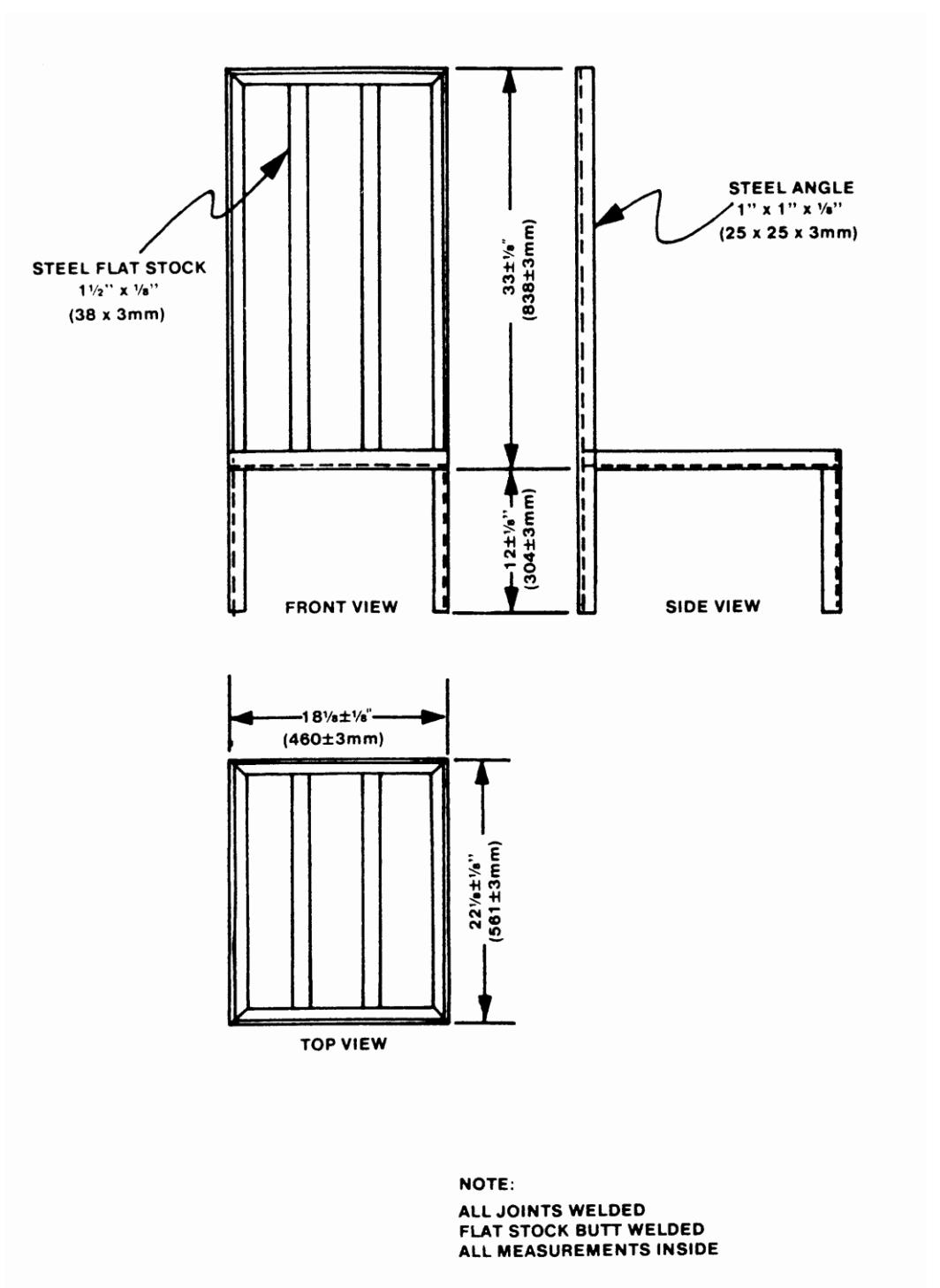


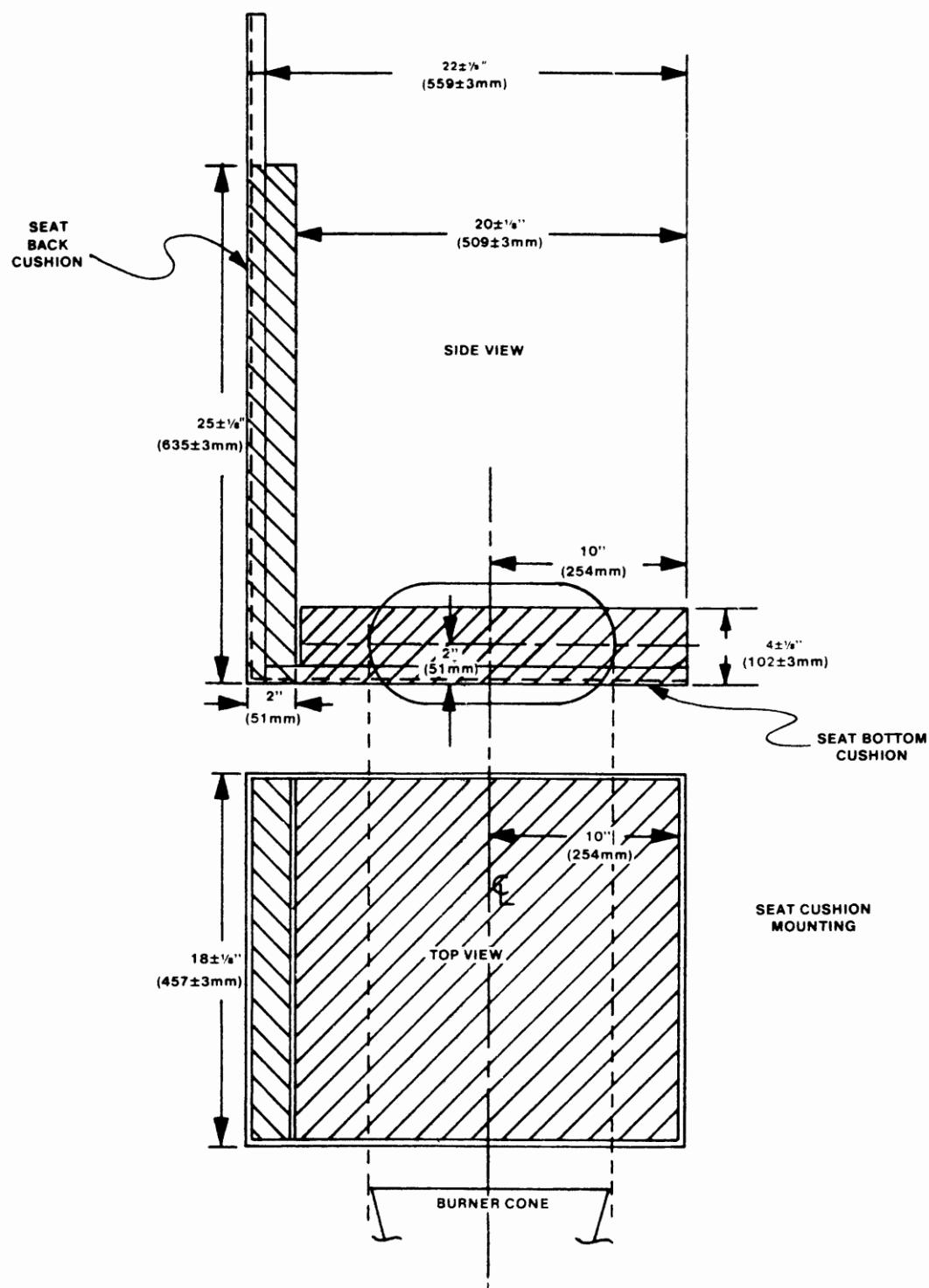
- (3) The seat back cushion specimen must be 457 ± 3 mm (18 ± 0.125 inches) wide by 635 ± 3 mm (25 ± 0.125 inches) high by 51 ± 3 mm (2 ± 0.125 inches) thick, exclusive of fabric closures and seam overlap.
- (4) The specimens must be conditioned at $21 \pm 2^\circ\text{C}$ ($70 \pm 5^\circ\text{F}$) $55\% \pm 10\%$ relative humidity for at least 24 hours before testing.
- (d) *Test Apparatus.* The arrangement of the test apparatus is shown in Figure 1 through 5 and must include the components described in this paragraph. Minor details of the apparatus may vary, depending on the model burner used.
- (1) *Specimen Mounting Stand.* The mounting stand for the test specimens consists of steel angles, as shown in Figure 1. The length of the mounting stand legs is 305 ± 3 mm (12 ± 0.125 inches). The mounting stand must be used for mounting the test specimen seat bottom and seat back, as shown in Figure 2. The mounting stand should also include a suitable drip pan lined with aluminium foil, dull side up.
