The present invention relates to a medical fluid-conducting cassette (1000) for a medical fluid treatment, comprising: a hard body (1) comprising channels (49) for guiding fluids through the cassette (1000); a first film section (3) arranged to cover parts of the hard body (1) and arranged to cover at least one of the channels (49) against an exterior of the blood cassette (1000); at least one connection point (41) configured to connect at least one of the channels (49) with an exterior of the blood cassette (1000) in a fluid communication; at least one covering device attached to the hard body (1) and arranged so as to cover the connection point (41), releasable or removable, wherein the covering device is or comprises a second film section (3') made from the same material as the first film section (3).
The present invention relates to a medical fluid-conducting cassette for a medical fluid treatment according to claim 1, for example a blood cassette such as can be used in dialysis devices. It also relates to a method for producing a medical fluid-conducting cassette for a medical fluid treatment or for covering a hard body thereof according to claim 15.

The handling of fluid-conducting cassettes, for example blood cassettes, by medical personnel always bears the risk that, during unpacking of a cassette from the sterile packaging, connection points which are used for adding a fluid into the cassette during the treatment of the patient (in short: fluid addition point of the cassette) are accidentally touched by a finger or another object and are thus contaminated. From EP 2 736 562 B1 a contact protection apparatus is known that can be used to cover the connection point until it is used.

One object of the present invention is to propose a further medical fluid-conducting cassette for a medical fluid treatment comprising both a connection point and a covering device for covering that connection point of the medical fluid-conducting cassette.

The object according to the invention is accomplished by a medical fluid-conducting cassette with the features of claim 1. It is further accomplished by a method with the features of claim 15.

The medical fluid-conducting cassette (short: cassette hereinafter) according to the invention comprises a hard part, main body or hard body (hereinafter short: hard body), e.g. made from hard resin.

The hard body comprises channels, or parts of channels, for guiding fluids through, or within, the cassette.

The hard body further comprises a first film section. The first film section is arranged to cover parts of the hard body. At the same time, it is arranged to cover at least one of the channels and/or an interior of the cassette.

The hard body further comprises at least one connection point. The connection point is configured to connect for example tubing in order to provide a fluid communication between at least the channel and an exterior of the cassette.

The hard body further comprises at least one covering device. The covering device is attached to the hard body and arranged so as to cover the connection point. The covering device is attached to the hard body in a releasable or removable manner such that it can be removed from the cassette by a user when using the cassette.

Also, the covering device is a second film section made from the same film material as the first film section. Alternatively, the covering device comprises such a second film section.

A method according to the present invention relates to covering a hard body of a medical fluid-conducting cassette for a medical fluid treatment with a film material.

The method comprises providing a cassette, the cassette comprising: a hard body comprising channels for guiding fluids through, or within, the cassette; at least one connection point configured to connect at least one of the channels with an exterior of the blood cassette in a fluid communication.

The method comprises also the steps: attaching a first film section to the hard body so as to cover parts of the hard body and so as to cover at least one of the channels against an exterior of the blood cassette; attaching a second film section to the hard body so as to cover the connection point in a releasable or removable manner, wherein the second film section comprises the same material as the first film section or consists thereof.

Advantageous developments of the present invention are each also the subject of the dependent claims.

In all of the following embodiments, the use of the expression may be or may have and so on, is to be understood synonymously with preferably is or preferably has, respectively, and so on, and is intended to illustrate exemplary embodiments according to the invention.

Whenever numerical words are mentioned herein, the person skilled in the art shall recognize or understand them as indications of numerical lower limits. Unless it leads the person skilled in the art to an evident contradiction, the person skilled in the art shall comprehend the specification for example of "one" encompassing "at least one". This understanding is also equally encompassed by the present invention as the interpretation that a numeric word, for example, "one" may alternatively mean "exactly one", wherever this is evidently technically possible for the person skilled in the art. Both are encompassed by the present invention and apply herein to all used numerical words.

