Technical Data Sheet

- EU Ecolabel
- US EPA VGP Compliant
- Versatile Applications

Shell **Naturelle Fluid** *HF-E 46*

Fully Synthetic, Biodegradable, Less-flammable Hydraulic Fluid

Shell Naturelle Fluid HF-E is an advanced biodegradable and HFDU type less flammable hydraulic fluid for use in hydraulic and power transmission systems. It is readily biodegradable with a low ecotoxicity, particularly suited for use in environmentally sensitive areas and in industrial equipment operating in areas subject to fire hazards, such as in steel mills, surface mines and foundries. Fully synthetic esters, blended with ashless additives, provide Shell Naturelle Fluid HF-E with a superior blend of lubrication performance and environmental acceptability.

DESIGNED TO MEET CHALLENGES

Performance, Features & Benefits

- **Excellent wear protection**
  Advanced ashless (zinc-free) anti-wear additives provide protection over a wide range of conditions – proven protection in tough industry standard tests such as the Eaton Vickers 35VQ25 vane pump and Komatsu HPV35+35 high pressure piston pump.
- **Maintaining system efficiency**
  Excellent viscosity / temperature characteristics can minimize the changes of viscosity with variation in operation temperature, giving true 'multigrade' characteristics. Superior cleanliness and filterability; coupled with excellent water separation, air release and anti-foam characteristics, all help to maintain or enhance hydraulic system efficiency. The filterability of Shell Naturelle Fluid HF-E is maintained, even when the fluid is contaminated with water.
- **Readily biodegradable & Low Ecotoxicity**
  Shell Naturelle Fluid HF-E contains a mean biobased content of over 80% (ASTM D6866) and is biodegraded by over 60% after 28 days in the OECD 301 B carbon dioxide evolution test. The fluid is classified as 'not harmful' to bacteria, algae, freshwater and marine invertebrates, and fish when tested as water-accommodated fractions (WAFs) according to OECD and EPA test guidelines.
- **Fire Resistance**
  Shell Naturelle Fluid HF-E is less flammable hydraulic fluid with high flash point, fire point and autoignition temperature for reduced risk of fire/explosion.
- **Mobile / exterior hydraulic applications**
  Hydraulic and fluid power transmission systems in exposed environments can be subject to wide variations in temperature.
  The naturally high, shear stable viscosity index (VI) of Shell Naturelle Fluid HF-E helps deliver responsive performance from cold start to full load, heavy duty operation.
- **General industrial control equipment and hydraulic systems**
  The excellent anti-wear properties and high viscosity index (VI) of Shell Naturelle Fluid HF-E, mean that it can often be used where ISO 11158 (HM/HV) and DIN 51524 Part 2 or Part 3 (HLP/HVLP) mineral oil hydraulic fluids are specified. However, bulk fluid operating temperatures should not be allowed to exceed 90^{0}C.
- **Environmentally sensitive areas**
  Shell Naturelle Fluid HF-E is an 'environmentally acceptable' hydraulic fluid (ISO 15380 HEES). When compared to conventional mineral oil hydraulic fluids, it will have a reduced environmental impact in the event of a leak or accidental spillage,and meets the United States Environmental Protection Agency's (EPA) 2013 Vessel General Permit (VGP) requirements for use in marine applications.
- **Industrial operation subject to fire hazards**
  Shell Naturelle HF-E Fluids are classified as HFDU type fire-resistant hydraulic fluid for use in industrial equipment operating in areas subject to fire hazards, such as in steel mills, surface mines and foundries. It has a high ignition temperature and heat release.

Main Applications

Specifications, Approvals & Recommendations

- EU Ecolabel for Lubricants
- License number UK/027/029
- Swedish Standard SS 15 54 34 SP
- ISO 15380 HEES
- ISO 12922 HFDU
- Factory Mutual approved
- United States Environmental Protection Agency's (EPA) 2013 Vessel General Permit (VGP)
- VDMA 24568 synthetic esters
- Dutch MIA/VAMIL Milieulijst
- German Positivliste Bioschmierstoffe
- USDA Bio-preferred program
- Sperry Marine
- Quantum Marine Engineering
- Rolls Royce Marine
- Shell Naturelle Fluid HF-E is approved as meeting the anti-wear requirements of the hydraulic fluid recommendations for Eaton Vickers products for mobile and industrial systems according to Brochure 03-401-2010.

  For a full listing of equipment approvals and recommendations, please consult your local Shell Technical Helpdesk.

Compatibility & Miscibility

- **Fluid Compatibility**

  Shell Naturelle Fluid HF-E is miscible with mineral oil hydraulic fluids. However, in order to ensure that the environmental properties and performance of Shell Naturelle Fluid HF-E are maintained, the hydraulic system should be drained and flushed thoroughly when changing fluids.

  Guidelines on fluid change-over can be found in ISO 15380 Annex A.
  Owing to the surface-wetting properties of Shell Naturelle Fluid HF-E, if the system was previously operated using a mineral oil hydraulic fluid, deposits formed in the system during operation may be loosened and deposited in the system filters. The filters should therefore be checked at regular intervals after fluid change-over.

- **Seal & Paint Compatibility**

  Shell Naturelle Fluid HF-E 46 is compatible with hydrogenated nitrile (HNBR) and fluoroelastomers (FPM/FKM) such as Viton®. Depending on the elastomer grade, it is also compatible with polyester urethane (AU) elastomers.

  Other seal materials and system components such as paints may be adversely affected and advice should be sought from the respective manufacturers

Typical Physical Characteristics

Properties			Method	Shell Naturelle Fluid HF-E 46
Viscosity grade				46
ISO Fluid Type			ISO 6743-4	HEES
Kinematic Viscosity	@-20°C	cSt	ISO 3104	1 522
Kinematic Viscosity	@40°C	cSt	ISO 3104	47.2
Kinematic Viscosity	@100°C	cSt	ISO 3104	9.41
Viscosity Index			ISO 2909	188
Density	@15°C	kg/m^3	ISO 12185	921
Flash Point (Cleveland Open Cup)		°C	ISO 2592	320
Pour Point		°C	ISO 3016	-42
Biodegradable		% 28days	OECD 301B	76
Auto-ignition temperature		°C minimum	ASTM D659	400

These characteristics are typical of current production. Whilst future production will conform to Shell's specification, variations in these characteristics may occur.

Health, Safety & Environment

- **Health and Safety**

  Shell Naturelle HF-E is unlikely to present any significant health or safety hazard when properly used in the recommended application and good standards of personal hygiene are maintained.

  Avoid contact with skin. Use impervious gloves with used oil. After skin contact, wash immediately with soap and water.

  Guidance on Health and Safety is available on the appropriate Safety Data Sheet, which can be obtained from https://www.epc.shell.com

- **Protect the Environment**

  Take used oil to an authorised collection point. Do not discharge into drains, soil or water.

Additional Information

- **Advice**

  Advice on applications not covered here may be obtained from your Shell representative.

Viscosity - Temperature Diagram for Shell Naturelle Fluid HF-E

