NOTICE OF PROPOSED AMENDMENT (NPA) NO 2008-13

DRAFT DECISION OF THE EXECUTIVE DIRECTOR OF THE EUROPEAN AVIATION SAFETY AGENCY

AMENDING
DECISION NO. 2003/2/RM OF THE EXECUTIVE DIRECTOR OF THE EUROPEAN AVIATION SAFETY AGENCY
of 17 October 2003
on

Certification Specifications, Including Airworthiness Code and Acceptable Means of Compliance, for Large Aeroplanes (« CS-25 »)

'Thermal/Acoustic Insulation Material'

TABLE OF CONTENTS

A. EXPLANATORY NOTE ... 3

I. GENERAL ... 3
II. CONSULTATION ... 3
III. COMMENT RESPONSE DOCUMENT ... 4
IV. CONTENT OF THE DRAFT DECISION ... 4
V. REGULATORY IMPACT ASSESSMENT ... 8

B. DRAFT DECISIONS ... 15

CS 25.856 THERMAL/ACOUSTIC INSULATION MATERIALS ... 15
APPENDIX F ... 15
PART I – TEST CRITERIA AND PROCEDURES FOR SHOWING COMPLIANCE WITH CS 25.853, 25.855 OR 25.869 ... 15
PART VI - TEST METHOD TO DETERMINE THE FLAMMABILITY AND FLAME PROPAGATION CHARACTERISTICS OF THERMAL/ACOUSTIC INSULATION MATERIALS ... 16
PART VII - TEST METHOD TO DETERMINE THE BURNTHROUGH RESISTANCE OF THERMAL/ACOUSTIC INSULATION MATERIALS ... 28
AMC 25.856(A) ... 43
AMC 25.856(B) ... 43

C. APPENDICES ... 44

APPENDIX I: ORIGINAL JAA NPA JUSTIFICTION ... 44

A. EXPLANATORY NOTE

I. General

1. The purpose of this Notice of Proposed Amendment (NPA) is to envisage amending Certification Specifications for Large Aeroplanes (CS-25) as originally issued by Executive Director's Decision 2003/2/RM of 17 October 2003[1] and last amended by Executive Director's Decision 2007/020/R of 20 December 2007[2] (CS-25 Amendment 4). The scope of this rulemaking activity is outlined in Terms of Reference (ToR) 25.006 and is described in more detail below.

2. The European Aviation Safety Agency (hereinafter referred to as Agency) is directly involved in the rule-shaping process. It assists the Commission in its executive tasks by preparing draft regulations, and amendments thereof, for the implementation of the Basic Regulation[3] which are adopted as Opinions (Article 19(1)). It also adopts Certification Specifications, including Airworthiness Codes and Acceptable Means of Compliance and Guidance Material to be used in the certification process (Article 19(2)).

3. When developing rules, the Agency is bound to following a structured process as required by Article 52(1) of the Basic Regulation. Such process has been adopted by the Agency's Management Board[4] and is referred to as the Rulemaking Procedure.

4. This rulemaking activity is included in the Agency's 2008 Rulemaking Programme. It implements the rulemaking task 25.006 Thermal/Acoustic Insulation Materials.

5. The text of this NPA has been prepared by the Agency. It is submitted for consultation by all interested parties in accordance with Article 52 of the Basic Regulation and Articles 5(3) and 6 of the Rulemaking Procedure.

II. Consultation

To achieve optimal consultation, the Agency is publishing the draft decision of the Executive Director on its internet site. Comments should be provided within 3 months from the date of publication in accordance with Article 6(4) of the Rulemaking Procedure.

Comments on this proposal should be submitted by one of the following methods:

CRT: Send your comments using the Comment-Response Tool (CRT) available at **http://hub.easa.europa.eu/crt/**

---

[1] Decision No 2003/2/RM of the Executive Director of the Agency of 17 October 2003 on Certification Specifications, Including Airworthiness Code and Acceptable Means of Compliance, for Large Aeroplanes (« CS-25 »).

[2] Decision No. 2007/020/R of the Executive Director of the European Aviation Safety Agency of 20 December 2007 on Certification Specifications, Including Airworthiness Code and Acceptable Means of Compliance, for Large Aeroplanes (« CS-25 Amendment 4»).

[3] Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC. OJ L 79, 19.03.2008, p.1.

[4] Management Board decision concerning the procedure to be applied by the Agency for the issuing of opinions, certification specifications and guidance material (Rulemaking Procedure), EASA MB 08/2007, 13.6.2007

E-mail: In case the use of CRT is prevented by technical problems these should be reported to the CRT webmaster and comments sent by email to NPA@easa.europa.eu.

Correspondence: If you do not have access to internet or e-mail you can send your comment by mail to:
Process Support
Rulemaking Directorate
EASA
Postfach 10 12 53
D-50452 Cologne
Germany

Comments should be received by the Agency **before 21 August 2008.** If received after this deadline they might not be taken into account.

III. Comment response document

6. All comments received in time will be responded to and incorporated in a comment response document (CRD). The CRD will be available on the Agency's website and in the Comment-Response Tool (CRT).

IV. Content of the draft decision

Subject of the proposed amendment

7. This Notice of Proposed Amendment (NPA) proposes upgraded flammability standards for thermal/acoustic insulation materials to be installed in the fuselage of large aeroplanes of new or significantly changed type designs to be certified in accordance with CS-25. The purpose of this material is to protect the occupants, cargo and equipment of an aeroplane from thermal and/or acoustic extremes associated with surrounding environmental conditions and engine noise sources.

8. The proposed rule does not address the thermal/acoustic characteristics of the insulation materials but their specific flammability characteristics related to flight safety. Two specific characteristics of the insulation material are addressed by the proposed rule: their capability to resist propagation of a flame and their capability to resist penetration of a flame through the material (burnthrough).

Current regulations pertinent to thermal/acoustic insulation materials and their performance

9. Current CS-25 already contains certification specifications addressing the flame propagation characteristics of thermal/acoustic insulation materials installed in certain compartments of the aeroplane. Existing CS 25.853(a) requires that materials in compartments occupied by crew or passengers must meet the applicable test criteria specified in Part I of Appendix F to CS-25. Existing CS 25.855(d) requires that materials used in cargo or baggage compartments not occupied by crew or passengers must meet the same test criteria. The applicable test criteria referenced above are defined in sub-paragraph (a)(1)(ii) of Part I of Appendix F and prescribe that the materials in the above compartments, including thermal and acoustical insulation, insulation blankets and covering, must be self-extinguishing after having been exposed to a vertical test in accordance with test procedures specified in sub-paragraph (b)(4) of Part I of Appendix F. This test method and criteria (called "Bunsen burner test") adopted in the past addressed the ignition sources considered then likely under actual conditions. These criteria appeared to provide the level of protection intended.

10. The service experience gathered since the time those standards were adopted however suggests that the level of protection achieved by those standards may not be sufficient. At least 8 events (accidents/incidents) have been recorded in which flammability characteristics of thermal/acoustic insulation material may have been a contributing factor. The most relevant event was the catastrophic accident involving a MD-11 (Swissair Flight 111) aeroplane on 2 September 1998 as a result of an in-flight fire that likely spread via thermal/acoustic insulation.

11. The Federal Aviation Administration of the U.S.A (FAA) initiated investigations and research to determine the appropriateness of existing Bunsen burner flammability criteria for thermal/acoustic insulation materials as typically installed in concealed and inaccessible areas. The FAA re-visited existing test methods contained in FAR Part 25, Appendix F and also considered a test method (cotton-swab test) used in certain segments of the industry for testing of the insulation. The FAA concluded that the existing test methods and standards in FAR Part 25 did not realistically address situations in which thermal/acoustic insulation materials may contribute to the propagation of fire. New, more stringent test methods and criteria were found necessary to reduce the incidence and severity of cabin fires particularly those ignited in inaccessible areas where thermal/acoustic insulation materials are installed.

Development of new test methods and criteria

12. The FAA, supported by the FAA William J. Hughes Technical Center, prepared new test methods and criteria addressing not only the flame propagation resistance of thermal/acoustic insulation material the but also its resistance to flame penetration. It had been already known that the existing thermal/acoustic insulation blankets when properly attached to the fuselage also provide certain time limited protection by delaying entry of an external fire through the fuselage skin and insulation blankets into an interior compartment. This delay of fuselage burnthrough in a post crash external fire scenario can provide valuable additional time for occupants to evacuate the aircraft. However this feature of thermal/acoustic insulation material and its potential for safety was until then not addressed by existing regulations. After research and testing performed with co-operation of some European National Aviation Authorities the FAA determined that by installing thermal/acoustic insulation material with improved flame penetration resistance an entry of a fire can be delayed by several minutes. Eventually, after a series of full, medium and small-scale testing, two separate small-scale test methods and performance criteria were prepared by the FAA Technical Center – one for flame propagation and one for burnthrough.

FAA Rulemaking

13. The FAA proposed the upgraded flammability standards for thermal/acoustic insulation materials through Notice of Proposed Rulemaking (NPRM) (Notice 00-09, Federal Register Vol. 65 No. 183) published on September 20, 2000. Disposition of comments lead to slight amendments of the proposed rules but did not change the substance of the proposed rules. The FAA then adopted the improved standards by Final Rule issued on July 31, 2003 standards (Docket No. FAA-2000-7909, Federal Register Vol 68, No. 147). The Final Rule amended not only FAR Part 25 (Amendment No. 25-111) to make the upgraded standards applicable to new or significantly changed type designs of Transport Category Airplanes but amended also FAR Parts 91, 121, 125, and 135 to make the upgraded standards applicable to aeroplanes of existing and certificated type designs when newly manufactured after certain compliance dates to enter service in accordance with one of the above FAR operational parts.

14. Later, two Advisory circulars (AC) were issued to support the above standards: The first AC 25.856-1 "Thermal /Acoustic Insulation Flame Propagation Test Method Details" dated 24 June 2005 provided guidance concerning the test method to determine the

flammability and propagation characteristics of thermal/acoustic insulation materials as required by FAR 25.856(a) and specified in part VI of Appendix F to FAR Part 25. The second AC 25.856-2 "Installation of Thermal/Acoustic Insulation for Burnthrough Protection" dated 17 January 2006 provided guidance for installation of thermal/acoustic insulation and details for the test method to determine burnthrough resistance as required by FAR 25.856(b) and specified in part VII of Appendix F to FAR Part 25.

JAA Rulemaking

15. The Joint Aviation Authorities (JAA) closely monitored the developments on the FAA side through the Cabin Safety Steering Group (CSSG) that was tasked by the JAA to review and evaluate the upgraded flammability standards for thermal/acoustic insulation materials proposed by the FAA and prepare a corresponding, possibly harmonised proposal for the JAA to amend JAR-25. The CSSG prepared JAA NPA 25-345 that in its final draft was technically fully harmonised with the FAA Final Rule Amdt. No. 25-111. Together with the proposal for JAR-25 the CSSG presented in the same document an NPA proposed for JAR-26 technically harmonised with the FAA Final Rule Amdt. No. 121-301. In the meantime the competency for rulemaking in the airworthiness area was transferred to the Community and the rulemaking task was further progressed by the Agency.

Development under EASA

16. The Agency established a rulemaking task 25.006 "Thermal/Acoustic Insulation Materials". The intend was to adopt for CS-25 the upgraded flammability standards as suggested in the JAA NPA 25-345, fully harmonised with the FAA Final Rule Amdt. No. 25-111. Information from Industry was received by the Agency which indicated certain problems were found in test houses of the manufacturers when testing and checking compliance with the upgraded standards. The prescribed testing equipment was not found adequate and the testing method was not providing repetitive and consistent results. The Agency therefore decided to postpone the task until these problems were resolved and the testing method and equipment, as prescribed in the FAA Final Rule, confirmed. This has happened in the mean time and therefore the Agency proposes to amend CS-25 with the below changes to upgrade the flammability standards for thermal/acoustic insulation materials. Again, it is to be stressed that upgraded standards being proposed are fully harmonised with those adopted by the FAA Final Rule Amdt. No. 25-111.

Discussion of the proposed changes to CS-25

Flame propagation resistance

17. The proposed new *CS 25.856 "Thermal /acoustic insulation materials"* requires in paragraph (a) that these materials meet the flame propagation test requirements as prescribed in a new Part VI to be added to Appendix F of CS-25. The proposed rule is applicable to all insulation materials in all large aeroplanes, regardless of their passenger seating capacity and regardless of where they are installed. Typically, thermal/acoustic insulation materials are installed behind aeroplane interior panels in passenger or cargo compartments, although they may be located in any other compartment or area throughout fuselage, where insulation is desired (e.g. in electrical/electronic equipment bays, around air ducts, on the pressure shell, floor panels etc.). The proposed rule therefore accounts for insulation installed in concealed areas or areas inaccessible in flight where a potential exists for a spread of a fire. The proposed rule does not however apply to "small parts" like knobs, handles, rollers, fasteners, clips, grommets, rub strips, pulleys, and small electrical parts that would not contribute significantly to the propagation of a fire.

18. The proposed new *Part VI of Appendix F to CS-25* contains a test method for evaluating the flammability and flame propagation characteristics of thermal/acoustic insulation materials when exposed to both a radiant heat source and a flame. The proposed CS 25.856(a) has a provision that allows to substitute other approved equivalent method for the method specified in the proposed Part VI of Appendix F.

19. The existing CS 25.853(a) requires that materials in aeroplane *compartment interiors* meet the flammability tests prescribed in Part I of Appendix F to CS 25. The existing CS 25.855(d) requires materials used in the construction of *cargo and baggage compartments* meet the same tests. Part I of Appendix F in sub-paragraphs (a)(1)(ii) and (a)(2)(i) specifically refers to "thermal and acoustical insulation", "insulation blankets and covering". Compliance to the new proposed test method is considered to fully provide an appropriate assurance of flammability resistance for thermal/acoustic insulation materials. The respective references are therefore proposed to be removed from Part I of the Appendix.

20. FAA AC 25.856-1 "Thermal /Acoustic Insulation Flame Propagation Test Method Details" dated 24 June 2005[5] is proposed for acceptance by the Agency as an Acceptable Means of Compliance (AMC) with CS 25.856(a) and to provide further guidance concerning the test method specified in Part VI of Appendix F to CS-25.

Flame penetration resistance

21. Paragraph (b) of the proposed CS 25.856 requires thermal /acoustic insulation materials to meet the flame penetration test requirements prescribed in a new Part VII to be added to Appendix F of CS-25. The proposed flame penetration rule is applicable to the thermal/acoustic insulation materials (including the means of fastening of the materials to the fuselage) installed in the lower half of the fuselage of aeroplanes with a passenger seating capacity of 20 or more.

22. The proposed new *Part VII of Appendix F to CS-25* contains a test method for evaluating the ability of thermal/acoustic insulation materials, and their means of fastening to the fuselage, to resist penetration by a defined flame source and to limit the transfer of heat. CS 25.856(b) has a provision that allows to substitute an alternative approved equivalent method for the method specified in Part VII.

23. A typical example of insulation is constructed in the form of a "blanket" composed of "batting" covered by a film (metallised or non-metallised) to contain the batting and protect it against penetration of moisture. Such blankets are attached to the fuselage skin and/or elsewhere e.g. to the floor panels. The proposed rules do not apply to the thermal/acoustic insulation installations that the Agency finds would not contribute to the fire penetration resistance. Insulation on ducts e.g. is not considered to significantly contribute to burnthrough and therefore does not have to comply.

24. The phrase "lower half of the aeroplane fuselage" means the area below a horizontal line that bisects the cross section of the fuselage, as measured with the airplane in a normal attitude on the ground. Future, non-conventional, design possibilities, such as blended wing-body configurations, would have to be addressed specifically, if the concept of the lower half is not appropriate.

25. Although the flame penetration resistance requirements typically affect thermal/acoustic insulation installed near the outer skin of the lower half of the fuselage, there may be

---

[5] Available on the FAA website:
http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/2853E3F35375B05386257037006CE99C?OpenDocument&Highlight=25.856-2

cases where there is no such insulation on the fuselage shell, but along the underside of the floor. In this case, the insulation along the underside of the floor would be subject to the flame penetration test. In cases where insulation is installed in both places, an applicant may choose which insulation shall be subject to the flame penetration test because insulation in either place delays the entry of an external post crash fire into the cabin.

