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Model 8830® Arc Spray System

The purpose of this bulletin is to give a detailed description of the 8830 arc spray system components, specifications, advantages, and service requirements.

The 8830 was developed as a totally new high performance 350 ampere gun. Modular design benefits you through highest performance, lowest cost and expandability as your needs change - no need to worry about obsolescence.

"Meets customer demand
for high reliability
and economical needs"

Praxair and TAFE has developed a broad line of interchangeable arc spray components: one basic gun, one improved control unit and one power unit. This provides many benefits--especially the easy assembly of many different systems--each designed to do the job best.

Modular Design Yields

Optimized Coating Quality:

The 8830 gun is available with many spray configurations as well as various spray pattern shapes. This optimizes coating quality with both low melt and high melt metals and gives the right coating density and finishability for each job.

Minimum Weight and Size:

The 8830 gun can be assembled from selected components to match the spray rate of the power unit. Result: minimum gun weight for each system.



8830 Arc Spray Gun

Small Simplified Control Console:

One basic control console is use to control and monitor spray parameters.

The Power Supply

All Praxair TAFE power units provide a relatively flat, constant, potential volt/ampere characteristic with a continuous control included for setting the open circuit voltage while operating. In the power supply the characteristics are developed exclusively for metal spraying. These features hold noise emission during spraying to the lowest possible level by carefully matching capacitance and inductance. The dimensions of the power supply are H-26¼ in. (67cm), W-16¼ in. (41cm), D-30¼ in. (77cm). The net weight of the unit is 346 pounds (157kg).

This unit operates with three-phase, 60 or 50 Hz, AC power. Casters on each power supply make the power supply portable.

Optional Feature:



Console Wire Reel Extension

- Model 839 Inside Diameter Gun: Available as an add on feature or a separate unit, the Model 839 can spray into pipes and small spaces only three inches in diameter and eight feet long. See Bulletin 1.1.8.3 for more information.
- Longer gun Leads: Extra length gun leads for operation in hard to get at places.
- ArcJet Option: This high velocity option is being universally used in the aircraft engine overhaul market (See Bulletin 1.1.8.4).

Spray Gun Specifics

The gun is rated at 350 amperes, 100 percent duty cycle. Note that all Praxair and TAFE arc spray guns are designed so that the serrations produced by the wire drive rollers are on the top and bottom of the wire as they pass through the contact tips, while the actual electrical contact (rubbing on the tips) occurs at 90 degrees. This reduces contact tip wear considerably compared with competitive units.

Contact Tubes & Atomizing Systems

The purposes of the contact tip and tube are to transfer current to the wire, to direct the wire at the appropriate angle to the axis of the torch, and to precisely maintain the relative position of the wires.

The 8830 arc head system maintains a constant wire position, arc length and atomizing gas geometry. Coating type (density, particle size, surface roughness and finishability) are simply varied by selecting air nozzle cap and atomizing gas pressure. Inexpensive contact tips are used to guide the wire into the arc region. These screw into contact tubes from the front of the gun thereby making tip change very rapid. Tips should be considered a consumable and changed regularly when 0.005 inch (125 microns) wear occurs. This consumable cost is very low and is a worthwhile expenditure to keep coating quality consistent; i.e., misaligned wires produce an erratic spray pattern and variable coating quality.

Wire Sizes

Praxair and TAFE recommends the use of 1/16 inch and 2 mm diameter wires. From our experience, this small diameter gives a more uniform particle

distribution and a better looking, superior coating. It has been our experience that 11 gauge wire is more difficult to handle relative to stiffness when attached to the gun, increases tip wear, and gives a coarser coating with wider particle size distribution and subsequent poorer finishing characteristics. Because of this and gun design characteristics Praxair and TAFE does not recommend that 11 gauge wire be used in the 8830.



Wire Drive Motor

A number of wire drive motors are available for special applications for all Praxair and TAFE guns. The specific air motor selected and shipped as standard on the 8830 rotates at a high speed and through a reduction gear, reduces to a roll speed range which permits 1/16 inch wires to be sprayed over the range of amperages permissible in the gun (25 to 350 amperes). The unit can be removed from the gun by simply unscrewing from the main body.

