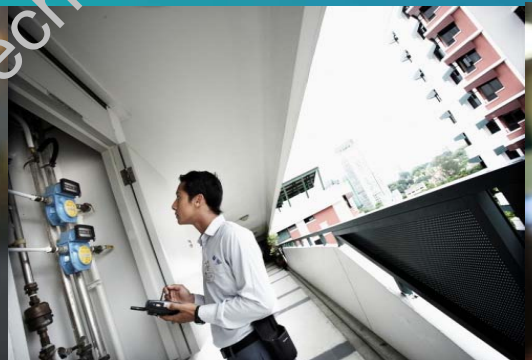
SPgroup
Empowering the Future of Energy

# Common Non-Compliances in Electrical installations

SP Services Ltd



# Overview

- Introduction
- List of common non-compliances
- Detailed descriptions of common non-compliances on site

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# Introduction

# Aim

- To provide LEWs with practical advice and guidance on the inspection and testing of electrical installation work

- Dead tests to be conducted before live tests, prior to inspection

The electricity supply to the dwelling is subject to the statutory requirements of the **Electricity Act 2001** and **Electricity (Electrical Installations) Regulations**

# Categories of Non-Compliance

- Category 1 – *Serious*
- Category 2 – *Minor*
- Category 3 – *Operational*

- Non-compliances in Category 1 & 2 are reportable to EMA
  - EMA may impose a penalty for these non-compliances

- No penalty is imposed by EMA for Category 3
  - However, SP Services or SP PowerGrid may not allow the supply to be turned-on

# Requirements

- No electricity supply shall be taken from a supply line until every electrical installation connected to such supply line has been **inspected** and **certified fit** by a **licensed electrical worker**; and where the installation is exempted from licensing, it shall be **checked by the Market Support Services Licensee**

- If the inspection failed, LEW is to **check the installation thoroughly**, **rectify all defects** and **apply for another appointment**.

- A fee is chargeable for each subsequent inspection

# List of Non-Compliances

# Non-Compliances of SS638 & Other Relevant Regulations

The legend for the common non-compliances of Singapore Standard Code of Practice SS 638 and other relevant regulations are:-

- Category 1: Common non-compliances that pose **immediate safety hazards** or are of a **serious nature**
- Category 2 : Violations that **may** pose safety hazards
- Category 3: Others

# Non-Compliances of SS638 & Other Relevant Regulations

**Category 1 – Violations that pose immediate safety hazards or are of a serious nature**

- 1001 – No basic protection for live conductors
- 1002 – Wrong polarity/phase sequence
- 1003 – Using single-pole switching/protective device for neutral conductor
- 1004 – Using unacceptable or deceptive method of earthing system/earthing system not provided
- 1005 – No provision of RCCB of 30 mA sensitivity for domestic SSO / lighting circuits
- 1006 – No provision of RCCB of 30mA sensitivity for SSO and portable equipment with rated current not exceeding 32A in non-domestic electrical installation
- 1007 – No provision of RCCB of 30mA sensitivity for socket-outlet assembly used at construction site
- 1008 –No provision of RCCB of 30mA sensitivity for telephone kiosks, bus shelters and sign
- 1009 – Neutral of generating set not effectively connected to Earth
- 1010 – concealed wiring installed at a depth less than 50mm from the surface without metallic conduit or trunking

# Non-Compliances of SS638 & Other Relevant Regulations

**Category 2 – Violations that may pose safety hazards**

*2.1 General*

- 2101 – Insulation resistance value less than 1 MΩ for low voltage circuit
- 2102 – No documentation on tests carried out / incomplete test reports
- 2103 – Single-line drawing not provided / updated / endorsed by LEW
- 2104 – No provision of safety related equipment or signs such as rubber mat / fire extinguisher / danger sign / CPR chart at main intake switchboard
- 2105 – Improper installation of reduced voltage or SELV system
- 2106 – Improper installation that pose electrical safety hazards to the public (to specify)
- 2107 – Improper installation of generating sets

# Non-Compliances of SS638 & Other Relevant Regulations

*2.2 Switchboard / DB / Control of Circuits*

- 2201 – Switchboard or DB not readily accessible
- 2202 – Circuit breaker before / after meter not of appropriate type
- 2203 – Circuit breaker of insufficient short circuit capacity
- 2204 – Improper interconnection of sources of supply
- 2205 – Failure to provide DP isolator / circuit breaker at meterboard or incoming of DB
- 2206 – Fittings or final circuits in defined area supplied from different sources of supply
- 2207 - Non-weatherproof distribution board located below water or drainage pipe joint or valve or outdoors
- 2208 – Circuit breaker overrated for protection of a circuit
- 2209 – Additional point(s) sharing with high consumption appliances/equipment at final circuit such as air-con or water heater or induction hob, etc.