26. The flame penetration resistance test requirements establish a standard for the ability of thermal/acoustic insulation to resist penetration by an external flame, rather than a standard for fuselage burnthrough per se. The test exposes samples of thermal/acoustic insulation blankets mounted in a test frame to a kerosene burner for four minutes. The insulation blankets must prevent flame penetration for at least four minutes but also limit the amount of heat that passes through the blanket during the test. The heat flux measurement provision is included in the pass/fail criteria to account for materials that behave similarly to a flame arrestor, but do not inhibit heat transfer. It provides an indication of the hazard inside the aeroplane and supplements rather than replaces the basic requirement to resist flame penetration.

27. During the preparation of this rulemaking, a question arose regarding the testing of specific double insulation configurations found in some aeroplane types where there is a (foam) insulation on the back side of the cabin walls in addition to insulation blankets also installed in that area a few cm apart and in parallel close to the fuselage. The Agency position is that the rule intends that the installation meet the requirement. Therefore, if one layer meets the burnthrough requirement and meets the heat flux requirement that is considered compliant, the Agency would not require the second layer to meet the burnthrough requirement. The second layer, depending on what material it is, would have to meet the relevant rules. With regard to the intent of the heat flux measurement, it is included in the rule to prevent "flame arrestors" from being qualified as meeting the burnthrough requirement. Based on this view, if there were a second insulation layer, it would not have to meet the burnthrough requirement, but it would have to pass the propagation rule.

28. FAA AC 25.856-2 "Installation of Thermal/Acoustic Insulation for Burnthrough Protection" dated 17 January 2006[6] is proposed for acceptance by the Agency as an Acceptable Means of Compliance (AMC) with CS 25.856(b) and to provide further guidance for the test method to determine burnthrough resistance specified in the proposed Part VII of Appendix F to CS-25. It also provides details for acceptable installation methods of insulation blankets to the fuselage.

29. The intent of this rulemaking is to enhance safety by implementing higher flammability standards for materials typically installed in aeroplanes. Although not anticipated, should removal of insulation become a common practice to avoid having to comply with this rule, the need for a specific fuselage burnthrough standard will have to be revisited.

V. Regulatory Impact Assessment

1. Purpose and Intended Effect

---

[6] Available on the FAA website:

http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/60FEBE04381264F0862570FC006944CC?OpenDocument&Highlight=25.856-2

a. Issue which the NPA is intended to address

Service experience and past accidents of large aeroplanes with in-flight or post-crash related fires suggest that certain flammability characteristics, in particular flame propagation resistance, of thermal/acoustic insulation materials installed in aeroplane fuselage may have been a contributing factor to propagation of an in-flight fire through the fuselage. After extensive investigation and testing it appears that the current standards for flame propagation are not sufficient since they do not realistically address real situations with an in-flight fire, its potential ignition sources and means of propagation. There is a need to develop and apply new standards which would improve the flame propagation resistance of the thermal/acoustic insulation materials.

It has also been concluded that the potential should be utilized for the same thermal/acoustic insulation material to contribute, through improved flame penetration resistance characteristics, to a better protection of the whole fuselage against penetration by external fire to the cabin (burnthrough).

b. Scale of the issue

Application of thermal/acoustic insulation materials in aeroplanes to protect occupants, cargo and equipment from thermal and/or acoustic extremes associated with surrounding environmental conditions and engine noise sources is a standard technology currently applied in the majority of aeroplane type designs. It is expected, even if new concepts may appear, that this technology will be widely applied in many aeroplanes manufactured in the future.

On the other hand there are thermal/acoustic materials commercially available today that meet the proposed upgraded standards for flame propagation and flame penetration resistance. Some of them have similar cost and weight as the fibreglass materials currently used. Besides, it is expected that the European manufacturers have already prepared or are preparing to comply with the corresponding rules adopted by the FAA. Therefore the scale of the issue is perceived as very moderate.

c. Brief statement of the objectives of the NPA

The first objective of the NPA is to improve the *flame propagation resistance* of the thermal/acoustic insulation material installed in large aeroplanes of new or significantly changed type designs and thus prevent or lower the risk of fires spreading. This has been prompted by in service evidence that the current regulatory standards do not result in adequate flammability characteristics.

The second objective of the NPA is to improve the fuselage *flame penetration resistance* that those materials provide. It is known that the currently used fibreglass thermal/acoustic insulation materials have certain inherent capability to resist flame penetration. Therefore, when used in the form of "blankets" installed behind interior panels and attached properly to the fuselage, they are considered a significant component of the barrier against the entry of an external fire into the aeroplane interior compartment (fuselage burnthrough). Taking into account the fact that thermal/acoustic insulation materials are being addressed anyway by this NPA because of their flame propagation resistance characteristics, it is considered advantageous to use this opportunity and improve the flame penetration resistance as well in order to improve the overall aeroplane fire safety.

2. Options

a. The options identified

The options to be potentially followed by the Agency are:

Option 1 - Do nothing

Option 2 - Rulemaking Action

Take a rulemaking action for CS-25 to make the upgraded flammability standards as adopted by the FAA applicable to thermal/acoustic insulation materials installed in large aeroplanes of new or significantly changed type designs to be certificated by the Agency.

b. The preferred option selected

See paragraph 5.c. below.

3. Sectors concerned

Those affected by this proposal in terms of safety and economic impact are:
- Large aeroplane manufacturers and their Design Organisations
- Manufacturers of insulation blankets and/or blanket components
- Large aeroplane operators
- Modifiers of large aeroplanes

Those affected by this proposal in terms of safety:
- Occupants (aircraft crew and passengers)

4. Impacts

a. All identified impacts

i. Safety

Option 1: This option would not change the current safety level provided by the current flammability standards for thermal/acoustic insulation materials. This is considered unsatisfactory. Fire related accidents and incidents of large aeroplanes with thermal/acoustic insulation materials acting as a contributing factor would continue to occur because the current flammability standards for these materials are not satisfactory and would not prevent such accidents.

Option 2: This option would bring upgraded flammability standards which would generate safety benefits by averting accidents that involve propagation of flame via thermal/acoustic insulation materials and by mitigating accidents that involve the risk of an external fire burning through the fuselage of an aeroplane into its cabin before an emergency evacuation can be completed.

The improved flame propagation resistance would reduce the incidence and severity of cabin fires, particularly of those in inaccessible areas where thermal/acoustic insulation materials are installed. The FAA estimated that over a 20 year time period the flame propagation requirement is expected to avert one catastrophic accident like e.g. the accident involving a MD-11 (Swissair Flight 111) aeroplane on 2 September 1998.

In case of a post-crash fire, the improved flame penetration resistance would provide additional time for evacuation of occupants by delaying the entry of the fire into the cabin.

A study performed for the FAA and CAA UK in 1999 (Ref. (5)) identified and evaluated in detail 17 Fuselage Burnthrough accidents that occurred between 1967 and 1993. The statistical and mathematical analysis performed using this sub-set of accidents concluded that the safety benefit potential in terms of a number of additional lives saved per year in the worldwide fleet aircraft accidents can be assessed to be 12.1 (for 4 min burnthrough time) or 12.5 (8 min) for the aircraft in its actual configuration and 10.1 (4 min) or 10.5 (8 min) for the aircraft configured to the airworthiness requirements introduced later (floor proximity lighting/marking, seat block layers, fire hardening of cabin interior material, improved access to type III exits).

The confidence in the results of the above study was confirmed by another study performed for the FAA and CAA UK in 2003 (Ref. (6)) which, using the same database updated to cover slightly extended timeframe (from 1967 to 1996) concluded that the number of additional lives saved per year can be estimated to be approximately 12 assuming an enhanced Fuselage Burnthrough protection providing 5 min of fuselage burnthrough time. These conclusions suggest there is a clear potential for a safety benefit if enhanced Fuselage Burnthrough protection measures are introduced.

Option 2 would make the upgraded flammability standards applicable to the thermal/acoustic insulation materials installed in large aeroplanes of new or significantly changed type designs.

ii. <u>Economic</u>

Option 1: Would have no economic effect.

Option 2: The FAA carefully evaluated in the Final Rule (Ref. (2)) costs associated with the new regulations as well as the related safety benefits. For details consult please this document. The Agency is unable to quantify the economical impact on European stakeholders since such quantification cannot be performed without corresponding cost figures provided my European stakeholders. It is however expected that the impact on the Europeans stakeholders will not be much different to that on U.S stakeholders as estimated by the FAA. The FAA estimated the total cost of the rule to $ 108,4 million while the summary of safety benefits, both from improvement of flame propagation and flame penetration resistance, over the next 20-year period is estimated to $ 222.6 million. It should be noted that the FAA estimate includes both the consequence of the amendment to Part 25 as well as to the operational rules. This NPA only addresses the update of CS-25 and not the possible 'forward-fit' through JAR-26. The cost figures for the CS-25 amendment only are considerably lower than the totals as estimated by the FAA. The Agency shares with the FAA the opinion that the total cost will be composed of:

a. New installation material cost: The new materials compliant with the upgraded flame propagation requirements and/or the flame penetration (burnthrough) requirements are expected to add cost compared to the cost of standard material currently used. There will be also cost of testing including testing equipment (test apparatus) to be added.

b. Added fuel cost: The new materials compliant with flame propagation or burnthrough requirements are expected to weight more and thus there will be a fuel-weight penalty.

c. Engineering cost: This cost will be mainly composed of cost of engineering work related to the material configuration management (managing aviation parts nomenclature)

The Agency wants to stress however, that no additional costs are expected to be involved with this NPA in addition to those costs which will be incurred by meeting the corresponding FAR requirements.

iii. Environmental

No impacts on the environment have been identified.

iv. Social

No social impacts have been identified.

v. Other aviation requirements outside EASA scope

Rulemaking for European operational requirements (corresponding to the FAR Parts 91, 121, 125, 135 etc) was until recently outside the scope of the Agency. This has been changed recently by adoption of a new Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 which extended the scope of the Agency to rulemaking in the area of operations, flight crew licensing and third-country aircraft. However the envisaged implementing rules for operations that are expected to bring new European requirements applicable to Operators, counterparts of the above mentioned FAR operational parts, are not expected to include requirements like the ones contained in (or proposed for) JAR-26 "Additional Airworthiness Requirements for Operators".

In the EU/EASA system it still remains undecided to whom and by which means the JAR-26 like requirements will be imposed. This is subject of the current EASA rulemaking task 21.039 "Elaboration and adoption in the Community framework, of additional specifications for a given type of aircraft and type of operation". Until such decision is taken there is no regulatory material that could be the object of rulemaking through an NPA process. The only regulatory material remaining available is the JAR-26 code. Since this code was not transferred to the Agency, any rulemaking for JAR-26 remains still within the remit of the JAA and is subject to the JAA rulemaking procedures. The JAA has adopted a rulemaking task for Thermal/acoustic insulation materials (NPA 26-17) to its JAA 2008 Rulemaking Programme. The Agency will be involved in the performance of this task as it agreed to act as a service provider for the JAA, using its own resources which the JAA does not have any longer.

vi. Foreign comparable regulatory requirements

a. FAA

The FAA adopted a Final Rule on 31 July 2003 (Ref. (2)) that was later amended by

- Final Rule issued on 30 December 2005 (Ref (3)) which alleviated the original requirements to limit the scope of insulation materials that need to be compliant with the flame propagation requirements when installed as replacements in certain aeroplanes in operation.

- Final Rule issued on 12 January 2007 (Ref. (4)) which extended , by 24 months (from 2 September 2007 to 2 September 2009), the date for operators to comply with the fire penetration resistance requirements.

Except relatively small differences in the applicability of the new rules given by differences in the definitions of "Transport Category Aircraft" and "Large Aeroplanes" the Option 2 would substantially improve harmonisation between FAR Parts 25 and 121 on one side and CS-25 and JAR-26 on the other side.

b. ICAO

ICAO Annex 8 was reviewed and it was concluded that it does not have any requirements for thermal/acoustic insulation. No text was found in conflict with the content or overall objectives of this NPA.

b. <u>Equity and fairness in terms of distribution of positive and negative impacts among concerned sectors</u>

No equity and fairness issues have been identified. The rule itself accounts for exclusion of smaller aeroplanes with less than 20 passengers having far better evacuation capability which would not benefit in full from application of the burnthrough requirements from the applicability of those requirements.

5. Summary and Final Assessment

a. <u>Comparison of the positive and negative impacts for each option evaluated</u>

Option 1: This option would have no impacts. The current safety level provided by current requirements for thermal/acoustic insulation materials would remain unsatisfactory and would not address the safety issues identified in flammability standards of thermal/acoustic insulation materials installed in large aeroplanes. In the next 20 years at least one catastrophic accident is estimated to occur that would not be averted.

Option 2: Compared to the other option this option would bring the highest safety benefits with related economic consequences that are considered acceptable. No additional economic impacts are expected on European stakeholders in addition to those expected to be incurred by meeting the FAA requirements. The Agency expects that European designers, manufacturers and operators of large aeroplanes have already prepared or are preparing to meet the corresponding FAA rules technically harmonised with the rules proposed by this option. Therefore no additional impact is expected.

b. <u>A summary describing who would be affected by these impacts and analysing issues of equity and fairness</u>

Both the European and non-European large aeroplane designers, manufacturers and operators are potentially affected by the proposed rules. However, the proposed rules will not be a novelty for them. They are expected to be already familiar with and prepared to meet the proposed rules which are harmonised with the rules adopted by the FAA. Option 2 would mean almost full harmonisation with the corresponding FAA rules adopted for FAR Part 25, restoring so a fair playing field for the Industry market competition.

c. <u>Final assessment and recommendation of a preferred option</u>

After due consideration the Agency decided that Option 2 is to be preferred. When taking this decision the Agency took into account the existence of the improved flammability standards for thermal/acoustic insulation materials adopted by the FAA. These rules were reviewed end endorsed including their justification. No substantial reasons were found by the Agency for not harmonizing its rules with the above corresponding FAA rules to the maximum extent possible.

It should be appreciated that the Agency has not yet developed and made available the full structure of its operational rules covering operations corresponding e.g. to FAR Parts 91, 121, 125, and 135. Therefore harmonisation must be for the time being limited to the scope of CS-25. Consequently, the JAR-26 part has to be progressed by means of another, JAA NPA (NPA 26-17) that needs to follow the JAA rulemaking procedures and be proposed to the JAA governing bodies. The Agency intends to propose in the NPA 26-17 a text technically harmonised with the FAA Final Rule Amdt. No. 121-301 as amended by Amdt. No. 121-320 and Amdt. No. 121-330.

It should be also appreciated that, because of the different legal/regulatory environment, the way of transposition of JAR-26 or JAR-26-like additional requirements for airworthiness into the EU/EASA regulatory environment has not yet been decided. By means of the JAA NPA for JAR-26 the Agency, in co-operation with the JAA, wishes to clearly indicate to the Industry its intentions and wants to consult Industry on the technical substance of this proposal.

6. References

(1) Notice of Proposed Rulemaking (NPRM) "Improved Flammability Standards for Thermal/Acoustic Insulation Materials Used in Transport Category Airplanes published on 20 September 2000 (Federal Register Vol. 65 No. 183, Notice 00-09, Docket No. FAA-2000-7909)

(2) FAA Final Rule "Improved Flammability Standards for Thermal/Acoustic Insulation Materials Used in Transport Category Airplanes for issued on July 31, 2003 (Federal Register Vol. 68, No. 147, Docket No. FAA-2000-7909, Amendment Nos. 25-111, 91-279, 121-301, 125-43, 135-90)

(3) FAA Final Rule "Thermal /Acoustic Insulation Installed on Transport Category Airplanes" issued on December 30, 2005 (Federal Register Vol. 70 No. 250, Docket No. FAA-2005-23462, Amendment Nos.91-290, 121-320, 135-103)

(4) FAA Final Rule "Fire Penetration Resistance of Thermal/Acoustic Insulation Installed on Transport Category Airplanes (Federal Register Vol. 72, No. 8, Docket No. FAA-2006-24277, Amendment No. 121-330)

(5) Fuselage Burnthrough Protection for Increased Postcrash Occupant Survivability: Safety Benefit Analysis Based on Past accidents (DOT/FAA/AR-99/57) by R.G.W. Cherry & Associates Limited, dated September 1999.

