

# equipment specs

## FLAT-JET BURNER SYSTEMS

### BENEFITS

- Improved heat transfer - increases productivity by 20-30 percent, maintains yields, lowers fuel costs
- Reduced roof and exhaust temperatures - extends refractory life
- Reduced flue gas volume,  $\text{NO}_x$ , and particulates - lowers furnace pressure
- Increased turndown ratio - permits idling with oxy-fuel
- Sophisticated combustion control - provides precise stoichiometric ratio control

Driven by the needs of our customers, BOC Gases has developed an innovative burner which has proven effective in aluminum melting — the *Flat-Jet* burner system. This unique burner produces a wide, low-velocity, well-mixed oxy-fuel flame that maximizes flame coverage, temperature, and heat transfer to increase melt rates when producing aluminum and other metals.

#### **How Flat-Jet burner systems work**

BOC's *Flat-Jet* burner systems produce a wide, flat flame with uniform heat transfer and high luminosity. Flexible burner design adjusts flame width to accommodate furnace dimensions.

The burner is aerodynamically engineered to provide broader, more uniform flame coverage than conventional tube-in-tube conical burners. Flame luminosity is also greater, which further enhances heat transfer.

Highly laminar flow at lower velocities than those of conical burners produces a more uniform flame profile to eliminate spiking temperatures, which in turn lowers thermal  $\text{NO}_x$  emissions.

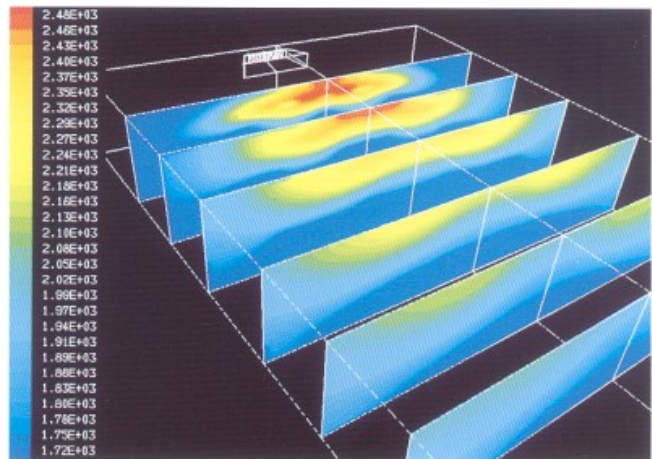


BOC Gases' patented *Flat-Jet* burner systems increase melt rates to maximize production.

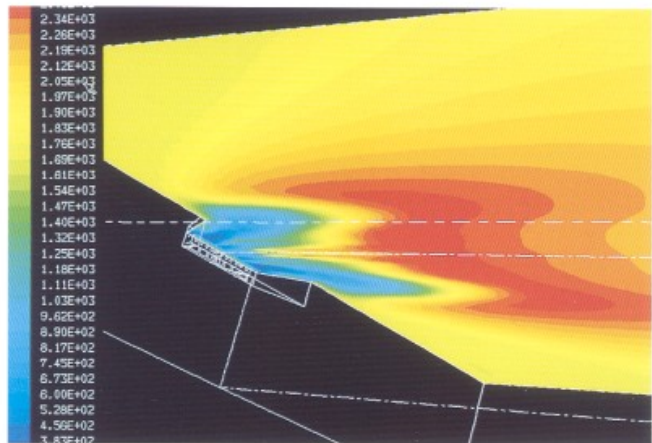
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## System advantages

- **Maximizes heat transfer.** Broad flame coverage gives the *Flat-Jet* burner the highest heat transfer rate of any oxy-fuel burner tested. Heat transfer is up to 50 percent better than conventional designs, significantly increasing productivity.
- **Maintains yields.** Unlike other oxy-fuel burner configurations, the *Flat-Jet* burner system does not increase dross formation.
- **Extends refractory life.** Although the *Flat-Jet* burner achieves higher melt rates, roof and exhaust temperatures are 100 – 200 °F (38 – 93 °C) less than those of conventional burners. Lower temperatures and low-velocity laminar gas flow can lead to longer refractory life.
- **Lowers NO<sub>x</sub>.** The low-velocity flat flame reduces the temperature variations and turbulence that can generate NO<sub>x</sub>. In laboratory trials, the *Flat-Jet* burner produced 16 percent less NO<sub>x</sub> than conventional oxy-fuel burners.
- **Lowers flue gas volumes.** By providing pure oxygen for combustion in place of air, the BOC *Flat-Jet* burner system reduces the volume of exhaust gas by 70 – 80 percent. There is less carry over of dust and fumes. Capital costs on associated equipment, maintenance, and power are significantly reduced.
- **Lowers fuel costs.** On well-type melters ranging from 140,000 – 165,000 lb (63,500 – 75,000 kg) in capacity, fuel consumption in commercial applications has been reduced by 50 – 65 percent.
- **Lowers maintenance costs and time.** The *Flat-Jet* burner system features a self-cooling design that reduces the effects of splashing on the burner.
- **Reduces noise.** Reduced velocity and gentler flow result in quiet operation. Laboratory trials have measured noise output of up to 7 dB below that of conventional conical burners.
- **Provides precise stoichiometric ratio control.** Combustion controls can be modified to meet the customer's process requirements.