- (2) *Test Burner.* The burner to be used in testing must –
- (i) Be a modified gun type;
 - (ii) Have an 80-degree spray angle nozzle nominally rated for 8.5 l/hr (2.25 US gallons/hour) at 690 KPa (100 psi);
 - (iii) Have a 31 cm (12-inch) burner cone installed at the end of the draft tube, with an opening 15 cm (6 inches) high and 28 cm (11 inches) wide, as shown in Figure 3; and
 - (iv) Have a burner fuel pressure regulator that is adjusted to deliver a nominal 7.6 l hr (2.0 US gallon/hour) of # 2 Grade kerosene or equivalent required for the test.
- (3) *Calorimeter*
- (i) The calorimeter to be used in testing must be a $0\text{--}17.0$ Watts/cm 2 ($0\text{--}15.0$ BTU per ft 2 sec) calorimeter, accurate $\pm 3\%$, mounted in a 15 by 31 cm (6-inch by 12-inch) by 19 mm (0.75 inch) thick calcium silicate insulating board which is attached to a steel angle bracket for placement in the test stand during burner calibration, as shown in Figure 4.
 - (ii) Because crumbling of the insulating board with service can result in misalignment of the calorimeter, the calorimeter must be monitored and the mounting shimmed, as necessary, to ensure that the calorimeter face is flush with the exposed plane of the insulating board in a plane parallel to the exit of the test burner cone.
- (4) *Thermocouples.* The seven thermocouples to be used for testing must be 1.59 to 3.18 mm (0.0625 to 0.125 inch) metal sheathed, ceramic packed, type K, grounded thermocouples with a nominal 22 to 30 American wire gauge (AWG)-size conductor 0.643 mm (0.0253 inches) to 0.254 mm (0.010 inches) diameter. The seven thermocouples must be attached to a steel angle bracket to form a thermocouple rake for placement in the test stand during burner calibration as shown in Figure 5.
- (5) *Apparatus Arrangement.* The test burner must be mounted on a suitable stand to position the exit of the burner cone a distance of 102 ± 3 mm (4 ± 0.125 inches) from one side of the specimen mounting stand. The burner stand should have the capability of allowing the burner to be swung away from the specimen-mounting stand during warm-up periods.

