

Subpart C—Interpretations and Policies

§§ 1632.61–1632.62 [Reserved]

§ 1632.63 Policy clarification on renovation of mattress.

(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 of Mattresses, as amended (FF 4–72) (subpart A of this part), issued pursuant to the act, provides that, with certain exceptions, mattress 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 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 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 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 to the Commission and petition for an exemption. Renovators are expected to comply with all the testing requirements of the Mattress Standard until an exemption is approved.

PART 1633—STANDARD FOR THE FLAMMABILITY (OPEN FLAME) OF MATTRESS SETS

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Subpart A—The Standard

§ 1633.1 Purpose, scope and applicability.

(a) *Purpose.* This part 1633 establishes flammability requirements that all mattress sets must meet before sale or introduction into commerce. The purpose of the standard is to reduce deaths and injuries associated with mattress fires by limiting the size of the fire generated by a mattress set during a thirty minute test.

(b) *Scope.* (1) All mattress sets, as defined in § 1633.2(c), manufactured, imported, or renovated on or after the effective date of this standard are subject to the requirements of the standard.

(2) One-of-a-kind mattress sets may be exempted from testing under this standard in accordance with § 1633.13(c).

(c) *Applicability.* The requirements of this part 1633 shall apply to each “manufacturer” (as that term is defined in § 1633.2(k)) of mattress sets which are manufactured for sale in commerce.

§ 1633.2 Definitions.

In addition to the definitions given in section 2 of the Flammable Fabrics Act as amended (15 U.S.C. 1191), the following definitions apply for purposes of this part 1633.

(a) *Mattress* means a resilient material or combination of materials enclosed by a ticking (used alone or in combination with other products) intended or promoted for sleeping upon. This includes mattresses that have undergone renovation as defined in paragraph (d) of this section.

(1) This term includes, but is not limited to, adult mattresses, youth mattresses, crib mattresses (including portable crib mattresses), bunk bed mattresses, futons, flip chairs without a permanent back or arms, sleeper chairs, and water beds or air mattresses if they contain upholstery material between the ticking and the mattress core. Mattresses used in or as part of upholstered furniture are also included; examples are convertible sofa bed mattresses, corner group mattresses, day bed mattresses, roll-away bed mattresses, high risers, and trundle bed mattresses. See § 1633.9 Glossary of terms, for definitions of these items.

(2) This term excludes mattress pads, mattress toppers (items with resilient filling, with or without ticking, intended to be used with or on top of a mattress), sleeping bags, pillows, liquid and gaseous filled tickings, such as water beds and air mattresses that contain no upholstery material between the ticking and the mattress core, upholstered furniture which does not contain a mattress, and juvenile product pads such as car bed pads, carriage pads, basket pads, infant carrier and lounge pads, dressing table pads, stroller pads, crib bumpers, and playpen pads. See § 1633.9 Glossary of terms, for definitions of these items.

(b) *Foundation* means a ticking covered structure used to support a mattress or sleep surface. The structure may include constructed frames, foam, box springs, or other materials, used alone or in combination.

(c) *Mattress set* means either a mattress and foundation labeled by the manufacturer for sale as a set, or a mattress labeled by the manufacturer for sale without any foundation.

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(d) *Renovation* means altering an existing mattress set for the purpose of resale.

(1) This term includes any one, or any combination of the following: replacing the ticking or batting, stripping a mattress to its springs, rebuilding a mattress, or replacing components with new or recycled materials.

(2) This term excludes alterations 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.

(e) *Ticking* means the outermost layer of fabric or related material of a mattress or foundation. It does not include any other layers of fabric or related materials quilted together with, or otherwise attached to, the outermost layer of fabric or related material.

(f) *Upholstery material* means all material, either loose or attached, between the mattress ticking and the core of a mattress.

(g) *Edge* means the seamed, unseamed or taped border edge of a mattress or foundation that joins the top and/or bottom with the side panels.

(h) *Tape edge* means an edge made by using binding tape to encase and finish raw edges.

(i) *Binding tape* means a fabric strip used in the construction of some edges.

(j) *Seam thread* means the thread used to form stitches in construction features, seams, and tape edges.

(k) *Manufacturer* means an individual plant or factory at which mattress sets are manufactured or assembled. For purposes of this part 1633, importers and renovators are considered manufacturers.

(l) *Prototype* means a specific design of mattress set that serves as a model for production units intended to be introduced into commerce and is the same as the production units with respect to materials, components, design and methods of assembly. A mattress intended for sale with a foundation(s) shall be considered a separate and distinct prototype from a mattress intended for sale without a foundation.

(m) *Prototype developer* means a third party that develops a prototype for use by a manufacturer. Such prototypes may be qualified by either the prototype developer or by the manufacturer.

(n) *Qualified prototype* means a prototype that has been tested in accordance with §1633.4(a) and meets the criteria stated in §1633.3(b).

(o) *Confirmed prototype* means a prototype that is part of a pooling arrangement and is the same as a qualified prototype with respect to materials, components, design and methods of assembly and has been tested in accordance with §1633.5(a)(3) and meets the criteria stated in §1633.3(b).

(p) *Subordinate prototype* means a mattress set that is based on a qualified or confirmed prototype and is the same as the qualified or confirmed prototype, except as permitted by §1633.4(b). A subordinate prototype is considered to be represented by a qualified or confirmed prototype and need not be tested in accordance with §1633.4(a) or §1633.5(a)(3).

(q) *Prototype pooling* means a cooperative arrangement—whereby one or more manufacturers build mattress sets based on a qualified prototype produced by another manufacturer or prototype developer. A manufacturer who relies on another manufacturer's or prototype developer's qualified prototype must perform a confirmation test on the mattress set it manufactures.

(r) *Confirmation test* means a pre-market test conducted by a manufacturer who is relying on a qualified prototype produced by another manufacturer or prototype developer. A confirmation test must be conducted in accordance with the procedures set forth in §1633.7 and meet the criteria in §1633.3(b).

(s) *Production lot* means any quantity of finished mattress sets that are produced in production intervals defined by the manufacturer, and are intended to replicate a specific qualified, confirmed or subordinate prototype that complies with this part 1633.

(t) *Specimen* means a mattress set tested under this regulation.

(u) *Twin size* means any mattress with the dimensions 38 inches (in) (965 millimeters) × 74.5 in. (1892 mm); all dimensions may vary by $\pm\frac{1}{2}$ in. (± 13 mm).

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(v) *Core* means the main support system that may be present in a mattress, such as springs, foam, water bladder, air bladder, or resilient filling.

§ 1633.3 General requirements.

(a) *Summary of test method.* The test method set forth in §1633.7 measures the flammability (fire test response characteristics) of a mattress specimen by exposing the specimen to a specified flaming ignition source and allowing it to burn freely under well-ventilated, controlled environmental conditions. The flaming ignition source shall be a pair of propane burners. These burners impose differing fluxes for differing times on the top and sides of the specimen. During and after this exposure, measurements shall be made of the time-dependent heat release rate from the specimen, quantifying the energy generated by the fire. The rate of heat release must be measured by means of oxygen consumption calorimetry.

(b) *Test criteria.* (1) When testing the mattress set in accordance with the test procedure set forth in §1633.7, the specimen shall comply with both of the following criteria:

(i) The peak rate of heat release shall not exceed 200 kilowatts (“kW”) at any time within the 30 minute test; and

(ii) The total heat release shall not exceed 15 megajoules (“MJ”) for the first 10 minutes of the test.

(2) In the interest of safety, the test operator should discontinue the test and record a failure if a fire develops to such a size as to require suppression for the safety of the facility.

(c) *Testing of mattress sets.* Mattresses labeled for sale with a foundation shall be tested with such foundation. Mattresses labeled for sale without a foundation shall be tested alone.

(d) *Compliance with this standard.* Each mattress set manufactured, imported, or renovated on or after the effective date of the standard shall meet the test criteria specified in paragraph (b) of this section and otherwise comply with all applicable requirements of this part 1633.

§ 1633.4 Prototype testing requirements.

(a) Except as otherwise provided in paragraph (b) of this section, each

manufacturer shall cause three specimens of each prototype to be tested according to §1633.7 and obtain passing test results according to §1633.3(b) before selling or introducing into commerce any mattress set based on that prototype, unless the manufacturer complies with the prototype pooling and confirmation testing requirements in §1633.5.

(b) Notwithstanding the requirements of paragraph (a) of this section, a manufacturer may sell or introduce into commerce a mattress set that has not been tested according to §1633.7 if that mattress set differs from a qualified or confirmed prototype only with respect to:

(1) Mattress/foundation length and width, not depth (*e.g.*, twin, queen, king);

(2) Ticking, unless the ticking of the qualified prototype has characteristics (such as chemical treatment or special fiber composition) designed to improve performance on the test prescribed in this part; and/or

(3) Any component, material, design or method of assembly, so long as the manufacturer can demonstrate on an objectively reasonable basis that such differences will not cause the mattress set to exceed the test criteria specified in §1633.3(b).

(c) All tests must be conducted on specimens that are no smaller than a twin size, unless the largest size mattress set produced is smaller than a twin size, in which case the largest size must be tested.

(d)(1) If each of the three specimens meets both the criteria specified in §1633.3(b), the prototype shall be qualified. If any one (1) specimen fails to meet the test criteria of §1633.3(b), the prototype is not qualified.

(2) Any manufacturer may produce a mattress set for sale in reliance on prototype tests performed before the effective date of this Standard, provided:

(i) The manufacturer has documentation showing that such tests were conducted in accordance with all requirements of this section and §1633.7 and yielded passing results according to the test criteria of §1633.3(b);

(ii) Any tests conducted more than 30 days after publication of this standard in the FEDERAL REGISTER must comply

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with the recordkeeping requirements in §1633.11;

(iii) Such mattress sets may be used for prototype pooling only if the manufacturer complies with applicable recordkeeping requirements in §1633.11; and

(iv) Such mattress sets may serve as the basis for a subordinate prototype only if the manufacturer has all records required by §1633.11.

§ 1633.5 Prototype pooling and confirmation testing requirements.

(a) *Prototype pooling.* One or more manufacturers may rely on a qualified prototype produced by another manufacturer or prototype developer provided that:

(1) The prototype meets the requirements of §1633.4;

(2) The mattress sets being produced are the same as the qualified prototype with respect to materials, components, design and methods of assembly; and

(3) The manufacturer producing mattress sets in reliance on a qualified prototype has performed a confirmation test on at least one (1) Specimen of the mattress set it produces in accordance with §1633.7. The tested specimen must meet the criteria under §1633.3(b) before any mattress sets based on the qualified prototype may be sold or introduced into commerce.

(b) *Confirmation test failure.* (1) If the confirmation test specimen fails to meet the criteria of §1633.3(b), the manufacturer thereof shall not sell any mattress set based on the same qualified prototype until that manufacturer takes corrective measures, tests a new specimen, and the new specimen meets the criteria of §1633.3(b).

(2) If a confirmation test specimen fails to meet the criteria of §1633.3(b), the manufacturer thereof must notify the manufacturer of the prototype of the test failure.

§ 1633.6 Quality assurance requirements.