(6) A Benefit Analysis for Cabin Water Spray Systems and Enhanced Fuselage Burnthrough Protection (DOT/FAA/AR-02/49) by R.G.W. Cherry & Associates Limited, dated 7 April 2003.

B. DRAFT DECISIONS

The text of the amendment is arranged to show deleted text, new text or new paragraph as shown below:

- deleted text is shown with a strike through: ~~deleted~~
- new text is highlighted with grey shading: new
- ….

  indicates that remaining text is unchanged in front of or following the reflected amendment.

Proposal 1: Add a new paragraph CS 25.856 as follows:

Book 1
SUBPART D - DESIGN AND CONSTRUCTION
….

CS 25.856 Thermal/acoustic insulation materials

(a) Thermal/acoustic insulation material installed in the fuselage must meet the flame propagation test requirements of Part VI of Appendix F to CS-25, or other approved equivalent test requirements. This requirement does not apply to "small parts", as defined in Part I of Appendix F to CS-25.

(b) For aeroplanes with a passenger capacity of 20 or greater, thermal/acoustic insulation materials (including the means of fastening the materials to the fuselage) installed in the lower half of the aeroplane fuselage must meet the flame penetration resistance test requirements of Part VII of Appendix F to CS-25, or other approved equivalent test requirements. This requirement does not apply to thermal/acoustic insulation installations that the Agency finds would not contribute to fire penetration resistance.

Proposal 2: Amend paragraph (a)(1)(ii) in Part I of Appendix F to CS-25 as follows:

Appendix F

Part I – Test Criteria and Procedures for Showing Compliance with CS 25.853, 25.855 or 25.869

(a) *Material test criteria–*

(1) *Interior compartments occupied by crew or passengers.*

(i) ….

(ii) Floor covering, textiles (including draperies and upholstery), seat cushions, padding, decorative and non-decorative coated fabrics, leather, trays and galley furnishings, electrical conduit, ~~thermal and acoustical insulation and insulation covering,~~ air ducting, joint and edge covering, liners of Class B and E cargo or baggage compartments, floor panels of Class B, C, D, or E cargo or baggage compartments, ~~insulation blankets,~~ cargo covers and transparencies, moulded and thermoformed parts, air ducting joints, and trim strips (decorative and chafing), that are constructed of materials not covered in sub-paragraph (iv) below, must be self-extinguishing when tested vertically in accordance with the applicable portions of Part I of this Appendix or other approved equivalent means. The average burn length may not exceed 20 cm (8 inches), and the average flame time after removal of the flame source may not exceed 15 seconds. Drippings from the test specimen may not continue to flame for more than an average of 5 seconds after falling.

Proposal 3: Remove and reserve paragraph (a)(2)(i) in Part I of Appendix F to CS-25 as follows:

(2) *Cargo and baggage compartments not occupied by crew or passengers.*

(i) *Reserved.* ~~Thermal and acoustic insulation (including coverings) used in each cargo and baggage compartment must be constructed of materials that meet the requirements set forth in sub-paragraph (a)(1)(ii) of Part I of this Appendix.~~

….

Proposal 4: Add a new Part VI into Appendix F to CS-25 to read as follows:

Part VI - Test Method To Determine the Flammability and Flame Propagation Characteristics of Thermal/Acoustic Insulation Materials

Use this test method to evaluate the flammability and flame propagation characteristics of thermal/acoustic insulation when exposed to both a radiant heat source and a flame.

(a) *Definitions.*

''Flame propagation'' means the furthest distance of the propagation of visible flame towards the far end of the test specimen, measured from the midpoint of the ignition source flame. Measure this distance after initially applying the ignition source and before all flame on the test specimen is extinguished. The measurement is not a determination of burn length made after the test.

''Radiant heat source'' means an electric or air propane panel.

''Thermal/acoustic insulation'' means a material or system of materials used to provide thermal and/or acoustic protection. Examples include fibreglass or other batting material encapsulated by a film covering and foams.

''Zero point'' means the point of application of the pilot burner to the test specimen.

(b) *Test apparatus.*

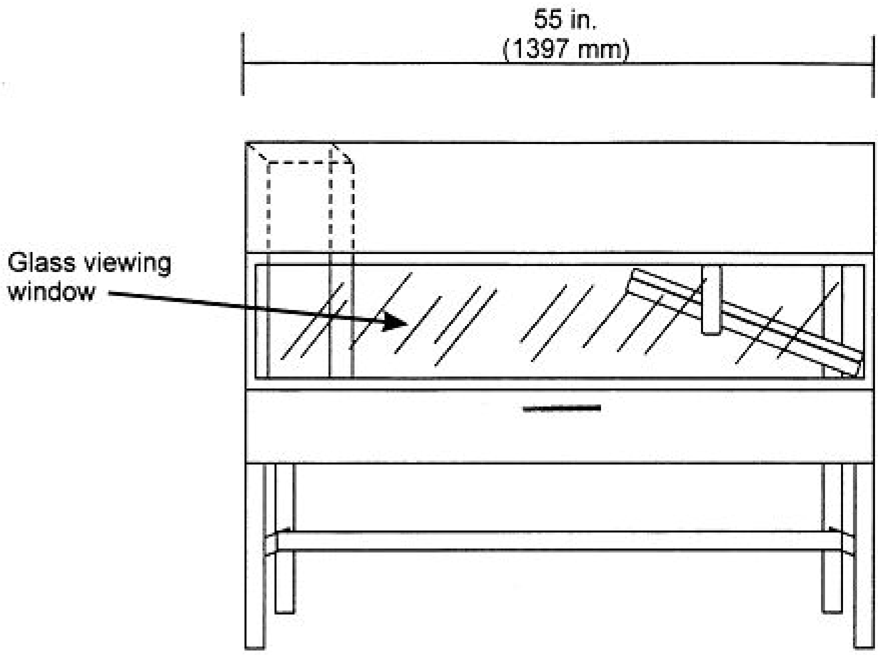

Figure 1 - Radiant Panel Test Chamber

(1) *Radiant panel test chamber.* Conduct tests in a radiant panel test chamber (see figure 1 above). Place the test chamber under an exhaust hood to facilitate clearing the chamber of smoke after each test. The radiant panel test chamber must be an enclosure 1397 mm (55 inches) long by 495 mm (19.5 inches) deep by 710 mm (28 inches) to 762 mm (maximum) (30 inches) above the test specimen. Insulate the sides, ends, and top with a fibrous ceramic insulation, such as Kaowool M^{TM} board. On the front side, provide a 52 by 12-inch (1321 by 305 mm) draft-free, high-temperature, glass window for viewing the sample during testing. Place a door below the window to provide access to the movable specimen platform holder. The bottom of the test chamber must be a sliding steel platform that has provision for securing the test specimen holder in a fixed and level position. The chamber must have an internal chimney with exterior dimensions of 129 mm (5.1 inches) wide, by 411 mm (16.2 inches) deep by 330 mm (13 inches) high at the opposite end of the chamber from the radiant energy source. The interior dimensions must be 114 mm (4.5 inches) wide by 395 mm (15.6 inches) deep. The chimney must extend to the top of the chamber (see figure 2).

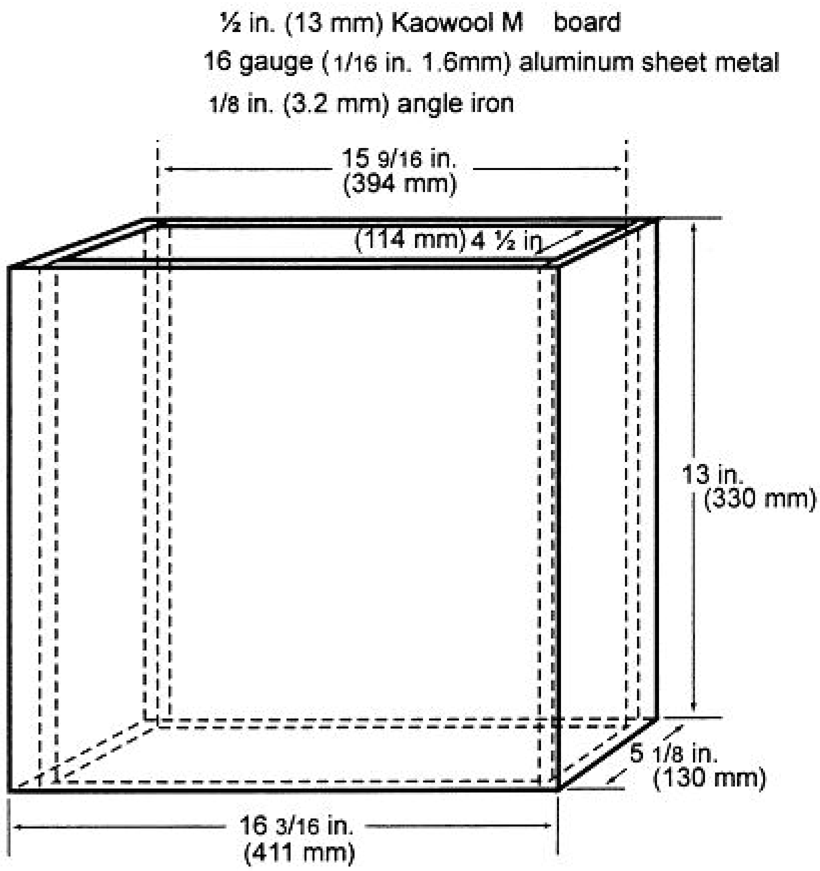

Figure 2 - Internal Chimney

(2) *Radiant heat source.* Mount the radiant heat energy source in a cast iron frame or equivalent. An electric panel must have six, 76 mm (3-inch) wide emitter strips. The emitter strips must be perpendicular to the length of the panel. The panel must have a radiation surface of 327 by 470 mm (12⅞ by 18½ inches). The panel must be capable of operating at temperatures up to 704°C (1300°F). An air propane panel must be made of a porous refractory material and have a radiation surface of 305 by 457 mm (12 by 18 inches). The panel must be capable of operating at temperatures up to 816°C (1500°F). See figures 3a and 3b.

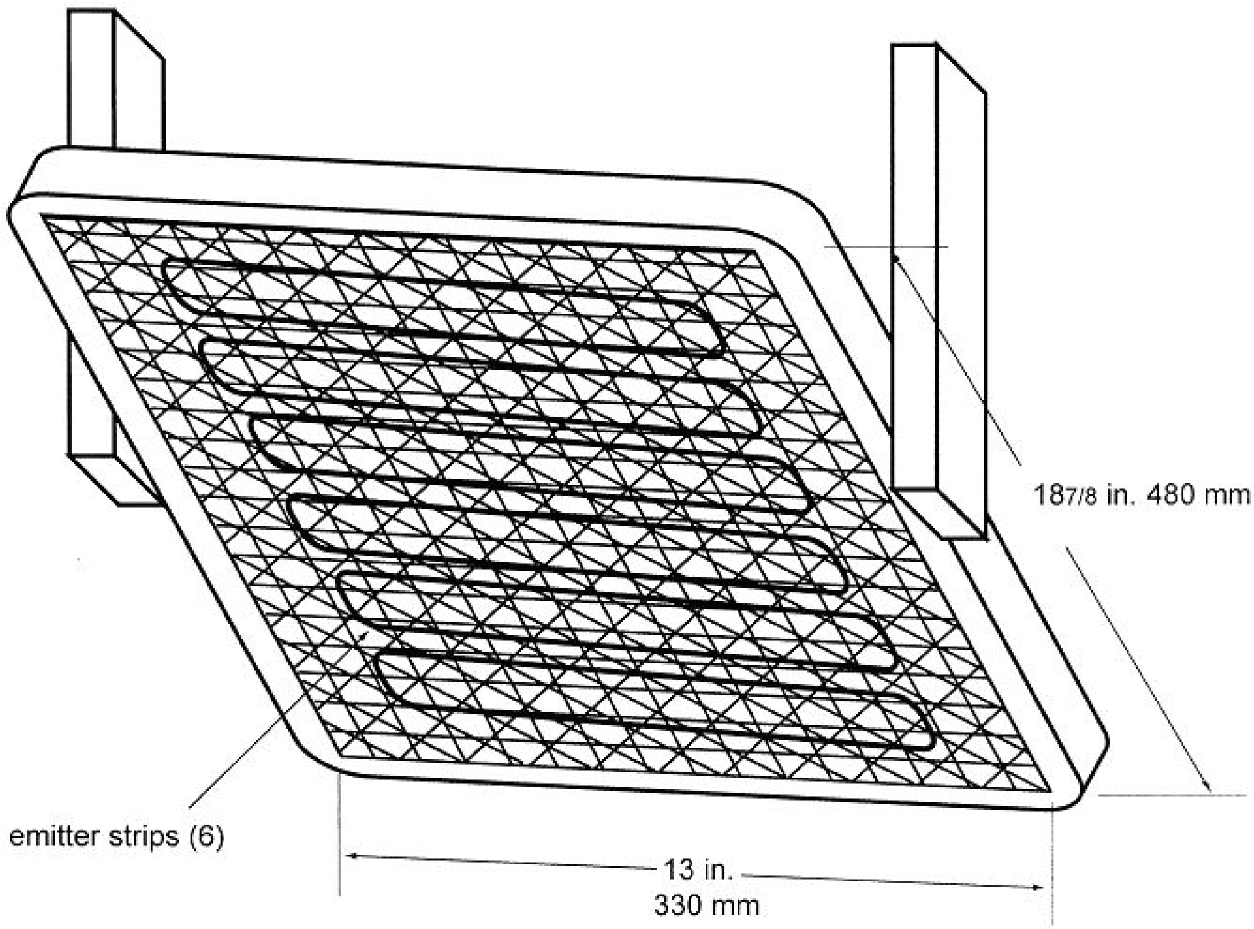

Figure 3a – Electric Panel

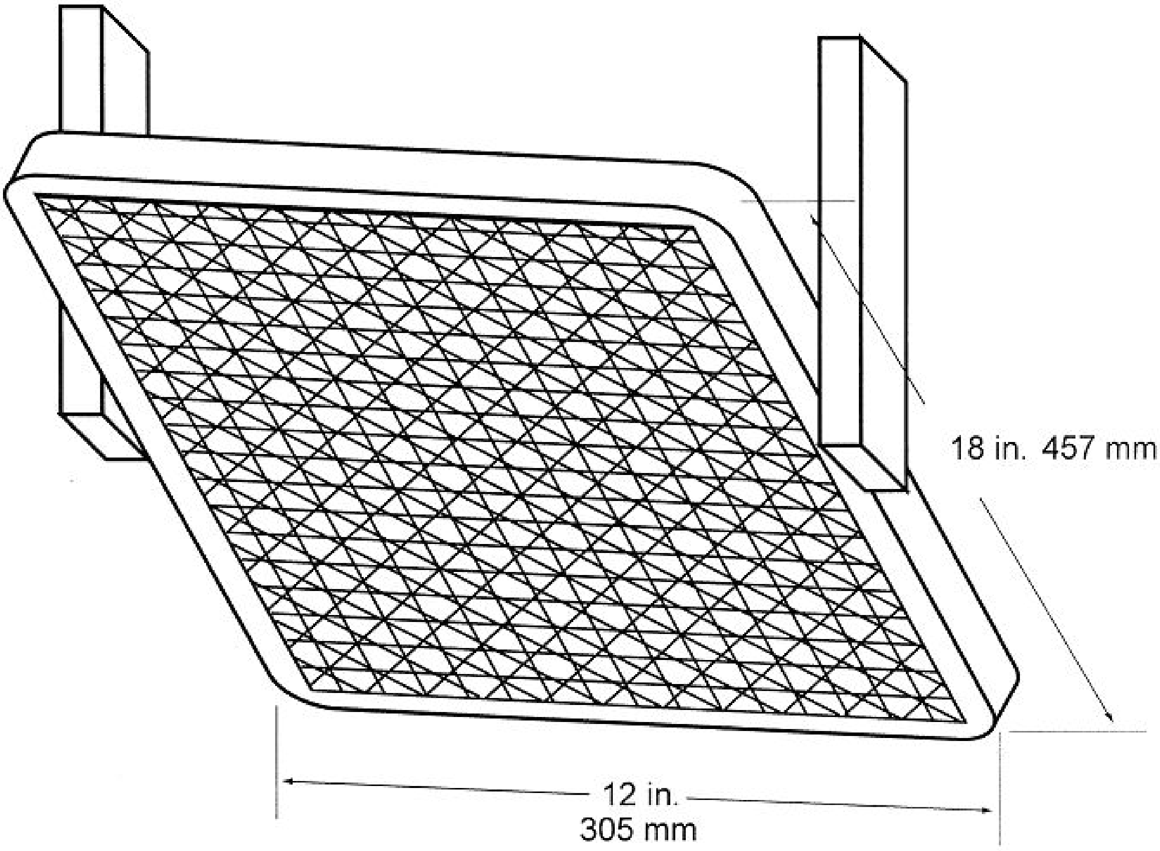

Figure 3b – Air Propane Radiant Panel

(i) *Electric radiant panel.* The radiant panel must be 3-phase and operate at 208 volts. A single-phase, 240 volt panel is also acceptable. Use a solid-state power controller and microprocessor-based controller to set the electric panel operating parameters.

