

## APPLICATION NOTE

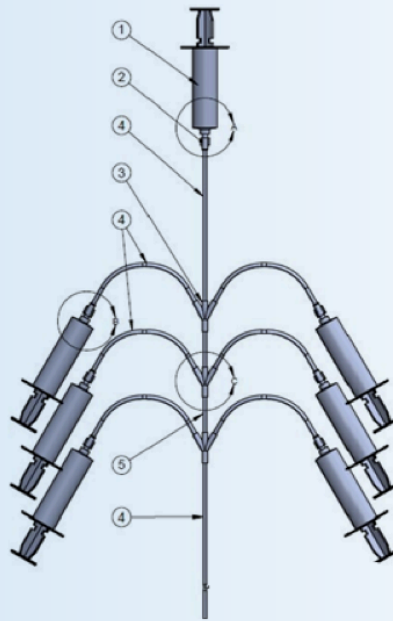
Partnering with our customers to design innovative solutions to their specific application challenges

# How Sterilization Techniques Affect Material Selection

## CHALLENGE

- > A request for a syringe set for sampling with no polycarbonate (PC) used in the construction
- > All materials needed to be gamma irradiated
- > The application required an assembly capable of handling the weight of the hanging syringe

## SOLUTION



- > Polypropylene (PP) syringes were chosen as gamma stable option
- > PVC tubing was selected as it is sterile dockable and gamma stable
- > Connectors and fittings were chosen based on compatibility with tubing and syringes as well as being gamma stable
- > Different gamma stable glues were identified for each connection: one for the luer connector to the syringe and another for the connector to the tubing

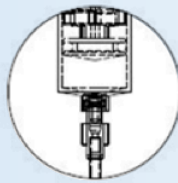


Figure 2

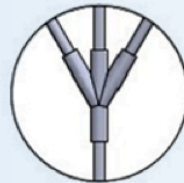


Figure 5

### References

1. [Sastri, V.R. \(2014\). \*Plastics in Medical Devices: Properties, Requirements, and Applications\*. Waltham, MA: Elsevier.](#)
2. [Massey, L.K. \(2005\). \*The Effect of Sterilization Methods on Plastics and Elastomers\*. Norwich, NY: William Andrew, Inc.](#)

## UNDERSTANDING STERILIZATION METHODS

### Steam

- > Sterilization by exposing products to saturated steam at high temperatures (121°C to 134°C)
- > Products placed into autoclave and heated through pressured steam to sterilize
- > Four parameters: steam, pressure, temperature and time

### Gamma Irradiation

- > Form of high-energy, electromagnetic radiation
- > Gamma rays pass readily through plastics and kill bacteria by breaking the covalent bonds of the bacterial DNA
- > Does not generate heat or moisture

### Ethylene Oxide

- > EtO gas can be used for sterilizing items that are sensitive to other methods (radiation, moisture, heat, chemicals)
- > Carried out between 30°C and 60°C with relative humidity above 30%
- > Highly effective as it penetrates porous materials and can penetrate some plastics

### E-beam Irradiation

- > Alternative form of ionizing radiation sterilization
- > Higher dose rate than gamma radiation, requiring less exposure time
- > Potential degradation to polymers is reduced by shorter exposure time but e-beams are less penetrating than gamma rays



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