Embodiments according to the invention may comprise some or all of the following features in arbitrary combination.

In some exemplary embodiments according to the present invention the covering device can be releasable or removable from the hard body without any tools or without being destructive beyond a pre-determined degree or measure.

In some exemplary embodiments according to the present invention the first film section and the second film section are integrally formed or produced, e.g. as a common piece of film material.

In some exemplary embodiments according to the present invention the first film section and the second film section are linked to the other by at least one perforation section. Alternatively, or in addition, the first film section and the second film section are linked to the other by at least two connectors which are integral with both the first film section and the second film section. The connectors preferably being spaced from each other, e.g. by spaced or gaps between corresponding sections.
In some exemplary embodiments according to thereof.

[0020] In some exemplary embodiments according to the present invention the first film section and the second film section are welded one to the other.

[0021] In some exemplary embodiments according to the present invention the first film section and the second film section are glued one to the other.

[0022] In some exemplary embodiments according to the present invention both the first film section and the second film section are welded to the hard body.

[0023] In some exemplary embodiments hereof, the welding method or intensity used for welding the two film sections to the hard body differ for the first and the second film section. For example, the second film section may be welded to the hard body while using less energy for the welding process. It may be welded by a thinner welding seam or line. It may be welded not along a line but by some welding spots or points only. It may be welded by not forming a tight seal between the covered area of the hard body and the exterior.

[0024] In some exemplary embodiments according to the present invention the second film section comprises an interconnecting element configured for connecting the second film section to a transport packaging of the cassette.

[0025] The transport packaging may be the packaging of the cassette that ensures that the cassette remains sterile until the packaging is opened and the cassette is exposed to the sterile environment or exterior.

[0026] In some exemplary embodiments according to the present invention the interconnecting element is attached to the second film section only, that is, it is not attached to the first film section at the same time.

[0027] In some exemplary embodiments according to the present invention the interconnecting element may be attached to the side of the second film section facing the exterior of the cassette and/or to the side of the second film section not facing the hard body side.

[0028] In some exemplary embodiments according to the present invention the cassette is packed into a transport packaging. The second film section is connected to the transport packaging of the cassette by the interconnecting element.

[0029] In some exemplary embodiments according to the present invention the interconnecting element is an adhesive strip, material or layer.

[0030] In some exemplary embodiments according to the present invention the interconnecting element is a strip with adhesive properties on both sides.

[0031] In some exemplary embodiments according to the present invention the second film section was sterilized together with the first film section.

[0032] In some exemplary embodiments according to the present invention at least one connection point is a connection point or coupling for a substituate line or a substitute addition site or a coupling.

[0033] In some exemplary embodiments according to the present invention the cassette is a blood cassette.

[0034] In some exemplary embodiments according to the present invention the method encompasses attaching the first film section and the second film section to the hard body in the same working step or at the same time.

[0035] In some exemplary embodiments according to the present invention the method encompasses attaching the first film section and the second film section which were produced integrally with each other.

[0036] In some exemplary embodiments according to the present invention the method encompasses providing a perforation line or gaps or slits between the first film section and the second film section of the covering device.

[0037] In some exemplary embodiments according to the present invention the method encompasses attaching at least one interconnecting element to the second film section on a side thereof that does not face the connection point.

[0038] In some exemplary embodiments according to the present invention the method encompasses both the first film section and the second film section, which are welded, or are being welded, to the hard body of the cassette.

[0039] In some exemplary embodiments according to the present invention the method encompasses both the first film section and the second film section, which are first welded, or are first being welded, to the hard body of the cassette and then provided with gaps or a perforation line between them.

[0040] In some embodiments according to the invention, the second film section comprises a section which protrudes from the edge of the cassette.

[0041] In some embodiments according to the invention, the at least one connection point, which is or will be covered by the covering device, is a connection point, joint or interface for a substitute line.