(a) *Quality assurance.* Each manufacturer shall implement a quality assurance program to ensure that mattress sets manufactured for sale are the same as the qualified and/or confirmed prototype on which they are based with respect to materials, components, de-

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sign and methods of assembly, except as permitted by §1633.4(b). At a minimum these procedures shall include:

(1) Controls, including incoming inspection procedures, of all mattress set materials, components and methods of assembly to ensure that they are the same as those used in the prototype on which they are based;

(2) Designation of a production lot that is represented by the prototype; and

(3) Inspection of mattress sets produced for sale sufficient to demonstrate that they are the same as the prototype on which they are based with respect to materials, components, design and methods of assembly.

(b) *Production testing.* Manufacturers are encouraged to conduct, as part of the quality assurance program, random testing of mattress sets being produced for sale according to the requirements of §§1633.3 and 1633.7.

(c) *Failure of mattress sets produced for sale to meet flammability standard—*(1) *Sale of mattress sets.* If any test performed for quality assurance yields results which indicate that any mattress set of a production lot does not meet the criteria of §1633.3(b), or if a manufacturer obtains test results or other evidence that a component or material or construction/assembly process used could negatively affect the test performance of the mattress set as set forth in §1633.3(b), the manufacturer shall cease production and distribution in commerce of such mattress sets until corrective action is taken.

(2) *Corrective action.* A manufacturer must take corrective action when any mattress set manufactured or imported for sale fails to meet the flammability test criteria set forth in §1633.3(b).

§ 1633.7 Mattress test procedure.

(a) *Apparatus and test materials—*(1) *Calorimetry.* The rate of heat release must be measured by means of oxygen consumption calorimetry. The calibration should follow generally accepted practices for calibration. The calorimetry system shall be calibrated at a minimum of two (2) calibration points—at 75 kW and 200 kW.

(2) *Test area.* The test area must have either Test Configuration A or B. The

test area conditions shall be maintained at a temperature greater than 15 °C (59 °F) and less than 27 °C (80.6 °F) and a relative humidity less than 75 percent.

(i) *Test configuration A. (an open calorimeter (or furniture calorimeter)).* In this configuration, the specimen to be tested is placed under the center of an open furniture calorimeter. Figure 1 of this part shows the test assembly atop a bed frame and catch surface. The specimen shall be placed under an open hood which captures the entire smoke plume and is instrumented for heat release rate measurements. The area surrounding the test specimen in an open calorimeter layout shall be sufficiently large that there are no heat re-radiation effects from any nearby materials or objects. The air flow to the test specimen should be symmetrical from all sides. The air flow to the calorimeter hood shall be sufficient to ensure that the entire fire plume is captured, even at peak burning. Skirts may be placed on the hood periphery to help assure this plume capture, if necessary, though they must not be of such an excessive length as to cause the incoming flow to disturb the burning process. Skirts must also not heat up to the point that they contribute significant re-radiation to the test specimen. The air supply to the hood shall be sufficient that the fire is not in any way limited or affected by the available air supply. The fire plume should not enter the hood exhaust duct. Brief (seconds) flickers of flame that occupy only a minor fraction of the hood exhaust duct inlet cross-section are acceptable since they do not signify appreciable suppression of flames.

(ii) *Test configuration B.* The test room shall have dimensions 10 ft. by 12 ft. by 8 ft. (3048 mm × 3658 mm × 2438 mm) high. The specimen is placed within the burn room. All smoke exiting from the room is caught by a hood system instrumented for heat release rate measurements. The room shall have no openings permitting air infiltration other than a doorway opening 38 in ±0.25 in by 80 in ±0.25 in (965 mm ±6.4 mm × 2032 mm ±6.4 mm) located as indicated in Figure 2 of this part and other small openings as nec-

essary to make measurements. The test room shall be constructed of wood or metal studs and shall be lined with fire-rated wallboard or calcium silicate board. An exhaust hood shall be positioned outside of the doorway so as to collect all of the combustion gases. There shall be no obstructions in the air supply to the set-up.

(3) *Location of test specimen.* The location of the test specimen is shown in Figure 2 of this part. The angled placement is intended to minimize the interaction of flames on the side surfaces of the test specimen with the room walls. One corner of the test specimen shall be 13 centimeters (cm) to 17 cm from the wall and the other corner shall be 25 cm to 30 cm from the wall. The test room shall contain no other furnishings or combustible materials except for the test specimen.

(4) *Bed frame. (i) Frame dimensions.* The specimen shall be supported around its perimeter by the bed frame with a flat surface and no edges extending up from the surface (i.e., the angle is configured down). For twin size mattresses, the specimen shall be placed on top of a welded bed frame 1.90 m by 0.99 m (75 in by 39 in) made from 40 mm (1.50 in) steel angle. If testing a size other than twin, the test frame shall similarly match the dimensions of the specimen.

(ii) *Frame height.* The frame shall be 115 mm (4.5 in) high, except if adjustments are necessary to accommodate the required burner position in paragraph (h)(2)(ii) of this section. The height of the test frame shall also be adjusted, as necessary, so that the burner is no less than 25mm (1 in) above the supporting surface.

(iii) *Frame crosspieces.* The frame shall be completely open under the foundation except for two crosspieces, 25 mm wide (1 in) at the 1/3 length points, except when sagging of the specimen between the crosspieces exceeds 19 mm (3/4 in) below the test frame. Minimal additional crosspieces shall then be added to prevent sagging of the specimen.

(5) *Catch pan.* The bed frame feet shall rest on a surface of either calcium silicate board or fiber cement board, 13 mm (0.5 in) thick, 2.11 m by 1.19 m (83 in by 47 in). The board serves

as a catch surface for any flaming melt/drip material falling from the bed assembly and may be the location of a pool fire that consumes such materials. This surface must be cleaned between tests to avoid build-up of combustible residues. Lining this surface with aluminum foil to facilitate cleaning is not recommended since this might increase fire intensity via reflected radiation.

(6) *Ignition source*—(i) *General*. The ignition source shall consist of two T-shaped burners as shown in Figures 3 and 4 of this part. One burner impinges flames on the top surface of the mattress. The second burner impinges flames on the side of the mattress and on the side of the foundation. Each of the burners shall be constructed from stainless steel tubing (12.7 mm diameter with 0.89 ±0.5 mm wall thickness; 0.50 in diameter with 0.035 ±0.002 in wall). Each burner shall incorporate a stand-off foot to set its distance from the test specimen surface (Figure 5 of this part). Both burners shall be mounted with a mechanical pivot point but the side burner is locked in place to prevent movement about this pivot in normal usage. The top burner, however, is free to rotate about its pivot during a burner exposure and is lightly weighted so as to exert a downward force on the mattress top through its stand-off foot so that the burner follows a receding top surface on the test specimen (Figure 6 of this part). The combination of burner stand-off distance and propane gas flow rate to the burners determines the heat flux they impose on the surface of the test specimen so that both of these parameters are tightly controlled.

(ii) *Top surface burner*. The T head of the top surface burner (horizontal burner, Figure 3 of this part) shall be 305 ±2 mm (12 ±0.08 in) long with gas tight plugs in each end. Each side of the T shall contain 17 holes equally spaced over a 135 mm length (8.5 mm ±0.1 mm apart; 0.333 ±0.005 in). The holes on each side shall begin 8.5 mm (0.33 in) from the centerline of the burner head. The holes shall be 1.45 mm to 1.53 mm (0.058 in to 0.061 in) in diameter (which corresponds to Grade 10 machining practice with a well formed #53 drill bit). The holes shall point 5° out of the plane of the diagram in Fig-

ure 3. This broadens the width of the heat flux profile imposed on the surface of the test specimen.

(iii) *Side surface burner*. The T head of the side surface burner (vertical burner) shall be constructed similarly to the top surface burner, as shown in Figure 4 of this part, except that its overall length shall be 254 ±2 mm (10 ±0.08 in). Each side of the burner head shall contain 14 holes spaced evenly over a 110 mm length (8.5 mm ±0.1 mm apart; 0.333 ±0.005 in). The holes shall be 1.45 mm to 1.53 mm (0.058 in to 0.061 in) in diameter (which corresponds to Grade 10 machining practice with a well formed #53 drill bit). The holes shall point 5° out of the plane of the diagram in Figure 4.

(iv) *Burner stand-off*. The burner stand-off on each burner shall consist of a collar fixed by a set screw onto the inlet tube of the burner head (Figure 5 of this part). The collar shall hold a 3 mm diameter stainless steel rod having a 12.7 mm by 51 mm by (2–2.5 mm) thick (0.5 in by 2 in by (0.08–0.10 in) thick) stainless steel pad welded on its end with its face (and long axis) parallel to the T head of the burner. The foot pad shall be displaced about 10 mm to 12 mm from the longitudinal centerline of the burner head so that it does not rest on the test specimen in an area of peak heat flux.

(v) *Burner inlet lines*. A short section (9.5 mm outer diameter (“OD”), about 80 mm long; 3/8 in OD, about 3.2 in long) of copper tubing shall be placed in the inlet gas line just before the burner to facilitate making the burner nominally parallel to the test specimen surface (by a procedure described below). The copper tube on the top surface burner should be protected from excessive heat and surface oxidation by wrapping it with a suitable layer of high temperature insulation to protect the equipment. Both copper tubes are to be bent by hand in the burner alignment process. They must be replaced if they become work-hardened or crimped in any way. The gas inlet lines (12.7 mm OD stainless steel tubing; 0.50 in) serve as arms leading back to the pivot points and beyond, as shown in Figure 6 of this part. The length to the pivot for the top burner shall be approximately 1000 mm (40 in).

(vi) *Burner frame.* Figure 6 of this part shows the frame that holds the burners and their pivots, which are adjustable vertically in height. All adjustments (burner height, burner arm length from the pivot point, counterweight positions along the burner arm) are facilitated by the use of knobs or thumbscrews as the set screws. The three point footprint of the burner frame, with the two forward points on wheels, facilitates burner movement and burner stability when stationary.

(vii) *Arms.* The metal arms attached to the burners shall be attached to a separate gas control console by flexible, reinforced plastic tubing.¹ The gas control console is mounted separately so as to facilitate its safe placement outside of the test room throughout the test procedure. The propane gas lines running between the console and the burner assembly must be anchored on the assembly before running to the burner inlet arms. A 1.5 m \pm 25 mm (58 in \pm 1 in) length of flexible, reinforced tubing between the anchor point and the end of each burner inlet allows free movement of the top burner about its pivot point. The top burner arm shall have a pair of moveable cylindrical counterweights that are used, as described below, to adjust the downward force on the stand-off foot.

(viii) *Burner head.* Each burner head shall have a separate pilot light consisting of a 3 mm OD ($\frac{1}{8}$ in OD) copper tube with an independently-controlled supply of propane gas. The tube terminates within 10 mm of the center of the burner head. Care must be taken to set the pilot flame size small enough so as not to heat the test specimen before the timed burner exposure is begun.

