

# North American 4485 Tempest® SE Medium/High Velocity Gas Burner



Low NO<sub>x</sub> gas burner, durable construction and flexible design to fit a variety of applications.

- NPT or BSP air/gas inlets, adjustable in 90° increments
- 500,000 to 1,500,000 Btu/h HHV
- Multiple tile options for medium and high velocity
- Flame rod or UV flame detection
- Direct spark ignition

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# Product Overview | Tempest® SE

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Built with the quality people have trusted for 100 years. North American, the inventors of the original Tempest high velocity/high excess air burners, presents the 4485 Tempest® SE.

The 4485 Tempest® SE is a direct fire, nozzle-mix burner that provides an alternative to the original North American Tempest burner line. It features good temperature uniformity, product quality, and system efficiency through a medium or high velocity stream of hot gases.

The 4485 Tempest® SE is available in 4 sizes, with a medium or high velocity tile, with capacities ranging from 500,000 Btu/h HHV (132 kW, LHV) to 1,500,000 Btu/h HHV (396 kW, LHV).

## THE HIGH VELOCITY FLAME YOU EXPECT FROM TEMPESTS

### Good Control Flexibility

The Tempest® SE gives you the choice of pulse firing, excess air, or near stoichiometric ratio control.

### Wide Turndown Range

The Tempest® SE uses high excess air or pulse firing to achieve a wide turndown range while still providing the efficiency benefits of high velocity.

### Direct Spark

The Tempest® SE delivers the ability to light anywhere through a spark ignition system.

The Tempest® SE features standard pre-engineered components to meet many common requirements. With the Tempest® SE you choose the capacity range, tile type, fuel type, thread type and flame sensing components to fit your needs.

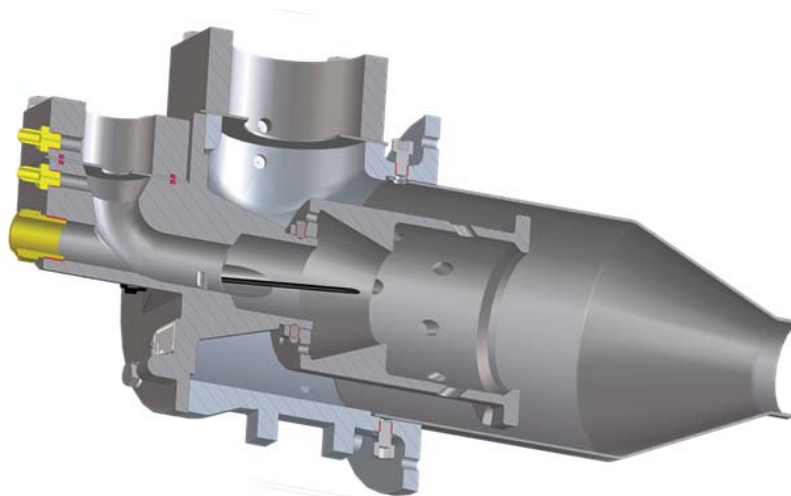
If you need a burner size outside the 4485 Tempest® SE range or you need an advanced or custom feature, North American has many other high and medium velocity Tempest® and HiRAM® models to choose from (see page 9).

## TYPES OF APPLICATIONS

- Periodic kilns
- Tunnel kilns
- Forge furnaces
- Heat treat furnaces
- Galvanizing baths
- Scrap preheaters
- Cupolas
- Pipe coaters
- Portable refractory dry out
- Preheat equipment
- Tempering furnaces
- Reheating furnaces
- Hardening furnaces
- Fluidized bed dryers
- Thermal oxidizers
- Nonferrous melting
- Ladle/tundish, glass lehrs

## PERFORMANCE BENEFITS

- Low NOx emissions
- Direct spark ignition
- Integral air and gas metering orifices
- Sturdy cast construction
- Four tile types, two velocity options



