

Flame Treatment Technology (Laboratory Equipment)

Flame Treatment

Flame Treatment Of Plastics

In industry today the usage of plastics is becoming more widespread due to their increased processability, mechanical strength, and resistance to chemical attack. Due to the resistance of plastics to chemical attack, their use in painting or bonding applications is somewhat restricted.

It has been known that the surface properties of plastics can be changed by Flame Treating the surface prior to any painting or bonding application as means to increase the plastics characteristics of adhesion and help overcome any level of chemical resistance.

Treatment of the surface with the plasma of a flame imparts oxygen into the surface molecular layers of the substrate in order to increase the surface energy of the treated material. Increasing the surface energy (measured by dynes or contact angle), improves the wettability and provides an improved and consistent surface for further processing to occur, such as painting, printing, bonding, or laminating.



Flame Treatment Of A Bumper Fascia

Approximate Surface Energy/Dyne Levels Of Common Untreated Plastics

Polypropylene	29
Polyethylene	31
Polystyrene	32
Ionomer (Low)	33
Ionomer (High)	37
Vinyl Acrylic	39
Saran	40
Cellulose	42
Polyester (Mylar)	43
Nylon	46

Oxygen Content Set Point Of The Flame (Air/Gas Ratio)

All Flame Treatment Systems manufactured by FTS Technologies contain Oxygen Analyzers to monitor the air/gas combustion mixture for excess oxygen within the flame. The Laboratory Flame Treatment Units with Oxygen Monitoring undertake this via 100% manual controls. The analytical devices are there as a means for operators to make manual adjustments within the combustion controls to achieve the desired level of excess oxygen within the flame. Upper and lower alarm limits (if necessary) are programmed into the analyzer to ensure that oxygen content drift does not result in adverse process conditions, and alert operators to the need to make a manual adjustment to continue operation.

The correct level of excess oxygen within the flame depends on the type of material being treated. Optimum ranges for today's modern substrates are between 0.2% and 1.0% excess oxygen within the flame with an accuracy level of +/- 0.01%.

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Flame Contact Time With Product (Dwell Time)

Use of FTS Technologies Cirqual® Burner technology allows for complex three-dimensional shapes to be treated more consistently with faster robot traverse speeds than conventional linear burner technology due to the flames unique circular / mushroom flame shape, its ability to maximize dwell time, and wrap around edges and parting lines.



Equipment Overview

FTS Technologies can configure the manufacture of a flame combustion system to any customers specific requirements, including, but not limited too, type of gas used, gas pressure, level of required plant integration, online or offline applications, and safety requirements.

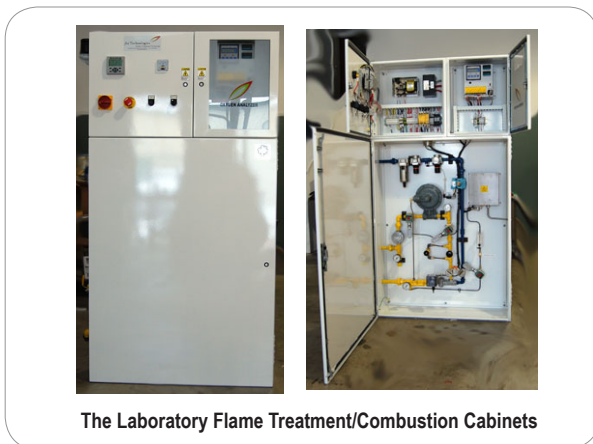
All of the equipment manufactured by FTS Technologies is built in accordance with the design and operational standards dictated by government or related association at the end use location of the equipment.

- Required Utilities:

- Gas: Any gas with a known calorific value
- Air: Standard compressed air
- Power: 110V or 240V

- Required Safety:

- Flame Safety: Constant monitoring devices for presence of flame
- Pressures: Utilities monitored for high and low pressure fluctuations
- E-Stop: Integrated E-Stop chain for external connection to peripheral devices

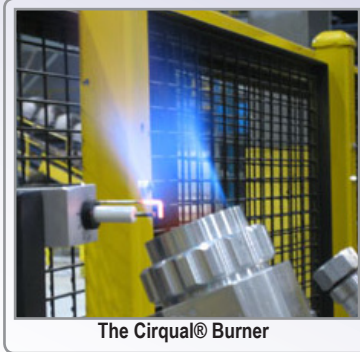


Laboratory Flame Treatment System with Oxygen Content Monitoring Executive Overview

Flame treatment

FTS Technologies have developed a line of laboratory flame surface treatment equipment, with oxygen content monitoring, intended to facilitate the need for a cost effective, and highly flexible, surface treatment solution that does not need the same level of process controls associated with fully productionized flame surface treatment equipment.