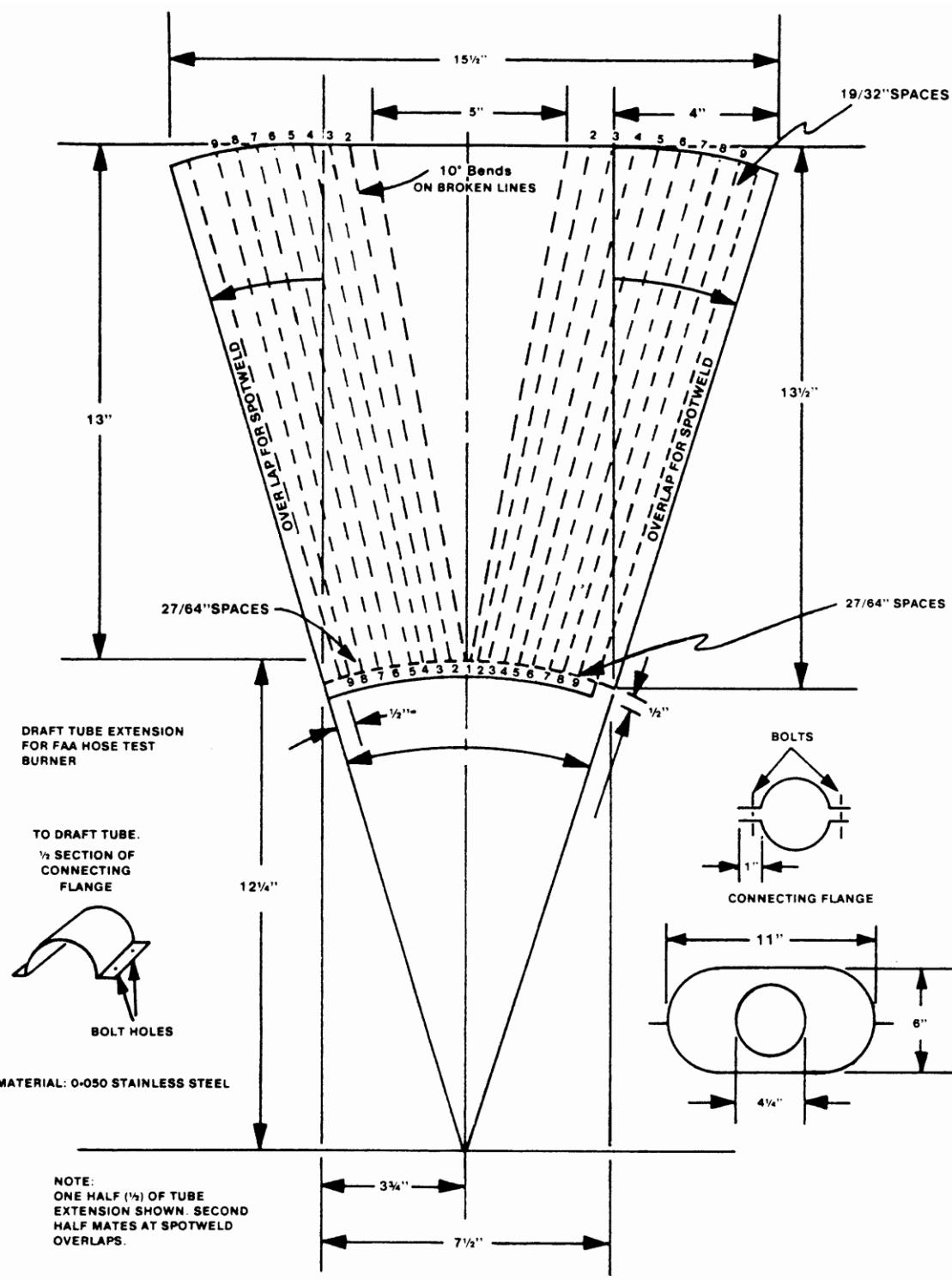
- (6) *Data Recording.* A recording potentiometer or other suitable calibrated instrument with an appropriate range must be used to measure and record the outputs of the calorimeter and the thermocouples.
- (7) *Weight Scale.* Weighing Device – A device must be used that with proper procedures may determine the before and after test weights of each set of seat cushion specimens within 9 grams (0.02 pound). A continuous weighing system is preferred.
- (8) *Timing Device.* A stopwatch or other device (calibrated to ± 1 second) must be used to measure the time of application of the burner flame and self-extinguishing time or test duration.
- (e) *Preparation of Apparatus.* Before calibration, all equipment must be turned on and the burner fuel must be adjusted as specified in sub-paragraph (d)(2).
- (f) *Calibration.* To ensure the proper thermal output of the burner, the following test must be made:
- (1) Place the calorimeter on the test stand as shown in Figure 4 at a distance of 102 ± 3 mm (4 ± 0.125 inches) from the exit of the burner cone.
 - (2) Turn on the burner, allow it to run for 2 minutes for warm-up, and adjust the burner air intake damper to produce a reading of 11.9 ± 0.6 Watts/cm² (10.5 ± 0.5 BTU per ft² sec) on the calorimeter to ensure steady state conditions have been achieved. Turn off the burner.
 - (3) Replace the calorimeter with the thermocouple rake (Figure 5).
 - (4) Turn on the burner and ensure that the thermocouples are reading $1038 \pm 56^\circ\text{C}$ ($1900 \pm 100^\circ\text{F}$) to ensure steady state conditions have been achieved.
