LVDC Standard
IS16711:2017

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New Standard for LVDC

- A standard for India, developed by BIS
- Several thousand installations have been already done based on this standard
- Proven rules for creating solutions at optimal cost
- Standard ensures maintainability, repair and availability of spares
- Uptake of distributed renewables. Much bigger opportunity in the developing world

Priority – Electricity Access

- Define a basic architecture for fast and immediate access to electricity
- Safety, considering first time users of electricity
- Scalability – Energy Sharing, DC/AC Microgrids, AC Grid
- Standardise rules when AC Grid eventually gets connected
- Uptake of distributed renewables. Much bigger opportunity in the developing world

Electricity Access - Considerations

- First Time users with no prior exposure to electricity and its potential for hazard to human life
- Minimum requirement to power few lights, fans and mobile chargers, sources and storage
- Leverage existing AC components, interconnects, electrical interfaces that are locally available as much as possible to reduce costs
- Distribution to be standardised for low losses.
- Provide a platform for funding renewable energy projects

Choice of Voltage

- 48V
  - Primary Voltage as defined in IEC 60038
  - Is safe – Falls under SELV System Classification and SELV circuit classification as per IEC 60950
  - Optimal voltage considering safety and distribution
  - Leverage EV battery eco-system and automotive battery eco-system for storage
  - DC-DC chips available with synchronous capabilities that operate beyond 48V

Some Specifics of the proposed standard

- 48V Bus Voltage Nominal
- 5A max. per circuit
- No limit to number of circuits
- Distribution topology similar to AC distribution
- AC wiring conductors of 1.5sq.mm, 2.5sq.mm or 4 sq.mm can be used depending on the length. AC over-current devices can be used
- Co-existence with AC, through an isolating interface

Safety

- Safe from single fault
- Safety from Electric Shock – SELV, floating outputs
- Safety from fire – due to arcing - only 5A in each circuit limits energy and does not allow arc to propagate
- Safety from fire – due to over current – limited by the finite power capability of the converter at the front end
- Safety from 230V shock during interoperability – RCD trips at the AC side
- Safety from fire and heat due to high instantaneous power from battery – Battery outputs to have over current protection

Some Specifics of the standard

- IT System with exposed conducting parts to ground (IEC 60364-1)
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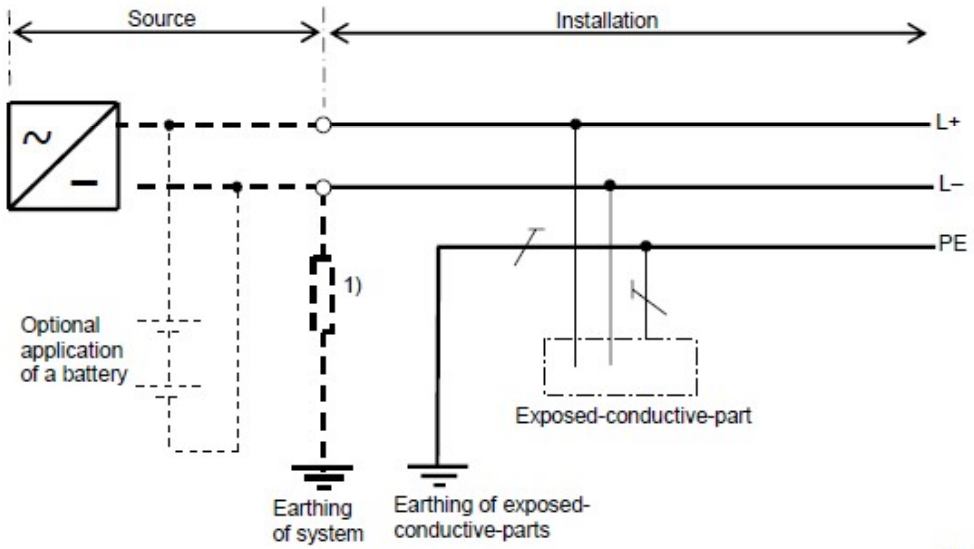
312.2.4.5 IT-system

Type a)



1) The system may be connected to earth via a sufficiently high impedance.

NOTE 1 Additional earthing of the PE in the installation may be provided.

Concerns

- What happens to existing 12V and 24V DC products/systems that exist now.
  - Continue to be used with DC-DC converters
  - Economies of scale will drive down costs
  - 48V semiconductor devices and integration already available

- If I am neck-deep in water and I touch 48V live wire, it can be fatal
  - No, since the 48V is floating. Unless both positive and negative is touched, current cannot flow.

- What about arcing?
  - In a limited power circuit, such as 6A max at 48V, arcing cannot be sustained. There will be an arc just as in 24V or 12V, but it will be extinguished automatically

Next Steps

- Pitch for an International Standard
  - BIS is already working on it
  - More installations
  - Industry participation to strengthen the standard
- Create a 48V Eco-System
  - Supply Chain
  - Capacity Building
- Standardisation for DC distribution at higher voltage for higher power
  - 380V?

Thank You