Bags Filters Vs Cartridges Filters

Bags filter or cartridges filter? What is the best technology?

Bags vs. cartridges on dust filtration

In the context of industrial processes, there are various technologies that allow the separation of solid particles. If the particles have dimensions greater than 10-50 µm, an apparatus that allows to obtain interesting results is the cyclone. The latter, by means of the centrifugal force, puts the particles in a position to impact against its walls, thus making them fall to then collect in a suitable container.

For smaller particles the cyclonic technology has some limitations, and it is necessary to apply mechanical filtration. What is meant by this term?

The meaning is extremely simple: the separation of the solid phase takes place by passing the gaseous stream through a specific filter surface, which retains the particles and separates them from the stream.

Although the process is extremely simple, there are numerous solutions that apply this principle. In particular, both bag filters and cartridges operating according to mechanical filtration: the difference resides in the morphological / structural characteristics of the material used and in some constructive peculiarities.

Here the comparison of our interest! Better bag filter or cartridge filter? Which of the two allows you to get the best performance? What are the differences? Let's start with our analysis.

Bags and cartridges: Operating principles

The filter media of bags or cartridges are both similarities and differences. The first thing we can note is that, as previously shown, both promote a mechanical filtration. In other words, both mechanically impede the entrainment of the powder within the gas stream. A key question is how to hinder it? To answer this question, it is appropriate to introduce the difference between surface and deep filtration.

What’s the difference? As you can see in the image, the materials prepared on the surface
filtration block the **particles** on its surface, while those predisposed to deep filtration allow the penetration of the particles within its thickness. Frequently the accumulated **particles** behave as an additional filter element, and thus enable to increase the separation efficiency. It is important to point out that, compared to an increase of efficiency, there is also an increase of the **pressure drop**, which make necessary a cleaning or a replacement of the filter element. As you may have guessed, given the lower penetration of **particles**, the materials that promote a surface filtration are easier to clean and last for more over time. The materials that instead promote a deep filtration are more difficult to clean and, although presenting lower initial costs, require more frequent replacement, as the cleaning processes are likely to spoil them.

Both the **bags** that the **cartridges** can exploit the mechanisms of filtration before described, in dependence on the microscopic shape of the material from which they are made. The materials used are typically **polymeric**, with treatments and additions which ensure certain performance in specific contexts. A difference that, instead, it is interesting to highlight is the different filtering surface. In fact, frequently the **cartridges** have a pleated conformation, which allows them to have a much greater filter surface area than **conventional bags** (compared with a greater risk of clogging).

Let’s move on to a practical question: how you can choose between a **bag filter** and a **cartridge filter**? What are the selection parameters that allow you to choose one over the other?

**Bag or cartridge: that is the question!**

Within the choice between **bag filter** and **cartridges filter**, there are many factors to be taken into consideration to make the choice.

Among them we can mention:

- the process flowrate. This parameter turns out to be of high importance to make the choice because profoundly affects the equipment sizing and therefore related costs. Empirical rules suggest that the **cartridge filters**, in contexts that allow it to be used, are
typically cheapest of bags filters for flow rates below 30,000-35,000 m³/h. This is a rule of thumb: nothing replaces adequate assessments and considerations in each specific context.

- **dust load.** With regard to the load of powder, the comparison typically sees winners bags filters. In fact, the filtering bags are to be usable in a very wide range of dusty load, unlike the cartridges that are extremely functional in contexts characterized by a limited concentration of dusts.

- Nature of the powders. Also with regard to the nature of the dust, bags tend to show a greater versatility with respect to the cartridges. For example, in case of hygroscopic powders it is highly recommended to opt for bags filter.

- Flexibility. In accordance with the above two considerations, the bags filter have greater flexibility with regard to any variations in the manufacturing process. Production processes that operate in an extremely precise and steady state conditions may opt, upon appropriate assessment and planning, for a cartridge filter. If the production process is instead characterized by intrinsic changes of operation, a bag filter is potentially the main choice to carry out the separation of powders.

- Low operating costs and maintenance costs. Frequently, in the purchase of air treatment systems, it assesses the cost of the plant or of the equipment itself. This analysis, which takes into account only the initial investment, is simplistic and not very functional. A good purchase analysis must in fact also assess the operating costs of the installation and the maintenance need. What translate these costs, in practice? Typically, the main cost items are the power consumption of the fan and the replacement cost of the filter media. Regarding the power consumption, it is a function of the flow rate ensured by the fan and its prevalence (helpful to overcome the pressure losses of the piping and the filtering equipment). As regards the parts costs of the material, they are a function of the cleaning potential applicable to it and to its structure. In fact, filter materials initially more expensive may present a possibility of more effective cleaning, and therefore take more time. As these considerations apply to bags and cartridges? Typically the cartridges filter have more to cleanliness issues. It is also true that to make some general considerations can be misleading: the dedicated analysis and design of the individual case allow you to find the best solution for the application examined.

Bag or cartridge: our experience

In the previous section we looked at the parameters to be considered for optimal mechanical filtration system choice. Tecnosida®, in more than 35 years of experience, has performed a very large number of analysis and design choices. What are the main ideas that have emerged from this experience?
• The **cartridges** have a significantly higher filtration area than **bags**. Therefore, in parity of filter surface, the cartridges determine a smaller footprint of the apparatus, and are therefore extremely functional in designs with limited space. Turn out to be a very good choice in the case of **non-hygroscopic powders**, which not overly clogged the material and have no tendency to packing. As previously mentioned, in addition to the **nature of the powders** is important to take into consideration also their concentration.

• The **bags**, typically have a lower filtering surface respect cartridge, they tend to provide greater accessibility to the filter surface itself and turn out to be suitable for **high dust concentrations**.

The various morphologies assumed by **filtering bags** allow the use in a variety of contexts, ensuring high efficiency and maintaining a high cleaning potential.

**So, what to choose?**

On the light of all the considerations developed, what is the best choice? **Bags** or cartridges? It is worth pointing out that the answer to this question does not exist. There are several industrial processes, with different operating conditions and each with their own specific needs. The filter equipment chosen to use, is to be made on the basis of **careful analysis and a proper design**: the experience and knowledge help in any context to outline the best solution that fully functional answer to customer needs.

Examines our **DUSTdown® filter**, and discover our **Case History**! You’ll find a number of applications of our treatment plants, to discover how they work and to examine the many industrial contexts in which they can be used.

See you soon with new interesting item!