**Claims**

1. A method for establishing a diagnosis of a component (100), in particular a valve (1000), by means of acoustic emission examination, which component (100) is installed in a pipeline (200, 1200), which pipeline (200, 1200) is designed for guiding a fluid along a flow path in a flow guiding direction (201, 1201), wherein the diagnosis of the component (100) is established taking into account a first acoustic emission sensor signal, a second acoustic emission sensor signal and a third acoustic emission sensor signal, wherein a distinguishing feature between the first acoustic emission sensor signal and the second acoustic emission sensor signal and a distinguishing feature between the first acoustic emission sensor signal and the third acoustic emission sensor signal are also taken into account for establishing the diagnosis,

   a) wherein the first acoustic emission sensor signal has been output by one of at least one acoustic emission sensor (2.1, 2.2), wherein a first acoustic emission signal has been detected by the respective one of the at least one acoustic emission sensor (2.1, 2.2) at a first position (51) on the pipeline, wherein the first acoustic emission sensor signal output by the respective one of the at least one acoustic emission sensor (2. 1, 2.2) corresponds to the detected first acoustic emission signal, wherein the first position (51, 151) is located at a height of the component (100, 1000) installed in the pipeline (200, 1200) as viewed in the flow guiding direction (201, 1201),

   b) wherein the second acoustic emission sensor signal has been output by one of the at least one acoustic emission sensor (2.1, 2.2), wherein a second acoustic emission signal has been detected at a second position (52, 152) on the pipeline (200, 1200) by the respective one of the at least one acoustic emission sensor (2.1, 2.2), wherein the second acoustic emission sensor signal output by the respective one of the at least one acoustic emission sensor (2. 1, 2.2) corresponds to the detected second acoustic emission signal, wherein the second position (52, 152) is located on the pipeline (200, 1200) at a distance from the first position (51, 151) in the flow guiding direction (201, 1201) or against the flow guiding direction (201, 1201),

c) wherein the third acoustic emission sensor signal has been output by one of the at least one acoustic emission sensors (2.1, 2.2), wherein a third acoustic emission signal has been detected with the respective one of the at least one acoustic emission sensors (2.1, 2.2) at a third position (53, 153) on the pipeline (200, 1200), wherein the third acoustic emission signal output by the respective acoustic emission sensor (2.1, 2.2) corresponds to the detected third acoustic emission signal, wherein the third position (53, 153) is located on a different side of the first position (51, 151) than the second position (52, 152) is located from the first position (51, 151) when viewed along the flow path, whereby the first position (51, 151) is located between the second position (52, 152) and the third position (53, 153) as viewed along the flow path, wherein a distinguishing feature between the first acoustic emission sensor signal and the third acoustic emission sensor signal is taken into account for establishing the diagnosis,

wherein, for the purpose of establishing the diagnosis of the component, the acoustic emission sensor signals (105) are evaluated over at least two mutually offset range sections (107) of the frequency range over which frequency range the acoustic emission signals are detected, in that at least one characteristic number of the respective acoustic emission sensor signal (105) is determined for each of these at least two mutually offset range sections (107),

wherein the diagnosis of the component is established taking into account the first acoustic emission sensor signal and at least two further ones of the acoustic emission sensor signals, wherein, as viewed along the flow path, the first position (151) is located between the two positions (152, 153) at which two of the at least two further ones of the acoustic emission signals have been detected,

wherein either, a classification is carried out for each of the at least two area sections (107) on the basis of one of the at least one characteristic number, in that the respective area section (107) is classified as belonging to a first class precisely when a condition is fulfilled for the one of the at least one characteristic number, according to which condition the one of the at least one characteristic number has a value determined for the respective area section (107) of the first sound emission sensor signal, which value

is greater by at least one classification threshold value than the value determined for the respective area section (107) of the one of the two of the at least two further acoustic emission sensor signals and is greater by at least the classification threshold value than the value determined for the respective area section (107) of the other of the two of the at least two further acoustic emission sensor signals,

or wherein a classification is carried out on the basis of the one of the at least one characteristic number for each of the at least two area sections (107), in that the respective area section (107) is classified as belonging to the first class precisely when a condition is fulfilled for the one of the at least one characteristic number, according to which condition the one of the at least one characteristic number has a value determined for the respective area section (107) of the first acoustic emission sensor signal, which value is smaller by at least the classification threshold value than the value determined for the respective area section (107) of the one of the two of the at least two further acoustic emission sensor signals and is smaller by at least the classification threshold value than the value determined for the respective area section (107) of the other of the two of the at least two further acoustic emission sensor signals,

wherein, if a quota of the at least two area sections (107) has been classified as belonging to the first class, which quota is greater than a quota threshold value, the component is diagnosed as defective as a diagnosis of the component.

