



# Shell Diala S4 ZX-I

## Technical Data Sheet

- Extra Performance
- Meets IEC 60296 - Higher Oxidation Stability & Low Sulphur Content
- Readily Biodegradable

## *Premium Inhibited, Readily Biodegradable Electrical Insulating Oil*

Shell Diala S4 ZX-I is a biodegradable electrical insulating oil from Shell designed to meet the challenges presented by the latest power transformers. It offers an extended oil life with the peace of mind of zero sulphur content.

Shell Diala S4 ZX-I is manufactured from zero sulphur base oils produced using Shell's GTL (gas-to-liquid) technology. These base oils offer a high degree of compositional consistency and have an excellent response to anti-oxidant. In addition they are globally available and free from PCBs, DBDS and passivators.

Shell Diala S4 ZX-I meets both the established and new industry copper corrosion tests.

## DESIGNED TO MEET CHALLENGES

### Performance, Features & Benefits

#### • Extended oil life

Shell Diala S4 ZX-I is a fully inhibited oil giving outstanding oxidation performance and an extended oil life. Shell Diala S4 ZX-I is also suitable for use in highly loaded applications.

#### • Transformer protection

Shell Diala S4 ZX-I is manufactured from a zero sulphur\* base oil, making it intrinsically non-corrosive towards copper, without the need for passivation or other additives.

Shell Diala S4 ZX-I meets all relevant tests for copper corrosion, namely the established DIN 51353 (Silver Strip Test), ASTM D1275, and also the latest more severe tests: IEC 62535 and ASTM D1275B.

\*Sulphur content below 1ppm detection limit of ASTM D5185

#### • System efficiency

The good low temperature viscometric properties of the oil ensure proper heat transfer inside the transformer, even from very low starting temperatures.

Shell Diala S4 ZX-I is specially dried and handled to achieve a low water content and retain a high breakdown voltage at point of delivery. This enables it to be used in many applications without further treatment.

#### • Readily biodegradable according to OECD 301B

Shell Diala S4 ZX-I can be used in Power & distribution transformers, whenever environmental concerns are of highest priority.

### Main Applications



### Specifications, Approvals & Recommendations

- IEC 60296 (Edition 5 year 2020); Type A, fully inhibited high grade oils
- IEC 60296 Ed4 (2012): Table 2 Transformer Oil (I) (Inhibited oil) Section 7.1 ("Higher oxidation stability & low Sulphur content")
- DOBLE TOPS (inhibited) performance
- ENGIE Laborelec (LPS 05/2020) Specification
- Siemens Energy (including HVDC application)
- Hitachi Energy
- GE Grid Solutions
- MR (Maschinenfabrik Reinhausen)
- TBEA, TWBB, SPECO, Huapeng Transformers, Xian XD
- HYOSUNG
- SGB-SMIT

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

## Typical Physical Characteristics

Properties	Method	IEC 60296, Type A minimum	IEC 60296, Type A maximum	Shell Diala S4 ZX-I Typical
Appearance	IEC 60296	Clear, free from sediment and suspended matter	Clear, free from sediment and suspended matter	Complies
Density @20°C kg/m <sup>3</sup>	ISO 3675		895	805
Kinematic Viscosity @40°C mm <sup>2</sup> /s	ISO 3104		12.00	9.8
Kinematic Viscosity @-30°C mm <sup>2</sup> /s	ISO 3104		1 800.00	438
Flash Point (PMCC) °C	ISO 2719	135		191
Pour Point °C	ISO 3016		40	-45
Neutralisation value mg KOH/g	IEC 62021-1			<0.01
Interfacial Tension @25°C mNm	ASTM D971			51
Colour	ISO 2049			L0.5
Total Sulphur Content mg/kg	ASTM D5185			< 10
Corrosive Sulphur	DIN 51353			Not corrosive
Potentially Corrosive Sulphur	IEC 62535			Not corrosive
Corrosive Sulphur	ASTM D1275B			Not corrosive
Breakdown Voltage Untreated kV	IEC 60156			50 - 60
Breakdown Voltage After Treatment kV	IEC 60156			78
Dielectric Dissipation Factor DDF @ 90°C	IEC 60247			0.001
Oxidation Stability 500h / 120°C	IEC 61125 C	High grade oil Type A	High grade oil Type A	Pass
Total Acidity mg KOH/g	IEC 62021-1		0.3	0.02
Sludge %m	IEC 61125 C			0.01
Dielectric Dissipation Factor DDF @90°C	IEC 60247			0.001
Water content (Drums/IBC) mg/kg	IEC 60296		40	14
Water content (Bulk) mg/kg	IEC 60296		30	10
2-Furfural and related compounds content mg/kg	IEC 61198		Not detectable	Complies
DBDS content mg/kg	IEC 62697-1			Complies
Metal passivator additives mg/kg	IEC 60666		Not detectable	Complies
Oxidation inhibitor content (DBPC) %m	IEC 60666			0.2
PCA Content %m	IP 346			Complies
PCB content mg/kg	IEC 61619			Complies

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 Diala S4 ZX-I 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.

Shell Diala S4 ZX-I is free from polychlorinated biphenyls (PCB). 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

- **Storage precautions**

The critical electrical properties of Shell Diala 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. 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 are stored indoors in climate-controlled environments.

- **Advice**

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