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(w) Sleep lounge. Upholstered seating section is mounted on a frame. May have bolster pillows along the wall as backrests or may have attached headrests (see fig. 11).

(x) Stroller pad. Cushion used in a baby stroller.

(y) Sofa bed. These are pieces in which the back of the sofa swings down flat with the seat to form the sleeping surface. All upholstered. Some sofa beds have bedding boxes for storage of bedding. There are two types: the one-piece, where the back and seat are upholstered as a unit, supplying an unbroken sleeping surface; and the two-piece, where back and seat are upholstered separately (see fig. 11).

(z) Sofa lounge--(includes glideouts). Upholstered seating section is mounted on springs and in a frame that permit it to be pulled out for sleeping. Has upholstered backrest bedding box that is hinged. Glideouts are single sleepers with sloping seats and backrests. Seat pulls out from beneath back and evens up to supply level sleeping surface (see fig. 11).

(aa) Studio couch. Consists of upholstered seating section on upholstered foundation. Many types convert to twin beds (see fig. 11).

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(bb) Studio divan. Twin size upholstered seating section with foundation is mounted on metal bed frame. Has no arms or backrest, and sleeps one (see fig. 11).

(cc) Trundle bed. A low bed which is rolled under a larger bed. In some lines, the lower bed springs up to form a double or two single beds as in a high riser (see fig. 11).

(dd) Tufted means buttoned or laced through the ticking and upholstery material and/or core, or having the ticking and loft material and/or core drawn together at intervals by any other method which produces a series of depressions on the surface.

(ee) Twin studio divan. Frames which glide out (but not up) and use seat cushions, in addition to upholstered foundation to sleep two. Has neither arms nor back rest (see fig. 11).

(ff) Flip or sleeper chair. Chair that unfolds to be used for sleeping, typically has several connecting fabric covered, solid foam core segments.

### **Subpart B - Rules and Requirements**

#### **§ 1633.10 Definitions.**

(a) *Standard* means the Standard for the Flammability (Open-Flame) of Mattresses and Foundations (16 CFR part 1633, subpart A).

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(b) The definition of terms set forth in the § 1633.2 of the Standard shall also apply to this section.

### § 1633.11 Records.

(a) *Test and Manufacturing Records—General.* Every manufacturer (including importers) or other person initially introducing into commerce mattresses or mattress and foundation sets subject to the standard, irrespective of whether guarantees are issued relative thereto, shall maintain the following records:

(1) Test results and details of each test performed by or for that manufacturer (including failures), whether for prototype, confirmation, or production, in accordance with § 1633.7. Details shall include: location of test facility, type of test room, test room conditions, prototype or production identification number, and test data including the peak rate of heat release, total heat release in first 10 minutes, a graphic depiction of the peak rate of heat release and total heat release over time. These records shall include the name and signature of person conducting the test, the date of the test, and a certification by the person overseeing the testing as to the test results and that the test was carried out in accordance

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with the Standard. For confirmation tests, the identification number must be that of the prototype tested.

(2) Video and/or a minimum of eight photographs of the testing of each mattress or mattress and foundation set, in accordance with § 1633.4 (one taken before the test starts, one taken within 45 seconds of the start of the test, and the remaining six taken at five minute intervals, starting at 1 minute and ending at 30 minutes), with the prototype identification number or production lot identification number of the mattress or mattress foundation set, date and time of test, and name and location of testing facility clearly displayed.

(b) *Prototype Records.* In addition to the records specified in paragraph (a) of this section, the following records related to prototype testing shall be maintained:

(1) Unique identification number for the qualified prototype and a list of the unique identification numbers of each prototype based on the qualified prototype.

(2) A detailed description of all materials, components, and methods of construction for each prototype mattress or prototype mattress and foundation set. Such description shall include at a minimum, the specifications of all materials and components, name and location of each material and component supplier, and a

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physical sample of each material and component of the prototype.

(3) A list of which models and production lots of mattresses or mattress and foundation sets are represented by each prototype identification number.

(4) Where a prototype is not required to be tested before sale, pursuant to § 1633.4(b), the prototype identification number of the qualified prototype on which the mattress to be offered for sale is based, and, at a minimum, the manufacturing specifications and a description of the materials substituted and/or the size change, photographs or physical specimens of the substituted materials, and documentation based on objectively reasonable criteria that the change in any component, material, or method of construction will not cause the prototype to exceed the test criteria specified in § 1633.3(b).

(5) Identification, composition, and details of the application of any flame retardant treatments and/or inherently flame resistant fibers or other materials employed in mattress components.

(c) *Pooling Confirmation Test Records.* With respect to pooling confirmation testing, records shall be maintained to show:

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(1) The prototype identification number assigned by the original prototype manufacturer.

(2) Name and location of the prototype manufacturer.

(3) Copy of prototype test records, and records required by section (b)(2) above.

(4) A list of models of mattresses, and/or mattress and foundation sets, represented by the prototype.

(d) *Quality Assurance Records.* In addition to the records required by paragraph (a) of this section, the following quality assurance records shall be maintained:

(1) A written copy of the manufacturer's quality assurance procedures.

(2) Records of any production tests performed. Production test records must be maintained and shall include in addition to the requirements of paragraph (a) of this section, an assigned production lot identification number and the identification number of the prototype associated with the specimen tested.

(3) For each prototype, the number of mattresses or mattress and foundation sets in each production lot based on that prototype.

(4) The duration of manufacture of the production lot, i.e., the start and end dates of production of that lot.

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(5) Component, Material and Assembly Records. Every manufacturer conducting tests and/or technical evaluations of components and materials and/or methods of construction must maintain detailed records of such tests and evaluations.

(e) *Record retention requirements.* The records required under this Section shall be maintained by the manufacturer (including importers) for as long as mattresses/foundations based on the prototype in question are in production and shall be retained for 3 years thereafter. Records shall be available upon the request of Commission staff.

### **§ 1633.12 Labeling.**

(a) Each mattress or mattress/foundation set subject to the Standard shall bear a permanent, conspicuous, and legible label containing:

- (1) Name of the manufacturer;
- (2) Location of the manufacturer, including street address, city and state;
- (3) Month and year of manufacture;
- (4) Model identification;
- (5) Prototype identification number for the mattress; and
- (6) A certification that the mattress complies with this standard.

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(b) The information required on labels by this section shall be set forth separately from any other information appearing on such label. Other information, representations, or disclosures, appearing on labels required by this section or elsewhere on the item, shall not interfere with, minimize, detract from, or conflict with the required information.

(c) No person, other than the ultimate consumer, shall remove or mutilate, or cause or participate in the removal or mutilation of, any label required by this section to be affixed to any item.

### **§ 1633.13 Tests for guaranty purposes, compliance with this section, and one of a kind exemption.**

(a) *Tests for guaranty purposes.* Reasonable and representative tests for the purpose of issuing a guaranty under section 8 of the Flammable Fabrics Act, 15 U.S.C. § 1197, for mattresses or mattress and foundation sets subject to the Standard shall be the tests performed to show compliance with the Standard.

(b) *Compliance with this section.* No person subject to the Flammable Fabrics Act shall manufacture for sale, import, distribute, or otherwise market or handle any mattress or

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mattress and foundation set which is not in compliance with the provisions under Subpart B.

(c) *"One of a kind" exemption for physician prescribed mattresses.* (1) A mattress or mattress and foundation set manufactured in accordance with a physician's written prescription or manufactured in accordance with other comparable written medical therapeutic specification, to be used in connection with the treatment or management of a named individual's physical illness or injury, shall be considered a "one of a kind mattress" and shall be exempt from testing under the Standard pursuant to § 1633.7 thereof: Provided, that the mattress or mattress and foundation set bears a permanent, conspicuous and legible label which states:

WARNING: This mattress or mattress and foundation set may be subject to a large fire if exposed to an open flame. It was manufactured in accordance with a physician's prescription and has not been tested under the Federal Standard for the Flammability (Open-Flame) of Mattresses and Foundation Sets (16 C.F.R. part 1633).

