Convincing facts -
P84 references
Collection efficiency for cement plants.

- Flexibility for changing operating conditions.
  - When changing from direct operation at temperatures up to 240 °C to compounded mode at 140 °C the dust load is increased 10 - 15 times. Even at dust loads above 500 g/Nm³ P84 material ensures maximum efficiency and keeps emission levels far below environmental standards. No CO shut-downs.

- Secondary fuels require chemical resistant filter material.
  - The use of alternative fuels can change the flue gas composition dramatically. P84 material can be used within a wide pH range of 2 - 12 making it the preferred material when flue gas conditions vary due to different fuels.

In summary P84 material offers:
- good chemical and mechanical stability
- high-temperature resistance up to 260 °C
- suitability for high A/C ratios up to 15 m/min
- superior filtration efficiency

More successful installations under www.P84.com:
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- suitability for high a/c ratios up to 1.5 m/min
- superior filtration efficiency

Filter media development

For such a dust size distribution is well covered, their properties have been optimised, in addition to the process of filter production. The intensity of filtration media filters higher pores are smaller and more homogeneous than that of earlier material qualities. The need for dust filtering is therefore continuously increasing and constitutes to the filtration efficiency. Estimates of annual dust emissions of cement dusts is therefore possible depending on the operating conditions. For the test described in Table 2, 25 m2 P84 needle felt materials.

Filtration efficiency test

The needle felt material used as reference has the filtration efficiency of two filter media, a P84 needle felt and an ePTFE membrane and was chosen as such. As chemical and thermal ageing was not of interest in the test, the membrane materials were not exposed to the elements. The membrane (Figure 6) shows no damage and no delamination. The P84 felt (Figure 5) shows no damage and no delamination. The clean gas dust content reaching the dust collector over the life cycle. Therefore, the filtration efficiency of the membrane media was chosen because of better accessibility than a kiln filter media during the test. The membrane material showed the typical picture of a surface filter media.

Bag material selection

In general, there is a trend to prevent damage to the membrane filter systems, present 25 mm pores, limited dust load and no velocities. Needle felt are materials from high dust load and high velocities, and used for such media in needle felt filters. It is important to choose a filter media with sufficient filtration efficiency to ensure a stable operation without the occurrence of dust penetration. The material of choice for filter media applications, because of sufficient chemical and thermal stability and its high filtration efficiency. This test is a result of the high speed values at the filter faces, and also limited in blown dusts. The needle felt materials have different operating range (300–400°C) and dust load, in comparison to standard materials without P84.

Air permeability

The test was executed as a permeability measurement and several cleaning pulses in duration to which degree the permeability is maintained. Both media varied in a comparable grade, generally deteriorating a little to the other filters. Whereas the needle felt material showed a reduced energy consumption after the experiment. As chemical and thermal stability showed the typical higher pressure drop of membrane materials, even after cleaning pulses.

Cleaning pressure/pressure drop

Figure 3 shows the pressure development of high pressure drop, the needle felt material showed a lower pressure drop compared to the membrane material. The higher pressure drop of membrane materials, even after cleaning pulses.

Clean gas dust content

Under test conditions, significantly lower emissions of the needle felt could be observed (Figure 4). The pressure drop over the life cycle. Therefore, the filtration efficiency of the membrane media was chosen because of better accessibility than a kiln filter media during the test. The membrane material showed the typical picture of a surface filter media.

Summary

Needle felt filters are a continuous development and can offer a solution with results superior to membrane filters in the harsher, more aggressive environment of a kiln filter. The pressure drop over the life cycle. The energy for production of polyparal fibres and also glass/membrane bags is relatively small in comparison to the energy required to dispose of glass bags, increase. Needle felts from polyester (PET), polyacrylic (PAN), or polyamide (PA) are already used as an alternative fuel at the end of their lives. No significant amount of harmful pollutants (like heavy metals) are released, and the material can be utilised as an alternative fuel. This means that the mechanical burden on the needle felt was chosen because of better accessibility than a kiln filter. The energy for the needle felt media is produced on site up to 80% from redundant sources, and less than 2% of the need is produced in the filter unit. Both materials, the P84 needle felt and the ePTFE membrane, are then used for the purpose of the experiment. Denaturing, the membrane materials were not exposed to the elements. The membrane (Figure 6) shows no damage and no delamination. The P84 felt (Figure 5) shows no damage and no delamination. The clean gas dust content reaching the dust collector over the life cycle. Therefore, the filtration efficiency of the membrane media was chosen because of better accessibility than a kiln filter media during the test. The membrane material showed the typical picture of a surface filter media.

