Molded PE3408 / PE4710 / PE100 Electrofusion Fittings

Integrity Fusion Products IntegriFuse Electrofusion Fittings are all-purpose, injection molded **High-Density Polyethylene Fittings** that are designed and manufactured for use in applications that include, but are not limited to:

- **Oil and gas production**
- **Municipal potable water distribution and service lines**
- **Stormwater conveyance**
- **Irrigation**
- **Mining**
- **Cable**
- **Natural gas distribution**
- **Wastewater conveyance**
- **Drainage**
- **Industrial piping applications**
- **Landfill**
- **Telecom Conduit**

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Integrity Fusion Products manufactures **IntegriFuse Electrofusion Fittings** in a variety of sizes and configurations that are produced from virgin, pre-blended, NSF listed bi-modal black high density polyethylene resin that has a cell classification of **445574C-CC3** that conforms to **ASTM D3350** and is recognized by the Plastic Pipe Institute as having a **PE3408 / PE4710 / PE100** rating with an **HDB** (Hydrostatic Design Basis) of **1600 psi @ 73° F**.

IntegriFuse Electrofusion Fittings from Integrity Fusion Products are manufactured, tested, certified, and listed in accordance with standards and requirements that meet a wide range of project requirements that include:

ASTM D2513	-	**Specification for Thermoplastic Gas Pressure Pipe, Tubing and Fittings**
ASTM D3350	-	**Specification for Polyethylene Plastic Pipes and Fittings Materials**
ASTM D3261	-	**Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Pipe and Tubing**
ASTM F714	-	**Specifications for HDPE Pipe Dimensions**
ASTM F1055	-	**Standard Specification for Electrofusion Fittings**
AWWA C901	-	**Polyethylene (Pe) Pressure Pipe and Tubing, 3/4 In. Through 3 In. For Water Service**
AWWA C906	-	**Polyethylene (Pe) Pressure Pipe and Tubing, 4 In. Through 65 In. For Water Works**
FM 1613	-	**Approval Standard: Plastic Pipe and Fittings for Underground Fire Protection Service**
ANSI/NSF 61	-	**Plastic Piping System Components & Related Materials**
ASTM F2880	-	**Specification for lap-Joint Type Flange Adapters for use on Polyethylene Pressure Pipe**

Integrity Fusion Products IntegriFuse Electrofusion Fittings are tested in accordance with the following standard ASTM test methods.

ASTM D1598	-	**Time-to-Failure of Plastic Pipe Under Constant Internal Pressure.**
ASTM D1599	-	**Short-Term Hydraulic Pressure Failure of Plastic Pipe, Tubing and Fittings.**
TM D2122	-	**Test method for Determining Dimensions of Thermoplastic Pipe and Fittings.**

IntegriFuse Electrofusion Fittings from Integrity Fusion Products can be fused to any manufacturers' PE pipe, molded fittings, or fabricated fittings manufactured from material made from **PE3408 / PE4710 / PE100** resin that complies to **ASTM D3350** and are compatible for cross-fusing to **PE2406/PE2708** pipe or fittings without special fusion instructions.

IntegriFuse Electrofusion Fittings from Integrity Fusion Products are designed for use on HDPE pressure pipe applications that conform to **ASTM F714, D2513** and **D3350** and are pressure rated according to industry guidelines for natural gas and water applications. (**TABLE 1**)

Conditions for the Required De-Rating of an Electrofusion Fittings MAOP

The material strength of High-Density Polyethylene is inversely dependent on temperature, and its strength decreases at elevated temperatures. The **Maximum Allowable Operating Pressures (MAOP)** for molded PE4710 fittings ***must be de-rated for elevated temperatures in all service applications***, (see **TABLE 2**), including for use in Oil & Gas Gathering Systems installed in Class 1 or Class 2 locations (low population areas not subject to DOT CFR *Title 49 Part 192* regulations) or where Federal Codes do not apply. ***Including Water, Brine, Dry Natural Gas applications with NO associated hydrocarbons.***

Pressure Rating of IntegriFuse PE4710 Molded Fittings

Fitting SDR (Standard Dimension Ration)	MAOP (Design Factor of .63)	MAOP (Gas) (Design Factor of .40)
7/9	333/250	125/125
11/17	200/125	125/80
21	100	64

NOTE: Pressure ratings are based on an operating temperature of up to 73° ambient temperature and will need to be reduced for higher temperatures and certain applications.

