# QUALITY Steel Corporation

## ORIFICE CAPACITIES

BTU/CU FT = 2.516 SPECIFIC GRAVITY = 1.52
PRESSURE AT ORIFICE, IN. WATER COLUMN = 11
ORIFICE COEFFICIENT = 0.9

| ORIFICE OR DRILL SIZE | ORIFICE CAPACITY BTU/HR, 11" W.C. | ORIFICE OR DRILL SIZE | ORIFICE CAPACITY BTU/HR, 11" W.C. |
|---|---|---|---|
| .008 | 519 | 51 | 36531 |
| .009 | 656 | 50 | 39842 |
| .010 | 812 | 49 | 43361 |
| .011 | 981 | 48 | 46983 |
| .012 | 1169 | 47 | 50088 |
| 80 | 1480 | 46 | 53296 |
| 79 | 1708 | 45 | 54641 |
| 78 | 2080 | 44 | 60229 |
| 77 | 2629 | 43 | 64369 |
| 76 | 3249 | 42 | 71095 |
| 75 | 3581 | 41 | 74924 |
| 74 | 4119 | 40 | 78029 |
| 73 | 4678 | 39 | 80513 |
| 72 | 5081 | 38 | 83721 |
| 71 | 5495 | 37 | 87860 |
| 70 | 6375 | 36 | 92207 |
| 69 | 6934 | 35 | 98312 |
| 68 | 7813 | 34 | 100175 |
| 67 | 8320 | 33 | 103797 |
| 66 | 8848 | 32 | 109385 |
| 65 | 9955 | 31 | 117043 |
| 64 | 10535 | 30 | 134119 |
| 63 | 11125 | 29 | 150366 |
| 62 | 11735 | 28 | 160301 |
| 61 | 12367 | 27 | 168580 |
| 60 | 13008 | 26 | 175617 |
| 59 | 13660 | 25 | 181619 |
| 58 | 14333 | 24 | 187828 |
| 57 | 15026 | 23 | 192796 |
| 56 | 17572 | 22 | 200350 |
| 55 | 21939 | 21 | 205525 |
| 54 | 24630 | 20 | 210699 |
| 53 | 28769 | 19 | 223945 |
| 52 | 32805 | 18 | 233466 |

## CONVERSION UNITS

| Multiply | By | To Obtain |
|---|---|---|
| **PRESSURE** | | |
| Grams per square centimeter | 0.0142 | pounds per square inch |
| Inches of mercury | 0.4912 | pounds per square inch |
| Inches of mercury | 1.133 | feet of water |
| Inches of water | 0.0361 | pounds per square inch |
| Inches of water | 0.0735 | inches of mercury |
| Inches of water | 0.5781 | ounces per square inch |
| Inches of water | 5.204 | pounds per square foot |
| **KPA** | 100 | BAR |
| Kilograms per sq. centimeter | 14.22 | pounds per square inch |
| Kilograms per square meter | 0.2048 | pounds per square foot |
| Pounds per square inch | 0.06804 | atmospheres |
| Pounds per square inch | 0.07031 | kilograms per sq. centimeter |
| Pounds per square inch | .145 | KPA |
| Pounds per square inch | 2.036 | inches of mercury |
| Pounds per square inch | 2.307 | feet of water |
| Pounds per square inch | 14.5 | BAR |
| Pounds per square inch | 27.67 | inches of water |
| **LENGTH** | | |
| Centimeters | 0.3937 | inches |
| Feet | 0.3048 | meters |
| Feet | 30.48 | centimeters |
| Feet | 304.8 | millimeters |
| Inches | 2.540 | centimeters |
| Inches | 25.40 | millimeters |
| Kilometer | 0.6214 | miles |
| Meters | 1.094 | yards |
| Meters | 3.281 | feet |
| Meters | 39.37 | inches |
| Miles (nautical) | 1,853.0 | meters |
| Miles (statute) | 1,609.0 | meters |
| Yards | 0.9144 | meters |
| Yards | 91.44 | centimeters |