FTS Technologies laboratory flame treating units use the patented Cirqual® Burner that produces a highly consistent circular flame of sufficient size and energy to produce an exceptionally large processing window. The use of the Cirqual® Burner places less emphasis on maintaining a perfect burner-to-target distance, with the dynamic of the burner easily accommodating for fluctuations in distance and part geometry. These unique benefits allow robot programs to be written faster with the utilization of faster traverse speeds, the ability to surface treat a greater surface area of the part, improve overall part consistency and quality, and do it all without compromising the processing time.



The Cirqual® Burner

The use of FTS Technologies laboratory flame treatment systems and Cirqual® Burner technology allows for the most complex of parts be 100% surface treated effectively and efficiently in an environment geared towards process research and development. Manually adjusted oxygen contents provide users with fast and effective adjustments to the flame treating process, allowing extensive development to be undertaken without compromising the quality of the surface treatment as would be expected from fully productionized equipment sets.

The laboratory flame surface treatment equipment allows for products and process to be developed in a laboratory environment with confidence that all process data can be transferred into productionized processing.

Current Product Offering:

- A laboratory flame treating unit that houses electrical and mechanical controls to operate a single Cirqual® Burner, with the addition of an oxygen analyzer for oxygen content monitoring



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Laboratory Flame Treatment Equipment Technical Data

Flame Treatment

The laboratory flame treatment system is a gas/compressed air mixing cabinet complete with all regulators, a gas/air mixer, safety valves, and flow meters all pre-assembled, piped, and wired. In a separate enclosure within the generator cabinet will be installed the control electronics including flame safety relay and microprocessor together with related switches and push buttons. A complete oxygen analyzer is installed for means of process monitoring, and providing the ability to manually adjust process conditions quickly, efficiently, and reliably.

Compressed Air:

Pressure	Min Inlet:	4.1 Bar (60 PSI)	Nominal: 6.1 - 6.2 Bar (90 -100 PSI)
	Max Inlet:	8.3 Bar (120 PSI)	
Volume	200 L/MIN - 700L/MIN (424 CFH - 1480 CFH)		Nominal: 300 - 500 L/MIN (630 - 1060 CFH)

Combustion Gas:

(Natural Gas Or Propane)

Pressure	Min Inlet:	0.5 Bar (7 PSI)	Nominal: 0.8 - 1.2 Bar (12 - 17 PSI)
	Max Inlet:	1.5 Bar (22 PSI)	
Volume (Max)	Propane:	30 L/MIN (63 CFH)	Nominal: 14 - 20 L/MIN (30 - 42 CFH)
	Natural Gas:	65 L/MIN (130 CFH)	

Burner Type:

Cirqual® Burner (3" Diameter)
Cirqual® Burner (1.5" Diameter)

Burner Output / Energy:

70,000 - 80,000 BTU/Hr

Oxygen Analyzer:

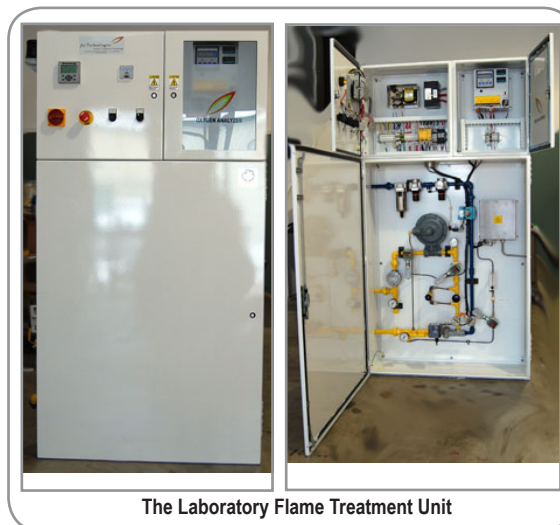
0.00% up to 20.90% (Non-Integrated)

Flame Velocity:

500 - 1100 ft/min

Burner-To-Target Distance:

1" - 5" Nominal: 3"



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