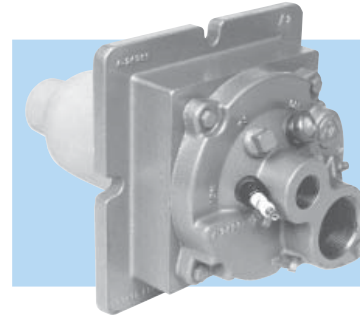


4441 Tempest. Shown with traditional square block refractory tile "R" for hardwall furnace installation.



4441 Tempest. Shown with alumina/mullite tile "A" for fiber wall furnace installation.

The Tempest High Velocity Gas Burner continues to be one of the world's most widely used burners. Its high velocity jet action and superior recirculation promoting capabilities have brought both the quality benefit of close temperature uniformity and the productivity benefit of safe higher heating rates to a wide variety of applications up to 3000 F. Common applications include: periodic and tunnel kilns in the ceramics and refractory industries, forge furnaces, heat treat furnaces, galvanizing baths, scrap preheaters, carbon baking furnaces, cupolas, pipe coaters, portable refractory dryout and preheat equipment, and many more.

The 4441 Tempest retains all the best features of the 4442: low NOx emissions, high excess air and excess fuel, direct spark ignition, integral meters, and sturdy cast construction, while improving stability range, maintainability, and stabilizer durability. New tile material and outlet shape choices provide greater flexibility in installation and "flame fitting." Wider operating limits and expanded ignition and flame supervision capabilities make the 4441 ideal for use with StepFire™ or any pulse fired control system, as well as thermal turndown and cross-connected systems. All these improvements were made while preserving the original 4442 "footprint" including air and gas connections, so retrofitting is easy.

- **Flexible operating capabilities**
 - Wide operating range -- from 30% excess fuel to 6000% excess air
 - Flame stability across full range to suit continuous and StepFire (pulse firing) control
 - Direct spark ignited with wide operating window
 - Low NOx emissions -- less than 60 ppm typical in 2000 F applications
- **Choice of flame supervision systems**
 - Flame rod or UV detector
- **Tile options to fit the application**
 - Material: dense refractory or light weight alumina/mullite
 - Exit shape: round or slotted
 - Alloy tile - Consult Fives North American
- **Dependable, long lasting cast construction**
 - Design allows full access to internals
 - Alloy stabilizer bolted to main body
 - Built in air purge for observation port and UV scanner
- **Preheated air versions available upon request**

General Operation and Control

- **Capacity:** 125,000 to 5,400,000 Btu/hr with 16 osig air pressure. For the high capacity tempest burners, see sheet 4441-4.
- **Combustion Air:** 0.2-24 osig air pressure.
- **Fuel:** Natural gas only, gas pressure varies per size but 11 osig is maximum required at design capacity, for 16 osig combustion air pressure, stoich ratio.
- **Flame Supervision:** Flame rod or UV detector. Consult National Safety Standards and insurance underwriters for specific flame supervision requirements. Flame supervisory components must be ordered separately. See Dimensions and Part List 4441-1 for correct flame rod part number.
- **Ignition:** Direct spark (no pilot) with 6000 V transformer. A halfwave transformer prevents UV sensing of the spark during trial for ignition. Ignition not recommended above 16 osig main air pressure.
- **Control:** Excellent performance with all control systems; StepFire™, on-ratio and thermal turndown. For best performance, a limiting orifice valve must be installed in gas supply line within 1ft. of burner and a ratio regulator recommended to be within 4 ft. of burner.
- **Relight:** Tempest® burners require spark for re-ignition as high velocity burners will not relight from a hot tile or furnace.
- **Piping:** For cross-connected systems, maximum gas pressure at the burner can be adversely impacted by excessive pressure drop in the gas line between the ratio regulator and the burner. The design, selection, and installation of these systems must take into account the gas pressure required at the burner to achieve the desired heat release (i.e. gas flow). For more detailed information on cross-connected control systems, see Sheet 4441-3.

Performance Data

UA-DA:..... Square rooting the UA-DA pressure drops using the published 16 osig data is reasonably accurate between 4-20 osig air pressure. Below 4 osig the UA-DA data should not be used for accurate air metering. Square rooting will over-estimate air flow below 4 osig and under-estimate above 20 osig.

UG-DG: UG-DG information can be used to approximate fuel gas flow. External gas orifices or O₂ analysis should be used for precise determination of fuel metering and air/fuel ratio.

Table 1. 4441 Performance Data

(Performance for 16 osi main air pressure operating at stoichiometric ratio unless stated otherwise)

Burner Size	-1	-2	-3-	4-A‡	-4-B‡	-5	-6	-7	-8-A†	-8-B†	-8-C†
Air Flow, not burning (scfh)	1560	2700	4000	6100	8100	11150	19000	26000	36000	50000	63000
Air Flow,(scfh)*	1250	2200	3300	5250	6900	9500	15000	22000	31000	42000	54000
Air Orifice ΔP,UA-DA, (in.wc)	15.6	14.6	14.1	12.8/16.4	13.5/16.5	15.5	7.3	7.1	13.8	11.9	8.3
Gas Orifice ΔP, UG-DG (in wc)	3.0	3.1	3.4	8.8/6.5	10.1/8.5	2.9	2.6	3.8	2.5	4.6	7.3
Gas Pressure UG (osig)	8.3	8.2	8.0	10.8/7.9	9.6/8.0	7.2	9.0	7.0	5.8	7.7	7.8
Gas Pressure UG (osig), 30% XSF	9.4	9.3	9.3	14.2/11.5	13.3/12.3	8.0	9.9	7.7	7.5	9.5	10.1
Max. % XSA, (ignition and flame signal limit)**	3000	5000	5000	5000	5000	6000	6000	6000	3000	3000	3000
Max. % XSF, (ignition and flame signal limit)	30	30	30	30	30	30	30	30	30	30	30
Flame Length (in.)	10	12	13	20/20	26/22	28	36	45	50	60	68
Flame Diameter (in.)	2	2	3	3/4	4/5	6	7	8	12	14	14

