



Formerly Known As: **Shell Naturelle S4 Transformer I**

Shell PANOLIN S4 Transformer - I

- Extra Performance
- Meets IEC 61099 T1

Advanced synthetic electrical insulating fluid

Shell PANOLIN S4 Transformer - I is a high performance, fully synthetic insulating fluid based on specially designed esters. It offers very high oxidation stability and good dielectric strength. Shell PANOLIN S4 Transformer Fluid - I is readily biodegradable and has low flammability.

High-Performance Biodegradable Lubricants

Performance, Features & Benefits

▪ Extended Oil Life

The fluid has very good ageing stability (resistance to oxidation) which allows a long service period without any oil change.

▪ Low flammability

Shell PANOLIN S4 Transformer Fluid I has low flammability characteristics. This makes the fluid particularly suitable when a mineral oil is not acceptable for safety reasons.

▪ System Efficiency

The fluid ensures that heat transfer inside the machinery is effective.

▪ Transformer protection

The fluid is compatible with commonly used transformer components.

▪ Lower Environmental Impact

Recommended for use in environmentally sensitive areas - offers reduced impact of leak or accidental spillage into the environment compared to conventional mineral oils.

Readily biodegradable, biodegraded by over 60% after 28 days in the OECD 301 B carbon dioxide evolution test. Low Ecotoxicity, 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.

▪ Industrial transformers

Electrical insulating fluid for power and distribution transformers, which may have advanced requirements regarding environment and fire protection e.g traction transformers and wind turbine applications.

▪ Transformers in electrical locomotives

Insulating and cooling fluid for mobile railroad transformers.

Specifications, Approvals & Recommendations

▪ IEC 61099 Type T1

▪ Meets IEC 61039 (replaced IEC 61100) K fire point classification, and low heat value classification 3

▪ The product meets the performance requirements of original equipment manufacturers.

▪ Maintenance should be carried out according to IEC 61203

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

Compatibility & Miscibility

▪ It is strongly recommended that an oil sample is taken from the system following changeover and analysed via the Shell Rapid Lubricants Analysis service to confirm the new fluid charge is fit for use.

▪ Fluid Compatibility

Shell PANOLIN Fluids are miscible with mineral oils.

However, in order to ensure that the environmental properties and performance of Shell PANOLIN Fluids are maintained, the system should be drained and flushed thoroughly when changing fluids.

Main Applications



Typical Physical Characteristics

Properties	Method	PANOLIN S4 Transformer - I
Appearance	DIN 57370	Bright and clear
Density @20°C kg/m ³	ISO 12185	970
Kinematic Viscosity @40°C mm ² /s	ISO 3104	27.2
Kinematic Viscosity @-20°C mm ² /s	ISO 3104	1 170
Flash Point (PM) °C	ISO 2719 / ASTM D93	255
Firepoint (COC) °C	ISO 2592 / ASTM D92	310
Pour Point °C	ISO 3016	-57
Breakdown Voltage (after treatment) kV	IEC 60156	72
Dielectric Dissipation Factor (After treatment) @90°C	IEC 60747	0.01
Oxidation Stability (164 hrs) - Total Acidity mg KOH/g	IEC 61125C	0.19
Oxidation Stability (164 hrs) - Sludge % m maximum	IEC 61125C	0.01
Biodegradability after 28 days %	OECD 301B	72

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

This product 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

- Note that this is especially critical for Shell PANOLIN S4 Transformer Fluid I since, being ester-based, it is hygroscopic (tends to absorb moisture from the air).
- It is strongly recommended that storage containers be dedicated for electrical service and include air-tight seals. It is further recommended that electrical insulating oils be stored indoors in climate-controlled environments.

Storage Precautions

The critical electrical properties of Shell PANOLIN Transformer Fluid are easily compromised by trace contamination with foreign material. Typically encountered contaminants include moisture, particles, fibres and surfactants. Therefore, it is imperative that electrical insulating oils be kept clean and dry.

Additional Technical Advice

The information and guidance offered for use of Shell PANOLIN products is based on experience and understanding gained through the development and manufacturing of lubricants. The performance of the products can be influenced by a number of variables, not limited to, contamination, operating temperature, equipment application, external environment and material type. It is recommended that you discuss application and fluid recommendations with both your OEM and local Shell technical representative before the product is used. Advice given is non binding and Shell will not be held liable for any consequence as a result of or through misuse of the fluid.