data, the re-evaluate.</p> <p>※ Recommended driving test of actual vehicle. Driving course: Nissan UD test course, wave road. Driving speed: 20km/h</p>
13	Temperature increase	Temperature increase at brush and bearing parts shall be lower than manufacturer's guaranteed value.	Measure temperature increase value at the brush and bearing parts during a rated operation of blower or air-con unit.
14	Starting voltage under low temperature	It shall be started at less than 5V for 12V specification and 10V for 24V specification.	After leaving blower assembly or air-con unit under the ambience of -30°C for 2 hours, pressurize impressed voltage from 0V gradually and started.
15	Jammed torque resistance	Following the test and after cooling, the motor should still meet the requirements of No.1 (rated torque) and No.11 (noise)	The motor should be able to withstand 30 seconds of jammed torque under the following condition: Voltage: 13.5V±0.1V Line resistance : 0.06Ω±0.005Ω Temperature: 23°C±0.5°C
16	Over voltages	Following the test and after cooling, the motor should still meet the requirements of No.1 (rated torque) and No.11 (noise)	Apply JASO D001-94, 5.5 Over voltage test (A method) voltage: 18 Volts Duration: 1 hour
17	Maximum consumption	It must be defined on the drawing	Under Jammed torque
18	Glazing of the commutator	The motor should not squeak or whistle after the test.	Same as Continuous durability test

(Note) Particular 3→4→5→6→7→8→9→10→11→12→13→14: Average value of more than n=3

	Change/Date	Approved By:	Definitions
0	2006/04/26	Nader Khosropour	First Issue
1			
2			
3			
4			
5			

	TITLE:		IK.STD.NO
	استاندارد موتور دمنده سیستم تهویه BLOWER MOTOR SPECIFICATION		5410700014
			PAGE 6 OF 10

Article 9.Reliability

If there is no change in a basic structure and materials with existing specification and reliability is satisfied, a reliability test may be omitted.

9-1.Standard (Note) Specification of every characteristic particular in the below table shall be satisfied after the test.

The number of testing items shall be more than n=1.

Characteristic particular		Standard after a test	Endurance test								
			Leave under high	Activation under high	Leave under low	Activation under high temperature	Vibration resistance	Humidity resistance	Continuous durability	Mode durability	Heat shock
1	Current	Variation rate to an initial value shall be within ±10%.	☺	☺	☺	☺		☺			
		Variation rate to an initial value shall be within ±15%.					☺		☺	☺	☺
2	Revolutions	Variation rate to an initial value shall be within ±10%.	☺	☺	☺	☺		☺			
		Variation rate to an initial value shall be within ±15%.					☺		☺	☺	☺
3	Insulating resistance	It shall be more than 1MΩ.	☺	☺	☺	☺	☺	☺			
4	Shaft end play	Increase volume shall be less than 0.5mm.							☺	☺	☺
5	Strange sound	It shall not be detected.	☺	☺	☺	☺	☺	☺	☺	☺	☺
6	Surface deflection of fan	It shall be less than 1mm.	☺	☺	☺	☺	☺	☺	☺	☺	☺
7	Core deflection of fan	It shall be more than 1mm.	☺	☺	☺	☺	☺	☺	☺	☺	☺
8	Appearance	No unusual deformation, discoloration, loose, backlash and crack.	☺		☺		☺	☺			☺
9)	Inner situation	No unusual deformation, discoloration, abrasion, loose, backlash and crack in a component.		☺		☺	☺	☺	☺	☺	☺

	Change/Date	Approved By:	Definitions
0	2006/04/26	Nader Khosropour	First Issue
1			
2			
3			
4			
5			