# Non-Compliances of SS638 & Other Relevant Regulations

*2.3 Earthing*

- 2301 – Earthing system inadequately / improperly installed
- 2302 – Improper or no earth electrode inspection chamber
- 2303 – Earth fault loop impedance is high – for TN-S system $Z_s I_{\Delta n} > 50$ V or TT system $R_a I_{\Delta n} > 50$ V
- 2304 – CPC not provided or sharing of CPC in final circuits
- 2305 – Earthing conductor / CPC / bonding conductor undersized
- 2306 – Using green & yellow colour combination wire as live conductor / wrong colour coding for protective conductor
- 2307 – Main equipotential bonding not provided for main water pipe, gas pipe or exposed metallic part of building structure
- 2308 – Exposed conductive parts not bonded to Earth

# Non-Compliances of SS638 & Other Relevant Regulations

*2.4 Equipment / SSO*

- 2401 – Circuit breaker / isolator / RCCB / switch / ceiling rose / connection unit underrated
- 2402 – Switch or SSO in enclosed space susceptible to risk of fire or explosion
- 2403 – Non weatherproof electrical device(s) exposed to weather or water splashing
- 2404 – on weatherproof electrical equipment installed under tents in outdoor conditions
- 2405 – SSO installed at less than 150 mm above working surface or floor level
- 2406 – SSO installed on floor without mechanical protection or protection against ingress of water
- 2407 – SSO for general purpose not readily accessible
- 2408 – Using electrical accessory / fitting not complying with standards stipulated in SS 638 or SS 650.

# Non-Compliances of SS638 & Other Relevant Regulations

*2.5 Cable / Wiring*

- 2501 – Mains / sub-mains / busbar / final circuit undersized
- 2502 – Cables laid underground without armour or metallic sheath; non-sheathed cable installed in underground pipe
- 2503 – Cable installed not suitable for the environment or weather conditions
- 2504 – Single PVC-insulated cable installed without conduit or trunking
- 2505 – Wiring above false ceiling not properly installed or installed without mechanical protection
- 2506 – Cable in same conduit / trunking / ducting sharing with other services
- 2507 – More than one final circuit in one circuit breaker way
- 2508 – Cable armour improperly bonded or not bonded Earth
- 2509 – No provision of PVC or rubber grommet / bushing at metallic sharp edges to prevent damage of cable insulation
- 2510 – Electrical connections / joints not mechanically and/or electrically sound
- 2511 – Wiring encroached into other premises / another electrical installation
- 2512 – Cable colour code does not comply with SS 638 – Annex B(L)

# Non-Compliances of SS638 & Other Relevant Regulations

*2.6 Special Installations*

- 2601 – No provision of 16A MCB / 10mA RCCB / DP switch for electric bidet
- 2602 – Electric bidet installed inside Zones 0, 1 and 2 in locations containing a bath or shower
- 2603 – SSO installed less than 3m away from the boundary of Zone 1 in locations containing a bath or shower
- 2604 – Improper installation of switchgear / controlgear / SSO / electrical equipment installed in Zone 0, 1 or 2 of swimming pool and other basins
- 2605 – No provision of Type B RCCB for solar PV power supply system without simple separation between a.c. side and d.c. side
- 2606 – No provision of Type A RCD of 30mA sensitivity for EV supply equipment
- 2607 - Earth fault loop impedance is high for temporary electrical installation – for TN-S system $Z_s$ $I_{\Delta n}$ > 25 V or TT system $R_a$ $I_{\Delta n}$ > 25 V

# Non-Compliances of SS638 & Other Relevant Regulations

**Category 3 – Others**

- 3001 –LEW absent
- 3002 – Gate/door locked
- 3003 – Work incomplete
- 3004 – No incoming electricity supply
- 3005 – Meter board/meter compartment at gatepost not complying with requirements
- 3006 – Incorrect address
- 3007 – Premises not fully accessible for inspection of electrical wiring installation
- 3008 – Wrong type of application
- 3009 – No Statement of Turn-On
- 3010 – No Revenue Meter
- 3011 – No Certificate of Readiness
- 3012 – No Licence to operate
- 3013 – LEW/customer request cancel on site
- 3014 – LEW refused to sign