# Performance Data | Tempest® SE

- **Combustion Air Requirement:** 16-17.5"w.c. (4.0-4.4 kPa) at maximum input, maximum preheat 400°F (204°C)
- **Fuel:** Natural Gas, Propane, Butane.
- **Flame Supervision:** UV detector or Flame rod in specially configured models. Flame rods can be used up to 2200°F (1204°C) operating temperature. UV detectors can be used to maximum operating temperature. Consult National Safety Standards and insurance underwriters for specific flame supervision requirements.
- **Ignition:** Direct spark (no pilot) with 6000 V transformer. Full-wave spark transformer required, one per burner.
- **Control:** Good performance with on-ratio and thermal turndown systems. With cross-connected pressure balanced systems 15% excess air is the recommended rich limit of operation.
- **Relight:** Tempest® SE burners require spark for reignition. They 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).

## 4485 NATURAL GAS PERFORMANCE DATA

Burner Size	-5-A	-5-B	-6-A	-6-B
Maximum Input, Btu/h (kW) <sup>①</sup>	500,000 (132)	750,000 (198)	1,000,000 (264)	1,500,000 (396)
Minimum Input On-Ratio, Btu/h (kW) <sup>①</sup>	50,000 (13)	75,000 (20)	100,000 (26)	150,000 (40)
Minimum Input Fixed Air, Btu/h (kW) <sup>①</sup>	10,000 (3)	15,000 (4)	20,000 (5)	30,000 (8)
Gas Inlet Pressure Required, "w.c. (mbar)	16.2 (40)	13.8 (34)	12.5 (31)	14.5 (36)
Air Inlet Pressure Required "w.c. (mbar) 15% Excess Air at Maximum Input	16.7 (42)	16.0 (40)	16.5 (41)	17.5 (44)
High Fire Flame Length, inches (mm)	25 (635)	28 (711)	33 (835)	38 (965)
Approximate Flame Velocity, ft/s (m/s) 15% Excess Air at Maximum Input <sup>②</sup>	540 (165)	480 (146)	630 (192)	680 (207)
Maximum % XSA at Maximum Input	50	50	50	50
Maximum % XSA at Minimum Input	7,500	7,500	7,500	7,500

<sup>①</sup>Imperial inputs based upon gross calorific values (HHV). All metric inputs based on net calorific values (LHV).

