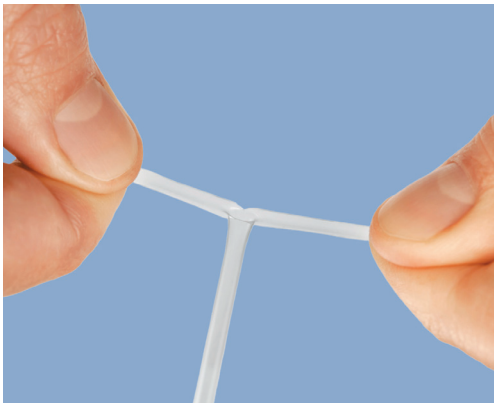
# Simplifying Catheter Construction with FluoroPEELZ™ Peelable Heat Shrink

Catheter construction is a delicate and laborious process that leaves little room for error, especially in the final step of removing the recovered fusing sleeve from the catheter shaft. While traditional FEP heat shrink is a time-tested and popular choice, it does have significant drawbacks during the removal phase as it must be shaved off using a skiving tool, potentially leading to damage to the finished device and subsequent reduction in yield.

***Overcoming this challenge with FluoroPEELZ™ Peelable Heat Shrink – With a simple linear tear, FluoroPEELZ™ peelable heat shrink helps increase yields, improve safety, and simplify catheter construction.***



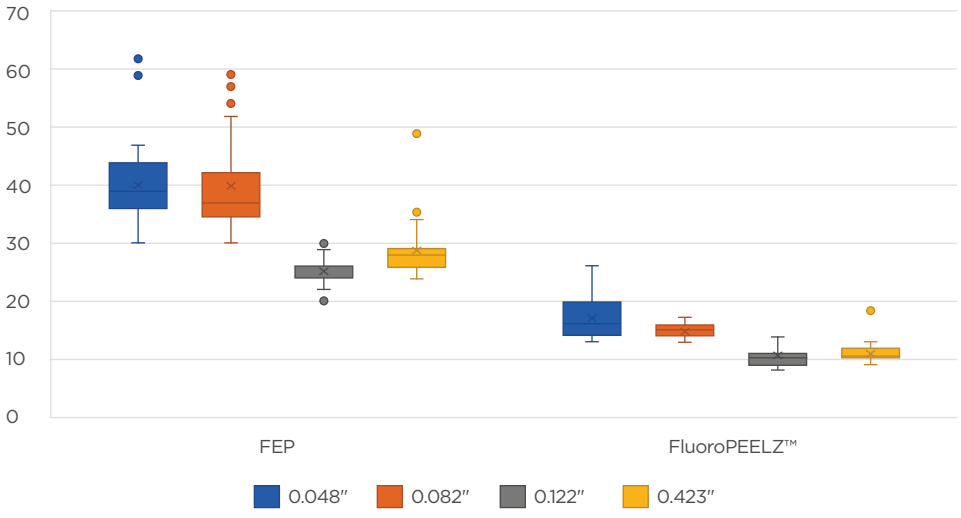
*FluoroPEELZ™ Peelable Heat Shrink*

## Testing Traditional FEP vs. FluoroPEELZ™ Peelable Heat Shrink

To test FluoroPEELZ™ peelable heat shrink against traditional FEP heat shrink, four different sizes of catheters were built (one large, one micro, and two mid-sized). For each of these four sizes, 60 catheters were constructed; 30 were built using traditional FEP heat shrink, and the remaining 30 were built using FluoroPEELZ™ peelable heat shrink. Catheters were reflowed using an MSI vertical laminator. The time to remove the recovered heat shrink from each build was recorded, and a QC inspection was performed to calculate yield.

