

# FLAMMABILITY AND SMOKE TESTS OF "GLASSPER" MATERIAL

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A recent request from the Program Manager, ARD-520 to initiate a test program to conduct flammability and smoke density test on a material has been completed.

Three different samples of an advanced flame retarded glass-impregnated paper "GLASSPER" were tested utilizing three different flammability test methods and the NBS smoke density chamber.

The materials are further identified as:

1. Untreated paper, 26 lb linerboard used as the raw material for "GLASSPER"
2. "GLASSPER" 107, manufactured from 26 lb linerboard with 30% glass reinforcement added for strength and flame retardance.

3. "GLASSPER" 102, manufactured from 42 lb linerboard with 50% glass reinforcement for wet strength and flame retardance.

The test methods employed were:

- (1) Vertical Burn Test, ASTM Method F-501-77 or Federal Test method 5903. - This test measures the burn length and self-extinguishing properties of a material when suspended directly over a Bunsen burner flame. The test method is used for showing compliance to Federal Aviation Regulation (FAR) part 25.853(a) and (b) "Fire Protection for Compartment Interiors". Regulations require that all materials of the type in this report be tested by this test method and that the flame self-extinguish within 15 seconds after removal of the Bunsen burner and that the burn length not exceed 8 inches.

(2) Limited Oxygen Index <sup>(LOI)</sup> Flammability test  
 ASTM-D 2863. Determines the oxygen index of materials by measuring the minimum concentration of oxygen in a slowly rising mixture of oxygen and nitrogen that will just support combustion. Materials with an index of 35 or above are considered outstanding materials by NASA standards.

(3) Radiant Panel Tests, ASTM method E-162.  
 This method is used to obtain a flame spread index (FS) for materials by calculating the product of the flame spread factor and the heat evolution factor. This test is not an FAA requirement however, the Department of Transportation Transportation Systems Center, guidelines for materials used in transit systems require that the index for wall and ceiling panels do not exceed 35.

(4) NBS Smoke Density Chamber provides a means for measuring the smoke generated by materials. Measurements are made of the attenuation of a light

beam by smoke accumulating within a closed chamber. Results are expressed in specific optical density <sup>(D<sub>s</sub>)</sup> derived from a geometrical factor and the measured optical density (absorbance). This was the proposed test referenced by the FAA for determining the smoke emission generated from aircraft passenger compartment interiors. The proposed limits for materials of the type for "GLASSPER" were less than D<sub>s</sub> equal to 100 at four minutes.

Average results of the material "GLASSPER" tested by the above test methods are contained in the following table.

| Mat No | Vertical Test    |                  | Limited Oxygen Index | Radiant PANEL (Is) | Smoke Density                      |                                   |
|--------|------------------|------------------|----------------------|--------------------|------------------------------------|-----------------------------------|
|        | Flame Time (sec) | Burn Length (in) |                      |                    | Flaming Exposure (D <sub>s</sub> ) | Smoker Exposure (D <sub>s</sub> ) |
| 1      | 6                | + 12             | Burns in atmosphere  |                    | 3.2                                | 11                                |
| 2      | 7                | 3.8              | 40                   | < 1                | 0.9                                | 0.5                               |
| 3      | 8                | 3.4              | 46                   | 28                 | 0.4                                | 1.6                               |