Such labeling must be attached to the mattress or mattress and foundation set so as to remain on or affixed thereto for the useful life of the mattress or mattress and foundation set. The label must be at least 40 square inches (250 sq. cm) with no

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linear dimension less than 5 inches (12.5 cm). The letters in the word "WARNING" shall be no less than 0.5 inch (1.27 cm) in height and all letters on the label shall be in a color which contrasts with the background of the label. The warning statement which appears on the label must also be conspicuously displayed on the invoice or other sales papers that accompany the mattress in commerce from the manufacturer to the final point of sale to a consumer.

(2) The manufacturer of a mattress or mattress and foundation set exempted from testing under this paragraph shall, in lieu of the records required to be kept by section 1633.10, retain a copy of the written prescription or other comparable written medical therapeutic specification for such mattress during a period of three years, measured from the date of manufacture.

(3) For purposes of this regulation the term physician shall mean a physician, chiropractor or osteopath licensed or otherwise permitted to practice by any State of the United States.

### **Subpart C - Interpretations and Policies**

**§ 1633.14 Policy clarification on renovation of mattress.**

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(a) Section 3 of the Flammable Fabrics Act (15 U.S.C. § 1192) prohibits, among other things, the "manufacture for sale" of any product which fails to conform to an applicable standard issued under the Act. The standard for the Flammability (Open-Flame) of Mattresses and Foundations (subpart A of this part), issued pursuant to the Act, provides that, with certain exceptions, mattresses must be tested according to a prescribed method. The standard does not exempt renovation; nor does it specifically refer to renovation.

(b) The purpose of this document is to inform the public that mattresses renovated for sale are considered by the Commission to be mattresses manufactured for sale and, therefore, subject to the requirements of the open-flame Mattress Standard. The Commission believes that this policy clarification will better protect the public against the unreasonable risk of fires leading to death, personal injury or significant property damage, and assure that purchasers of renovated mattresses receive the same protection under the Flammable Fabrics Act as purchasers of new mattresses.

(c) For purposes of this document, mattress renovation includes a wide range of operations. Replacing the ticking or batting, stripping a mattress to its springs, rebuilding a

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mattress, or replacing components with new or recycled materials, are all part of the process of renovation. Any one, or any combination of one or more, of these steps in mattress renovation is considered to be mattress manufacture.

(d) If the person who renovates the mattress intends to retain the renovated mattress for his or her own use, or if a customer or a renovator merely hires the services of the renovator and intends to take back the renovated mattress for his or her own use, "manufacture for sale" has not occurred and such a renovated mattress is not subject to the mattress standard.

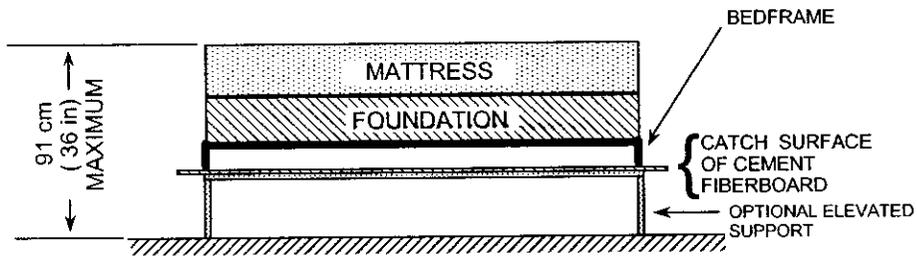
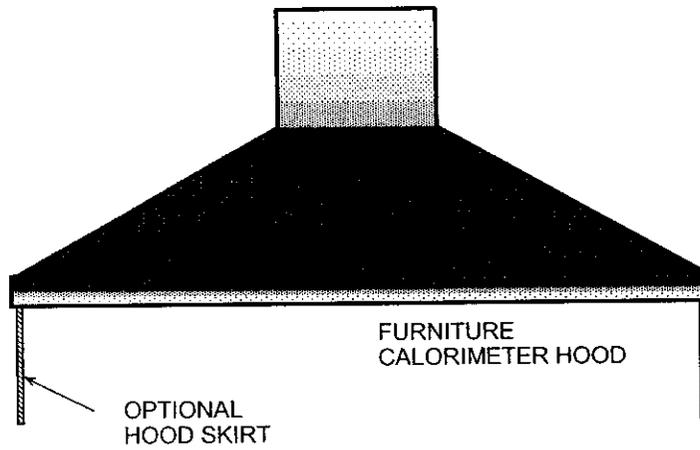
(e) However, if a renovated mattress is sold or intended for sale, either by the renovator or the owner of the mattress who hires the services of the renovator, such a transaction is considered to be "manufacture for sale".

(f) Accordingly, mattress renovation is considered by the Commission to be "manufacture for sale" and, therefore, subject to the open-flame Mattress Standard, when renovated mattresses are sold or intended for sale by a renovator or the customer of the renovator.

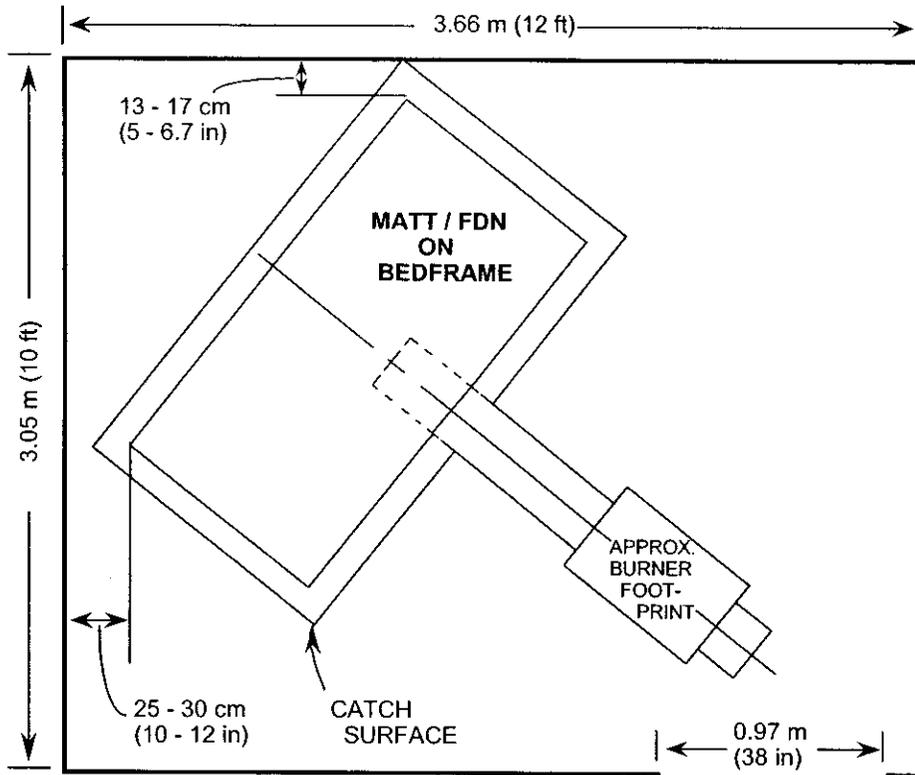
(g) A renovator who believes that certain mattresses are entitled to one-of-a-kind exemption, may present relevant facts

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to the Commission and petition for an exemption. Renovators are expected to comply with all the testing requirements of the open-flame Mattress Standard until an exemption is approved.