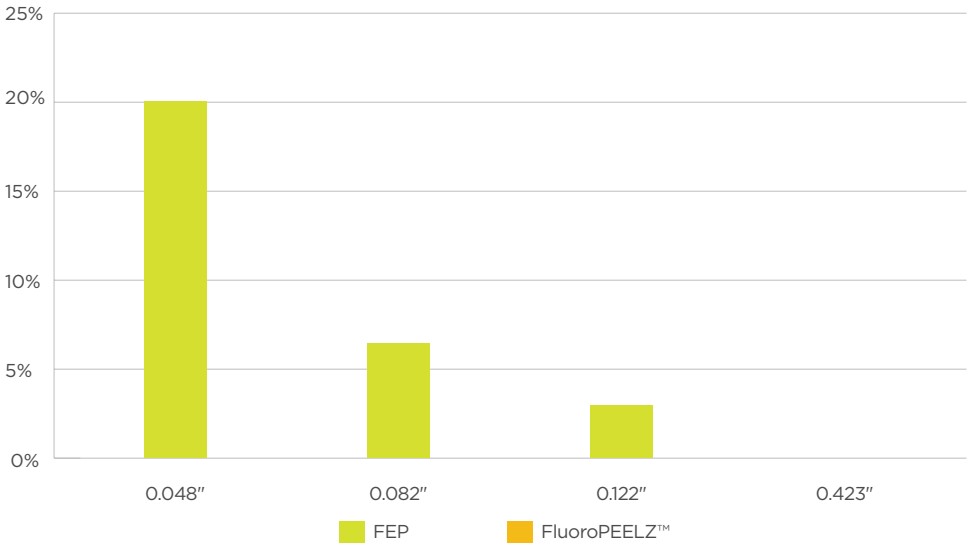
| Group | Catheter OD | Catheter Len. | Liner ID | Liner Wall Thickness | Reinforcement | Jacketing | Heat Shrink Exp. ID | Heat Shrink Rec. ID | Heat Shrink Rec. Wall | Heat Shrink Len. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.048″ (1.219 mm) | 60″ (1542 mm) | n/a | n/a | n/a | Pebax® 55D | 0.074″ (1.880 mm) | 0.045″ (1.143 mm) | 0.013″ (0.330 mm) | 75″ (1905 mm) |
| 2 | 0.082″ (2.083 mm) | 52″ (1320.8 mm) | 0.071″ (1.803 mm) | 0.0007″ (0.0178 mm) | n/a | Pebax® 55D | 0.110″ (2.794 mm) | 0.067″ (1.702 mm) | 0.010″ (0.254 mm) | 60″ (1542 mm) |
| 3 | 0.122″ (3.099 mm) | 35″ (889 mm) | 0.109″ (2.769 mm) | 0.001″ (0.025 mm) | n/a | Pebax® 55D | 0.140″ (3.556 mm) | 0.110″ (2.794 mm) | 0.010″ (0.254 mm) | 43″ (1092.2 mm) |
| 4 | 0.423″ (10.744 mm) | 40″ (1016 mm) | 0.360″ (9.144 mm) | 0.0032″ (0.0813 mm) | Flat Coil 0.004″ x 0.012″ (0.102 mm x 0.305 mm) | Pebax® 55D | 0.448″ (11.379 mm) | 0.313″ (7.950 mm) | 0.012″ (0.305 mm) | 47″ (1193.8 mm) |

### Heat Shrink Removal Time (Seconds) – FEP vs. FluoroPEELZ™




*Across all catheter sizes, the total average time to remove FEP heat shrink using a skive tool from R&D Engineering was 33.44 seconds compared to removing FluoroPEELZ™ by hand, which averaged only 13.3 seconds (**2.5x faster**). Our testing confirmed that removing heat shrink from smaller-diameter catheters is generally more time-consuming and challenging, even for highly skilled operators. Still, efficiency gains were seen across all catheter sizes when utilizing FluoroPEELZ™ peelable heat shrink.*

## Damage Rate - FEP vs. FluoroPEELZ™




*Across all catheter sizes, FEP resulted in a 7.5% damage rate compared to 0% for FluoroPEELZ™. In addition to the heat shrink being more time-consuming to remove from smaller-diameter catheters, there was also an increase in the rate at which skive marks were detected by QC inspection. For the smallest-sized catheter,* ***1 out of every 5 shafts showed skive marks*** *during inspection.*

**Potential Catheter Production and Scrap Costs – Traditional FEP vs. FluoroPEELZ™**

| Catheter Group | Approximate Total Material Cost of Catheter Build | Yearly Production Volume | Total Production Cost | % Damage (FEP) | Potential Damage/Scrap Cost (FEP) | % Damage (FluoroPEELZ™) | Potential Damage/Scrap Cost (FluoroPEELZ™) |
|---|---|---|---|---|---|---|---|
| 1 (0.048″ OD) | $ 190.00 | 100,000 units | $19,000.000 | 20% | $3,800,000 | 0% | n/a |
| 2 (0.082″ OD) | $175.00 | 100,000 units | $17,500,00 | 7% | $1,225,000 | 0% | n/a |
| 3 (0.122″ OD) | $150.00 | 100,000 units | $15,000,000 | 3% | $450,000 | 0% | n/a |
| 4 (0.423″ OD) | $300.00 | 100,000 units | $30,000,000 | 0% | n/a | 0% | n/a |

*Switching to FluoroPEELZ™ can result in not only time savings, but most notably, can save significant cost by reducing the amount of scrap during production. Additional factors such as reduced operator training requirements and QC inspection times, as well as a simplified BOM should also be considered.*

## The Results

Zeus' FluoroPEELZ™ peelable heat shrink greatly simplifies catheter construction. On average, operators could remove FluoroPEELZ™ peelable heat shrink **2.5 times faster** and with **no observable defects** when compared to traditional FEP heat shrink.

These results suggest that the increased efficiency of FluoroPEELZ™ can result in substantial downstream benefits, including reduced manufacturing costs and increased revenue.

### Request A Sample

To request samples of FluoroPEELZ™ for your next project, visit zeusinc.com/FluoroPEELZ™

Request A Sample