



# WHY INFRASTRUCTURE MATTERS: THE STANDARDS THAT GUIDE US

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This is a continuation of the [Why Infrastructure Matters](#) article from last year.

In today's era of Industry 4.0, Internet Protocol (IP) based technologies continue to make a positive impact on manufacturing and have quickly moved onto plant floors. However, the rapid implementation of these innovative changes has led to unwanted issues, such as miscommunication among information technologies (IT) and operational technologies (OT) decision makers, leading to unplanned downtime. These preventable issues have left manufacturers in critical need of network and infrastructure solutions that can be quickly and easily deployed and maintained while remaining cost effective.

A robust industrial network infrastructure consists of integrated IT and OT solutions to simplify network deployment and has an intricate standards-based approach to address critical infrastructure requirements. However, manufacturing plant floor

networks and systems have been converging onto Ethernet, or Converged Plant-wide Ethernet (CPwE), and have grown in a non-planned, non-standards-based way. Moving onto Ethernet raises many areas of concern because a typical manufacturer's physical network infrastructure, such as cabling, is not set-up to handle the harsh environment on a plant floor.

The physical layer of network infrastructure is extremely vital to a smooth operation and a study conducted by [Sage](#) reports that nearly 80 percent of network problems are physical layer related. Traditionally, an average project budget for the physical network layer ranges around 7 percent but some businesses reduce that percentage even further to save funds. The [Telecommunications Industry Association](#) (TIA) Standards and Strategies ensures that network infrastructures are installed with best practices in mind

to prevent unnecessary reductions in physical network layers and connectivity issues.

TIA/EIA-568-C is the common standard for Ethernet, similar to how National Electrical Code (NEC) is the standard for electrical systems. It defines cabling types, distances, connectors, cable system architectures, cable termination standards and performance characteristics, cable installation requirements and methods of testing installed cable. Cabling standards that apply on the plant floor, or industrial networks, can be very similar to enterprise networks but with key dynamic environmental conditions. [TIA-1005-A](#) is the industrial standard and the guiding premise that references both the architectural — supporting almost all industrial topologies — and the environmental aspects with a methodology developed around an evaluation of MICE factors.

» MICE is an abbreviation that stands for: Mechanical, Ingress, Climatic/Chemical and Electromagnetic.

» Mechanical — Shock and vibration, bump, peak acceleration, vibration, displacement amplitude, acceleration amplitude, crush, impact.

» Ingress — Handling of water or dust, particulate ingress, immersion (NEMA or Ingress Protection Rating systems).

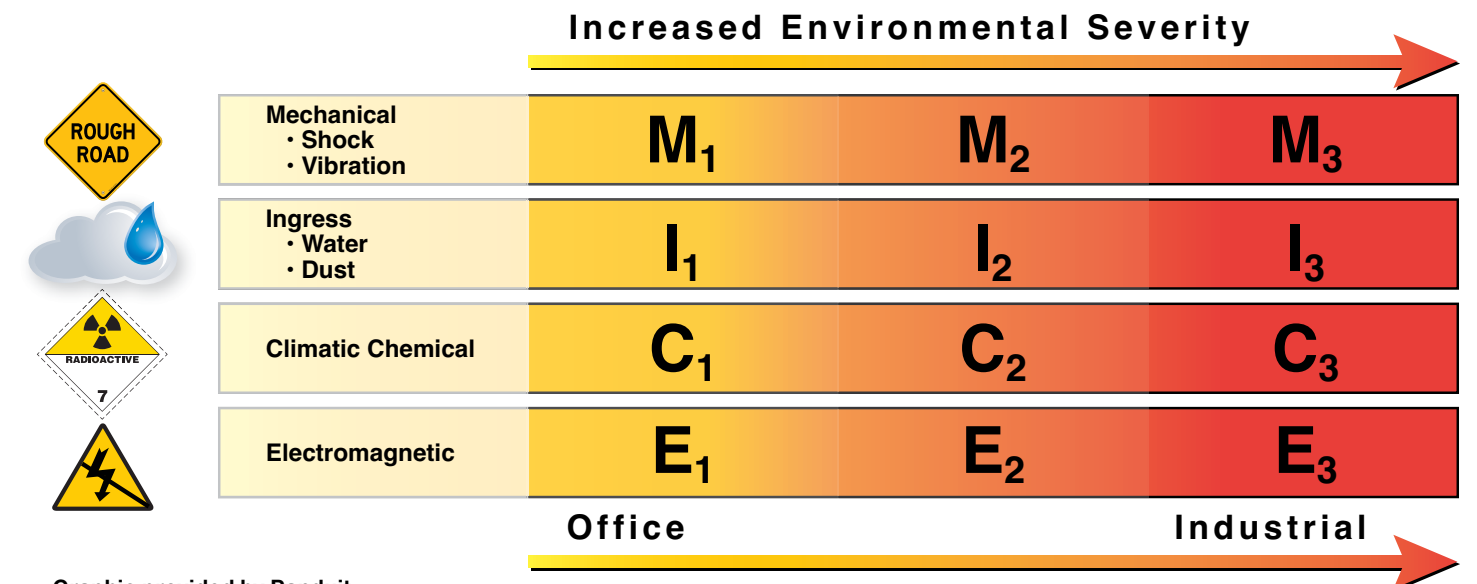
» Climatic/Chemical — Temperature and washdown of water, exposure to acids or oil mixtures, ambient temperature, rate of change, humidity, UV radiation, liquid pollution, gaseous pollution.

» Electromagnetic — ESD and electrical noise, electrostatic discharge, contact, electrostatic discharge, air, radiated RF - AM, conducted RF, EFT/B, magnetic field (50/60Hz), magnetic field (60-20,000Hz).

Designing for the manufacturing environment requires an intimate knowledge of these areas to ensure the infrastructure supports the different environments found on the plant floor. Considerations such as shock and vibration, handling of water or dust, temperature, washdown areas, exposure to acids or oil mixtures and electromagnetic noise must be considered when selecting infrastructure solutions to support these harsh environments. Industrial infrastructure solutions that adhere to network architectures, such as the CPwE, will provide a reliable and scalable end-to-end network physical layer infrastructure — from the enterprise to the industrial edge.

Kirby Risk's Physical and Logical Infrastructure building blocks, tools and design services simplify network deployment for better equipment optimization and broader risk management. [↗](#)

For more information on the MICE Standards or assistance with evaluating how your company can improve its own connected enterprise infrastructure journey, please reach out to [EnterpriseSolutions@kirbyrisk.com](mailto:EnterpriseSolutions@kirbyrisk.com).



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