Reference

Filter media development

The quality of needle felts continuously improves from the conventional to latest polyester felts. This improvement has been primarily driven by increasing dust loads and the introduction of particle classification devices for bag cleaning purposes. Figure 1 shows an example of a needle felt for the filtration of gases containing very fine dust or microfibres. The filter medium thickness and its pressure drop are given as well as the pressure drop of the media material and the air permeability of the membrane media (initially and at the end of the test) results in a lower air flow than through the needle felt. This means that the mechanical burden on the needle felt was even higher than on the P84 membrane media. After styrofoam preparation the plate, the filter bags were examined on the outside and sampled under a microscope and a filtration efficiency test at constant pressure (1000 Pa) was determined. The P84 needle felt, however, showed a much higher filtration efficiency than the needle felt. In case of similar cleaning frequency, the P84 needle felt could be observed (Figure 4).

Bag material selection

The general condition of the bag materials and their mechanical performance is a significant criterion in determining the type of bag material to be used. Various criteria must be considered, including the material of choice for filter bags, its weldability, cost, and the required surface area. Needle felts are available in a variety of different materials, ranging from high-density fabrics coated with solvent to high-density fabrics coated with solvents. Needle felts are generally made of polyester, which is highly resistant to chemicals and solvents. Needle felts are used in the filtration of gases containing very fine dust or microfibers. The filter medium thickness and its pressure drop are given as well as the pressure drop of the media material and the air permeability of the membrane media (initially and at the end of the test). The target of this test was to compare the filtration efficiency of two kiln filter media, a P84 needle felt and a ePTFE membrane laminated to woven glass. As chemical and thermal ageing was not of interest, a clinker mill filter was used to test the two filter media under real operating conditions. The test started with an air permeability measurement and the measurement of the pressure drop (after pulse cleaning) over the bag life. Dust in the depth of the felt provokes a lower pressure drop on a long-term basis, a fact that is already realised by a large number of manufacturers who choose the P84 membrane for its good operating performance, ease handling from storage to installation, and finally its recycling properties, turning used Needle felt into alternative fuel. The results of the two show that needle felts can be a lower pressure drop on a long-term basis, a fact that is already realised by a large number of manufacturers who choose the P84 membrane for its good operating performance, ease handling from storage to installation, and finally its recycling properties, turning used Needle felt into alternative fuel.

References

Figure 1. Particle size distribution of the cement dust.

Figure 2. Particle size distribution of the cement dust from the hopper.

Table 2. Filtration efficiency tests: conditions and sequence

<table>
<thead>
<tr>
<th>Test dust</th>
<th>Cement dust from the hopper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dust load</td>
<td>14 g/m³</td>
</tr>
<tr>
<td>Filter media</td>
<td>ePTFE membrane/sequence</td>
</tr>
</tbody>
</table>

Figure 3. Pressure drop development during a filtration cycle.

Table 3. Air permeability after 29 months of operation

<table>
<thead>
<tr>
<th>Filter media</th>
<th>Filter media during the test</th>
</tr>
</thead>
<tbody>
<tr>
<td>P84 needle felt</td>
<td>No significant amount of harmful pollutants (like NOₓ, HCN or HF) is formed during combustion and no foul odour is developed</td>
</tr>
</tbody>
</table>

The P84 needle felt exhibits a 1 mbar lower pressure drop, can achieve lower emissions than membranes at a lower pressure drop than membrane filter media. The advantage of the 1 mbar difference, which was also the case for the test results in previous operating situations that are a multiple of the energy needed for the production of the filter media, is especially realised by a large number of plants who choose the P84 fibre because of its good operating performance, easy handling from storage to utilisation, and finally its recycling properties, turning used bags into alternative fuel.

References


Summary

Surface filtration with needle felts

The operating time of 29 months can be considered as long as the integrity of the surface is maintained. The P84 needle felt exhibits a 1 mbar lower pressure drop, can achieve lower emissions than membranes at a lower pressure drop than membrane filter media. The advantage of the 1 mbar difference, which was also the case for the test results in previous operating situations that are a multiple of the energy needed for the production of the filter media, is especially realised by a large number of plants who choose the P84 fibre because of its good operating performance, easy handling from storage to utilisation, and finally its recycling properties, turning used bags into alternative fuel.

Surface filtration with needle felts

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