filtration device, in order to ensure the removal of the residual liquid below the membrane filter after having detached the funnel.

Summary

This object is achieved by a filtration base for vacuum membrane filtration applications having the features according to a first aspect. Advantageous and useful designs of the filtration base are specified herein.

In the first aspect, the filtration base according to the present disclosure is provided for vacuum membrane filtration applications and comprises a membrane bearing area on the upper side of the filtration base, which has a bearing structure and a supporting contour surrounding the bearing structure for a membrane filter placed in the membrane bearing area. According to the first aspect, the supporting contour has at least one notch which is in flow connection with the bottom side of the membrane bearing area and which is arranged such that it is adapted to be selectively covered by a membrane filter placed in the membrane bearing area.

The invention is based on the findings that in a vacuum membrane filtration device, no complex construction including a valve or the like which is provided especially for this purpose and which has to be switched separately is required for a selective aeration of the bottom side of the wetted membrane filter if the behavior of the membrane filter after removal of the funnel is exploited by a small but clever constructional measure. More specifically, the invention makes use of the fact that the wetted membrane filter, which is still sucked to the upper side of the filtration base by the applied vacuum, is no longer clamped at the rim without the funnel, so that the rim can bulge upwards. With the filtration base according to the present disclosure, this deformation of the membrane filter can be used to cause a deliberate leakage in the interaction between the membrane filter and the filtration base by releasing a notch specifically provided for aeration, which was previously covered by the clamped membrane filter. The released notch - assisted by the vacuum still applied - allows the ambient air to flow to the bottom side of the membrane filter, such that the residual liquid still present below the

membrane filter can be sucked off and the membrane filter can be easily removed from the filtration base.

Preferably, in an example, the supporting contour is delimited from the bearing structure by a circumferential edge, and the notch provided according to the present disclosure interrupts this circumferential edge between the bearing structure and the supporting

contour. When the rim of the membrane filter is no longer clamped and the vacuum pulls the center portion of the membrane filter down onto the bearing structure of the filtration base, the membrane filter is pressed against the edge between the bearing structure and the supporting contour. Therefore, the membrane filter in principle still tightly rests against the filtration base at this point; however, the interruption created by the notch provides for the desired leakage, which permits an air flow below the membrane filter.

To ensure its function, the notch should be delimited from its surroundings by edges which are as sharp as possible. Otherwise, i.e. if the edges of the notch were too rounded, there would be the risk that the membrane filter contacts the rounded shapes too easily and thus forms in an undesirable manner a tight connection with the filtration base also at this point. In this respect, the shape and dimensions of the notch are adapted to the stiffness of commercially available membrane filters, such that an undesired tight application of such a membrane filter in the wetted state at a typical suction negative pressure is excluded.

The function of the notch may be assisted by the fact that the notch extends into the supporting contour, particularly if the filtration base is manufactured as an injection-molded plastic part and the desired sharp-edged delimitation of the notch is not easily ensured due to manufacturing tolerances. Owing to this increase in the size of the notch, an enlarged suction window is then available.

A preferred example of the filtration base according to the present disclosure is configured such that the supporting contour on its outside adjoins a sealing face onto which the rim of the membrane filter may be pressed by a pouring funnel put onto the filtration base. In such a design, the membrane filter clamped between the funnel and the sealing face of the filtration base tightly rests against the supporting face when a vacuum is applied, such that the notch is covered. If, on the other hand, the rim area of the membrane filter is no longer pressed onto the sealing face by the funnel after filtration, a

slight upward bulging of the membrane filter rim is already sufficient to release a flow path below the membrane filter due the notch formed in the adjoining supporting contour.

The notch should not extend from the supporting contour into the sealing face to not impair the tight rest of the membrane filter rim in the clamped state.

Ideally, the bearing structure and the sealing face are arranged offset to each other, a difference in height between the bearing structure and the sealing face being bridged by the supporting contour. This means that the rim of the membrane filter initially clamped by the funnel is arranged higher than the central area of the membrane filter sucked against the bearing area. After removal of the funnel, this design assists the desired upward bulging of the membrane filter rim to release the notch.