**FIGURE 1. TEST ASSEMBLY, SHOWN IN FURNITURE CALORIMETER. (CONFIGURATION A.)**



**FIGURE 2. TEST ARRANGEMENT IN 3.05m X 3.66 m (10 ft x 12 ft) ROOM; CONFIGURATION B.**

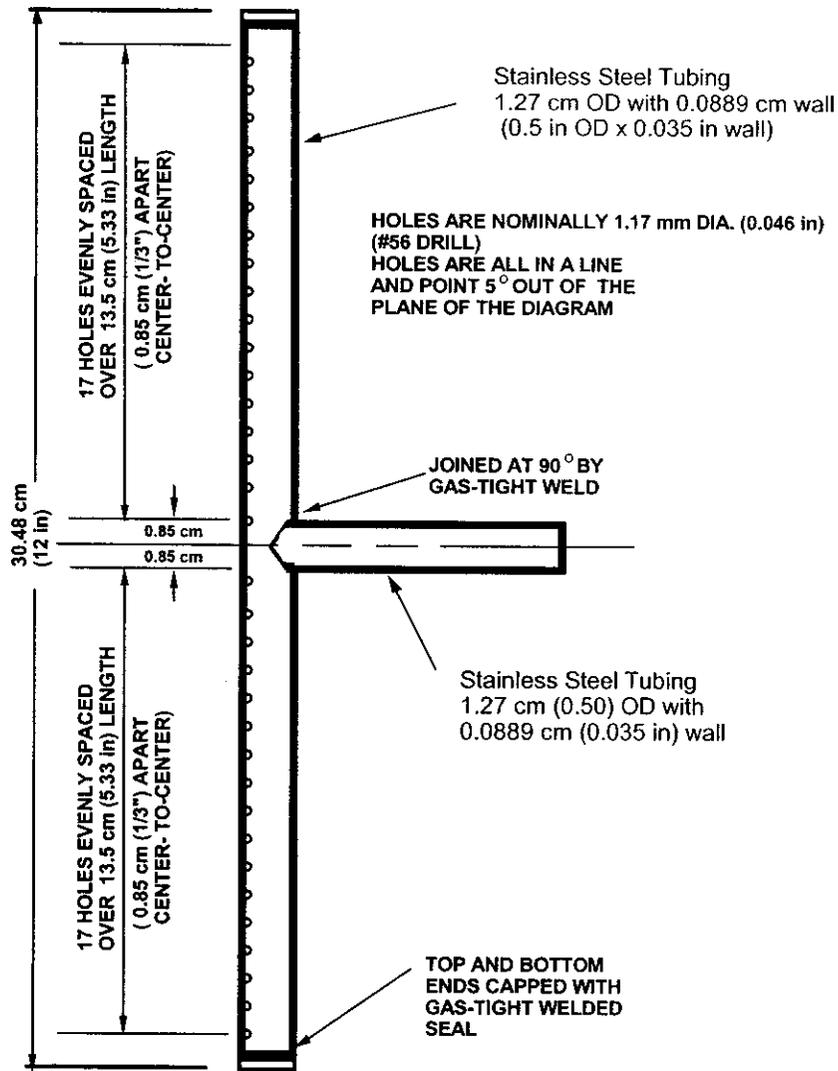


FIGURE 3. DETAILS OF HORIZONTAL BURNER HEAD.

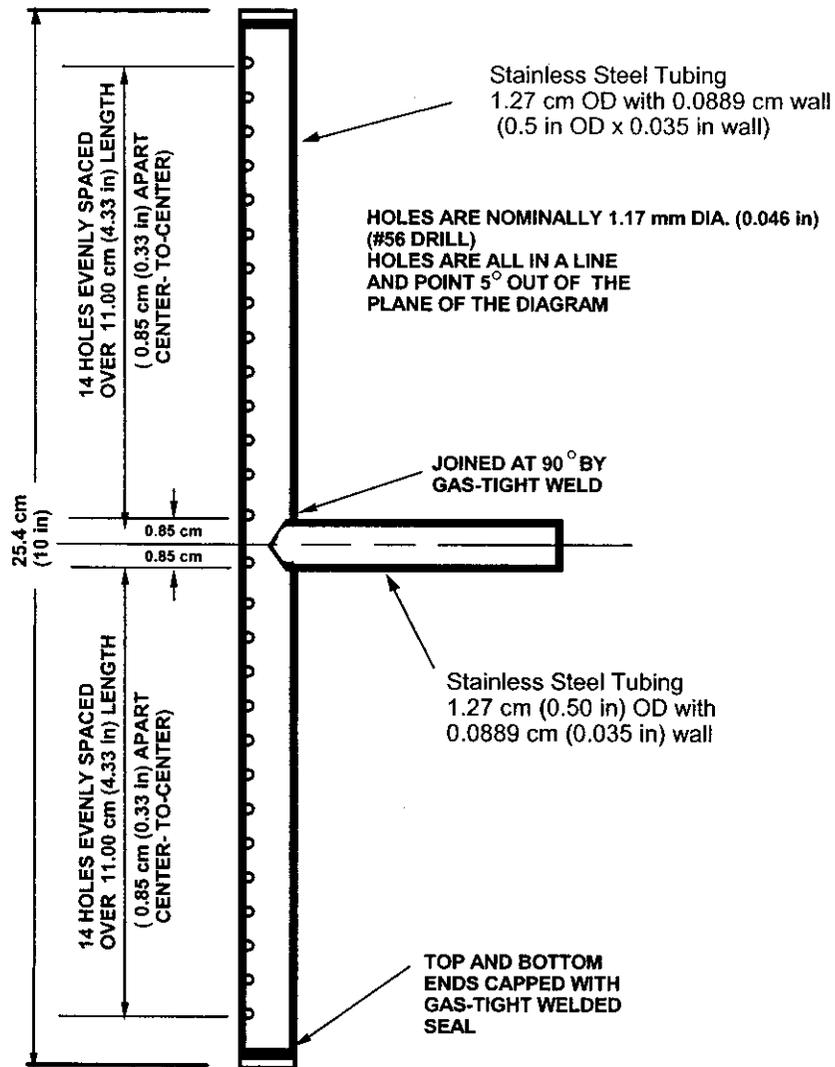


FIGURE 4. DETAILS OF VERTICAL BURNER HEAD.