(ii) *Gas radiant panel.* Use propane (liquid petroleum gas—2.1 UN 1075) for the radiant panel fuel. The panel fuel system must consist of a venturi-type aspirator for mixing gas and air at approximately atmospheric pressure. Provide suitable instrumentation for monitoring and controlling the flow of fuel and air to the panel. Include an air flow gauge, an air flow regulator, and a gas pressure gauge.

(iii) *Radiant panel placement.* Mount the panel in the chamber at 30° to the horizontal specimen plane, and 19 cm (7 ½ inches) above the zero point of the specimen.

(3) *Specimen holding system.*

(i) The sliding platform serves as the housing for test specimen placement. Brackets may be attached (via wing nuts) to the top lip of the platform in order to accommodate various thicknesses of test specimens. Place the test specimens on a sheet of Kaowool M^{TM} board or 1260 Standard Board (manufactured by Thermal Ceramics and available in Europe), or equivalent, either resting on the bottom lip of the sliding platform or on the base of the brackets. It may be necessary to use multiple sheets of material based on the thickness of the test specimen (to meet the sample height requirement). Typically, these non-combustible sheets of material are available in 6 mm (¼ inch) thicknesses. See figure 4. A sliding platform that is deeper than the 50.8 mm (2-inch) platform shown in figure 4 is also acceptable as long as the sample height requirement is met.

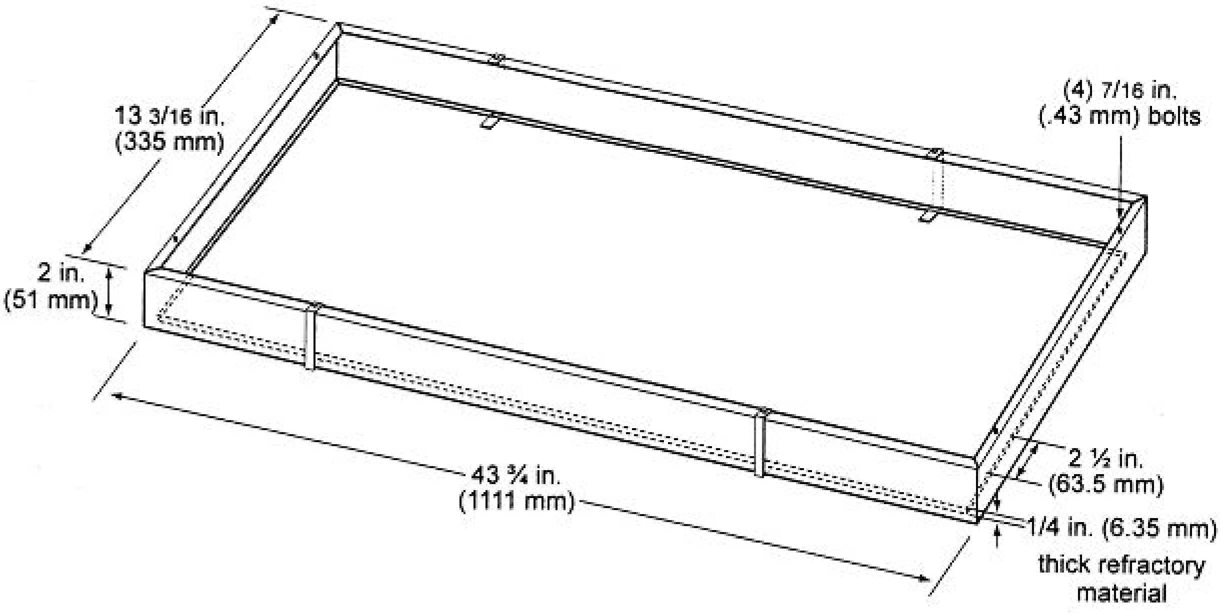

Figure 4 - Sliding Platform

(ii) Attach a 13 mm (½ inch) piece of Kaowool M™ board or other high temperature material measuring 1054 by 210 mm (41½ by 8¼ inches) to the back of the platform. This board serves as a heat retainer and protects the test specimen from excessive preheating. The height of this board must not impede the sliding platform movement (in and out of the test chamber). If the platform has been fabricated such that the back side of the platform is high enough to prevent excess preheating of the specimen when the sliding platform is out, a retainer board is not necessary.

(iii) Place the test specimen horizontally on the non-combustible board(s). Place a steel retaining/securing frame fabricated of mild steel, having a thickness of 3.2 mm (⅛ inch) and overall dimensions of 584 by 333 mm (23 by 13⅛ inches) with a specimen opening of 483 by 273 mm (19 by 10¾ inches) over the test specimen. The front, back, and right portions of the top flange of the frame must rest on the top of the sliding platform, and the bottom flanges must pinch all 4 sides of the test specimen. The right bottom flange must be flush with the sliding platform. See figure 5.

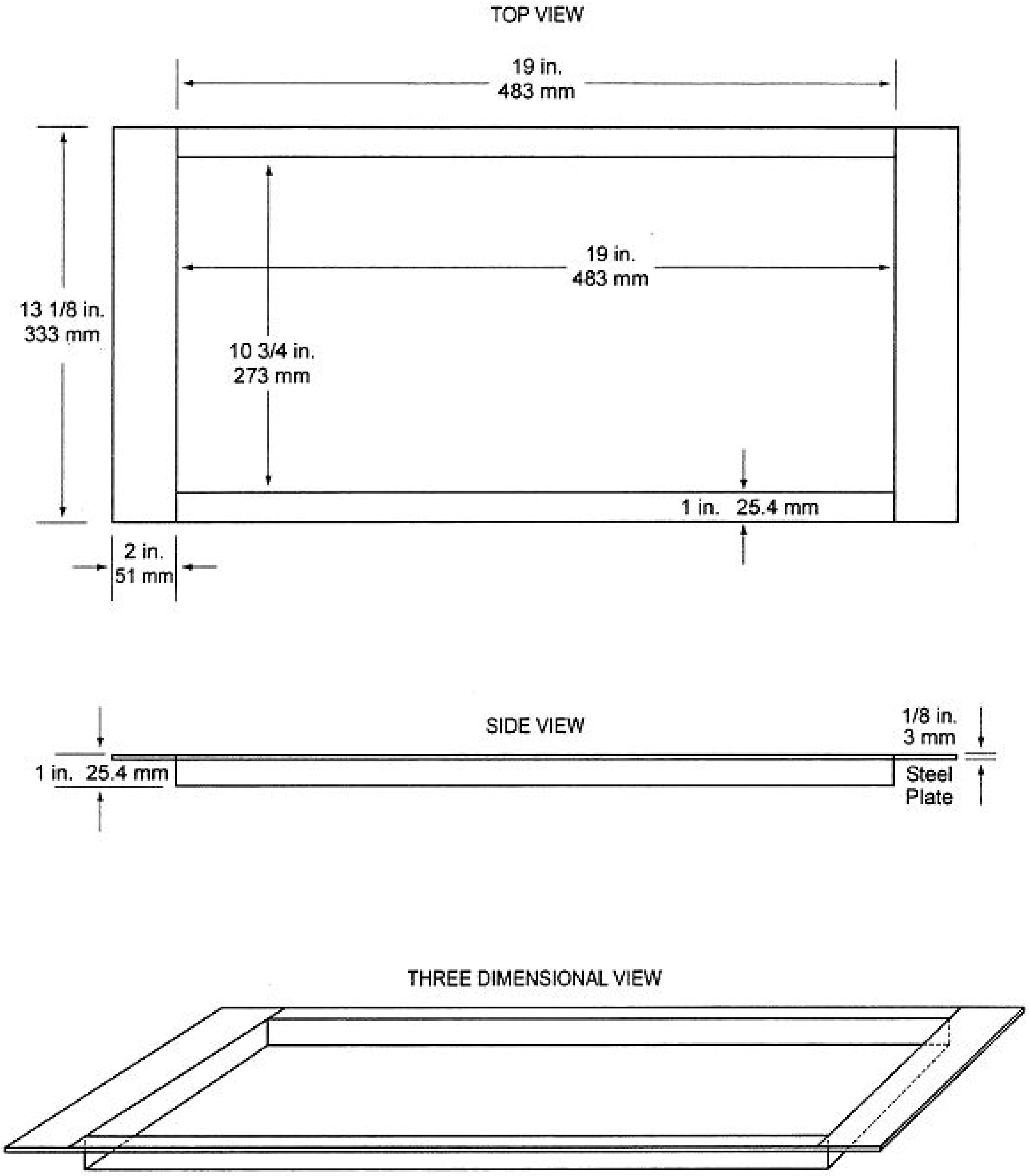

Figure 5: 3 views

(4) *Pilot Burner.* The pilot burner used to ignite the specimen must be a Bernzomatic™ (or equivalent) commercial propane venturi torch with an axially symmetric burner tip and a propane supply tube with an orifice diameter of 0.15 mm (0.006 inches). The length of the burner tube must be 71 mm (2⅞ inches). The propane flow must be adjusted via gas pressure through an in-line regulator to produce a blue inner cone length of 19 mm (¾ inch). A 19 mm (¾ inch) guide (such as a thin strip of metal) may be soldered to the top of the burner to aid in setting the flame height. The overall flame length must be approximately 127 mm (5 inches) long. Provide a way to move the burner out of the ignition position so that the flame is horizontal and at least 50 mm (2 inches) above the specimen plane. See figure 6.

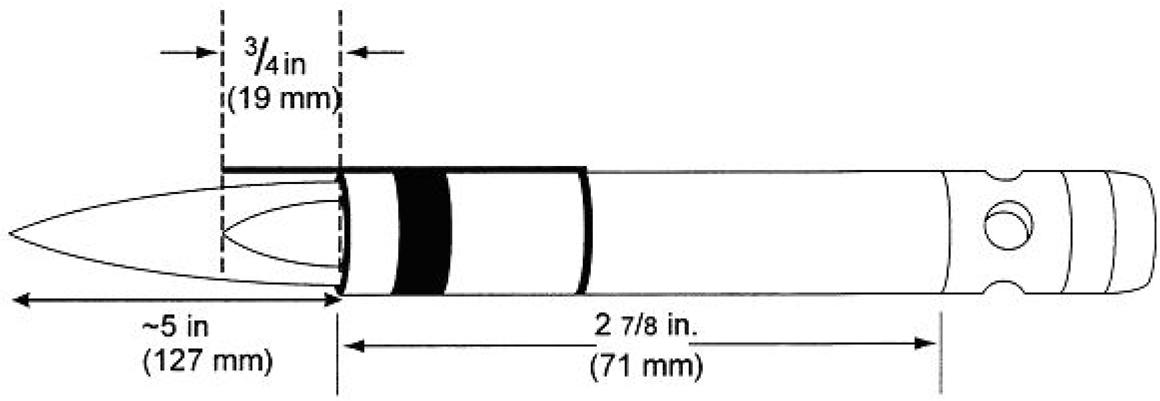

Figure 6 – Propane Pilot Burner

(5) *Thermocouples.* Install a 24 American Wire Gauge (AWG) Type K (Chromel-Alumel) thermocouple in the test chamber for temperature monitoring. Insert it into the chamber through a small hole drilled through the back of the chamber. Place the thermocouple so that it extends 279 mm (11 inches) out from the back of the chamber wall, 292 mm (11½ inches) from the right side of the chamber wall, and is 51 mm (2 inches) below the radiant panel. The use of other thermocouples is optional.

(6) *Calorimeter.* The calorimeter must be a one-inch cylindrical water-cooled, total heat flux density, foil type Gardon Gage that has a range of 0 to 5.7 Watts/cm^2 (0 to 5 BTU/ft^2 sec).

(7) *Calorimeter calibration specification and procedure.*

(i) *Calorimeter specification.*

(A) Foil diameter must be 6.35 ± 0.13 mm (0.25 ± 0.005 inches).

(B) Foil thickness must be 0.013 ± 0.0025 mm (0.0005 ± 0.0001 inches).

(C) Foil material must be thermocouple grade Constantan.

(D) Temperature measurement must be a Copper Constantan thermocouple.

(E) The copper center wire diameter must be 0.013 mm (0.0005 inches).

(F) The entire face of the calorimeter must be lightly coated with ‘‘Black Velvet’’ paint having an emissivity of 96 or greater.

(ii) *Calorimeter calibration.*

(A) The calibration method must be by comparison to a like standardized transducer.

(B) The standardized transducer must meet the specifications given in paragraph (b)(6) of Part VI of this Appendix.

(C) Calibrate the standard transducer against a primary standard traceable to the National Institute of Standards and Technology (NIST).

(D) The method of transfer must be a heated graphite plate.

(E) The graphite plate must be electrically heated, have a clear surface area on each side of the plate of at least 51 by 51 mm (2 by 2 inches), and be 3.2 ± 1.6 mm (⅛± 1/16 inch) thick.

(F) Center the 2 transducers on opposite sides of the plates at equal distances from the plate.

(G) The distance of the calorimeter to the plate must be no less than 1.6 mm (0.0625 inches), nor greater than 9.5 mm (0.375 inches).

(H) The range used in calibration must be at least 0–3.9 Watts/cm^2 (0–3.5 BTUs/ft^2 sec) and no greater than 0–6.4 Watts/cm^2 (0–5.7 BTUs/ft^2 sec).

(I) The recording device used must record the 2 transducers simultaneously or at least within $^1/10$ of each other.

(8) *Calorimeter fixture.* With the sliding platform pulled out of the chamber, install the calorimeter holding frame and place a sheet of non-combustible material in the bottom of the sliding platform adjacent to the holding frame. This will prevent heat losses during calibration. The frame must be 333 mm (13⅛ inches) deep (front to back) by 203 mm (8 inches) wide and must rest on the top of the sliding platform. It must be fabricated of 3.2 mm (⅛ inch) flat stock steel and have an opening that accommodates a 12.7 mm (½ inch) thick piece of refractory board, which is level with the top of the sliding platform. The board must have three 25.4 mm (1 inch) diameter holes drilled through the board for calorimeter insertion. The distance to the radiant panel surface from the centreline of the first hole (''zero'' position) must be 191 ± 3 mm (7½ ± ⅛ inches). The distance between the centreline of the first hole to the centreline of the second hole must be 51 mm (2 inches). It must also be the same distance from the centreline of the second hole to the centreline of the third hole. *See* figure 7. A calorimeter holding frame that differs in construction is acceptable as long as the height from the centreline of the first hole to the radiant panel and the distance between holes is the same as described in this paragraph.

