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| SUBJECT  | <b>QUALITY APPROVAL and STRUCTURE</b> |            |       | REV.     | <b>C01</b>           |            |

## 1. STRUCTURE

| NO. | ITEM          | DESCRIPTION                                     |          |                    |
|-----|---------------|---|----------|--------------------|
| 1.1 | Main Material | Ceramic cylinder, electrode, inert gas          |          |                    |
| 1.2 | Marking       | <b>Part Number or Designation Number,</b>       |          |                    |
| 1.3 | Appearance    | Without dirt and crack, marking should be clear |          |                    |
| 1.4 | Dimensions    |   | L3       | $1.5 \pm 0.1$      |
|     |               |   | L4       | $7.2 \pm 0.3$      |
|     |               |   | L5       | $2.85 \pm 0.15$    |
|     |               |   | W3       | $\psi 5.0 \pm 0.2$ |
|     |               |   | Unit: mm |                    |

|          |                                   |            |       |          |                      |            |
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## 2. ELECTRICAL CHARACTERISTICS

| NO. | ITEM   | PERFORMANCE      | TEST METHODS  |
|-----|--|------------------|---|
| 2.0 | Standard Conditions                                |                  | Unless otherwise specified, all tests are made under environmental conditions as given below:<br>Temperature: 5 35<br>Relative humidity: 45 85 % RH                                   |
| 2.1 | Nominal dc spark-over voltage ( $V_{sdc}$ )        | V                | The Gas Discharge Tubes shall be placed in darkness for at least 24 hours immediately prior to testing and tested in darkness with a voltage which a rate of rise of 100 V/S is used. |
| 2.2 | Gas Discharge Tube dc spark-over voltage           | V                | Voltage across the Gas Discharge Tubes measured at a rate of rise of 100 V/S is used.   |
| 2.3 | Impulse spark-over voltage ( $V_{si}$ )            | V                | The maximum voltage measured across the open circuit test terminals shall have a nominal rate of rise of 1.0kV/ $\mu$ S or 100V/ $\mu$ S.   |
| 2.4 | DC Holdover Voltage ( $V_H$ )                      | @ V              | The maximum DC voltage across the two terminals of gas tube under which it may be expected to return to the high impedance state after the gas tube breakdown.                        |
| 2.5 | Nominal impulse discharge current ( $i_{di}$ )     | A                | For rated discharge current of 8 $\times$ 20 $\mu$ s waveform, Gas Discharge Tubes shall be subjected to 1 discharge.   |
|     |  | A                | For rated discharge current of 8 $\times$ 20 $\mu$ s waveform, Gas Discharge Tubes shall be subjected to 10 discharges at intervals of 1 minute.                                      |
|     |  | A                | For rated discharge current of 10 $\times$ 1000 $\mu$ s waveform, Gas Discharge Tubes shall be subjected to 300 discharges at intervals of 3 minute.                                  |
| 2.6 | Nominal alternating discharge current ( $i_{da}$ ) | A                | For rated rms value of ac current at 50 Hz and 1second, Gas Discharge Tubes shall be subjected to 5 discharges at intervals of 3 minute.  |
|     |  | A                | For rated rms value of ac current at 50 Hz and Single 9cycles, Gas Discharge Tubes shall be subjected to 1 discharge.   |
| 2.7 | Insulation resistance ( $R_{is}$ )                 | at $\Omega$<br>V | The measuring source shall be limited to a short current of less than 10mA.   |
| 2.8 | Capacitance  | pF               | The capacitance shall be measured between each terminal and every other terminal of Gas Discharge Tubes.  |

\* 2.1, 2.2, 2.3,2.4 --- Each pair of terminals of 3-electrode Gas Discharge Tube shall be tested separately with the other terminal unterminated.

\* 2.5,2.6 --- 3-electrode Gas Discharge Tube shall be discharged simultaneously from each electrode to the common electrode.

