Flaretite Seal

Performance Evaluation Test Results

With

R-22 Refrigerants

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FLARETITE SEALS USED FOR ALL TESTS

Seal composite – Copper
Sealant – SPP purple loctite

FLARETITE PART NUMBERS:

- 45FT04-CU-SPP
- 45FT06-CU-SPP
- 45FT08-CU-SPP
- 45FT10-CU-SPP and
- 45FT12-CU-SPP

COMPATIBILITY WITH REFRIGERANT AND OIL STATIC IMMERSION TEST

TEST METHOD

Dip Flaretite Seal in refrigerant and oil for 1 month and check if Loctite coating breaks down.

Test piece Flaretite 5/8" new one

TEST RESULT

Refrigerant and mineral oil

No peel-off was observed. Slightly undulating surface was observed.

Refrigerant and POE oil

Conclusion

No significant change was observed.

REFRIGERANT CIRCULATION TEST WITH A REFRIGERANT RECOVERY MACHINE

TEST METHOD

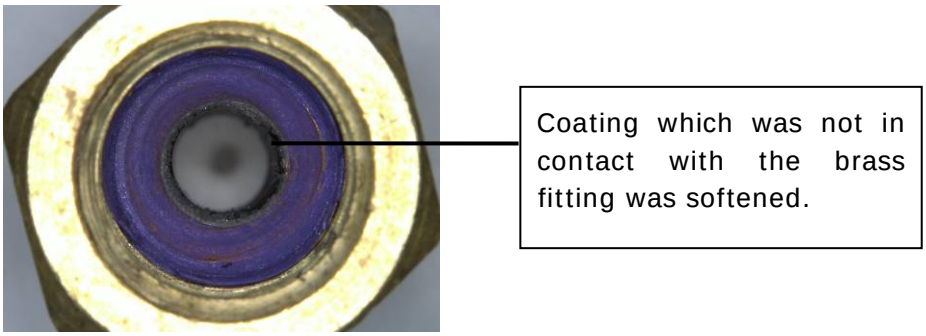
Install a Flaretite Seal on the outlet valve of the refrigerant recovery unit and circulate refrigerant HCFC-22 and mineral oil for 1 month and check if the Loctite coating breaks down.

TEST PIECE

Flaretite Part number **45FT04-CU-SPP**

TEST RESULT

No change was observed at the contact surface between the Flaretite Seal, the brass fitting and copper tube flare surface. The coating at the Non contact surface was softened but no peel-off was observed.



Conclusion

Loctite at non-contact area is unlikely to peel off under normal circumstances.

EFFECT TEST WHEN PARTICLES OF LOCTITE GET MIXED IN A/C SYSTEM

TEST METHOD

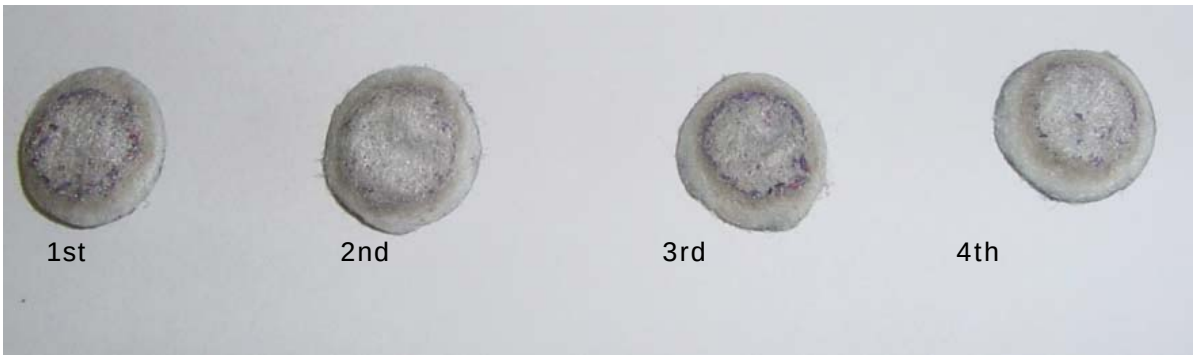
On the assumption that particles of the Flaretite Seal (Loctite) get mixed into the A/C system, circulate the particles with refrigerant using a refrigerant recovery machine for 1 week. Then check what effect the particles have on compressor, solenoid valve and other system components.