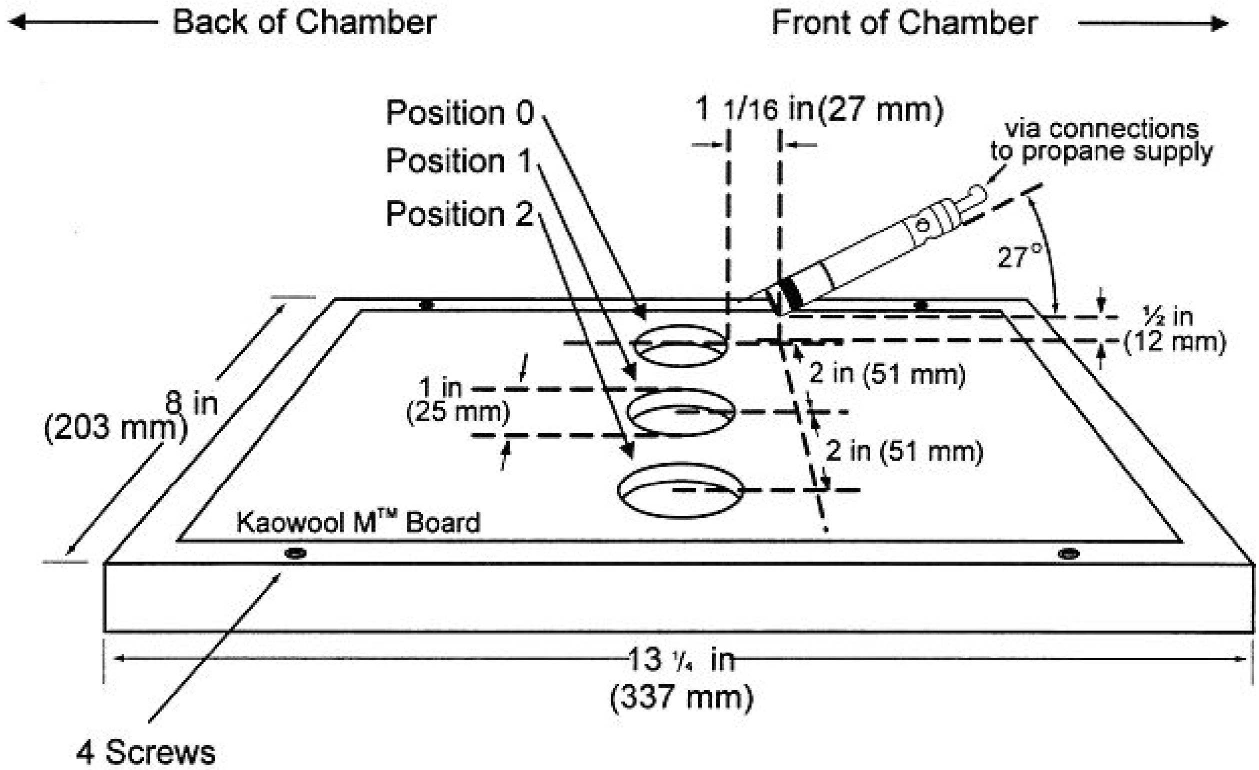

Figure 7 - Calorimeter Holding Frame

(9) *Instrumentation.* Provide a calibrated recording device with an appropriate range or a computerized data acquisition system to measure and record the outputs of the calorimeter and the thermocouple. The data acquisition system must be capable of recording the calorimeter output every second during calibration.

(10) *Timing device.* Provide a stopwatch or other device, accurate to ± 1 second/hour, to measure the time of application of the pilot burner flame.

(c*) Test specimens.*

(1) *Specimen preparation.* Prepare and test a minimum of three test specimens. If an oriented film cover material is used, prepare and test both the warp and fill directions.

(2) *Construction.* Test specimens must include all materials used in construction of the insulation (including batting, film, scrim, tape etc.). Cut a piece of core material such as foam or fiberglass, and cut a piece of film cover material (if used) large enough to cover the core material. Heat sealing is the preferred method of preparing fiberglass samples, since they can be made without compressing the fiberglass (‘‘box sample’’). Cover materials that are not heat sealable may be stapled, sewn, or taped as long as the cover material is over-cut enough to be drawn down the sides without compressing the core material. The fastening means should be as continuous as possible along the length of the seams. The specimen thickness must be of the same thickness as installed in the airplane.

(3) *Specimen Dimensions.* To facilitate proper placement of specimens in the sliding platform housing, cut non-rigid core materials, such as fibreglass, 318 mm (12½ inches) wide by 584 mm (23 inches) long. Cut rigid materials, such as foam, 292 ± 6 mm (11½ ± ¼ inches) wide by 584 mm (23 inches) long in order to fit properly in the sliding platform housing and provide a flat, exposed surface equal to the opening in the housing.

(d) *Specimen conditioning.* Condition the test specimens at 21 ± 2°C (70 ± 5°F) and 55% ± 10% relative humidity, for a minimum of 24 hours prior to testing.

(e) *Apparatus Calibration*.

(1) With the sliding platform out of the chamber, install the calorimeter holding frame. Push the platform back into the chamber and insert the calorimeter into the first hole (‘‘zero’’ position). *See* figure 7. Close the bottom door located below the sliding platform. The distance from the centerline of the calorimeter to the radiant panel surface at this point must be 191 ± 3 mm (7½ ± ⅛ inches). Prior to igniting the radiant panel, ensure that the calorimeter face is clean and that there is water running through the calorimeter.

(2) Ignite the panel. Adjust the fuel/air mixture to achieve 1.7 Watts/cm2 ± 5% (1.5 BTUs/ft2 sec ± 5%) at the ‘‘zero’’ position. If using an electric panel, set the power controller to achieve the proper heat flux. Allow the unit to reach steady state (this may take up to 1 hour). The pilot burner must be off and in the down position during this time.

(3) After steady-state conditions have been reached, move the calorimeter 51 mm (2 inches) from the ‘‘zero’’ position (first hole) to position 1 and record the heat flux. Move the calorimeter to position 2 and record the heat flux. Allow enough time at each position for the calorimeter to stabilize. Table 1 depicts typical calibration values at the three positions.

TABLE 1.—CALIBRATION TABLE

Position	BTU’s/ft^2 sec	Watts/cm^2
‘‘Zero’’ Position...	1.5	1.7
Position 1	1.51–1.50–1.49	1.71–1.70–1.69
Position 2	1.43–1.44	1.62–1.63

(4) Open the bottom door. Remove the calorimeter and holder fixture. Use caution as the fixture is very hot.

(f) *Test Procedure.*

(1) Ignite the pilot burner. Ensure that it is at least 51 mm (2 inches) above the top of the platform. The burner must not contact the specimen until the test begins.

(2) Place the test specimen in the sliding platform holder. Ensure that the test sample surface is level with the top of the platform. At ''zero'' point, the specimen surface must be 191 ± 3 mm (7 ½ ± ⅛ inches) below the radiant panel.

(3) Place the retaining/securing frame over the test specimen. It may be necessary (due to compression) to adjust the sample (up or down) in order to maintain the distance from the sample to the radiant panel 191 ± 3 mm (7½ ± ⅛ inches) at ''zero'' position). With film/fiberglass assemblies, it is critical to make a slit in the film cover to purge any air inside. This allows the operator to maintain the proper test specimen position (level with the top of the platform) and to allow ventilation of gases during testing. A longitudinal slit, approximately 2 inches (51 mm) in length, must be centered 76 ± 13 mm (3 ± ½ inches) from the left flange of the securing frame. A utility knife is acceptable for slitting the film cover.

(4) Immediately push the sliding platform into the chamber and close the bottom door.

(5) Bring the pilot burner flame into contact with the center of the specimen at the ''zero'' point and simultaneously start the timer. The pilot burner must be at a 27° angle with the sample and be approximately ½ inch (12 mm) above the sample. See figure 7. A stop, as shown in figure 8, allows the operator to position the burner correctly each time.

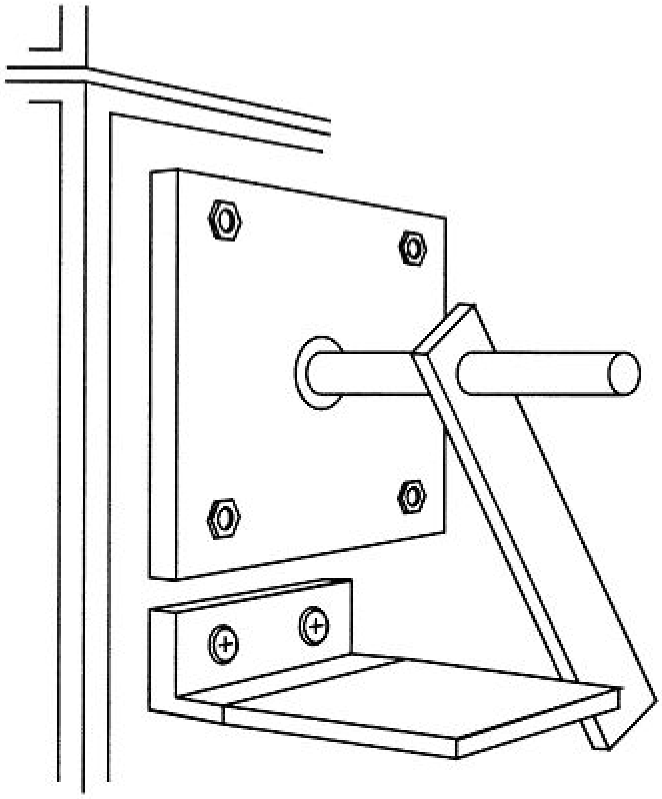

Figure 8 - Propane Burner Stop

(6) Leave the burner in position for 15 seconds and then remove to a position at least 51 mm (2 inches) above the specimen.

(g) *Report.*

(1) Identify and describe the test specimen.

(2) Report any shrinkage or melting of the test specimen.

(3) Report the flame propagation distance. If this distance is less than 51 mm (2 inches), report this as a pass (no measurement required).

(4) Report the after-flame time.

(h) *Requirements.*

(1) There must be no flame propagation beyond 51 mm (2 inches) to the left of the centerline of the pilot flame application.

(2) The flame time after removal of the pilot burner may not exceed 3 seconds on any specimen.

Proposal 5: Add a new Part VII into Appendix F to CS-25 to read as follows:

Part VII - Test Method To Determine the Burnthrough Resistance of Thermal/Acoustic Insulation Materials

Use the following test method to evaluate the burnthrough resistance characteristics of aircraft thermal/acoustic insulation materials when exposed to a high intensity open flame.

(a) *Definitions.*

Burnthrough time means the time, in seconds, for the burner flame to penetrate the test specimen, and/or the time required for the heat flux to reach 2.27 W/cm^2 (2.0 Btu/ft^2 sec) on the inboard side, at a distance of 30.5 cm (12 inches) from the front surface of the insulation blanket test frame, whichever is sooner. The burnthrough time is measured at the inboard side of each of the insulation blanket specimens.

Insulation blanket specimen means one of two specimens positioned in either side of the test rig, at an angle of 30° with respect to vertical.

Specimen set means two insulation blanket specimens. Both specimens must represent the same production insulation blanket construction and materials, proportioned to correspond to the specimen size.

(b) *Apparatus.*

(1) The arrangement of the test apparatus is shown in figures 1 and 2 and must include the capability of swinging the burner away from the test specimen during warm-up.

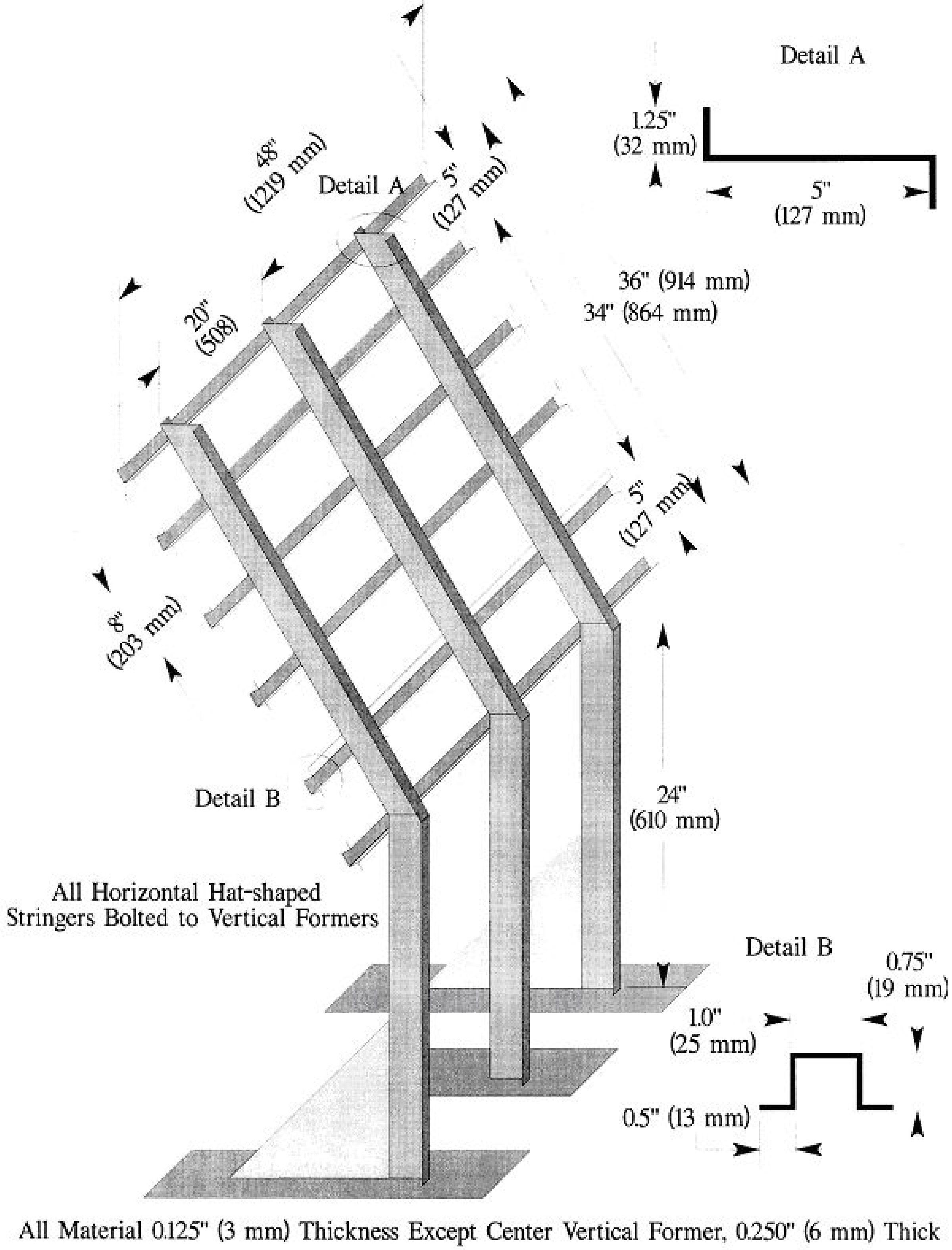

Figure 1 - Burnthrough Test Apparatus Specimen Holder

(2) *Test burner.* The test burner must be a modified gun-type such as the Park Model DPL 3400. Flame characteristics are highly dependent on actual burner setup. Parameters such as fuel pressure, nozzle depth, stator position, and intake airflow must be properly adjusted to achieve the correct flame output.