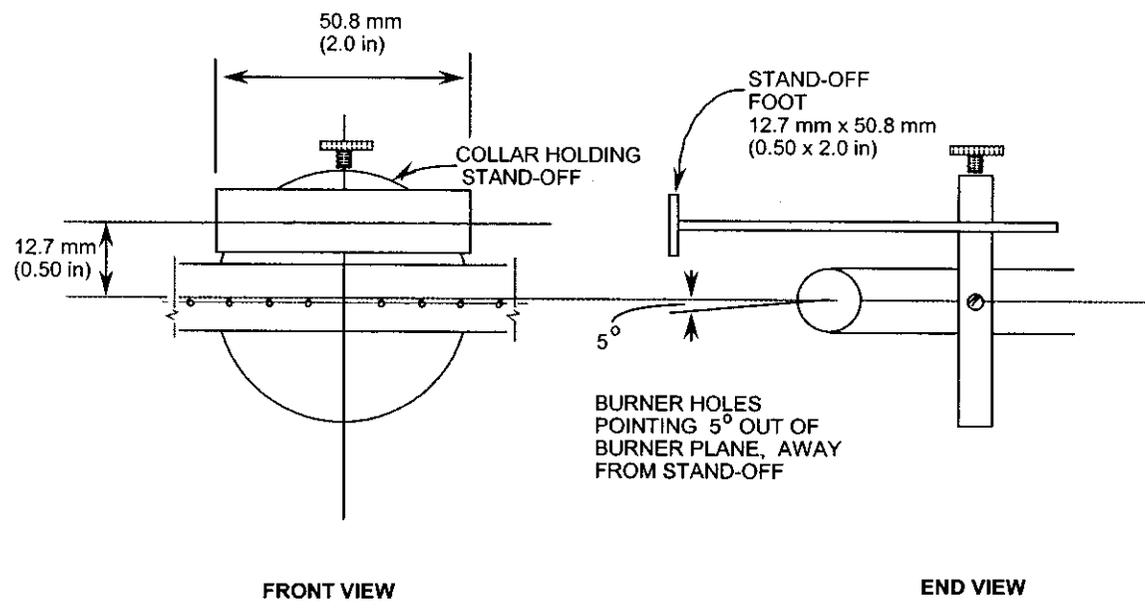
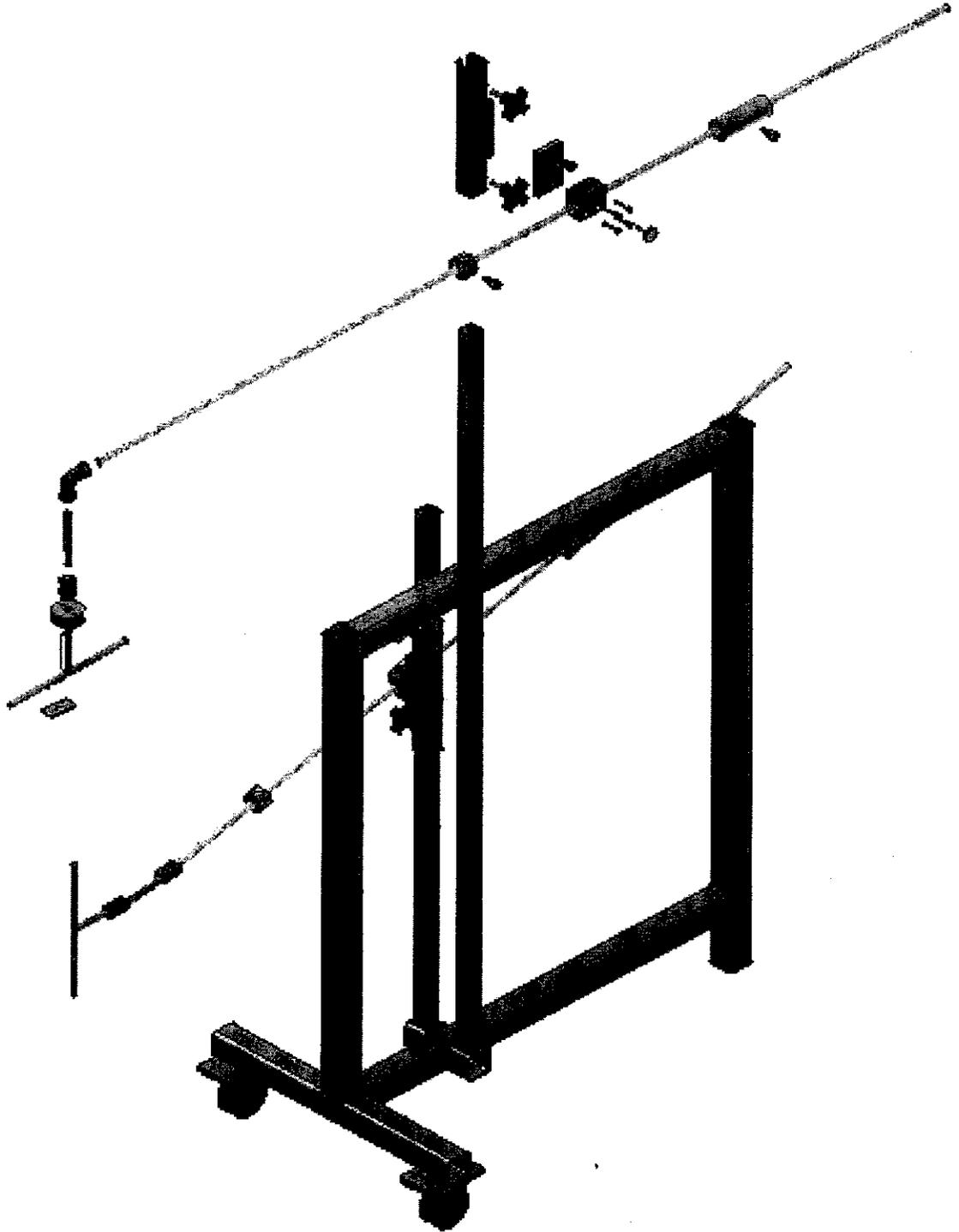


FIGURE 5. DETAILS OF BURNER STAND-OFF.



**FIGURE 6. BURNER ASSEMBLY\* SHOWING ARMS AND PIVOTS (Shoulder Screws), IN RELATION TO, PORTABLE FRAME ALLOWING BURNER HEIGHT ADJUSTMENT.**

\*Note that the feed tube for the side burner will be horizontal when the side burner pivot is locked in place, as is usual during a test exposure.