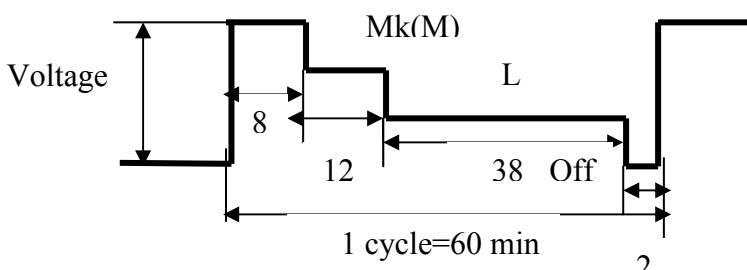
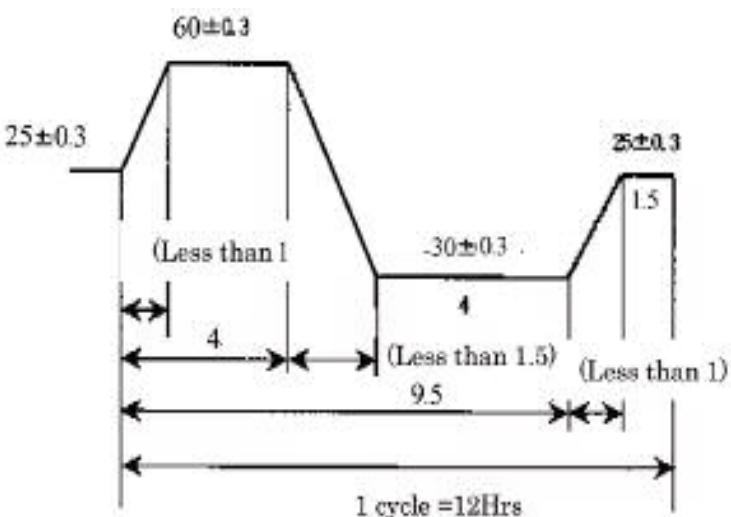
	TITLE:	IK.STD.NO
	استاندارد موتور دمنده سیستم تهویه BLOWER MOTOR SPECIFICATION	5410700014
		PAGE 7 OF 10

9-2. Test method

Particular		Test Method
1	Leave test under high temperature	JIS D 0204 type 4 After leaving under an ambience of $80\pm0.3^{\circ}\text{C}$ for 96 hours, return to a room temperature.
2	Activation test under high temperature	JIS D 0204 type 4 After a rated operation for 1 hour under an ambience of $60\pm0.3^{\circ}\text{C}$, return to a room temperature.
3	Leave test under low temperature	JIS D 0204 type 4 After leaving under an ambience of $-30\pm0.3^{\circ}\text{C}$ for 96 hours, return to a room temperature.
4	Activation test under low temperature	JIS D 0204 type 4 After a rated operation for 1 hour under an ambience of $-30\pm0.3^{\circ}\text{C}$, return to a room temperature.
5	Vibration resistance test	
5-1	Vibration resistance test (Blower Motor ASSY)	JIS D 1601 classification 1 type A (2.9G) Agitation frequency: 33Hz Agitation duration: Vertically 4 hours, forward/backward 2 hours, horizontally 2 hours.
5-2	Vibration resistance test (with HVAC UNIT ASSY)	Carry out in HVAC UNIT ASSY Attached position corresponds to installation of actual vehicle. Based on JISD1601. Temperature : Normal temperature Vibration condition classification : Class 1 B Resonant point detection test : Category 100 Vibration endurance test : Phase 30
6	Humidity resistance test	JIS D 0203 M1 Leave under an ambience of $32\pm0.3^{\circ}\text{C}95\%\text{Rh}$ for 8 hours.
7	Continuous durability test	Under standard test conditions, impress 12V specification by $\text{DC}13.5\pm0.5\text{V}$ and confirm the characteristic after an continuous operation of 1000 hours. And, revolve more than 1500 hours and confirm the characteristic and measure the remainder length of brush, then estimate a residence life.

	Change/Date	Approved By:	Definitions
0	2006/04/26	Nader Khosropour	First Issue
1			
2			
3			
4			
5			

