Shell Diala *S4 ZX-I (EU)*

Technical Data Sheet

- Extra Performance
- Meets IEC 60296 - Type A, fully inhibited High Grade

Premium Inhibited Electrical Insulating Oil

Shell Diala S4 ZX-I (EU) is the High-Grade electrical insulating oil from Shell designed to meet the challenges presented by the latest power transformers. It offers an extended oil life and passes nowadays sulphur corrosion tests.
Shell Diala S4 ZX-I (EU) is manufactured from carefully selected, premium (iso) paraffinic mineral base oils. These base oils offer a high degree of compositional consistency and have an excellent response to antioxidant. In addition, they are globally available and free from PCBs, DBDS and passivators.

DESIGNED TO MEET CHALLENGES

Performance, Features & Benefits

- **Extended oil life**

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

- **Transformer protection**

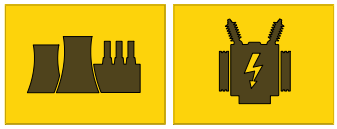
  Shell Diala S4 ZX-I (EU) is manufactured from carefully selected, premium, virtually sulfur fee, mineral base oils, making it intrinsically non-corrosive towards copper, without the need for passivation or other additives.

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

- **System efficiency**

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

Main Applications



Specifications, Approvals & Recommendations

- IEC 60296 (Edition 5 year 2020); Type A, fully inhibited high grade oils

  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 (EU) Typical
Appearance			Visual	Clear, free from sediment and suspended matter	Clear, free from sediment and suspended matter	Clear, free from sediment and suspended matter
Density	@20°C	kg/m³	ISO 3675		895	835
Kinematic Viscosity	@40°C	mm²/s	ISO 3104		12	7.6
Kinematic Viscosity	@-30°C	mm²/s	ISO 3104		1 800	302
Flash Point (PMCC)		°C	EN ISO 2719	135		159
Pour Point		°C	ISO 3016		-40	-48
Acidity / Neutralisation value		mg KOH/g	IEC 62021-1		0.01	<0.01

Properties		Method	IEC 60296, Type A minimum	IEC 60296, Type A maximum	Shell Diala S4 ZX-I (EU) Typical
Interfacial Tension	mN/m	IEC 62961	43		52
Colour		ISO 2049		L0.5	L0.5
Total Sulphur Content	m%	ISO 14596		0.05	< 0.001
Corrosive Sulphur - Silver Strip Method		DIN 51353		Not corrosive	Not corrosive
Potentially Corrosive Sulphur		IEC 62535		Not corrosive	Not corrosive
Corrosive Sulphur		ASTM D1275			Not corrosive
Breakdown Voltage Untreated	kV	IEC 60156	30		49
Breakdown Voltage After Treatment	kV	IEC 60156	70		78
Dielectric dissipation factor (DDF)	DDF @ 90°C	IEC 60247		0.005	0.0005
Oxidation Stability 500h@120°C		IEC 61125		High grade oil, Type A	High grade oil, Type A
Total Acidity (after oxidation)	mg KOH/g	IEC 62021-1		0.3	0.02
Sludge (after oxidation)	%m	IEC 61125		0.05	0.01
Dielectric Dissipation Factor (after oxidation)	DDF	IEC 60247		0.05	0.001
Water content (Bulk)	mg/kg	IEC 60814		30	12
2-Furfural and related compounds content	mg/kg	IEC 61198		Not detectable (< 0,05 mg/kg) for each individual compound	Complies
DBDS content	mg/kg	IEC 62697-1		Not detectable (< 5 mg/kg)	Complies
Metal passivator additives	mg/kg	IEC 60666		Not detectable (< 5 mg/kg)	Complies
Oxidation inhibitor content (DBPC)	%m	IEC 60666	0.08	0.40	0.24
PCA Content	%m	IP 346		3	Complies
PCB content	mg/kg	IEC 61619		Not detectable (< 2 mg/kg)	Complies

These characteristics are typical for current production as validated by 3P lab under SL 4949 formulation. 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 (EU) 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 (EU) 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

- **Stray Gassing, test data, part of requirements High Grade oil, type A, table 1 in IEC 60296 Ed5 (2020)**

  Typical test data from Stray Gassing test

  IEC60296, procedure in Clause A.4: Oil saturated with Air, in presence of copper (48 hours, at 105^{0}C)

DGA after stray gassing test (DGA test according to IEC 60567)	Requirements per IEC 60296 Ed5 (Table 3, Type A oil)	Shell Diala S4 ZX-I (EU) Typical value
Hydrogen (H2)	≤ 50 µl/l	Complies
Methane (CH4)	≤ 50 µl/l	Complies
Ethane (C2H6)	≤ 50 µl/l	Complies

  Evaluation results per IEC 60296: Shell Diala S4 ZX-I (EU) is classified as non-stray gassing oil.

- **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 on applications not covered here may be obtained from your Shell representative or technical helpdesks.**