<sup>②</sup>Velocity noted references high velocity tile option

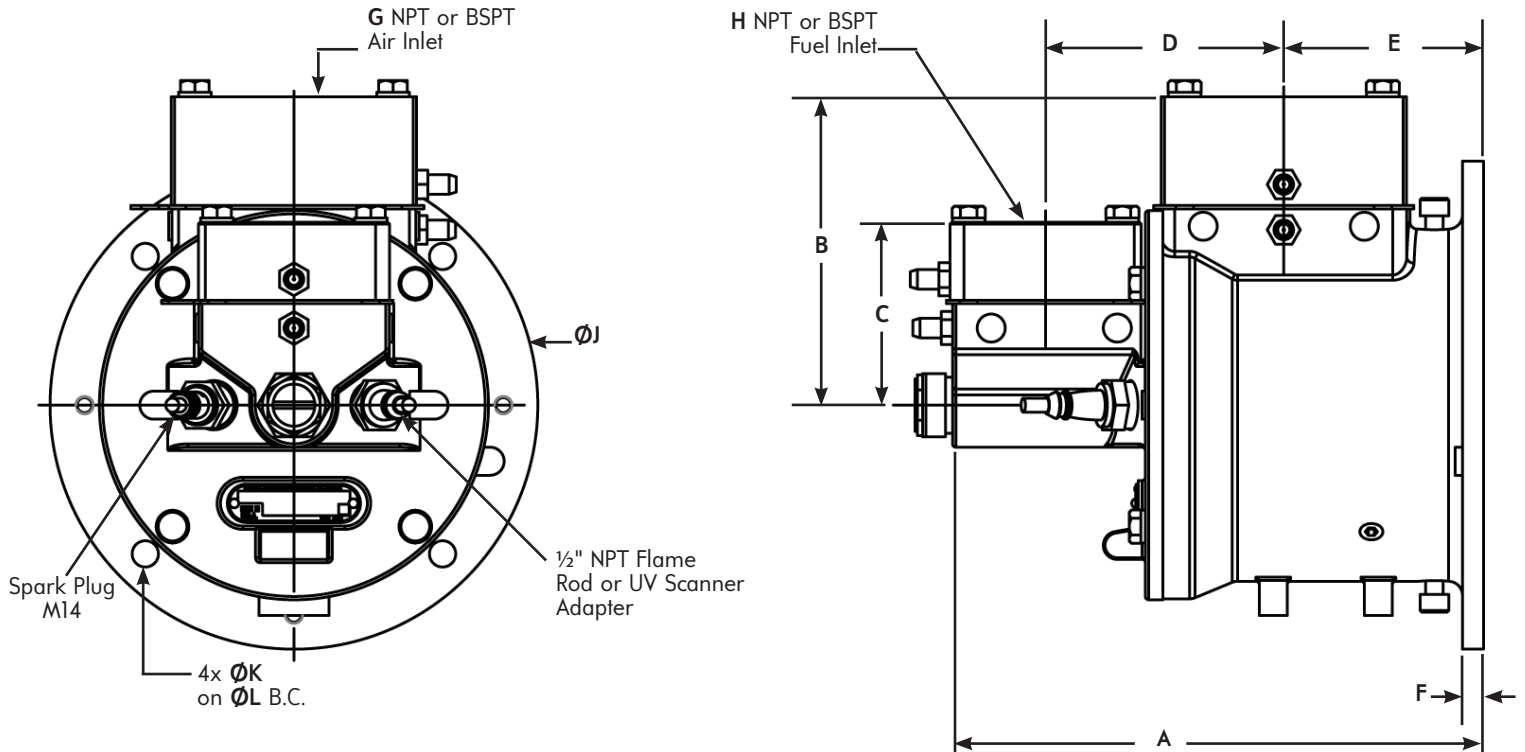
<sup>③</sup>The listed air pressure is the maximum recommended for stable operation.

<sup>④</sup>Excess fuel operation is not recommended for 4485 burners.

# Dimension and Specification | Tempest® SE

## BURNER HOUSING

DIMENSIONS, inches (mm)



5-A/5-B Burner weight less tile: 28 lbs. (12.7 Kg)

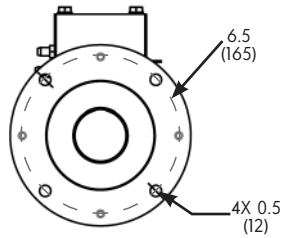
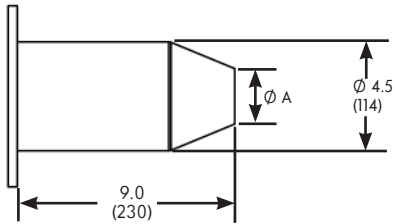
6-A/6-B Burner weight less tile: 39 lbs. (17.7 Kg)

dimensions in inches (mm) or NPT (BSPT)

Part Number	A	B	C	D	E	F	G	H	J	K	L
4485-5-A	8.4 (214)	5.1 (129)	3.1 (78)	3.7 (93)	3.4 (87)	0.4 (9)	2½	1	7.5 (190)	0.5 (12)	6.5 (165)
4485-5-B	8.4 (214)	5.1 (129)	3.1 (78)	3.7 (93)	3.4 (87)	0.4 (9)	2½	1	7.5 (190)	0.5 (12)	6.5 (165)
4485-6-A	9.5 (240)	5.5 (140)	3.2 (81)	4.1 (105)	3.6 (92)	0.4 (10)	3	1½	8.7 (220)	0.5 (12)	7.5 (190)
4485-6-B	9.5 (240)	5.5 (140)	3.2 (81)	4.1 (105)	3.6 (92)	0.4 (10)	3	1½	8.7 (220)	0.5 (12)	7.5 (190)

Dimensions are nominal. Please obtain certified prints from Fives North American Combustion, Inc. if space limitations or other considerations make dimension(s) critical.