TEST PIECE

Cutting scraps of Flaretite

TEST RESULT

At a strainer (mesh # 80) on the inlet of the refrigerant recovery machine, the cutting scraps were not caught.
At a felt filter on an outlet, the cutting scrapes were caught. The scrapes became smaller than initially injected by the reason that the scraps were crushed by bumping into the compressor's valve during circulation.



The sealant scraps have no influence on the A/C system.
Sealant scraps which may peel off from the softened Flaretite seal, where there is no contact on the fitting, has no effect.

Conclusion

Loctite Sealant proved harmless to the system.

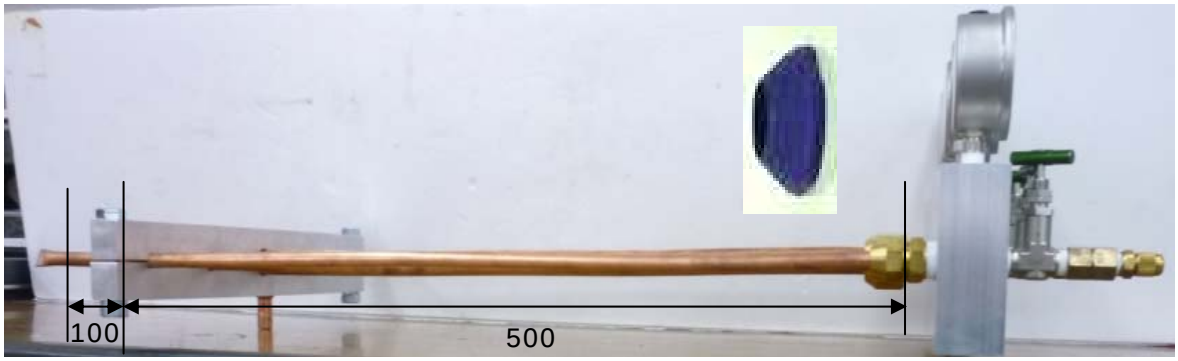
VIBRATION TEST

TEST METHOD

Produce 1 million cycles of vibration in the Flaretite Seal by vibration tester. Vibration is set to span 500mm, amplitude ±2.5mm, and number of vibration frequency of cycles
600 times /min.

TEST PIECE

Install Flaretite Seal in the flare joint and connect with 600 mm of flare jointed copper tube with an aluminum manifold. Inject N2 to 4.1MPa.
1/4”-6.35mm, 3/8” -9.52mm, 1/2”-12.7mm, 5/8” -15.88mm, 3/4”-19.05mm each 1pcs



TEST RESULT

No leak and no malfunction were observed in flare joints.
When the test was completed, the pressure of the gauge was the same as the pressure when the test was started.

Size	1/4”	3/8”	1/2”	5/8”	3/4”
Leak	No	No	No	No	No
Malfunction	No	No	No	No	No

Initial time point

Final time point

Conclusion

Flaretite seals provide a leak free joint under high vibration.

PRESSURE TEST

TEST METHOD

Put the test piece into the hydraulic test pump and pressurize to 17.2MPa or 2500 Psi and leave for 5 minutes and check if there is any leakage or loss of pressure.

