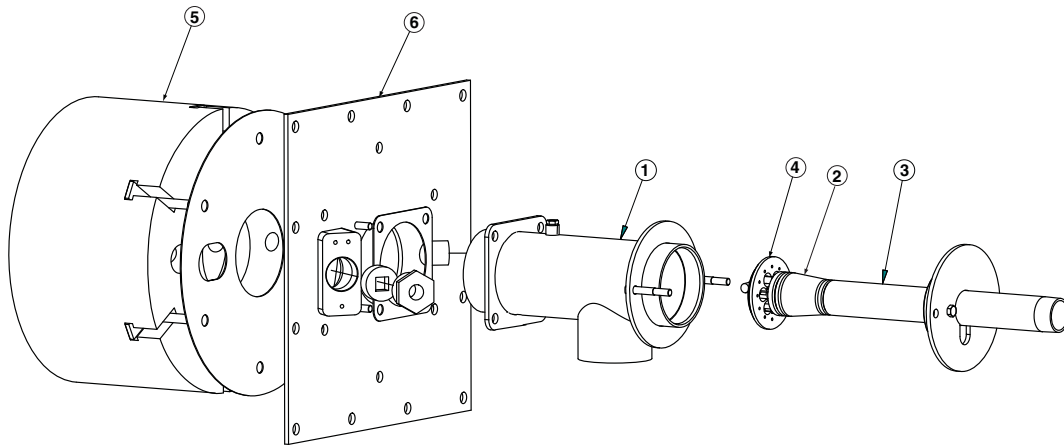


Specifications of OXY-THERM® TITAN™ burners

Typical burner data			
Fuel: natural gas at 15°C with 10.9 kWh/Nm ³ HHV - sg = 0.6			
Oxygen: 90-100% purity			
Stated pressures are indicative. Actual pressures are a function of air humidity, altitude, type of fuel and gas quality.			
Gas OXY-THERM® TITAN™ burners		1-1/2"	2"
Capacity	kW	586 to 3514	2928 to 9660
Thermal turndown from specified maximum capacity		8:1	8:1
Required pressures to burner inlet for maximum capacities	Natural gas	mbar	<710 [1]
	Oxygen	mbar	138
Typical oxygen to fuel volumetric ratios	To natural gas		2.05:1
			2.05:1

[1] Nozzles drilled per order to accommodate various fuels, available supply pressures, and desired capacity.

Materials of construction



Item number	Burner part	Material
1	Housing	304 SS (1.4301)
2	Nozzle tip	310 SS (1.4841)
3	Nozzle body	304 SS (1.4301)
4	Nozzle mixing plate	310 SS (1.4841)
5	Block	Alumina / Mullite refractory
6	Mounting plate	Carbon steel

Selection criteria

Application details

OXY-THERM® TITAN™ burners can be used in furnaces, melters, unit melters, reverberatory furnaces, ladles and other high temperature applications.

OXY-THERM® TITAN™ burners have a unique design which minimizes flame length. For applications such as ladle heating or rotary melting, chamber length will often be compact, making it necessary to use a burner with a compact flame to avoid damaging the end or bottom of the chamber.

OXY-THERM® TITAN™ has a mounting flange and block design that will accommodate vertical fired applications requiring “down fired” mounting or for units that require mounting onto removable/hinged doors like rotary melters.

Application temperatures

The OXY-THERM® TITAN™ burners are suitable for furnaces and melters with temperatures up to 1650°C.

Cooling flow, either clean, dry air or oxygen, must be used whenever the burner assembly is in a high temperature atmosphere and is not firing. See installation and operating instructions for more details.

Fuels

OXY-THERM® TITAN™ burners are designed for firing on any fuel gas.

Flame supervision

Flame scanning is possible down the optional flame sensing connection. Flame scanner cannot be used through pilot location to see main flame. Flame rod is not available.

Piloting and ignition

Oxy-fuel pilots and air-fuel pilots are available. Refer to pages 3-18.3-10 and 11 for pilot dimensions and specifications.

Oxygen/gas ratio controls

Correct fuel/oxygen ratio control valves should be selected. Trims should be selected for compatibility with oxygen. MAXON's MICRO-RATIO® valves are available with oxygen trim. For more accurate ratio control, use MAXON SMARTLINK® MRV valves, or for best performance, use SMARTFIRE® Intelligent Combustion Control System. Calibrated flow meters in the fuel and the oxygen lines are recommended for establishing accurate volumetric flow rates.

