«МАТЕРІАЛОЗНАВСТВО, ПОЛІМЕРНІ, КОМПОЗИЦІЙНІ МАТЕРІАЛИ ТА ХІМІЧНІ ВОЛОКНА»

ANALYSIS OF TRENDS OF FILTER MATERIAL

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ABSTRACT

The following general classification filters. Consider new technologies in the field of filter material , the structure filters, raw material composition. The dependence of the distribution and performance of the filter on the physical and chemical properties of filter products, technological conditions of the filtering process and the type of filter material. The problem of designing, building , construction and choice of filter material , which in most cases are crucial for filtration , especially early in the process when caught on the surface of the first material of the solid phase to the sediment , as this is determined by rate of filtration (filter output) filtrate purity and other parameters.

Key words: filter materials, structure, purpose properties.

INTRODUKTION

Acute environmental situation related with air pollution and industrial waste water, resulting in the need to develop new technologies, the use of cheap filter elements that allow multiple regeneration.

Create a filter materials that combine high performance with Hold capacity, is today the most important task, the successful solution of which is promoted as the right choice of designs filter system, filtration process conditions and choices most filter materials.

Filter materials can be used as filters and when pre- cleaning water, gases, organic solvents, mineral and organic solvents, low -acid, mono- alkali solvents, oils, radioactive aerosols, etc..

Currently, for the manufacture of filter elements, a broad range of synthetic polymers. Along with polyethylene, polypropylene, polyamide and polyester fibers, thermoplastics are an advantage, which is very suitable for processing by extrusion, which makes it possible to obtain single thread or yarn.

To protect and clean the environment from harmful emissions from oil pollution, processing and disposal of waste and used sorption filter materials.

At the core of porous filters of all kinds is the process of gas filtration through the walls, in which solid particles are trapped, and the gas passes completely through them. Filter partitions varied in structure, but mostly they consist of fibrous or granular cells and are divided into the following types:

- Flexible porous walls - woven materials from natural, synthetic or mineral fibers, nonwoven fibrous materials (felt, punched and glued materials, paper, cardboard, fibrous mother), cellular sheets (foam rubber, polyurethane, membrane filters);
- Semi- cellular walls - layers of fibers, flakes, woven wire mesh, placed on supports;
- Rigid porous walls - granular materials (porous ceramics or plastics, sintered or pressed powders of metals, porous glass, carbon-graphite materials etc.) Fibrous materials (formed by layers of glass and metal fibers), metal mesh and perforated sheets.

Depending on the purpose and size of the input and output concentrations, filters conventionally divided into three classes: fine filters, air filters, industrial filters.

Results and Discussion

Recently woven filters are improved through the use of new materials. In such filters, are used filter materials of two types: ordinary fabrics made on looms and felting obtained by stalling or mechanical interlacing fibers punched method. In typical filter cloth size pinholes between the filaments is 100-200 microns. Previously, these filters are produced mainly from natural raw fiber and yarn

structure, which led to their fragility, now - of synthetic fibers and yarns, single and multithread yarn. It is possible to obtain a framework that is able to carry electrostatic charges, which helps in filtering air mixtures and gases.

Today has developed various methods of surface modification of woven filter method applying a different material. In particular, may be laminating several layers of filtering. Example – "Filterlink" filters, a feature which is very smooth front surface that is highly resistant to contamination (Ivanov M., 2003).

Filtration capacity of tissues depends on the nature and number of pores in the fabric, which are determined by raw material composition and its structure. We found that the filtering capacity of tissue due to the peculiarities of its structure (plain weave , the minimum density, maximum surface porosity and maximum pore cross , like the base, and on the weft) (Ivanov M., 2003).

Fibrous filter element filter consists of one or more layers of fibers are uniformly distributed. Fibrous filters with pores evenly distributed between the thin fibers run with high efficiency, the degree of purification of 99.5 - 99.9 % for gas filtration velocity of 0.15 - 1.0 m / s and P = 500 Pa ¸ 1000. Filter with glass-fiber materials possible cleaning corrosive gases at temperatures up to 275 ° C. For fine cleaning of gases at high temperatures , apply filters with ceramic wool satin stainless steel with high strength and resistance to changing loads, but their hydraulic resistance is - 1000 Pa . Fibrous fine filters used in nuclear power engineering, radio electronics , precision instrumentation, industrial microbiology , in the chemical- pharmaceutical and other industries. Filters allow you to clean large volumes of gas from the particulates of all sizes, including submicron (Pelyk L., 1999).

