REVOLUTIONIZING RAILWAY MAINTENANCE SAFETY WITH THE CHEKVOLT® APPLICATION NOTE

As the world pushes towards cleaner, more sustainable modes of transportation, electrified rail systems are becoming increasingly vital. However, the maintenance of these railway infrastructures, particularly those utilizing high voltage DC power systems, presents unique challenges. Addressing these challenges head-on is the ChekVolt®, a Permanent Electrical Safety Device (PESD), that significantly enhances safety during lockout/tagout (LOTO) procedures and, in turn, accelerates the pace of railway electrification.

RAILWAY APPLICATIONS FOR CHEKVOLT

Electric locomotives are typically powered by high voltage DC electricity, which is usually provided by overhead lines or a third rail. Maintaining these power systems, whether it's the substation equipment that converts and distributes the power, or the power lines and rails themselves, involves working with dangerous levels of electricity. This is where LOTO procedures, and specifically the ChekVolt®, could be especially beneficial.

1. **Maintenance of Substations:** Electric railways often operate using DC power supplied by local substations. When maintenance or repairs need to be performed on these substations, a device like the ChekVolt® would be useful to ensure safety during LOTO procedures. The ChekVolt® could be installed in substations to allow for easy and safe verification of absence of voltage prior to commencing work.
2. **Third Rail Maintenance:** Some railway systems use a third rail to supply DC power to the trains. These rails need regular maintenance, and ensuring they are safely de-energized before work begins is critical. Here, a PESD like the ChekVolt® could provide an efficient and safe way to verify absence of voltage.
3. **Overhead Line Systems:** Similarly, overhead line equipment (OLE) is used in many railway systems to deliver DC power. These systems are high up and exposed to the elements, which means maintenance can be risky and complex. The ChekVolt's IP69 rating and LED indicators could be particularly beneficial in these situations, ensuring safety in various weather conditions and making it easier for technicians to determine whether power is present.

RAILWAY DC VOLTAGE RANGES

In many railway systems, the DC voltage output from these substations can be within the range of 600 to 1000 VDC, suitable for the ChekVolt's maximum rating. Maintenance in these substations can involve tasks like inspecting and replacing components, testing the functionality of circuit breakers, and ensuring the effective operation of transformers and rectifiers which convert AC to DC power.

Third rail system voltage typically ranges from 600 to 750 VDC. The lower end of this range (600 VDC) is common in many subway and light rail systems. The higher end (750 VDC) is sometimes used in more modern systems or mainline railways that require more power. Overhead line systems generally use higher voltages. Many such systems use 1500 VDC, especially in older networks. However, 3000 VDC systems also exist, particularly in some parts of Italy and South Africa.

While some overhead line systems operate at higher voltages, many systems, especially those for urban light rail, trams, and trolleys, often use lower voltage levels. These systems frequently use voltages of 600 VDC or 750 VDC. Many tram systems in Europe, such as those in Amsterdam or Zurich, operate at around

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600 VDC. A significant number of trolley systems in the United States, like those in San Francisco or Philadelphia, also operate at 600 VDC.

REINFORCING SAFETY IN CHALLENGING ENVIRONMENTS

Equipped with touch-safe, high impedance protected test points rated up to 1000 VAC/VDC, the ChekVolt® allows for absence of voltage testing with minimal risk. This PESD incorporates redundant LED voltage presence indicators, which flash when voltage is present in any phase. This offers a clear visual verification of energy presence or absence, significantly reducing the risk of exposure to electrical hazards.

The device's robust IP69 rating, indicating high protection against dust and water intrusion, makes it resilient in even the most demanding environments. This ensures its reliability during maintenance tasks in various weather conditions, whether it's third rail maintenance or work on overhead line equipment.

EXPEDITING LOCKOUT/TAGOUT PROCEDURES

LOTO procedures, designed to ensure the safe isolation of electrical equipment during maintenance or repair, are crucial when interacting with high-voltage DC systems used in electrified railway infrastructure. ChekVolt® shines in this area, simplifying and streamlining these procedures.

ChekVolt's design allows for the device to be wired directly to either the line side or load side of the power circuit. Consequently, maintenance personnel can test for absence of voltage without opening the enclosure door, providing a safer and quicker process. The device can reduce LOTO procedure times by 35-40 minutes, resulting in significant time and cost savings.

COMPACT, ROBUST, AND VERSATILE

Despite these robust capabilities, ChekVolt® remains compact and straightforward to install. It's quickly mounted through a single 30mm knockout and comes with four lead wires potted in the construction. This makes the ChekVolt® suitable for diverse railway systems, regardless of space constraints or existing electrical configurations.

For instance, ChekVolt® can be integrated into substations that supply high voltage DC power to the railway systems. Likewise, it can be incorporated into third rail systems or overhead line equipment, ensuring safety in maintenance procedures across various railway power delivery methods.

CONCLUSION

The rise of electrified railway infrastructure calls for innovative safety solutions. The ChekVolt® PESD meets this demand, offering an efficient and safer way to conduct maintenance on DC electrified railway systems. By streamlining LOTO procedures and enhancing safety, ChekVolt® is set to play a vital role in the maintenance of the growing electrified railway infrastructure, ultimately supporting the global shift towards more sustainable transportation.