

HDPE CONDUIT JOINING GUIDELINES

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Foreword

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The purpose of this technical note is to provide guidance on joining of HDPE conduit for broadband and power applications.

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1.0 INTRODUCTION AND OVERVIEW

There are multiple joining methods that can be used for joining or terminating HDPE conduit. Joining methods can be broken into three very broad categories:

- Mechanical
- Heat fusion
- Adhesive bonding

This guide provides an overview of each joining category by joining method. The guide also identifies key design attributes to be considered when choosing a joining method for specific applications. Joining for this document refers to coupling the ends of two lengths of a conduit for extending the raceway. It could be joining the ends of two HDPE conduit lengths or the end length of HDPE conduit to a length of other conduit material such as PVC, FRP, galvanized steel, etc. Termination refers to joining a length of conduit to appurtenances such as enclosures, meters, building entrances, and other devices.

1.1. Mechanical Coupling Overview

Mechanical fittings are the most often used coupler types for joining or terminating HDPE conduit. Mechanical fittings are usually attached to the outside surface of the conduit ends so as not to reduce the conduit's inside diameter, allowing the cable to pass freely through the joined section as it is being installed.

Multiple mechanical coupler designs are available for joining or terminating HDPE conduit. For this guide's purposes, the following characteristics broadly describe commonly used mechanical coupler designs:

- Compression – in this design the gasket is utilized as a mechanism for both sealing and gripping.
- Self-threading – the coupler has internal threads used for gripping, but it typically has no mechanism for sealing.
- Push-fit – usually a combination of gasket for sealing and internal metallic locking ring for gripping.
- Elastomeric Sleeved – internal elastomeric layer for sealing and gripping with an external rigid housing for providing axial and circumferential strength.
- Hybrid – Combines internal gasketing with tool actuated clamps for engaging locking rings.

Each mechanical coupling type is discussed in more detail in Section 5.0 on mechanical couplers.

1.2. Heat Fusion Overview

A less often used but important joining method, is heat fusion. The most often used heat fusion methods are butt fusion and electrofusion for joining conduit. Socket fusion is another heat fusion method typically used for smaller conduit diameters. Socket fusion is more frequently used for joining pressure rated water tubing or gas tubing.

Heat fusion joining methods for conduit are recommended where very high tensile loads are expected to occur during installation, for example when conduit is to be pulled-in using the Horizontal Directional Drilling (HDD) method.

Heat fusion joining methods are covered in more detail in Section 6.0.

1.3. Adhesive Bonding Overview

Joining conduit by adhesive bonding is the third joining method. Joining HDPE conduit requires special preparation of the conduit ends and couplers for bonding. Adhesive types are typically two-part formulations that create a curing reaction after mixing the two ingredients together. They do not require the addition of water, air, or outside energy sources, such as Ultraviolet (UV), Electron Beam (EB), or heat. Once the two parts are mixed the reaction begins, making application time sensitive.

Joining details for adhesive bonding are provided in Section 7.0.

2.0 TERMINOLOGY:

- Conduit – A plastic raceway used to protect either power, telecommunications, or control cables.
- Coupler/Coupling – A fitting used to join a conduit to another conduit or to a termination point.
- Fitting – A component used to join, terminate, branch, or change direction of the raceway.
- FRP conduit – Also known as composite conduit, a rigid conduit of fiber reinforced plastic material used most often in bridge locations requiring greater strength or highly corrosive environments.¹
- HDPE – High density polyethylene is a durable plastic material used in the manufacture of conduit.¹
- Joining – coupling the ends of two lengths of a conduit for extending the raceway or the end of an HDPE conduit to a length of conduit made from other materials.
- Joint – The location at which two pieces of pipe or a pipe and a fitting are connected together.²
- PVC conduit – A conduit made from polyvinyl chloride.