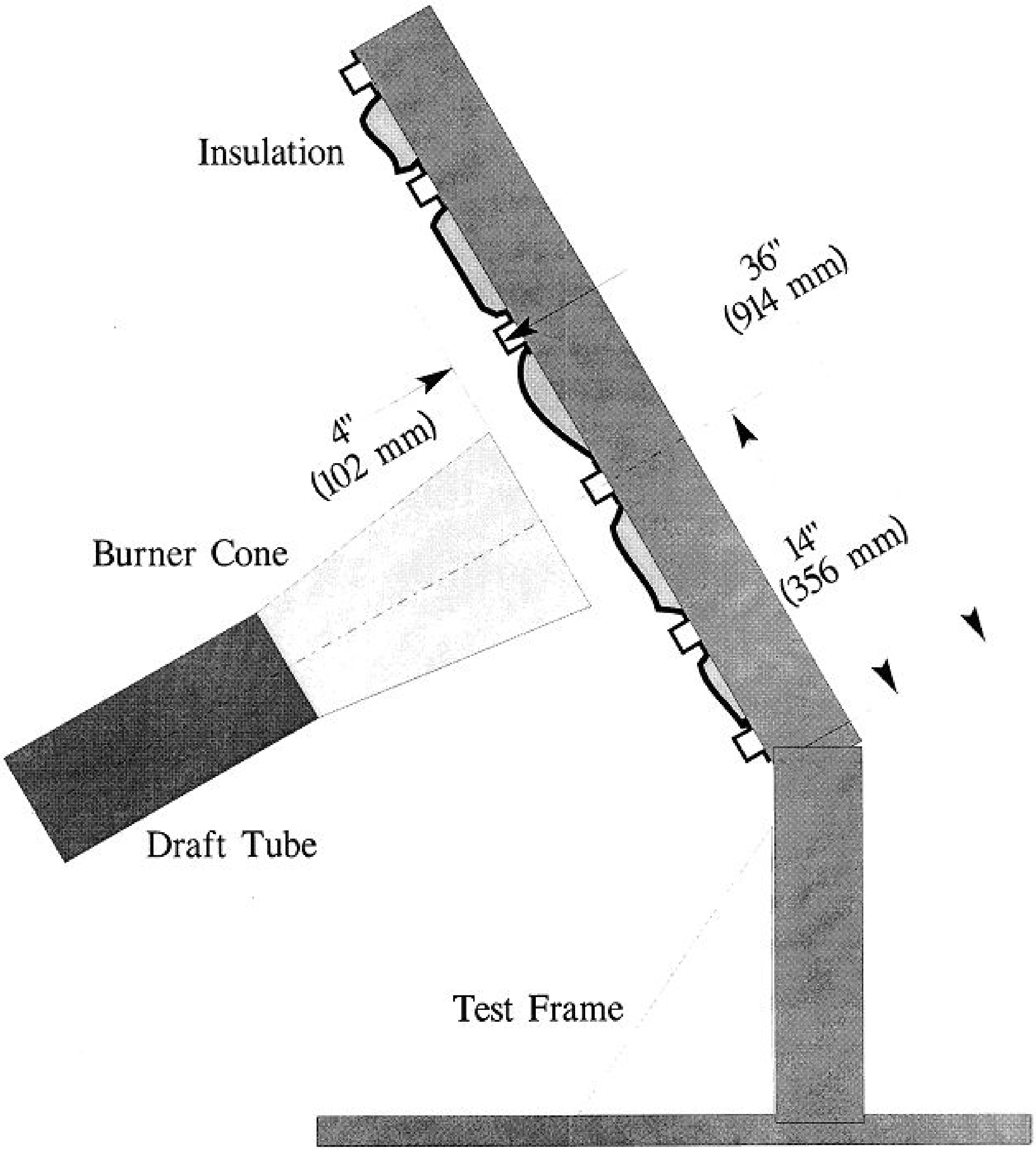

Figure 2 – Burnthrough Test Apparatus

(i) *Nozzle.* A nozzle must maintain the fuel pressure to yield a nominal 0.378 l/min (6.0 gal/hr) fuel flow. A Monarch-manufactured 80° PL (hollow cone) nozzle nominally rated at 6.0 gal/hr at 100 lb/in^2 (0.71 MPa) delivers a proper spray pattern.

(ii) *Fuel Rail.* The fuel rail must be adjusted to position the fuel nozzle at a depth of 8 mm (0.3125 inch) from the end plane of the exit stator, which must be mounted in the end of the draft tube.

(iii) *Internal Stator.* The internal stator, located in the middle of the draft tube, must be positioned at a depth of 95 mm (3.75 inches) from the tip of the fuel nozzle. The stator must also be positioned such that the integral igniters are located at an angle midway between the 10 and 11 o'clock position, when viewed looking into the draft tube. Minor deviations to the igniter angle are acceptable if the temperature and heat flux requirements conform to the requirements of paragraph (e) of Part VII of this Appendix.

(iv) *Blower Fan.* The cylindrical blower fan used to pump air through the burner must measure 133 mm (5.25 inches) in diameter by 89 mm (3.5 inches) in width.

(v) *Burner cone.* Install a 305 ± 3-mm (12 ± 0.125-inch) burner extension cone at the end of the draft tube. The cone must have an opening 152 ± 3 mm (6 ± 0.125 inches) high and 280 ± 3 mm (11 ± 0.125 inches) wide (see figure 3).

(vi) *Fuel.* Use JP–8, Jet A, or their international equivalent, at a flow rate of 0.378 ± 0.0126 l/min (6.0 ± 0.2 gal/hr). If this fuel is unavailable, ASTM K2 fuel (Number 2 grade kerosene) or ASTM D2 fuel (Number 2 grade fuel oil or Number 2 diesel fuel) are acceptable if the nominal fuel flow rate, temperature, and heat flux measurements conform to the requirements of paragraph (e) of Part VII of this Appendix.

(vii) *Fuel pressure regulator.* Provide a fuel pressure regulator, adjusted to deliver a nominal 0.378 l/min (6.0 gal/hr) flow rate. An operating fuel pressure of 0.71 MPa (100 lb/in^2) for a nominally rated 6.0 gal/hr 80° spray angle nozzle (such as a PL type) delivers 0.378 ± 0.0126 l/ min (6.0 ± 0.2 gal/hr).

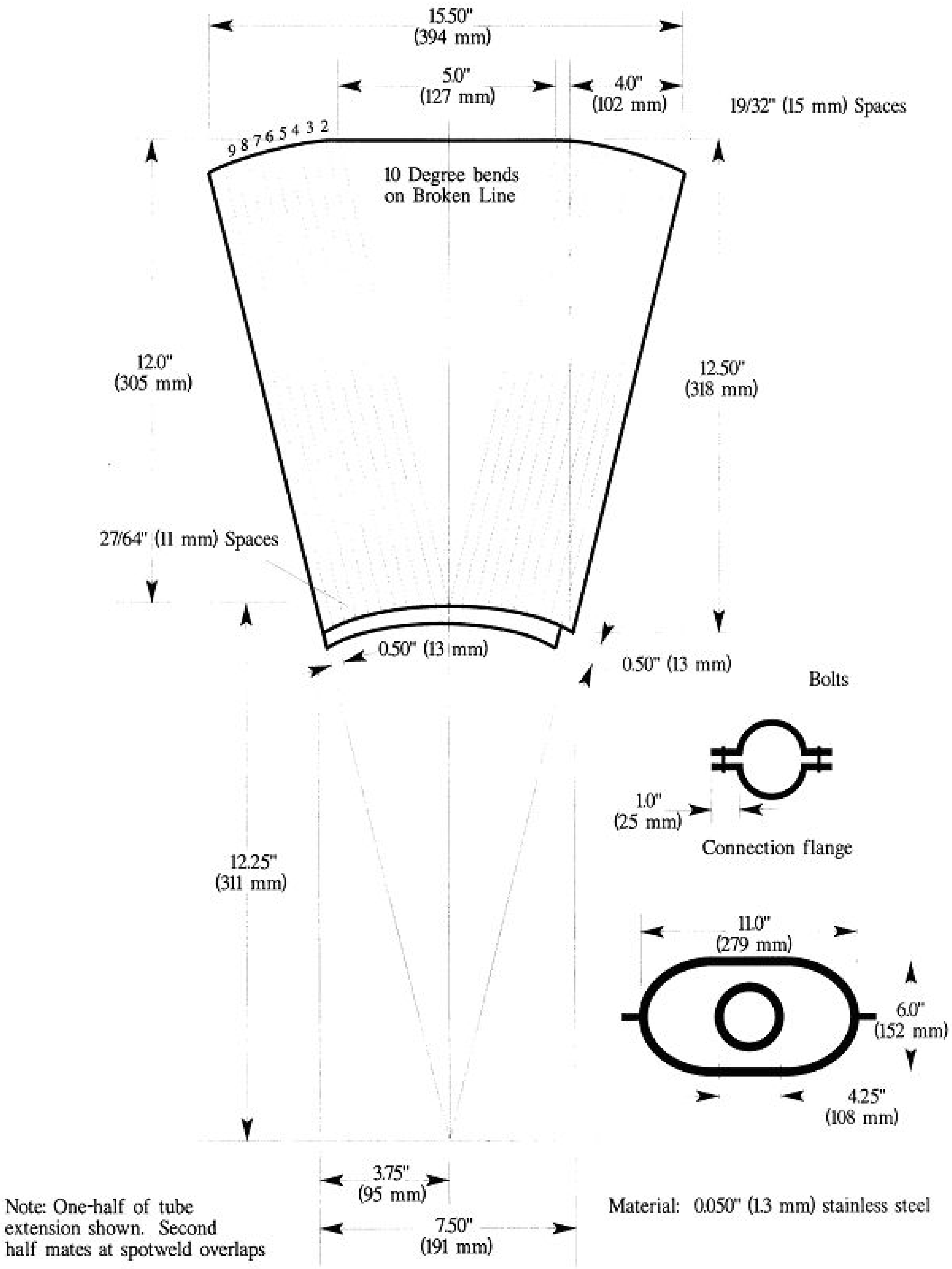

Figure 3 – Burner Draft Tube Extension Cone Diagram

(3) *Calibration rig and equipment.*

(i) Construct individual calibration rigs to incorporate a calorimeter and thermocouple rake for the measurement of heat flux and temperature. Position the calibration rigs to allow movement of the burner from the test rig position to either the heat flux or temperature position with minimal difficulty.

(ii) *Calorimeter.* The calorimeter must be a total heat flux, foil type Gardon Gage of an appropriate range such as 0–22.7 W/cm^2 (0–20 Btu/ft^2 sec), accurate to ± 3% of the indicated reading. The heat flux calibration method must be in accordance with paragraph (b)(7) of Part VI of this Appendix.

(iii) *Calorimeter mounting.* Mount the calorimeter in a 152 by 305 ± 3 mm (6 by 12 ± 0.125 inches) by 19 ± 3 mm (0.75 ± 0.125 inches) thick insulating block which is attached to the heat flux calibration rig during calibration (figure 4). Monitor the insulating block for deterioration and replace it when necessary. Adjust the mounting as necessary to ensure that the calorimeter face is parallel to the exit plane of the test burner cone.

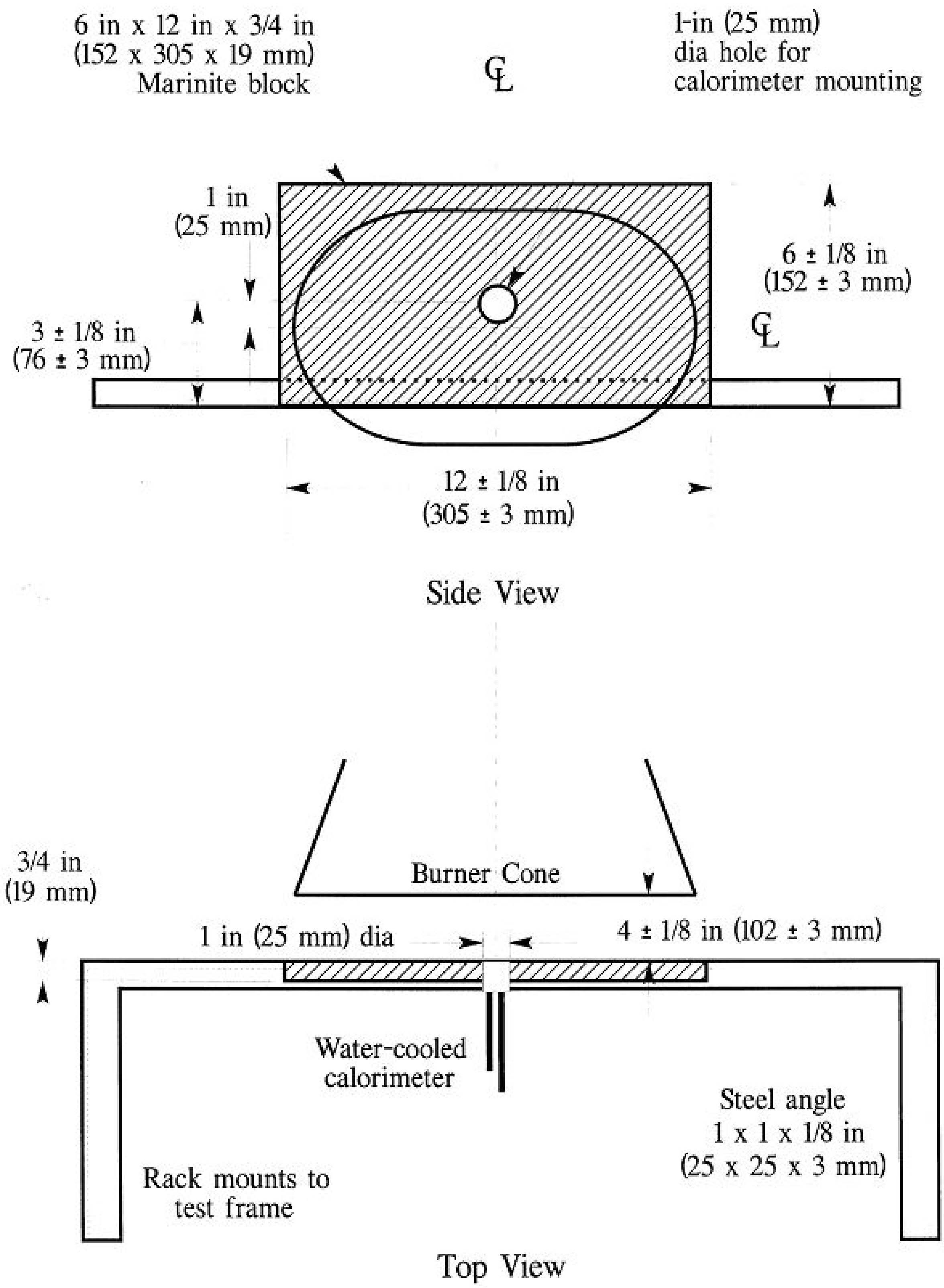

Figure 4 - Calorimeter Position Relative to Burner Cone

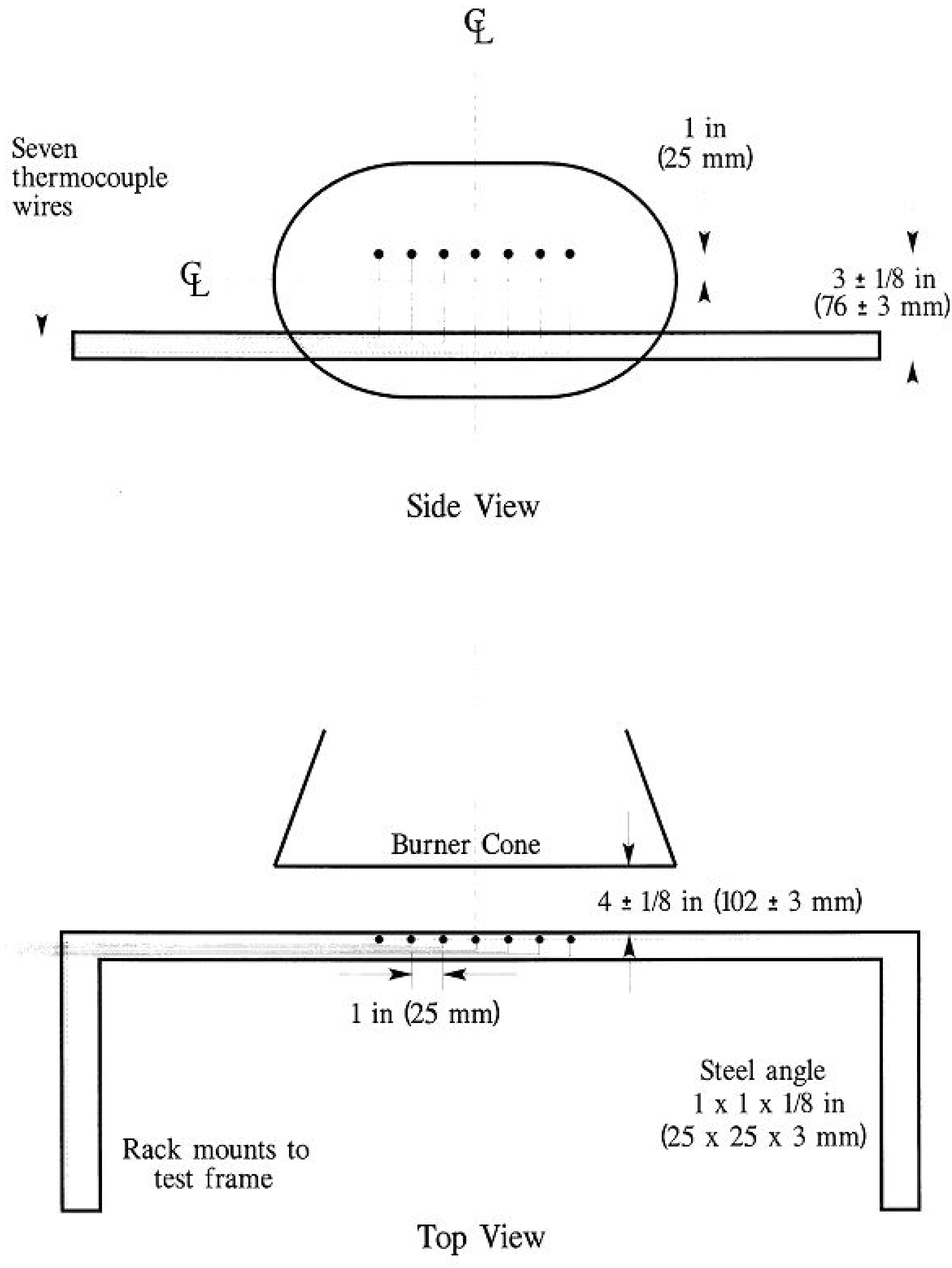

Figure 5 – Thermocouple Rake Position Relative to Burner Cone

(iv) *Thermocouples*. Provide seven 3.2 mm (⅛-inch) ceramic packed, metal sheathed, type K (Chromel-alumel), grounded junction thermocouples with a nominal 24 American Wire Gauge (AWG) size conductor for calibration. Attach the thermocouples to a steel angle bracket to form a thermocouple rake for placement in the calibration rig during burner calibration (figure 5).