*Nominal capacities. Actual capacities may vary based on tile selection

** Limits may vary depending on flame supervisory equipment used.

‡ For sales orders below 2214482 use data on left side of column, above 2214482 use data on right of column. Sales order 2214482 booked 12/4/2012.

† See Bulletin 4441-4 for additional information.

Tile and Mounting Options

Tile materials and shapes to suit your specific needs.

Tile Materials/Mountings

"R" Tile — Traditional square refractory block for applications to 3000 F. **Note: Recommended only for installation in solid wall construction furnaces/kilns. Available with either flanged or eared mounting.**

"A" Tile — Alumina/Mullite tile for fiber wall and most applications up to 2900 F. Available with flanged mounting only. Consult Fives North American for other tile options.

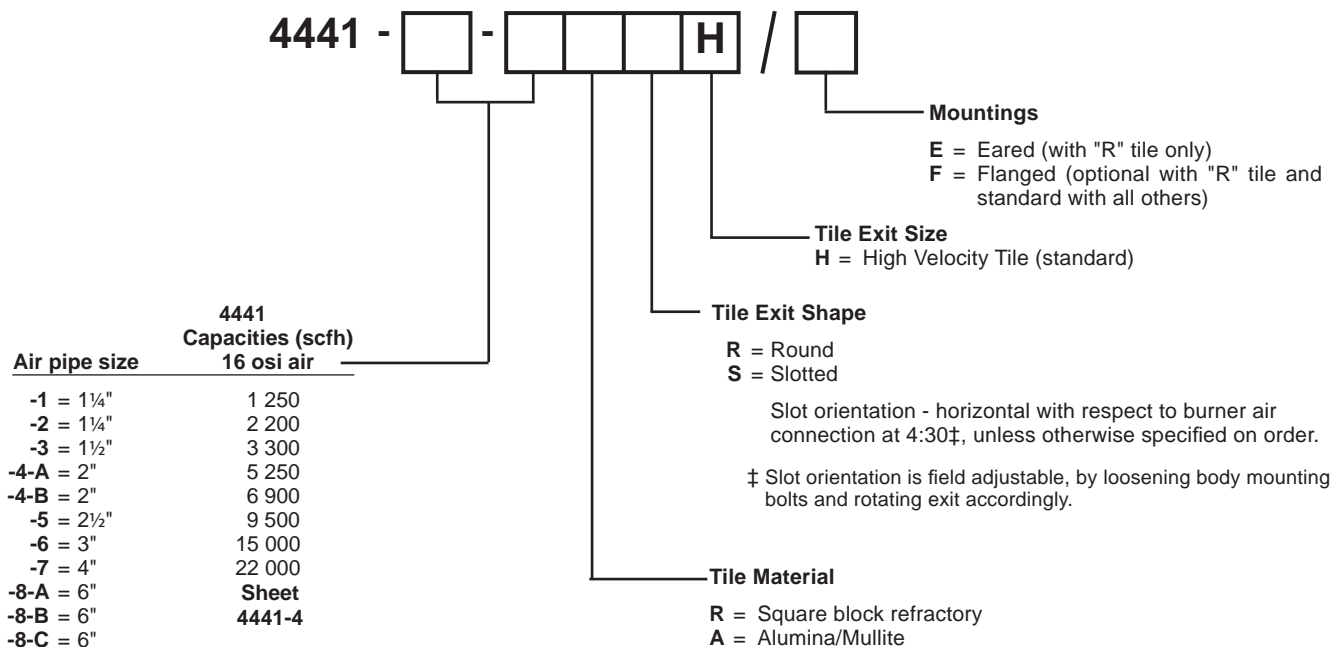
Alloy Tile — Consult Fives North American

Exit Shapes

"R" Round — for high penetration and maximum "drive".

"S" Slotted — for narrow lane firing and better temperature uniformity (available with "A" tile only).

Ordering Information



Examples:

- 4441-4-AASH/F = -4-A Capacity 4441 Burner with an Alumina/Mullite slotted high velocity tile, with flanged mounting.
- 4441-2-RRH/E = -2 Capacity 4441 Burner with a square refractory high velocity tile, with eared mounting.
- 4441-7-ARH/F = -7 Capacity 4441 Burner with an Alumina/Mullite round high velocity tile, with flanged mounting.

Flame supervisory components must be ordered separately.

WARNING: Situations dangerous to personnel and property may exist with the operation and maintenance of any combustion equipment. The presence of fuels, oxidants, hot and cold combustion products, hot surfaces, electrical power in control and ignition circuits, etc., are inherent with any combustion application. Parts of this product may exceed 160F in operation and present a contact hazard. Fives North American urges compliance with National Safety Standards and Insurance Underwriters recommendations, and care in operation.