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**COMMITTEE OF EXPERTS ON THE TRANSPORT OF  
DANGEROUS GOODS AND ON THE GLOBALLY  
HARMONIZED SYSTEM OF CLASSIFICATION  
AND LABELLING OF CHEMICALS**

Sub-Committee of Experts on the  
Transport of Dangerous Goods

Twenty-seventh session, 4-8 July 2005  
Item 3 (b) of the provisional agenda

EXPLOSIVES, SELF-REACTIVE SUBSTANCES AND ORGANIC PEROXIDES

Miscellaneous proposals

Aluminium witness screens used in Series 6 (c) testing

Transmitted by the expert from Australia

**SCOPE**

This proposal aims at recommending:

Amendments to 16.6.1.2 (g) of the Manual of Tests and Criteria (Fourth revised edition) with regards to the specifications for aluminium witness screens.

**RELATED DOCUMENTS**

UN/SCETDG/26/INF.38 (Australia) Aluminium Witness Screens used in Series 6(c) Testing

**Introduction**

1. During the twenty-sixth session the expert from Australia presented informal document INF.38 relating to Aluminium witness screens used in Series 6(c) testing. As noted in ST/SG/AC.10/C.3/52, para. 135, there was insufficient time to consider this proposal, however, some comments were provided to the Australian expert. The content of UN/SCETDG/26/INF.38 has been reproduced in this paper along with relevant revisions arising out of subsequent research into the issue.

**Issue**

2. Paragraph 16.6.1.2 (g) of the Manual of Tests and Criteria (Fourth revised edition) specifies that witness screens used in series 6(c) [External Fire (Bonfire) Test] should be 1100-0 aluminium sheets of Brinell Hardness 23 with a tensile strength of 90 MPa, or equivalent. Investigations indicated that this specification is not in common use and as such compliant aluminium sheets could not be sourced for tests conducted in Australia. Initial investigations indicated that aluminium sheet of type 1100-0 appeared to only be available on special order from Norway and with a minimum order quantity of 4m<sup>3</sup>. It has been suggested that there may be greater availability than indicated in UN/SCETDG/26/INF.38, however, subsequent investigations have suggested that 1100-0 is very hard to source in most regions.
2. It is unrealistic to expect testing authorities to use a material that is not reasonably available to them. As a result Series 6(c) testing in Australia has been conducted using an 'equivalent material' which is softer and more prone to indentation. For example, 2mm thick 1150-0 Aluminium sheets with a Brinell Hardness of 21 and ultimate tensile strength of 76 MPa have been employed.
3. The use of softer material does ensure confidence in the test results provided no allowance is made for the fact the material is more prone to indentation. Even where results are marginal, such judgements are likely to be subjective. It is also critical that harder material (less prone to indentation) not be permitted for use in Series 6(c) testing on the basis that using materials that do not provide the same susceptibility to indentation and penetration will not be consistent and will reduce confidence in the results.
4. Investigations into 'equivalent materials' found that the scope of materials available that are reasonably close, without being harder (with a higher tensile strength or Brinell Hardness) for 1100-0 aluminium sheets, is quite limited. Further, the materials identified are not available worldwide but specific materials can be sourced in particular parts of the world. It is expected that at least one of the materials identified in the table below (which have been compared to 1100-0) should be available in most locations.

Aluminium Alloy	Brinell Hardness (500kg/10mm)	Ultimate Tensile Strength (MPa)	Sheer Strength (MPa)
1100-0	23	89.6 (90.0)	62.1
1145-0	21	75.0	55.0
1150-0	21	76.0	51.0
1160-H12	23	82.7	55.2
1200-0	23	90.0	60.0
1350-0	23	82.7	55.2

5. The information gathered suggests that 1160-H12, 1200-0 and 1350-0 are the closest equivalent to 1100-0 without being harder. 1145-0 and 1150-0 are both marginally softer and should not significantly affect test results.

**Proposal**

6. It is recommended that section 16.6.1.2 be modified to reflect the fact that equivalent materials may not have a greater resistance to indentation than 1100-0 aluminium sheets of Brinell Hardness 23 and tensile strength of 90 MPa. In addition reference to viable alternatives should be included to reduce the difficulties in identifying equivalent materials.

7. In view of this it is recommended that a new 16.6.1.2.1 be added to the effect that:

*“16.6.1.2.1. Where 1100-0 aluminium sheets (Brinell Hardness 23, tensile strength of 90 MPa) are to be replaced by an ‘equivalent’ the material employed shall not have a Brinell hardness greater than 23 or a tensile strength exceeding 90 MPa. Viable alternatives to 1100-0 aluminium sheets are detailed in table 16.2. ”*

**Table 16.2 Alternatives to 1100-0 aluminium sheets**

<b>Aluminium Alloy</b>	<b>Brinell Hardness (500kg/10mm)</b>	<b>Tensile Strength (MPa)</b>
<b>1145-0</b> (see note)	21	75.0
<b>1150-0</b> (see note)	21	76.0
<b>1160-H12</b>	23	82.7
<b>1200-0</b>	23	90.0
<b>1350-0</b>	23	82.7

*Note: No allowance can be made for the fact that these materials are marginally more prone to indentation than 1100-0 aluminium sheets when assessing results.*

8. If the new 16.6.1.2.1 and Table 16.2 are adopted the existing Table 16.2 (page 152) will have to be renumbered Table 16.3.

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