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**Fusion Splicing Equipment and Applications for the
Cable/Broadband Industry**

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1.0 PURPOSE, SCOPE AND DEFINITIONS

1.1 Purpose and Scope

This standard defines the equipment, methods, and practices used within the cable/broadband industry to obtain consistent low loss fusion splice connections between optical fibers.

1.2 Definitions and Acronyms

LID: Local Injection and Detection

L-PAS: Lens – Profile Alignment System

MFD: Mode Field Diameter

PAS: Profile Alignment System

2.0 FUSION SPLICING BASICS

Fusion splicing consists of aligning and permanently fusing together stripped, cleaned and cleaved optical fibers with a high temperature arc. It provides a fast, reliable, low-loss, connection by creating a transparent joint between two fiber ends. Fusion splices provide a high-quality joint with the lowest loss (in the range of 0.01 dB to 0.10 dB for single-mode fibers) and are practically non-reflective.

3.0 EQUIPMENT

3.1 Fusion Splicers

Fusion splicers are typically used in the field or within a Lab/OEM environment. While many splicers may be used in either environment, some splicers are designed for specific performance environments.

3.2 Alignment Methods

Two fiber alignment techniques are:

- Passive alignment (Single-axis)
- Active alignment (Multi-axis)

3.2.1 Passive

Passive alignment systems do not move the fibers in the x or y axes, the fibers are moved in the z axis only (single-axis).

This technique is used in fixed v-groove machines. Fiber alignment is dependent on how the fibers are positioned relative to each other in the precision cut grooves in the x and y axes. In order to achieve a good quality splice, the two fiber ends must be aligned correctly.

The cleanliness and good condition of the v-grooves are important to insure that the fibers are positioned in the v-groove to allow the proper alignment necessary for a good quality splice.

3.2.2 Active

Active alignment systems detect and compensate for any fiber misalignment, moving the fibers in the x, y and z axes (multi-axis).

Active alignment methods fall within one of the following categories:

- LID™ system (Local Injection and Detection)
- CDS (Core Detection System)
- L-PAS™ (Lens – Profile Alignment System)
- PAS (Profile Alignment System)

3.2.2.1 Local Injection and Detection (LID)

The LID system aligns and monitors the fusion splice with an optical transmitter and receiver. This allows for the cores to be optimally aligned. A source (transmitter) injects a light signal into the fiber through a bending coupler and a power meter (receiver) measures the received light signal through another coupler. When the transmitted signal is at its maximum level, both fiber cores are perfectly aligned. The transmitted signal from the LID source is present throughout the process, allowing effective control of the splice process. The LID™ system provides a splice loss measurement after the splice is complete by comparing the post-splice light level to the pre-splice level.