SEE OTHER SIDE FOR MORE CONVERSION UNITS

## CONVERTING VOLUMES OF GAS
(CFH to CFH or CFM to CFM)

| Multiply Flow of: | By | To Obtain Flow of: |
|---|---|---|
| Air | 0.707 | Butane |
| | 1.290 | Natural Gas |
| | 0.808 | Propane |
| Butane | 1.414 | Air |
| | 1.826 | Natural Gas |
| | 1.140 | Propane |
| Natural Gas | 0.775 | Air |
| | 0.547 | Butane |
| | 0.625 | Propane |
| Propane | 1.237 | Air |
| | 0.874 | Butane |
| | 1.598 | Natural Gas |

## TEMPERATURE CONVERSION

| Degrees F | Degrees C | Degrees F | Degrees C |
|---|---|---|---|
| -50 | -46 | 60 | 15.6 |
| -40 | -40 | 70 | 21.1 |
| -30 | -34 | 80 | 26.7 |
| -20 | -29 | 90 | 32.2 |
| -10 | -23 | 100 | 37.8 |
| 0 | -17.8 | 110 | 43 |
| +10 | -12.2 | 120 | 49 |
| 20 | -6.7 | 130 | 54 |
| 30 | -1.1 | 140 | 60 |
| 32 | 0 | 150 | 66 |
| 40 | +4.4 | 160 | 71 |
| 50 | 10.0 | 170 | 77 |

FORMULAE: Degrees C =(°F-32) X 5/9
Degrees F = 9/5 X °C +32


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## PIPE AND TUBING SIZING

**SIZING BETWEEN SINGLE OR SECOND STAGE (LOW PRESSURE REGULATOR) AND APPLIANCE**

Maximum undiluted propane capacities listed are based on 11" W.C. setting and a 0.5" W.C. pressure drop — Capacities in 1,000 BTU/HR

| PIPE OR TUBING LENGTH FEET | COPPER TUBING SIZE, OUTSIDE DIA., TYPE "L" | | | | | PIPE OR TUBING LENGTH FEET | NOMINAL PIPE SIZE, SCHEDULE 40 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ⅜" (.315) | ½" (.430) | ⅝" (.545) | ¾" (.666) | ⅞" (.785) | | ½" (.622) | ¾" (.824) | 1" (1.049) | 1¼" (1.380) | 1½" (1.610) | 2" (2.067) |
| 10 | 49 | 110 | 206 | 348 | 536 | 10 | 291 | 608 | 1146 | 2353 | 3525 | 6789 |
| 20 | 34 | 76 | 141 | 239 | 368 | 20 | 200 | 418 | 788 | 1617 | 2423 | 4666 |
| 30 | 27 | 61 | 114 | 192 | 296 | 30 | 161 | 336 | 632 | 1299 | 1946 | 3747 |
| 40 | 23 | 52 | 97 | 164 | 253 | 40 | 137 | 287 | 541 | 1111 | 1665 | 3207 |
| 50 | 20 | 46 | 86 | 146 | 224 | 50 | 122 | 255 | 480 | 985 | 1476 | 2842 |
| 60 | 19 | 42 | 78 | 132 | 203 | 60 | 110 | 231 | 435 | 892 | 1337 | 2575 |
| 70 | 17 | 39 | 72 | 121 | 187 | 80 | 94 | 198 | 372 | 764 | 1144 | 2204 |
| 80 | 16 | 36 | 67 | 113 | 174 | 100 | 84 | 175 | 330 | 677 | 1014 | 1954 |
| 90 | 15 | 34 | 63 | 106 | 163 | 125 | 74 | 155 | 292 | 600 | 899 | 1731 |
| 100 | 14 | 32 | 59 | 100 | 154 | 150 | 67 | 141 | 265 | 544 | 815 | 1569 |
| 150 | 11 | 26 | 48 | 80 | 124 | | | | | | | |

TO CONVERT TO CAPACITIES IN CUBIC FEET PER HOUR DIVIDE BY 2.5
NOTE: DIMENSIONS IN PARENTHESIS ARE THE INSIDE DIA. OF THE COPPER TUBING & INSIDE DIA. OF SCHEDULE 40 PIPE.

