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**Forming moulds of composite material for upper cover of new
energy vehicle battery pack**

新能源汽车电池包上盖复合材料成型模

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Foreword

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1 Scope

China's national standard for the composite forming moulds used to make the upper cover of an electric vehicle battery pack. The cover has become a composite part for the reasons that decide most electric vehicle design questions: it is a large flat panel high on the vehicle, so replacing steel with resin-based fibre-reinforced composite takes weight off the top of the pack, and the composite additionally insulates electrically and thermally, which matters directly for a component sitting over the cells. Producing it needs a mould that holds a large area to a tolerance the pack's sealing depends on, distributes heat evenly enough to cure the resin uniformly, and survives the pressures and cycle counts of series production. The standard specifies the structure, parts, assembly and performance requirements of such moulds, describes the corresponding test methods, and sets out the inspection rules, marking, packaging, transport and storage provisions.

This document specifies the structure, parts, assembly and performance requirements, describes the corresponding test methods, and stipulates inspection rules, marking, packaging, transportation and storage for forming moulds of composite material for upper cover of new energy vehicle battery pack. This document is applicable to the manufacture of forming moulds of composite material for upper cover of new energy vehicle battery pack.

Note

1.The "composite material" in this document refer specifically to "resin-based fiber-reinforced composite materials". Note

2.In order to avoid confusion, the "forming moulds of composite material for upper cover of

new energy vehicle battery pack" in this document is referred to as the "moulds".

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 191, Packaging - Pictorial marking for handling of goods

GB/T 230.1, Metallic materials - Rockwell hardness test - Part

3 Terms and definitions

For the purposes of this document, the terms and definitions given in GB/T 8845 and GB/T 40724, as well as the following apply.

3.1 upper cover of battery pack Protective cover on the top of the power battery.

3.2 projected area of moulded part The total projected area of the moulded part in the direction of the main pressure.

4.1 Structure

4.1.1 Typical structure The mould structure is shown in Figure 1.

4.1.3 Overflow system

4.1.3.1 A semicircular overflow trough shall be provided on the outside of the lower die. Its width B shall not be less than twice the thickness δ of the moulded part; the distance b between the overflow trough and the edge of the cavity should be preferably 10 mm ~ 20 mm, as shown in Figure 3.

4.1.3.2 A venting gap shall be reserved between the upper and lower dies. The gap value h should be

0.3 times the thickness δ of the moulded part; the venting structure shall be set outside the size of the moulded part blank, as shown in Figure 3.

4.3.3 The opening, closing and demoulding of the mould shall be smooth and without interference, obstruction or abnormal noise.

4.3.4 The contact area between the limit blocks and guide plates of the upper and lower dies shall not be less than 75%.

4.3.5 There shall be no leakage at the joints and plugs, and the external pipes shall not interfere with other parts.

4.4 Performance

4.4.1 Vacuum degree For moulds that require vacuuming, test according to 5.2.3. After closing the vacuum valve for 5 minutes, the relative vacuum degree change rate shall not be greater than 10%.

4.4.2 Temperature difference The temperature difference between two locations within 1 m of the cavity shall not be greater than 5 °C, and the temperature difference between two locations 1 m or more apart shall not be greater than 10 °C.

4.4.3 Workpiece quality Carry out mould trial according to 5.2.5. All inspection data of the workpiece shall meet the requirements of the customer's drawings.

4.4.4 Mould quality stability During customer acceptance, the mould shall be able to produce continuously without failure for no less than 60 moulds (times) or 8 hours under normal working conditions.

5.1.1 Materials and hardness

5.1.1.1 Check the material report and quality certificate of the parts.

5.1.1.2 Rockwell hardness shall be determined in accordance with GB/T 230.1.

5.1.2 Dimensions and tolerances Dimensions shall be measured according to GB/T 3177 and geometric tolerances shall be measured according to GB/T 1958.

5.1.3 Surface treatment The coating thickness shall be determined according to the method described in

6.4 of GB/T 11379-2008.

5.2.1 Idle running test

5.2.1.1 The mould shall be opened and closed repeatedly for not less than 10 times, and the mould ejection mechanism shall be operated repeatedly for not less than 10 times. Observe whether there is any interference, obstruction or abnormal noise in the mechanism operation.

5.2.1.2 Apply blue-lead/red-lead mould oil evenly to the stop block and guide plate; apply 30% of the rated mould clamping force to the mould; observe the contact condition of the stop block and guide plate.

5.2.2 Tightness test Test the pressure of the temperature control system at

1.5 times the rated pressure value and maintain the pressure for 24 hours. Use absorbent cotton to wipe the joints and seals; check the cleanliness of the absorbent cotton.

5.2.3 Vacuum test Carry out a vacuum test of the mould in the following steps.