(ix) *Flow control system.* Each burner shall have a flow control system of the type shown in Figure 7 of this part. Propane gas from a source such as a bottle is reduced in pressure to approximately 140 \pm 5 kilopascals ("kPa") (20 \pm 1 pounds per square inch gage ("psig")) and fed to the system shown in Figure 7 of this part. The gas flow to the burner is delivered in a square-wave manner (constant flow with rapid

onset and termination) by means of the solenoid valve upstream of the flowmeter. An interval timer (accurate to \pm 0.2 s) determines the burner flame duration. The pilot light assures that the burner will ignite when the solenoid valve opens.² The gas flow shall be set using a rotameter type of flowmeter, with a 150 mm scale, calibrated for propane. When calibrating the flowmeter, take into account that the flow resistance of the burner holes causes a finite pressure increase in the flowmeter above ambient. (If a calibration at one atmosphere is provided by the manufacturer, the flowmeter reading, at the internal pressure existing in the meter, required to get the flow rates listed below must be corrected, typically by the square root of the absolute pressure ratio. This calls for measuring the actual pressure in the flow meters when set near the correct flow values. A value roughly in the range of 1 kPa to 3 kPa—5 in to 15 in of water—can be expected.) See information on calibration in paragraph (b) of this section.

(x) *Gas flow rate.* Use propane gas: The propane shall be minimum 99% pure (often described by suppliers as CP or "chemically pure" grade, but this designation should not be relied on since the actual purity may vary by supplier). Each burner has a specific propane gas flow rate set with its respective, calibrated flowmeter. The gas flow rate to the top burner is 12.9 liters per minute ("L/min") \pm 0.1 L/min at a pressure of 101 \pm 5 kPa (standard atmospheric pressure) and a temperature of 22 \pm 3 °C. The gas flow rate to the side burner is 6.6 \pm 0.05 L/min at a pressure of 101 \pm 5 kPa (standard atmospheric pressure) and a temperature of 22 \pm 3 °C. The total heat release rate of the burners is 27 kW.

(b) *Calibration of Propane Flowmeters—*
(1) *Preparation.* 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

¹Fiber-reinforced plastic tubing (6 mm ID by 9.5 mm OD; 0.25 inch ID by 0.4 inch OD) made of PVC should be used.

²If the side burner, or more commonly one half of the side burner, fails to ignite quickly, adjust the position of the igniter, bearing in mind that propane is heavier than air. The best burner behavior test assessment is done against an inert surface (to spread the gas as it would during an actual test).

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) ± 0.1 LPM and 6.6 LPM ± 0.05 LPM for the top and side burners (Burners 1 and 2), respectively, at a pressure of 101 ± 5 kiloPascal (kPa) (standard atmospheric pressure) and a temperature of 22 ± 3 °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.

(i) 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.

(ii) The gas pressure downstream of the rotameters that are installed in the control box of the burner assembly should be 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 ± 1 pounds per square inch gage (psig).

(2) *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 ± 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 complete rotations while counting the number of rotations.³

³With a diaphragm test meter well-sized to this application, this should be more than

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 setting 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.

(c) *Conditioning.* Remove the specimens from any packaging prior to conditioning. Specimens shall be conditioned in air at a temperature greater than 18 °C (65 °F) and less than 25 °C (77 °F) and a relative humidity less than 55 percent for at least 48 continuous hours prior to test. Specimens shall be supported in a manner to permit free movement of air around them during conditioning.

(d) *Test preparation—(1) General.* Horizontal air flow at a distance of 0.5 m (20 in) on all sides of the test specimen at the mattress top height shall be no more than 0.5 m/s. If there is any visual evidence that the burner flames are disturbed by drafts during their exposure durations, the burner regions must be enclosed on two or more sides by at least a triple layer of screen wire. The screens shall be at least 25 cm tall. The screen(s) for the top burner shall sit on the mattress top and shall be wide enough to extend beyond the area of the burner impingement. All screens shall be far enough away (typically 30 cm or more) from the burner tubes so as not to interfere or interact with flame spread during the burner exposure. The screen for the side burner will require a separate support from below. All screens shall be removed at

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.

the end of the 70 second exposure interval.

(2) *Specimen*. Remove the test specimen from the conditioning room immediately before it is to be tested. Testing shall begin within 20 minutes after removal from the conditioning area. Be sure the test frame is approximately centered on the catch surface. Carefully center the foundation on top of the test frame to eliminate any gaps between the bottom periphery of the foundation and the inside edges of the test frame. If the mattress is to be tested alone, place it similarly. A mattress tested with its foundation should be centered longitudinally and laterally on the foundation. Carefully center them on the bed frame and on each other. The mattress shall be centered on top of the foundation (see Figure 1 of this part). However, in order to keep the heat flux exposure the same for the sides of the two components, if the mattress is 1 cm to 2 cm narrower than the foundation, the mattress shall be shifted so that the side to be exposed is in the same plane as the foundation. Refer to Figure 8 of this part. A product having an intended sleep surface on only one side shall be tested with the sleeping side up so that the sleeping surface is exposed to the propane burner.

(e) *Burner flow rate/flow timer confirmation*. Just prior to moving the burner adjacent to the test specimen, briefly ignite each burner at the same time, and check that the propane flow to that burner is set at the appropriate level on its flowmeter to provide the flows listed in §1633.7(a)(6)(x). Check that the timers for the burner exposures are set to 70 seconds for the top burner and 50 seconds for the side burner. For a new burner assembly, check the accuracy of the gas flow timers against a stop watch at these standard time settings. Set pilot flows to a level that will not cause them to impinge on sample surfaces.

(f) *Location of the gas burners*. The general layout for the room configuration is shown in Figure 2 of this part. Place the burner heads so that they are within 300 mm (1 ft) of the mid-length of the mattress. If there are unique construction features (e.g., handles, zippers) within the burner placement

zone, the burner shall impinge on this feature. For a quilted mattress top the stand-off foot pad must alight on a high, flat area between dimples or quilting thread runs. The same is to be true for the side burner if that surface is quilted. If a specimen design presents a conflict in placement such that both burners cannot be placed between local depressions in the surface, the top burner shall be placed at the highest flat surface.

(g) *Burner set-up*. The burners shall be placed in relation to the mattress and foundation surfaces in the manner shown in Figure 9 of this part, i.e., at the nominal spacings shown there and with the burner tubes nominally parallel⁴ to the mattress surfaces on which they impinge. Since the heat flux levels seen by the test specimen surfaces depend on burner spacing, as well as gas flow rate, care must be taken with the set-up process.

(h) *Burner alignment procedure*—(1) *Preparation*. Complete the following before starting the alignment procedure:

(i) Check that the pivot point for the mattress top burner feed tube and the two metal plates around it are clean and well-lubricated so as to allow smooth, free movement.

(ii) Set the two burners such that the 5° out-of-plane angling of the flame jets makes the jets on the two burners point slightly toward each other.

(iii) Check the burner stand-off feet for straightness and perpendicularity between foot pad and support rod and to see that they are clean of residue from a previous test.

(iv) Have at hand the following items to assist in burner set-up: The jig, shown in Figure 10 of this part, for setting the stand-off feet at their proper distances from the front of the burner tube; a 3 mm thick piece of flat stock (any material) to assist in checking the parallelness of the burners to the mattress surfaces; and a 24 gage stainless steel sheet metal platen that is 30 mm (12 in) wide, 610 mm (24 in) long and has

⁴The top burner will tend to be tangential to the mattress surface at the burner mid-length; this orientation will not necessarily be parallel to the overall average mattress surface orientation nor will it necessarily be horizontal. This is a result of the shape of the mattress top surface.

a sharp, precise 90° bend 355 mm (14 in) from one 30 mm wide end or another dimension that meets the requirements for a specific sample.

(2) *Alignment.* (i) Place the burner assembly adjacent to the test specimen. Place the sheet metal platen on the mattress with the shorter side on top. The location shall be within 30 cm (1 ft) of the longitudinal center of the mattress. The intended location of the stand-off foot of the top burner shall not be in a dimple or crease caused by the quilting of the mattress top. Press the platen laterally inward from the edge of the mattress so that its side makes contact with either the top and bottom edge or the vertical side of the mattress.⁵ Use a sufficient length of duct tape (platen to mattress top) to assure that the platen stays firmly against the surfaces of the mattress.

(ii) With both burner arms horizontal (pinned in this position), fully retract the stand-off feet of both burners and, if necessary, the pilot tubes as well.⁶ (Neither is to protrude past the front face of the burner tubes at this point.) Move the burner assembly forward (perpendicular to the mattress) until the vertical burner lightly contacts the sheet metal platen. Adjust the height of the vertical burner on its vertical support column so as to center the tube on the crevice between the mattress and the foundation. (This holds also for pillow top mattress tops, i.e.,

⁵ Mattresses having a convex side are treated separately since the platen cannot be placed in the above manner. Use the platen only to set the top burner parallelness. Set the in/out distance of the top burner to the specification in paragraph (h)(1)(iii). Set the side burner so that it is approximately (visually) parallel to the flat side surface of the foundation below the mattress/foundation crevice once its foot is in contact with the materials in the crevice area. The burner will not be vertical in this case. If the foundation side is also non-flat, set the side burner vertical (± 3 mm, as above) using a bubble level as a reference. The side surface convexities will then bring the bowed out sections of the specimen closer to the burner tube than the stand-off foot.

⁶ The pilot tubes can normally be left with their ends just behind the plane of the front of the burner tube. This way they will not interfere with positioning of the tube but their flame will readily ignite the burner tubes.

ignore the crevice between the pillow top and the main body of the mattress.)⁷ Adjust the height of the horizontal burner until it sits lightly on top of the sheet metal platen. Its burner arm should then be horizontal.

(iii) Move the horizontal burner in/out (loosen the thumb screw near the pivot point) until the outer end of the burner tube is 13 mm to 19 mm ($\frac{1}{2}$ in to $\frac{3}{4}$ in) from the corner bend in the platen (this is facilitated by putting a pair of lines on the top of the platen 13 mm and 19 mm from the bend and parallel to it). Tighten the thumb screw.

(iv) Make the horizontal burner parallel to the top of the platen (within 3 mm ($\frac{1}{8}$ inch) over the burner tube length); when properly parallel, it should not be possible to insert the 3 mm flat stock under either burner end by bending the copper tube section appropriately. Note: After the platen is removed (in paragraph (h)(2)(vii) of this section), the burner tube may not be horizontal; this is normal. For mattress/foundation combinations having nominally flat, vertical sides, the similar adjustment for the vertical burner is intended to make that burner parallel to the sides and vertical. Variations in the shape of mattresses and foundations can cause the platen section on the side to be non-flat and/or non-vertical. If the platen is flat and vertical, make the vertical burner parallel to the side of the platen (± 3 mm) by bending its copper tube section as needed. If not, make the side burner parallel to the mattress/foundation sides by the best visual estimate after the platen has been removed.

(v) Move the burner assembly perpendicularly back away from the mattress about 30 cm (1 ft). Set the two stand-off feet to their respective distances using the jig designed for this purpose. Install the jig *fully* onto the burner tube (on the *same side* of the tube as the stand-off foot), with its side edges parallel to the burner feed arm,

⁷ For tests of the mattress alone, set the center of the side burner at the lower edge of the mattress OR the top (upper tip) of the side burner 25 mm (1 in) below the top edge of the mattress, whichever is lower. This prevents inappropriate (excessive) exposure of the top surface of the mattress to the side burner.

at about the position where one end of the foot will be. Loosen the set screw and slide the foot out to the point where it is flush with the bottom end of the jig. Tighten the set screw. Make sure the long axis of the foot is parallel to the burner tube. It is essential to use the correct side of the spacer jig with each burner. Double check this. The jig must be clearly marked.

