THE COMPONENT CHECKLIST

Finding the Right Fitting for Fluid Management Systems

Nordson MEDICAL

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Fluid management components join flexible tubing assemblies, allowing the flow of valuable media to be easily regulated. With the thousands of available connectors out there, it can be tough to find the right one.

Correctly defining all the details of a desired connector and understanding the options available can help in the selection of the right fitting and also save OEMs significant time and money. This article provides a detailed checklist of the items to be considered when choosing the best fitting to ensure a product's success.

1. INTENDED USE

Identify the intended use of the product or assembly and how the component will be used in the application. While defining what the fitting needs to do, determine what the user interface will be like and what the mating requirements are. Fittings must be intuitive for users and safe for patients. Describe certain aesthetics.

2. TOLERANCES

Determine sizes, like the critical dimensions of the assembly and the required fitting. A reasonable tolerance range for a plastic component is typically + or - .005 inches and + or - .002 inches for critical dimensions, depending on the actual size and the amount of plastic around the feature. Be aware that specifying tight tolerances where they're not needed can significantly drive up costs.

3. TYPE OF FITTING

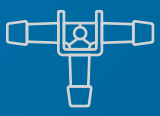
Specify the type of component needed for the assembly. Explain any desired features such as product family, threads, barbs, connection type, configuration, etc. Does it need to be a straight through connector, elbow, Y, tee, multiport connector, or panel mount?

Types of Fittings:

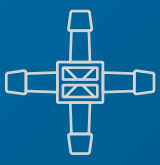
Straight Through Connector

Elbow Connector

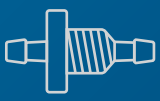
Y Connector



Tee Connector



Multiport Connector



Panel Mount Connector

4. MATERIALS

Describe what is being connected, so the appropriate material can be determined. Will the material need to be solvent bondable or weldable? To ensure product integrity, consider assembly methods. Some materials weaken upon exposure to solvents or crack under stress. Others may not weld well.

5. MEDIA COMPATIBILITY

Ensure that the chosen material will not react to the fluids exposed to it. What kind of media will be going through the component – water, air, lipids, blood, chemicals, etc.? The type of media flowing through the connector can affect the strength, appearance, color, and performance. Define toughness, ductility, lubriciousness, etc.

6. BIOCOMPATIBILITY AND REGULATORY REQUIREMENTS

Are there any requirements that the product must meet, such as ISO 10993, animal derivative-free, BPA-free, USP Class VI, RoHS and REACH? Many of these assessments are conducted for materials used in medical devices to minimize any potential hazards to patients.

Commonly Used Plastic Resins:

Polyethylene - Chemically resistant, opaque thermoplastic that can withstand reasonably high temperatures.

Polycarbonate - Hard, transparent thermoplastic with moderate chemical resistance that provides good impact resistance and superior dimensional stability. Gamma irradiation stable and can be tinted to prevent color change.

Polypropylene - Soft thermoplastic with high chemical resistance to solvents and chemicals in harsh environments, and gamma irradiation stable.

Polyamide (Nylon) - Thermoplastic with good wear and chemical resistance, low permeability to gases, and sufficient performance at elevated temperatures.

Acetal - Strong and lightweight thermoplastic that provides high strength and rigidity over a wide range of temperatures.

PTFE - Fluoropolymer that is resistant to most chemicals and solvents, with stability at high temperatures.

PVDF - Thermoplastic that is mechanically strong with good ductility over a broad temperature range, and has excellent chemical resistance.

7. TEMPERATURE RANGE

Determine temperature requirements. Very low temperatures or freezing and thawing can cause certain materials to become brittle, while high temperatures may cause deformation. Humidity also needs to be considered.

8. PRESSURE RANGE

Determine minimum, maximum, and working pressures that the connector will be expected to tolerate. The strength and durability of a material needs to be evaluated in high pressure applications.

9. FLOW RATE

Assess the required flow rate, volume requirements, and the effect of any fluid pulsation for connect and disconnect forces.

10. STERILIZATION

Not all plastics are suited for all sterilization methods. It's important to identify what sterilization processes and parameters apply, if any, and that the chosen material will perform appropriately with that sterilization method.

11. TUBING DETAILS

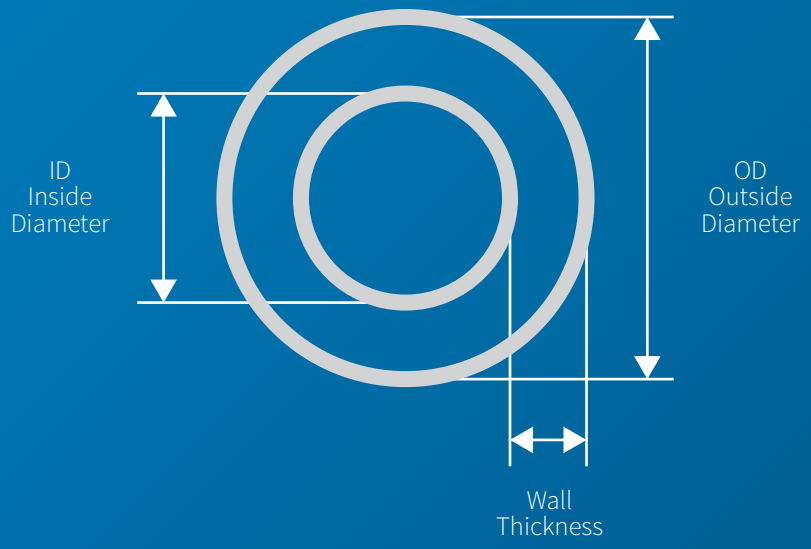
Define the material, size, wall thickness, and durometer of the tubing that will be connected. This will help define the barb style and size that's right for the application.

Types of Tubing:

Soft and Flexible
Polyurethane
Thermoplastic Elastomer (TPE)
Silicone
Polyvinyl Chloride (PVC)

Semi-Rigid
Linear Low Density Polyethylene (LLDPE)

Tubing Dimensions:



12. LIFE CYCLE

Is the product single-use or will it be exposed to cleaning solutions? Anticipate maintenance, changeability, and the expected longevity of the whole system.

13. MANUFACTURING

Define expectations for cost, volume, minimum order quantities, and lead times.

Fluid management components are a critical piece in the transfer of valuable media in medical equipment, laboratory, analytical instrumentation, and industrial applications. By following the steps outlined in this article, engineers can ensure the selection of the appropriate fitting and the success of their delivery systems.

About Nordson MEDICAL

Nordson MEDICAL is a global expert in the design, development, and manufacturing of complex medical devices and component technologies. We serve interventional, surgical, and specialized markets with technologies that save or enhance lives. As an integrated, single-source partner, we enable our customers to save costs and speed time to market. Visit Nordson MEDICAL at nordsonmedical.com.

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