[0042] In a further embodiment according to the invention, the medical fluid-conducting cassette is designed as a blood cassette, for example for dialysis treatment, in particular for hemodialysis, hemofiltration, hemodiafiltration, peritoneal dialysis, acute dialysis, and so on.

[0043] Some or all embodiments according to the invention may comprise one, more or all of the advantages mentioned above and/or hereinafter.

[0044] In some advantageous embodiments, there is a reduced risk of unintentionally contaminating the connection point of the cassette, for example by touching it by hand, as the connection point is safely covered by the second film section.

[0045] Since the second film section may extend beyond the rim of the cassette neither the connection point itself nor any point nearby the connection point does have to be touched in order to detach the second film section.
from the cassette. In fact, using the interconnecting element described herein, the second film section covering the connection point may even be removed automatically, i.e., without any further action having to be taken by the user. In any way, the present invention may contribute to minimizing the risk of unintended contamination during detachment of the device covering the connection point.

[0047] The second film section is made from the same material as the first film section needed for covering the hard body and, in some embodiments, for covering or completing the fluid-guiding channels of the cassette. Thus, the second film portion may advantageously undergo the same sterilization processes as the cassette comprising the first film section.

[0048] Also, since the first film section is cut from a film layer necessarily bigger or differently shaped than the hard body of the cassette, applying the first film section always means that some film material has to be cut off and disposed. According to the present invention, however, parts of this waste film material is being used as the second film section. Hence, in some embodiments according to the present invention providing the second film section does not even require providing additional material. Rather, there are no additional material costs to be born for the second film section.

[0049] Detaching the contact protection apparatus from the cassette may in some embodiments be advantageously carried out with just one hand.

[0050] Since the second film section is in certain embodiments according to the invention a soft or flexible film material the risk of injury for the user during its operation as well as the risk of damaging other parts of the contact protection apparatus or the cassette, for example by sharp contours, is minimized.

[0051] As it is possible to do without the use of adhesives for mounting the second film section to the cassette, no residual adhesive remains at the cassette when the second film section is detached from the cassette and thus no adhesive can penetrate into the interior of the cassette via the connection point.

[0052] The present invention is hereafter exemplarily explained by means of the appended drawings, in which identical reference numerals refer to identical or similar components. In the figures it applies that:

Fig. 1 shows a medical fluid-conducting cassette according to the present invention from one side;

Fig. 2 shows the medical fluid-conducting cassette of Fig. 1;

Fig. 3 shows the medical fluid-conducting cassette of Fig. 2;

Fig. 4 shows a medical fluid-conducting cassette according to another embodiment according to the present invention from one side;

Fig. 5 shows the medical fluid-conducting cassette in another embodiment according to the present invention; and

Fig. 6 shows the medical fluid-conducting cassette of Fig. 5 in a transport packaging.

[0053] Fig. 1 shows a possible embodiment of the medical fluid-conducting cassette 1000 (short: cassette 1000) according to the present invention. The cassette 1000 comprises a hard body 1 comprising channels such as the substituate conduit 49 for guiding a medical fluid such as substituate or blood through the hard part 1.

[0054] The hard part 1 is covered by a first film section 3.

[0055] The cassette 1000 comprises a connection section 41 embodied, in this exemplary embodiment, as a substituate addition site.

[0056] For better understanding only a second film section that is also comprised by the cassette 1000 according to the present invention is not shown in Fig. 1, but in Fig. 2 to Fig. 4.

[0057] As discussed above, the substituate addition site 41 needs to be protected against the environment in a manner such that it remains sterile until use of the cassette 1000.

[0058] Fig. 2 shows the cassette 1000 of Fig. 1. In contrast to Fig. 1, a second film section 3’ is illustrated in Fig. 2.

[0059] The second film section 3’ is made from the same material as the first film section 3. It is arranged so as to cover the connection point, here the substituate addition site 41.