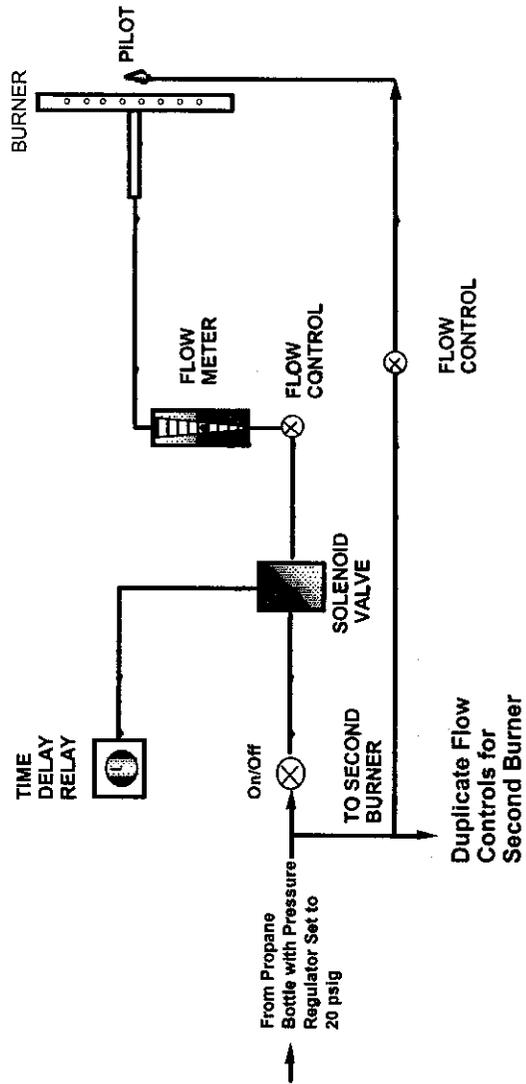


FIGURE 7. ELEMENTS OF PROPANE FLOW CONTROL FOR EACH BURNER

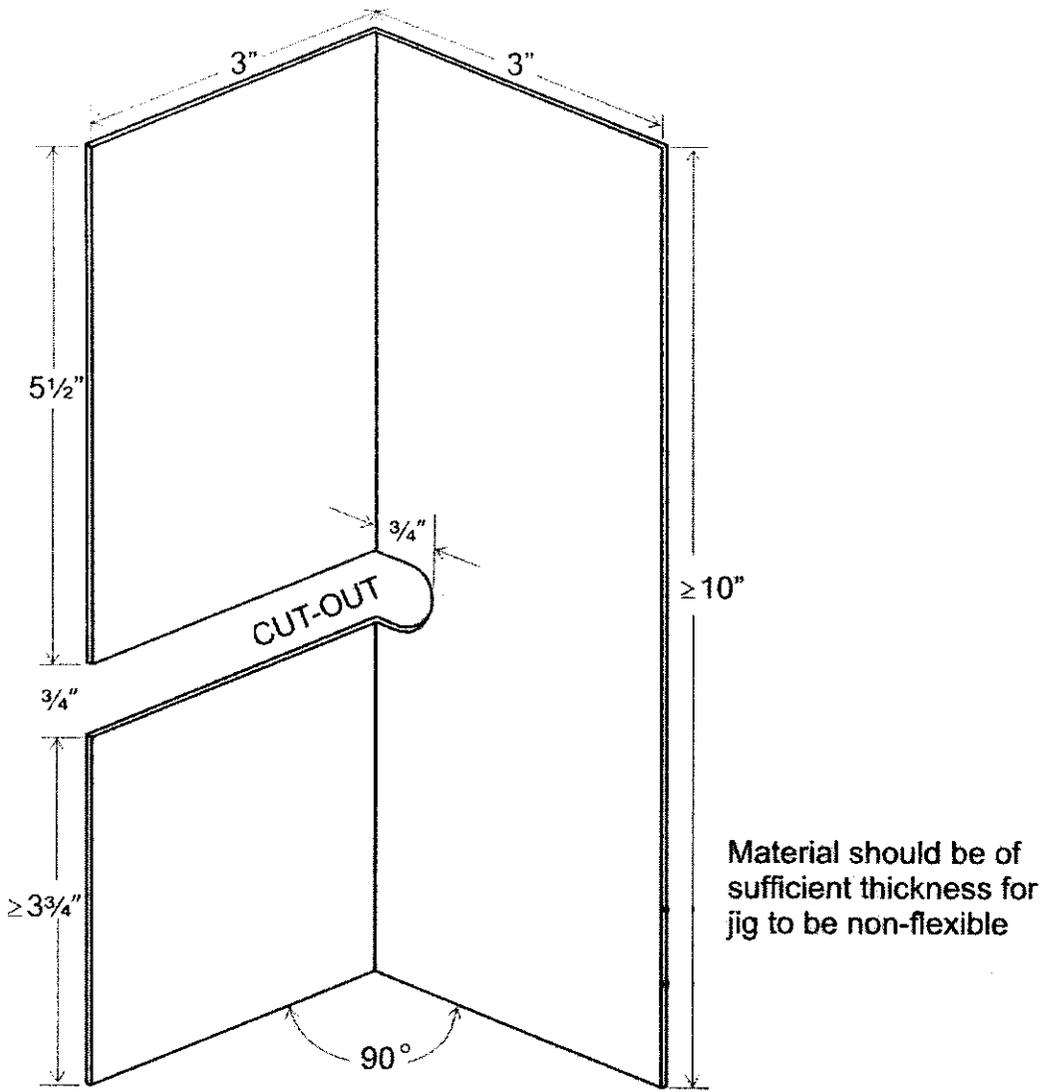
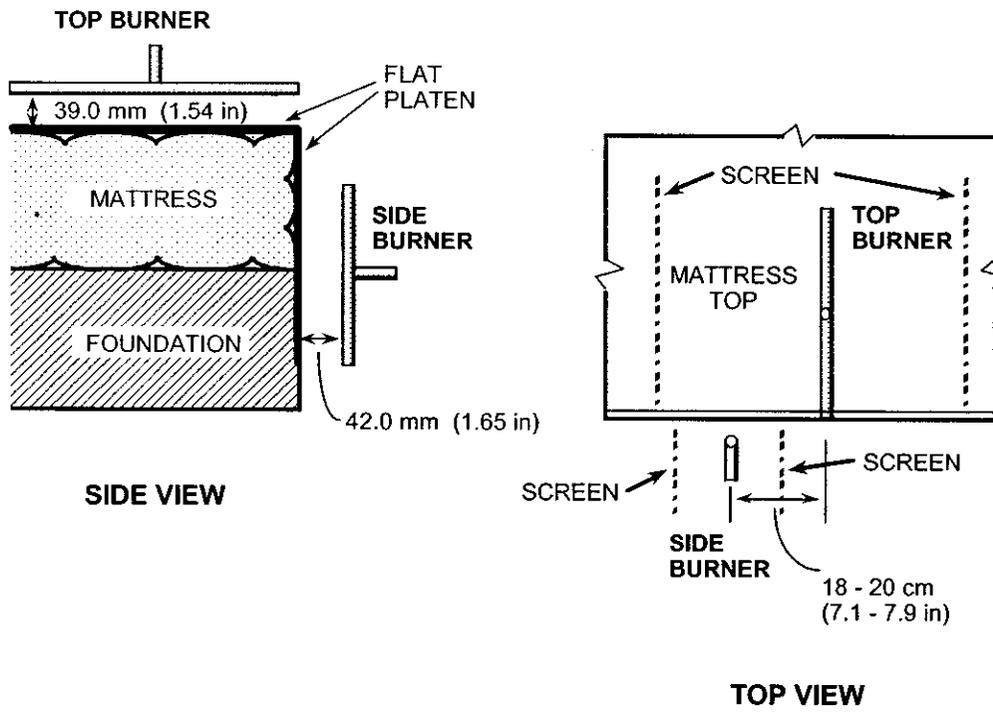
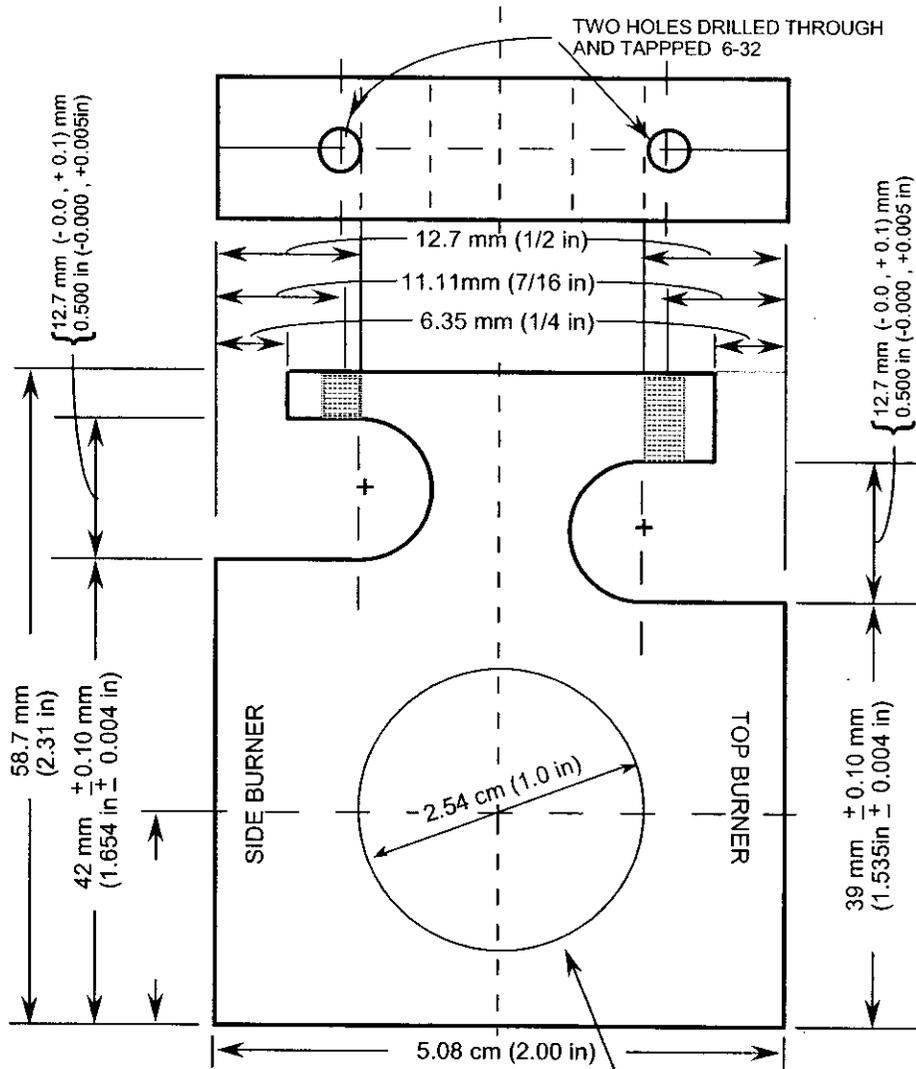


FIGURE 8. JIG FOR SETTING MATTRESS AND FOUNDATION SIDES IN SAME PLANE



**FIGURE 9. BURNER PLACEMENTS ON MATTRESS / FOUNDATION**



NOTE: PUNCH WORDS SHOWN ON BOTH FLAT FACES OF JIG.