 - (5) If the calorimeter and thermocouples do not read within range, repeat steps in sub-paragraphs 1 to 4 and adjust the burner air intake damper until the proper readings are obtained. The thermocouple rake and the calorimeter should be used frequently to maintain and record calibrated test parameters. Until the specific apparatus has demonstrated consistency, each test should be calibrated. After consistency has been confirmed, several tests may be conducted with the pre-test calibration before and a calibration check after the series.
- (g) *Test Procedures.* The flammability of each set of specimens must be tested as follows:
- (1) Record the weight of each set of seat bottom and seat back cushion specimens to be tested to the nearest 9 grams (0.02 pound).
 - (2) Mount the seat bottom and seat back cushion test specimens on the test stand as shown in Figure 2, securing the seat back cushion specimen to the test stand at the top.
 - (3) Swing the burner into position and ensure that the distance from the exit of the burner cone to the side of the seat bottom cushion specimen is 102 ± 3 mm (4 ± 0.125 inches).
 - (4) Swing the burner away from the test position. Turn on the burner and allow it to run for 2 minutes to provide adequate warm-up of the burner cone and flame stabilization.
 - (5) To begin the test, swing the burner into the test position and simultaneously start the timing device.
 - (6) Expose the seat bottom cushion specimen to the burner flame for 2 minutes and then turn off the burner. Immediately swing the burner away from the test position. Terminate

