RE13:045 RDE V0 11/20/13

**Data Cabling Grounding Recommendations for Integrated Network Zone System**

**Introduction**

The Integrated Network Zone System from Panduit Corporation offers an out-of-the-box zone based solution to enable Ethernet network aggregation and distribution throughout the Industrial shop floor. The Integrated Network Zone System acts as a consolidation point for distribution of individual Ethernet connections to control panels and associated machinery and provides uplink data to the control room and enterprise applications.

The Integrated Network Zone System can be deployed with either fiber or copper cabling. In the case of copper cabling, either unshielded or shielded four pair twisted pair copper cabling can be used. In the case of shielded cabling deployments, grounding of the cabling shield is required. This note provides recommendations for grounding the cabling shield.

**Grounding Recommendations**

Figure 1, below, shows a typical example of an Integrated Network Zone System from Panduit.



Figure 1: Example of the Integrated Network Zone System

This example shows fiber cabling entering into the enclosure at the top left, being routed to Rockwell Stratix switches in the enclosure and then white copper patch cords leading from the switches to a vertically mounted patch panel located towards the right hand side of the enclosure. Green solid copper cables, as downlinks, are then led from the patch panel, terminated into jacks located in the patch panel, through the conduit entry located at the top right. These cables would typically provide connection to Ethernet enabled control panels and devices on the factory floor. The zone enclosure then functions as a consolidation point for aggregation of data connections that are routed to the manufacturing and enterprise network. The patch panel used in the zone enclosure includes non-metallic faceplates into which the jacks are located. This is done so that the jacks can be installed or removed from the front side of the patch panel. It is also to be noted that if shielded jacks are used in this patch panel, they are not required to be connected to a grounding point within the enclosure.

The downlink cables can be fiber or copper, depending on the choice of switch deployment. In the case of copper cabling, the cables can use either unshielded or shielded cabling, i.e. four pair UTP or STP respectively. In the case of shielded cabling, recommendations are required for the grounding of the shield of the data cable.

Effective grounding in the industrial environment is made more complex than in the enterprise because of the possibility of different feed points for utility power to devices that are spatially separated. In this way, the possibility exists for different active devices in Industrial Automation applications to have differing ground potentials. If this is the case, inadvertent use of shielded cables with bonded connections to metallic enclosures with differing potential could give rise to ground loops which in turn could give rise to electromagnetic interference that could couple onto data cables, cause data corruption and increased bit error rate.

The grounding recommendations are summarized as follows:

1. The potential difference between the two metallic enclosures bonded to local grounds at the two ends of the shielded horizontal cable, for example the enclosure of the Integrated Network Zone System and the control panel on the shop floor to which data connection is provided, should be measured or known.
2. If the potential difference is less than or equal to 1 volt, r.m.s., the shield of the cable should be connected to the shielded jack at both ends of the horizontal cable and shielded patch cords used to connect from jacks on the horizontal cable to equipment. Since the switch / active equipment in the zone enclosure is grounded, the jack on the horizontal cable does not have to be grounded itself. As an option, depending on user preference, it can be grounded to the enclosure.
3. If the potential difference is greater than 1 volt, r.m.s., the use of a Potential Equalizing Conductor (PEC) should be evaluated. The PEC is used to connect spatially separated devices to ensure that they are at the same potential.
4. If the potential difference is greater than 1 volt, r.m.s., a measurement of the potential difference has not been made or a PEC is not deployed, the shield of the horizontal cable should not be connected to the local ground at the end farthest away from the zone enclosure switch. In the event that a shielded jack is used at this remote end, it has to be isolated from the local ground. This can be accomplished by mounting the jack in a patch panel similar to the one described above, or by using another isolating device, for example a DIN rail mount adaptor. The shield should be connected to the jack at the end that is located in the pre-configured zone enclosure.