Burner blocks

OXY-THERM® TITAN™ burners are available with refractory block only.

Block material	
Type	Alumina / Mullite
Maximum temperature	1650° C

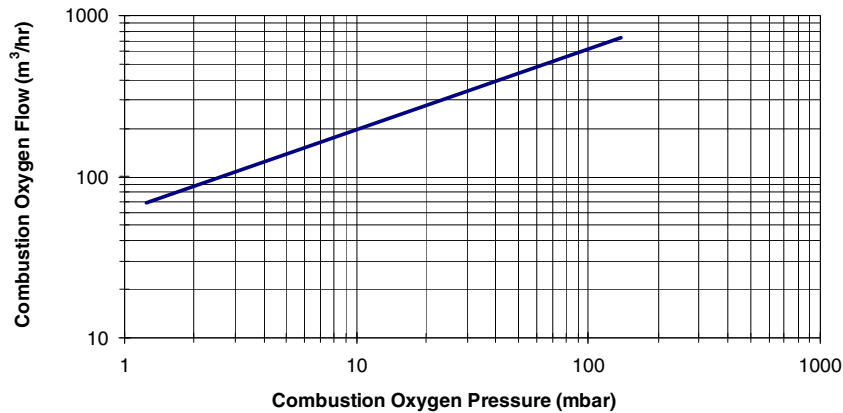
In addition to maximum furnace temperatures, temperature variations and furnace atmosphere (chemical composition) can also be factors used to determine the appropriate block material. Alternate materials are available upon request. Please contact MAXON for further details.

Combustion oxygen pressure vs. flow

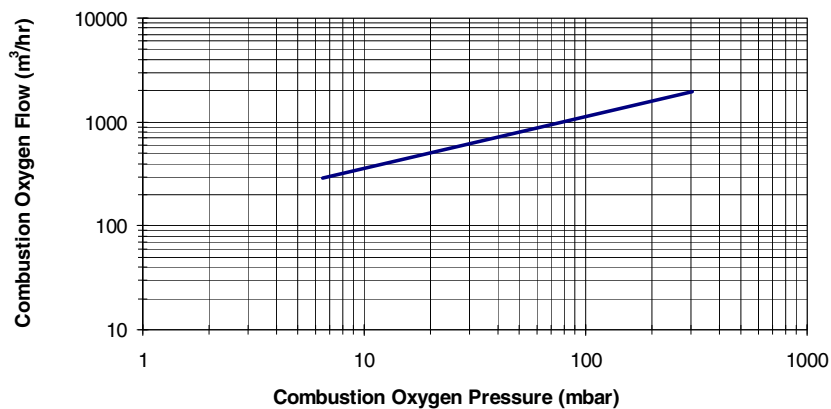
OXY-THERM[®] TITAN[™] burners may be adjusted to operate on ratio, with excess oxygen (oxidizing environment) or with excess fuel (reducing environment). Typical applications will operate with 1-2% excess oxygen.

If burners are shut down while the furnace remains hot, it is recommended to continue a small flow of oxygen for cooling of the burner. Alternatively, air or nitrogen can be used for burner cooling during burner shut down. Total elimination of oxygen flow in hot furnaces can thermally damage burner fuel inserts and other parts. For extended shut downs in hot furnaces, it is recommended that the fuel insert be removed.

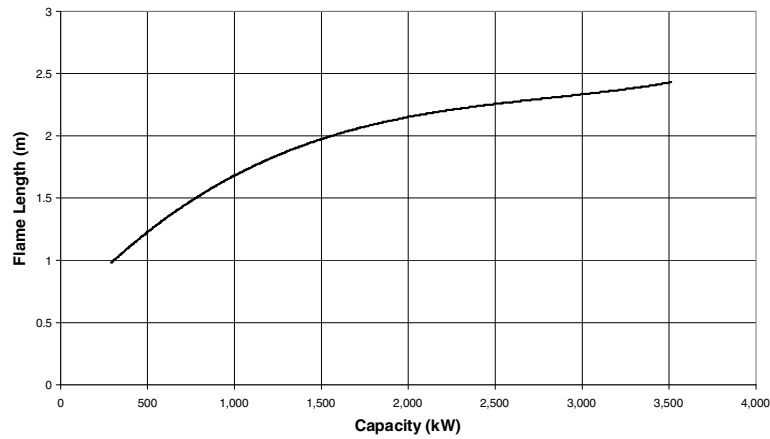
Combustion oxygen pressure - 1-1/2" OXY-THERM[®] TITAN[™] burners