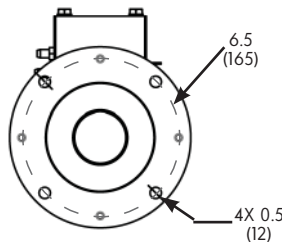
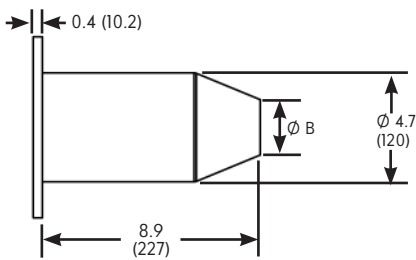
## 5-A/5-B DIMENSIONS, inches (mm)



### 310 Alloy Tile:

5-A/5-B weight: 2.7 lb (1.2 kg)

Maximum chamber temp: 1750°F (950°C)

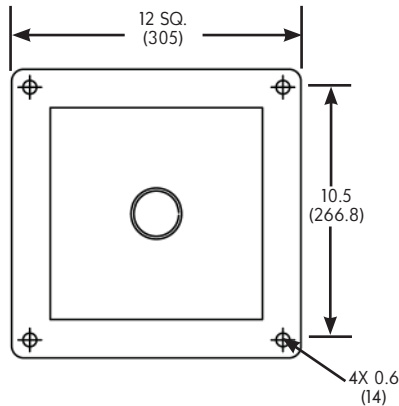
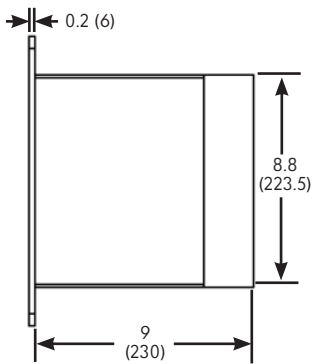


### Silicon Carbide Tile:

5-A/5-B weight: 5 lb (2.3 kg)

Maximum chamber temp: 2500°F (1371°C)

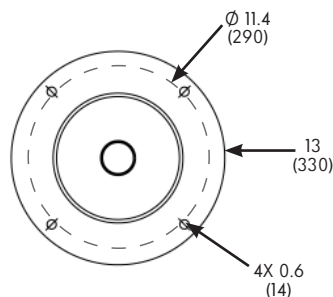
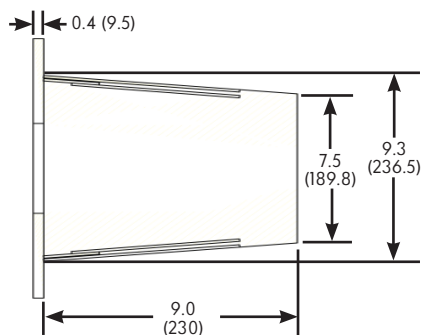
Dimensions	High Velocity 5-A/5-B	Medium Velocity 5-A/5-B
Ø A	1.8/2.3 (45/58)	2.2/3.1 (57/78)
Ø B	2.0/2.5 (51/64)	2.5/3.3 (64/84)



### Square Refractory Tile:

5-A/5-B weight: 69 lb (31.3 kg)

Maximum chamber temp: 2800°F (1535°C)



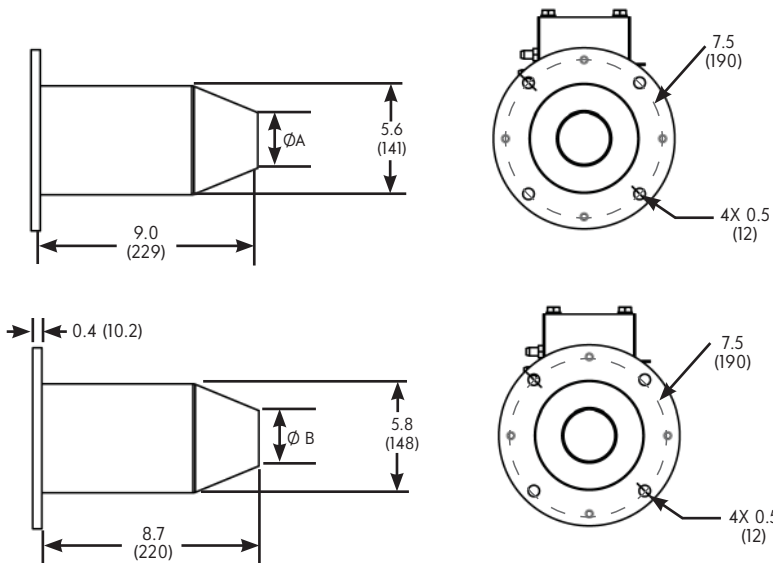
### Round Refractory Tile:

5-A/5-B weight: 54 lb (24.5 kg)

Maximum chamber temp: 2800°F (1535°C)

# Tiles | Tempest<sup>®</sup> SE

## 6-A/6-B DIMENSIONS, inches (mm)



### 310 Alloy Tile:

6-A/6-B weight: 3.1 lb (1.4 kg)

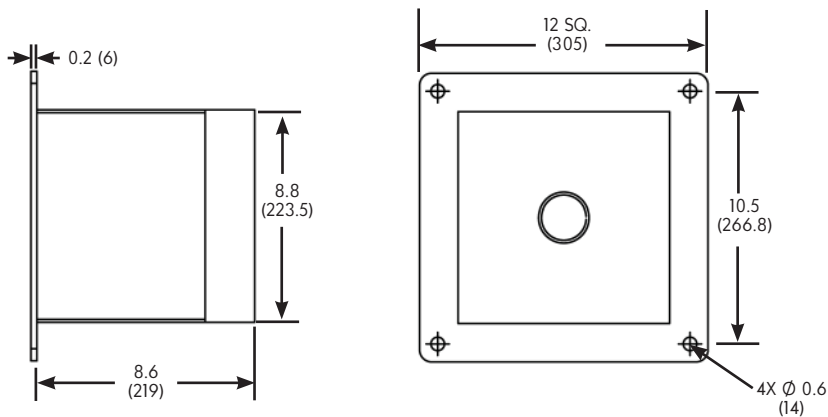
Maximum chamber temp: 1750°F (950°C)

### Silicon Carbide Tile:

6-A/6-B weight: 6 lb. (2.7 kg)

Maximum chamber temp: 2500°F (1371°C)

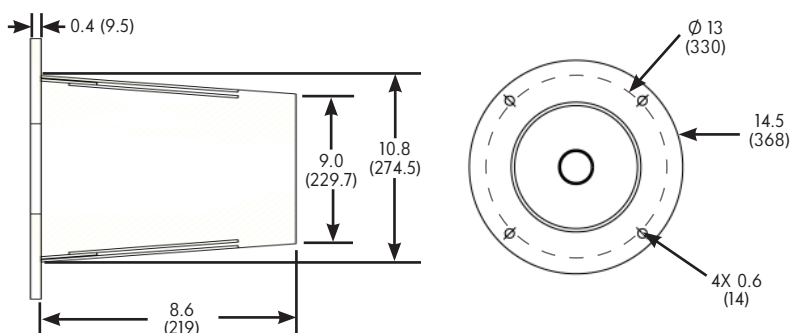
Dimensions	High Velocity 6-A/6-B	Medium Velocity 6-A/6-B
Ø A	2.3/2.6 (58/67)	3.2/3.7 (80/93)
Ø B	2.5/2.9 (64/74)	3.4/3.9 (87/99)



### Square Refractory Tile:

6-A/6-B weight: 62 lb (28.1 kg)

Maximum chamber temp: 2800°F (1535°C)



### Round Refractory Tile:

6-A/6-B weight: 37 lb (30.4 kg)

Maximum chamber temp: 2800°F (1535°C)

# Tile Options | Tempest<sup>®</sup> SE

Tile materials and shapes to suit your specific needs.