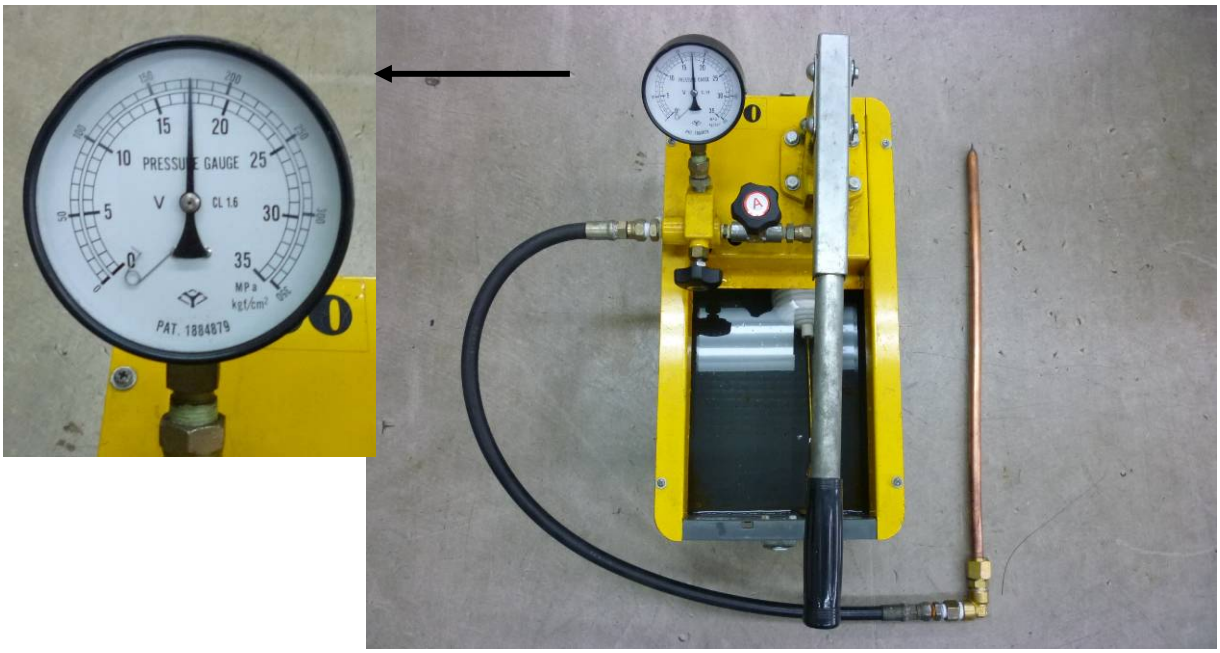
TEST PIECE

600mm of copper tube used on the vibration test.

TEST RESULT

After 5 minutes of pressurizing, check if there is any leakage or loss of pressure.

Size	1/4”	3/8”	1/2”	5/8”	3/4”
Leak	No	No	No	No	No
Malfunction	No	No	No	No	No



Conclusion

Flaretite provides a leak free joint at pressures well in excess of any refrigeration system.

Note from Flaretite Inc: Also see the Hill Phoenix Going Green 03-2009E document on the Flaretite website for leakage tests with 95/5 nitrogen/hydrogen.

THERMAL SHOCK TEST

TEST METHOD

Expose Flaretite Seals to temperatures of both +120 and -40 degrees Celsius each 1 hour alternately and repeat this 100 times then leave Flaretite Seal on normal temperature. Inject N2 to 4.1MPa and leave the test pieces for 1 hour. Then check if a leak is observed.

TEST PIECE

Seal one end of a 200mm copper tube and install a Flaretite Seal on the other side 1/4"-6.35mm,3/8" -9.52mm, 1/2" -12.7mm, 5/8" -15.88mm, 3/4"-19.05mm 2 of each.

TEST RESULT

Test piece	No.1					No.2				
Size	1/4"	3/8"	1/2"	5/8"	3/4"	1/4"	3/8"	1/2"	5/8"	3/4"
Leak	No	No	No	No	No	No	No	No	No	No

第 293 号

成 績 書

平 成 24 年 7 月 2 日

依 頼 者 アサダ 株式会社

依頼事項 冷熱衝撃試験

記 事 試料名 フレアタイト 接合サンプル
(1/4×2本, 3/8×2本, 1/2×2本, 5/8×2本, 3/4×2本)