[0060] Thus, an unintended touching of the substituate addition site 41 (the connection point) of the cassette 1000 before its use, i.e., before mounting the cassette 1000 to a fluid treatment apparatus is prevented by means of the covering device. Since the second film section 3’ covers not only the very spot of the substituate addition site 41, but has been provided with a generous rim or overhang with respect to the hard body 1, unintended touching of the connection point is prevented by the second film section 3’ even during removal of it.

[0061] As can be seen from Fig. 1 and Fig. 2, the first film section 3 seals the channels of the hard body 1 such as the substituate conduit 49 against an exterior of the cassette 1000 by a peripheral weld by which the first film section 3 is welded to the sealing bar 4. The sealing bar 4 can be a closed structure with no beginning and no end; it may project from the main level of the hard body 1.

[0062] Likewise, the second film section 3’ can be welded to the hard body 1 as well. The weld can be a closed structure, it may be continuous or intermittent, it may follow both the sealing bar 4 and/or a another bar 4’ positioned on opposite sides of the connection point 41 and thus, together with the sealing bar 4, enclosing the connection point 41.

[0063] The aforementioned closed structure can be a
Alternatively, or in addition, the second film section 3' can be glued to the hard body 1, preferably in a manner that allows easy removal of the second film section 3' when required.

The first film section 3 and the second film section 3' can be made from a common piece or layer of film. However, between the first film section 3 and the second film section 3' a perforation line 6 can be provided. The perforation may allow tearing the second film section 3' off the first film section 3 or the remainder of the cassette 1000 in order to use the cassette 1000 or the substitute addition site 41.

A perforation may be a combination of a multitude of openings and interposed non-openings (e.g., film material). Likewise, if the second film section 3' is interconnected to the first film section 3 one might also speak of a perforation in accordance with the present invention.

The first film section 3 and the second film section 3' may be interconnected or integral with each other by a perforation which is a sequence of subsequent openings separated from each other by a multitude of film sections in Fig. 2. Alternatively the first film section 3 and the second film section 3' may be interconnected or integral with each other by a small number of struts or connectors, which are preferably also made from the film material comprised by the first film section 3 and the second film section 3'. For example, two, three or a few more struts or connectors should be enough for keeping the second film section 3' in place. Also, the smaller the number of struts or connectors is the easier it is for the user to remove the second film section 3' when using the cassette 1000.

The cassette 1000 may further comprise one or more of the following elements in any arbitrary combination: A sealing bar 4, a sealing bar 4', a peripheral weld 5, a peripheral weld 5', a perforation line 6, an arterial patient connection 7, an arterial pressure measurement chamber 9, a connector 11 for the entry of blood into cassette 1000, a chamber 15 for the entry of blood into the cassette 1000, a connector 13 for the exit of blood from cassette 1000, a connector 11 for the exit of blood from the cassette 1000, a chamber 15 with arterial post-pump, or a peripheral weld 5', a perforation line 6, an arterial patient connection 7, an arterial pressure measurement chamber 9, a connector 11 for the exit of blood from cassette 1000, a chamber 15 with arterial post-pump, or a peripheral weld 5', a perforation line 6, an arterial patient connection 7, an arterial pressure measurement chamber 9, a connector 11 for the exit of blood from cassette 1000, a chamber 15 with arterial post-pump, or a peripheral weld 5', a perforation line 6.

The interconnecting element 150 serves to keep the second film section 3' securely to a lid 201 of a transport packaging 200 only shown in Fig. 6 and is, hence, discussed only with respect to Fig. 6.

The second film section 3' comprises a flap or removal flap 91 which extends from a rim of the second film section 3' and may facilitate getting a grip on the second film section 3' in order to tear it off the cassette 1000.

Also, two end sections or edge sections 93 and 95 are emphasized by circles in Fig. 4. At sections 93 and 95 the sealing bar 4 joins with the sealing bar 4. In the example of Fig. 4, this junction is where the second film section 3' ends. In other embodiments according to the present invention, there is no such junction, but the second film section 3' ends nevertheless in some end sections.