**"A" Tile (standard)** — 310 SST alloy tile for applications up to 1750°F (954°C).

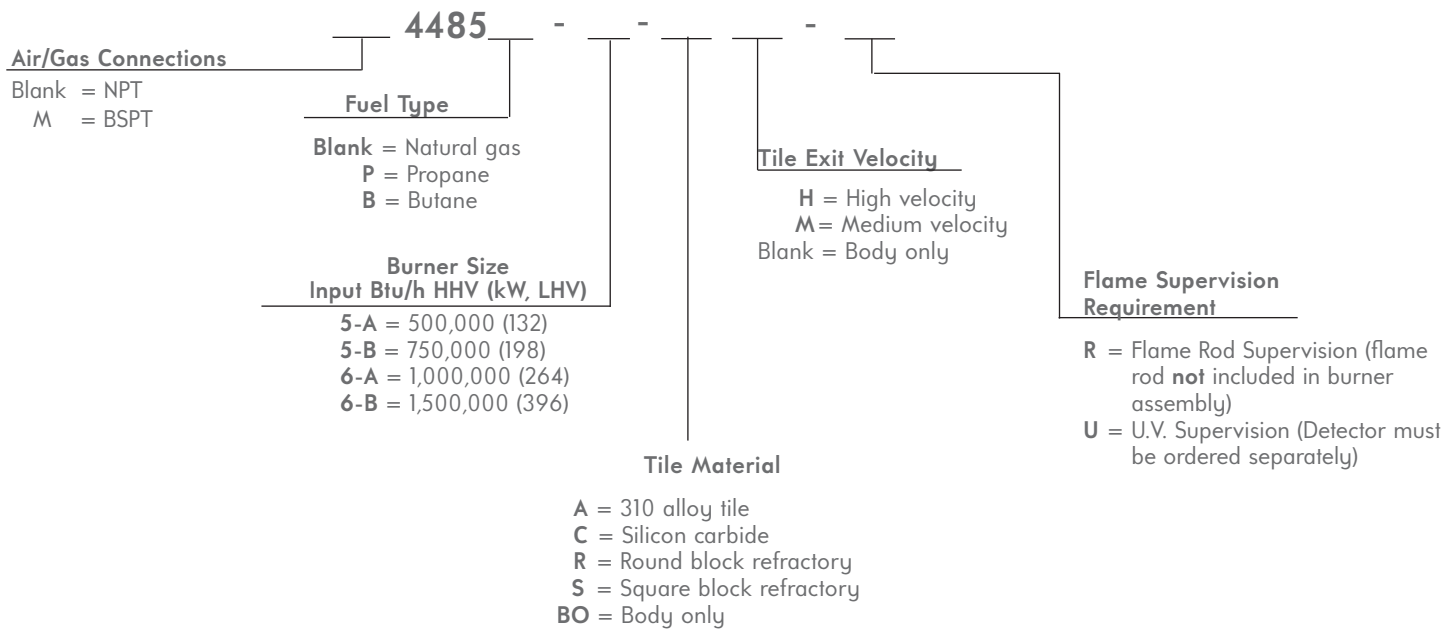
**"C" Tile** — Silicon carbide tile for fiber wall and most applications up to 2500°F (1371°C).

**"R" Tile** — Round refractory block for applications to 2800°F (1535°C). **Note: Recommended only for installation in solid wall construction furnaces/kilns.**

**"S" Tile** — Square refractory block for applications to 2800°F (1535°C). **Note: Recommended only for installation in solid wall construction furnaces/kilns.**