Wire Feed Unit

This unit uses a proven, double yoke system which retains constant mesh of all gearing, both in the open and closed position. Ball and needle bearings are used throughout. The wire is easily fitted into the gun. The infinitely variable roller tensioning mechanism is controlled by a simple thumb operated lever. Specially designed and hardened rollers contact the wire, give long life and are simply replaced. Roller covers protect this area from dust yet are easily removed. All four wire drive rollers are driven. Both drive rolls open. This assures centering of all wire diameters in wire guides.

Arc Shield

A permanent arc shield is built into the gun to shield the operator from arc radiation (arc temperatures reach 4000°C (7232°F) at the point where the two wires meet). With such a shield, the operator needs to wear only safety glasses. (NOTE: Plastic does not screen out ultraviolet which gives eye burn). This shield is made only long enough to do an adequate job of shielding the operator. Caution must be used when spraying on reflective surfaces; in such applications wear tinted glass safety glasses with side shields.

Amperage Rating of Gun

The maximum continuous amperage rating (100 percent duty cycle) of the 8830 gun is 350 amperes. The following table indicates the spray rates as a function of wire type and amperage.

Spray Rates for 8830 Gun	
	Lbs/hr/100 amps
Steel	10
Aluminum Bronze	9
Bronze	11
Copper	11
Aluminum	6
Zinc	24

All 8830 Guns are furnished with a hand operated trigger on the handle for turning on and off the wire feed. A small needle valve for wire speed control (spray rate), which is located on the same handle, is standard on all 8830 guns. Note that in special cases, this can be replaced with a simple manual valve. The purpose of these two valves is as follows. During normal operation, the needle valve is adjusted to give the proper wire feed rate and is no longer touched during constant operating periods. The trigger valve is used to turn the wire feed on and off.

It has the following advantages:

- Permits instant on/off operation of the unit without moving the hand or changing grip.
- Permits reproduction of exact wire feed speeds from operating period to operating period without waste of wire and going through and adjustment period, thus providing assurance that the exact spray rates previously used are reproduced.
- Conserves wire

Advantages of Arc Spray over Combustion

- The arc spray is a far more simplified system for reproducibility. If the air pressure is kept constant with proper regulation and the amperages set (indicating constant wire feed), then one can always reproduce the same melt power and coating conditions. This is not the case in a combustion gun which involves adjustment of flame intensity, oxy/fuel ration, etc.
- The arc spray gun is an instant on/off device. When the air control lever is pressed, one immediately begins to spray at the proper rate. In addition, there is no need to allow the wire to pass through the gun after the flame is shut down to assure that plugging of tips does not occur.

- The arc spray gun is very reproducible from operator to operator and Friday night to Monday morning. There is only one setting. When the air system is shut down, you do not need to readjust any of the air flow or current settings. Thus, when the unit is started up with a single push button, exact settings are reproduced.
- All of the above characteristics of the arc spray gun lead to less operator judgment and, therefore, more reproducible coatings.
- Because the arc spray melts the wire with an electric arc, a higher particle temperature is achieved and one is guaranteed of complete melting. This results in higher bond strengths with the higher melting point materials-- with most materials, two and one-half times that of a gas gun.
- Considerably less energy is consumed by the arc spray gun (1/9th that of a gas gun). This combined with instant on/off results in considerable cost savings.

The System

The system consists of a control unit which turns the power and air supply on and off with toggle switches. A wire feed motor, pressure regulator, an oil lubricator for the air motor, and an atomizing air pressure regulator (which controls coating smoothness and density and improves first pass bond strength) are also provided. The power supply is a constant potential unit especially designed for operation with the Praxair and TAFE arc spray system to give a better, more consistent spray pattern, easy starting, reduced noise level, and can be adjusted under load for proper voltage setting. Pressure gauges indicate atomizing pressure and wire drive pressure to permit reproducible coatings. An inlet auto dumping filter regulator is furnished to regulate air pressure to the system. A built in run time meter is also included. The available automatic control unit provides for remote operation or interlocking with other process equipment.

Coating Selection

For specific spraying details, amperage levels, coating properties, standoffs, etc. see wire series Bulletins 1.9.1.2_.

