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INFORMATION
GPO



| EHD[2] | ID (in.) | 10 ft | 20 ft | 30 ft | 40 ft | 50 ft | 60 ft | 70 ft | 80 ft | 90 ft | 100 ft |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Corrugated Stainless Steel Tubing—Length[1]** | | | | | | | | | | | |
| 13 | ⅜ | 31 | 21 | 17 | 14 | 13 | 12 | 11 | 10 | 10 | 9 |
| 15 | ⅜ | 42 | 30 | 24 | 20 | 18 | 16 | 15 | 14 | 13 | 12 |
| 18 | ½ | 79 | 56 | 45 | 39 | 36 | 33 | 30 | 28 | 27 | 25 |
| 19 | ½ | 91 | 64 | 52 | 45 | 40 | 36 | 35 | 32 | 31 | 29 |
| 23 | ¾ | 155 | 111 | 92 | 80 | 72 | 65 | 60 | 58 | 55 | 52 |
| 25 | ¾ | 184 | 132 | 108 | 93 | 84 | 77 | 71 | 66 | 62 | 60 |
| 30 | 1 | 317 | 222 | 180 | 156 | 138 | 126 | 116 | 108 | 103 | 97 |
| 31 | 1 | 368 | 258 | 209 | 180 | 161 | 147 | 135 | 127 | 120 | 113 |
| 37 | 1¼ | 598 | 426 | 350 | 304 | 273 | 250 | 231 | 217 | 205 | 195 |

| OD (in.) | 10 ft | 20 ft | 30 ft | 40 ft | 50 ft | 60 ft | 70 ft | 80 ft | 90 ft | 100 ft |
|---|---|---|---|---|---|---|---|---|---|---|
| **Copper Tubing—Length** | | | | | | | | | | |
| ¼ | 27 | 18 | 15 | 13 | 11 | 10 | 9 | 9 | 8 | 8 |
| ⅜ | 56 | 38 | 31 | 26 | 23 | 21 | 19 | 18 | 17 | 16 |
| ½ | 113 | 78 | 62 | 53 | 47 | 43 | 39 | 37 | 34 | 33 |
| ¾ | 197 | 136 | 109 | 93 | 83 | 75 | 69 | 64 | 60 | 57 |
| 1 | 280 | 193 | 155 | 132 | 117 | 106 | 98 | 91 | 85 | 81 |

[1] Includes losses for four 90-degree bends and two end fittings. Tubing runs with larger numbers of bend and/or fittings shall be increased by an equivalent length of tubing according to the following equation: $L = 1.3n$, where $L$ is actual length (ft) of tubing and $n$ is the number of additional fittings and/or bends.
[2] EHD (Equivalent Hydraulic Diameter)—A measure of the hydraulic efficiency between different tubing sizes.

* * * * *

(f) * * *

(1) Tubing joints shall be made with either a single or a double flare of 45 degrees in accordance with Flares For Tubing, SAE–J533b–1992 or with other listed vibration-resistant fittings, or joints may be brazed with material having a melting point exceeding 1,000 °F. Metallic ball sleeve compression-type tubing fittings shall not be used.

* * * * *

(h) *Concealed tubing*. (1) Copper tubing must not be run inside walls, floors, partitions, or roofs. Corrugated stainless steel tubing (CSST) may be run inside walls, floors, partitions, and roofs under the following conditions:

(i) The CSST is protected from accidental puncture by a steel strike barrier not less than 0.058 inch thick, or the barrier's equivalent, installed between the tubing and the finished wall and extending 4 inches beyond concealed penetrations of plates, firestops, and wall studs, or specified by the tubing manufacturer's instructions; and

(ii) The CSST is installed in single runs and is not rigidly secured.

(2) Where tubing passes through exterior walls, floors, partitions, or similar construction, the tubing must be protected by the use of weather-resistant grommets that snugly fit both the tubing and the hole through which the tubing passes, or protected as specified in the tubing manufacturer's instructions.

(3) Concealed joints: Piping or tubing joints must not be located in any wall, floor, partition, or similar concealed construction space.

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## § 3280.706 Oil piping systems.

(a) *General*. The requirements of this section shall govern the installation of all liquid fuel piping attached to any manufactured home. None of the requirements listed in this section shall apply to the piping in the appliance(s).