(vi) Set the downward force of the horizontal burner. Remove the retainer pin near the pivot. While holding the burner feed arm horizontal using a spring scale⁸ hooked onto the thumbscrew holding the stand-off foot, move the small and/or large weights on the feed tube appropriately so that the spring scale reads 170 g to 225 g (6 oz to 8 oz).

(vii) Remove the sheet metal platen (and tape holding it).

(viii) Hold the horizontal burner up while sliding the burner assembly forward until the vertical burner stand-off foot just touches the mattress and/or the foundation, then release the horizontal burner. The outer end of the burner tube should extend at least 6 mm to 12 mm ($\frac{1}{4}$ in to $\frac{1}{2}$ in) out beyond the uppermost corner/edge of the mattress so that the burner flames will hit the edge. (For a pillow top mattress, this means the outer edge of the pillow top portion and the distance may then be greater than 6 mm to 12 mm.) If this is not the case, move the burner assembly (perpendicular to the mattress side)—not the horizontal burner alone—until it is.⁹ Finally, move the

vertical burner tube until its stand-off foot just touches the side of the mattress and/or the foundation. (Use the set screw near the vertical burner pivot.)

(ix) Make sure all thumbscrews are adequately tightened. Care must be taken, once this set-up is achieved, to avoid bumping the burner assembly or disturbing the flexible lines that bring propane to it.

(x) If there is *any* indication of flow disturbances in the test facility which cause the burner flames or pilot flames to move around, place screens around the burners so as to minimize these disturbances.¹⁰ These screens (and any holders) must be far enough away from the burners (about 30 cm or more for the top, less for the side) so that they do not interact with the flames growing on the specimen surfaces. For the top surface burner, at least a triple layer of window screen approximately 30 cm high sitting vertically on the mattress top (Figure 9 of this part) has proved satisfactory. For the side burner at least a triple layer of screen approximately 15 cm wide, formed into a square-bottom U-shape and held from below the burner has proved satisfactory. Individual laboratories will have to experiment with the best arrangement for suppressing flow disturbances in their facility.

(i) *Running the test.* (1) Charge the hose line to be used for fire suppression with water.

(2) *Burner Preparation.* (i) Turn AC power on; set propane pressure to 20 psig at bottle; set timers to 70 s (top burner) and 50 s (side burner); with burner assembly well-removed from test specimen, ignite burners and check that, WHEN BOTH ARE ON AT THE SAME TIME, the flowmeters are set to the values that give the requisite propane gas flow rates to each burner. Turn off burners. Set pilot tubes just behind front surface of burners; set pilot flow valves for approximately 2 cm flames. Turn off pilots.

spacing. Compress the mattress/foundation surface 1 mm to 2 mm when using the jig for this purpose.

¹⁰The goal here is to keep the burner flames impinging on a fixed area of the specimen surface rather than wandering back and forth over a larger area.

⁸An acceptable spring scale has a calibrated spring mounted within a holder and hooks on each end.

⁹The foot should depress the surface it first contacts by no more than 1 mm to 2 mm. This is best seen up close, not from the rear of the burner assembly. However, if a protruding edge is the first item contacted, compress it until the foot is in the plane of the mattress/foundation vertical sides. The intent here is that the burner be spaced a fixed distance from the vertical mattress/foundation sides, not from an incidental protrusion. Similarly, if there is a wide crevice in this area which would allow the foot to move inward and thereby place the burners too close to the vertical mattress/foundation sides, it will be necessary to use the spacer jig (rather than the stand-off foot) above or below this crevice to set the proper burner

(ii) Position burner on test specimen and remove sheet metal platen.

(iii) Place screens around both burners.

(3) *Start pilots.* 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 (Note that 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.)

(4) *Start recording systems.* With the calorimetry system fully operational, after instrument zeroes and spans, start the video lights and video camera and data logging systems two minutes before burner ignition (or, if not using video, take a picture of the setup).

(5) *Initiate test.* Start test exposure by simultaneously turning on power to both timers (timers will turn off burners at appropriate times). Also start a 30 minute timer of the test duration. 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.) If not using video, one photo must be taken within the first 45 seconds of starting the burners.

(6) *End of burner exposure.* When the burners go out (after 70 seconds for the longer exposure), carefully lift the top burner tube away from the specimen surface, producing as little disturbance as possible to the specimen. Turn off power to both timers. Remove all screens. Turn off pilots at their ball valves. Remove the burner assembly from the specimen area to facilitate the video camera view of the full side of the specimen. In the case of the room-based configurations, remove the burner assembly from the room to protect it.

(j) *Video Recording/Photographs.* Place a video or still frame camera so as to have (when the lens is zoomed out) just slightly more than a full-length view of the side of the test specimen being ignited, including a view of the flame impingement area while the burner assembly is present. The view must also include the catch pan so that it is clear

whether any melt pool fire in this pan participates significantly in the growth of fire on the test specimen. The camera shall include a measure of elapsed time to the nearest 1 second for video and 1 minute for still frame within its recorded field of view (preferably built into the camera). For the room-based configuration, the required full-length view of the sample may require an appropriately placed window, sealed with heat resistant glass, in one of the room walls. Place the camera at a height just sufficient to give a view of the top of the specimen while remaining under any smoke layer that may develop in the room. The specimen shall be brightly lit so that the image does not lose detail to over-exposed flames. This will require a pair or more of 1 kW photo flood lights illuminating the viewed side of the specimen. The lights may need to shine into the room from the outside via sealed windows.

(k) *Cessation of Test.* (1) The heat release rate shall be recorded and video/photographs taken until either 30 minutes has elapsed since the start of the burner exposure or a fire develops of such size as to require suppression for the safety of the facility.

(2) Note the time and nature of any unusual behavior that is not fully within the view of the video camera. This is most easily done by narration to a camcorder.

(3) Run the heat release rate system and datalogger until the fire has been fully out for several minutes to allow the system zero to be recorded.

(1) *Use of alternate apparatus.* Mattress sets may be tested using test apparatus that differs from that described in this section if the manufacturer obtains and provides to the Commission data demonstrating that tests using the alternate apparatus during the procedures specified in this section yield failing results as often as, or more often than, tests using the apparatus specified in the standard. The manufacturer shall provide the supporting data to the Office of Compliance, Recalls & Compliance Division,

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U.S. Consumer Product Safety Commission, 4330 East West Highway, Bethesda, Maryland 20814. Staff will review the data and determine whether the alternate apparatus may be used.

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§ 1633.8 Findings.

(a) *General.* In order to issue a flammability standard under the FFA, the FFA requires the Commission to make certain findings and to include these in the regulation, 15 U.S.C. 1193(j)(2). These findings are discussed in this section.

(b) *Voluntary standards.* No findings concerning compliance with and adequacy of a voluntary standard are necessary because no relevant voluntary standard addressing the risk of injury that is addressed by this regulation has been adopted and implemented.

(c) *Relationship of benefits to costs.* The Commission estimates the potential total lifetime benefits of a mattress that complies with this standard to range from \$45 to \$57 per mattress set (based on a 10 year mattress life and a 3% discount rate). The Commission estimates total resource costs of the standard to range from \$8 to \$22 per mattress. This yields net benefits of \$23 to \$50 per mattress set. The Commission estimates that aggregate lifetime benefits associated with all mattresses produced the first year the standard becomes effective range from \$1,024 to \$1,307 million, and that aggregate resource costs associated with these mattresses range from \$175 to \$511 million, yielding net benefits of about \$514 to \$1,132 million. Accordingly, the Commission finds that the benefits from the regulation bear a reasonable relationship to its costs.

(d) *Least burdensome requirement.* The Commission considered the following alternatives: alternative maximum peak heat release rate and test duration, alternative total heat released in the first 10 minutes of the test, mandatory production testing, a longer effective date, taking no action, relying on a voluntary standard, and requiring labeling alone (without any performance requirements). The alternatives of taking no action, relying on a voluntary standard (if one existed), and requiring

labeling alone are unlikely to adequately reduce the risk. Requiring a criterion of 25 MJ total heat release during the first 10 minutes of the test instead of 15 MJ would likely reduce the estimated benefits (deaths and injuries reduced) without having much effect on costs. Both options of increasing the duration of the test from 30 minutes to 60 minutes and decreasing the peak rate of heat release from 200 kW to 150 kW would likely increase costs significantly without substantial increase in benefits. Requiring production testing would also likely increase costs. Therefore, the Commission finds that an open flame standard for mattresses with the testing requirements and criteria that are specified in the Commission rule is the least burdensome requirement that would prevent or adequately reduce the risk of injury for which the regulation is being promulgated.

§ 1633.9 Glossary of terms.

(a) *Absorbent pad.* Pad used on top of mattress. Designed to absorb moisture/body fluids thereby reducing skin irritation, can be one time use.

(b) *Basket pad.* Cushion for use in an infant basket.

(c) *Bunk beds.* A tier of beds, usually two or three, in a high frame complete with mattresses (see Figure 11 of this part).

(d) *Car bed.* Portable bed used to carry a baby in an automobile.

(e) *Carriage pad.* Cushion to go into a baby carriage.

(f) *Chaise lounge.* An upholstered couch chair or a couch with a chair back. It has a permanent back rest, no arms, and sleeps one (see Figure 11).

(g) *Convertible sofa.* An upholstered sofa that converts into an adult sized bed. Mattress unfolds out and up from under the seat cushioning (see Figure 11).

(h) *Corner groups.* Two twin size bedding sets on frames, usually slipcovered, and abutted to a corner table. They also usually have loose bolsters slipcovered (see Figure 11).

(i) *Crib bumper.* Padded cushion which goes around three or four sides inside a crib to protect the baby. Can also be used in a playpen.

(j) *Daybed*. Daybed has foundation, usually supported by coil or flat springs, mounted between arms on which mattress is placed. It has permanent arms, no backrest, and sleeps one (see Figure 11).

(k) *Dressing table pad*. Pad to cushion a baby on top of a dressing table.

(l) *Drop-arm loveseat*. When side arms are in vertical position, this piece is a loveseat. The adjustable arms can be lowered to one of four positions for a chaise lounge effect or a single sleeper. The vertical back support always remains upright and stationary (see Figure 11).

(m) *Futon*. A flexible mattress generally used on the floor that can be folded or rolled up for storage. It usually consists of resilient material covered by ticking.

(n) *High riser*. This is a frame of sofa seating height with two equal size mattresses without a backrest. The frame slides out with the lower mattress and rises to form a double or two single beds (see Figure 11).

(o) *Infant carrier and lounge pad*. Pad to cushion a baby in an infant carrier.

(p) *Mattress foundation*. This is a ticking covered structure used to support a mattress or sleep surface. The structure may include constructed frames, foam, box springs or other materials used alone or in combination.

(q) *Murphy bed*. A style of sleep system where the mattress and foundation are fastened to the wall and provide a means to retract or rotate the bed assembly into the wall to release more floor area for other uses.

(r) *Pillow*. Cloth bag filled with resilient material such as feathers, down, sponge rubber, urethane, or fiber used as the support for the head of a person.

(s) *Playpen pad*. Cushion used on the bottom of a playpen.

(t) *Portable crib*. Smaller size than a conventional crib. Can usually be converted into a playpen.

