



HITECBIO HFDR 137

Phosphate Ester Fire-Resistant Hydraulic Fluid

Phosphate Ester Fluid Technology for Critical Turbine EHC Systems

Product Overview

HITECBIO HFDR 137 is formulated with a synthetic triaryl phosphate ester base fluid and a balanced additive system containing antioxidants, corrosion inhibitors, and antifoam agents. It is developed for electro-hydraulic control (EHC) systems in steam turbines, gas turbines, and other hydraulic applications exposed to elevated fire risk.

The product is engineered to balance inherent fire resistance, thermal-oxidative stability, hydrolytic stability, electrical insulation, air-release performance, and anti-wear protection. It serves as the power-transmission, lubrication, and cooling medium in EHC systems and supports the stable operation of precision components such as high-pressure pumps, servo valves, and actuators.

Product Features and Application Benefits

Inherent Fire Resistance and Thermal-Oxidative Stability

- The triaryl phosphate ester base fluid provides inherent fire resistance and a high autoignition temperature
- Thermal-oxidative stability has been verified by DIN EN 14832 and RPVOT
- Designed for EHC applications exposed to hot surfaces, ignition hazards, and high-temperature cycling

Hydrolytic Stability and Metal Protection

- Hydrolytic stability has been verified by DIN EN 14833, helping control the formation of acidic by-products
- The corrosion-inhibitor system helps reduce corrosion risks associated with water contamination, rising acid number, and metal contact
- Water content, acid number, temperature, and contamination levels should be closely controlled during operation and maintenance

Electrical Insulation and Precision Control

- High volume resistivity supports the electro-hydraulic control requirements of EHC systems
- Rapid air release and foam control help maintain stable pump suction, pressure transmission, and servo response
- Anti-wear and load-carrying performance have been verified by four-ball and FZG tests

Typical Operating Conditions and Risks

During long-term operation, EHC systems may be exposed to high-temperature oxidation, hydrolysis and acidic by-product formation, metal corrosion, declining volume resistivity, air entrainment, foaming, and particle contamination that may cause servo-valve sticking. Product selection and maintenance strategies should be determined according to unit type, system temperature, filtration configuration, cleanliness targets, and equipment manufacturer requirements.

The condition of phosphate ester fire-resistant hydraulic fluid is closely related to water content, acid number, particle cleanliness, and electrical insulation performance. Periodic fluid testing and trend monitoring are recommended.

Recommended Applications

- Steam-turbine electro-hydraulic control (EHC) systems in thermal power plants
- Gas-turbine electro-hydraulic control systems
- Governing and control systems in nuclear-power and biomass-power units
- Other hydraulic systems exposed to elevated fire risk, subject to equipment manufacturer approval

Reference Specifications and Standards

The product is classified as ISO 6743-4 HFDR and designed with reference to ISO 12922 and ASTM D4293. Relevant tested properties are listed against the applicable requirements of DL/T 571-2024. Compliance with specific OEM requirements is subject to valid technical documentation and equipment manufacturer requirements.

Typical Properties

Property	Test Method	DL/T 571-2024	HFDR 137
Physical Properties			
Appearance	Visual	Clear, transparent liquid	Clear, transparent liquid
Density at 20 °C, kg/m ³	ASTM D1298	1,130–1,170	1,137
Kinematic viscosity at 40 °C, mm ² /s	ASTM D445	41.4–50.6	47.41
Pour point, °C	ASTM D97	≤−18	−24
Acid number, mg KOH/g	ASTM D664	≤0.05	0.03
Chlorine content, mg/kg	Microcoulometry	≤50	15
Water content, mg/L	ASTM D6304	≤600	300
Particle cleanliness level	SAE AS4059F	≤6	≤6
Air release at 50 °C, min	ASTM D3427	≤6	1
Demulsibility at 54 °C, min	ASTM D1401	≤5	≤5
Volume resistivity at 20 °C, Ω·cm	IEC 60247	≥1.0×10 ¹⁰	4.6×10 ¹⁰
Foaming characteristics (tendency/stability), mL/mL	ASTM D892		
Sequence I, 24 °C		≤50/0	10/0
Sequence II, 93.5 °C		≤30/0	5/0
Sequence III, 24 °C after 93.5 °C		≤50/0	10/0
Thermal Properties			
Flash point (COC), °C	ASTM D92	≥240	270

