

1、 Seal test

1.1 By doing seal test on the seal test bed, compress air into the inside of radiator by 180kpa, and keep it with 60s.

2、 Vibration test

Test temperature: 5℃~35℃、 relative humidity≤90% (under 25℃)

2.1 Do seal test according to regulation 1.1.

2.2 On the vibration test bed, inject normal temperature water into the radiator and seal it, then fix the radiator on the test bed like mounting it on a real car (if on a real car, the radiator and intercooler use the same holder, then should do the vibration test on both radiator and intercooler at the same time, just like on a real car). Fix the acceleration sensor on the under pan of the vibration bed, this vibration bed should vibrate as a sine wave. The frequency, acceleration and vibration direction should be according to table 1. After this test, do seal test again according to regulation 1.1.

2.3 After seal test, change the frequency, acceleration and vibration direction according to table 1, and do vibration test again. After this test, do seal test again according to regulation 1.1.

Table 1 conditions of vibration test

application	frequency.hz	acceleration, m/s ²	direction	times
Passenger car	23	±25	Vertical, front and back	In each direction
Commercial car	23	±25	Vertical, front and back	1.8×10 ⁶

3、 Seal test under low temperature

Apply to radiator with plastic tanks and rubber seals.

3.1 do seal test according to regulation 1.1.

3.2 Inject anti freezing with freezing temperature of -45℃ into the inside of radiator, and put radiator into the -40℃ of low temperature box, like on a real car. After 12 hours, get the radiator out and let all anti freezing out within 10 min. After this test, do seal test again according to regulation 1.1.

4、 test the resistance of high temperature

4.1 do seal test according to regulation 1.1.

4.2 on the property test bed of cold & hot pressure cycle, inject 50% ethylene glycol and 50% water (volume), medium temperature is 130℃±5℃, add pressure of 130kpa, under temperature of 60℃~80℃, do the resistance test of high temperature for 72 hours, After this test, do seal test again according to regulation 1.1.

5、 seal test for high & low temperature exchange

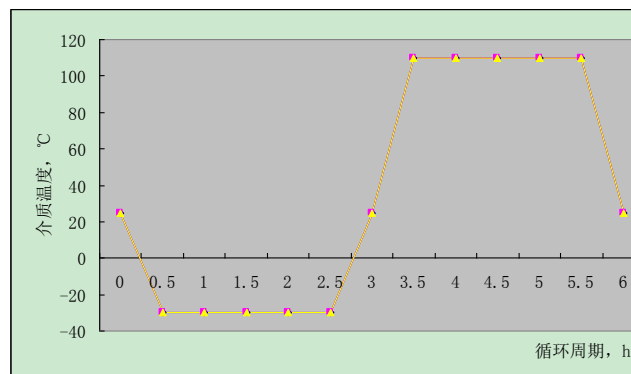
Apply to radiator with plastic tanks and rubber seals.

5.1 do seal test according to regulation 1.1.

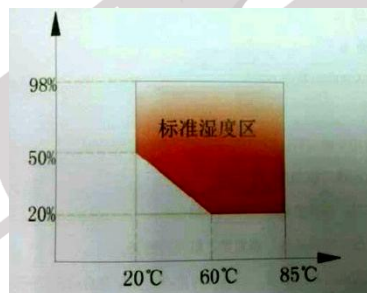
5.2 mix the anti freezing with freezing temperature of -45℃, ethylene glycol and water, according to the proportion of 3: 4: 3.

5.3 inject the solution into the inside of radiator and seal it, do the test by 12 times, according to the temperature cycle of normal→-30℃ (keep for 2 hours) →normal →110℃ (keep for 2 hours) →normal (in table 1) . After the test, do seal test according to regulation 1.1.

Graph 1



5.4 humidity range: 20%~98%RH(reference to the temperature and humidity range in table 2)

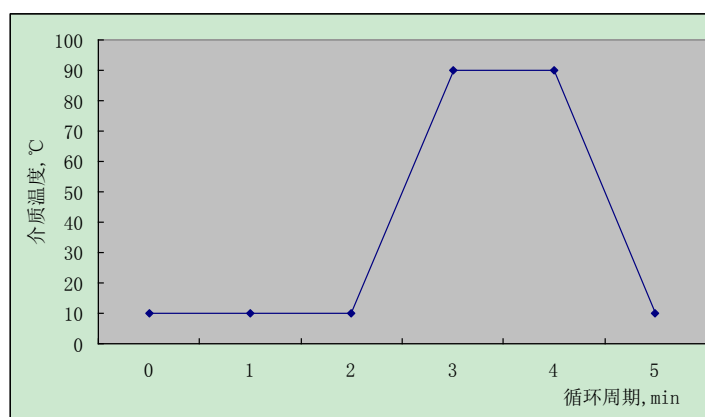


6、 property test of cold & hot cycle

6.1 do seal test according to regulation 1.1.

6.2 inject 50% ethylene glycol and 50% water (volume), add pressure 120kpa±10kpa to the commercial car radiator, or pressure 150kpa±10kpa to the passenger car radiator, do cycle of temperature exchange by 2000 times as 10℃→90℃→10℃ (in table 1), frequency is 15 times/h. After the test, do seal test according to regulation 1.1.

Graph 3



7、outside corrosion property test

7.1 concentration of saline solution is $(5 \pm 1) \%$ (weight): mix it according to $5 \pm 1\%$ sodium chloride and 95% water (attention: PH should be 7 ± 0.5).

7.2 do the test according to table 2.

Table 2

	Temperature of test box	Temperature of saturated bottle	condition	time	result
radiator	35 ± 2	$47 \pm$	Continuous mist spray	8h	Non-oxidation
component				16h	Non-oxidation

8、three combined test (vibration、cold & hot cycle、insulation box)

Apply to products which produced more than 50,000pcs in a batch, or new products with high potential failure.

8.1 do seal test according to regulation 1.1.

8.2 combine the vibration bed and insulation box, fix radiator on vibration test bed, like on a real car (if on a real car, the radiator and intercooler use the same holder, then should do the vibration test on both radiator and intercooler at the same time, just like on a real car), fix the acceleration sensor on the under pan of the vibration bed.

8.3 use insulation box to set the outside temperature as normal.

8.4 inject 50% ethylene glycol and 50% water (volume), (medium temperature: $10^{\circ}\text{C} \rightarrow 90^{\circ}\text{C} \rightarrow 10^{\circ}\text{C}$ cycle exchange); add pressure $120\text{kpa} \pm 10\text{kpa}$ to commercial car radiator, or pressure $150\text{kpa} \pm 10\text{kpa}$ to the passenger car radiator, do cold & hot cycle.

8.5 set all equipments, mount the radiator, then do three combined test (vibration、cold & hot cycle、insulation box), test time: according to the vibration time.

8.6 After this test, do seal test again according to regulation 1.1.