(u) *Quilted* means stitched with thread or by fusion through the ticking and one or more layers of material.

(v) *Roll-away-bed*. Portable bed which has frame that folds with the mattress for compact storage.

(w) *Sleep lounge*. Upholstered seating section which is mounted on a frame. May have bolster pillows along the

wall as backrests or may have attached headrests (see Figure 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. 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 Figure 11 of this part).

(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 Figure 11).

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

(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 Figure 11 of this part).

(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 Figure 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 Figure 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 Regulations**§ 1633.10 Definitions.**

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

(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 C general.* Every manufacturer and any other person initially introducing into commerce mattress sets subject to the standard, irrespective of whether guarantees are issued relative thereto, shall maintain the following records in English at a location in the United States:

(1) Test results and details of each test performed by or for that manufacturer (including failures), whether for qualification, confirmation, or production, in accordance with §1633.7. Details shall include: name and complete physical address of test facility, type of test room, test room conditions, time that sample spent out of conditioning area before starting test, 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 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 set, in accordance with §1633.7 (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 5 minutes and ending at 30 minutes), with the prototype identification number or production lot identification number of the mattress 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 shall be maintained for each qualified, confirmed and subordinate prototype:

(1) Unique identification number for the qualified or confirmed prototype and a list of the unique identification numbers of each subordinate prototype based on the qualified or confirmed prototype. Subordinate prototypes that differ from each other only by length or width may share the same identification number.

(2) A detailed description of all materials, components, and methods of assembly for each qualified, confirmed and subordinate prototype. Such description shall include the specifications of all materials and components, and the name and complete physical address of each material and component supplier.

(3) A list of which models and production lots of mattress sets are represented by each qualified, confirmed and/or subordinate prototype identification number.

(4) For subordinate prototypes, the prototype identification number of the qualified or confirmed prototype on which the mattress set is based, and, at a minimum, the manufacturing specifications and a description of the materials substituted, 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 assembly will not cause the subordinate 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.* In addition to the test and prototype records specified in paragraphs (a) and (b) of this section, the following records shall be maintained:

(1) The prototype identification number assigned by the qualified prototype manufacturer;

(2) Name and complete physical address of the qualified prototype manufacturer;

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(3) Copy of qualified prototype test records, and records required by paragraph (b)(2) of this section; and

(4) In the case of imported mattress sets, the importer shall be responsible for maintaining the records specified in paragraph (b) of this section for confirmation testing that has been performed with respect to mattress sets produced by each foreign manufacturing facility whose mattress sets that importer is importing.

(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 qualified, confirmed or subordinate prototype associated with the specimen tested;

(3) For each qualified, confirmed and subordinate prototype, the number of mattress sets in each production lot based on that prototype;

(4) The start and end dates of production of that lot; and

(5) Component, material and assembly records. Every manufacturer conducting tests and/or technical evaluations of components and materials and/or methods of assembly 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 mattress sets 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.

(f) *Record location requirements.* (1) For mattress sets produced in the United States, all records required by this section must be maintained at the plant or factory at which the mattress sets are manufactured or assembled.

(2) For mattress sets produced outside of the United States, a copy of all

records required by this section must be maintained at a U.S. location, which must be identified on the mattress set label as specified in §1633.12(a).

§ 1633.12 Labeling.

(a) Each mattress set subject to the Standard shall bear a permanent, conspicuous, and legible label(s) containing the following information (and no other information) in English:

(1) Name of the manufacturer, or for imported mattress sets, the name of the foreign manufacturer and importer;

(2)(i) For mattress sets produced in the United States, the complete physical address of the manufacturer.

(ii) For imported mattress sets, the complete address of the foreign manufacturer, including country, and the complete physical address of the importer or the United States location where the required records are maintained if different from the importer;

(3) Month and year of manufacture;

(4) Model identification;

(5) Prototype identification number for the mattress set;

(6) A certification that the mattress complies with this standard.

(i) For mattresses intended to be sold without a foundation, a certification stating "This mattress meets the requirements of 16 CFR part 1633 (federal flammability (open flame) standard for mattresses) when used without a foundation"; or

(ii) For mattresses intended to be sold with a foundation, a certification stating "This mattress meets the requirements of 16 CFR part 1633 (federal flammability (open flame) standard for mattresses) when used with foundation <ID>." Such foundation(s) shall be clearly identified by a simple and distinct name and/or number on the mattress label; or

(iii) For mattresses intended to be sold both alone and with a foundation, a certification stating "This mattress meets the requirements of 16 CFR part 1633 (federal flammability (open flame) standard for mattresses) when used without a foundation or with foundation(s) <ID>." Such foundation(s) shall be clearly identified by a simple and distinct name and/or number on the mattress label; and

(7) A statement identifying whether the manufacturer intends the mattress to be sold alone or with a foundation.

(i) For mattresses intended to be sold without a foundation, the label shall state "THIS MATTRESS IS INTENDED TO BE USED WITHOUT A FOUNDATION." See Figures 16 and 17 of this part; or

(ii) For mattresses intended to be sold with a foundation, the label shall state "THIS MATTRESS IS INTENDED TO BE USED WITH FOUNDATION(S): <Foundation ID>." See Figures 12 and 13 of this part; or

(iii) For mattresses intended to be sold both alone and with a foundation, the label shall state "THIS MATTRESS IS INTENDED TO BE USED WITHOUT A FOUNDATION OR WITH FOUNDATION(S): <Foundation ID>." See Figures 14 and 15 of this part.

(b) The mattress label required in paragraph (a) of this section must measure 2¾" in width and the length can increase as needed for varying information. The label must be white with black text. The label text shall comply with the following format requirements:

(1) All information specified in paragraphs (a)(1) through (6) of this section must be in 6-point font or larger with mixed uppercase and lowercase letters. The text must be left justified and begin ¼" from left edge of label. See Figure 12-17 of this part.

(2) The statement specified in paragraph (a)(7)(i) of this section must be in 10-point Arial/Helvetica font or larger, uppercase letters with the words "WITHOUT A FOUNDATION" bolded and the word "WITHOUT" in italics. The text shall be centered in a text box with the width measuring 2½" and the length increasing as needed. See Figures 16 and 17 of this part.

(3) The statement specified in paragraph (a)(7)(ii) of this section must be in 10-point Arial/Helvetica font or larger in uppercase letters. The foundation identifier should be in 12-point font or larger, bolded, and underlined. The text shall be centered in a text box with the width measuring 2½" and the length increasing as needed. See Figures 12 and 13 of this part.

(4) The statement specified in paragraph (a)(7)(iii) of this section must be

in 10-point or larger Arial/Helvetica font, uppercase letters with the words "WITHOUT A FOUNDATION OR" bolded and the word "WITHOUT" in italics. The foundation identifier should be in 12-point font or larger, bolded, and underlined. The text shall be centered in a text box with the width measuring 2½" and the length increasing as needed. See Figures 14 and 15 of this part.

(c) The foundation label required in paragraph (a) of this section must measure 2¾" in width and the length can increase as needed for varying information. The label must be white with black text. The label shall contain the following:

(1) The information specified in paragraphs (a)(1) through (5) of this section; and

(2) The words "Foundation ID:" followed by a distinct name and/or number that corresponds to the name and/or number used on the mattress. This text must be in 10-point or larger bold Arial/Helvetica font, and the foundation identifier must be underlined. See Figures 12 through 15 of this part.

(d) The statements specified in paragraphs (a)(6)(i) through (iii) and (a)(7)(i) through (iii) of this section may be translated into any other language and printed on the reverse (blank) side of the label.

(e) 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.

[71 FR 13498, Mar. 15, 2006, as amended at 73 FR 6843, Feb. 6, 2008]

§ 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 mattress 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

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or handle any mattress set which is not in compliance with the provisions under Subpart B.

(c) *“One of a kind” exemption for physician prescribed mattresses.* (1)(i) A mattress 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 set bears a permanent, conspicuous and legible label which states:

WARNING: This mattress 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 Mattress Sets (16 CFR part 1633).

(ii) Such labeling must be attached to the mattress set so as to remain on or affixed thereto for the useful life of the mattress set. The label must be at

least 40 square inches (250 sq. cm) with no 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 set in commerce from the manufacturer to the final point of sale to a consumer.

(2) The manufacturer of a mattress set exempted from testing under this paragraph (c) shall, in lieu of the records required to be kept by §1633.10, retain a copy of the written prescription or other comparable written medical therapeutic specification for such mattress set 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.

FIGURE 1 TO PART 1633—TEST ASSEMBLY, SHOWN IN FURNITURE CALORIMETER (CONFIGURATION A)

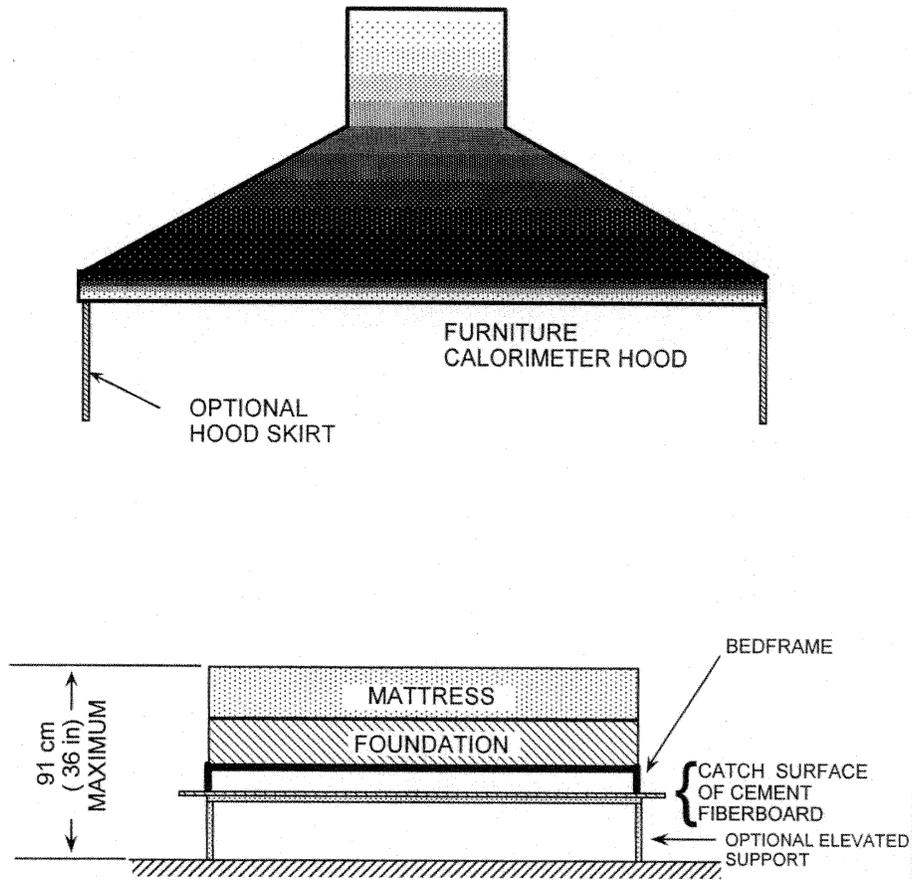


FIGURE 1. TEST ASSEMBLY, SHOWN IN FURNITURE CALORIMETER. (CONFIGURATION A.)

