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## 400 HP FIRETUBE BOILER

Maximum BTU/hr Input (ie: Rated Input @ High Fire / 100% Input Rating)	$400 \times 42,000 = 16,800,000 \text{ BTU}$
Cubic Feet of Natural Gas Required	$16,800,000 \div 1,000 = 16,800 \text{ Cu Ft}$
Cubic Feet of Vaporized Propane Required	$16,800,000 \div 2,500 = 6,720 \text{ Cu Ft}$
Gallons of Liquid Propane Required	$16,800,000 \div 91,600 = 183.4 \text{ Gallons}$
Gallons of #2 Diesel Oil Required	$16,800,000 \div 140,000 = 120 \text{ Gallons}$
Minimum BTU/hr Input at a 4:1 Turndown Ratio (Low Fire)	$16,800,000 \div 4 = 4,200,000 \text{ BTU}$
Cubic Feet of Natural Gas Required	$4,200,000 \div 1,000 = 4,200 \text{ Cu Ft}$
Cubic Feet of Vaporized Propane Required	$4,200,000 \div 2,500 = 1,680 \text{ Cu Ft}$
Gallons of Liquid Propane Required	$4,200,000 \div 91,600 = 45.85 \text{ Gallons}$
Gallons of #2 Diesel Oil Required	$4,200,000 \div 140,000 = 30 \text{ Gallons}$
Maximum Steam Production in lbs/hr (High Fire)	$400 \times 34.5 = 13,800 \text{ lbs/hr}$
Maximum Water Evaporation Rate	$400 \times .069 = 27.6 \text{ GPM}$
Minimum Feedwater Pump Flow (on / off pump strategy)	$27.6 \times 2 = 55.2 \text{ GPM}$
Minimum Feedwater Pump Flow (modulating pump strategy)	$27.6 \times 1.5 = 41.4 \text{ GPM}$
Minimum Feedwater Tank Storage Requirement	276 Gallons
Steam Temperature at <u>135 psi</u> Saturated	357 °F
BTU/hr Output, Based on 80% Efficiency at High Fire	$16,800,000 \times .80 = 13,440,000 \text{ BTU}$
BTU/hr Output, Based on 80% Efficiency at Low Fire	$4,200,000 \times .80 = 3,360,000 \text{ BTU}$
Square Feet Heating Surface (sq. ft. HS) at 5 sq. ft. per HP	$400 \times 5 = 2,000 \text{ Sq Ft}$
Minimum Steam Safety Relief Valve Capacity at Boiler Design	$13,800 \times 1.10 = 15,180 \text{ lbs/hr}$
Minimum Water Softener Flow Capacity at High Fire (always based upon 100% input)	$27.6 \times 2 = 55.2 \text{ GPM}$

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