At least one of its end or edge sections 93, 95, the second film section 3' may be connected to the first film section 3 in a manner which differs from how the two film sections 3, 3' are interlinked with each other. For example, in either of sections 93, 95, the two film sections 3, 3' may be integral without perforation between them. That way, the second film section 3' may be firmly connected to the first film section 3. A perforation between them, e.g., between the two edge sections 93, 95 may
not be needed in those embodiments. In particular, the two film sections 3, 3' may be cut into two separate pieces between the two edge sections 93, 95 that are solely responsible for keeping the second film section 3' to the first film 3 or for connecting them with each other.

In some embodiments according to the present invention, the edge sections 93, 95 are chosen such that they do not cover a rib of the hard body 1 and/or are not supported by a rib or other hard body structure from underneath.

Fig. 5 shows a medical fluid-conducting cassette 1000 in yet another exemplary embodiment of the present invention.

Another interconnecting element 150 is connected to the second film section 3'. It may be provided as a substitute or an alternative to the one shown in Fig. 3. Again, the interconnecting element 150 can be an adhesive, a sticky tape, a Velcro fastener, a tape that is adhesive on both sides or double-sided adhesive tape, or the like. The interconnecting element 150 serves to keep the second film section 3' securely to a lid 201 of a transport packaging 200 only shown in Fig. 6 and is, hence, again further discussed with respect to Fig. 6.

Fig. 6 shows a transport packaging 200. The transport packaging 200 comprises a lid 201 covering or sealing a reception 203 of the transport packaging 200. The reception 203 holds or houses a cassette 1000 like that of Fig. 3. The cassette 1000 comprises the interconnecting element 150 mentioned above. As can be derived from the illustration of Fig. 6, the interconnecting element 150 has obviously been attached to the lid 201 during the packing of the cassette 1000 into the transport packaging 200. Also, as is indicated by the arrow indicating that the lid 201 is being opened in Fig. 4, the interconnecting element 150 does not only stick to the lid 201 but also lifts or takes the second film section 3' with it in which turn is attached to the interconnecting element 150. That way the second film section 3' is removed from the cassette 1000 merely by opening the lid 201 of the transport packaging 200 upon opening the latter.

Reference numerals

1000  cassette
1   hard part or hard body
3   first film section
3'  second film section
4   sealing bar
4'  sealing bar
5   peripheral weld
5'  peripheral weld
6   perforation line
7   arterial patient connection
9   arterial pressure measurement chamber

connector for the exit of blood from cassette 1000, or: blood outlet connector
connector for the entry of blood into cassette 1000, or: blood inlet connector
chamber with arterial post-pump, or pre-filter, pressure measurement site
arterial filter conduit
venous filter conduit
venous blood chamber
upper space of the venous blood chamber 21
lower space of the venous blood chamber 21
cross-sectional restriction of the hard body 1
clot trap
venous patient connection
arterial addition site
check valve of the arterial addition site 33
venous addition site
check valve of the venous addition site 37
substitute addition site
connector for exit of substitute from the cassette 1000
connector for entry of substitute into the cassette 1000
check valve for addition of substitute
substitute conduit
di-stilution addition valve (phantom valve)
post-distilution addition valve (phantom valve)
single-needle sterile membrane
single-needle chamber
blood surge redirection element
single-needle blood valve (phantom valve)
evacuation site for vacuum coupling
primary alignment center
secondary alignment site
pump tube segment of blood pump
pump tube segment of substitute pump
flap
end sections or edge section
interconnecting element
transport packaging
lid
reception

Claims

1. A medical fluid-conducting cassette (1000) for a medical fluid treatment, comprising:

- a hard body (1) comprising channels (49) for guiding fluids through the cassette (1000);
- a first film section (3) arranged to cover parts of the hard body (1) and arranged to cover at least one of the channels (49) against an exterior of the blood cassette (1000);
- at least one connection point (41) configured to connect at least one of the channels (49) with an exterior of the blood cassette (1000) in a fluid communication;
- at least one covering device attached to the hard body (1) and arranged so as to cover the connection point (41),

characterised in that
the covering device is or comprises a second film section (3') made from the same material as the first film section (3).