For further details on coating selection, surface preparation, use of bond coats and other useful application and spray knowledge – See Bulletin 2.1.1.1.

Note that the Model 8830 arc spray gun can reproduce optimum spray patterns for each wire type and thus produce the highest quality coating with the

highest density and bond strength. The basic design is keyed to the smallest diameter wires and operates under the lowest possible air pressure and flow rates with low to moderate amperage (spray rates) for each application; i.e., the gun setup is tailored to the specific coating properties.

For example, by using the finest spray setting with 1/16 inch (1.6 mm) aluminum, a dense, smooth coating can be laid down at very reasonable air pressure (40 psi). This lower pressure reduces noise and increases deposit efficiency, while maintaining a consistent coating quality. Finer, denser coatings can be achieved by increasing spray pressures. Fineness and density of the coating can be varied by adjusting console spray pressure and nozzle cap diameter. Low pressures give coarse coatings; exceptionally low pressures in the range of 15 psi produce very rough coatings with 1/8 inch (3.2 mm) peak-to-valley coating roughnesses. With pressures above 45 psi; for example, 80 psi, the 8830/350/350 system gives extremely fine particle size distribution, densest coatings, and smoothest coating surfaces.

The spray pattern shape can be varied by changing the nozzle/positioner insert in the spray head. The slot orifice gives an oval pattern, while the cross nozzle/positioner produces a circular pattern. Either spray pattern shape can be made fine or coarse by adjusting pressure and nozzle cap diameter as discussed previously.

Again see specific wire bulletins (series 1.9.1.2-___) for detailed settings for each wire and dimensions of spray patterns.

Note that extreme care should be exercised when changing pressures and nozzle caps from those recommended because coating properties such as hardness, bond strength, oxide content, finishability, density and deposit efficiency can vary widely from the optimum. When in doubt, run test coupons.

Noise Level

The noise level from these devices is related to amperage and material sprayed. At 350 amperes, decibel ranges of 102-105 are achieved. However, as the amperage is reduced, noise level is reduced. With prolonged exposure to the gun, the operator should wear ear protection. See Bulletin 1.11.7, for more detailed information on sound generated by Praxair and TAFE Arc Spray Guns and control procedures. Note that different atomizing heads, air pressures, and wires also influence sound level.

Operation

See instruction manual for details. Operation is simple and initial operator training takes less than

one hour. Bulletin series 1.9.1.2-___ give specific spraying conditions.

Coatings

Generally, the arc spray coatings appear dense and quite attractive to the experienced eye. See Bulletin 1.9.1.1.1 for description of some coatings and Bulletin series 1.9.1.2-___ for specific coating properties. Consult Praxair and TAFE for more detailed information and references on specific applications.

Spray Pattern

With 8 inch standoff, two patterns are possible: 1" (2.1 cm) x 1 3/4" (4.4 cm) width or 2" (5 cm) x 1" width.

Remote Reel Holders

Specially designed remote reel holders some with or without casters are available for mounting wire reels remote from the console. These units permit the spray gun (with limited distance for the wire reels) to operate at any distance from the control console, for example, inside a tank or on scaffolding. The remote reel holders can either be pulled along by the operator as he sprays, or located on a boom.

These remote reel holders also useful on installations where the gun is permanently mounted. In this case, wire reels can be located directly behind the gun, thereby eliminating the need for conduits.

Payoff Paks

Payoff Paks are available for some wires. Payoff Paks are used in permanent installations where large volumes of wire are sprayed. Purchase of wire, in this bulk form, also leads to some savings in wire cost.

Service Requirements

Compressed Air 50 cfm at 80 psig (includes air motor at 6 cfm). Air should be free from foreign matter and moisture. Actual flow 15 cfm at 16 psi, 40 cfm at 53 psi, 50 cfm at 84 psi. 2 cfm on air motor.

Voltages 230/460, 200(208)/380/415, 460/575 at 50 or 60 Hertz available. The kVA input and line amperage depend on power unit:

Model 30*8A 200 amp max. kVA 7, line amps 18.6/9.3

Model 30*8B35 350 amp max. kVA 17, line amps 47/24

To calculate, Duty cycle at 70% = $\frac{(100\% \text{ rating})^2}{0.7}$



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