PLACEMENT AND DIAMETER NOT CRITICAL (THIS HOLE IS JUST FOR LOWERING THE WEIGHT OF THE JIG).

**FIGURE 10. JIG FOR SETTING BURNERS AT PROPER DISTANCES FROM MATTRESS / FOUNDATION**

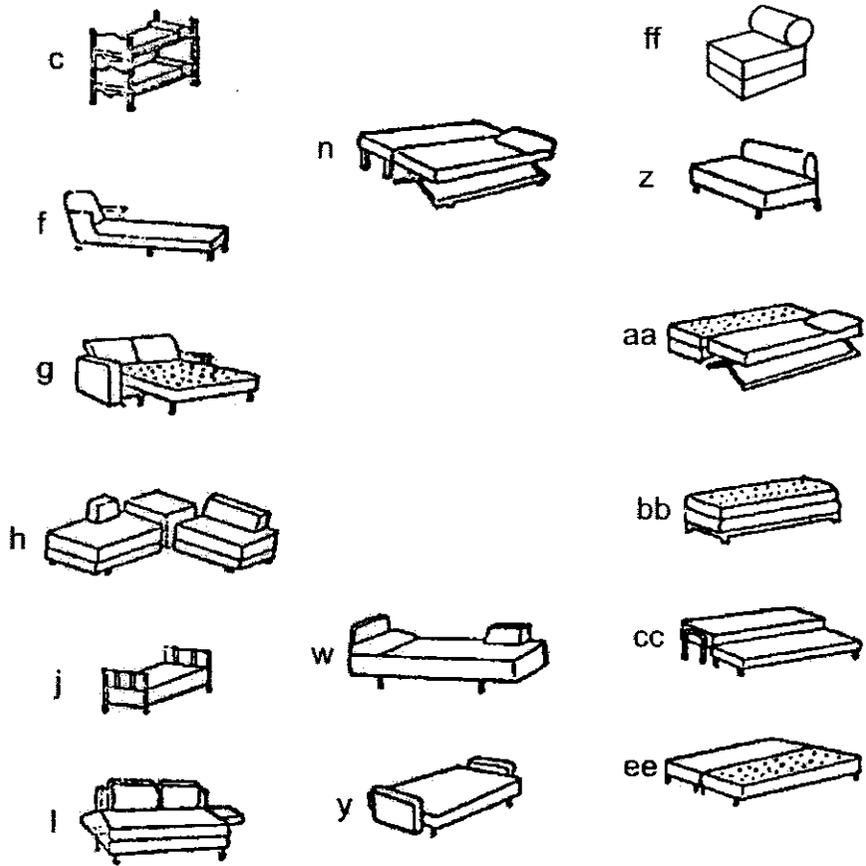


FIGURE 11

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## Appendix A: Calibration of Propane Flowmeters

Once the assembly of the burner is completed and all the connecting points are checked for gas leakage, the most critical task is ensuring the exact flow rates of propane into the top and side burners, as described in the test protocol. The gas flow rates are specified at 12.9 Liters per minute (LPM)  $\pm$  0.1 LPM and 6.6 LPM  $\pm$  0.05 LPM for the top and side burners (Burners 1 and 2), respectively, at a pressure of 101  $\pm$  5 kiloPascal (kPa) (standard atmospheric pressure) and a temperature of 22  $\pm$  3° Centigrade(C). The rotameters that are installed in the control box of the burner assembly need to be calibrated for accurate measurement of these flow rates.

The most practical and accurate method of measuring and calibrating the flow rate of gases (including propane) is use of a diaphragm test meter (also called a dry test meter). A diaphragm test meter functions based on positive displacement of a fixed volume of gas per rotation and its reading is therefore independent of the type of the gas being used. The gas pressure and temperature, however, can have significant impact on the measurement of flow rate.

The gas pressure downstream of the rotameters that are installed in the control box of the burner assembly is maintained near atmospheric pressure (only a few millimeters of water above atmosphere). Therefore, the best location to place the diaphragm test meter for gas flow calibration is right downstream of the control box. The pressure at the propane tank must be set at 20 $\pm$ 0.5 pounds per square inch gage (psig).

### Calibration Procedure:

Install the diaphragm test meter (DTM) downstream of the control box in the line for the top burner. Check all connecting points for gas leakage. Open the main valve on the propane tank and set a pressure of 20 $\pm$ 0.5 psig. Set the timers in the control box for 999 seconds (or the maximum range possible). Record the barometric pressure. Turn the "Burner 1" switch to ON and ignite the top burner. Allow the gas to flow for 2-3 minutes until the DTM is stabilized. Record the pressure and temperature in the DTM. Use a stopwatch to record at least one minute worth of

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complete rotations while counting the number of rotations<sup>10</sup>. Calculate the propane gas flow rate using the recorded time and number of rotations (total flow in that time). Use the pressure and temperature readings to convert to standard conditions. Repeat this measurement for two additional meter settings to allow for calibrating the flowmeter throughout the range of interest. Plot the flow versus meter reading, fit a best line (possibly quadratic) through these points to find the meter setting for a flow of 12.9 LPM at the above "standard " conditions. Repeat this procedure for "Burner 2" using three meter readings to find the setting that gives a flow rate of 6.6 LPM at the standard conditions. After completion of the calibration, re-set the timers to 70 and 50 seconds.

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<sup>10</sup> With a diaphragm test meter well-sized to this application, this should be more than five rotations. A one liter per rotation meter will require 10 to 15 rotations for the flow measurements and greater than the minimum of one minute recording time specified here.

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## Appendix B: Burner Operation Sequence

Starting point:

AC power on (red knob out); propane pressure set to 20 psig at bottle; timers set to 70 s (top burner) & 50 s (side burner); flowmeters pre-set to values that give the requisite propane gas flow rates to each burner. Pilot tubes set just behind front surface of burners; pilot flow valves set for ca. 2 cm flames.

Position burner on test specimen and remove sheet metal platen

Place screens around both burners

Open pilot ball valves one at a time and ignite pilots with hand-held flame; adjust flame size if necessary being very careful to avoid a jet flame that could prematurely ignite the test specimen (Beware: after a long interval between tests the low pilot flow rate will require a long time to displace air in the line and achieve the steady-state flame size.)

Open both burner ball valves

Start test exposure by simultaneously turning on power to both timers (timers will turn off burners at appropriate times)

Check/adjust propane flow rates (DO THIS ESSENTIAL TASK IMMEDIATELY. Experience shows the flow will not remain the same from test-to-test in spite of fixed valve positions so adjustment is essential.)

After burners are out:

Lift top burner and back assembly away from specimen

Turn off power to both timers

Remove screens

Turn off pilots at their ball valves

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Billing Code 6355-01-P

## CONSUMER PRODUCT SAFETY COMMISSION

16 CFR Part 1634

### Standard to Address Open Flame Ignition of Bedclothes; Advance Notice of Proposed Rulemaking

**AGENCY:** Consumer Product Safety Commission.

**ACTION:** Advance Notice of Proposed Rulemaking.

**SUMMARY:** The Commission is considering issuing a flammability standard that would address open flame ignition of bedclothes. Elsewhere in today's *Federal Register*, the Commission is proposing a flammability standard that addresses open flame ignition of mattresses/foundations. Research indicates that in mattress fires the mattress and bedclothes operate together as a system. Thus, the Commission believes that a flammability standard for bedclothes in addition to one for mattresses may be appropriate. The Commission invites comments concerning the risk of injury identified in this notice, the regulatory alternatives being considered, and other possible alternatives. The Commission also invites submission of any existing standard or statement of intention to modify or develop a voluntary standard to address small open flame ignition of bedclothes.

**DATE:** Comments and submissions must be received by \_\_\_\_\_

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[insert date 60 days after publication].