2. The medical fluid-conducting cassette (1000) according to claim 1, wherein the first film section (3) and the second film section (3') are integrally formed or produced.

3. The medical fluid-conducting cassette (1000) according to one of the preceding claims, wherein the first film section (3) and the second film section (3') are linked one to the other by at least one perforation section (6) and/or at least two connectors integral with both the first film section (3) and the second film section (3'), the connectors preferably being spaced from each other.

4. The medical fluid-conducting cassette (1000) according to one of the preceding claims, wherein the first film section (3) and the second film section (3') are welded one to the other.

5. The medical fluid-conducting cassette (1000) according to one of the preceding claims, wherein the first film section (3) and the second film section (3') are glued one to the other.

6. The medical fluid-conducting cassette (1000) according to one of the preceding claims, wherein the second film section (3') is welded to the hard body (1).

7. The medical fluid-conducting cassette (1000) according to one of the preceding claims, wherein the first film section (3) and the second film section (3') are welded to the hard body (1), wherein the welding method or parameters used for the two film sections (3, 3') differs for each of the sections (3, 3').

8. The medical fluid-conducting cassette (1000) according to one of the preceding claims, wherein the second film section (3') comprises an interconnecting element (150) configured for interconnecting the second film section (3') to a transport packaging (200) of the cassette (1000).

9. The medical fluid-conducting cassette (1000) according to claim 8, packed into the transport packaging (200), wherein the second film section (3') is interconnected to the transport packaging (200) of the cassette (1000) by the interconnecting element (150).

10. The medical fluid-conducting cassette (1000) according to one of claims 8 or 9, wherein the interconnecting element (150) is a strip with adhesive properties on both sides.

11. The medical fluid-conducting cassette (1000) according to one of claims 8 or 10, wherein the second film section (3') comprises an interconnecting element (150) configured for interconnecting the second film section (3') to a substitute line or a substitute addition site.

12. The medical fluid-conducting cassette (1000) according to one of the preceding claims, wherein at least one connection point (41) is a connection point for a substitute line or a substitute addition site.

13. The medical fluid-conducting cassette (1000) according to one of the preceding claims, wherein the second film section (3') was sterilized together with the first film section (3).

14. The medical fluid-conducting cassette (1000) according to one of the preceding claims, embodied as a blood cassette.

15. A method for covering a hard body (1) of a medical fluid-conducting cassette (1000) for a medical fluid treatment by a film material, the method comprising the steps:

- providing a cassette, the cassette (1000) comprising:
- a hard body (1) comprising channels (49) for guiding fluids through the cassette (1000);
- at least one connection point (41) configured to connect at least one of the channels (49) with an exterior of the blood cassette (1000) in a fluid communication;

- attaching a first film section (3) to the hard body (1) so as to cover parts of the hard body (1) and so as to cover at least one of the channels (49) against an exterior of the blood cassette (1000);
- attaching a second film section (3') to the hard body (1) so as to cover the connection point (41) in a releasable or removable manner, the second film section (3') comprising the same material as the first film section (3) or consisting thereof.

16. The method according to claim 15, wherein the first film section (3) and the second film section (3') are...
being attached to the hard body (1) in the same working step and/or wherein the first film section (3) and 
the second film section (3') were produced integrally with each other.

17. The method according to claim 15 or claim 16, comprising the step:

- Providing or generating a perforation line (6) or gaps or slits between the first film section (3) 
and the second film section (3') of the covering device.

18. The method according to claim 15, 16 or 17, comprising the step:

- Attaching at least one interconnecting element (150) to the second film section (3') on a side 
thereof that does not face the connection point (41).
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The present search report has been drawn up for all claims.

Place of search: The Hague Date of completion of the search: 28 June 2017 Examiner: Kaden, Malte

CATEGORY OF CITED DOCUMENTS

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