# Super Neoprenes For HVAC Systems

Technical Bulletin

No. 5724B1-USA

## New Super Neoprenes deliver superior long-term compression set, refrigerant resistance for longer seal life

The Super Neoprene family consisting of compounds C1276-70, C1277-75 and C1278-80 provide resistance to a broad range of refrigerants and lubricants, while performing in a broader temperature range than existing Neoprene formulations, e.g. C0873-70. Super Neoprenes combine the latest technology in low-temperature, crystallization resistant polymers, with an advanced proprietary vulcanization chemistry. This gives them superior long-term compression set resistance and results in longer seal life.

When sealing refrigerants, the designer can choose from three basic elastomer families, EPDM, HNBR, or Neoprene:

**EPDM**

EPDMs offer good high and low temperature capability with excellent compression set for R134a systems. However, EPDMs have poor resistance to mineral oil used in R11, R12, R22 and R123 systems.

**HNBR**

HNBRs have been successfully used in high pressure and broad temperature automotive air conditioning systems. However, HNBRs are not acceptable for use in R22 and R123 Systems. They are also significantly more expensive than EPDM and Neoprene materials.

Super Neoprenes C1276-70, C1277-75, C1278-80

**Neoprene**

Super Neoprenes provide:

- The broadest resistance to refrigerants and lubricants
- Improved high temperature compression set resistance
- Good low temperature flexibility
- Competitive pricing with existing neoprenes, making them less expensive than HNBRs

The Super Neoprenes are suitable for a variety of refrigerant and refrigerant lubricant applications, including:

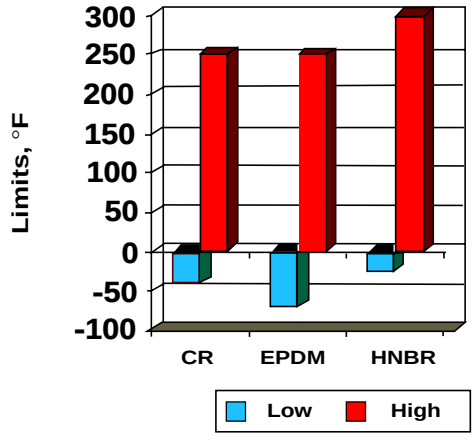
- Ammonia-based refrigeration systems used in ice houses
- R22 systems for “window unit” air conditioners
- R502 systems for freezers and food storage cases
- R134a systems for industrial chillers and automotive air conditioners
- Refrigerant reclaiming equipment

## Comparison of Sealing Materials for Refrigerants

***Suitability with Refrigerant and Lubricant Systems***

| Materials | Super Neoprene | EPDM | HNBR |
|---|---|---|---|
| Temp Range | -40°F to 250°F (-40°C to 121°C) | -70°F to 250°F (-57°C to 121°C) | -25° to 300°F (-32°C to 149°C) |
| R11 | Excellent | Poor | Poor |
| R12 | Excellent | Poor | Good |
| R22 | Excellent | Poor | Poor |
| R123 | Good | Poor | Poor |
| R134a | Excellent | Excellent | Excellent |
| R112 | Good | Poor | Good |
| R113 | Excellent | Poor | Excellent |
| R114 | Excellent | Excellent | Excellent |
| R502 | Excellent | Excellent | Good |
| Hot Ammonia | Excellent | Excellent | Good |

**TEMPERATURE RANGE**



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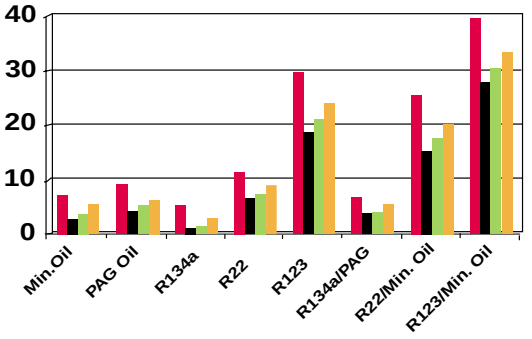
## Super Neoprene Performance Profile