test 7 minutes after initiating cushion exposure to the flame by use of an appropriate gaseous extinguishing agent.

- (7) Determine the weight of the remains of the seat cushion specimen set left on the mounting stand to the nearest 9 grams (0·02 pound) excluding all droppings.
- (h) *Test Report* With respect to all specimen sets tested for a particular seat cushion for which testing of compliance is performed, the following information must be recorded:
- (1) An identification and description of the specimens being tested.
 - (2) The number of specimen sets tested.
 - (3) The initial weight and residual weight of each set, the calculated percentage weight loss of each set, and the calculated average percentage weight loss for the total number of sets tested.
 - (4) The burn length for each set tested.


FIGURE 1


FIGURE 2


FIGURE 3

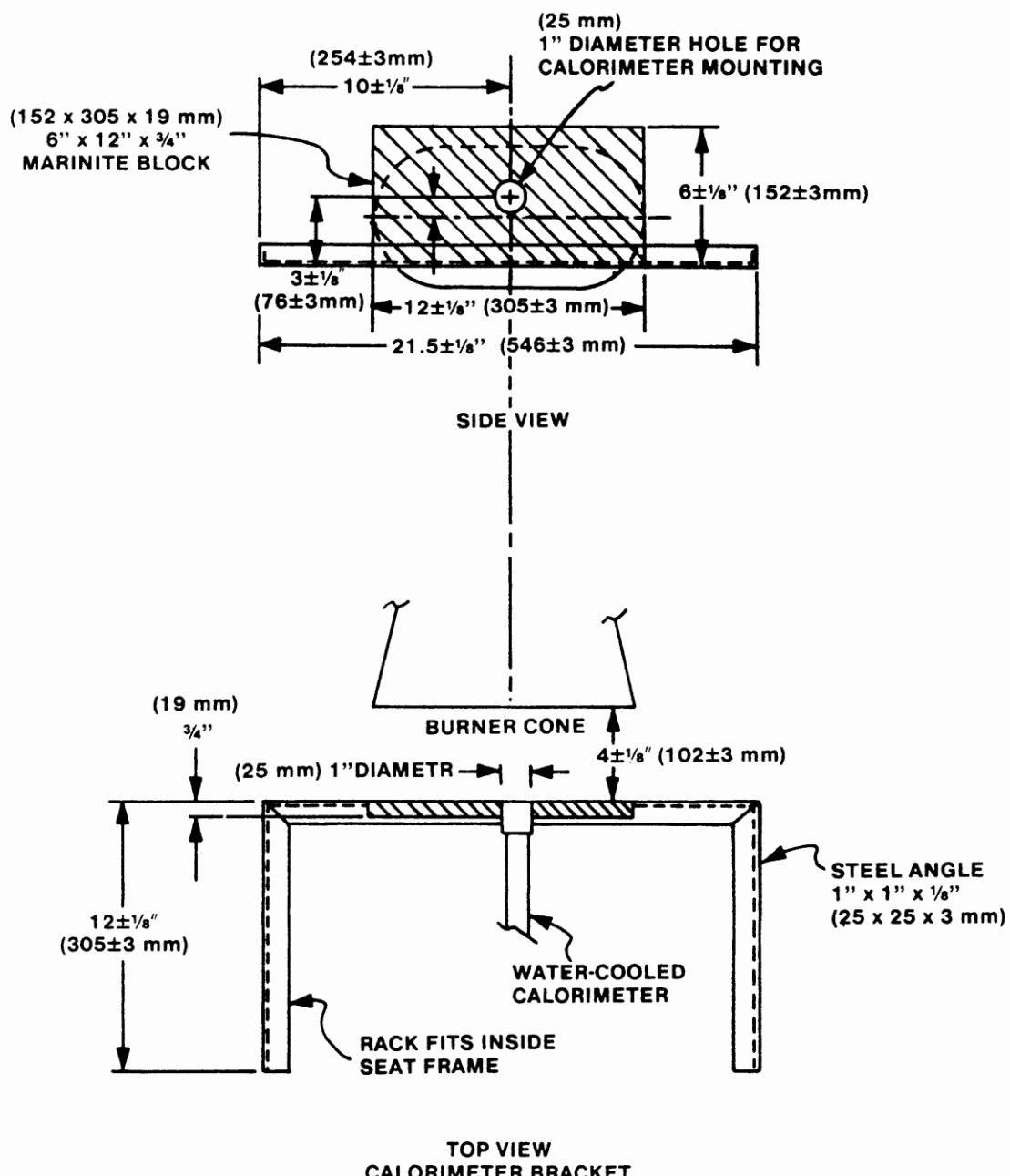


FIGURE 4

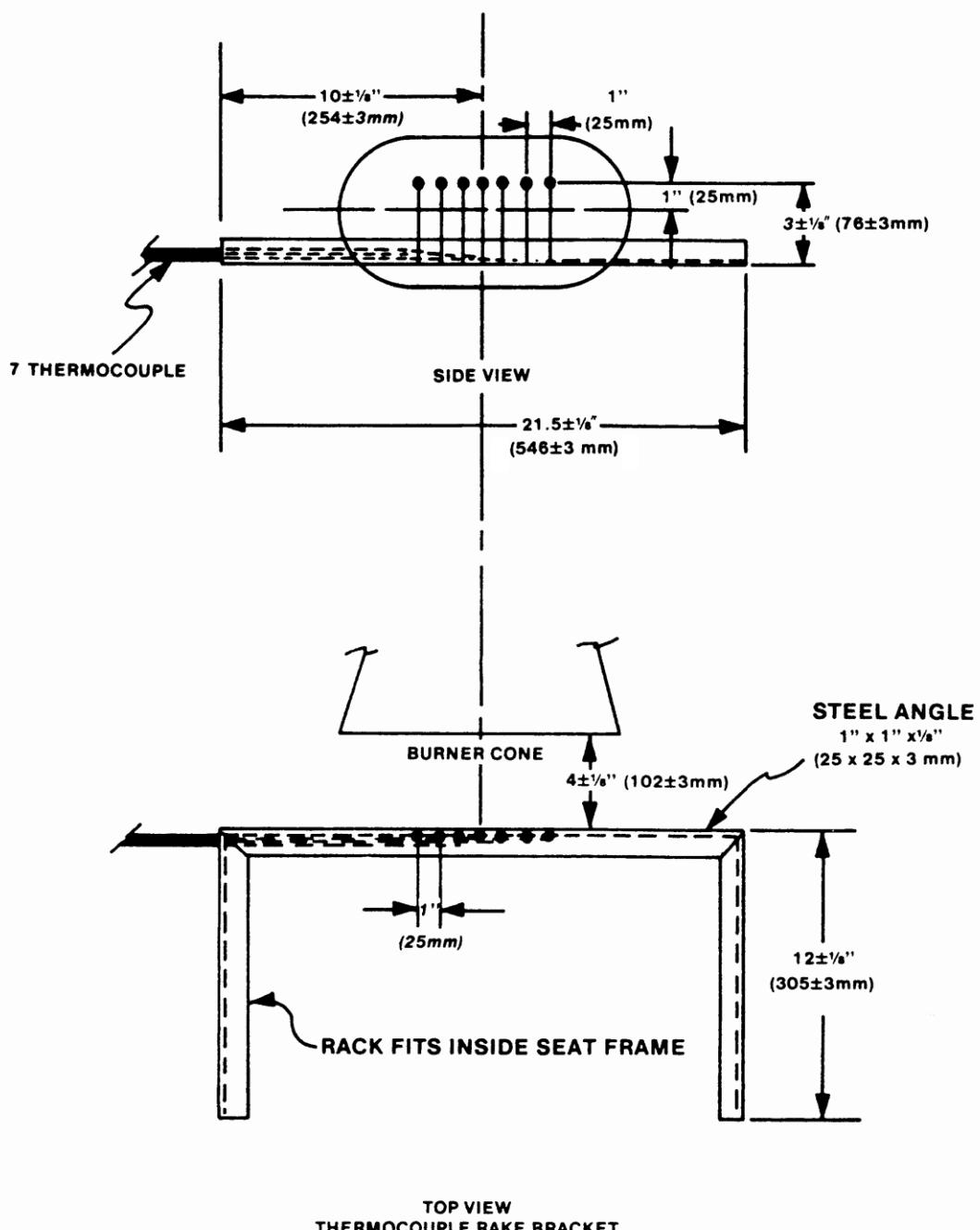


FIGURE 5

[Amdt 25/2]
[Amdt 25/4]
[Amdt 25/12]
[Amdt 25/17]

Part III – Test Method to Determine Flame Penetration Resistance of Cargo Compartment Liners

ED Decision 2009/017/R

(a) *Criteria for Acceptance*

- (1) At least three specimens of cargo compartment sidewall or ceiling liner panels must be tested.
- (2) Each specimen tested must simulate the cargo compartment sidewall or ceiling liner panel, including any design features, such as joints, lamp assemblies, etc., the failure of which would affect the capability of the liner to safely contain a fire.
