Technical Data Sheet

- Electrohydraulic control fluid
- Flame resistant

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.

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 fire-resistant hydraulic fluid, designed for use in EHC systems, with low toxicity to humans. It is free of trixylenyl phosphate (TXP) and fully formulated fluid based on tert-butylphenyl phosphate.

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 (GEK 46357K), Mitsubishi Hitachi Power Systems (MS-04-CL004, Revision 7), Siemens AG Power & Gas TLV 901202 and TLV901203, and Solar ES 9-224 Revision AA Class IV VG 46.
- Shell Turbo S5 DR 46 is FM Approved 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^2/s	ISO 3104	44.5
Kinematic Viscosity	@100°C	mm^2/s	ISO 3104	5.4
Density	@20°C	kg/m^3	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 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.