2. The method according to claim 1, characterised in that the acoustic emission signals detected with the at least one acoustic emission sensor (2.1, 2.2), in particular detected with each of the at least one acoustic emission sensors (2.1, 2.2), are detected over a frequency range, in particular from about 1 kHz to about 1 MHz, preferably from 1 kHz to 1 MHz, particularly preferably from 25 kHz to 500 kHz, very particularly preferably from 25 kHz to 300 kHz.

3. The method according to claim 1 or 2, characterised in that, for establishing the diagnosis of the component, the acoustic emission sensor signals are filtered with a prefilter, the prefilter comprising a prefilter criterion, wherein for establishing the diagnosis of the component, for further processing of the acoustic emission sensor

signals, the prefiltered acoustic emission sensor signals are used as acoustic emission sensor signals.

4. The method according to claim 3, wherein the prefiltering includes the time-resolved reproduction of the respective detected acoustic emission signal by the respective acoustic emission sensor signal and the subdivision of the respective time-resolved acoustic emission sensor signal into sections, whereafter for prefiltering, at least one characteristic number of the respective acoustic emission sensor signal is determined for each of the sections of the respective acoustic emission sensor signal, wherein the prefilter criterion is applied to the values of the at least one characteristic number determined for the various sections and one or more sections of the respective acoustic emission sensor is selected on the basis of the prefilter criterion and the selected section or sections are used as the respective prefiltered acoustic emission sensor signal for establishing the diagnosis of the component (100).

5. The method according to one of claims 1 to 4, characterised in that an aggregate state of the fluid and/or a medium of the fluid is also taken into account for establishing the diagnosis of the component (100).

6. The method according to one of claims 1 to 5, characterised in that a pressure difference, in particular pressure drop, in the pipeline (200, 1200) across the component (100) installed in the pipeline (200, 1200) is also taken into account for establishing the diagnosis of the component (100).

7. The method according to one of claims 2 to 6, characterised in that, for establishing the diagnosis of the component (100), the acoustic emission sensor signals (105) are evaluated over a sub-range (108) of the frequency range over which frequency range the acoustic emission signals are detected.

8. The method according to claim 7, characterised in that, for the purpose of establishing the diagnosis of the component (100), the acoustic emission sensor signals (105) are evaluated over the sub-range (108) of the frequency range over which frequency range

the acoustic emission signals are detected, in that at least one characteristic number of the respective acoustic emission sensor signal is determined for this sub-range (108).

9. The method according to claims 1 and 8, characterised in that the diagnosis of the component (100) is established taking into account the first acoustic emission sensor signal and at least two further ones of the acoustic emission sensor signals, the first position (51) being located between the two positions (52, 53, 54, 55) at which two of the at least two further ones of the acoustic emission signals have been detected, as viewed along the flow path,

wherein, if a condition is met for one of the at least one characteristic number, according to which condition the one of the at least one characteristic number determined for the sub-range of the first acoustic emission sensor signal has a value which is between the value determined for the sub-range of the one of the two of the at least two further of the acoustic emission sensor signals and the value determined for the sub-range of the other of the two of the at least two further of the acoustic emission sensor signals, the sub-range within the frequency range over which frequency range the acoustic emission signals are detected is shifted to higher frequencies, and the acoustic emission sensor signals are evaluated over the shifted sub-range of the frequency range over which frequency range the acoustic emission signals are detected in order to establish the diagnosis of the component (100) in that the at least one characteristic number of the respective acoustic emission sensor signal is determined for this shifted sub-range.

10. The method according to claim 8 or 9, characterised in that the diagnosis of the component (100) is made taking into account the first acoustic emission sensor signal and at least one other of the acoustic emission sensor signals,

wherein, if a condition is fulfilled for one of the at least one characteristic number, according to which condition the one of the at least one characteristic number determined for the sub-range of the first acoustic emission sensor signal has a value which is greater by at least one threshold value than the value determined for the sub-

range of the at least one other of the acoustic emission sensor signals, the component (100) is diagnosed as defective as a diagnosis of the component (100).