\* 2.7 ---Terminals of 3-electrode Gas Discharge Tube not involved in the measurement shall be left unterminated.

\* 2.8 ---In measurements involving 3-electrode Gas Discharge Tube, the terminal not being tested shall be connected to a ground plane in the measuring instrument.

\* **DC Breakdown Voltage @ 100V/ $\mu$ s for a/b to e and a to b**

\* **Impulse Breakdown Voltage @ 100V/ $\mu$ s and 1000V/ $\mu$ s for a/b to e**

**See Page 3**

| Part No. | Nominal dc spark-over voltage<br><br>$V_{sdc}$<br>(V) | Gas Discharge Tube dc spark-over voltage<br><br>$V_{sdc}$<br>(V) | Impulse spark-over voltage |              | DC Holdover voltage<br><br>$V_h$<br>(V) | Nominal impulse discharge current |                             |                              | Nominal Alternating discharge current at(A) |    | Insulation resistance |             | Capacitance at 1kHz<br><br>C<br>(pF) |                                 |
|----------|---|--|----------------------------|--------------|---|-----------------------------------|-----------------------------|------------------------------|---|----|-----------------------|-------------|--------------------------------------|---------------------------------|
|          |   |  | $V_s$<br>(V)               |              |   | 8/20 $\mu$ s(KA)                  |                             | 10/1000 $\mu$ s<br>(A)       | i <sub>di</sub> 50Hz, 1s                    |    | Single<br>9 cycle     | V<br>(V)    |                                      | R <sub>is</sub><br>( $\Omega$ ) |
|          |   |  | 100V/ $\mu$ s              | 1kV/ $\mu$ s |   | i <sub>di</sub><br>1 time         | i <sub>di</sub><br>10 times | i <sub>di</sub><br>300 times |   |    |                       |             |                                      |                                 |
|          |   |  |                            |              |   |                                   |                             |                              |   |    |                       |             |                                      |                                 |
| 50B75    | 75  | 60~90  | $\leq 700$                 | $\leq 800$   | 52                                      | 10                                | 5                           | 200                          | 5   | 30 | 50                    | $\geq 10^9$ | $\leq 3$                             |                                 |
| 50B90    | 90  | 72~108   | $\leq 600$                 | $\leq 700$   | 52                                      |                                   |                             |                              |   |    | 50                    |             |                                      |                                 |
| 50B120   | 120   | 96~144   | $\leq 600$                 | $\leq 700$   | 52                                      |                                   |                             |                              |   |    | 50                    |             |                                      |                                 |
| 50B150   | 150   | 120~180  | $\leq 600$                 | $\leq 700$   | 52                                      |                                   |                             |                              |   |    | 100                   |             |                                      |                                 |
| 50B200   | 200   | 160~240  | $\leq 700$                 | $\leq 800$   | 80                                      | 15                                | 10                          | 200                          | 10  | 60 | 100                   |             |                                      |                                 |
| 50B230   | 230   | 184~276  | $\leq 700$                 | $\leq 800$   | 80                                      |                                   |                             |                              |   |    | 100                   |             |                                      |                                 |
| 50B250   | 250   | 200~300  | $\leq 700$                 | $\leq 800$   | 80                                      |                                   |                             |                              |   |    | 100                   |             |                                      |                                 |
| 50B350   | 350   | 280~420  | $\leq 800$                 | $\leq 900$   | 80                                      |                                   |                             |                              |   |    | 100                   |             |                                      |                                 |
| 50B400   | 400   | 320~480  | $\leq 900$                 | $\leq 1000$  | 135                                     |                                   |                             |                              |   |    | 100                   |             |                                      |                                 |
| 50B420   | 420   | 336~504  | $\leq 1000$                | $\leq 1100$  | 135                                     |                                   |                             |                              |   |    | 250                   |             |                                      |                                 |
| 50B470   | 470   | 376~564  | $\leq 1300$                | $\leq 1500$  | 135                                     | 250                               |                             |                              |   |    |                       |             |                                      |                                 |
| 50B600   | 600   | 480~720  | $\leq 1400$                | $\leq 1600$  | 135                                     | 10                                | 5                           | 200                          | 5   | 30 | 250                   |             |                                      |                                 |
| 50B800   | 800   | 640~960  | $\leq 1500$                | $\leq 1600$  | 135                                     |                                   |                             |                              |   |    | 250                   |             |                                      |                                 |
| 50B1100  | 1100  | 880~1320   | $\leq 800$                 | $\leq 900$   | 150                                     |                                   |                             |                              |   |    | 500                   |             |                                      |                                 |

