



# Shell Diala S4 ZX-I

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

## Premium Inhibited Electrical Insulating Oil

Shell Diala S4 ZX-I is the new 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.

#### Main Applications



#### Specifications, Approvals & Recommendations

- IEC 60296 (2012): Table 2 Transformer Oil (I) (Inhibited oil) Section 7.1 ("Higher oxidation stability & low sulphur content")

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

#### Typical Physical Characteristics

| Properties                                    | Method    | IEC 60296 Table 2 + section 7.1                | Shell Diala S4 ZX-I Typical |
|---|-----------|--|-----------------------------|
| Appearance                                    | IEC 60296 | Clear, free from sediment and suspended matter | Complies                    |
| Density @20°C kg/m <sup>3</sup>               | ISO 3675  | Max. 895                                       | 805                         |
| Kinematic Viscosity @40°C mm <sup>2</sup> /s  | ISO 3104  | Max. 12  | 9.6                         |
| Kinematic Viscosity @-30°C mm <sup>2</sup> /s | ISO 3104  | Max. 1 800                                     | 382                         |
| Flashpoint P.M. °C                            | ISO 2719  | Min. 135                                       | 191                         |
| Pour Point °C                                 | ISO 3016  | Max. -40                                       | -42                         |

| Properties                                |              | Method      | IEC 60296 Table 2 + section 7.1 | Shell Diala S4 ZX-I Typical |
|---|--------------|-------------|---------------------------------|-----------------------------|
| Neutralisation value                      | mg KOH/g     | IEC 62021-1 | Max. 0.01                       | <0.01                       |
| Total Sulphur Content                     | mg/kg        | ASTM D5185  | Max. 500                        | <1                          |
| Corrosive Sulphur                         |              | DIN 51353   | Not corrosive                   | Not corrosive               |
| Potentially Corrosive Sulphur             |              | IEC 62535   | Not corrosive                   | Not corrosive               |
| Corrosive Sulphur                         |              | ASTM D1275B |                                 | Not corrosive               |
| Breakdown Voltage Untreated               | kV           | IEC 60156   | Min. 30                         | 60                          |
| Breakdown Voltage After Treatment         | kV           | IEC 60156   | Min. 70                         | 75                          |
| Dielectric Dissipation Factor             | @90°C DDF    | IEC 60247   | Max 0.005                       | <0.001                      |
| Oxidation Stability                       | 500h / 120°C | IEC 61125 C | Section 7.1 Limits              |                             |
| Total Acidity                             | mg KOH/g     | IEC 61125 C | Max 0.3                         | 0.02                        |
| Sludge                                    | %m           | IEC 61125 C | Max 0.05                        | <0.01                       |
| Dielectric Dissipation Factor (DDF @90°C) |              | IEC 61125 C | Max 0.05                        | 0.001                       |
| Water content (drums and IBC)             | mg/kg        | IEC 60814   | Max 40                          | 6                           |
| Water content (Bulk)                      | mg/kg        | IEC 60814   | Max 30                          | 6                           |
| 2-Furfural and related compounds content  | mg/kg        | IEC 61198   | Not detectable                  | Complies                    |
| Metal passivator additives                | mg/kg        | IEC 60666   | Not detectable                  | Complies                    |
| Oxidation inhibitor content (DBPC)        | % mass       |             |                                 | 0.2                         |
| PCA Content                               | % mass       | IP346       | Max 3                           | Complies                    |
| PCB content                               | mg/kg        | IEC 61619   | Not detectable                  | Complies                    |

These characteristics are typical of current production. Whilst future production will conform to Shell's specification, variations in these characteristics may occur.

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

## 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 Material Safety Data Sheet, which can be obtained from your Shell representative.

### • 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.