**"BO" Burner Only** — Burner without tile, for applications where the tile is formed in the furnace wall.

# Ordering Information | Tempest<sup>®</sup> SE

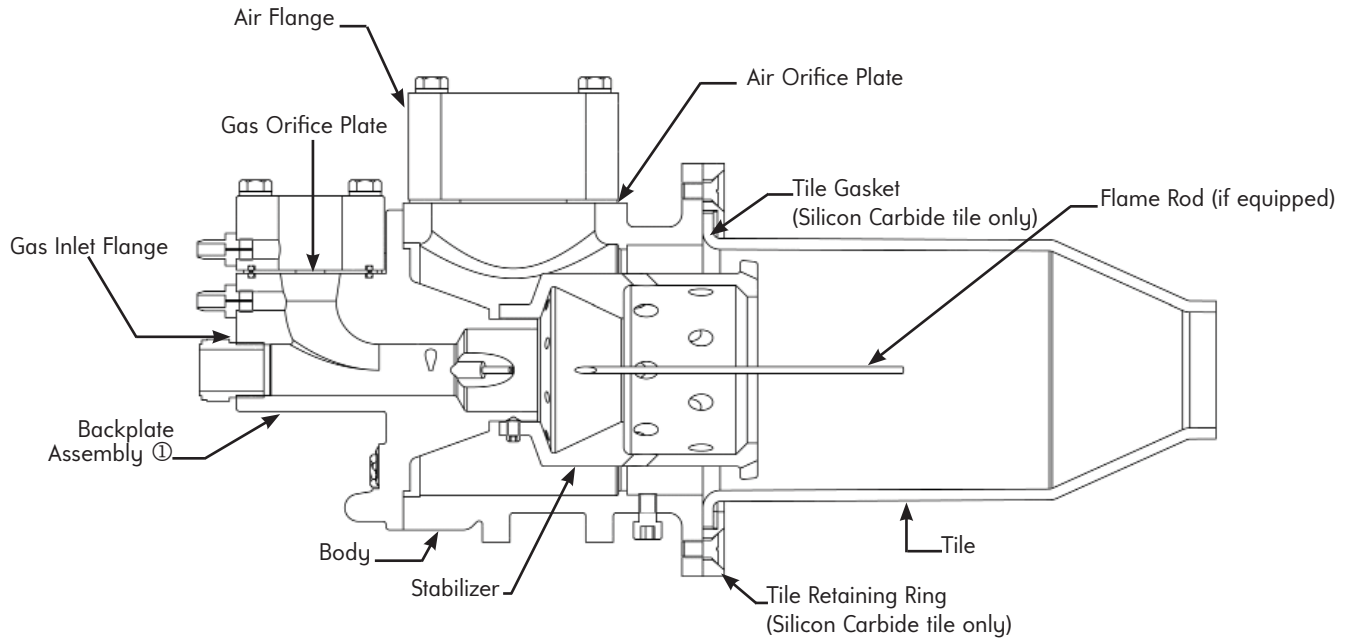


## Examples:

**4485-6-A-AH-U** – 1,000,000 Btu/h HHV (264 kW LHV) capacity Natural Gas burner with NPT air/gas connections, 310 alloy tile and high velocity tile outlet, and UV flame supervision compatibility.

**M4485P-6-B-CM-R** – 1,500,000 Btu/h HHV (396 kW LHV) capacity Propane burner with BSPT air/gas connections, silicon carbide tile, medium velocity tile outlet, and flame rod supervision compatibility.