(b) *Materials*. All materials used for the installation extension, alteration, or repair, of any oil piping systems shall be new and free from defects or internal obstructions. The system shall be made of materials having a melting point of not less than 1,450 F, except as provided in § 280.706(d) and (e). They shall consist of one or more of the materials described in § 3280.706(b) (1) through (4).

(1) Steel or wrought-iron pipe shall comply with ANSI B 36.10–1979, Welded and Seamless Wrought Steel Pipe. Threaded copper or brass pipe in iron pipe sizes may be used.

(2) Fittings for oil piping shall be wrought-iron, malleable iron, steel, or brass (containing not more than 75 percent copper).

(3) Copper tubing must be annealed type, Grade K or L conforming to the Standard Specification for Seamless Copper Water Tube, ASTM B88–93, or

shall comply with ASTM B280–1995, Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.

(4) Steel tubing shall have a minimum wall thickness of 0.032 inch for diameters up to ½ inch and 0.049 inch for diameters ½ inch and larger. Steel tubing shall be constructed in accordance with the Specification for Electric-Resistance-Welded Coiled Steel Tubing for Gas and Field Oil Lines, ASTM, A539–90a, and shall be externally corrosion protected.

(c) *Size of oil piping.* The minimum size of all fuel oil tank piping connecting outside tanks to the appliance shall be no smaller than ⅜ inch OD copper tubing or ¼ inch IPS. If No. 1 fuel oil is used with a listed automatic pump (fuel lifter), copper tubing shall be sized as specified by the pump manufacturer.

(d) *Joints for oil piping.* All pipe joints in the piping system, unless welded or brazed, shall be threaded joints which comply with ANSI/ASME B1.20.1–1983, Pipe Threads, General Purpose (Inch). The material used for brazing pipe connections shall have a melting temperature in excess of 1,000 F.

(e) *Joints for tubing.* Joints in tubing shall be made with either a single or double flare of the proper degree, as recommended by the tubing manufacturer, by means of listed tubing fittings, or brazed with materials having a melting point in excess of 1,000 F.

(f) *Pipe joint compound.* Threaded joints shall be made up tight with listed pipe joint compound which shall be applied to the male threads only.

(g) *Couplings.* Pipe couplings and unions shall be used to join sections of threaded pipe. Right and left nipples or couplings shall not be used.

(h) *Grade of piping.* Fuel oil piping installed in conjunction with gravity feed systems to oil heating equipment shall slope in a gradual rise upward from a central location to both the oil tank and the appliance in order to eliminate air locks.

(i) *Strap hangers.* All oil piping shall be adequately supported by galvanized or equivalently protected metal straps or hangers at intervals of not more than 4 feet, except where adequate support and protection is provided by structural members. Solid-iron-pipe oil supply connection(s) shall be rigidly anchored to a structural member within 6 inches of the supply connection(s).

(j) *Testing for leakage.* Before setting the system in operation, tank installations and piping shall be checked for oil leaks with fuel oil of the same grade that will be burned in the appliance. No other material shall be used for testing fuel oil tanks and piping. Tanks shall be filled to maximum capacity for the final check for oil leakage.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979, as amended at 52 FR 4588, Feb. 12, 1987; 58 FR 55017, Oct. 25, 1993; 70 FR 72050, Nov. 30, 2005]

EFFECTIVE DATE NOTE: At 78 FR 73988, Dec. 9, 2013, § 3280.706 was amended by revising paragraph (j), effective June 6, 2014. For the convenience of the user, the revised text is set forth as follows:

**§ 3280.706 Oil piping systems.**

* * * * *

(j) *Testing Tag.* A tag must be affixed to each oil-fired appliance stating: ''Before setting the system in operation, tank installations and piping must be checked for oil leaks with fuel oil of the same grade that will be burned in the appliance. No other material may be used for testing fuel oil tanks and piping. Tanks must be filled to maximum capacity for the final check for oil leakage.''

## § 3280.707 Heat producing appliances.

(a) Heat-producing appliances and vents, roof jacks and chimneys necessary for their installation in manufactured homes shall be listed or certified by a nationally recognized testing agency for use in manufactured homes.

(1) A manufactured home shall be provided with a comfort heating system.

(i) When a manufactured home is manufactured to contain a heating appliance, the heating appliance shall be installed by the manufacturer of the manufactured home in compliance with applicable sections of this subpart.

(ii) When a manufactured home is manufactured for field application of an external heating or combination heating/cooling appliance, preparation