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| Assets Planning and Delivery GroupEngineering |

Design Standard DS 26-32

Type Specifications – Electrical

Type Specification for Main Circuit Low Voltage

Surge Protective Devices

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| april 2024 |

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The intent of Design Standards is to specify requirements that assure effective design and delivery of fit for purpose Water Corporation infrastructure assets for best whole-of-life value with least risk to Corporation service standards and safety. Design standards are also intended to promote uniformity of approach by asset designers, drafters and constructors to the design, construction, commissioning and delivery of water infrastructure and to the compatibility of new infrastructure with existing like infrastructure.

Design Standards draw on the asset design, management and field operational experience gained and documented by the Corporation and by the water industry generally over time. They are intended for application by Corporation staff, designers, constructors and land developers to the planning, design, construction and commissioning of Corporation infrastructure including water services provided by land developers for takeover by the Corporation.

Nothing in this Design Standard diminishes the responsibility of designers and constructors for applying the requirements of the Western Australia's Work Health and Safety (General) Regulations 2022 to the delivery of Corporation assets. Information on these statutory requirements may be viewed at the following web site location:

[Overview of Western Australia’s Work Health and Safety (General) Regulations 2022 (dmirs.wa.gov.au)](https://www.dmirs.wa.gov.au/sites/default/files/atoms/files/overview_general_regulations.pdf)

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Head of Engineering

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REVISION STATUS

The revision status of this standard is shown section by section below:

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Type Specification for Main Circuit Low Voltage

Surge Protective Devices

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# General

This Specification covers the requirements for the design, performance, construction and factory testing of switchboard mounted Low Voltage surge protective devices (SPDs) for use in main circuits in various types of Water Corporation Low Voltage switchboards.

# Standards

Switchboard mounted Low Voltage surge protective devices shall be in accordance with all relevant parts of IEC 61643 - Low Voltage Surge Protective Devices.

Specific reference is made within this Specification to the following part of the above standard:

IEC 61643-11 Low Voltage surge protective devices - Surge protective devices connected to Low Voltage power systems - Requirements and test methods.

# Type Tests

The Low Voltage surge protective devices shall have been type tested in accordance with IEC 61643-11 in order to verify all performance values quoted and type test certificates shall be available to verify such testing.

# Use in 690 Volt Switchboards

## General

If the SPDs are specified in the Annexure for use in 690 Volt switchboards, the SPDs shall comply with the requirements listed in clause 4.2 and 4.3 hereunder.

## Basic Performance Requirements

The SPD basic performance requirements shall be as listed hereunder:

(a) Application class Class I and II

(b) Type Voltage switching

(c) Number of poles 1 pole (1 SPD per phase)

(d) Nominal Voltage UN = 690 Volt (L-L)

(e) Maximum Continuous Voltage UC ≥ 800 Volt (L-PE/N)

(f) Impulse Discharge Current for Class I test Iimp ≥35kA (10/350 µs)

(g) Nominal Discharge Current for Class II test In ≥ 25 kA (8/20 µs)

(h) Follow Current Interrupt Rating Ifi ≥ 50 kA

(i) Voltage Protection Level UP ≤ 4.5 kV (L-PE/N) at Iimp = 35 kA

(j) Response Time tA ≤ 100 ns

(k) Short Circuit Current Rating ISCCR ≥ 50 kA

(l) Rated maximum operating temperature ≥ 70 ˚C

(m) Degree of protection ≥ IP 20

## Auxiliary Components

(a) Each SPD shall be fitted with a mechanical fault indicator which does not need an auxiliary power supply

(b) Each SPD shall be fitted with a remote signaling contact to indicate SPD failure

# Use in Major 415 Volt Switchboards

## General

If the SPDs are specified in the Annexure for use in 415Volt main switchboards rated greater than 440 Amps, the SPDs shall comply with the requirements listed clause 5.2 and 5.3 hereunder.