CT002048

# QUALITY Steel Corporation

## AVERAGE PROPERTIES OF PROPANE

| | |
|---|---|
| Formula | $C_3H_8$ |
| Boiling Point, °F | -44 |
| Specific Gravity of Gas (Air =1.00) | 1.53 |
| Specific Gravity of Liquid (Water=1.00) | 0.51 |
| Lbs. per Gallon of Liquid at 60 °F | 4.24 |
| BTU per Gallon of Gas at 60 °F | 91547 |
| BTU per Lb. of Gas | 21591 |
| BTU per Cu. Ft. of Gas at 60 °F | 2516 |
| Cu. Ft. of Vapor at 60 °F/Gal. of Liquid at 60 ºF | 36.39 |
| Cu. Ft. of Vapor at 60 °F/Lb. of Liquid at 60 °F | 8.547 |
| Latent Heat of Vaporization at Boiling Point BTU/Gal | 785.0 |
| Combustion Data: Cu. Ft. Air Required to Burn 1 Cu. Ft. Gas | 23.86 |
| Flash Point, °F | -156 |
| Ignition Temperature in Air, °F | 920-1020 |
| Maximum Flame Temperature in Air, °F | 3595 |
| Limits of Inflammability, Percentage of Gas in Air Mixture: at Lower Limit—% | 2.4 |
| at Upper Limit—% | 9.6 |
| Octane Number (ISO-Octane =100) | Over 100 |

## QUALITY STEEL CORPORATION STANDARD DOMESTIC TANK SPECIFICATIONS

| Capacity | Diameter | Length | Tank Weight |
|---|---|---|---|
| 120 gal | 24" | 68" | 257 lb |
| 454 l | 610 mm | 1727 mm | 117 kg |
| 120 gal (vert) | 30" | 54" | 260 lb |
| 454 l | 762 mm | 1372 mm | 118 kg |
| 250 gal | 30" | 94" | 483 lb |
| 946 l | 762 mm | 2387 mm | 219 kg |
| 320 gal | 30" | 119" | 597 lb |
| 1211 l | 762 mm | 3023 mm | 271 kg |
| 500 gal | 37" | 119" | 949 lb |
| 1893 l | 940 mm | 3023 mm | 430 kg |
| 1000 gal | 41" | 192" | 1760 lb |
| 3785 l | 1041 mm | 4877 mm | 799 kg |
| 1450 gal | 47" | 208" | 2658 lb |
| 5488 l | 1182 mm | 5277 mm | 1205 kg |
| 1990 gal | 46" | 288" | 3521 lb |
| 7532 l | 1182 mm | 7283 mm | 1597 kg |

## APPROXIMATE VAPORIZATION CAPACITIES OF QSC PROPANE TANKS

BTU PER HOUR WITH 40% LIQUID IN TANK DOMESTIC SYSTEMS

| TANK SIZE WATER CAPACITY | PREVAILING AIR TEMPERATURE | |
|---|---|---|
| | 20 °F | 60 °F |
| 120 | 235,008 | 417,792 |
| 150 | 290,304 | 516,096 |
| 200 | 341,280 | 606,720 |
| 250 | 406,080 | 721,920 |
| 320 | 514,100 | 937,900 |
| 500 | 634,032 | 1,127,168 |
| 1000 | 1,088,472 | 1,978,051 |
| 1450 | 1,485,961 | 2,427,447 |
| 1990 | 2,059,960 | 3,365,726 |

## VAPOR PRESSURES OF PROPANE

| TEMP. | PRESS. | TEMP. | PRESS. | TEMP. | PRESS. | TEMP. | PRESS. |
|---|---|---|---|---|---|---|---|
| 130°F | 257 psig | 70°F | 109 psig | 20°F | 40 psig | -20°F | 10 psig |
| 120°F | 225 psig | 65°F | 100 psig | 10°F | 31 psig | -25°F | 8 psig |
| 110°F | 197 psig | 60°F | 92 psig | 0°F | 23 psig | -30°F | 5 psig |
| 100°F | 172 psig | 50°F | 77 psig | -5°F | 20 psig | -35°F | 3 psig |
| 90°F | 149 psig | 40°F | 63 psig | -10°F | 16 psig | -40°F | 1 psig |
| 80°F | 128 psig | 30°F | 51 psig | -15°F | 13 psig | -44°F | 0 psig |