**ADDRESS:** Comments should be mailed, preferably in five copies, to the Office of the Secretary, Consumer Product Safety Commission, Washington, D.C. 20207-0001, or delivered to the Office of the Secretary, Consumer Product Safety Commission, Room 502, 4330 East-West Highway, Bethesda, Maryland; telephone (301) 504-0800. Comments also may be filed by telefacsimile to (301)504-0127 or by email to [cpsc-os@cpsc.gov](mailto:cpsc-os@cpsc.gov). Comments should be captioned "Bedclothes ANPR."

**FOR FURTHER INFORMATION CONTACT:** Margaret Neily, Directorate for Engineering Sciences, Consumer Product Safety Commission, Washington, D.C. 20207; telephone (301) 504-0508, extension 1293.

### **SUPPLEMENTARY INFORMATION:**

#### **A. Background**

An existing flammability standard for mattresses addresses ignition of mattresses and mattress pads by cigarettes. 16 CFR Part 1632. On October 11, 2001, the Commission published an advance notice of proposed rulemaking (ANPR) addressing open flame ignition of mattresses. 66 FR 51886. That ANPR was the result of several years of evaluation by Commission staff and petitions on mattress flammability submitted by the Children's Coalition for Fire-safe Mattresses. As explained in the ANPR, the Sleep Products Safety Council (SPSC), an affiliate of the International Sleep Products Association (ISPA), sponsored a

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research program at the National Institute of Standards and Technology (NIST). The NIST research program has provided a great deal of technical information about mattress fires, including the role of bedclothes in such fires.

As noted in the mattress ANPR, mattresses generally are not used alone, but are covered by bedding or bedclothes, whose presence significantly affects the character of the fire. In most incidents a small open flame initially ignites the bedding, and these materials serve as a larger ignition source for the mattress. Because few materials can resist such a large ignition source, the typical approach of preventing ignition of a mattress through a product performance standard may not be fully adequate for an open flame mattress standard. Therefore, the Commission has taken the approach in its proposed mattress standard of limiting the fire intensity in order to minimize the possibility of or delay flashover for a period of time in mattress/bedding fires. Flashover occurs when a fire becomes so intense that all exposed surfaces ignite nearly simultaneously, and the fire quickly spreads through the structure.

In response to the mattress ANPR, the Commission received comments both in favor of the Commission regulating bedclothes and against such regulation. Those opposed to regulating bedclothes argued that bedclothes are an uncontrolled variable and there is no way to predict the type of bedclothes that may

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become involved in a fire incident. They also stated that there would be no objective method to determine if consumers were using regulated bedclothes, there is little data indicating that regulating some bedding items would have an impact on the hazard, and flammability performance should not be based on what consumers may (or may not) use as bedclothes. Those in favor of regulating bedclothes argued that bedclothes are a significant ignition source for mattress fires and significantly affect the burning characteristics of the mattress and foundation. They also asserted that bedclothes can generate a fire large enough to pose a hazard on their own, and that improving the flammability of certain bedclothes, such as filled items, is economically feasible.

As discussed below, the Commission believes that regulating bedclothes may be appropriate. Bedclothes contribute substantially to the complexity and magnitude of the mattress fire hazard. The NIST research has shown that, even with mattresses that would meet the Commission's proposed small open flame mattress standard, certain bedclothes have produced near flashover conditions in laboratory tests.

### **B. The Products**

The term "bedclothes" can include a variety of products, such as sheets, blankets, mattress pads, pillows, comforters, and similar products that are used as covering on a bed. Products

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that contain fibrous or other materials are called "filled" bedding. Because of their greater mass or fuel load, filled products are likely to contribute more significantly to a mattress fire than unfilled products, such as sheets and blankets. California's Bureau of Home Furnishings and Thermal Insulation (CBHF) has issued a draft Technical Bulletin 604 that specifies an open flame standard for filled bedding products. The draft TB 604 does not cover textiles, such as sheets, pillowcases and blankets. CBHF only regulates filled bedclothing.

At the present time, the Commission is not limiting this rulemaking to any particular bedclothes. The Commission intends that during the course of rulemaking it will evaluate continuing research to determine which bedclothes have the greatest impact on mattress fires. The Commission requests comments on particular bedclothes that should be included in or excluded from a proposed bedclothes standard.

At the request of CBHF, the American Textiles Manufacturers Institute (ATMI) conducted a survey in 2003 of its members about the U.S. market for filled bedding products. The 12 firms surveyed reportedly account for 80% of the U.S. market for these products. Although these firms are located in the U.S., many of their products are manufactured outside the U.S. According to U.S. Department of Commerce 2002 import statistics, perhaps 90%

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of all quilts and comforters, and perhaps 20% of all bed pillows are imported. According to the ATMI survey, the most common fill material for bedclothes is polyester (not flame-resistant). Some of the improved fill materials being developed for mattresses could also be used for bedclothes. Use of barrier fabrics or flame resistant outer fabrics are other approaches that could be used to improve fire performance of bedclothes.

A trade publication, "Home Textiles Today," reported in its 2003 annual business issue that the top five firms marketing comforters and bedspreads sold about \$1.1 billion in the U.S. in 2002, essentially unchanged from 2001. The top five makers of down comforters reported sales of about \$303 million in 2002.

Mattress pads are constructed of the same types of foam used in mattresses and filled bedding products. They can also contribute significantly to mattress/bedding fires. Foam mattress pads may be made with a flat surface, an "egg crate" design, or with "memory foam" that contours to the body. Egg crate pads retail for \$10 to \$50 each. Industry sources estimate that perhaps 4 to 5 million egg crate pads are sold annually. Memory pads, which retail for \$100 or more, sell about 3 million units annually.

### C. Risk of Injury

The most recent national fire loss estimates indicated that mattresses and bedding were the first items to ignite in 19,400

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residential fires attended by the fire service annually during 1995 - 1999 (based on data from the U.S. Fire Administration's National Fire Incident Reporting System data and the National Fire Protection Association's annual survey). These fires resulted in 440 deaths, 2,230 injuries and \$273.9 million in property loss each year. Open flame ignition sources accounted for 35 percent of these fires and smoking material sources accounted for 30 percent of the fires. The remaining fires included a variety of ignition sources including heat sources too close to the bed. Based on these data alone, it is very difficult to determine whether the first item ignited was a mattress or an item of bedclothes.

The primary source for information on the involvement of various bedclothes items in mattress fires is CPSC's in-depth investigations. Staff analyzed 241 investigated fire incidents that occurred between January 2000 and June 2003. These investigations were based on a variety of initial sources, NEISS hospital emergency room reports, newspaper clippings, and fire department reports.

Unless someone witnessed the fire ignition, it was often difficult to determine whether the mattress or a bedclothes item, such as a pillow or blanket, ignited first. When the initial ignition was not observed and reported, staff determined what ignited first based on the reported scenario. For example, if a

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lamp fell on a blanket on the top surface of the bed, the incident was classified as igniting the blanket first. Based on this evaluation, it was determined that a non-electric bedclothes item ignited first in 190 of 235 fires (81 percent). However, in 75 percent of those bedclothes' ignitions it was not possible to determine the type of bedclothes involved. Among incidents for which a specific item was reported, sheets, blankets, and comforters/quilts were the items cited most frequently. Ignition sources included cigarette lighters (primarily children playing), candles, smoking materials, and other nearby heat sources. Although the investigations could not provide information on which types of bedclothes were more likely to ignite, they did show that most bedclothes items that were present did ignite at some point during the fire.

### D. Statutory Provisions

Section 4 of the Flammable Fabrics Act ("FFA") authorizes the Commission to initiate proceedings for a flammability standard when it finds that such a standard is "needed to protect the public against unreasonable risk of the occurrence of fire leading to death or personal injury, or significant property damage." 15 U.S.C. 1193(a). That section also sets forth the process by which the Commission can issue a flammability standard. The Commission first must issue an advance notice of proposed rulemaking (ANPR) which: (1) identifies the fabric or

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product and the nature of the risk associated with the fabric or product; (2) summarizes the regulatory alternatives under consideration; (3) provides information about existing relevant standards and reasons why the Commission does not preliminarily believe that these standards are adequate; (4) invites interested persons to submit comments concerning the identified risk of injury, regulatory alternatives being considered, and other possible alternatives; (5) invites submission of an existing standard or portion of a standard as a proposed regulation; and (6) invites submission of a statement of intention to modify or develop a voluntary standard to address the risk of injury. 15 U.S.C. 1193(g).

