



# 6 Expert Tips on How to Choose your Industrial Fitting!

White Paper



ENGINEERING YOUR SUCCESS.



# INTRODUCTION

Used in a wide variety of areas, often invisible and yet necessary, industrial fittings are essential connecting elements for machine manufacturers and their end users. Given its function and its impact on the final assembly, choosing the optimum product is an important and strategic step. This choice is also complex in view of the many possibilities available.

Why so many ranges, so many different fittings, ...?

How do you find what you need knowing there are 300 million fittings sold worldwide every year?

Making the right choice will always be a guarantee of quality and safety. It will avoid disappointments if the product does not meet expectations, cannot perform all the required operations, deteriorates rapidly or is not adapted to or dimensioned for the task, ...

The offer is so extensive in order to meet the specific requirements of each equipment. Therefore, a precise definition of the use will ensure selection of the ideal product. This document is designed to offer advice on your choice of fitting, guaranteeing you optimum performance.

## 6 key points to consider before choosing your industrial fitting



# 1 APPLICATION ENVIRONMENT

The application itself is obviously the heart of the reflection which will lead to the selection of the industrial fitting. We will develop this aspect in the following chapters through the required performances, the fluid conveyed, the associated products that form the circuit.

In the first instance, it is essential to consider the environment of the application. To find a suitable product, it is essential to have a global overview of the environment in which it is used.

The quality and the state of ambient air (dry, salty, with dust, ...) must be taken into account. The temperature and its variations, projection hazards (water, chemicals, sparks) must also be taken into account.

Often overlooked, the possibility of shocks should not be excluded. Sometimes the fitting can be exposed to contacts with moving objects and can be damaged. This can be the case with the proximity of an actuator, parts in transfer or when it is installed near a circulation zone ... In a situation involving this type of risk, in addition to an in-depth study of the product implantation to minimize the risk, more resistant materials or specific design fittings are recommended.



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There are also cases of tight spaces or difficult-to-access areas which require a conform dimensional of the fitting in order to allow correct assembly and the possibility of subsequent interventions. For this, ranges of so-called "compact" products or "modular" fittings can be proposed by the manufacturers to adapt the number of connections and optimize the space (banjo, shortened elbow, manifold, ...).

External applications characterized by risks of frost, rapid temperature changes, UV exposure, rain, etc. require a very specific selection of products designed to withstand these rigorous conditions.

The use of products on board mobile machinery (car, rail, etc.), strong vibrations, water or mud splashing, high and repeated temperature changes also require calibrated fittings for extreme operating conditions.

In summary, all potential aggressions have to be identified and studied in order to select a product which is suited to its operating environment.

## 2 CONDITIONS OF USE AND PERFORMANCE

When choosing the fitting that is suitable for the application, the user must examine the conditions of use and the performance required so the product is adapted to the requirements of the pneumatic systems in question. Indeed, the mechanical strength is not the same for a polymer product compared to a product made of stainless steel. Moreover, meeting the constraints is not only related to the materials but also to the connection design. The various attachment systems for example: gripping ring, collet, spigot compression do not all have the same mechanical limits as shown in the below illustration, and they offer a range of solutions to each specific need.

These are the requested performances that guide the choice.

The first and most obvious elements that needs to be known are both the temperature and the pressure inside the pneumatic systems. As basic parameters of any pneumatic, or other, circuit, these are fundamentals which determine the fitting to be selected.

The notion of sealing is also essential. Since total and absolute seal from leakage does not exist, it is necessary to determine the maximum allowable pressure drop in the pneumatic systems for a limited period of time. This data is expressed in liter/h and helps to decide on a fitting through the technology used and its performance.

The required flow rate is also an important point to consider. According what is required to ensure proper functioning of the application, it is directly the flow diameter of the fitting (and of its tube) that will be estimated to ensure a sufficient fluid quantity through the circuit.

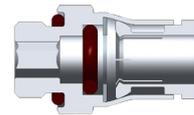
The risk of vibrations that the component has to resist must be estimated. And more generally, it is necessary to take into consideration the tensions applied; particularly to help determine the gripping technology (gripping ring or gripping collet, or compression fitting). The problem is the same in the case of an intensive cycle of physical variations applied to the circuit or fluid (temperature, pressure ...). The constraints will then impose pressure on the products and the connections (tube seizing, fitting disconnection). All fittings have pressure and operating temperature ranges which should be consulted to ensure that they meet the requirements of the pneumatic system.

### Push-In Fittings

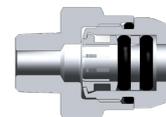
Tube retention with gripping ring



Tube retention with collet



Tube retention with reversed collet



### Principle

Connected and sealed simply by pushing the tube into the fitting. Disconnected by pushing on the release button.

