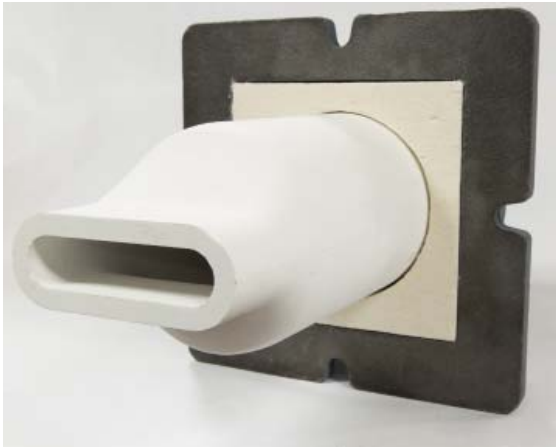


North American Tempest® 4441DMC Gas Burner



Tempest® DMC. Has slotted tile exit shape for narrow lane firing and better temperature uniformity.

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.

Diffuse Mode Combustion (DMC) is a flameless technology that can achieve ultra-low NOx emissions and improve temperature uniformity in many furnace applications. DMC technology applied to the industry standard Tempest® burner builds upon proven heat patterns and furnace performance, while reducing furnace NOx emissions to ultra-low levels from auto ignition to 2300°F. By allowing the flame to combust in the furnace, rather than in the burner tile, the maximum flame temperature is reduced, thus lowering NOx. Additionally, a point source of radiant energy that causes temperature non-uniformity is removed.

The Tempest® DMC retains all the best features of the 4441 series including low NOx emissions, stable high excess air and excess fuel operation, direct spark ignition, integral air and gas meters, sturdy cast construction, maintainability, and stabilizer durability. Operating limits and expanded ignition and flame supervision capabilities make the Tempest® DMC ideal for use with StepFire™ or any pulse fired control system, as well as with thermal turndown and cross-connected systems.

Ultra low NOx

- Low NOx emissions -- less than 50 ppm typical in 2200 F applications

Flexible operating capabilities

- Wide operating range -- from 30% excess fuel to 2000% excess air
- Flame stability across full range to suit continuous and StepFire (pulse firing) control
- Direct spark ignition with wide lighting window

Choice of flame supervision systems

- Optimized for flame rod
- UV as an option

Dependable, long lasting cast construction

- Design allows full access to internals
- Alloy stabilizer bolted to main body
- Built in air purge for observation port
- Single gas and air connections
- Simple tile construction

Common applications

- Forge furnaces
- Heat treat furnaces
- Roller hearth furnaces
- Continuous strip lines
- Indirect fired rotary kilns
- Ceramic kilns
- Most continuous or batch furnaces in a NOx sensitive location that operate part or all of the time at a temperature above the fuel's auto-ignition point.



Tempest® DMC. Alumina/mullite tile "A" for fiber wall furnace installation.

GENERAL OPERATION and CONTROL

- **Capacity:** 400,000 to 2,600,000 Btu/h in DMC at 16 osig air pressure.
- **Combustion Air:** 0.2-24 osig air pressure (max 150 F).
- **Fuel:** Natural gas. 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. Consult National Safety Standards and insurance underwriters for specific flame supervision requirements. Flame supervisory components must be ordered separately. See Dimensions and Part List 4441DMC-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.
- **Relight:** Tempest® DMC burners require spark for re-ignition. They will not relight from a hot tile or furnace.
- **DMC:** DMC operation requires a solenoid valve in the gas line near the burner. The valve must be installed within 3 feet of the burner gas connection between the limiting orifice valve and the ratio regulator.
- **Control:** Not for use with conventional BMS controls. Excellent performance with StepFire™, on-ratio and thermal turndown CMS controls. A limiting orifice valve must be installed in gas supply line within 1ft. of burner. A ratio regulator must be within 4 ft. of burner. Consult Fives for BMS control requirements.
- **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 4441DMC-3.

Table 1. 4441DMC Performance Data - Conventional Mode

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

Burner Size	-3	4-A	-4-B	-5	-6	-7
Air Flow, not burning (scfh)	4000	6100	7100	10100	19000	26000
Air Flow,(scfh)*	3300	5250	6300	9500	15000	22000
Air Orifice DR,UA-DA, (in.wc)	17.4	16.4	14.6	15.5	7.3	7.1
Gas Orifice DR, UG-DG (in wc)	8.5	6.5	6.5	2.9	2.6	3.8
Gas Pressure UG (osig)	9.9	8.8	9.8	7.2	9.0	7.0
Gas Pressure UG (osig), 30% XSF	13.5	11.9	—	8.0	9.9	7.7
Max. % XSA, (ignition and flame signal limit)**	—	—	—	—	—	—
Max. % XSF, (ignition and flame signal limit)	30	30	30	30	30	30
Flame Length (in.)	12	20	24	28	36	45
Flame Diameter (in.)	2	3	5	6	7	8

*Nominal capacities.