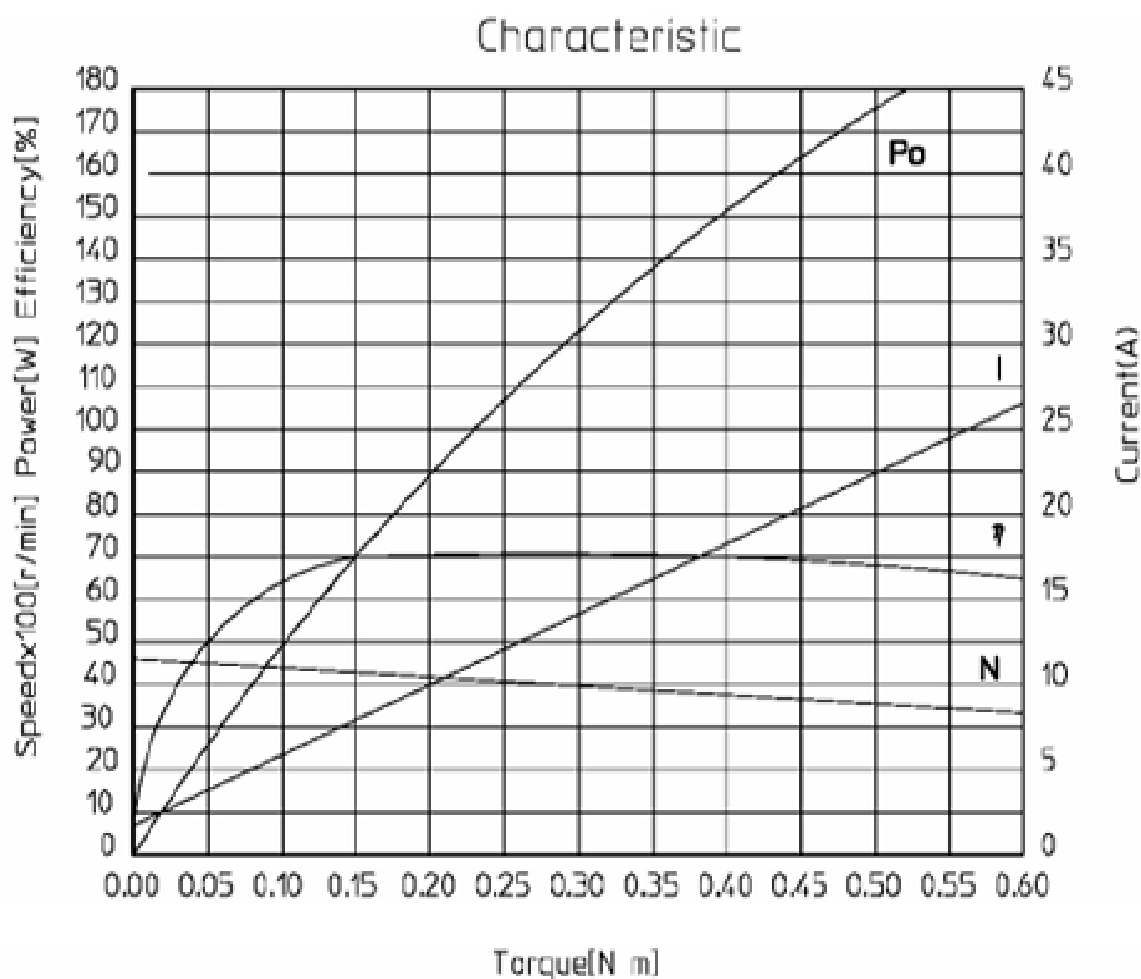
	TITLE:	IK.STD.NO
	استاندارد موتور دمنده سیستم تهویه	5410700014
	BLOWER MOTOR SPECIFICATION	PAGE 8 OF 10

8	Mode durability test	<p>Under standard test conditions,</p> <p>① H: 12V specification is $DC13.5 \pm 0.5V$</p> <p>② Mh(M): Basically, a voltage under actual load situation, or 12V specification is $12 \pm 0.5V$</p> <p>③ L: Basically, a voltage under actual load situation, or 12V specification is $7 \pm 0.5V$. Confirm the characteristic after 1000 cycles operation under below stated mode. And, revolve more than 2000 cycles further.</p>  <p>1 cycle=60 min</p>
9	Heat shock	<p>Impress 12V specification by $DC13.5 \pm 0.5V$, and perform 6 cycles as the below stated mode is 1 cycle.</p>  <p>1 cycle =12Hrs</p>

	Change/Date	Approved By:	Definitions
0	2006/04/26	Nader Khosropour	First Issue
1			
2			
3			
4			
5			

	TITLE:	IK.STD.NO
	استاندارد موتور دمنده سیستم تهویه BLOWER MOTOR SPECIFICATION	5410700014
		PAGE 9 OF 10

APPENDIX NO.1



Change/Date	Approved By:	Definitions
0 2006/04/26	Nader Khosropour	First Issue
1		
2		
3		
4		
5		