FIGURE 2 TO PART 1633—TEST ARRANGEMENT IN 3.05M × 3.66M (10 FT × 12 FT) ROOM (CONFIGURATION B)

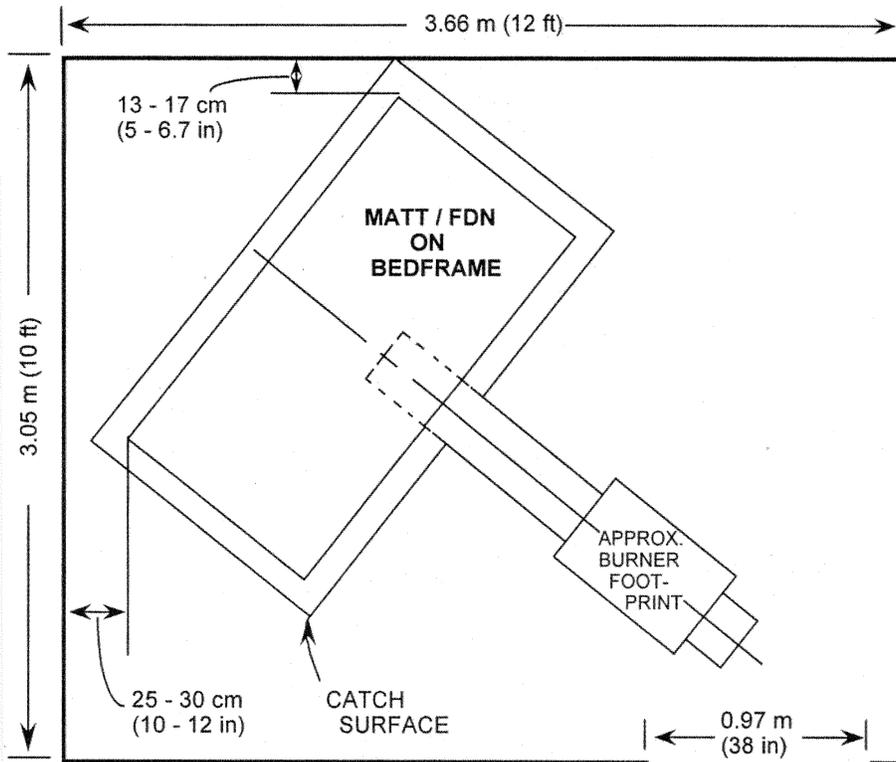


FIGURE 2. TEST ARRANGEMENT IN 3.05m X 3.66 m (10 ft x 12 ft) ROOM; CONFIGURATION B.

FIGURE 3 TO PART 1633—DETAILS OF HORIZONTAL BURNER HEAD

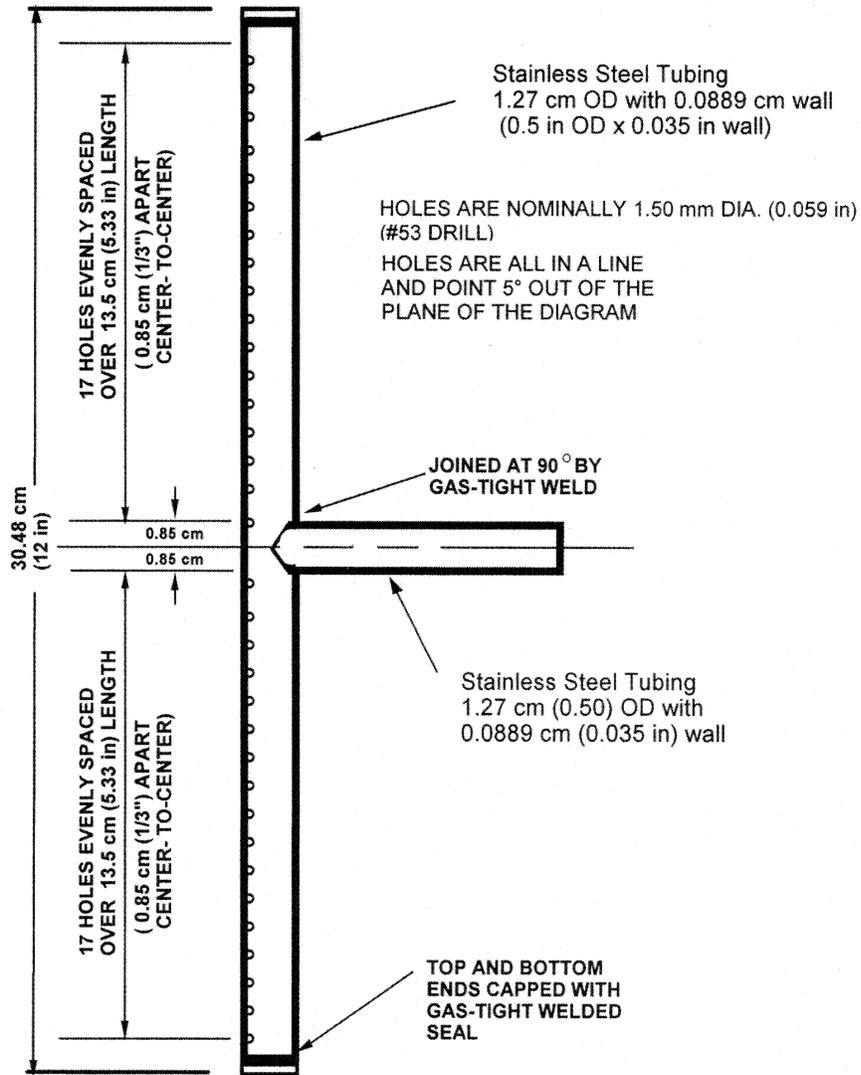


FIGURE 3. DETAILS OF HORIZONTAL BURNER HEAD.

FIGURE 4 TO PART 1633—DETAILS OF VERTICAL BURNER HEAD

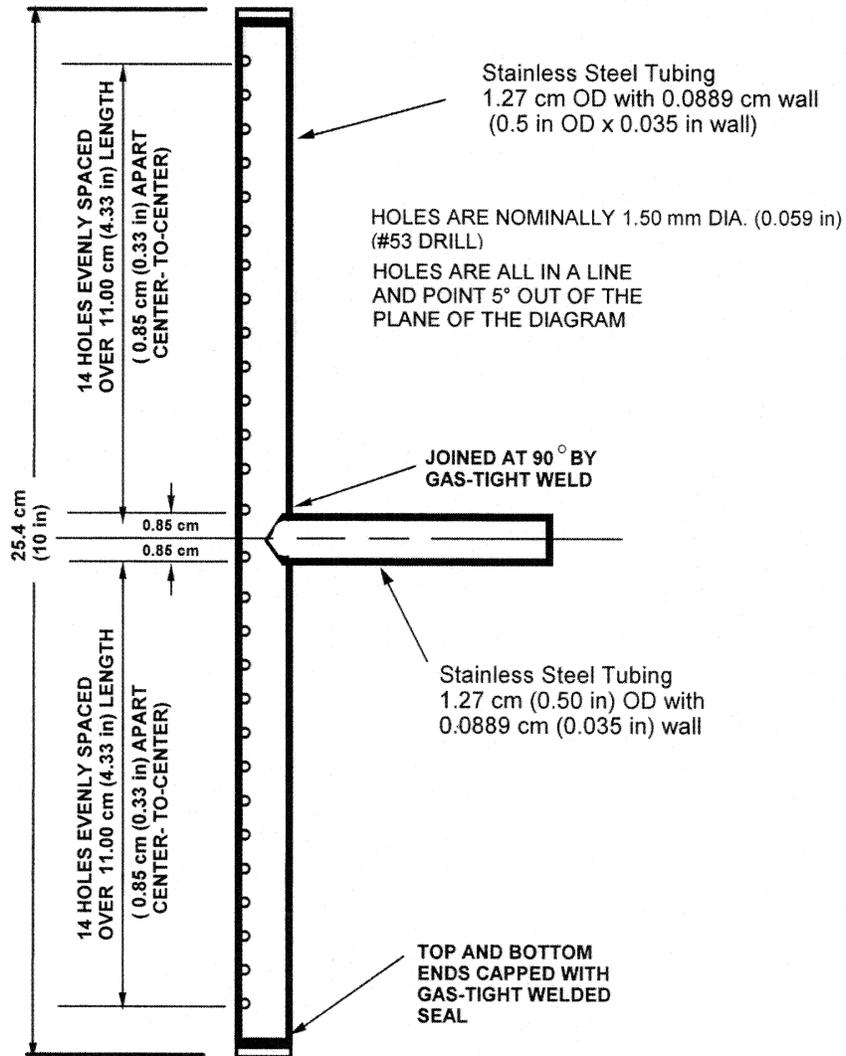


FIGURE 4. DETAILS OF VERTICAL BURNER HEAD.

FIGURE 5 TO PART 1633—DETAILS OF BURNER STAND-OFF

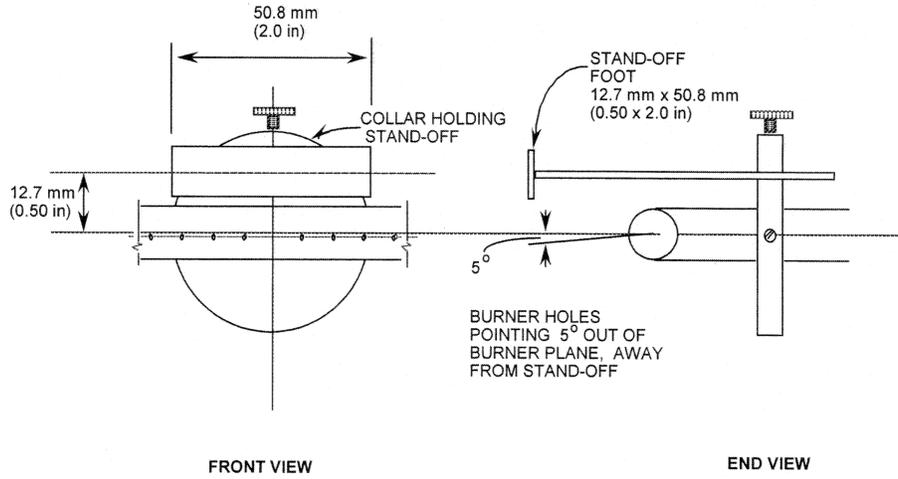


FIGURE 5. DETAILS OF BURNER STAND-OFF

FIGURE 6 TO PART 1633—BURNER ASSEMBLY SHOWING ARMS AND PIVOTS (SHOULDER SCREWS), IN RELATION TO, PORTABLE FRAME ALLOWING BURNER HEIGHT ADJUSTMENT