** Limits may vary depending on flame supervisory equipment used. Flame rod data represented in Table 1.

Table 2. 4441DMC Performance Data - DMC Mode

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

Burner Size	-3	4-A	-4-B	-5	-6	-7
Air Flow, not burning (scfh)	4000	6100	7100	10100	19000	26000
Air Flow,(scfh)*	4000	6100	7100	10100	19000	26000
Air Orifice DR,UA-DA, (in.wc)	—	—	—	—	—	—
Gas Orifice DR, UG-DG (in wc)	—	—	—	—	—	—
Gas Pressure UG (osig)	—	—	—	—	—	—
Gas Pressure UG (osig), 30% XSF	—	—	—	—	—	—
Max. % XSA, (ignition and flame signal limit)**	200	200	200	200	200	200
Max. % XSF, (ignition and flame signal limit)	30	30	30	30	30	30

*Nominal capacities.

** Limits may vary depending on flame supervisory equipment used. Flame rod data represented in Table 2.

Note: DMC Mode features flameless combustion.

TILE and MOUNTING

Tile Materials/Mountings

"A" Tile — Alumina/Mullite tile for fiber wall and most applications up to 3000 F. Available with flanged mounting only.

Consult Fives North American for other tile options.

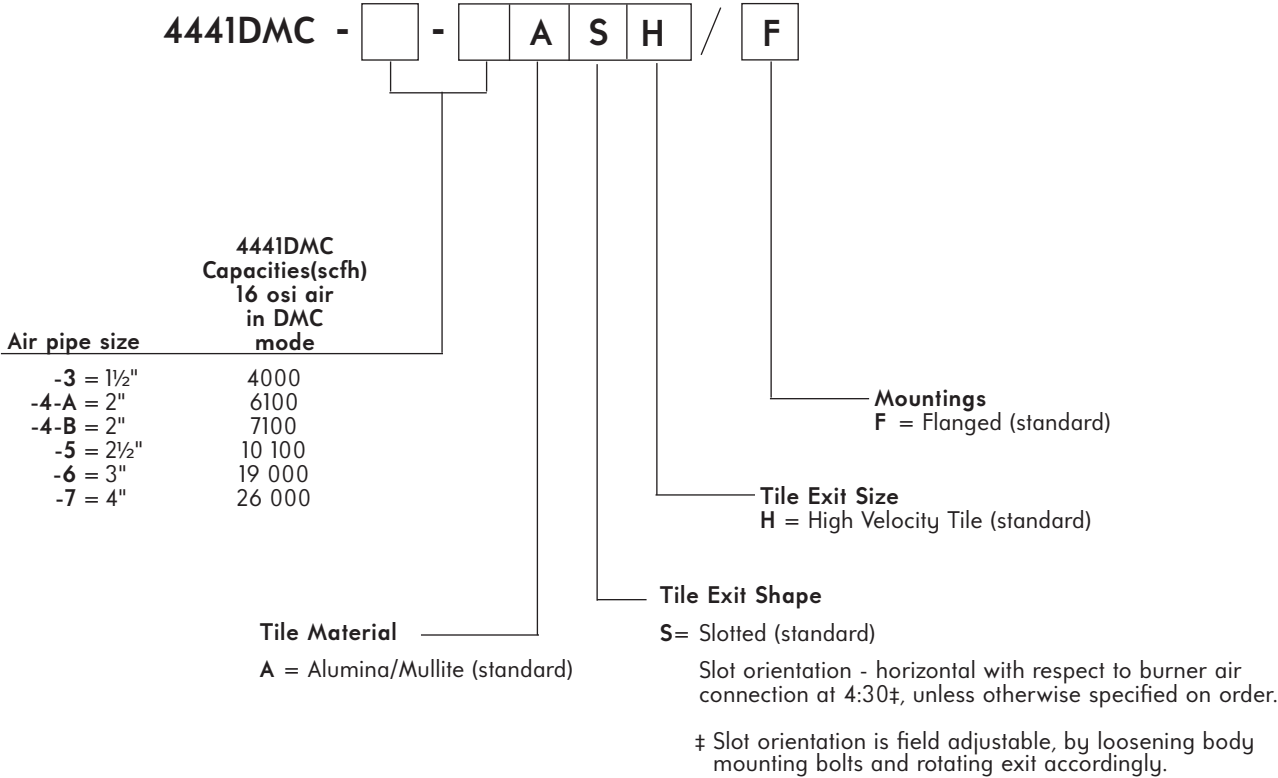
Exit Shapes

"S" Slotted — for narrow lane firing and better temperature uniformity.

Installation

For tile installation, see Supplement 4441DMC for more information.

ORDERING INFORMATION



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 Combustion, Inc. urges compliance with National Safety Standards and Insurance Underwriters' recommendations, and care in operation.



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