

FIBER OPTICS IN THE INDUSTRIAL ENVIRONMENT

INTRODUCTION

In today's industrial networks, fiber optic cable is often used as the backbone because of the inherent benefits over copper cable, but two of the main focuses for industrial fiber are the benefits of bandwidth and no electromagnetic interference. Industrial-rated fiber can be run inside cable tray throughout a harsh environment alongside electrical cable while remaining immune to electromagnetic noise. The second benefit is that when the network grows the fiber offers bandwidth that is suitable for today's needs and future needs.

CONSIDERATIONS FOR FIBER OPTICS IN INDUSTRIAL ENVIRONMENTS

In an industrial application, the fiber optics needs to withstand harsher environmental conditions such as extreme temperatures, abrasion, sunlight and oil. This requires products with jacketing compounds that are manufactured differently to withstand the environment compared to commercial-grade fiber optic cable made for an office environment.

In the industrial environment, the total number of actual fibers needed is typically far less than a commercial application like those that would be used in a data center or by a telephone company. When lots of fibers are needed (as in a commercial application), a loose-tube fiber construction is a cost-effective solution. In an industrial application where few total fibers are needed, it is beneficial to use tight-buffered fiber constructions, which not only provide additional protection for the fibers but also eliminate the need for fan out kits for connector termination due to the fact that it can be terminated right to the cable itself.

ANIXTER LEVELS FOR INDUSTRIAL ENVIRONMENTS

Within an industrial environment, there are different degrees of environmental harshness. The Anixter Levels for Industrial Environments defines three areas of harshness to make product selection easy.

A Level 1 environment is one where products are somewhat protected—similar to a commercial application. This might be something like a shipping office or a control room located within a plant. For Level 1, Anixter recommends an economical tight-buffered construction that has an operating temperature of 0° to 60° C and a pull tension of up to 20 lb.

A Level 2 environment is located inside an industrial facility where cabling and components are subjected to more extreme ambient

temperatures, humidity and potential damage. This Level is typically located inside a light-industrial facility where machines and devices require occasional connection and reconnection for maintenance and movement. These areas could include assembly, dry packaging, warehouse and enclosed cabinets. Level 2 fibers have a tight-buffered construction that has increased abrasion resistance, operating temperatures of -10° to 60° C, oil and UV resistance and a pulling tension of 40 lb.

A Level 3 environment is located in a harsh industrial area where cabling and components are exposed to oil, solvents, cleaning agents, lubricants, water, wide varying temperatures, humidity and dust. These areas can be subject to wash downs, heavy vibrations and occasional forces of shock. Machine operators frequently connect and reconnect plugs and receptacles to move, clean or maintain equipment. These areas could include automation islands, robotics, welding, heavy machining, industrial equipment and exposed environments. Again a tight-buffered cable is used but with an additional fiber jacket over the individual fibers. This allows for the installation of a connector to each fiber without the need of an enclosure or fiber patch panel as well as for extra protection. Level 3 fibers or cables have increased abrasion resistance, operating temperatures of -40° to 70° C, oil and UV resistance and a pulling tension of 40 lb.

FIBER OPTIC CONNECTORS

For connectors, Anixter recommends mechanical connectors over fusion splicing. As the fiber count is typically low, investment in tooling and training on fusion splicing is not practical. Mechanical connectors may have a higher loss rate, but the distances in fiber runs in the industrial environment are relatively short, which allows for greater loss. Low-cost mechanical connectors are available for Levels 1 and 2 and have an ingress protection of IP20. For Level 3, IP67 rated connectors are recommended. The IEC Variant 1 connector is commonly used, but care must be taken to match the connector type that mates with the device it is being attached to.

To avoid installing connectors all together, preconnectorized patch cords can be ordered in custom lengths and styles that meet Levels 1, 2 and 3 and have a variety of connector types. This is especially convenient when only two fibers are needed to connect a device.

To make industrial fiber product selection as easy as point and click, visit the product selection guide at anixter.com/levels.

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Anixter Inc. World Headquarters
2301 Patriot Boulevard
Glenview, Illinois 60026
224.521.8000

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