	TITLE:	IK.STD.NO
	استاندارد موتور دمنده سیستم تهویه BLOWER MOTOR SPECIFICATION	5410700014
		PAGE 10 OF 10

APPENDIX NO.2

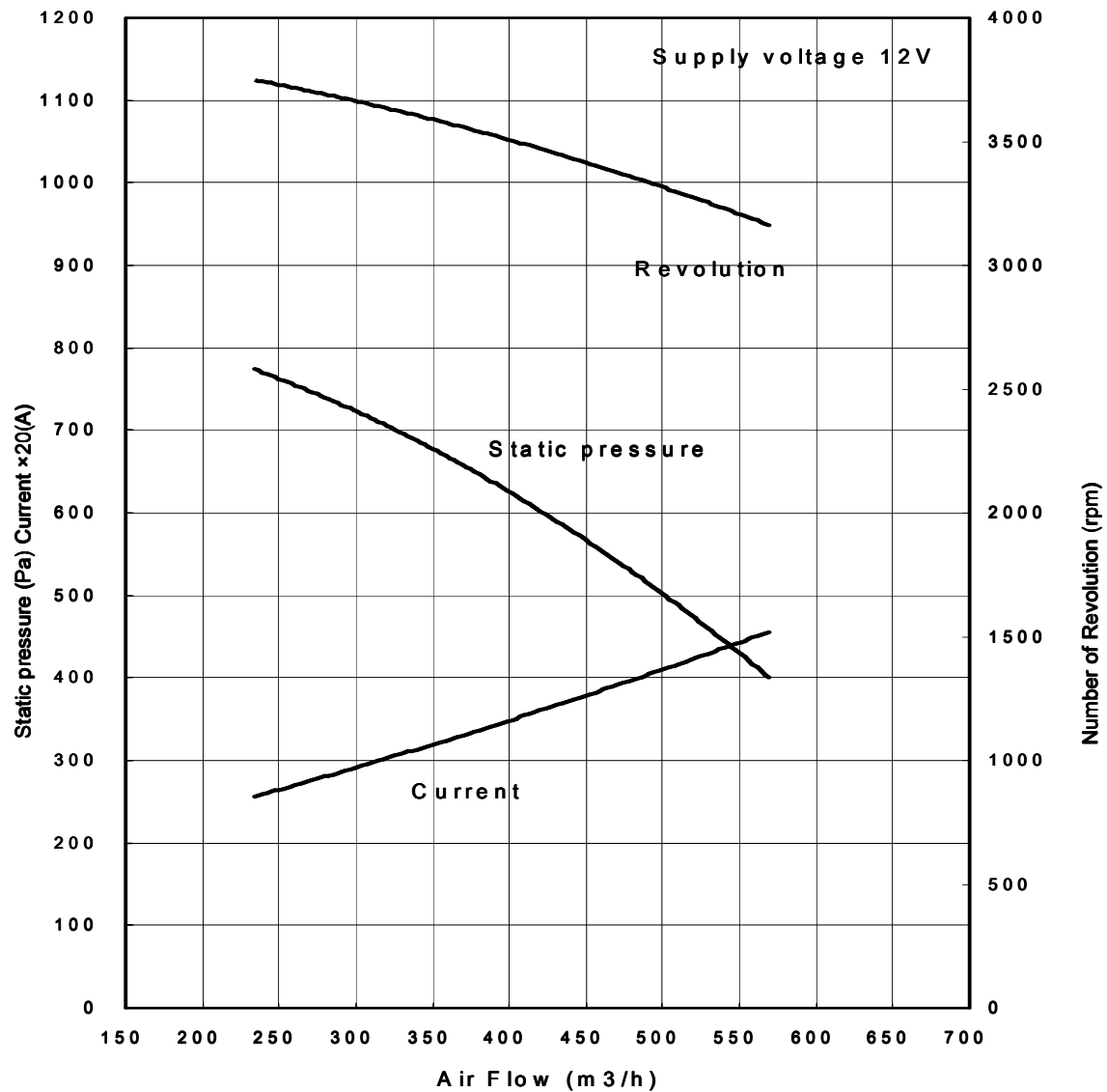


Fig. P-Q Characteristic

Change/Date	Approved By:	Definitions
0 2006/04/26	Nader Khosropour	First Issue
1		
2		
3		
4		
5		