Portable Rotary Degasser for Aluminum

Palmer Manufacturing & Supply, Inc.
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Features:

- Low Cost With High Efficiency
- Stainless Steel Construction
- Variable Speed Air Motor
- Portable and Lightweight - Under 50 Pounds
- Versatile - Can be used in dip-out or crucible furnaces with capacities from 40 to 3000#
- Unique one piece lance reduces cost by eliminating shaft / impellor design
- Eliminates use of hazardous degassing tablets and chlorine or freon gas

General Specifications:

- Motor Horsepower - 3/4 HP
- Motor RPM - 3600 RPM Variable Speed
- Lances - 24” and 36” are available. Note that 12” of lance length are contained within the unit shroud
- Body Size - 8” Diameter x 17” Long x 12” Base Flange - Suspension Hook 14” above body
- Customer Requirements - Compressed air source (90-100 PSI), Overhead Hoist, Dry Nitrogen, Argon or proprietary dry gas

Included with Purchased Unit

- Degas unit, combination air regulator / filter / lubricator for air motor, four standard lances either 24” or 36” (non-impellor). See system picture to the upper left.
- Customer supplies interconnecting hoses for compressed air, filtered gas and inert gas to suit the needs of the installation.

Degas Times (Estimated)

- 70–500 pound crucible: 1–5 minutes
- 500–3000 pound crucible: 5–10 minutes

Options

- Three leg mounting for support on flat top crucible furnaces
- Impellor style lances available
- Reduced pressure tester for sample comparison to national and metallurgical standards

Aluminum Degassing

The degassing of aluminum is based on the principle that dissolved hydrogen gas will move from an area of high concentration (in the melt) to an area of low concentration (in the inert gas). Hydrogen gas disperses in molten metal as it would if it were released in any confined space. It will maintain a constant concentration throughout the melt. Hydrogen gas can migrate in liquid metal almost as fast as it can in air. Therefore, it is unnecessary to bring every ounce of metal in contact with the inert gas. The efficiency of aluminum degassing is determined by two factors, the transfer rate across the metal/gas interface and the total surface area available for transfer.

Traditional hydrogen degassing systems bubbled specialty gases (Chlorine, Freon, or SF6) through the metal to speed the hydrogen transfer across the metal gas interface into large bubbles. There was a practical limit to hydrogen removal on humid days because as the large bubbles would break the surface, an increased surface area of metal was created which then absorbed more hydrogen from the humid atmosphere.

Chlorine was the original gas of choice but due to its hazardous nature, most foundries switched to other gases. However, many foundries have not considered the hazardous materials released by the breakdown of any specialty gas used.

Rotary degassing works on the principle of increasing the surface area of an inset gas exposed to the metal. The larger surface area increases the rate of transfer from metal to the inert gas. The smaller the bubble size for a given volume of gas, the greater is the surface area. For example, a 1” diameter bubble of gas has a surface area of 6 square inches. If the same bubble is divided into 1/16” diameter bubbles, the surface area is increased to 96 square inches. In other words, if the same volume of gas is used and the diameter of the bubbles are reduced to 1/16th the original diameter, the total surface area is increased by a factor of 16. The smaller bubbles disturb the surface of the melt less reducing additional hydrogen pickup from humid atmospheres.

This degassing unit is recommended for dry nitrogen or argon. Compatibility with specialty gases cannot be guaranteed. All parts of the unit exposed to gas except for the graphite lance are either stainless steel or Buna-N (seals). A four minute degassing time for a 400 pound crucible is common when nitrogen gas is used. There is no practical reason to use expensive specialty gases (costing up to $500 per bottle) when a $20 bottle of nitrogen will do the same job. Also, no toxic emissions are produced from nitrogen gas.

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Reduced Pressure Tester

Whenever degassing is a requirement of the melting process, it is desirable to verify the effectiveness of the degassing process. Palmer supplies a simple, easy to use partial pressure test unit for this verification.

To use, the operator warms a sample cup, dips the cup into the furnace for a metal sample, quickly places the sample into the vacuum chamber, and starts the vacuum pump.

The aluminum solidifies under a vacuum causing any entrained hydrogen gas bubbles to expand greatly. Once solid and cooled, the sample is cut in half and compared to the chart below for gas level analysis.

Test Bar Mold

- Complies with ASTM B108-02
- CNC machined from class 30 gray iron.
- Optional digital temperature read out available.
- Portable
- Weight 150 lbs (68 kg)

Spectrographic Coupon Mold

- CNC machined from A36 steel
- Heat dissipating handle
- Homogeneous element distribution within the sample.
- Depressed center to aid lathe machining
- Easy sample removal
- Portable
- Weight 7 lbs (3 kg)

VIDEO

Reduced Pressure Tester

Test Bar Mold

Spectrographic Coupon Mold