## Basic Performance Requirements

The SPD basic performance requirements shall be as listed hereunder:

(a) Application class Classes I and II

(b) Type Combination (voltage switching and limiting)

(c) Number of poles 3 pole

(d) Nominal Voltage UN = 240/415 Volt

(e) Maximum Continuous Voltage UC > 350 Volt (L-PE/N)

(f) Impulse Discharge Current for Class I test Iimp > 25 kA (10/350 µs)

(g) Nominal Discharge Current for Class II test In > 25 kA (8/20 µs)

(h) Maximum Discharge Current IMAX > 50 kA (8/20 µs)

(i) Follow Current Interrupt Rating Ifi > 25 kA

(j) Voltage Protection Level UP < 1.5 kV (L-PE/N) at Iimp = 25 kA

(k) Response Time tA < 100 ns

(l) Short Circuit Current Rating ISCCR > 25 kA

(m) Rated Maximum Operating Temperature > 70 ˚C

(n) Degree of Protection > IP 20

## Auxiliary Components

(a) Each SPD shall be fitted with a mechanical fault indicator which does not need an auxiliary power supply

(b) Each SPD shall be fitted with a remote signaling contact to indicate SPD failure

# Use in Minor 415 Volt Main Switchboards

## General

If the SPDs are specified in the Annexure for use in 415Volt main switchboards rated not greater than 440 Amps, the SPDs shall comply with the requirements listed clause 6.2 and 6.3 hereunder.

For the purposes of this Specification the term minor 415 Volt main switchboard shall be deemed to refer also to minor 415 Volt distribution switchboards which include a direct connection between incoming neutral and local protective earth, i.e., L-PE.

## Basic Performance Requirements

The SPD basic performance requirements shall be as listed hereunder:

(a) Application class Class I and II

(b) Type Combination (voltage switching and limiting)

(c) Number of poles 3 pole

(d) Nominal Voltage UN = 240/415 Volt

(e) Maximum Continuous Voltage UC  > 350 Volt (L-PE/N)

(f) Impulse Discharge Current for Class I test Iimp > 12.5 kA (10/350 µs)

(g) Nominal Discharge Current for Class II test In > 12.5 kA (8/20 µs)

(h) Maximum Discharge Current IMAX > 50 kA (8/20 µs); (L-PE/N)

(i) Follow Current Interrupt Rating Ifi > 25 kA

(j) Voltage Protection Level UP < 1.2 kV (L-PE/N) at Iimp = 12.5 kA

(k) Response Time tA < 25 ns

(l) Short Circuit Current Rating ISCCR > 25 kA

(m) Rated Maximum Operating Temperature > 70 ˚C

(n) Degree of Protection > IP 20

## Auxiliary Components

 (a) Each SPD shall be fitted with a mechanical fault indicator which does not need an auxiliary power supply

 (b) Each SPD shall be fitted with a remote signaling contact to indicate SPD failure

# Use in Minor 415 Volt Distribution Switchboards

## General

If the SPDs are specified in the Annexure for use in 415Volt distribution switchboards rated not greater than 440 Amps, the SPDs shall comply with the requirements listed clause 7.2 and 7.3 hereunder.

For the purposes of this Specification the term minor 415Volt distribution switchboard shall mean a switchboard which does not include a direct connection between incoming neutral and local protective earth, i.e., separate L-N, N-PE surge protective devices connections.

## Basic Performance Requirements

The SPD basic performance requirements shall be as listed hereunder:

(a) Application class Class II

(b) Type Voltage limiting

(c) Number of poles 4 pole (3+1)

(d) Nominal Voltage UN = 240/415 Volt

(e) Maximum Continuous Voltage UC > 350 Volt (L-/N), 260 Volts (N-PE)

(f) Impulse Discharge Current for Class II test In > 20 kA (8/20 µs); (L-N & N-PE)

(g) Maximum Discharge Current IMAX > 40 kA (8/20 µs); (L-N & N-PE)

(h) Voltage Protection Level UP = < 1.5 kV (L-PE & N-PE) at In=20 kA

(i) Response Time tA < 25 ns (L-N), < 100 ns (N-PE)

(j) Short Circuit Current Rating ISCCR > 25 kA (in conjunction with a 315 Amp HRC fuse)

(k) Rated Maximum Operating Temperature > 70 ˚C

(l) Degree of Protection > IP 20

## Auxiliary Components

(a) Each SPD shall be fitted with a mechanical fault indicator which does not need an auxiliary power supply

