Technical Data Sheet

- Extra long oil life
- Enhanced wear protection

Shell **Turbo** *S4 GX 46*

Premium based industrial steam, gas and combined cycle turbine lubricant for geared turbines

Shell Turbo S4 GX 46 is based on Gas-to-Liquid (GTL) technology and has been developed to meet the demands of the latest high efficiency turbine systems. Designed to offer outstanding, long term performance under the most severe operating conditions Shell Turbo S4 GX 46 will minimise wear, deposit and sludge formation even under cyclic peak loading conditions.

DESIGNED TO MEET CHALLENGES

Performance, Features & Benefits

- **Extended oil life**

  Shell Turbo S4 GX 46 delivers exceptional resistance to degradation, even under conditions of high oxidative and thermal stress. Excellent results in both the ASTM dry TOST and the TOST life test (ASTM D943) demonstrate the potential for Shell Turbo S4 GX 46 to offer extended service life, reduced maintenance costs and less downtime when compared to conventional mineral oil technology.

- **Enhanced Equipment protection**

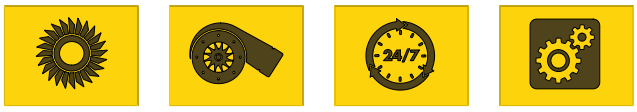
  The excellent prevention of deposit formation provided by Shell Turbo S4 GX 46 enables it to lubricate the hottest gas turbine bearings with minimal deposit build up or sludge formation. This reduces the potential for critical component failure and the risk of unplanned turbine shutdown.

- As the pressure increases on gearboxes in turbines it is critical for an oil to provide greater anti-wear protection. Shell Turbo S4 GX 46 offers enhanced anti-wear protection for heavily loaded gear boxes helping end users maintain optimum operating conditions under challenging situations without sacrificing resistance to deposits or oil life.

- **Enhanced System Efficiency**

  Demulsibility, air release, resistance to foaming, and filter blockage are critical factors for oil in the latest geared turbine designs (especially turbines which have shorter oil residence times). Shell Turbo S4 GX 46 offers excellent performance in all four areas, ensuring that optimum operating conditions are maintained.

Main Applications



- **Power and industrial steam, gas & combined cycle turbines**

  Shell Turbo S4 GX 46 is used as the lubricating oil of choice in modern steam, gas and combined cycle turbines, especially those needing enhanced anti-wear performance to protect highly loaded gearboxes.

- **Further industrial applications**

  Shell Turbo S4 GX 46 may also be used for other industrial applications requiring a high performance gas turbine oil, such as the lubrication of turbo compressors

Specifications, Approvals & Recommendations

Shell Turbo S4 GX 46 meets & exceeds international specification and requirements of the major turbine manufacturers including:

- ASTM 4304-13 Type I, II & III
- GB (China) 11120-2011, L-TSE, L-TGE and L-TGSE
- DIN 51515 Part 1 L-TDP & Part 2 L-TGP, 51524-2 HLP
- JIS K 2213:2006 Type 2
- ISO 8068:2006 L-TSE, ISO 8068:2006 L-TGE, ISO 8068:2006 L-TGF, ISO 8068:2006 L-TGSE
- Shell Turbo S4 GX is approved by Siemens Power Generation, spec TLV 9013 04 and TLV 9013 05
- Alstom HTGD 90117 V 0001 AA
- Dresser Rand 003-406-001 Type I and III
- Solar ES 9-224AA Class II
- MAN D&T SE TED 10000494596, Rev. 3
- Shell Turbo S4 GX meets Siemens Turbo-machinery specifications 1CW0047915, WN80003798, and report 65/0027
- Shell Turbo S4 GX meets Siemens Finspong MAT812109
- GE Oil and Gas – Appropriate Specification listed under document ITN52220.04

- ANSALDO TGO2-0171-E00000/B
- Shell Turbo S4 GX 46 is approved against the requirements of MHI MS04-MA-CL003 (R-8)
- MHPS MS04-MA-CL005 (Rev.3)
- General Electric Power GEK 32568Q, GEK 46506E, GEK 28143B, GEK 101941A, GEK 107395B, GEK 121608

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

Typical Physical Characteristics

Properties			Method	Shell Turbo S4 GX 46
ISO Viscosity Grade			ISO 3448	46
Kinematic Viscosity	@40°C	mm^2/s	ASTM D445	43.5
Kinematic Viscosity	@100°C	mm^2/s	ASTM D445	7.50
Viscosity Index			ASTM D2270	139
Density	@15°C	g/cm^3	IP 365	0.829
Flash Point (COC)		°C	ASTM D92	250
Pour Point		°C	ASTM D97	-42
Neutralisation Number		mg KOH/g	ASTM D974	0.15
Air Release	@50°C	minutes	ASTM D3427	1
Copper Corrosion	3hr/100°C		ASTM D130	1b
Rust Preventing Properties			ASTM D665 A & B	No Rust
Water Separability	minutes to 3 mL emulsion	minutes	ASTM D1401	15
Steam Demulsibility		seconds	IP 19	95
Sequence I				0/0
Sequence II				0/0
Sequence III				0/0
Load Carrying Capacity (FZG Gear Machine)		failure load stage	ISO 14635-1 A/8.3/90	11
RPVOT		minutes	ASTM D2272	1 400
Modified RPVOT		% of RPVOT		95%
TOST lifetime		hours minimum	ASTM D943	10 000
TOST 1000hr sludge		mg/kg	ASTM D4310	25
Sludge Content at 50% RPVOT		mg/kg		26
Time to 50% RPVOT		hours		1 460

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 S4 GX 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 (SDS) 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.