Combustion oxygen pressure - 2" OXY-THERM[®] TITAN[™] burners

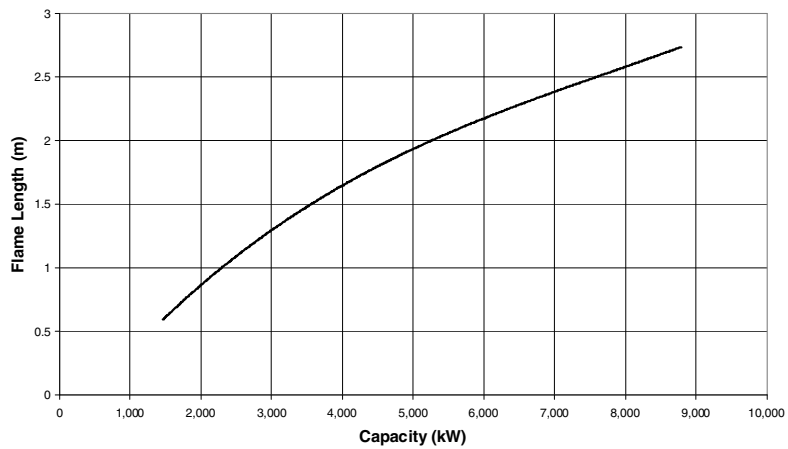


Flame lengths - 1-1/2" OXY-THERM[®] TITAN[™] burners



Contact MAXON for flame length details when selecting a burner with maximum capacity below 3500 kW

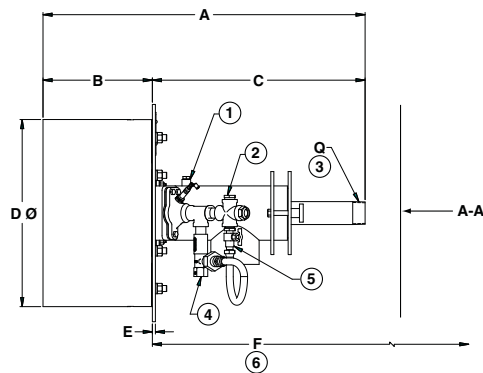
Flame lengths - 2" OXY-THERM[®] TITAN[™] burners



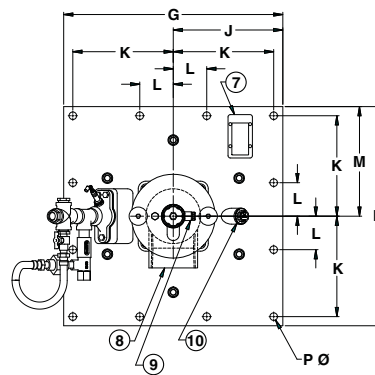
Contact MAXON for flame length details when selecting a burner with maximum capacity below 8800 kW

Dimensions and weights

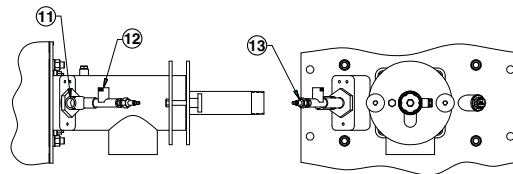
- 1) 1/4" NPT combustion oxygen pressure tap
- 2) 3/8" NPT gas inlet
- 3) Fuel gas inlet
- 4) 3/8" NPT air inlet
- 5) Optional sealed boosted air pilot assembly shown. See partial view B-B for optional oxy-pilot assembly
- 6) Distance to remove gas insert assembly
- 7) Nameplate
- 8) 3" NPT combustion oxygen inlet
- 9) 1/4" NPT fuel gas pressure tap
- 10) 3/4" NPT coupling location for optional flame sensing device
- 11) 1/2" NPT oxygen inlet
- 12) 3/8" NPT gas inlet
- 13) Optional oxy-pilot assembly