Tube retention with gripping ring:

- No damage to the tube
  - Ideal for polymer tubes
  - Particularly compact
- Tube retention with collet:
- Robust solution for harsh environments
  - Resistant to high pressure, excellent lifespan
  - Ideal for grooved metal tubes

Tube retention with reversed collet:

- Protected disconnection
- Can withstand very high pressures
- Double sealing

### Compression Fittings



### Principle

Connection and sealing achieved by crimping a metal olive onto a tube. The seals are metal to metal.

All these elements play a major role in defining which product will be the most reliable and perennial, with regard to the user's expectations.

Some applications have a unique character, original use or tailor-made needs requiring special attention. The examples are numerous, it may be a transparent tube to control the appearance of the fluid, or check that the flow is correct. In other cases, high level performance is required to meet a specific sealing level or provide added resistance to extreme conditions.

All these criteria mean the user needs to fully understand what kind of solution is required in order to find the "standard" product that will meet this "special" application.

Whenever this "standard" product is not an option, the partnership with the fitting manufacturer is a solution. The user and the manufacturer find themselves developing a specific product (evolution of a standard product or completely new design) to obtain an optimal functioning of the application.

### 3 NATURE OF THE FLUID TO BE CONVEYED

A question springs naturally to mind: which fluid needs to be conveyed?

The importance of the fluid is mainly in the notion of compatibility with the fitting's materials. If there is a "reaction" between the materials, this can lead to pollution of the circuit and fluid, or deterioration of the fitting.

It is therefore important to be fully aware of the characteristics of the fluid used and to ensure that it can be combined with the fitting's materials. This includes the notions of compressible (air) or incompressible (water, oil) fluid, the overall composition, as well as the consideration of possible additives with their concentration, and of course the data sheet, ...

A fitting for each fluid!

For grease, lubricant or water, nickel plated brass fittings are used. If the circuit is dedicated to transporting chemicals, stainless steel is the best option. In the case of compressed air from a compressor drawing ambient air, there is no particular constraint, the choice is greater.

Finally, in more rare cases, it is the viscosity of the conveyed fluid which is important, and which requires larger diameters to ensure a sufficient flow.

Note also the extremely important role of the sealing ring in the concept of compatibility. Directly in contact with the fluid, it has to ensure the sealing of the pneumatic circuit with the outside world. A reaction with the conveyed fluid can have very negative consequences on the pneumatic circuit which can be contaminated if the sealing ring comes apart.

In addition, the sealing ring will no longer provide the sealing function regarding the external environment. Special attention should also be given to this component.

The table below provides overall indications for your information. In any instance, if there is any doubt about the fluid composition or if there is one in particular, do not hesitate to ask your supplier for advice, they will be able to establish the best rates for your fitting.

Fluid	Possible materials for fittings	
	Body	Seal
<b>Compressed air</b>	Technical polymer, bio-based polymer, HR polymer, brass, nickel-plated brass, stainless steel	NBR (Nitrile), FKM
<b>Water, Beverages</b>	Resistant to hydrolysis polymer, HR polymer, nickel-plated brass, stainless steel	EPDM, FKM
<b>Oil, Analytical Gas</b>	Brass, nickel-plated brass, stainless steel	NBR (Nitrile), FKM
<b>Grease, Lubricant</b>	Nickel-plated brass, stainless steel	FKM
<b>Others : chemicals, detergent, ...</b>	Stainless steel, bio-based polymer in some cases (detergent)	FKM, EPDM, NBR (Nitrile)

The whole circuit to be designed or completed and its overall consistency are also part of the important selection criteria for your industrial fitting.

In which type of circuit is the fitting used? What other materials is it connected to?

Directly connected to the fitting, the tube is a major component of the pneumatic circuit. That is why it is interesting to think in terms of: fitting + tube. This couple fitting/tube has to be imagined as a complete solution regarding the application requirements and constraints. After that principally valves, couplers, blowguns are connected to the fitting; there are also support blocks, fixing plates on which the product can be fixed.

Given the need for dimensional compatibility for product assembly, these components affect choice or dictate mandatory characteristics such as diameter, material, type and thread size.

If the tube has been previously defined, it guides the selection of the fitting according to the same parameters (compatibility, required temperature and pressure levels, ...), and its diameter dictates that of the fitting. Similarly, if a specific range has been selected or is already used (case of an extension), the choice depends on this same range to ensure consistency.