## BTU COMPARISON

| COMMON FUELS | per Gal. | per Lb. |
|---|---|---|
| Propane | 91,547 | 21,591 |
| Butane | 102,032 | 21,221 |
| Gasoline | 110,250 | 20,930 |
| Fuel Oil | 134,425 | 16,960 |

## CONVERSION UNITS

| Multiply | By | To Obtain |
|---|---|---|
| **VOLUME** | | |
| Cubic centimeter | 0.06103 | cubic inches |
| Cubic feet | 7.4805 | gallons (US) |
| Cubic feet | 28.316 | liters |
| Cubic feet | 1728 | cubic inches |
| Gallons (US) | 0.1337 | cubic feet |
| Gallons (US) | 3.785 | liters |
| Gallons (US) | 231 | cubic inches |
| Liters | 1.057 | quarts (US) |
| Liters | 2.113 | pints (US) |
| **MISCELLANEOUS** | | |
| BTU | 0.252 | calories |
| Decitherm | 10,000 | BTU |
| Kilogram | 2.205 | pounds |
| Kilowatt Hour | 3412 | BTU |
| Ounces | 28.35 | grams |
| Pounds | 0.4536 | kilograms |
| Pounds | 453.5924 | grams |
| Pounds | 21,591 | LPG BTU |
| Therm | 100,000 | BTU |
| API Bbls | 42 | gallons (US) |
| Gallons of Propane | 26.9 | KWH |
| HP | 746 | KWH |
| HP (Steam) | 42,418 | BTU |

SEE OTHER SIDE FOR MORE CONVERSION UNITS


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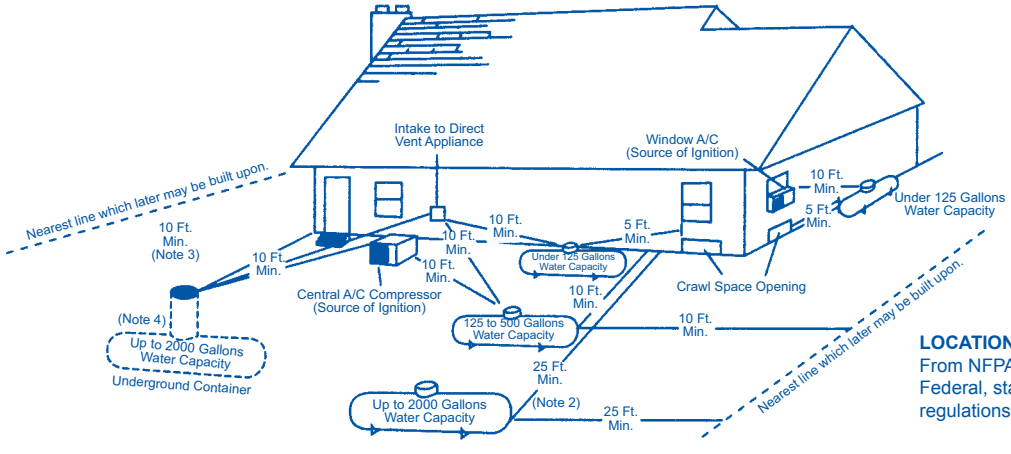


**LOCATION OF ASME CONTAINERS**
From NFPA 58, Appendix I
Federal, state, or local ordinances and regulations should be observed at all times.

Notes:

1) Regardless of its size, any ASME tank filled on-site must be located so that the filling connection and fixed liquid level gauge are at least 10 feet from external source of ignition (i.e. open flame, window A/C, compressor, etc.), intake to direct vented gas appliance or intake to a mechanical ventilation system.
2) May be reduced to 10 feet minimum for a single container of 1200 gallons water capacity or less if it is located at least 25 feet from any other LP Gas container of more than 125 gallons water capacity.
3) Minimum distances from underground containers shall be measured from the relief valve and filling or level gauge vent connection at the container, except that no part of an underground container shall be less than 10 feet from a building or line of adjoining property which may be built upon.
4) Where the container may be subject to abrasive action or physical damage due to vehicular traffic or other causes it must be either, (a) placed not less than 2 feet below grade; (b) otherwise protected against such physical damage.