



# Shell Turbo S5 DR 46

## Fire resistant hydraulic and lubricating fluid for turbines

Shell Turbo S5 DR 46 is a fire-resistant hydraulic and lubricating fluid made using Tri-Aryl Phosphates based on butylated phenol.

- Electrohydraulic control fluid
- Flame resistant

### DESIGNED TO MEET CHALLENGES

#### Performance, Features & Benefits

- **Excellent fire resistance**

Shell Turbo S5 DR 46 is a high-performance phosphate ester self-extinguishing fire-resistant fluid, offering high flash point, high fire point and high auto ignition temperature. It minimises the risk of fire, which could potentially be caused by mineral oil products.

- **Good oxidation stability**

To provide long service life under normal operating conditions.

- **Good hydrolytic stability**

Shell Turbo S5 DR 46 is to a great extent able to withstand rapid decomposition of the base fluid under the influence of moisture and water in the oil system.

- **Good demulsibility**

To enable rapid separation from water for improved service intervals.

- **Controlled air release**

Good air-release minimises air entrainment in lubrication and governor control systems in order to ensure safe operation of the whole equipment.

- **Low foaming**

Minimal tendency for foaming to provide proper lubrication and heat transfer.

- **HSSE**

Shell Turbo S5 DR 46 is an advanced low toxicity fire-resistant hydraulic fluid that is trixylenyl phosphate (TXP)-free and is designed specifically to comply with future EU REACH regulations for use in EHC systems. It is a fully formulated fluid based on tert-butylphenylphosphate.

#### Main Applications



- **Hydraulic fluid**

It can be used as the hydraulic fluid in electrohydraulic governor control (EHC) systems in steam and gas turbines.

- **Lubrication of steam and gas turbines**

Shell Turbo S5 DR 46 can also be used as the lubricating oil for main bearings in steam and gas turbines, generators and cooling pumps. As a precaution its compatibility with system components should be confirmed.

#### Specifications, Approvals & Recommendations

- Shell Turbo S5 DR 46 is approved and/or exceeds the requirements of the major original equipment manufacturers such as General Electric (GE), Mitsubishi Hitachi Power Systems (MS04-MA-CL004 R-5), and Siemens, etc.
- Shell Turbo S5 DR 46 is approved by FM (Factory Mutual) Global against Standard 6930 for 'Less flammable hydraulic fluids'. It also meets the requirements of ISO Standard 12922 and ASTM 4293 for HFDR-type fire-resistant hydraulic fluids.
- For a full listing of equipment approvals and recommendations, please consult your local Shell Technical Helpdesk.

#### Compatibility & Miscibility

- **Compatibility - Packing, seals and hoses**

The following materials are recommended for use with Shell Turbo S5 DR 46: Butyl rubbers, Nylon, PTFE, VITON rubber (depending on operation temperature range).

- **Compatibility - Paints**

Attention must be paid to painted surfaces. Cured epoxy paints are regarded as resistant to Shell Turbo S5 DR 46.

- **Compatibility - Other fluids**

Shell Turbo S5 DR can be mixed in any proportion with other phosphate ester fluids. However, when combining different phosphate ester products, it is always suggested to monitor the performance of the system. The mixing of phosphate ester fluids with mineral oil and polyol esters, polyalkylene glycol and water-based fluids should be avoided. For more information, please consult your local Shell Technical Helpdesk.

### Typical Physical Characteristics

Properties		Method	Shell Turbo S5 DR 46
ISO Viscosity Grade		ISO 3448	46
Kinematic Viscosity	@40°C mm <sup>2</sup> /s	ISO 3104	44.5
Kinematic Viscosity	@100°C mm <sup>2</sup> /s	ISO 3104	5.4
Density	@20°C kg/m <sup>3</sup>	ISO 3675	1 150
Flash Point (COC)	°C	ASTM D92	262
Fire Point (COC)	°C	ASTM D92	354
Pour Point	°C	ISO 3016	-24
Neutralisation Number	mg KOH/g	ISO 6619	0.05
Water Content	m-%	ISO 760	0.04
Cleanliness		ISO 4406	-/15/12
Hot Manifold Ignition	°C	ISO 20823	726
Air Release	minutes	ISO 9120	5.5

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 Turbo S5 DR 46 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 <http://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.