This computer model illustrates the *Flat-Jet* burner system's uniform heat distribution over the melt.



Our advanced combustion modeling shows the *Flat-Jet* burner system's broad flame coverage.



*R&D Magazine* recently selected BOC's *Flat-Jet* oxy-fuel burner system as one of the world's 100 most technologically significant new product developments.

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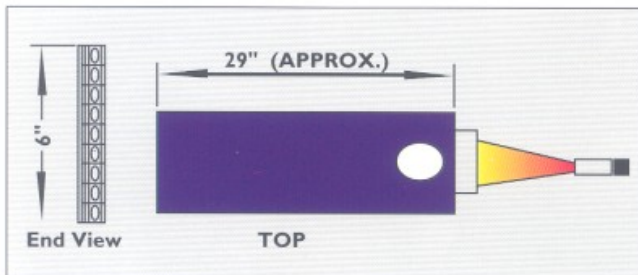
## FLAT-JET BURNER SYSTEMS SPECIFICATIONS

<b>Material of construction</b>	stainless steel
<b>Capacity</b>	0.5 – 20 mmBTU/h (0.53 – 21 GJ/h)
<b>Flame angle at the nozzle</b>	60°
<b>Amplitude (height) of flame</b>	12 – 18 in ( 30.5 – 46 cm )
<b>Turndown</b>	8:1 or greater
<b>Burner block</b>	proprietary flame-shaping design

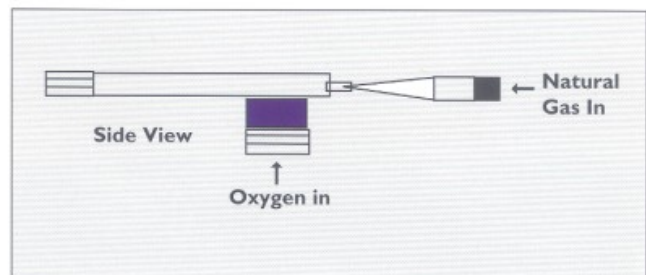
## FLAT-JET BURNER SYSTEMS DIMENSIONS

Nominal burner rating mmBTU/h (GJ/h)	Block dimensions in (cm)			Flame dimensions ft (m)*	
	Height	Width	Depth	Length	Width
2.5 (2.63)	12 (30.5)	15 (38.1)	15 (38.1)	6 (1.8)	5 (1.5)
5.0 (5.25)	12 (30.5)	15 (38.1)	15 (38.1)	8 (2.4)	7.5 (2.3)
10.0 (10.50)	12 (30.5)	18 (45.7)	15 (38.1)	10.5 (3.2)	9 (2.7)

\* Dimensions estimated based on test firing at nominal rating

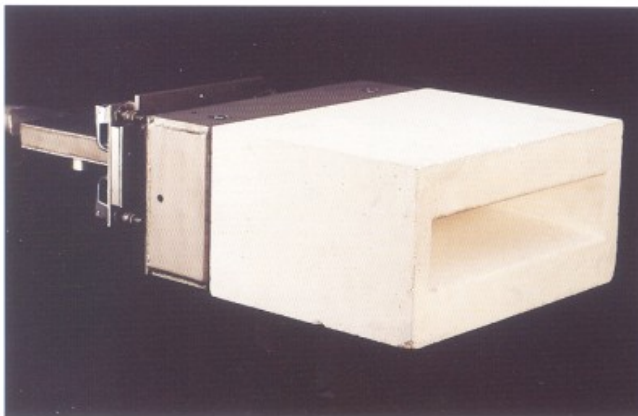


Top View

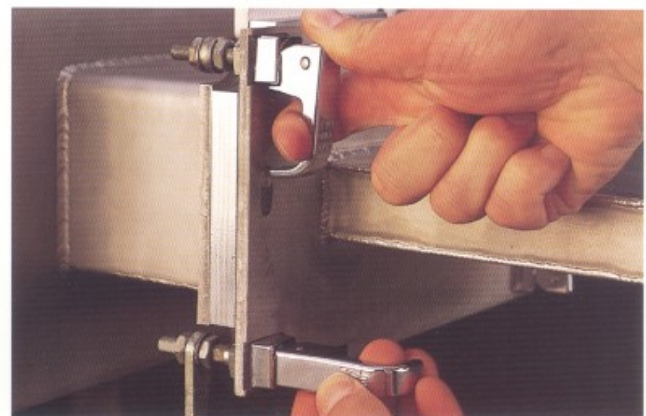


Side View

The *Flat-Jet* burner system's flame is wide (see top view) and flat (see side view), with a uniform temperature profile.



The burner block is an integral part of the *Flat-Jet* burner system.



Quick disconnect and remounting without hand tools allows for easy removal and installation.

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## BOC GASES

BOC Gases is a trading name used by operating companies within The BOC Group, the parent company of which is The BOC Group plc

The BOC Group can be found on the Internet at <http://www.boc.com>

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