

Annex 5 to BAM-GGR 024

Regulations for cooled transport

General

The rule for cooled transport may only be applied if a fire test in accordance with annex 2 of this BAM-GGR has been successfully completed.

Definitions used:

Cooling time	Time required for the entire packaging to cool to $< -60\text{ °C}$
Transport time	Planned duration of transport at $< -60\text{ °C}$
Reserve time	A 12-hour period at $< -60\text{ °C}$, as a reserve for unforeseen delays during transport
Holding time	Sum of transport time and reserve time

1. Test requirements:

Test method 1: Determination of the required quantity of coolant based on a transport scenario
The packaging is filled with cells/modules/batteries or dummies and the required quantity of coolant. Once the entire contents have cooled to below -60 °C (cooling time), the temperature must be recorded for the longest planned transport time plus 12 hours (reserve time). If it is confirmed that the temperature remained below -60 °C at all time (holding time), the test is considered passed and the maximum transport time confirmed.

Test method 2: Determination of the maximum holding time for a specified quantity of coolant
The packaging is filled with cells/modules/batteries or dummies and the intended quantity of coolant. Once the entire contents have cooled to below -60 °C (cooling time), the holding time during which the temperature remains below -60 °C is determined. The test is considered passed if the longest intended transport time and the reserve time (12 hours) do not exceed the determined holding time.

Furthermore, the required quantity of coolant can be calculated. For this purpose, the records of the holding time over at least 24 hours (according to test methods 1 or 2) shall be used as a basis. On this basis, the required quantity of coolant for transport times can be calculated. The quantity of coolant must cover the cooling time, the intended transport time and the reserve time.

2. Regulations

When carrying out cooled transport (using dry ice or other suitable means), there are no restrictions on the (cathode) chemistry or quantity of the cells/modules/batteries being transported, assumed that the cells/modules/batteries are not intended for use at low temperatures ($< -30\text{ °C}$). This applies regardless of the nominal energy tested in the fire test or the cell level tested in the fire test.

The gross mass of the packaging, including the cells/modules/batteries and coolant, must not exceed the maximum gross mass specified in the approval.

For the purposes of realisation, insulation material within the interior of the packaging may be partially substituted by coolant.

The insulation, gas flow and packaging must be resistant to both low temperatures and the coolant medium used.

The packaging must be fitted with a venting device to prevent bursting in the event of any overpressure, e.g. caused by the coolant used.

The provisions of Section 5.5.3 of the ADR/RID/ADN/IMDG Code apply.

For this purpose, brackets/racks may be installed inside the packaging to secure the battery in position.

Transport may only commence after the cooling time determined in Section 1. If the cooling time cannot be determined, it must be at least 12 hours or be calculated in detail based on the physical properties of the construction materials and materials used (e.g. heat capacity, thermal conductivity, heat transfer coefficient, ambient conditions).