- (3) There must be no flame penetration of any specimen within 5 minutes after application of the flame source, and the peak temperature measured at 10 cm (4 inches) above the upper surface of the horizontal test sample must not exceed 204°C (400°F).

(b) *Summary of Method.* This method provides a laboratory test procedure for measuring the capability of cargo compartment lining materials to resist flame penetration within a 7.6 l/hr (2 US gallons/hour) # 2 Grade kerosene or equivalent burner fire source. Ceiling and sidewall liner panels may be tested individually provided a baffle is used to simulate the missing panel. Any specimen that passes the test as a ceiling liner panel may be used as a sidewall liner panel.

(c) *Test Specimens*

- (1) The specimen to be tested must measure 406 ± 3 mm (16 ± 0.125 inches) by 610 ± 3 mm (24 ± 0.125 inches).
- (2) The specimens must be conditioned at $70^\circ\text{F} \pm 5^\circ\text{F}$ ($21^\circ\text{C} \pm 2^\circ\text{C}$) and $55\% \pm 5\%$ humidity for at least 24 hours before testing.

(d) *Test Apparatus.* The arrangement of the test apparatus, which is shown in Figure 3 of [Part II](#) and Figures 1 through 3 of this Part of Appendix F, must include the components described in this paragraph. Minor details of the apparatus may vary, depending on the model of the burner used.