(v) *Air velocity meter.* Use a vane-type air velocity meter to calibrate the velocity of air entering the burner. An Omega Engineering Model HH30A is satisfactory. Use a suitable adapter to attach the measuring device to the inlet side of the burner to prevent air from entering the burner other than through the measuring device, which would produce erroneously low readings. Use a flexible duct, measuring 102 mm (4 inches) wide by 6.1 meters (20 feet) long, to supply fresh air to the burner intake to prevent damage to the air velocity meter from ingested soot. An optional airbox permanently mounted to the burner intake area can effectively house the air velocity meter and provide a mounting port for the flexible intake duct.

(4) *Test specimen mounting frame.* Make the mounting frame for the test specimens of 3.2 mm (⅛-inch) thick steel as shown in figure 1, except for the centre vertical former, which should be 6.4 mm (¼-inch) thick to minimize warpage. The specimen mounting frame stringers (horizontal) should be bolted to the test frame formers (vertical) such that the expansion of the stringers will not cause the entire structure to warp. Use the mounting frame for mounting the two insulation blanket test specimens as shown in figure 2.

(5) *Backface calorimeters.* Mount two total heat flux Gardon type calorimeters behind the insulation test specimens on the back side (cold) area of the test specimen mounting frame as shown in figure 6. Position the calorimeters along the same plane as the burner cone centreline, at a distance of 102 mm (4 inches) from the vertical centreline of the test frame.

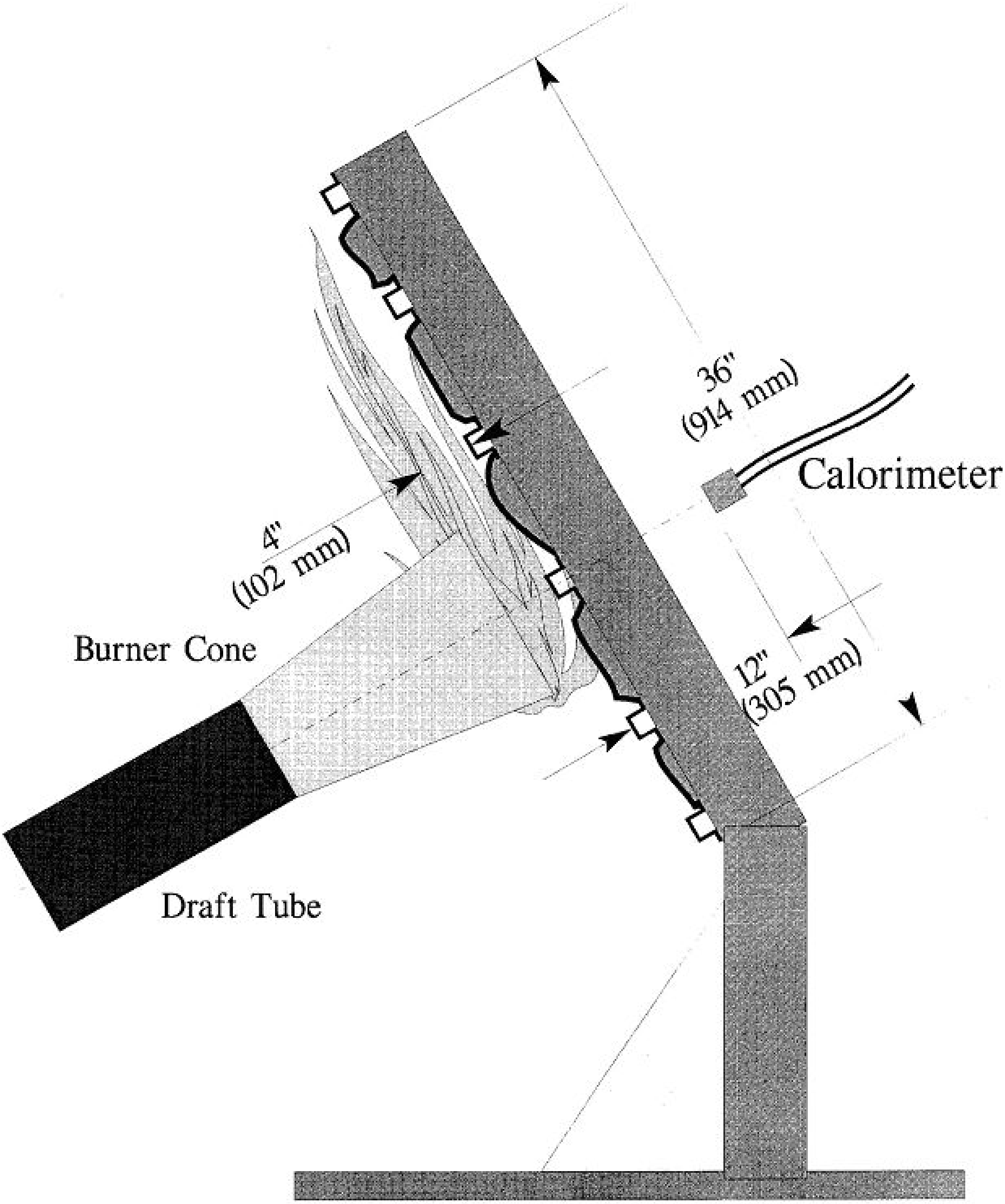

Figure 6 - . Position of Backface Calorimeters Relative to Test Specimen Frame

(i) The calorimeters must be a total heat flux, foil type Gardon Gage of an appropriate range such as 0–5.7 W/cm2 (0–5 Btu/ft^2 sec), accurate to ± 3% of the indicated reading. The heat flux calibration method must comply with paragraph (b)(7) of Part VI of this Appendix.

(6) *Instrumentation.* Provide a recording potentiometer or other suitable calibrated instrument with an appropriate range to measure and record the outputs of the calorimeter and the thermocouples.

(7) *Timing device.* Provide a stopwatch or other device, accurate to ± 1%, to measure the time of application of the burner flame and burnthrough time.

(8) *Test chamber.* Perform tests in a suitable chamber to reduce or eliminate the possibility of test fluctuation due to air movement. The chamber must have a minimum floor area of 305 by 305 cm (10 by 10 feet).

(i) *Ventilation hood.* Provide the test chamber with an exhaust system capable of removing the products of combustion expelled during tests.

(c) *Test Specimens.*

(1) *Specimen preparation.* Prepare a minimum of three specimen sets of the same construction and configuration for testing.

(2) *Insulation blanket test specimen*.

(i) For batt-type materials such as fibreglass, the constructed, finished blanket specimen assemblies must be 81.3 wide by 91.4 cm long (32 inches by 36 inches), exclusive of heat sealed film edges.

(ii) For rigid and other non-conforming types of insulation materials, the finished test specimens must fit into the test rig in such a manner as to replicate the actual in-service installation.

(3) *Construction.* Make each of the specimens tested using the principal components (i.e., insulation, fire barrier material if used, and moisture barrier film) and assembly processes (representative seams and closures).

(i) *Fire barrier material.* If the insulation blanket is constructed with a fire barrier material, place the fire barrier material in a manner reflective of the installed arrangement For example, if the material will be placed on the outboard side of the insulation material, inside the moisture film, place it the same way in the test specimen.

(ii) *Insulation material.* Blankets that utilize more than one variety of insulation (composition, density, etc.) must have specimen sets constructed that reflect the insulation combination used. If, however, several blanket types use similar insulation combinations, it is not necessary to test each combination if it is possible to bracket the various combinations.

(iii) *Moisture barrier film.* If a production blanket construction utilizes more than one type of moisture barrier film, perform separate tests on each combination. For example, if a polyimide film is used in conjunction with an insulation in order to enhance the burnthrough capabilities, also test the same insulation when used with a polyvinyl fluoride film.

(iv) *Installation on test frame.* Attach the blanket test specimens to the test frame using 12 steel spring type clamps as shown in figure 7. Use the clamps to hold the blankets in place in both of the outer vertical formers, as well as the centre vertical former (4 clamps per former). The clamp surfaces should measure 25.4 by 51 mm (1 inch by 2 inches). Place the top and bottom clamps 15.2 cm (6 inches) from the top and bottom of the test frame, respectively. Place the middle clamps 20.3 cm (8 inches) from the top and bottom clamps.

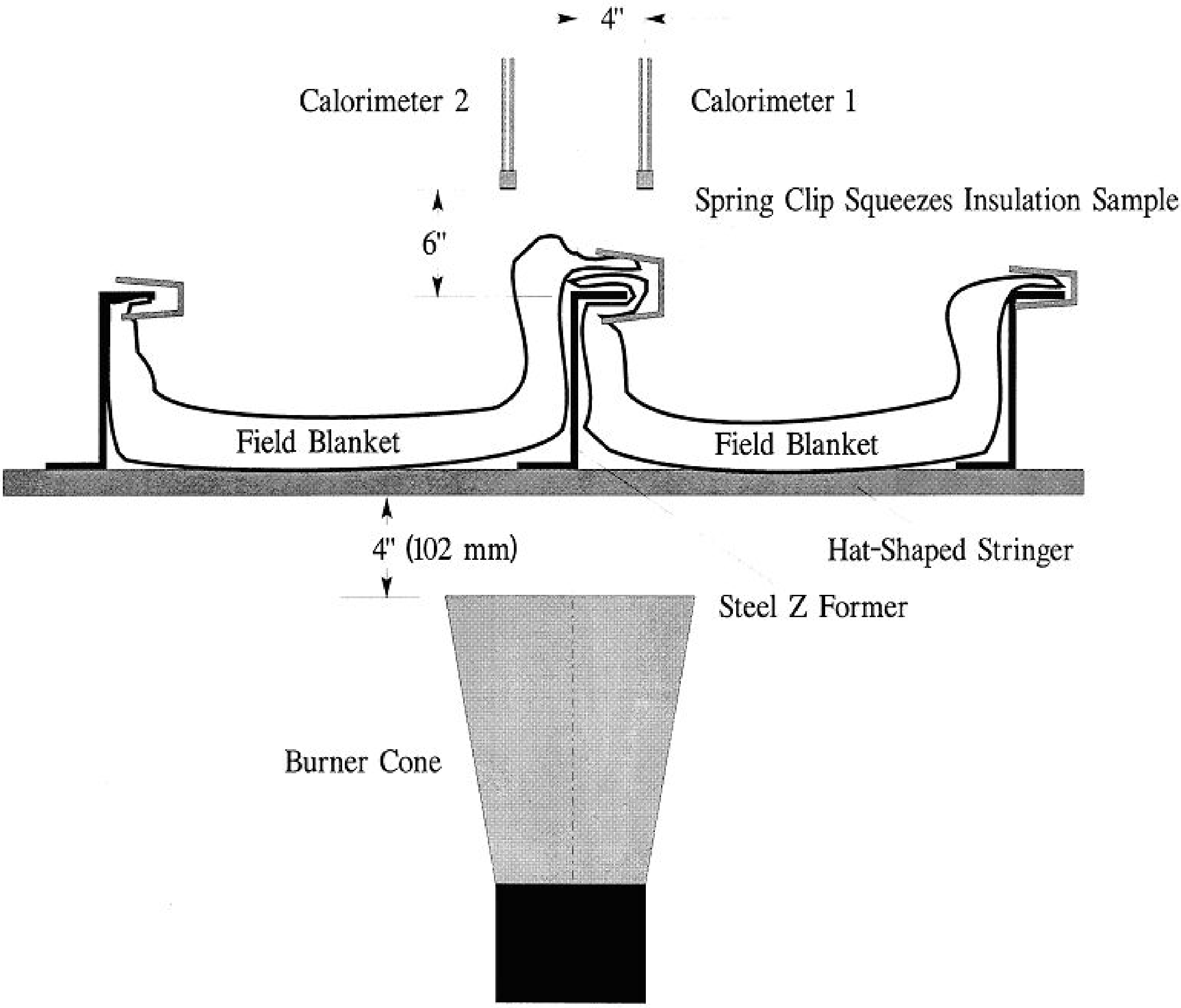

Figure 7 – Test Specimen Installation on Test Frame

(Note: For blanket materials that cannot be installed in accordance with figure 7 above, the blankets must be installed in a manner approved by the Agency.)

(v) *Conditioning.* Condition the specimens at 21° ± 2°C (70° ± 5°F) and 55% ± 10% relative humidity for a minimum of 24 hours prior to testing.

(d) Preparation of apparatus.

(1) Level and centre the frame assembly to ensure alignment of the calorimeter and/or thermocouple rake with the burner cone.

(2) Turn on the ventilation hood for the test chamber. Do not turn on the burner blower. Measure the airflow of the test chamber using a vane anemometer or equivalent measuring device. The vertical air velocity just behind the top of the upper insulation blanket test specimen must be 100 ± 50 ft/min (0.51±0.25 m/s). The horizontal air velocity at this point must be less than 50 ft/min (0.25 m/s).

(3) If a calibrated flow meter is not available, measure the fuel flow rate using a graduated cylinder of appropriate size. Turn on the burner motor/fuel pump, after insuring that the igniter system is turned off. Collect the fuel via a plastic or rubber tube into the graduated cylinder for a 2-minute period. Determine the flow rate in gallons per hour. The fuel flow rate must be 0.378 ± 0.0126 l/min (6.0 ± 0.2 gallons per hour).

(e) *Calibration.*

(1) Position the burner in front of the calorimeter so that it is centred and the vertical plane of the burner cone exit is 4 ± 0.125 inches (102 ± 3 mm) from the calorimeter face. Ensure that the horizontal centreline of the burner cone is offset 1 inch below the horizontal centreline of the calorimeter (figure 8). Without disturbing the calorimeter position, rotate the burner in front of the thermocouple rake, such that the middle thermocouple (number 4 of 7) is centred on the burner cone.