TABLE 1

API Specification 15LE (1995) states "In most circumstances, the HDB obtained at 73° F can be used for applications up to 100° F without further derating" Values in this table use a material design factor of .63 and a Fluid Service Factor of 1.0

The maximum pressure testing operating temperature of Integrity Fusion Products PE4710 Molded Electrofusion fittings ***should not exceed 140° F.***

Derating PE4710 Fitting MAOP by SDR and Operating Temperature						
Temperature Range	>60° F to ≤80° F	>81° F to ≤90° F	>91° F to ≤110° F	>111° F to ≤130° F	>131° F to ≤140° F	>140° F
f_T Multiplier	1.00	0.90	0.80	0.70	0.60	X
SDR 7	333 psi	300 psi	267 psi	233 psi	200 psi	X
SDR 9	250 psi	225 psi	200 psi	175 psi	150 psi	X
SDR 11	200 psi	180 psi	160 psi	140 psi	120 psi	X
SDR 17	125 psi	113 psi	100 psi	88 psi	75 psi	X
Values in Table 2 use Multipliers and Pressure Ratings calculated using *Plastic Pipe Institute HDPEAPP (https://hdpeapp.com/#/pipe)*						

TABLE 2

Dry, gaseous hydrocarbons have no adverse effect on our molded fittings normal expected service life, and naturally occurring chemicals in the soil will not attack or cause our fittings to degrade. They do not rust, rot, or corrode; they naturally resist the buildup of scale and other deposits, and they do not support the growth of algae, bacteria, fungi, or other marine life. ***HOWEVER, should the fitting be installed in an application where permeating or solvating liquids are present in the pipe or the surrounding soil, such as gasoline, fuel oil, kerosene, crude oil, diesel fuel, liquid hydrocarbons fuels, oilfield production water containing hydrocarbons, and vegetable and mineral oils; the MAOP of the fitting must be further derated.***

Table 3 reflects an added derated MAOP for an HDPE 4710 molded, or molded electrofusion fitting when installed into services and applications subjected to an extended exposure of liquid hydrocarbon concentrations of 2% and greater.

Derating PE4710 Fitting MAOP by SDR for Operating Temperature and Transporting a Media Containing 2% or Greater Hydrocarbon Content						
Temperature Range	>60° F to ≤80° F	>81° F to ≤90° F	>91° F to ≤110° F	>111° F to ≤130° F	>131° F to ≤140° F	>140° F
f_T Multiplier	1.00	0.90	0.80	0.70	0.60	X
SDR 7	166 psi	150 psi	267 psi	116 psi	100 psi	X
SDR 9	125 psi	225 psi	100 psi	175 psi	75 psi	X
SDR 11	100 psi	112 psi	80 psi	70 psi	60 psi	X
SDR 17	62 psi	56 psi	50 psi	44 psi	37 psi	X
Values in Table 3 use an additional fluid service factor of 0.50						

TABLE 3

Fluid Service Factors

Production Water, Brine, Process Water with no associated liquid hydrocarbons	**1.0**
Dry Natural Gas (no hydrocarbon liquids used in Class 1 and Class 2 locations and in low population area not subject to DOT CFR *Title 49 part 192*	**1.0**
Crude Oil, Wet Natural Gas, Liquid Hydrocarbons, Process Water with >2% liquid hydrocarbons	**.5**
Gas Distribution piping that is permeated by solvating chemicals, liquid hydrocarbons or liquified gas condensate	**.5**

Injection Molded Electrofusion Fittings from Integrity Fusion Products have a strong resistance to chemical compounds. For more information on the chemical resistance of PE4710 resin, please reference PPI Technical Report TR-19.

Injection Molded Electrofusion Fittings can be stored outdoors but it is highly recommended that **they** be stored indoors in their original packaging. Black HDPE fittings stored properly indoors have unlimited shelf life.