- (1) *Specimen Mounting Stand.* The mounting stand for the test specimens consists of steel angles as shown in Figure 1.
- (2) *Test Burner.* The burner to be used in testing must –
 - (i) Be a modified gun type.
 - (ii) Use a suitable nozzle and maintain fuel pressure to yield a 7.6 l/hr (2 US gallons/hour) fuel flow. For example: an 80-degree nozzle nominally rated at 8.5 l/hr (2.25 US gallons/hour) and operated at 586 Kpa (85 pounds per square inch) gauge to deliver 7.7 l hr (2.03 US gallons/hour).
 - (iii) Have a 31 cm (12 inch) burner extension installed at the end of the draft tube with an opening 15 cm (6 inches) high and 28 cm (11 inches) wide as shown in Figure 3 of [Part II](#) of this Appendix.
 - (iv) Have a burner fuel pressure regulator that is adjusted to deliver a nominal 7.6 l/hr (2.0 US gallons/hour) of # 2 Grade kerosene or equivalent.

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- (3) **Calorimeter**
- (i) The calorimeter to be used in testing must be a total heat flux Foil Type Gardon Gauge of an appropriate range, approximately $0\text{--}17\cdot0 \text{ Watts/cm}^2$ (0 to $15\cdot0 \text{ BTU per ft}^2 \text{ sec}$). The calorimeter must be mounted in a 15 by 31 cm (6 inch by 12 inch) by 19 mm ($0\cdot75$ of an inch) thick insulating block which is attached to a steel angle bracket for placement in the test stand during burner calibration as shown in Figure 2 of this Part of this Appendix.
 - (ii) The insulating block must be monitored for deterioration and the mounting shimmed as necessary to ensure that the calorimeter face is parallel to the exit plane of the test burner cone.
- (4) **Thermocouples.** The seven thermocouples to be used for testing must be 1.59 mm ($0\cdot0625$ of an inch) ceramic sheathed, type K, grounded thermocouples with a nominal 30 American wire gauge (AWG)-size conductor $0\cdot254 \text{ mm}$ ($0\cdot010$ inches) diameter). The seven thermocouples must be attached to a steel angle bracket to form a thermocouple rake for placement in the stand during burner calibration as shown in Figure 3 of this Part of this Appendix.
- (5) **Apparatus Arrangement.** The test burner must be mounted on a suitable stand to position the exit of the burner cone a distance of 20 cm (8 inches) from the ceiling liner panel and 50 mm (2 inches) from the sidewall liner panel. The burner stand should have the capability of allowing the burner to be swung away from the test specimen during warm-up periods.
- (6) **Instrumentation.** A recording potentiometer or other suitable instrument with an appropriate range must be used to measure and record the outputs of the calorimeter and the thermocouples.
- (7) **Timing Device.** A stopwatch or other device must be used to measure the time of flame application and the time of flame penetration, if it occurs.
- (e) **Preparation of Apparatus.** Before calibration, all equipment must be turned on and allowed to stabilize, and the burner fuel flow must be adjusted as specified in sub-paragraph (d)(2).
- (f) **Calibration.** To ensure the proper thermal output of the burner the following test must be made:
- (1) Remove the burner extension from the end of the draft tube. Turn on the blower portion of the burner without turning the fuel or igniters on. Measure the air velocity using a hot wire anemometer in the centre of the draft tube across the face of the opening. Adjust the damper such that the air velocity is in the range of 7.9 m/s to 9.1 m/s (1550 to 1800 ft/min). If tabs are being used at the exit of the draft tube, they must be removed prior to this measurement. Reinstall the draft tube extension cone.
 - (2) Place the calorimeter on the test stand as shown in Figure 2 at a distance of 20 cm (8 inches) from the exit of the burner cone to simulate the position of the horizontal test specimen.
 - (3) Turn on the burner, allow it to run for 2 minutes for warm-up, and adjust the damper to produce a calorimeter reading of $9\cdot1 \pm 0\cdot6 \text{ Watts/cm}^2$ ($8\cdot0 \pm 0\cdot5 \text{ BTU per ft}^2 \text{ sec}$).
 - (4) Replace the calorimeter with the thermocouple rake (see Figure 3).
 - (5) Turn on the burner and ensure that each of the seven thermocouples reads $927^\circ\text{C} \pm 38^\circ\text{C}$ ($1700^\circ\text{F} \pm 100^\circ\text{F}$) to ensure steady state conditions have been achieved. If the