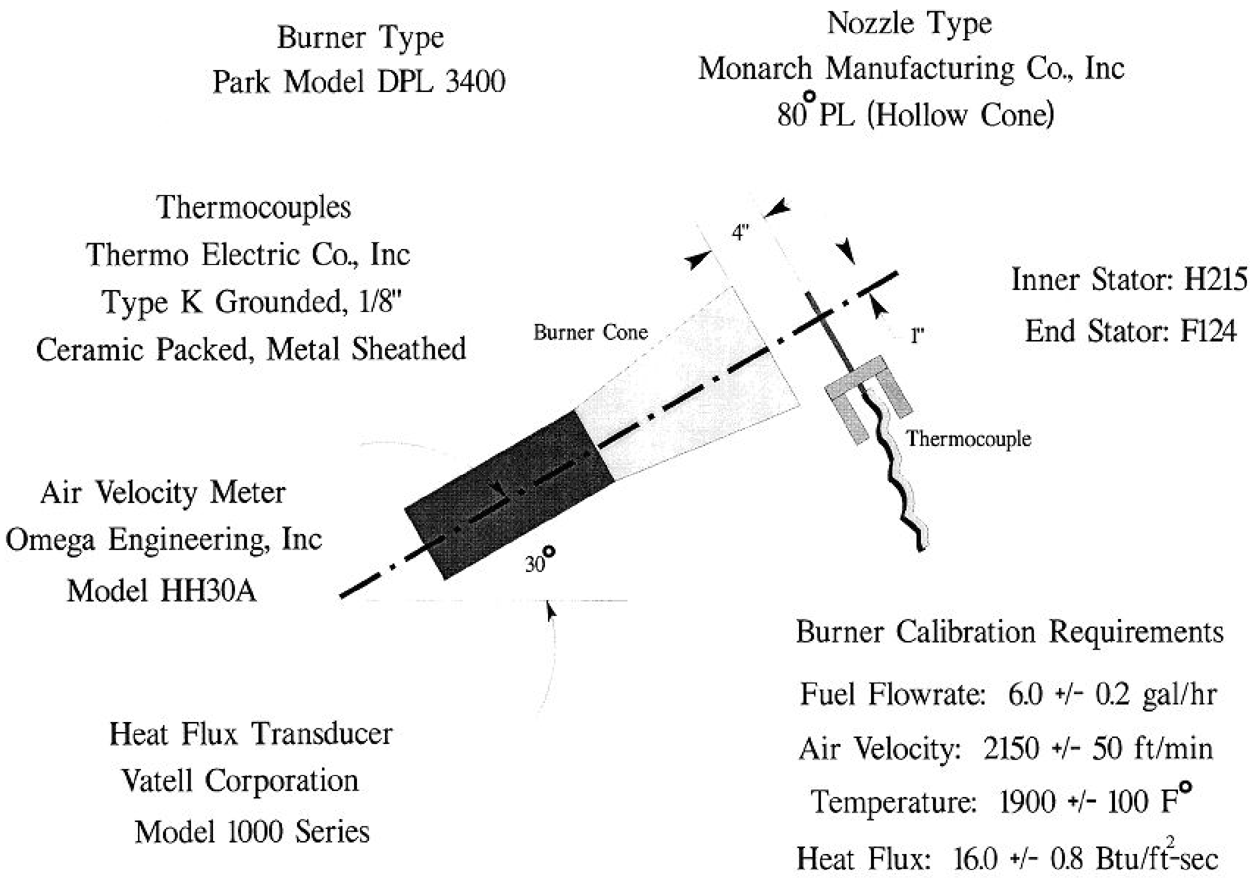

Figure 8 – Burner Information and Calibration Settings

Ensure that the horizontal centreline of the burner cone is also offset 25.4 mm (1 inch) below the horizontal centreline of the thermocouple tips. Re-check measurements by rotating the burner to each position to ensure proper alignment between the cone and the calorimeter and thermocouple rake. (Note: The test burner mounting system must incorporate ‘‘detents’’ that ensure proper centring of the burner cone with respect to both the calorimeter and the thermocouple rakes, so that rapid positioning of the burner can be achieved during the calibration procedure.)

(2) Position the air velocity meter in the adapter or airbox, making certain that no gaps exist where air could leak around the air velocity measuring device. Turn on the blower/motor while ensuring that the fuel solenoid and igniters are off. Adjust the air intake velocity to a level of 10.92 m/s, (2150 ft/min) then turn off the blower/motor. (Note: The Omega HH30 air velocity meter measures 66.7 mm (2.625 inches) in diameter. To calculate the intake airflow, multiply the cross-sectional area 0.0035 m^2 (0.03758 ft^2) by the air velocity 10.92 m/s (2150 ft/min) to obtain 2.29 m^3/min (80.80 ft^3/min). An air velocity meter other than the HH30 unit can be used, provided the calculated airflow of 2.29 m^3/min (80.80 ft^3/min) is equivalent.)

(3) Rotate the burner from the test position to the warm-up position. Prior to lighting the burner, ensure that the calorimeter face is clean of soot deposits, and there is water running through the calorimeter. Examine and clean the burner cone of any evidence of build-up of products of combustion, soot, *etc.* Soot build-up inside the burner cone may affect the flame characteristics and cause calibration difficulties. Since the burner cone may distort with time, dimensions should be checked periodically.

(4) While the burner is still rotated to the warm-up position, turn on the blower/motor, igniters and fuel flow, and light the burner. Allow it to warm up for a period of 2 minutes. Move the burner into the calibration position and allow 1 minute for calorimeter stabilization, then record the heat flux once every second for a period of 30 seconds. Turn off burner, rotate out of position, and allow to cool. Calculate the average heat flux over this 30-second duration. The average heat flux should be 18.2 ± 0.9 W/cm^2 (16.0 ± 0.8 Btu/ft^2 sec).

(5) Position the burner in front of the thermocouple rake. After checking for proper alignment, rotate the burner to the warm-up position, turn on the blower/motor, igniters and fuel flow, and light the burner. Allow it to warm up for a period of 2 minutes. Move the burner into the calibration position and allow 1 minute for thermocouple stabilization, then record the temperature of each of the 7 thermocouples once every second for a period of 30 seconds. Turn off burner, rotate out of position, and allow to cool. Calculate the average temperature of each thermocouple over this 30-second period and record. The average temperature of each of the 7 thermocouples should be 1038 ± 56°C (1900 ± 100°F).

(6) If either the heat flux or the temperatures are not within the specified range, adjust the burner intake air velocity and repeat the procedures of paragraphs (4) and (5) above to obtain the proper values. Ensure that the inlet air velocity is within the range of 10.92 ± 0.25 m/s (2150 ft/min ± 50 ft/min).

(7) Calibrate prior to each test until consistency has been demonstrated. After consistency has been confirmed, several tests may be conducted with calibration conducted before and after a series of tests.

(f) *Test procedure.*

(1) Secure the two insulation blanket test specimens to the test frame. The insulation blankets should be attached to the test rig centre vertical former using four spring clamps positioned as shown in figure 7 (according to the criteria of paragraph (c)(3)(iv) of Part VII of this Appendix).

(2) Ensure that the vertical plane of the burner cone is at a distance of 102 ± 3 mm (4 ± 0.125 inch) from the outer surface of the horizontal stringers of the test specimen frame, and that the burner and test frame are both situated at a 30° angle with respect to vertical.

(3) When ready to begin the test, direct the burner away from the test position to the warm-up position so that the flame will not impinge on the specimens prematurely. Turn on and light the burner and allow it to stabilize for 2 minutes.

(4) To begin the test, rotate the burner into the test position and simultaneously start the timing device.

(5) Expose the test specimens to the burner flame for 4 minutes and then turn off the burner. Immediately rotate the burner out of the test position.

(6) Determine (where applicable) the burnthrough time, or the point at which the heat flux exceeds 2.27 W/cm^2 (2.0 Btu/ft^2 sec).

(g) *Report.*

(1) Identify and describe the specimen being tested.

(2) Report the number of insulation blanket specimens tested.

(3) Report the burnthrough time (if any), and the maximum heat flux on the back face of the insulation blanket test specimen, and the time at which the maximum occurred.

(h) *Requirements.*

(1) Each of the two insulation blanket test specimens must not allow fire or flame penetration in less than 4 minutes.

(2) Each of the two insulation blanket test specimens must not allow more than 2.27 W/cm^2 (2.0 Btu/ft^2 sec) on the cold side of the insulation specimens at a point 30.5 cm (12 inches) from the face of the test rig.

Proposal 6: Add new AMC 25.856(a) and AMC 25.856(b) as follows:

BOOK 2

AMC – SUBPART D

….

AMC 25.856(a)
Thermal/acoustic insulation materials: Flame propagation resistance

FAA Advisory Circular 25.856-1 Thermal/Acoustic Insulation Flame Propagation Test Method Details, dated 24/06/2005, is accepted by the Agency as providing acceptable means of compliance with CS 25.856(a) and Part VI of Appendix F to CS-25.

AMC 25.856(b)
Thermal/acoustic insulation materials: Flame penetration (Burnthrough) resistance

FAA Advisory Circular 25.856-2 Installation of Thermal/Acoustic Insulation for Burnthrough Protection, dated 17/01/2006, is accepted by the Agency as providing acceptable means of compliance with CS 25.856(b) and Part VII of Appendix F to CS-25.

….

C. APPENDICES

Appendix I: ORIGINAL JAA NPA JUSTIFICTION

NPA 25-345
NPA 26-17

FINAL DRAFT

These NPAs are sponsored by the Cabin Safety Study Group.

Improved Flammability Standards for Thermal/Acoustic Insulation Materials Used in Large Aeroplanes

A Introduction:

Summary:

This Notice proposes upgraded flammability standards for thermal/acoustic insulation materials used in large aeroplanes. These standards have been developed in the USA based on research conducted by the FAA's Technical Center. The standards were adopted July 31, 2003 by the FAA (see Docket No. FAA-2000-7909, FR Vol.68, No.147). FAR Parts 25, 91,121,125, and 135 were amended accordingly.
The proposed standards include new flame propagation tests and criteria for all insulation material used in large aeroplanes, to reduce the possibility that this material, particularly the one installed in inaccessible areas, contributes to the spread and severity of an in-flight fire. Also, the proposal includes new flame penetration resistance test requirements for large aeroplanes with a passenger capacity of 20 or greater to delay the entry (burnthrough) of an external post-crash fire into the occupied areas of the aeroplane and thereby gain additional time for evacuation of the aeroplane's occupants. The flame penetration resistance test is applicable to insulation material installed in the lower half of the fuselage only because the benefits of protecting the upper half of the fuselage in the same manner are considered to be minor.
The intent of this rulemaking is to enhance safety by implementing higher flammability standards for materials typically installed in aeroplanes. (Although not anticipated, should removal of insulation become a common practice to avoid having to comply with this rule, the need for a specific fuselage burnthrough standard will have to be revisited.)
Both sets of requirements include a provision that allows a manufacturer to substitute approved equivalent methods for the new tests specified in Parts VI and VII of Appendix F to CS 25, and JAR 26 respectively.

Both, the flame propagation and the flame penetration resistance requirements shall be incorporated in CS 25 to be applicable to new aeroplane type designs.

Large aeroplanes operated in accordance with JAR-OPS 1 shall also benefit from the new standards as far as reasonably practicable in the following manner:

According to proposed JAR 26.156,

- thermal/acoustic insulation material installed in the fuselage of large aeroplanes manufactured after a period of 2 years after the effective date of the final rule shall comply with the flame propagation requirements of Appendix F part VI of CS 25 or, JAR 26 respectively;

- thermal/acoustic insulation materials installed in the lower half of the fuselage of large aeroplanes manufactured after a period of 4 years after the effective date of the final rule shall meet the new flame penetration resistance requirements of Appendix VII of CS 25 or, CS 26 respectively;

- for aeroplanes manufactured 2 years before the effective date of the final rule, thermal/acoustic insulation material installed in the fuselage of large aeroplanes as replacements shall comply with the flame propagation requirements only.

Interpretation:

Existing CS 25.853(a) requires that materials in aeroplane compartment interiors meet the flammability tests prescribed in Part I of Appendix F to CS 25. Existing CS 25.855(d) requires materials used in the construction of cargo and baggage compartments meet the same tests. Thermal/acoustic insulation materials are not required to meet the requirements of Part I of Appendix F to CS 25 in addition to the new requirements of Parts VI and/or VII of Appendix F. The respective phrases will therefore be removed from Part I of the Appendix.

<u>Flame propagation requirements</u>:

The flame propagation requirements are applicable to all thermal/acoustic insulation installed in the aeroplane, except for “small parts”. “Small parts”, such as knobs, handles, rollers, fasteners, clips, grommets, rub strips, pulleys and small electrical parts, are exempted because it would not be practical to test them in the flame propagation test apparatus and because they do not contribute significantly to a fire.

<u>Flame penetration resistance requirements</u>:

The phrase “lower half of the aeroplane fuselage” means the area below a horizontal line that bisects the cross section of the fuselage, as measured with the airplane in a normal attitude on the ground. Future, non-conventional, design possibilities, such as blended wing-body configurations, would have to be addressed specifically, if the concept of the lower half is not appropriate.

The flame penetration resistance requirements apply to all thermal/acoustic insulation installed in the lower half of the fuselage that contributes to delaying burnthrough according to the judgement of the certifying agency. Insulation on ducts e.g. is not considered to significantly contribute to burnthrough and therefore does not have to comply.

Although the flame penetration resistance requirements typically affect thermal/acoustic insulation installed near the outer skin of the lower half of the fuselage, there may be cases where there is no such insulation on the fuselage shell, but along the underside of the floor. In this case, the insulation along the underside of the floor would be subject to the flame penetration test. In cases where insulation is installed in both places, an applicant may choose which insulation shall be subject to the flame penetration test because insulation in either place delays the entry of an external post crash fire into the cabin.

The flame penetration resistance test requirements establish a standard for the ability of thermal/acoustic insulation to resist penetration by an external flame, rather than a standard for fuselage burnthrough per se. The test exposes samples of thermal/acoustic insulation blankets mounted in a test frame to a kerosene burner for four minutes. The insulation blankets must prevent flame penetration for at least four minutes but also limit the amount of heat that passes through the blanket during the test. The heat flux measurement provision is included in the pass/fail criteria to account for materials that behave similarly to a flame arrestor, but do not inhibit heat transfer. It provides an indication of the hazard inside the aeroplane and supplements rather than replaces the basic requirement to resist flame penetration.

During the preparation of this rulemaking, a question arose regarding the testing of specific double insulation configurations found in some aeroplane types where there is a (foam) insulation on the back side of the cabin walls in addition to insulation blankets also installed in that area a few cm apart and in parallel close to the fuselage It is our position that the rule intends that the installation meet the requirement. Therefore, if one layer meets the burnthrough requirement and meets the heat flux requirement that is considered compliant. We would not require the second layer to meet the burnthrough requirement. The second layer, depending on what material it is, would have to meet the relevant rules.

With regard to the intent of the heat flux measurement, it is included in the rule to prevent "flame arrestors" from being qualified as meeting the burnthrough requirement.

Based on this view, if there were a second insulation layer, it would not have to meet the burnthrough requirement, but it would have to pass the propagation rule, so if it does ignite, it should not propagate a fire.

The establishment of an Advisory Circular containing more details with respect to the testing and installation methods etc. is envisaged.

Harmonization with FAA:

The proposed new standards are harmonized with the corresponding standards in 14 CFR Parts 25 and 121, except that the FAR Part 121 requirements refer to transport category aeroplanes, whereas JAR 26 refers to “large aeroplanes” which includes per definition a few SFAR 41C derivatives of FAR 23 type certificated aeroplanes.
With respect to FAR 125 and FAR 135 there are no corresponding JAA regulations in existence. Also, JAR 26 does not contain additional airworthiness requirements for privately operated aircraft so far, contrary to FAR Part 91. FAR Part 91 as well as FAR Parts 125 and 135 now include improved thermal/acoustic insulation material requirements which address flame propagation, but not flame penetration resistance.

Harmonization with ICAO:

There are no such ICAO requirements identified.

Costs/Benefits:

The proposed rule changes are considered necessary because past incidents, which were described in the FAA’s NPRM No. 00-09 published September 20, 2000, have shown that the current standards by which insulation blankets have to comply with the basic “Bunsen burner” flammability requirements do not realistically address situations in which insulation materials represent a significant fuel source in the event of a fire, or provide a medium for a fire to spread inside the aeroplane.
The FAA carefully evaluated the costs associated with the new regulations with respect to their operators of transport category airplanes as well as the benefits derived by averting deaths, loss of aircraft or injuries as well as benefits derived by averting accident investigations.

Cost involved parties are mainly aircraft manufacturers and operators. The proposed rules do not add design costs, because compliance can be shown with materials that have to be designed and manufactured in order to comply with the respective FAR requirements.

Concerning purchasing and operating costs, the FAA has determined that there would be no incremental cost (for either materials or weight) of installing insulation in aeroplanes with fewer than 20 passenger seats, because some materials that are currently used would meet the proposed requirements for flame propagation.

The EASA concurs that for aeroplanes with 20 or more passengers, it is in principle possible to limit the additional cost to that of replacing 1 inch of fibreglass with 1 inch of the compliant material used by the FAA in their analysis. Since this material and fibreglass are comparable in weight, there would be no weight penalty associated with this material's use. However, this material is not preferred by all manufacturers for several reasons. Other materials do add costs and weight to a certain extent.

However, there will be no additional costs involved with this NPA than those which will be incurred by meeting the FAR requirements.