Particular interest are knitted filter sleeves made wear knitting way. Their strength, deformation characteristics and surface density varies easily. With this method may manufacture seamless filter element which reduces the economic costs of more raw besides precludes rapid destruction of arms in the joint zone. Seamless filtering sleeves have been tested and working in cement plants, food processing, machine building industry and construction materials. Analysis of seamless wear knitted filter bags showed high efficiency dust collection ŋ = 99,99%, breathability B = 165 dm^3/m^2*s, tensile strength long sleeve diameter of 200 mm is 88 kN. The efficiency of 19-25 months. Hose satisfactorily treated with reverse blowing. The surface structure can shake even the limestone dust that has settled and hardened on the sleeve. The degree of regeneration after blow down is 94-97 %. RMS surface density in wear knitting sleeves is 345 r/m^2 (Ivanov M., 2003).

Earlier in the non-woven filter material applied felt, however, because of the small frangible strength and low permeability of its use was limited. Improved methods of casting polymers from the melt allowed to start producing extrusive air- filled polymer fibers , called «spunbonded». New materials technology have made it possible to obtain an extremely small diameter fibers, satisfactorily proved in the implementation of fine filtration. From these plastics can be made layered filtering material such as "sandwich".

There are also filtering materials in the form of grids, obtained with single wire and plastic fibers (see also Figure 1). Given the particular filter should be considered in the category screens, a feature which is guaranteed mesh size (Ivanov M., 2003). Screens can be obtained in several ways, the most common of which - sintering several grids. To carry on the thinnest wire mesh filter using multilayer nets, called abroad Bopp's Poromet.

A novelty among the filter material is membrane. After developing methods of ultrafiltration membranes are used to remove solids from liquids. Rapid recognition of membrane technology and the creation of a new trend - microfiltration, was due to the need for a small.

Figure 1: Example of filtering.

With this process achieved a high degree of purification, filter but it is associated with a significant pressure drop , therefore membranes should be material in the form of greater strength. To solve this problem, they provide special grid supporting layer. Development of materials for membranes produced in two ways: first - design development filtering membrane that can operate at high differential pressure (membrane with reinforcing mesh, multi-layer membrane), the second - to obtain materials with defined pore size, a minimum of dispersion and uniform distribution of pore on the surface. A reasonable value and importance of the membrane are the main element of water treatment equipment. At the same time they are the main product in the market filtration materials.

Also the trend of popular filter material provides filters made of metals and ceramics, which makes it possible to apply membrane technology to filter corrosive solutions with high temperatures (Ivanov M., 2003). Today many Ceramic membranes are produced by foreign firms.

Outstanding scale popularity gained replaceable filter elements which are often referred to cartridges. After working life they are released or regenerated. Cartridges are a complete design consisting of filter material, bearing components, which provide mechanical strength and connection elements of the filter housing.

Modern cartridges are characterized by diverse range of content and different characteristics. Cartridges are divided into two types: the main element of the first type is a segment of a cylindrical tube, closed on both sides for input and output filtering thread. In the inner cavity of the tube is placed filter material. The second includes cartridges that consist of a set of identical, series-connected filter elements arranged in a single package. In recent years, the basic design elements have not changed. The most important changes were folded devices for cleaning of gas and air (Pelyk L., 1999). Fillers are different cartridge filter media: activated carbon, ion exchange resins, natural and artificial mineral compounds, etc.. Technical solutions implemented to improve cartridge filters were designed to counteract the formation of dead zones, areas breakout filtering flow and compaction bulk material.

One of the most popular categories of filter material is air and gas filtration. Over the past decade, this branch has developed considerably. At present, there used materials from alloy of polypropylene sulfide rubbers. Strict legal requirements on environmental protection and improvement requirements to air cleaning, caused attention to the problems of removal of fine particles from air mixtures (Ivanov M., 2003). Because of the ability to accumulate dust in air masses and electrify and serve the cause of the explosions, special importance in gas cleaning came with electrostatic filter medium resistance.

Much attention is given to the ceramic and metallic materials due to the importance of capacity environment clean hot gases, since it is known that both of these types of materials capable of withstanding high temperatures. The most common metal filters made of corrugated steel tape heat resistant and porous ceramics. These filters combine a variety of treatment with continuous heat resistance. To make the air masses disposed not only solid dust particles, but also toxic impurities developed composite materials that combine filtering medium with adsorption materials or materials that remove impurities. For example, activated carbon combined with fibers or filaments.

Conclusions

For today, there has been a great activity in introduction of new technologies in the field of filtration materials.

Quality of distribution and filter performance depends not only on the physical and chemical properties of filter products, technological conditions of the filtering process, but also on the type of filter material. Therefore, the design, construction, manufacturing and choice of filter material in most cases is critical for filtering, especially early in the process when caught on the surface of the first material of the solid phase to the sediment, as this is determined by rate of filtration (filter efficiency), the purity of the filtrate and other indicators.

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