View A-A



View B-B



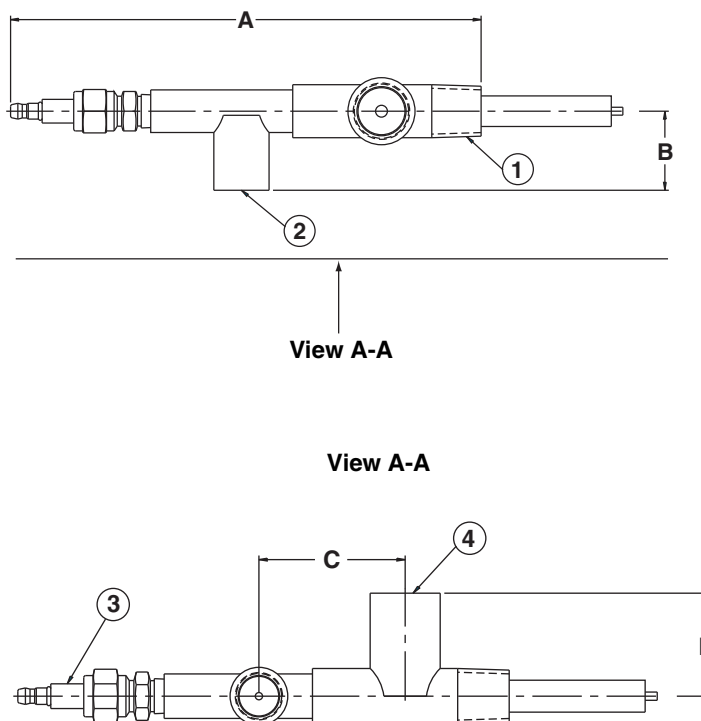
Dimensions in mm unless stated otherwise								
Size	A	B	C	D Ø	E	F	G	J
1-1/2"	678	230	448	394	6	775	457	229
2"	749	230	519	394	6	914	457	229

Size	K	L	M	N	P	Q NPT	Weight kg
1-1/2"	210	70	229	457	16	1-1/2"	84
2"	210	70	229	457	16	2"	88

Accessories

Oxy-pilot

- 1) 1/2" NPT
- 2) 3/8" NPT fuel inlet
- 3) Spark ignitor
- 4) 1/2" NPT oxygen inlet

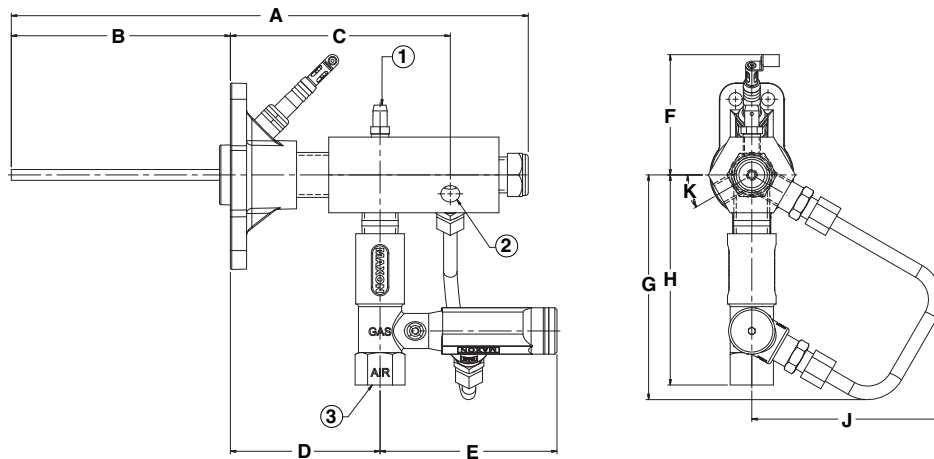


Dimensions in mm unless stated otherwise			
A	B	C	D
191	33	56	41

Oxy-fuel pilot specifications			
Gas flow	Flow m ³ /h	Pressure mbar	Capacity kW
Natural gas	1.0	12	10
Propane	0.4	5	10
Oxygen	5.7	20	10

Air-fuel boosted pilot

- 1) Pressure tap 1/8" NPT
- 2) Gas inlet 1/4" NPT
- 3) Air inlet 3/8" NPT



Dimensions in mm unless specified otherwise									
A	B	C	D	E	F	G	H	J	K
304	128	129	88	104	71	132	123	112	30°

Air-fuel boosted pilot specifications			
Gas flow	Flow m ³ /h	Pressure mbar	Capacity kW
Natural gas	2.6	25	27
Air	8.5	27	27