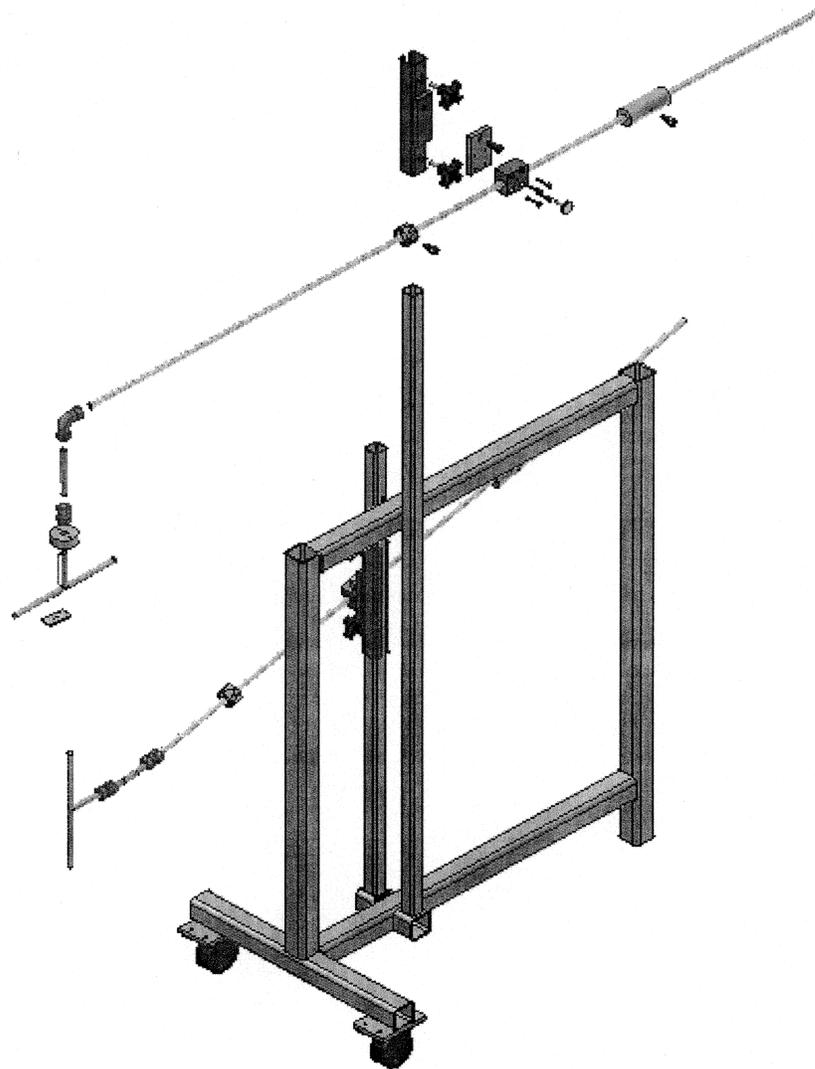


FIGURE 6. BURNER ASSEMBLY* SHOWING ARMS AND PIVOTS (Shoulder Screws), IN RELATION TO, PORTABLE FRAME ALLOWING BURNER HEIGHT ADJUSTMENT.

*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 TO PART 1633—ELEMENTS OF PROPANE FLOW CONTROL FOR EACH BURNER

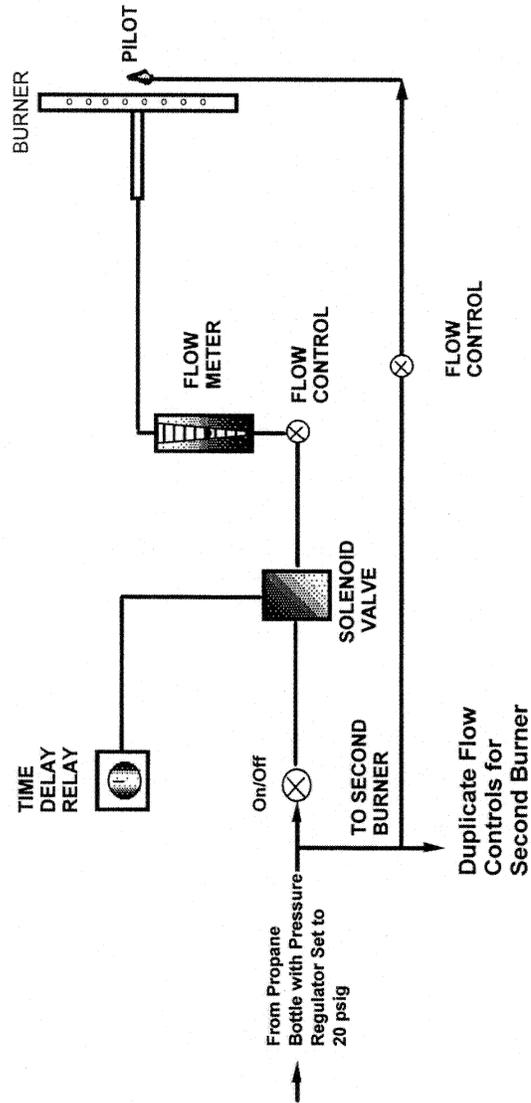


FIGURE 7. ELEMENTS OF PROPANE FLOW CONTROL FOR EACH BURNER

Pt. 1633, Fig. 8

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FIGURE 8 TO PART 1633—JIG FOR SETTING MATTRESSES AND FOUNDATION SIDES IN SAME PLANE