(b) Each SPD shall be fitted with a remote signaling contact to indicate SPD failure

| **Type Specification for Main Circuit Low Voltage Surge Protective DevicesTender Technical Response Schedule** |
| --- |
| **DS26.32** | **Subject** | **Noted** | **Compliance** | **Comments** |
| **Clause No.** |  |  | **Yes** | **No** |  |
| **1** | **General** |  |  |  |  |
| **2** | **Standards** |  |  |  |  |
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| 4.2(c) | Number of Poles |  |  |  |  |
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| 4.2 (e)  | Maximum Continuous Voltage |  |  |  | UC (Volts) = |
| 4.2(f) | Class I Test - Impulse Discharge Current |  |  |  | Iimp (kA) = |
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| 4.2(i) | Voltage Protection Level |  |  |  | UP (Volts) = |
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| 5.2(b)  | SPD Type |  |  |  | SPD Type = |
| 5.2(c) | Number of Poles |  |  |  |  |
| 5.2(d) | Nominal Voltage |  |  |  | UN (Volts) = |
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| 5.2(f) | Class I Test - Impulse Discharge Current |  |  |  | Iimp (kA) = |
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| 5.2 (i)  | Follow Current Interrupt Rating |  |  |  | Ifi (kA) = |
| 5.2(j) | Voltage Protection Level |  |  |  |  Up (Volts) = |
| 5.2(k) | Response Time |  |  |  | tA (ns) = |
| 5.2(l) | Short Circuit Current Rating  |  |  |  | Isccr (kA) = |
| 5.2(m)  | Rated Maximum Operating Temperature  |  |  |  | Temperature (˚C) = |
| 5.2(n)  | Degree of Protection |  |  |  | IP rating = |
| **5.3**  | **Auxiliary Components** |  |  |  |  |
| 5.3(a) | Mechanical Fault Indicators |  |  |  |  |
| 5.3(b) | Remote Signaling Contacts |  |  |  | Contacts rated Volts = |
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| 6.2(a) | Application Class |  |  |  | SPD Class = |
| 6.2(b)  | SPD Type |  |  |  | SPD Type = |
| 6.2(c) | Number of Poles |  |  |  |  |
| 6.2(d) | Nominal Voltage |  |  |  | UN (Volts) = |
| 6.2 (e)  | Maximum Continuous Voltage |  |  |  | UC (Volts) = |
| 6.2(f) | Class I Test - Impulse Discharge Current |  |  |  | Iimp (kA) = |
| 6.2(g) | Class II Test - Nominal Discharge Current  |  |  |  | In (kA) = |
| 6.2(h) | Maximum Discharge Current |  |  |  | IMAX (kA) = |
| 6.2 (i)  | Follow Current Interrupt Rating |  |  |  | Ifi (kA) = |
| 6.2(j) | Voltage Protection Level |  |  |  | UP (Volts) = |
| 6.2(k) | Response Time |  |  |  | tA (ns) = |
| 6.2(l) | Short Circuit Current Rating  |  |  |  | ISCCR (kA) = |
| 6.2(m)  | Rated Max. Operating Temperature  |  |  |  | Temperature (˚C) = |
| 6.2(n)  | Degree of Protection |  |  |  | IP rating = |
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| 6.3(a) | Mechanical Fault Indicators |  |  |  |  |
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| **7.2** | **Basic Performance Requirements** |  |  |  |  |
| 7.2(a) | Application Class |  |  |  | SPD Class = |
| 7.2(b)  | SPD Type |  |  |  | SPD Type = |
| 7.2(c) | Number of Poles |  |  |  |  |
| 7.2(d) | Nominal Voltage |  |  |  | UN (Volts) = |
| 7.2 (e)  | Maximum Continuous Voltage |  |  |  | UC (Volts) = |
| 7.2(f) | Class II Test – Impulse Discharge Current  |  |  |  | In (kA) = |
| 7.2(g) | Maximum Discharge Current |  |  |  | IMAX (kA) = |
| 7.2(h) | Voltage Protection Level |  |  |  | UP (Volts) = |
| 7.2(i) | Response Time |  |  |  | tA (ns) = |
| 7.2(j) | Short Circuit Current Rating |  |  |  | ISCCR (kA) = |
| 7.2(k)  | Rated Max. Operating Temperature  |  |  |  | Temperature (˚C) = |
| 7.2(l)  | Degree of Protection |  |  |  | IP rating = |
| **7.3**  | **Auxiliary Components** |  |  |  |  |
| 7.3(a) | Mechanical Fault Indicators |  |  |  |  |
| 7.3(b) | Remote Signaling Contacts |  |  |  | Contacts rated Volts = |

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