Property	Test Method	DL/T 571-2024	HFDR 137
Autoignition temperature, °C	ASTM E659	≥530	540
Evaporation loss at 100 °C for 22 h, %	ASTM D972	—	1.2
Volumetric thermal expansion coefficient at 40 °C, mL/(mL·°C)	—	—	0.0003
Lubricity and Load-Carrying Performance			
Four-ball wear test (1,200 r/min, 75 °C, 392 N, 60 min), wear scar diameter, mm	ASTM D4172	—	0.48
FZG gear test (A/8.3/90), failure load stage	DIN 51354 Part II	—	7
Four-ball EP test	ASTM D2783		
Load-wear index, N		—	392
Weld load, N		—	1,962
Stability			
Oxidation stability	DIN EN 14832		
Acid number change, mg KOH/g		≤1.5	0.2
Metal weight change: iron, mg		≤1.0	0
Metal weight change: copper, mg		≤2.0	−0.3
Rotating Pressure Vessel Oxidation Test (RPVOT), min	ASTM D2272	—	360
Hydrolytic stability, mg KOH/g	DIN EN 14833	≤0.5	0.02

The values shown are typical averages for technical reference only and do not constitute a quality guarantee.

Material Compatibility

Commonly compatible materials: phosphate-ester-resistant epoxy coatings; butyl rubber, silicone rubber, EPDM, and PTFE sealing materials; and metal filter elements.

Materials requiring particular evaluation before use: coatings, sealing materials, hoses, and other components commonly used in mineral-oil systems that have not been verified for phosphate-ester compatibility.

Actual suitability depends on the specific material grade, formulation, temperature, contact duration, and equipment design. Compatibility should be confirmed against equipment manufacturer requirements and compatibility-test results before formal application or system conversion.

System Conversion and Operating Management

- When converting from mineral oil or another hydraulic medium, drain the existing fluid, clean the system, and verify the phosphate-ester compatibility of coatings, seals, hoses, and filter elements
- Control particulate contamination during filling and conversion, and follow the conversion procedure specified by the equipment manufacturer
- During operation, closely monitor acid number, water content, particle cleanliness, volume resistivity, filter condition, and servo-valve response
- Monitor changes in system temperature, air release, foaming, and pump noise; abnormal conditions should be handled by appropriately qualified technical personnel

Packaging Specifications

- 230 kg steel drum
- 238 kg steel drum
- 208 L steel drum
- Other packaging options may be agreed subject to supply conditions

Storage and Handling

Store the product indoors in sealed containers and protect it from water ingress, direct sunlight, and contamination. If outdoor storage is unavoidable, provide suitable shelter and protection against rain and moisture, and prevent damage to container labels or water ingress through closures.

The recommended storage temperature should not exceed 60 °C. Avoid prolonged exposure to extreme cold, intense sunlight, or severe temperature fluctuations. Confirm that the packaging is intact before use and follow a first-in, first-out inventory policy.

Health, Safety and Environment

Before using this product, consult the latest Safety Data Sheet (SDS) and follow its requirements for storage, handling, personal protective equipment, spill response, waste disposal, and environmental protection.

Used lubricant may contain contaminants introduced during operation. Avoid prolonged or repeated skin contact, and collect and dispose of used lubricant in accordance with local regulations and site management requirements.

For applications or special operating conditions not listed or recommended in this document, contact HITECRUN Technical Service before use for appropriate technical guidance.

Management System Certifications

This product is manufactured under ISO 9001:2015, ISO 14001:2015, and ISO 45001:2018 management systems.

Disclaimer

The information in this document is based on technical data, test results, and application experience available to HITECRUN at the date of issue. It is provided solely as general technical guidance and does not constitute a quality guarantee, performance warranty, or contractual term.

Because actual application conditions, equipment condition, operating practices, and maintenance management may vary significantly, users are responsible for assessing product suitability for the intended application and for complying with applicable local laws, regulations, and safety and environmental requirements.

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