In the case of a connector fitted onto a block, a selection of fitting threads with diameters and thread types (BSPT, BSPP, NPT, Metric, etc.) corresponding to those present on the receiving base is required. If the type is not defined, then taper threads have the advantage of sealing directly into the thread by adding a material (precoating, fluoropolymer strip, oakum, etc.), but they require a greater and more precise tightening when assembling. Moreover, the grade of these taper threads makes it possible to transfer the nut + screw forces and to reduce the assembly constraints, which provides a more reliable

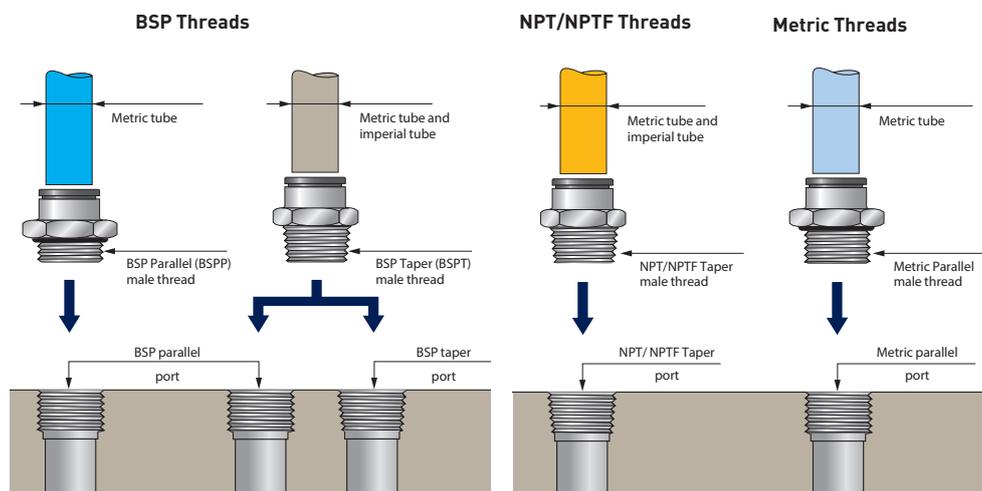
connection, especially in the case of vibrations (less risk of unscrewing for example).

As for the cylindrical threads, they require the addition of a seal and the presence of a flat surface (with a good surface condition on the base plate) so that the seal can be applied correctly and ensure the sealing. Easier to install, the screwing is more flexible and can be repeated without modification. Everyone will find the model that is most suited to an application.

Other elements can be taken into account such as the number of tubes to be connected, the constraint of a precise orientation or not, the necessity to dissociate several parallel circuits. This makes it possible to define the shape of the fitting (straight, T, elbow, Y, multiple, ...), but also its size, color, etc ...

The purchaser should always bear in mind that some materials are not compatible with each other, or can interact. For example, due to a difference in hardness coefficient, premature wear may occur in the case of an inadequate association between a fitting and another component within the circuit. This phenomenon can increase whenever there is movement of the parts relative to each other. Oxidation can also contribute to the premature deterioration of the connection.

Maintaining a global perspective of the pneumatic system is the best way to ensure harmony between the components and their performance by avoiding the creation of a "weak point" that could interfere with the cohesion of the circuit.



Some common threads

# 5 REGULATIONS AND SPECIFIC MARKETS

Sometimes the user must meet standards criteria. The selection of the product can be regulated by national, European and/or global legislation, specific to a company or linked to a particular sector of activity. These rules are likely to fix specific material characteristics, regulated treatments, calibrated dimensions, particular manufacturing methods ...

Regulations will be used to establish safety coefficients, ensure compatibility, define resistance values or justify classifications regarding reference systems. They also serve as instructions relative to health concerns, compliance rules which provide instructions for elements intended to be used in hazardous, electrical or other areas. For example, specific markets such as food, rail, medical, among others, impose their own regulations.

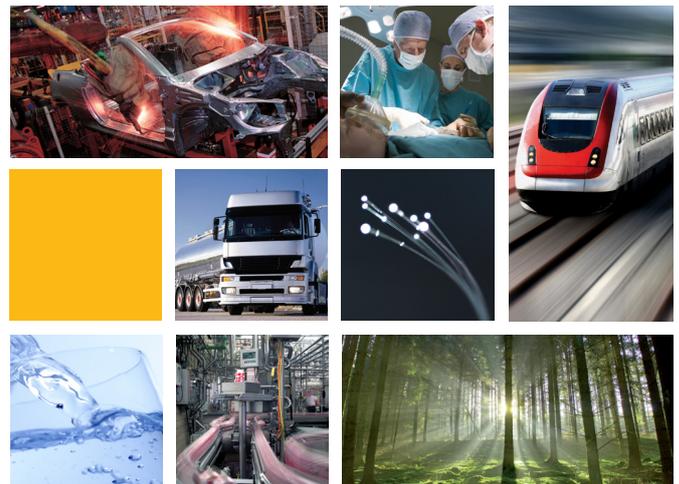
As well as acting as a significant guarantee of quality, it should be noted that compliance with these regulations is necessary in order to obtain certifications required for countries or activities. When you choose a fitting, these guidelines are constraints that banish some products and impose others, and as such, making it easier to choose.

