CLAIMS

1. An air filter for an air conditioning system of a railway vehicle, which is configured to filter air along an air flow direction,

characterized by:

- a first layer (12) of a first filter medium with a first medium surface;
- a second layer (13) of a second filter medium with a second medium surface, wherein the second layer (13) comprises a pleated layer material and the first layer (12) comprises a flat surface and is glued on one side of the pleated second layer (13) to provide air cavities between the first layer (12) and the second layer (13), and wherein the first layer (12) is arranged to be upstream from the second layer (13) and comprises an equal or a lower packing density than the second layer (13); and
- a peripheral frame (11) to hold the first layer (12) and the second layer (13) adjacent to each other, wherein the second medium surface ~~medium area~~ is non-flat and provides a larger filter surface area than the first layer (12), wherein the peripheral frame (11) includes two vertical flaps (19), one per side, which are pleated and glued to the first layer (12) and the second layer (13), which is secured to the peripheral frame (11).

2. The air filter according to claim 1,

characterized in that

an area of the second medium surface is more than two times the first medium surface.

3. The air filter according to one of the preceding claims,

characterized in that

the first layer (12) comprises at least one of the following materials: glass fibers, synthetic fibers, a mix of organic and synthetic fibers.

4. The air filter according to one of the preceding claims,

characterized in that

the second layer (13) comprises at least one of the following materials: glass fibers, synthetic fibers, a mix of organic and synthetic fibers, cellulose fibers.

5. The air filter according to one of the preceding claims,
characterized in that
the first layer (12) comprises a packing density of less than 0.05 ~~0.04 or 0.03~~; and/or
the second layer (13) comprises a packing density of more than 0.05 or at least as large as the packing density of the first layer (12).

6. The air filter according to one of the preceding claims,
characterized by
at least one additional layer of a filter medium forming with the first layer (12) and the second layer (13) a plurality of layers held by the peripheral frame (11) on top of each other, wherein along a flow direction through the air conditioning system the packing density increases stepwise from layer to layer.

7. The air filter according to one of the preceding claims,
characterized in that
the frame (11) is configured to allow an unconstrained air flow to enter the first layer (12), in particular without being split by any reinforcement elements.

8. A method for manufacturing an air filter for an air conditioning system of a railway vehicle, the air filter being configured to filter air along an air flow direction,
characterized by:

- providing a first layer (12) of a first filter medium with a first medium surface;
- providing a second layer (13) of a second filter medium with a second medium surface, wherein the second layer (13) comprises a pleated layer material and the first layer (12) comprises a flat surface and is glued on one side of the pleated second layer (13) to provide air cavities between the first layer (12) and the second layer (13), and wherein the first layer (12) is arranged to be upstream from the second layer (13) and comprises an equal or a lower packing density than the second layer (13); and
- arranging a peripheral frame (11) to hold the first layer (12) and the second layer (13) adjacent to each other, wherein the second medium surface ~~medium area~~ is non-flat and provides a larger filter surface area than the first layer (12), wherein the peripheral frame (11) includes two vertical flaps (19), one per side, which are

pleated and glued to the first layer (12), and the second layer (13), which is secured to the peripheral frame (11).

9. The method according to claim 8, the second layer (13) is a pleated layer **characterized by:**

fixing the second, pleated layer (13) on the first layer (12) to enable a reinforcement of the first layer (12) by the pleated second layer (13).