# Non-Compliances of SS638 & Other Relevant Regulations

## ABBREVIATIONS

| | |
|---|---|
| CPC | Circuit Protective Conductor |
| DB | Distribution Board |
| DP | Double Pole |
| EV | Electric Vehicle |
| $I_{\Delta n}$ | Rated Residual Operating Current of the Protective Device in Amperes |
| LEW | Licensed Electrical Worker |
| PV | Photovoltaic |
| PVC | Polyvinyl Chloride |
| $R_a$ | Sum of Resistances of the Earth Electrode and Protective Conductor connecting it to the Exposed-Conductive-Parts |
| RCCB | Residual Current Circuit Breaker |
| SELV | Separated Extra Low Voltage |
| SSO | Switched Socket-Outlet |
| TT | Terre (Earth) Terre (Earth) |
| TN-S | Terre (Earth) Neutral-Separate |
| $Z_s$ | Earth Fault Loop Impedance |

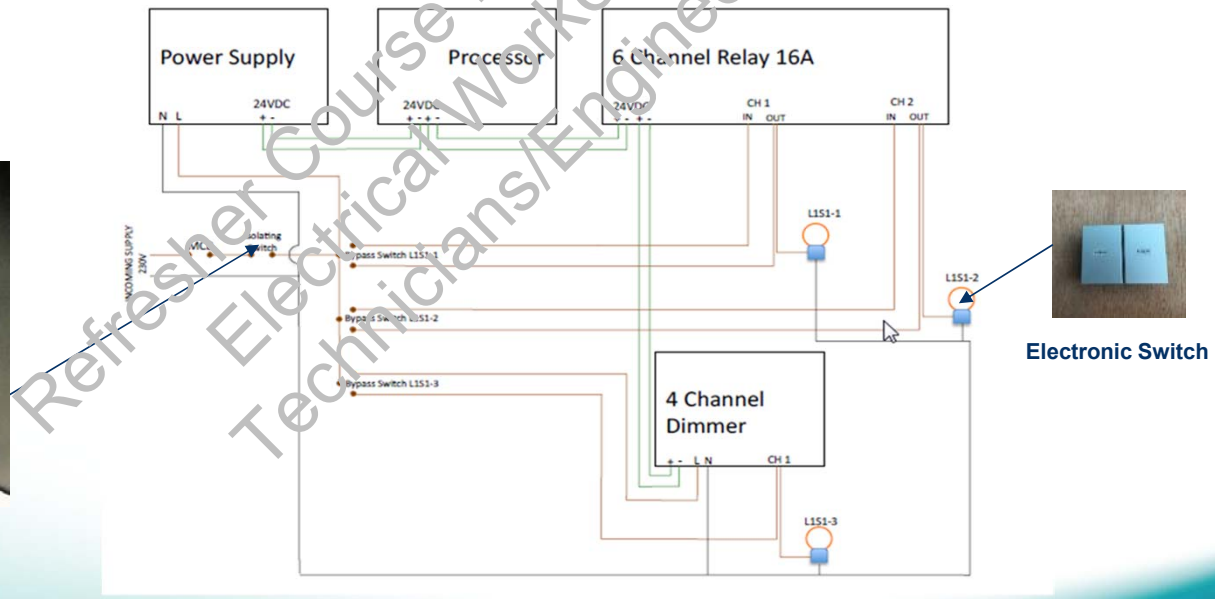
# Detailed Descriptions of Non-Compliances

# 1. Electronic Switch Controlled Remotely

Electronic switches without a mechanical switch in the main circuit do not provide a full off-state. Therefore, the circuit on the load side should be considered **live.**



Mechanical Switches






Electronic Switch

# 2. Identification of Protective Conductor without Using the Colour Combination of Green and Yellow

When a single core black colour PVC-insulated/PVC sheathed or XLPE-insulated/PVC sheathed cable is used as a CPC in final circuit, the application of **tapes, sleeve** or **discs** with the combination colours of green and yellow at terminations is acceptable.

# 3. Requirements For Electric Bidets