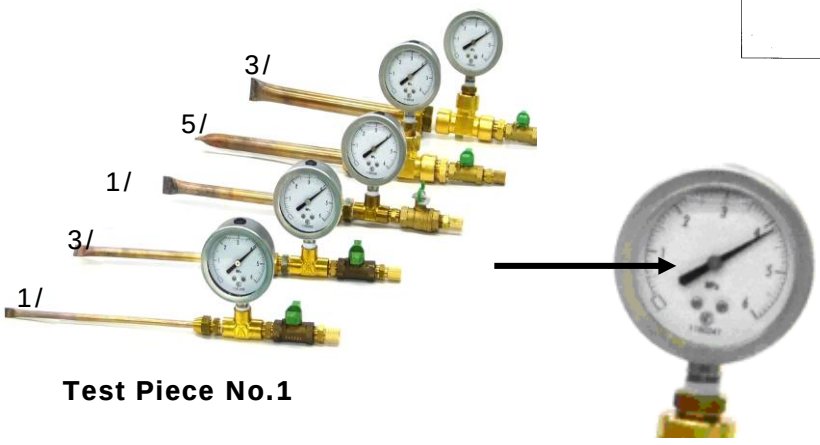
試験装置 エスペック株式会社製
冷熱衝撃装置 TSA－100D－W
試験装置シリアル No: 3290900067

試験装置設定内容
高温さらし温度 ＋120℃
低温さらし温度 － 40℃
さらし時間（高温・低温共） 各 60 分
試験サイクル数 100 回
(低温側より開始)

試験日 平成 24 年 6 月 20 日～6 月 29 日
試験場所 名古屋市工業研究所 環境試験室

以上の条件にて試験を実施しました。

名 古 屋 市 工 業 研 究 所 名古屋市工業研究所
所 長 濱 田 幸 弘



Test Piece No.1

Conclusion

The Flaretite Joint, when operated within these temperature ranges, is impervious to temperature variations.

NEGATIVE PRESSURE TEST

TEST METHOD

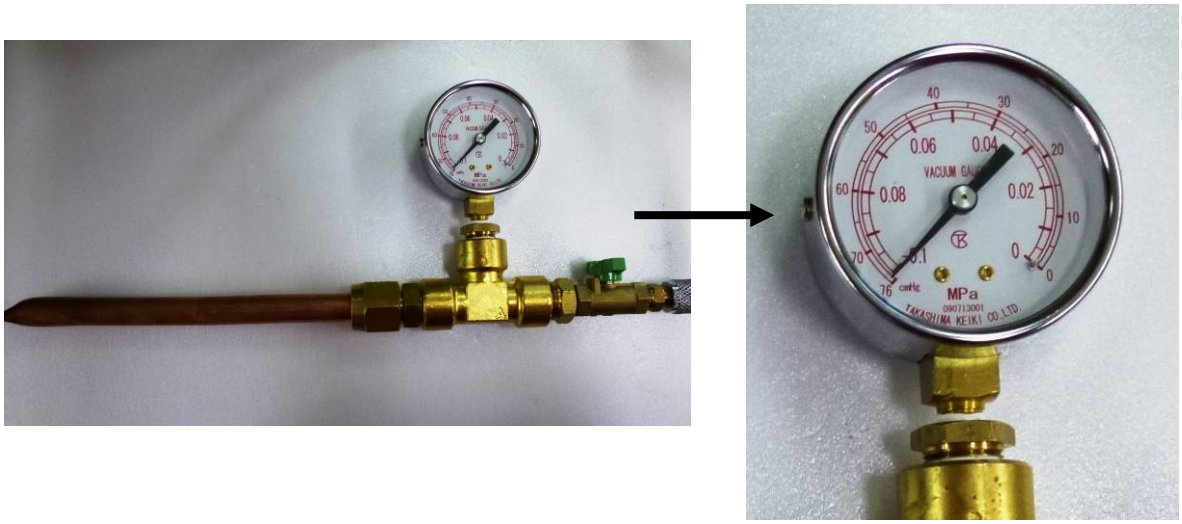
Vacuum Flaretite Seal to -0.1Mpa with a vacuum pump and leave it for 2 hours. Check if no pressure rise is evident.

TEST PIECE

Copper tube which was used on cold impact test each 1 piece.

TEST RESULT

2 hours later, no pressure rise and no air suction were observed in all sizes.



Size	1/4”	3/8”	1/2”	5/8”	3/4”
Pressure rise	No	No	No	No	No

Conclusion

The Flaretite Seal is impervious to positive and negative pressures within the specified range.

