**Economic Commission for Europe**

Inland Transport Committee

**Working Party on the Transport of Dangerous Goods**

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**Proposals for amendments to annexes A and B of ADR: construction and approval of vehicles**

# Interpretation of the requirements in 9.3.4.2 of ADR for EX/II and EX/III vehicles

**Transmitted by the Government of Germany**

*Summary*

**Executive summary**: Germany would like to ask WP.15 how the requirements in 9.3.4.2 of ADR are to be understood with regard to the materials used for the construction of the vehicle body, in particular its inside, of EX/III vehicles.

**Action to be taken**: Discussion

## Introduction

1. In Germany, there are differing opinions on the interpretation of the requirements in 9.3.4.2 of ADR.

2. Within the framework of this discussion, the question arose how the requirements in the third sentence of 9.3.4.2 of ADR are interpreted if the material used for the construction of the body is not pure metal but a multilayer system (inseparably combined layers), and the material consists of a plastics sheet on the outside, an insulating foam layer in the middle and a thin metal sheet with a high-strength coating on the inside. (See enclosed "Description of product properties of a sandwich panel")

3. Germany would like to know

- whether, in accordance with 9.3.4.2 of ADR, coated metal is also excluded as a material for the inside

or

- whether the third sentence of 9.3.4.2 of ADR is to be understood to mean that metal may be used as a material for the required inner cover if the requirement described in the second sentence of 9.3.4.2 is fulfilled. The current wording points to the latter.

4. Germany is of the opinion that the safety targets to be achieved are described or laid down as requirements in an insufficient way in 9.3.4.2 and that, for this reason, no unambiguous application is possible. Possible safety targets are the fire/flame resistance of the inner wall, insulation against heat input from the outside (this was addressed in previous

legislation) and the prevention of sparking on the inside. In particular the capability of preventing heat input from the outside and the resistance to sparking should be made clear in a revised wording.

# Proposal

5. The problems that need to be dealt with should be discussed in depth in a special group of experts in order to clarify and, if necessary, draft amendments to the regulations. If an international working group is set up, Germany offers to organise a meeting of the working group in Germany.

# Description of product properties of a sandwich panel

**Structure of the panel:**

The core of the sandwich panel is made of polyurethane foam that is inserted in between the surface layers in thicknesses of between 30 mm and 145 mm by means of a large area foam procedure.

The core of the outer surface layer is made of a galvanized, 0.6 mm thick steel sheet that is covered with a surface layer made of Platal-E (with a protective film) and a PU-based 4-layer coating.

On the inside of the panel, the core of the surface layer is also made of a 0.6 mm thick galvanized steel sheet; here, however, the sheet is coated with a rigid polyvinyl chloride ("PVC") layer of a thickness of 120 µm.

To prepare the surfaces for the foam, both surface layers are coated from the inside with a primer.

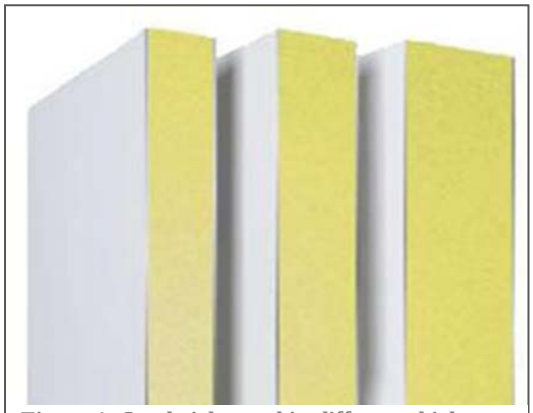

**Figure 1: Sandwich panel in different thicknesses**

**Product properties (extract)**:

Insulation capacity: Box bodies made of sandwich panels are used primarily for temperature-controlled transport operations. The customer requirement of good temperature preservation results in a high insulation capacity. Depending on the thickness of the panel, a heat transmission coefficient of up to Lambda = 0.02 [W/m²k] is achieved. The product also benefits from this in fire protection tests.

Vapour diffusion tightness: If water were to enter into the panel, the insulation capacity of the vehicle would deteriorate over time. The outer and inner panel surface layers form a barrier that prevents water vapour from entering into the polyurethane foam and completely closes off the foam. This is why the foam remained completely intact in flame tests in accordance with EN 13501-1:2007 + A1:2009.

Surface protection on the inside of the box: During loading and unloading of refrigerated vehicles, cargo carriers are dragged over or scratch the panel. Corroding steel surfaces are not accepted by users for reasons of food hygiene. Therefore, the interior surface layer is covered with a rigid PVC layer. This layer protects the surface from scratches or dents.

Penetration resistance: When loads are applied by means of ball pressure tests (ball diameter of 20 mm), there is no permanent deformation of the surface at forces of 300 N. Here, force is applied to the interior surface of the fully supported sandwich by means of a ball tip until permanent deformation occurs. Furthermore, in an impact test, an energy of 50 KJ was introduced into the panel; at this energy, the protective layer is not destroyed.

Resilience of the surfaces: The combination of the hard surface layer and the soft foam results in a surface that is resilient to some extent. Shocks and impacts do not immediately result in deformation of the surface but are absorbed up to a certain force.

# Annex

## Schematic illustration of the structure of the Ferroplast panel:


Legend:

| | |
|---|---|
| Verzinktes Stahl-Blech | Galvanised steel panels |
| Vorbehandlung | Pre-treatment |
| Hart-PVC-Schicht | Rigid PVC layer |
| Deck- & Grundlack<br>Füller & Primer | Top and primer coats<br>Film & primers |
| Schaumkern | Foam coar |