Model number description

OXY-THERM® TITAN™ model number						
Series	Model	Size	Fuel	Pilot	Flame detection	Block material
S	TITAN	15	N	N	N	3

Series

S - if special - blank if not

Model

TITAN - model ID

Size

15 - 1-1/2" size
20 - 2" size

Fuel

N - natural gas
X - other fuel

Pilot

A - air pilot chosen
N - no pilot chosen
O - oxy-fuel pilot chosen

Flame detection

N - no flame sensor will be used
Y - UV scanner provision (customer supplied)

Block material

3 - Alumina/Mullite
X - special

Installation and operating instructions for OXY-THERM® TITAN™ burners

Application requirements

View port

A view port to observe burner flame is essential to inspect flame aspect. Locate the view port downstream of the flame, looking back to the burner block. Make sure the complete flame can be evaluated.

Support burner oxygen and gas piping

The OXY-THERM® TITAN™ burner shall not be used as support for the piping to the burner. Gas and oxygen piping shall be supported in such a way that no additional loads will be created on the burner. Flexible connections are typically recommended for all OXY-THERM® TITAN™ installations for both fuel and oxygen to prevent transferring mechanical loads or vibrations to the burner's ceramic parts.

Burner mounting flange loads

Check burner weight and reinforce burner mounting flange or combustion chamber/furnace back wall if necessary to accept complete burner weight.

Installation instructions

Storage of OXY-THERM® TITAN™ burners

OXY-THERM® TITAN™ burners shall be stored dry (inside). Burner blocks have been cured carefully before shipment and shall be kept dry. Wetting of the blocks could result in premature failures.

Handling of OXY-THERM® TITAN™ burners

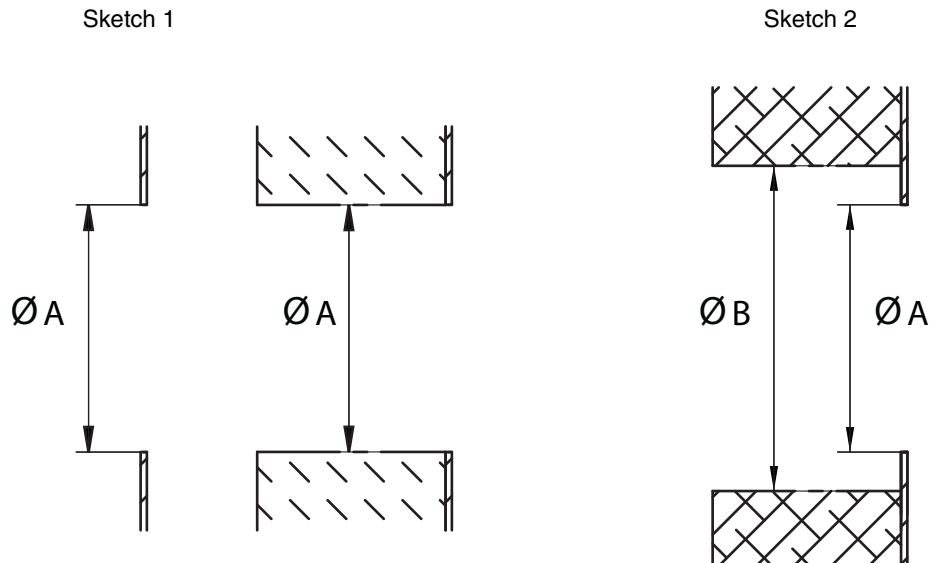
OXY-THERM® TITAN™ burners are shipped as complete units. Handle burners with care, using proper equipment, during unpacking, transport, lifting and installation. Any impact on the burner could result in damage.

Flange the burner to the installation

Bolt the burner to the installation's burner mounting flange. Use proper gasketing. Tighten the flange bolting with correct torque. Retighten all bolts after first firing and regularly after commissioning.