Fitting manufacturers regularly propose ranges dedicated to specific applications or which meet requirements of a particular standard to offer optimum solutions for their customers.

These ranges offer a wide selection of products made from suitable materials, with special treatments and other options that will not be present in more conventional ranges.

A significant example is in requests for products intended for use in 'clean rooms' or medical settings. These applications are framed by several very strict standards which impose, in particular, an increased level of cleanliness of fittings. However, few manufacturers offer complete ranges of fittings that respond positively to these requirements.

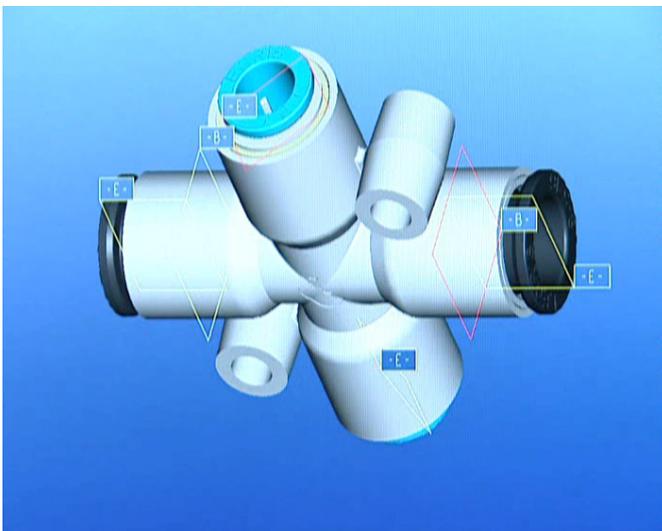
In conclusion, only articles in accordance with the required characteristics by the regulations in force and related to the intended application should therefore be used.



*"The customer-supplier relationship must be a partnership based on trust and driven by the quality of products and services."*

More generally, among the last criteria that we will discuss in this document, are the scopes of ranges and the sustainability of the manufacturer's offer. These two concepts are essential because the wider the choice, the more accurate a product can be found. In the future, the continuity of the offer will make it possible to find the right product if there is a modification, repair or extension of the pneumatic system.

The quality of materials is also an important criteria. Many variants of quality and technical characteristics exist for each material and each production. It is important to know how the manufacturer selects raw materials and how consistent they are. This is to ensure that the product meets the required quality with homogeneity over time.



For the supplier knowing if you are dealing with a manufacturer or a distributor (with a possible exclusivity) is important. The fewer intermediaries, the better the quality, the service and the prices. Similarly, the size of the distribution network should be considered according to national or international requirements. Lastly, the ability to process urgent requests for parts, troubleshooting, after-sales service are not to be overlooked.

Other service options also offer a significant advantage for greater efficiency. These can be 3D plans, dimensional data, certificates, traceability, technical specification, accessibility to the order system, customer interfaces for technical support and claims. Quality policy and environmental policy can also influence the supplier choice.



Despite the fact that these elements do not directly concern the selection of an industrial fitting, they have an important impact both at initial choice and throughout the life of the pneumatic system. All this available, updated and accessible data plays a crucial role in guaranteeing reliability of the offer, and ensuring an optimization of the support provided for, ultimately, a better result.

The customer-supplier relationship must be a partnership based on trust and driven by the quality of products and services.

# CONCLUSION

This document has presented you with 6 key points to consider when choosing your industrial fitting. By following these tips, you will be guaranteed a product allowing you to operate your pneumatic system optimally. It is your choice on how to grade the criteria or evaluate them according to the application.

To facilitate investigations, selection-support tools are available to help you find your fitting. These "Product Selectors" make it possible to determine, in an interactive, simple and fast way, the most appropriate product according to the technical characteristics indicated.

However, standard products proposed in suppliers/manufacturers' catalogues do not always meet the application's requirements. In this case, a customized study must be carried out to determine an adequate "special fitting". Through R&D and engineering capacity, as well as capacity for market surveillance and studies, the manufacturer is there to provide the most efficient solution and work in close collaboration with the customer.

This white paper highlights, through the information provided, the importance of a complete and precise vision of the application in order to choose the right fitting.

You can also count on the manufacturer's teams who, through their experience and valuable tips, can guide you in choosing the right fitting. Do not hesitate to contact them!

*A question?  
A project?*

*Contact us  
email: [webcontact@parker.com](mailto:webcontact@parker.com)*

*Inventor of the push-in fitting with more than 40 years of experience, Parker Legris has the know-how necessary for providing fluid connectors adapted to a wide variety of environments, such as production automation, packaging, transport, food process and the medical industry. Our wide selection of fittings, tubing, ball valves and accessories, along with our capacity to develop specific products, allow our customers to find the very best connector solution. Parker Legris, the right partner to accompany you in product development.*



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