Food Grade HX-1 Product Line

Functional Products Inc.

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Agenda

- Specialty lubricant additive lines
  - HX1 Food Grade
    - What is it?
    - Relevant certifications / status
    - Advantages / challenges
    - Base oils supported
    - Viscosity modifiers
    - Additives & packages

Specialty Additives

- Standard petroleum lubricant products
  - Useful but not unique – commoditized; match specs and sell for less

- Specialty (biobased and food grade) lubricant additives
  - Useful and unique - compete on performance, opportunity

  - More specialized knowledge needed
    - More custom products, less interchangeability
      - Longer relationship with customer

  - More rules and exceptions about what is compatible / certifiable

"Food Grade"

- Products certified and maintained by NSF International
  - Formerly called NSF (National Sanitation Foundation)
  - Lubricant (H1/HX2) or a lubricant additive (HX1/HX2)

- **H1/HX1** products are to be used where there is the potential for incidental food contact; still expect less than 10 ppm of contamination

- **H2/HX2** products with no potential for food contact; for instance, to be used on-site around food prep in a sealed piece of equipment
  - No one is interested in H2/HX2

- Neither status means product is "edible", "food grade", or safe to consume
  - "Food grade" term being phased out for "HX1"
  - Correct Term for H1/HX1 should be "Incidental Food Contact"

Food Grade Challenges

- Limited toolbox for formulators
  - Must be listed on the NSF white book list http://info.nsf.org/USDA/Listings.asp or regulation 21 CFR 178.3570
  - Some critical roles in a formulation are very difficult to fill or are lacking – no reactive sulfur for heavy duty EP; HX1 PPDs and defoamers limited
  - Raw chemical manufacturers must submit extensive testing to add to white book list

HX1 Base Oils

- Water
- White oil meeting certain UV/Vis purity requirements
- Vegetable oils
- Polyalphaolefin and some polybutene
- Certain proprietary synthetic esters
- Certain polyalkylene glycols

HX1 Tackifiers and VM

- Functional's options for HX1 tackifiers and liquid viscosity modifiers
  - Example - Oven chain oils for food industry
  - No maximum treat level – use as needed

Product	Role	Compatible In	Notes
V-425	Tackifier / VM	White oil, PAO	OCP tackifier
V-422	Tackifier	White oil, PAO	PIB tackifier; use <0.1% for antimist
V-475	Tackifier	White oil, PAO	Ultra-high MW PIB tackifier, low treat
V-584	Tackifier	Veg oil, some ester	Proprietary tackifier for biobased
V-802	Tackifier	Water, some emulsions	Proprietary tackifier for water; use at low treat for antimist
V-460	VM	White oil, PAO	22 SSI thickener in white oil Concentrated, 3000 cSt @ 100C
V-508	VM	Veg oil, most ester	28 SSI thickener; limited to >-20°C. V-508F higher conc of polymer in methyl ester

HX1 Grease

- Typically calcium sulfonate or aluminum complex chemistry

Product	Role	Max treat level for HX-1 status	Compatible In	Notes
V-211	Grease polymer, flake	None; use as needed	Grease	1% treat provides excellent water resistance (10% WSO/WWO)
V-4064	Grease polymer, flake	None; use as needed	Grease	1-2% treat provides cohesion for improved oil bleed and shear stability
Ceramax	AW / EP	None; use as needed	Grease	Boron nitride powder; 1% treat Available as a paste to control dust.

- HX1 greases tend to use lighter HX1 base oils
  - Boost viscosity to ISO 220–460 with VM for better mechanical properties

- V-207 is a powdered grease polymer with HX2 status
  - 0.5 – 2% treat for excellent tack and water spray-off

HX1 Corrosion Inhibitors

- Individual HX1 components, no formal packages
- Pass turbine oil rust test: D665A for water / D665B for brine

Product	Role	Max Treat	Compatible In	Notes
CI-426	CI / AW	0.5	White oil, vegetable oil, PAO	0.2% for rust protection 0.5% for some mild AW
CI-426EP	CI / AW / Mild EP	2.0	White oil, vegetable oil, PAO	2wt% for CI/AW/EP; 126 kgf weld load ***New reproductive hazard added***
CI-446EP	CI / AW / Mild EP	2.0	White oil, vegetable oil, PAO	Hazard-free CI-426EP w/ white oil; 126 kgf weld load in white oil
CI-526EP	CI / AW / Mild EP	2.0	White oil, vegetable oil, PAO	Hazard-free CI-426EP w/ veg oil; 200 kgf weld load in veg oil
CI-498	CI	None; use as needed	Water, PAG	0.1 - 0.3% for rust protection; in water

Summary

- Functional Products tailors products and services for specialty markets

- HX1
  - “Incidental food contact” not ‘edible’ or ‘food’
  - Limited toolbox due to NSF regulations
  - Strong options for tackifier, corrosion inhibitors, grease