The invention relates to a collecting vat (1) comprising at least one tie rod (2) formed by a rivet, a screw or a bolt, the tractive forces thereof being at least partially absorbed by an element arranged inside the collecting vat (1).
COLLECTING VAT, HEAT EXCHANGER AND METHOD FOR PRODUCING A COLLECTING VAT

[0001] The invention relates to a collecting vat, in particular for a motor vehicle, according to the precharacterizing clause of claim 1, to a heat exchanger according to the precharacterizing clause of claim 10 and to a method for producing a collecting vat.

[0002] Conventional, injection-molded plastic charge air vats which are exposed to high stresses, namely high temperatures and high pressures, are frequently configured, in regions having particularly high stresses with tie rods which form a connection from one wall of the charge air vat to the other. Said tie rods are generally taken into consideration in the production mold and are injection molded at the same time as the charge air vat from the same material. It is problematic here, particularly in the case of tie rods composed of plastic, that the tie rods are arranged directly in the hot air flow, which may have temperatures of up to 240°C, which means that they age thermally much more severely than the regions of the charge air vat which undergo a cooling by the ambient air. A charge air vat of this type therefore leaves something to be desired.

[0003] EP 0 641 985 B1 discloses a heat exchanger container having a plurality of reinforcing struts which are designed separately from the heat exchanger container and, after the heat exchanger container is finished, are inserted into depressions which extend between opposite walls of the heat exchanger container. However, the production in this case is relatively complex, so that a heat exchanger container of this type also leaves something to be desired.

[0004] It is the object of the invention to provide an improved collecting vat and heat exchanger.

[0005] This object is achieved by a collecting vat having the features of claim 1 and by a heat exchanger as claimed in claim 9. Advantageous refinements are the subject matter of the subclaims.

[0006] According to the invention, a tie rod which is formed by a rivet, a screw or a bolt is provided in a collecting vat which is composed in particular of plastic. A tie rod of this type can be produced in a simple manner; depending here on the configuration it may even be a standard component. Since, in this embodiment, the tie rod can be fitted into an otherwise finished collecting vat, the production of the collecting vat is simplified. For example, in the case of an injection-molded plastic collecting vat, the injection mold is simplified, as a result of which costs can be spared.

[0007] The tie rod is preferably arranged in a hollow profile, in particular in a tube, i.e. it stretches through the hollow profile when assembled. The hollow profile may also be configured as a guide vane, so that the flow resistance in the collecting vat is reduced. A geometrical shape of the tie rod may also be based on any other desired, open profiles which are similar, for example, to the profile of a guide vane. In this case, however, an additional sealing of the tie rod is required, so that, for example, charge air does not pass, or passes only to a limited extent, to the outside.

[0008] The hollow profile is sealed off from the collecting vat in particular by means of one or two sealing elements, so that further sealing of the openings through which the tie rod is guided is not required. The hollow profile absorbs the excess tensile forces of the tie rod and prevents the collecting vat from contracting, with the sealing elements being held securely between collecting vat and hollow profile and preventing charge air, for example, from penetrating the interior of the hollow profile.

[0009] According to a preferred refinement, an inner thread into which the tie rod is screwed is provided in the collecting vat. The inner thread may be a metal insert which is cast into the collecting vat. However, the collecting vat may also be of somewhat reinforced design, with the result that a screw having a self-tapping thread can be screwed directly into the wall.

[0010] According to a preferred refinement, a collecting vat according to the invention is inserted in a heat exchanger, the heat exchanger having tubes through which a first medium can flow and around which a second medium can flow, with the result that heat can take place from the first to the second medium or vice versa. The tubes communicate with the at least one collecting vat, so that the first medium is distributed in the collecting vat to the tubes or is collected in the collecting vat from the tubes. In order to increase the heat-transferring surface, ribs, for example in the form of corrugated ribs, can be arranged between the tubes and, in particular, can be soldered to the tubes.

[0011] The invention is explained in detail below using two exemplary embodiments and partially with reference to the drawings. In the drawing, the single FIGURE shows a section through a collecting vat according to the invention, which is designed as a charge air vat of a charge air cooler, with a tie rod.

