

# PF100 SERIES

## Norseal® PF100 Series, Cushioning for Li-ion Battery Packs

**Norseal** PF100 Series features premium micro-cellular polyurethane foam specifically developed for cell cushioning within electric vehicle battery packs. This next generation foam provides the widest and flattest compression range of our portfolio, a critical performance measurement commonly required by today's battery pack designers. PF100 exhibits outstanding, industry leading "aged" compression set resistance at elevated temperature (up to 90°C) and humidity conditions, essential for extending the life of the battery pack. PF100 performance is delivered in the lowest thickness/density combination in the industry, allowing design engineers to maximize energy density and space while minimizing overall weight.

A typical compression curve of **Norseal** PF100 cushion pads is shown in Figure 1 to highlight the narrow range of compressive stresses across a wider range of compressive strains. Figure 2 highlights the excellent compression set resistance exhibited by PF100 even at elevated temperatures, for example 90°C and high humidity conditions like 85% RH.

## APPLICATIONS

- Compression/Tolerance pads for high energy density lithium-ion battery packs
- Sealing/Cushioning needs within a battery pack
- Electrically insulating support for elements like thermistors in a battery pack

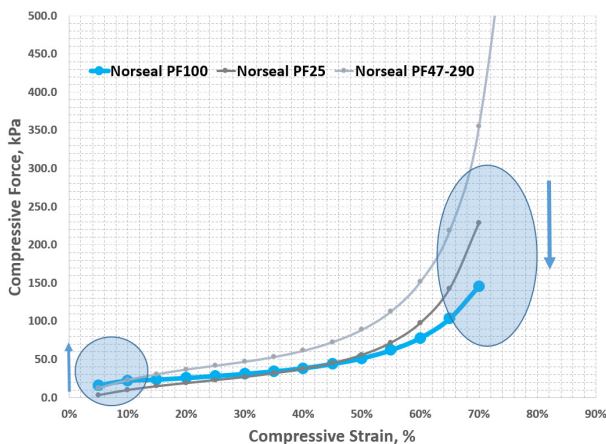


Figure 1.

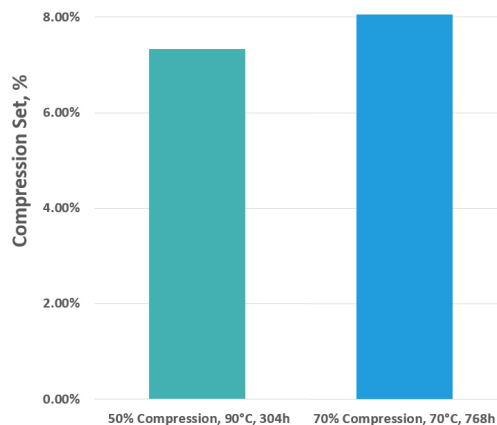


Figure 2.

## Norseal PF100 Series — Properties

Performance tests are conducted using standard test procedures. The values presented are typical values and should not be used for specification purposes.

| Properties                                      | Test Method  | PF100   |  |
|---|--|---|--|
| PHYSICAL  |  |   |  |
| Density, kg/m³ (lb/cu.ft.)                      | ASTM D3574   | 140 (9)   | 320 (20)   |
| Thickness, mm (in)                              |  | 1.0 - 3.5<br>(0.04 - 0.14)  |  |
| Standard color                                  | -  | Black   |  |
| Standard liner                                  | -  | Paper, PET (release or permanent)   |  |
| Compression set (@ 70%, 7 days), %              | ASTM D1667   | <3 @ 23°C (73°F)<br><3 @ 70°C (158°F)<br><5 @ 90°C (194°F)                |  |
| Typical Force to Compress, kPa (psi)            | ASTM D1667   | 29 kPa (4.2 psi) @10%<br>60 kPa (8.7 psi) @50%<br>185 kPa (26.8 psi) @70% | 80 kPa (11.6 psi) @10%<br>367 kPa (53.3 psi) @50%<br>1715 kPa (248.8 psi) @70% |
| Typical Compression Force Deflection, kPa (psi) | ASTM D1667   | 20 kPa (2.9 psi) @10%<br>46 kPa (6.7 psi) @50%<br>135 kPa (19.6 psi) @70% | 61 kPa (8.9 psi) @10%<br>309 kPa (44.9 psi) @50%<br>1294 kPa (187.7 psi) @70%  |
| THERMAL   |  |   |  |
| Temperature resistance, °C (°F)                 | Recommended constant use, max.<br>Recommended intermittent, max. | 70 (158)<br>121 (250)   |  |
| Thermal Conductivity, W/m.K (Density 320 Kg/m³) | ISO 8302   | 0.04  |  |
| Low Temperature resistance                      | -40°C w/25 mm mandrel  | PASS  |  |
| ELECTRICAL<br>(on nominal 1 mm thick material)  |  |   |  |
| Breakdown strength, AC, kV/mm (V/mil)           | ASTM D149, Method B  | 1.4 (35)  | 2.0 (50)   |
| Breakdown strength, DC, kV/mm (V/mil)           | ASTM D3755   | 1.8 (45)  | 2.4 (60)   |
| FLAME RESISTANCE                                |  |   |  |
| Flame resistance                                | ASTM D4986<br>(Self-extinguishing)                               | PASS  |  |

\* Data in table above features typical values, is preliminary in nature and should not be considered as formal product specifications. Please consult your representative for more details.

## Shelf Life

12 months when stored at 21°C, 50% relative humidity, when product is stored in its original packaging, away from direct sources of heat and sunlight.



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