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### 3. ENVIRONMENTAL CHARACTERISTICS

| NO. | ITEM             | PERFORMANCE  | TEST METHODS  |
|-----|------------------|--|---|
| 3.1 | Damp heat cyclic | Insulation resistance $\geq 1000 \text{ M}\Omega$                                | IEC 68-2-30, Test D <sub>b</sub> ; 2 cycles, 24hrs/cycle<br>Start conditions:<br>25 $\pm$ 3°C /3 $\pm$ 0.5 hrs,45~75%RH<br>Damp heat, cyclic(first cycle):<br>55 $\pm$ 2°C /12 $\pm$ 0.5 hrs, 90~96%RH<br>Recovery conditions:<br>25 $\pm$ 3°C /3 $\pm$ 0.5 hrs,95~100%RH<br>Damp heat, cyclic(remaining cycle):<br>55 $\pm$ 2°C /12 $\pm$ 0.5 hrs, 90~96%RH<br>End conditions:<br>15~35°C / $\leq$ 3 hrs, 45~75%RH |
| 3.2 | Low temperature  | V <sub>sd</sub> c ,V <sub>si</sub> shall be within the limits in Specifications. | IEC 68-2-1,test Aa<br>Temperature/Duration: -40°C/ 2 hrs  |

### 4. MECHANICAL CHARACTERISTICS

| NO. | Item                         | Requirements   | Test Specifications  |
|-----|------------------------------|--|--|
| 4.1 | Vibration                    | 1. No visible Damage<br>2. V <sub>sd</sub> c shall be within the limits in Specifications.<br>3. Insulation resistance $\geq 1000 \text{ M}\Omega$ | IEC 68-2-6, Test F <sub>c</sub> Method B4<br>Frequency range: 10~500 Hz<br>Amplitude : 0.15mm or 20 m/s <sup>2</sup><br>Duration : 90minutes         |
| 4.2 | Solderability                | 95% of the immersed portion covered with solder  | IEC 68-2-20, Test T <sub>a</sub> Method 1<br>Solder temp. : 235 $\pm$ 5°C<br>Immersed time : 2 $\pm$ 0.5 sec   |
| 4.3 | Resistance to Soldering Heat | 1. No visible Damage<br>2. V <sub>sd</sub> c shall be within the limits in Specifications.   | IEC 68-2-20, Test T <sub>b</sub> Method 1B<br>Solder temp. : 350 $\pm$ 5°C<br>Immersed time : 4 $\pm$ 0.5sec   |
| 4.4 | Robustness of Terminations   | No visible Damage  | IEC 68-2-21, Test U <sub>a</sub><br>Force : 1 kg <sub>f</sub> for 0.8 $\phi$ mm wire<br>2 kg <sub>f</sub> for 1.0 $\phi$ mm wire<br>Duration: 10 sec |
| 4.5 | Sealing                      | Leak rate $\leq 10^{-7} \text{ bar}\cdot\text{cm}^3\cdot\text{s}^{-1}$   | IEC 68-2-17, Test Qk<br>Duration : 600 hours   |

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## 5. TECHNICAL TERM

| No. | Item               | Specifications  | Description                                 |
|-----|--------------------|---|---|
| 5.1 | Storage conditions | Temperature: -40°C to 100°C<br>Relative humidity: up to 95% | Storage conditions without voltage applied. |