Typical filtration bases for vacuum membrane filtration devices include a membrane bearing area having an outer diameter in the range of 15 to 55 mm. The outside diameter preferred here is in the range of 25 to 50 mm, particularly preferably of 45 to 50 mm. It has proven to be particularly useful to provide the at least one notch at a distance in the range of 2 to 10 mm, preferably of 3 to 7 mm from this outside diameter.

In a preferred example of the filtration base according to the present disclosure, the supporting contour is annular, and provision is made for a plurality of notches which are spaced apart from each other in the circumferential direction. Due to the plurality of notches arranged in a distributed manner in the supporting contour, a reliable aeration is ensured even if one notch is blocked.

In view of a preferred symmetrical design, each angular distance between the notches is of equal size and is preferably 30°.

The at least one notch provided according to the present disclosure in the supporting contour of the filtration base may basically be a recess of any shape which establishes the desired flow connection to the bottom side of the membrane filter. However, it must be ensured that the membrane filter is not sucked into the notch according to the present disclosure when the funnel is removed so as to still block the flow connection. The notch should be dimensioned very small in accordance with this requirement to ensure that the membrane filter cannot significantly penetrate the notch due to its inherent

stiffness. It has been shown that notches having a width in a range of 0.1 to 4 mm in the circumferential direction meet this requirement.

Of course, each notch should also have a minimum depth to allow air to pass through. A preferred depth is in the range of 0.1 to 1.5 mm.

A particularly advantageous design provides that the at least one notch is a prolongation of a discharge groove formed in the bearing structure. The aim is to suck off as much of the residual liquid still present in the bearing structure as possible after filtration. In the bearing structure of the filtration base, discharge grooves are provided to collect the liquid sucked through the membrane filter during filtration and to allow it to flow to the discharge of the filtration base. If after filtration air is sucked under the membrane filter due to the notches and is specifically directed into a discharge groove, the entrainment of residual liquid is particularly effective.

The filtration base according to the present disclosure may be designed as a reusable or single-use component. In the former case, it is preferably made of stainless steel, in the latter case preferably of a sterilizable plastic material. This opens up the possibility of pre-sterilizing the filtration base - if necessary along with further components of the filtration device. The filtration base is thus ready for use immediately after delivery.

In a second aspect, the present disclosure also refers to a filtration device comprising a filtration base according to the first aspect, a pouring funnel detachably mounted on the filtration base, and a membrane filter clamped between the filtration base and the pouring funnel.

For clamping the membrane filter, a sealing face surrounding the supporting contour may be provided on the side of the filtration base and a matching bulge may be provided on the side of the funnel to press the rim of the membrane filter onto the sealing face. In principle, the sealing face and the bulge may also be reversed, i.e. the sealing face can be formed on the funnel and the bulge on the filtration base. Due to the sealing achieved in this way, filtration is also possible without the suction of air when the filter is fitted.

For typical applications, however, the filtration base is connected to a suction device by means of which a vacuum (negative pressure) is produced under the filtration base to accelerate the filtration process or make it possible at all.

As already explained, the at least one notch should be dimensioned so small that the membrane filter does not come into tight contact with the contour of the

notch due to its stiffness in case of a negative pressure generated by the suction device for a filtration process.

With regard to a preferred single use application, the filtration base and/or the funnel are made of a (pre-)sterilizable plastic material. If a multiple use application is intended, these components are typically made of stainless steel or aluminum. In any case, the filtration device according to the present disclosure is adapted to be mounted on a negative pressure-based suction device (suction strip). The suction device may in turn be made of sterilizable stainless steel or aluminum (multiple use) or of sterilizable plastic material (single use).