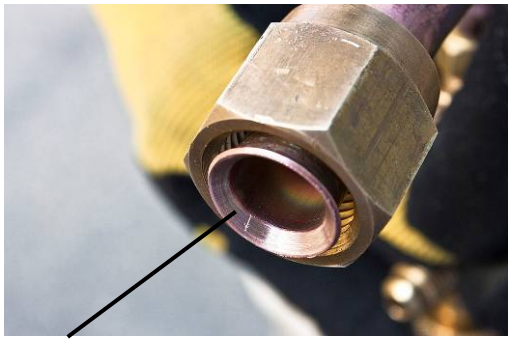
LEAK PREVENTION TEST

TEST METHOD

Inject N2 to 5 MPa and confirm that a leak occurs from the intentionally scratched flared copper tube and install a Flaretite Seal on the tube. Check if the leak stops.

TEST PIECE

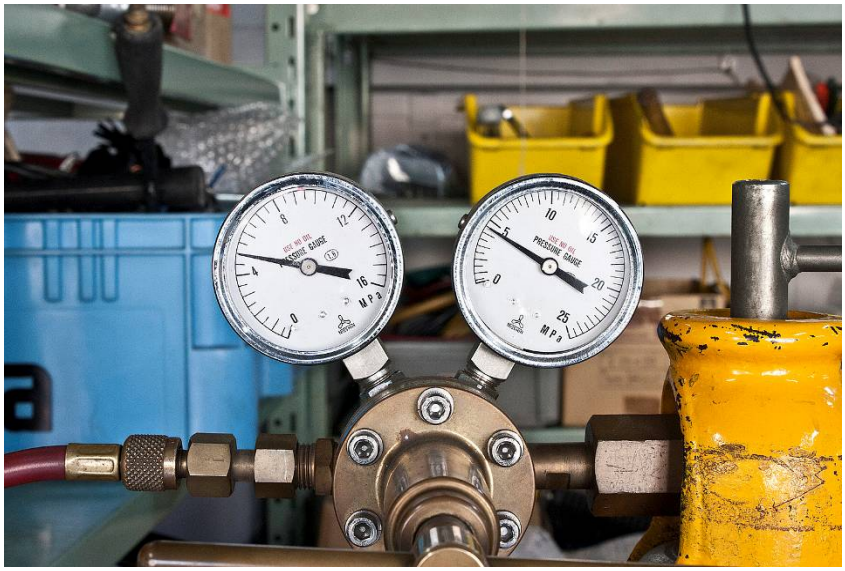
Scratched flared copper tube.



Scratch

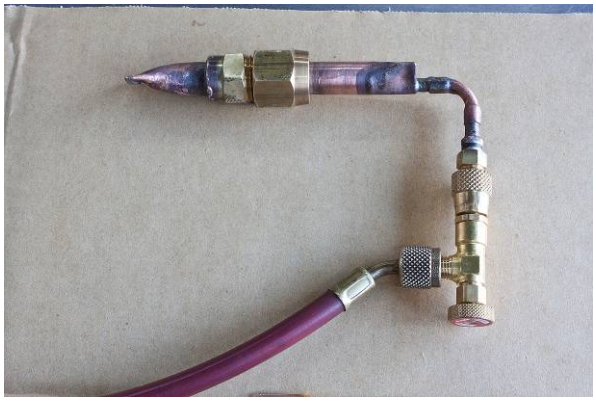
TEST RESULT

Confirm the leak before installing Flaretite Seal and no leak after installing Flaretite Seal. No pressure decrease was observed 2 hours later.



Before installing

After installing



Conclusion

Flaretite creates a leak free flared joint even when intentionally damaged. Sealant and the collapsible rings design fill imperfections.

ADDENDUM TO ASADA TESTING

This Asada testing was conducted with Freon 22, a common refrigerant in Japan and in the rest of the world. However, this refrigerant is banned from new installations here in the USA.

Flaretite, Inc. seals have also successfully been installed in systems utilizing the following other refrigerants:

R-22 (HCFC, Banned on new installations USA)

R-404a (HFC, popular new refrigeration standard)

R-407a (HFC, replacement for R-22)

R-410a (HFC, air-conditioning standard)

R-507 (HFC, replacement for R-502)

R-744 (CO2, new high pressure systems)

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