- C0873-70
- C1278-80
- C1277-75
- C1276-70

**% Volume Changes**

### Volume Swell at 100°C, 168 hours

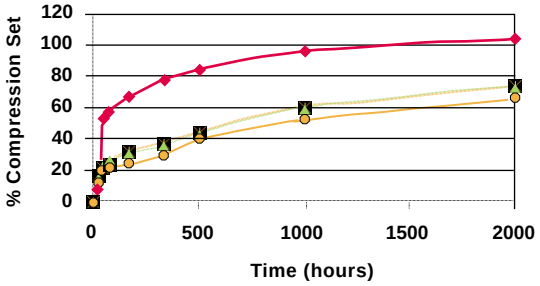



## Improved Compression Set

- C0873-70
- C1278-80
- C1277-75
- C1276-70

**Tested on O-Rings**

### Compression Set at 125°C, 25% Squeeze




## Test Report

Parker Compounds: C0873-70, C1276-70, C1277-75, and C1278-80 Date: May 3, 2000

Test Samples:
2-214 size O-Rings

Specification:
General Comparison

Specification Limits
shown in Parenthesis

| PROPERTY | C0873-70 | C1276-70 | C1277-75 | C1278-80 |
|---|---|---|---|---|
| ***Originals*** | | | | |
| Shore A hardness | 68 (70+/-5) | 72 (70 +/-5) | 76 (75 +/-5) | 81 (80 +/-5) |
| Tensile, psi | 2135 (1450 min) | 1708 (1450 min) | 1655 (1450 min) | 1604 (1450 min) |
| Elongation, % | 371 (250 min) | 220 (175 min) | 198 (175 min) | 239 (175 min) |
| ***Heat aged, 70 hours @125°C*** | | | | |
| Pts. Shore A change | +8 | +5 | +5 | +6 |
| %Tensile change | -14 | -8 | -7 | +5 |
| %Elongation change | -30 | -10 | -8 | -16 |
| ***ASTM #1 oil, 70 hours @125°C*** | | | | |
| Pts. Shore A change | -2 | -2 | -2 | -2 |
| %Tensile change | -12 | +5 | +3 | +8 |
| %Elongation change | -7 | -8 | -5 | +6 |
| %Volume change | +8.7 (+10 max) | +3.7 (+5 max) | +3.5 (+5 max) | +3.4 (+5 max) |
| ***PAG refrigerant oil, 70 hours @125°C*** | | | | |
| Pts. Shore A change | -2 | -1 | -1 | -1 |
| %Tensile change | +4 | -12 | -15 | -10 |
| %Elongation change | -7 | -5 | -6 | -8 |
| %Volume change | +11.3 | +4.8 | +4.6 | +4.2 |
| | | | | |
| ***Compression set, 70 hours @125°C 2-214 O-Rings*** | 57.2 (65 max) | 33.2 (45 max) | 33.8 (45 max) | 35.1 (45max) |
| | | | | |
| ***R134a immersion, 70 hours @ room temp*** | | | | |
| %Volume change | +1.7 | +0.8 | +0.6 | +0.6 |
| ***Glass transition temperature by DSC, 20°C per minute heat rate*** | | | | |
| T(g) by DSC, °C | -41.3 (-40 max) | -42.1 (-40 max) | -42.3 (-40 max) | -42.0 (-40 max) |
| ***Volume change in refrigerants and refrigerant lubricants*** | | | | |
| R22/3GS oil, 50/50, 70 hours @125°C | +55.5 | +40.0 | +37.0 | +35.9 |
| R12/3GS oil, 50/50, 70 hours @125°C | +38.1 | +27.2 | +26.1 | +24.3 |
| R22, 70 hours @125°C | +6.8 | +4.1 | +3.9 | +3.3 |
| R12, 70 hours @ 125°C | +4.6 | +2.4 | +2.0 | +1.9 |
| R123, 70 hours @ 100°C | +29.9 | +21.1 | +19.5 | +18.8 |
| R123/Mineral oil, 50/50, 70 hours @100°C | +39.9 | +28.5 | +26.9 | +25.5 |
| R134a, 70 hours @100°C | +5.4 | +3.0 | +2.6 | +2.4 |
| PAG oil, 70 hours @ 100°C | +9.5 | +6.1 | +5.7 | +5.1 |
| R134a/PAG oil, 50/50, 70 hours @100°C | +6.9 | +4.1 | +3.7 | +3.4 |
| R22, 70 hours @100°C | +11.7 | +7.7 | +6.9 | +6.6 |
| Mobil Arctic 22A oil, 70 hours @100°C | +54.0 | +38.9 | +36.2 | +34.9 |
| R22/Mobil Arctic 22A oil, 50/50, 70 hours @100C | +12.0 | +7.9 | +7.2 | +6.8 |

7/003M/CE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