11. The method according to any one of claims 1 to 10, characterised in that the diagnosis of the component (100) is established by an evaluation method based on supervised machine learning.

12. A computer program product (5) for carrying out the method according to any one of claims 1 to 11.

13. A method for diagnosing a component (100), in particular a valve (1000), by means of acoustic emission examination, which component (100) is installed in a pipeline (200, 1200), which pipeline (200, 1200) is designed for guiding a fluid along a flow path in a flow guiding direction (201),

    a) wherein the first acoustic emission signal is detected by one of at least one acoustic emission sensor (2.1, 2.2) at a first position (51, 151) on the pipeline (200, 1200) and the first acoustic emission sensor signal corresponding to the detected first acoustic emission signal is output by that of the at least one acoustic emission sensor (2.1, 2.2) by which the first acoustic emission signal is detected at the first position (51, 151) on the pipeline (200, 1200),

    b) wherein the second acoustic emission signal is detected by one of the at least one acoustic emission sensor (2.1, 2.2) at a second position (52, 152) on the pipeline (200, 1200) and the second acoustic emission sensor signal corresponding to the second acoustic emission signal is output by the one of the at least one acoustic emission sensor (2.1, 2.2) by which the second acoustic emission signal is detected at the second position (52, 152) on the pipeline (200, 1200),

    c) wherein the third acoustic emission signal is detected by one of the at least one acoustic emission sensor (2.1, 2.2) at the third position (53, 153) on the pipeline (200, 1200) and the third acoustic emission sensor signal corresponding to the third acoustic emission signal is output by the of the at least one acoustic emission sensor (2.1, 2. 2) by which the third acoustic emission signal is detected at the third position (53, 153) on the pipeline (200, 1200),

wherein the first acoustic emission sensor signal is transmitted to a diagnostic module (4) connected to that of the at least one acoustic emission sensor (2.1, 2.2) with which the first acoustic emission signal has been detected for establishing the diagnosis of the component (100), the second acoustic emission sensor signal is transmitted to the diagnostic module (4) connected to that of the at least one acoustic emission sensor (2.1, 2. 2) with which the second acoustic emission signal has been detected for establishing the diagnosis of the component (100) and the third acoustic emission sensor signal is transmitted to the diagnostic module (4) connected to the one of the at least one acoustic emission sensor (2.1, 2. 2) with which the third acoustic emission signal has been detected for establishing the diagnosis of the component (100) and the diagnosis of the component (100) is established by means of the diagnostic module, taking into account the first acoustic emission sensor signal, the second acoustic emission sensor signal and the third acoustic emission sensor signal, using the method according to one of claims 1 to 11.

14. Arrangement (1) for carrying out the method according to claim 13, comprising

a) at least one acoustic emission sensor (2.1, 2.2) for detecting a first acoustic emission signal at a first position (51, 151) on a pipeline (200, 1200) and outputting a first acoustic emission sensor signal, wherein the first acoustic emission sensor signal corresponds to the detected first acoustic emission signal, for detecting a second acoustic emission signal at a second position (52, 152) on the pipeline (200, 1200) and outputting a second acoustic emission sensor signal, the second acoustic emission sensor signal corresponding to the detected second acoustic emission signal, and for detecting a third acoustic emission signal at a third position (53, 153) on the pipeline (200, 1200) and outputting a third acoustic emission sensor signal, the third acoustic emission sensor signal corresponding to the detected third acoustic emission signal, and

b) a diagnostic unit (3) with the diagnostic module (4) for establishing the diagnosis of the component (100), taking into account the first acoustic emission sensor signal and the second acoustic emission sensor signal, the diagnostic unit being adapted to establish the diagnosis of the component (100) with the method according to

one of claims 1 to 11, wherein the diagnostic unit (3) with the diagnostic module (4) is connected to the one of the at least one acoustic emission sensor (2.1, 2.2) with which the first acoustic emission signal is to be detected for receiving the first acoustic emission sensor signal and is connected to the one of the at least one acoustic emission sensor (2.1, 2.2) with which the second acoustic emission signal is to be detected for receiving the second acoustic emission sensor signal and is connected to the one of the at least one acoustic emission sensor (2.1, 2.2 with which the third acoustic emission signal is to be detected for receiving the third acoustic emission sensor signal.