If, after reviewing comments and submissions responding to the ANPR, the Commission determines to continue the rulemaking proceeding, it will issue a notice of proposed rulemaking. This notice must contain the text of the proposed rule along with alternatives the Commission has considered and a preliminary regulatory analysis. 15 U.S.C. 1193(i). Before issuing a final rule, the Commission must prepare a final regulatory analysis, and it must make certain findings concerning any relevant voluntary standard, the relationship of costs and benefits of the rule, and the burden imposed by the regulation. *Id.* 1193(j). The Commission also must provide an opportunity for interested persons to make an oral presentation before the Commission issues

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a final rule. Id. 1193(d).

### **E. Existing Open Flame Standards**

Currently, there are no mandatory flammability requirements for residential bedclothes in the United States. A few voluntary standards apply to bedding items. ASTM D4151-92(2001) measures ease of ignition and surface flame spread of blankets. Underwriters Laboratories (UL) has a standard for electric blankets. A European standard, ISO 12952 - Textiles- Burning behaviour of bedding items, Parts 1-4, specifies a general test method for assessing the ignitability of bedding items. The test method calls for observation of progressive smoldering and/or flaming when a bedding specimen is exposed to a small propane burner. The test relates only to ignitability of the bedding material under the specific conditions of the test. None of these tests appears adequate to measure or address the specific hazard posed by a bedclothes item or its contribution to a residential mattress/bedding fire.

### **F. California's Rulemaking**

In 2001, the California legislature passed Assembly Bill 603 (AB 603), which mandated that CBHF issue regulations by January 2004 that would require that mattresses and box springs meet a test for open-flame resistance. AB 603 also stated: "If the bureau [CBHF] concludes that other bedding contributes to mattress fires, the regulations shall require the other bedding

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to be flame retardant under the resistance to open-flame test." Based on their own research and that conducted by NIST, CBHF determined that regulation of filled bedding products - such as comforters, pillows, and mattress pads - is necessary. CBHF has been working with a multi-disciplinary task force to develop a proposed standard for these bedding items. CBHF prepared a draft standard (TB 604) that was discussed in the Task Force in 2003. However, it was withdrawn because of technical problems with the test method. CBHF issued a new draft of the TB 604 standard on October 1, 2004, and scheduled a Task Force meeting for November 18, 2004, to discuss it. CBHF has stated that it expects to open formal rulemaking at the end of the year and hold hearings on the proposal in January or February 2005.

### **G. Technical Research on Bedclothes**

As discussed in the mattress ANPR, several research projects have examined open-flame ignited mattress and bedding fires. Some of this research provides a better understanding of the contribution of bedclothes to these fires.

The Sleep Product Safety Council (SPSC) sponsored several phases of research at NIST. One of the focuses during Phase 1 was to evaluate the fire behavior of various combinations of bedclothes. Twelve different combinations of bedclothes sets ranging from very light (two sheets and a pillow) to heavy (two sheets, a pillow, a mattress pad, one blanket, and one heavy

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weight filled comforter) were burned on an inert, twin-size mattress made of fiberglass. The peak heat release rates varied from 50kW to 200kW. Combinations without a comforter were typically under 100kW. Peak heat release rate is basically a measure of the intensity of the fire produced by these items. Further tests were conducted on a range of combinations of bedclothes.

Part of Phase 2 of the NIST work included a limited assessment of bedclothes and their contribution to mattress fire hazards. The same set of bedclothes was used on mattresses of varying heat release rate performance. The bedclothes were tested with a king sized mattress that had contributed very little heat release rate in prior testing without bedclothes. The result was a peak heat release rate of 400kW, primarily from the bedclothes. While this scenario would not readily cause flashover, it is important to note that this result assumes little involvement from the mattress.

SPSC expanded its research at NIST to examine filled bedclothes (such as comforters, pillows, and mattress pads). This research tested bedclothes constructed of a variety of filling and cover materials to assess the effect of material changes on the flammability behavior. The study evaluated two design changes: one involved replacing polyester fiberfill with a modified, lower heat release fiber of a comparable loft; the

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other involved using a barrier-type cover to protect the polyester fiberfill. These design changes were examined using three different mattress and foundation designs: one representing current mattress/foundation construction and the other two using experimental, improved designs.

The report on this bedclothes study was published in February 2003, NIST Technical Note 1449. According to the NIST report, for a mattress standard to be most effective, the performance of the entire bedding system (that is, the mattress/foundation and the bedclothes) must be taken into consideration. The study showed that the bedclothes and the mattress/foundation function as a system and that the improved mattress pads, pillows and comforters resulted in major improvements in the performance of the system. This was indicated by a lower peak heat release rate or a longer time to peak.

A related research project conducted for CPSC by NIST reinforced one of the conclusions of the bedclothes study discussed above. A portion of the tests using conventional bedclothes showed that, as mattress designs improve, two separate peak heat release rates occur. The first observed peak appears to be dominated by the bedclothes, while the second is dominated by the mattress/foundation. Good mattress designs tended to have a peak heat release rate appreciably later in the test and

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comparable to or less than the peak dominated by the bedclothes.

A more recent study conducted for CPSC by NIST included a series of tests using the same bedclothes combination on twin, queen, and king size mattresses. The tests were conducted in a room environment to evaluate any resulting room effects, which generally begin to occur at heat release rates of about 300 to 400 kW. The early heat release rate peaks, driven primarily by burning bedclothes, tripled from twin size to king size. Larger size bedclothes combinations on good performing mattress designs (those with peak heat release rates less than 50 kW when tested with burners and no bedclothes) showed heat release rate peaks up to 800 kW, occurring 7 to 8 minutes after ignition. This is much higher than rates allowed for mattresses/foundations under CPSC's proposed mattress standard. On mattress designs that yielded a moderate heat release rate peak with burners, the bedclothes resulted in more serious fires. This study shows that a combination of some bedclothes with even a well performing mattress/foundation (that would meet CPSC's proposed mattress standard) could still cause flashover in a room.

### **H. Invitation to Comment**

In accordance with section 4(g) of the FFA, the Commission invites comments on this notice. Specifically, the Commission invites the following types of comments.

1. Comments concerning the risk of injury identified in

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this notice, the regulatory alternatives discussed above, and other alternatives to address the risk of injury;

2. The submission of an existing standard or portion of a standard as a proposed rule;

3. The submission of a statement of intention to modify or develop a voluntary standard to address the risk of injury identified in the notice along with a description of a plan to modify or develop the standard.

In addition, the Commission is interested in obtaining further information about the following issues that may influence the flammability of bedclothes.

1. Cleaning and laundering methods of bedclothes;
2. Frequency of cleaning or laundering of various bedclothes items over their useful lives.

Dated: \_\_\_\_\_

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Todd Stevenson, Secretary  
Consumer Product Safety Commission

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## List of Relevant Documents

1. Briefing memorandum from Margaret Neily, Project Manager, Directorate for Engineering Sciences, to the Commission, "Notice of Proposed Rulemaking for Mattress Flammability (Open Flame) and Options for Addressing Bedclothes Involvement in Mattress/Bedding Fires," October \_\_\_\_\_, 2004.

2. Memorandum from Linda Smith, EPHA, to Margaret Neily, Engineering Sciences, "Involvement of Bedclothes in Residential Fires Mattress Fires," October \_\_\_\_\_, 2004.

3. Memorandum from Terrance R. Karels, EC, to Margaret L. Neily, ES, "Bedding Market Information," October \_\_\_\_\_, 2004.

4. Memorandum from Allyson Tenney, ES, to Margaret Neily, Project Manager, "Bedclothes Flammability," October \_\_\_\_\_, 2004.