

FUNCTIONAL V-211

Food Grade Polymer for Greases (Quick Dissolving Powder Form)

APPLICATION:

FUNCTIONAL V-211 is powdered polymer specifically designed for use in greases. Unlike pre-dissolved polymers, the absence of diluent oil permits complete formulating flexibility. Greases made with **FUNCTIONAL V-211** have greatly improved water resistance versus other polymers. **FUNCTIONAL V-211** is NSF approved for use in food-processing equipment where incidental food contact may occur.

COMPOSITION:

FUNCTIONAL V-211 is styrene/ethylene/butylene copolymer.

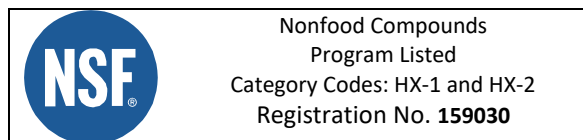
| Typical properties | |
|--|----------------------------------|
| Appearance (Visual) | Clear - white particles (powder) |
| Specific Gravity (ASTM D1298) | 0.92 |
| Thickening Efficiency (1.0% in ISO 32 oil, ASTM D445) | 9.0 cSt @ 100°C, gels at low T |

TREATMENT LEVEL:

Typical treatment level is 0.5-1.0wt% for water resistance and mechanical stability. 1wt% treat can achieve <10% D4049 sprayoff and D1264 washout in an appropriate base oil (see next page for guide).

HANDLING:

FUNCTIONAL V-211 is resistant to caking and no particular precautions are needed in storage. Dissolving is best accomplished with continuous agitation at temperatures of at least 200°F (95°C). When used in greases, **FUNCTIONAL V-211** should be incorporated into the batch right after the addition of the cooling oil to allow sufficient time (1 -3 hrs depending on the batch size) and high enough temperature for dissolving. **FUNCTIONAL V-211** is non-hazardous material; see the current Safety Data Sheet.



This Technical Data Sheet and the Safety Data Sheet contain information believed to be accurate and reliable. No warranty is made, however, to information beyond the control of FUNCTIONAL PRODUCTS INC. The engineering and management personnel of the user are responsible for determining the suitability of this or any product for any specific application, and this information is offered to them for that purpose. 6/24/2020

FUNCTIONAL PRODUCTS INC.

Innovative Chemistry for Lubricants

Technical Data Sheet

INDUSTRIAL FORMULATING GUIDE:

FUNCTIONAL V-211 performs best in Group I/II and bright stock based greases where the aromatic carbon content (by ASTM D2140) of the base oil is approximately 4-7%. Consult with your base oil supplier to find the ASTM D2140 paraffinic/naphthenic/aromatic carbon profile for your base oils.

Naphthenic oils are not recommended due to high aromatics (10-20% aromatic carbon) which produce an unwanted rubbery consistency with **FUNCTIONAL V-211**. Naphthenic/paraffinic oil blends may still contain excessive aromatics unless the paraffinic oil has very low aromatics.

H1 INCIDENTAL FOOD CONTACT FORMULATING GUIDE:

In H1 grease, **FUNCTIONAL V-211** performs well in white oil and H1 Group III base oils. For best results, include 10wt% 5 cSt H1 alkylated naphthalene for solvency. Avoid metallocene PAO and use H1 polybutenes or OCP viscosity modifiers like **FUNCTIONAL V-460** or **FUNCTIONAL V-425** for viscosity.

FUNCTIONAL V-211 does not perform well in PAO/mPAO blends. Use 2wt% **FUNCTIONAL V-4064** or a combination 1.4wt% **FUNCTIONAL V-4064** / 0.6wt% **FUNCTIONAL V-211** for best results in PAO grease.

ISO 150 Oil Blends vs. D4049 Water Sprayoff in #2 Hydrated Calcium Grease w/ 1wt% **FUNCTIONAL V-211**

| Base Oil Blend: | Industrial Paraffinic | Industrial Naph. | WO + PB | WO/AN + PB | WO + mPAO | WO + VM | GrIII + PB | GrIII + VM | Full PAO | PAO + VM |
|-------------------------------|------------------------------|-------------------------|----------------|-------------------|------------------|----------------|-------------------|-------------------|-----------------|-----------------|
| 600SN Group I | 85 | | | | | | | | | |
| 150 Bright Stock | 15 | | | | | | | | | |
| 200 SUS Naphthenic | | 52 | | | | | | | | |
| 3500 SUS Naphthenic | | 48 | | | | | | | | |
| 500 SUS White Oil (H1) | | | 95 | 82.5 | 68 | 86 | | | | |
| 8 cSt Group III (H1) | | | | | | | 69 | 75 | | |
| PIB 2500MW (H1) | | | 5 | 7.5 | | | 16 | | | |
| FUNCTIONAL V-460 (H1) | | | | | | 6.7 | | 12.5 | | |
| FUNCTIONAL V-425 (H1) | | | | | | | | | | 14.3 |
| PAO 6 (H1) | | | | | | | | | 50 | 57.4 |
| mPAO 100 (H1) | | | | | 22 | | | | 50 | |
| 5 cSt Alkyl. Naph. (H1) | | | | 10 | 10 | 7.3 | 15 | 12.5 | | 28.3 |
| | | | | | | | | | | |
| Base Oil Composition: | | | | | | | | | | |
| % Paraffinic Carbon | 70.2 | 51.3 | 71.5 | 70.8 | 75.1 | 69.2 | 81.2 | 78.0 | 100 | 83.3 |
| % Naphthenic Carbon | 25.7 | 30.2 | 28.5 | 24.8 | 20.4 | 27.5 | 11.9 | 16.2 | 0 | 4.0 |
| % Aromatic Carbon | 4.2 | 18.4 | 0 | 4.5 | 4.5 | 3.3 | 7.0 | 5.9 | 0 | 12.7 |
| | | | | | | | | | | |
| D4049 Water Sprayoff * | 7.8% | 13.3% ** | 49% | 8.0% | 32% | 8.7% | 26% | 27% | 59% | 19% |

*Base grease has 70% D4049 water sprayoff

** = rubbery texture from high % aromatics

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