# Spare Parts List | Tempest® SE



Part Name	5-A	5-B	6-A	6-B
Burner only (less tile) -NPT	4485-5-A-BO	4485-5-B-BO	4485-6-A-BO	4485-6-B-BO
Burner only (less tile) -BSP	M4485-5-A-BO	M4485-5B-BO	M4485-6-A-BO	M4485-6-B-BO
Body	4-55362-1	4-55362-1	4-55491-1	4-55491-1
Air inlet flange ③	4-55633	4-55633	4-55634	4-55634
Gas inlet flange ③	4-55364	4-55364	4-55493	4-55493
Stablizer, -U (U.V. only)	4-55837-1	4-55369-1	4-55498-1	4-55498-1
Stablizer, -R (flame rod compatible)	4-55523-1	4-55838-1	4-55839-1	4-55839-1
Backplate assembly ①③	4-55659	4-55660	4-55661	4-55662
Air orifice plate	4-55522-1	4-55367-1	4-55496-1	4-55526-1
Natural gas orifice plate	4-55365-2	4-55365-1	4-55524-2	4-55524-1
Propane orifice plate	4-55365-5	4-55365-3	4-55524-4	4-55534-2
Butane orifice plate	4-55365-6	4-55365-4	4-55524-4	4-55524-3
310 SST Alloy tile (High Velocity)	4-55635-1	4-55360-1	4-55490-1	4-55520-1
310 SST Alloy Tile (Medium Velocity)	4-55360-1	4-55730-1	4-55731-1	4-55732-1
Silicon carbide tile (High Velocity)	4-55528-1	4-55373-1	4-55507-1	4-55532-1
Silicon carbide tile (Medium Velocity)	4-55373-1	4-55720-1	4-55721-1	4-55722-1
Silicon carbide tile assembly (High Velocity)②	4-55663-1	4-55664-1	4-55665-1	4-55666-1
Silicon carbide tile assembly (Medium Velocity)②	4-55664-1	4-55757-1	4-55728-1	4-55729-1
Round refractory block tile (High Velocity)	4-55542-1	4-55499-1	4-55640-1	4-55642-1
Round refractory block tile (Medium Velocity)	4-55499-1	4-55751-1	4-55752-1	4-55753-1
Square refractory block tile (High Velocity)	4-55530-1	4-55537-1	4-55540-1	4-55543-1
Square refractory block tile (Medium Velocity)	4-55537-1	4-55743-1	4-55744-1	4-55745-1
Tile retaining ring	4-55374-1	4-55374-1	4-55508-1	4-55508-1
Tile gasket	4-55375-1	4-55375-1	4-55509-1	4-55509-1
Spark plug			4-55370-1	
Flame rod			4-55740-1	

① Backplate assembly includes backplate, gas inlet flange, gas orifice plate, pressure taps and o-ring.

② Assembly includes tile, tile retaining ring and tile gasket

③ Use "-1" suffix for NPT, "-2" for BSPT.



# North American High Velocity Family

If the 4485 does not suit your application, the original North American Tempest® and HiRAM® high velocity burners offer many features the 4485 SE type burners does not. North American is still developing new models, and enhancements to our classic burners.

## 4441 Tempest®

The 4441 Tempest® is the improved version of the innovative 4442, the original high velocity, high excess air, nozzle mix burner that revolutionized the industrial heating industry. It offers many advanced features, including higher velocity, wider stable operating range and lower NOx options. The high fire capacity range is 0.13M to 5.4M Btu/h HVV.

Tile options include:

- Slotted tiles for better temperature uniformity
- Threaded metal tile exits, for unique mounting options
- Engineered tile exits to provide higher velocities than 4485 type burners
- Mounting plates that give the "A" style thin wall tiles an 11" length.
- Light weight ceramic tiles that can be used in up to 3000°F applications

Product Highlights:

- Stable operation to over 40" w.c. air inlet pressure.
- Stable operation for applications that require excess fuel.
- Simple inexpensive cross connected control is available over a wide range of operations.
- Tested with the DMC ultra-low NOx control system.
- All 4441's work with UV or Flame rod without modifying the burner.



**4441 Tempest®.** Shown with alumina/mullite slotted tile for narrow lane firing and better temperature uniformity.

## 4445 Tempest®

The 4445 Tempest® is a small diameter high velocity burner that can be ordered to fit in 9" to 40" thick walls. The 4445-capacity range is 195K to 1.5M Btu/h HHV. They can be ordered with a flame rod, or it can be omitted for UV flame supervision.

Tile exit options including:

- Round or slotted ceramic tiles suitable for up to 2900°F operation
- Round metal investment cast tiles (HT grade alloy)
- Special metal tile option with outside diameter of 3¼" with a capacity up to 690K Btu/h HHV

Product Highlights:

- Stable operation for applications that require excess air or fuel.
- Simple inexpensive cross connected control is available over a wider range of operations.



## 4575/6575 HiRAM®

The 4575/6575 HiRAM® burners are low NOx high velocity burners available in larger sizes.

Product Highlights:

- Sizes ranging from 4 to 25 million Btu/h HVV for natural gas or propane
- Available as the dual fuel 6575 for gas or light oil from 6 to 25 million Btu/h HVV
- Lights with direct spark or pilot (6575 pilot only)
- Available with round refractory or metal alloy tiles





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