Further features and advantages of the invention will become apparent from the description below and from the accompanying drawings to which reference is made and in which:

- Figure 1 shows a side view of a filtration device according to the invention;

- Figure 2 shows a perspective view of the filtration base according to the invention of the filtration device of Figure 1;

- Figure 3 shows a side sectional view of the filtration base of Figure 2;

- Figure 4 shows a perspective view of a boundary area of the filtration base of Figure 3;

- Figure 5 shows a top view of a boundary area of the filtration base of Figure 3; and

- Figure 6 is a cutaway detailed view of the clamping area of the filtration device of Figure 1.

Figure 1 shows a filtration device 10 intended for vacuum membrane filtration applications. A pouring funnel 14 is detachably mounted on a filtration base 12. The filtration base 12 and the funnel 14 are typically reusable stainless steel units. However, in the present case, designs made of plastic material which are adapted to be pre-sterilized and which are intended for a single use are preferred.

A membrane filter 16 (see sectional view in Figure 6) is clamped between the filtration base 12 and the funnel 14.

Claims

1. A filtration base for vacuum membrane filtration applications, comprising a membrane bearing area on the upper side of the filtration base, which has a bearing structure and a supporting contour surrounding the bearing structure for a membrane filter placed in the membrane bearing area,

characterized in that the supporting contour has at least one notch which is in flow connection with the bottom side of the membrane bearing area and which is arranged such that it is adapted to be selectively covered by a membrane filter placed in the membrane bearing area.

2. The filtration base according to claim 1, characterized in that the notch interrupts a circumferential edge between the bearing structure and the supporting contour.

3. The filtration base according to claim 1 or 2, characterized in that the notch is delimited in a sharp-edged manner.

4. The filtration base according to any of the preceding claims, characterized in that the notch extends into the supporting contour.

5. The filtration base according to any of the preceding claims, characterized in that the supporting contour on its outside adjoins a sealing face onto which the rim of the membrane filter can be pressed by a pouring funnel put onto the filtration base.

6. The filtration base according to claim 5, characterized in that the notch does not extend into the sealing face.

7. The filtration base according to claim 5 or 6, characterized in that the bearing structure and the sealing face are arranged offset to each other and in that a difference in height between the bearing structure and the sealing face is bridged by the supporting contour.

8. The filtration base according to any of the preceding claims, characterized in that the membrane bearing area has an outer diameter in the range of 15 to 55 mm, preferably of 25 to 50 mm, particularly preferably of 45 to

50 mm, and in that the at least one notch is formed at a distance in the range of 2 to 10 mm, preferably of 3 to 7 mm, from the outer diameter.

9. The filtration base according to any of the preceding claims, characterized in that the supporting contour is annular and in that a plurality of notches spaced apart from each other in the circumferential direction is provided.

10. The filtration base according to claim 9, characterized in that each angular distance between the notches is of equal size and is preferably 30°.

11. The filtration base according to claim 9 or 10, characterized in that the notches have a width in the range of 0.1 to 4 mm in the circumferential direction.

12. The filtration base according to any of claims 9 to 11, characterized in that the notches have a depth in the range of 0.1 to 1.5 mm.

13. The filtration base according to any of the preceding claims, characterized in that the at least one notch is a prolongation of a discharge groove formed in the bearing structure.

14. The filtration base according to any of the preceding claims, characterized in that the filtration base is made of a sterilizable plastic material.

15. A filtration device comprising a filtration base according to any of the preceding claims, a pouring funnel detachably mounted on the filtration base, and a membrane filter clamped between the filtration base and the pouring funnel.

16. The filtration device according to claim 15, characterized in that the membrane filter is clamped between a sealing face surrounding the supporting contour and a bulge of the funnel.

17. The filtration device according to claim 15 or 16, characterized in that the filtration base is connected to a suction device.

18. The filtration device according to claim 17, characterized in that the at least one notch is dimensioned so small that in case of a negative pressure generated by the suction device for a filtration process, the membrane filter does not come into tight contact with the contour of the notch due to its stiffness.

19. The filtration device according to any of claims 15 to 18, characterized in that the filtration base and/or the funnel and/or the suction device are made of a sterilizable plastic material.