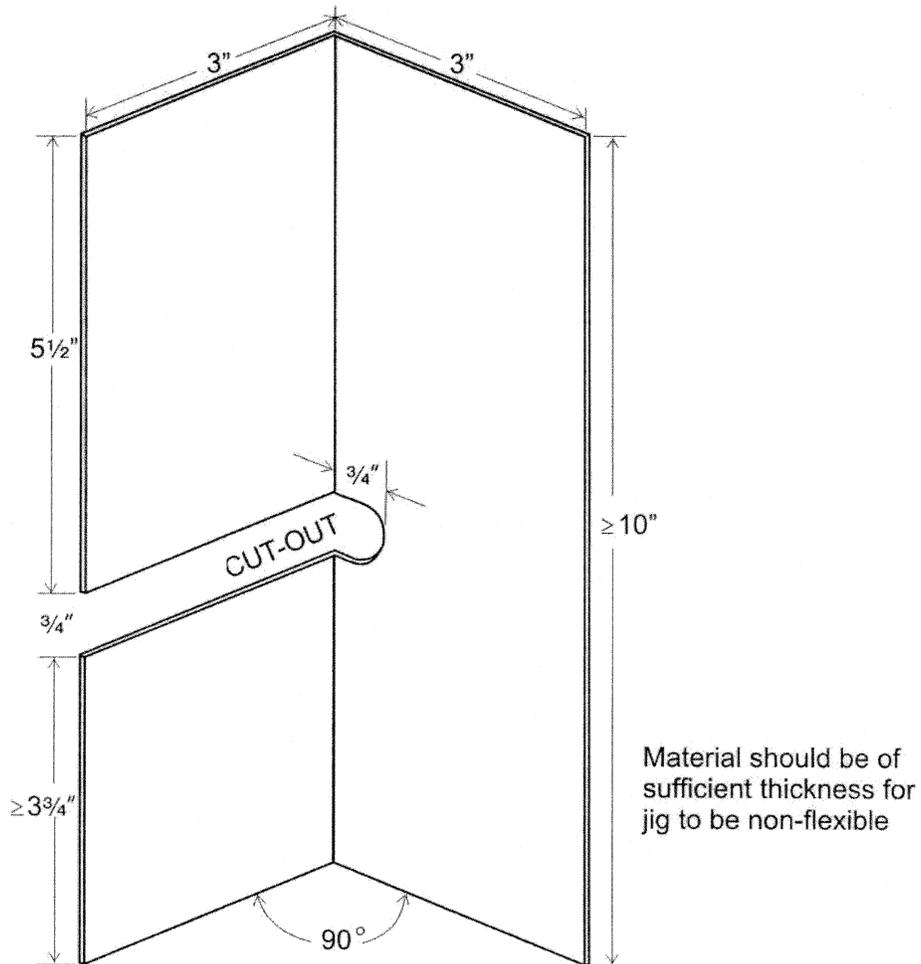


FIGURE 8 JIG FOR SETTING MATTRESS AND FOUNDATION SIDES IN SAME PLANE

FIGURE 9 TO PART 1633—BURNER PLACEMENTS ON MATTRESS/FOUNDATION

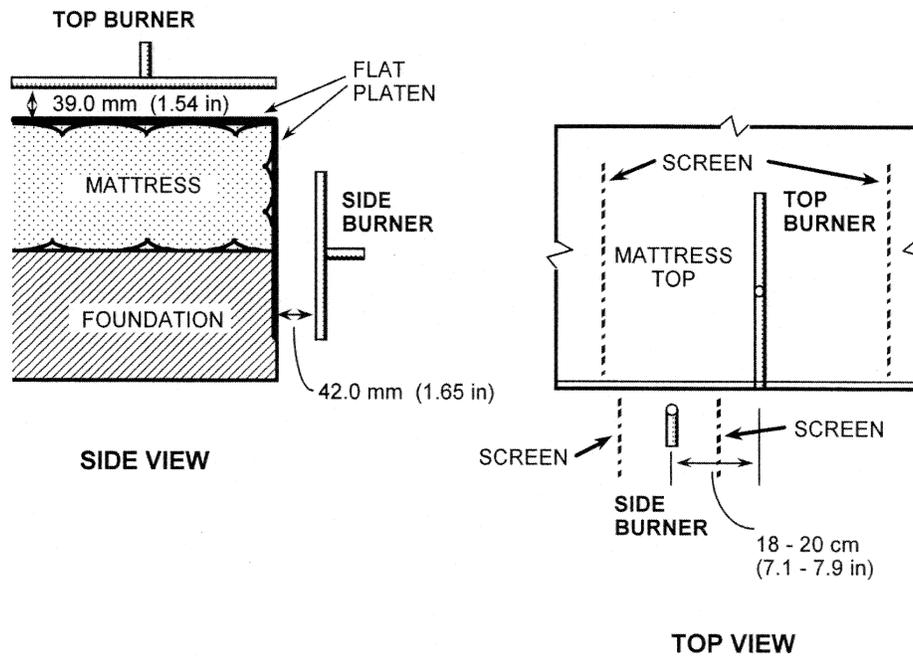


FIGURE 9. BURNER PLACEMENTS ON MATTRESS / FOUNDATION

FIGURE 10 TO PART 1633—JIG FOR SETTING BURNERS AT PROPER DISTANCES FROM MATTRESS/FOUNDATION

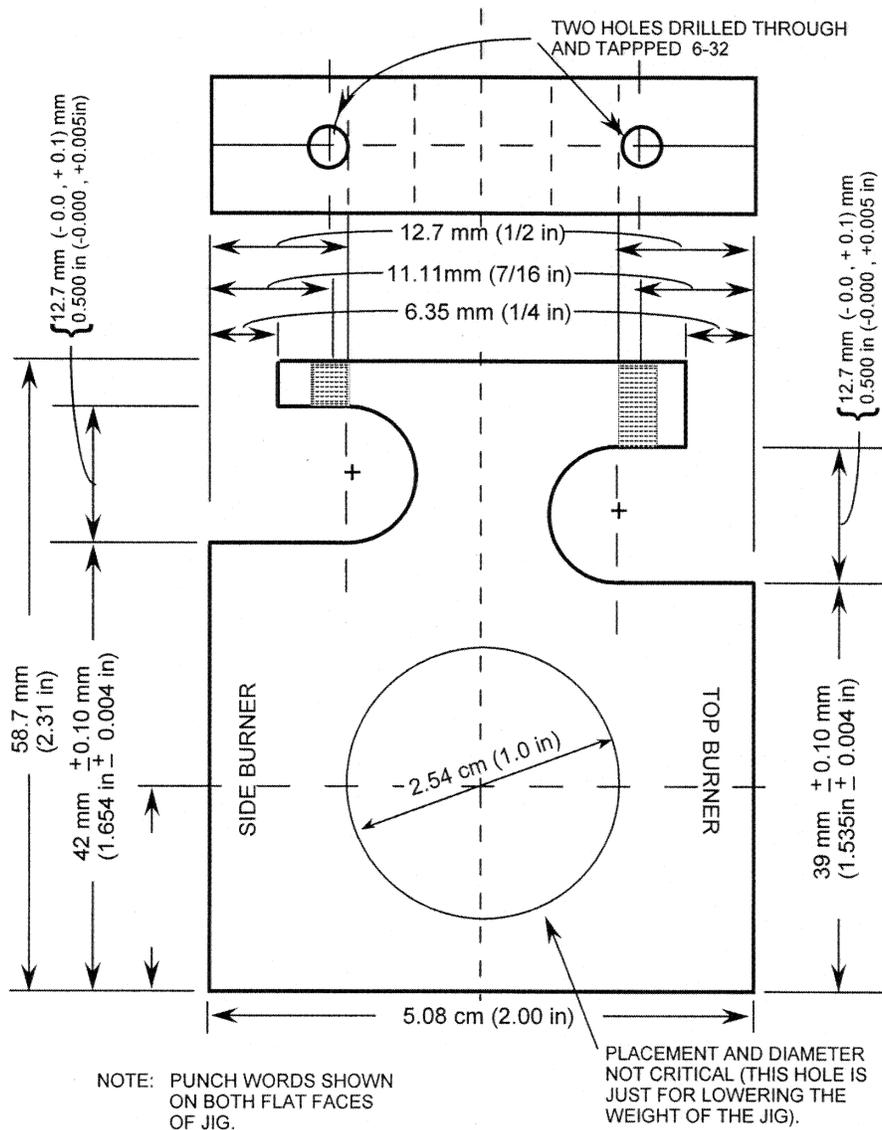


FIGURE 10. JIG FOR SETTING BURNERS AT PROPER DISTANCES FROM MATTRESS / FOUNDATION

FIGURE 11 TO PART 1633—DIAGRAMS FOR GLOSSARY OF TERMS

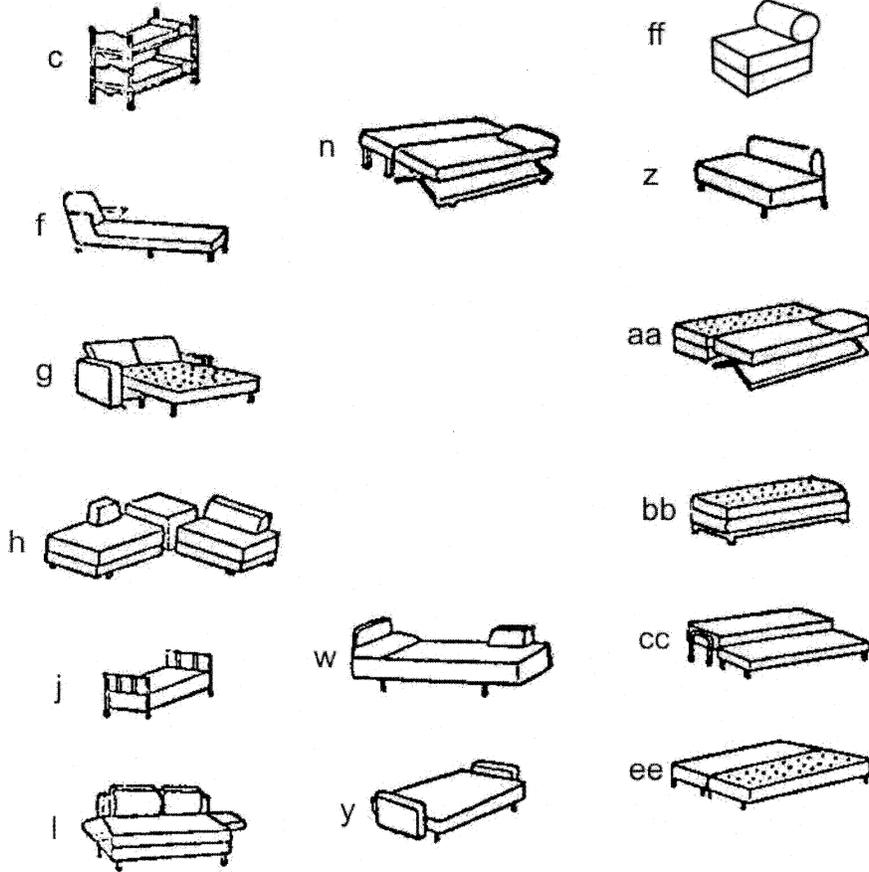


FIGURE 11. DIAGRAMS FOR GLOSSARY OF TERMS

FIGURE 12 TO PART 1633—LABELS FOR DOMESTIC MATTRESS WITH FOUNDATION

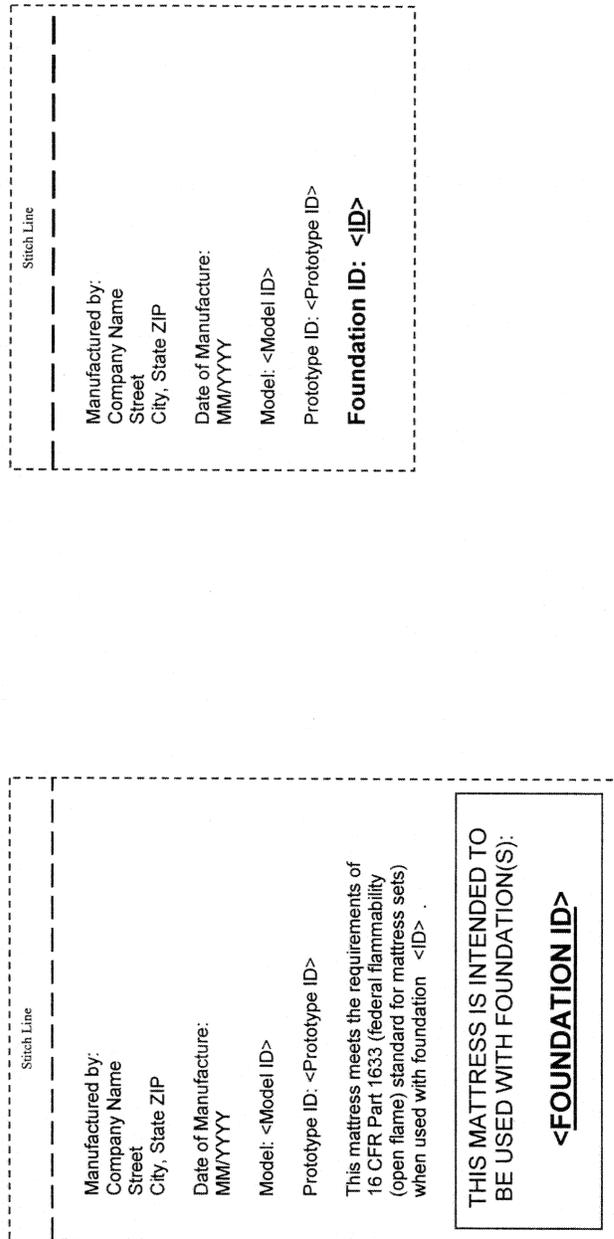


Figure 12. Labels for Domestic Mattress w/
Foundation

FIGURE 13 TO PART 1633—LABELS FOR IMPORTED MATTRESS WITH FOUNDATION

Stitch Line

Manufactured by:
Foreign Company Name
Street
City, State
Country

Date of Manufacture:
MM/YYYY

Importer/U.S. Records Location:
Importer Name
Street
City, State ZIP
Model: <Model ID>

Prototype ID: <Prototype ID>

Foundation ID: <ID>

Stitch Line

Manufactured by:
Foreign Company Name
Street
City, State
Country

Date of Manufacture:
MM/YYYY

Importer/U.S. Records Location:
Importer Name
Street
City, State ZIP

Model: <Model ID>

Prototype ID: <Prototype ID>

This mattress meets the requirements of 16 CFR Part 1633 (federal flammability (open flame) standard for mattress sets) when used with foundation <ID>.

<FOUNDATION ID>

THIS MATTRESS IS INTENDED TO BE USED WITH FOUNDATION(S):

Figure 13. Labels for Imported Mattress w/
Foundation

FIGURES 14 AND 15 TO PART 1633—LABEL FOR DOMESTIC MATTRESS ALONE AND WITH FOUNDATION AND LABEL FOR IMPORTED MATTRESS ALONE AND WITH FOUNDATION

Stitch Line

Manufactured by:
Foreign Company Name
Street
City, State
Country

Date of Manufacture:
MM/YYYY

Importer/U.S. Records Location:
Importer Name
Street
City, State ZIP

Model: <Model ID>

Prototype ID: <Prototype ID>
<Prototype ID>

This mattress meets the requirements of 16 CFR Part 1633 (federal flammability (open flame) standard for mattress sets) when used without a foundation or with foundations <ID>.

THIS MATTRESS
IS INTENDED TO BE USED
WITHOUT A FOUNDATION
OR
WITH FOUNDATION(S):
<FOUNDATION ID>

Figure 15. Label for Imported Mattress Alone and w/ Foundation

Stitch Line

Manufactured by:
Company Name
Street
City, State

Date of Manufacture:
MM/YYYY

Model: <Model ID>

Prototype ID: <Prototype ID>
<Prototype ID>

This mattress meets the requirements of 16 CFR Part 1633 (federal flammability (open flame) standard for mattress sets) when used without a foundation or with foundations <ID>.

THIS MATTRESS
IS INTENDED TO BE USED
WITHOUT A FOUNDATION
OR
WITH FOUNDATION(S):
<FOUNDATION ID>

Figure 14. Label for Domestic Mattress Alone and w/ Foundation

FIGURES 16 AND 17 TO PART 1633—LABEL FOR DOMESTIC MATTRESS ONLY AND LABEL FOR IMPORTED MATTRESS ONLY

Stitch Line

Manufactured by:
Foreign Company Name
Street
City, State
Country

Date of Manufacture:
MM/YYYY

Importer/U.S. Records Location:
Importer Name
Street
City, State ZIP

Model: <Model ID>

Prototype ID: <Prototype ID>

This mattress meets the requirements of 16 CFR Part 1633 (federal flammability (open flame) standard for mattress sets) when used without a foundation.

**THIS MATTRESS
IS INTENDED TO BE USED
WITHOUT A FOUNDATION**

**Figure 17. Label for Imported
Mattress Only**

Stitch Line

Manufactured by:
Company Name
Street
City, State

Date of Manufacture:
MM/YYYY

Model: <Model ID>

Prototype ID: <Prototype ID>

This mattress meets the requirements of 16 CFR Part 1633 (federal flammability (open flame) standard for mattress sets) when used without a foundation.

**THIS MATTRESS
IS INTENDED TO BE USED
WITHOUT A FOUNDATION**

**Figure 16. Label for Domestic
Mattress Only**