Burner mounting

Furnace/combustion chamber requirements



Sketch 1: sheet metal combustion chambers, furnaces without internal insulation or with soft wall internal insulation: flange / opening internal diameter shall be = Ø A

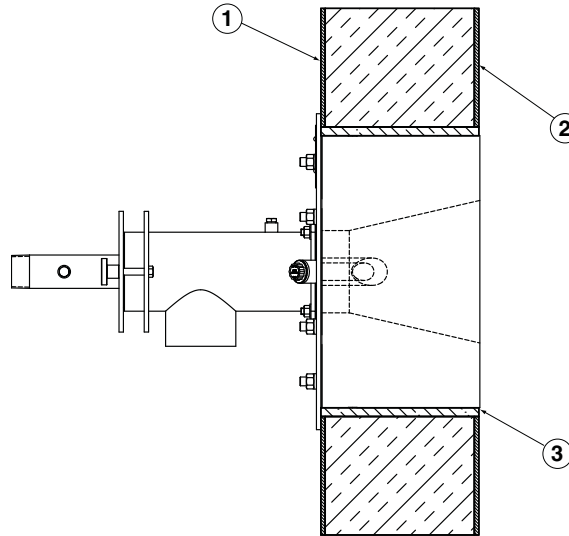
Sketch 2: furnaces or ovens with brick walls: opening in brick wall shall be = Ø B (to be stuffed with castable refractory)

Dimensions in mm unless stated otherwise		
Burner size	A Ø	B Ø
1-1/2"	420	540
2"	420	540

Burners with refractory blocks require supporting of the burner block by the furnace wall. Check burner weight and reinforce combustion chamber/furnace back wall if necessary to take complete burner weight. Stuff the gap between block and furnace wall with castable refractory.

Blocks are not to extend out of furnace. Block life is enhanced when block is installed per the drawing below and insulated.

- 1) Furnace shell
- 2) Furnace wall
- 3) Castable refractory material



Start-up instructions

Instructions provided by the company or individual responsible for the manufacture and/or overall installation of a complete system incorporating MAXON burners take precedence over the installation and operating instructions provided by MAXON. If any of the instructions provided by MAXON are in conflict with local codes or regulations, please contact MAXON before initial start-up of equipment.



Read the combustion system manual carefully before initiating the start-up and adjustment procedure. Verify that all of the equipment associated with and necessary to the safe operation of the burner system has been installed correctly, that all pre-commissioning checks have been carried out successfully and that all safety-related aspects of the installation are properly addressed.

First firing or restart after shut-down

During first start-up of the burner, and after every longer installation shut-down, the temperature rise shall be limited. Allow the burner to fire on low fire for some time to allow the parts to heat up slowly.

Checks during and after start-up

During and after start-up, check the integrity of the system. Check all bolted connections after first firing (first time on temperature) and retighten if necessary.

Pilot ignition

Before ignition of the pilot, adjust the oxygen to the minimum burner oxygen flow. Set pilot gas flow to the correct value before pilot ignition attempt.

Main burner ignition

Set correct gas flow for burner minimum capacity before attempt of main burner ignition.

After ignition of main burner, allow some time on minimum capacity to allow the burner parts to heat up slowly.

Burner adjustment and control

Oxygen-fuel burners require accurate control of both fuel and oxygen for optimum performance. Piping to individual burners should include control valves for both oxygen and fuel. In addition, flow meters for oxygen and fuel capable of local or remote readout are required for proper burner adjustment.

If required, flame sensing may be accomplished by UV scanner. Burner design can incorporate a UV scanner port suitable for supervision of both pilot and main flames. UV scanner, if used, should be kept as close to burner as feasible. Heat block, if used, may affect signal strength with some brands of UV scanners.



CAUTION: Oxygen should only be used with approved materials, properly cleaned pipe and equipment, and specially designed systems. Ordinary materials can be extremely flammable in the presence of oxygen and air enriched with oxygen.

Maintenance and inspection instructions

Safety requirements

Regular inspection, testing and recalibration of combustion equipment according to the installation manual is an integral part of its safety. Inspection activities and frequencies shall be carried out as specified in the installation manual.

Perform the following activities at least annually as part of a recommended preventative maintenance routine:

- Inspect burner internal parts for wear and oxidation.
- Inspect associated control instruments and devices for function with particular attention to all safety permissive switches.
- Perform leak tests on fuel shut-off valve according to any schedule established by the authority having jurisdiction.

Visual inspections

Regular visual inspection of all connections (oxygen and gas piping to the burner, bolting of the burner to the furnace) and burner flame size and aspect are essential for safe operation.

Spare parts

Keep local stock of spark ignitor if burner is equipped with pilot. It is not recommended to keep local stock of other burner parts. Consult installation manual for burner spare parts and system accessories.