[0012] The collecting vat 1, which can be used as a charge air vat in a motor vehicle, is composed, for example, of polyamide. The collecting vat 1, which is downwardly open and can be closed with what is referred to as a tube plate, communicates via openings in the tube plate with heat exchanger tubes which, in turn, are inserted into the openings and are optionally soldered to the tube plate. A connection piece 6 which serves to supply or withdraw charge air can clearly be seen. Furthermore, a tie rod 2 for increasing the stability of the charge air vat 1 is provided in order to reduce deformation of the collecting vat 1 in the event of internal pressurization.

[0013] During production, the collecting vat 1 is injection molded from plastic without the tie rod. For further processing, around a hollow profile 3, in the present case a tube is placed with sealing elements 4 at both ends into the collecting vat 1. Two holes are made in the lateral walls of the collecting vat 1 in the longitudinal axis of the hollow profile 3, for example by drilling or, preferably, by shaping during injection molding, through which a blind rivet serving as the tie rod 2 is introduced. To this end, the rivet is pushed through the two holes in the hollow profile 3, a washer 5 is pushed over the free end and the head shaped.

[0014] According to a further exemplary embodiment which is not illustrated in the FIGURE, a threaded insert is cast in one of the walls of the collecting vat, into which a screw serving as the tie rod is screwed. In this case, a hollow profile which is in the shape of a guide vane and has sealing elements, and also a washer for the screw head are provided. Instead of a threaded insert, the corresponding wall region can be of reinforced design and a screw with a self-tapping thread can be used.
LIST OF REFERENCE NUMBERS

0015 1 Charge air vat
0016 2 Tie rod
0017 3 Hollow profile
0018 4 Sealing element
0019 5 Washer
0020 6 Connection piece

1. A collecting vat for a heat exchanger, with at least one tie rod (2), the collecting vat being composed in particular of plastic, characterized in that the tie rod (2) is formed by a rivet, a screw or a bolt.

2. The collecting vat as claimed in claim 1, characterized in that the tie rod (2) is arranged in a hollow profile (3).

3. The collecting vat as claimed in claim 2, characterized in that the hollow profile (3) is a tube or a hollow profile designed in the manner of a guide vane.

4. The collecting vat as claimed in claim 2, characterized in that the collecting vat (1) is sealed off from the hollow profile (3).

5. The collecting vat as claimed in claim 1, characterized in that a sealing element (4) is placed between collecting vat (1) and hollow profile (3) and/or collecting vat (1) and tie rod (2).

6. The collecting vat as claimed in claim 1, characterized in that a washer (5) is provided on the outside of the collecting vat (1).

7. The collecting vat as claimed in claim 1, characterized in that an inner thread is provided on one side of the collecting vat, in the interior thereof, and the tie rod is screwed into it.

8. The collecting vat as claimed in claim 2, characterized in that the hollow profile (3) is under a compressive stress as a consequence of a tensile stress exerted continually by the tie rod (2).

9. The collecting vat as claimed in claim 1, characterized in that the tie rod has at least one mount, in particular a screw thread, with a fastening means, in particular a screw, engaging from the outside into the mount through an opening in the collecting vat.

10. A heat exchanger, in particular charge air cooler for a motor vehicle, with at least one collecting vat and heat exchanger tubes, the heat exchanger tubes communicating with the at least one collecting vat, characterized in that at least one collecting vat is designed as claimed in claim 1.

11. A method for producing a collecting vat as claimed in claim 1, characterized in that, after the collecting vat (1) is finished, the tie rod (2) is introduced into the same and fixed in place, with an element for absorbing tensile forces of the tie rod (2) being provided in the collecting vat (1).

12. The method as claimed in claim 9, characterized in that the tie rod (2) is guided through a hollow profile (3).

13. The method as claimed in claim 9, characterized in that the element for absorbing tensile forces of the tie rod (2) is injected, placed or clamped into the collecting vat.

14. The method as claimed in claim 9, characterized in that a respective sealing element (4) is fitted at at least one end of the element for absorbing tensile forces and/or at at least one end of the tie rod (2).

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