APPLICATION NOTE

VACUUM BRAZING

edwardsvacuum.com

WHERE IS VACUUM USED?

Brazing is a process to join metals by flowing a thin layer of non-ferrous filler material into the space between the metals. The intimate contact produced by the dissolution of a small amount of base metal and the molten filler metal results in bonding without the fusion of the base metal.

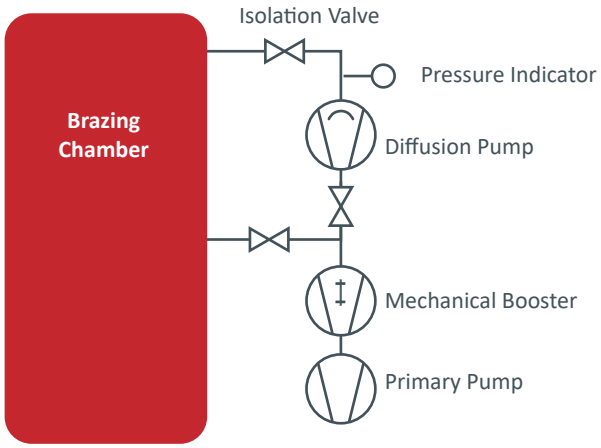
Vacuum aids this process by removing all the gases in the brazing area and improving the metal wetting properties. Vacuum plus high temperature results in decomposing oxide layers.

The brazing process consists of a pump down to 10^{-3} mbar and heating in different steps; vacuum is maintained below 10^{-4} mbar during heating.

TYPICAL VACUUM BRAZING SYSTEM

Historically, oil-sealed pumps and diffusion pumps are used in the brazing process. More recently, dry roughing pumps and turbomolecular pumps, duly protected from radiated heat, have become the preferred technology, especially when the cleanliness of the final product is instrumental.

Typical layout for vacuum brazing



SOLUTION

Dry pumping systems – Recommended technology	
GXS dry screw pumps and booster combinations	High throughput STP series STP pumps with integrated controller

Oil-Sealed pumping systems – Conventional technology	
Stokes Microvac rotary piston pumps with EH and 6” Stokes booster combination	nHT series diffusion pumps

EDWARDS BENEFITS

GXS DRY SCREW PUMPS

160–750 m^3/h primary pumps offer pumping speeds of up to 3,450 m^3/h with vacuum boosters. Equipped with an intelligent on-board controller with extensive communication and automated control capabilities, these dry pump systems substantially reduce maintenance and operating costs.

Benefits:
- Increased tolerance to particles created by the brazing process
- Clean residual vacuum
- Elimination of oil back streaming, a source of product and/or furnace contamination
- Large water vapour pumping capacity aids the drying of the new chamber lining
- Elimination of oil mist at the exhaust and external oil leaks

Highly reliable
Ability to handle harsh processes

Low maintenance cost
No unplanned down time

Increased productivity
Longer intervals between services

Safe operation, consistent output
Automated control of your process

STOKES MICROVAC ROTARY PISTON PUMPS

Packaged with the EH range or 6" series of mechanical boosters. When oil sealed technology is used for brazing, piston pumps are the vacuum pumps of choice.

Value for investment
Low rotational speed enables longest pump life cycle

Easy maintenance on site
Robust simple mechanism for high reliability and ease of rebuild

Proven and tested; peace of mind
Over 80 years of time-tested proven performance

EM TWO STAGE ROTARY VANE PUMPS

EM Series pumps are rugged, mechanical oil-sealed pumps with a compact and noise-free design. They feature advanced lubrication circuits, high reliability and accessories to suit your specific application needs.

Flexible and reliable
Compact in build and packing a punch, these pumps are available as free-standing units that are easy to deploy.

Easy to install and maintain
Pumps equipped with an integral IEC connector. O-ring sealed sight glass simplifies the inspection of oil level and condition.

Built-in protection systems
Automatic reset and restart when the motor cools down – no manual intervention.

STPs TURBOMOLECULAR PUMPS

Our magnetically levitated turbomolecular pumps are available in a range of up to 4,500 ls^{-1} and offer a multi-axis bearing system. The rotor is entirely suspended by magnetic bearings; so, all contact between the rotor and the rest of the pump is eliminated.

Increased productivity
Quicker pump down to base pressure

Low cost of ownership
Low power and utilities consumption

Economical
Maintenance free

nHT SERIES DIFFUSION PUMPS

The nHT series diffusion pumps have been designed for optimum heat transfer to the oil, resulting in faster heat up and a significant reduction in energy consumption.

Increased productivity
High-throughput pumping

Stable performance
High backing line pressure

Better end product quality
Low oil back streaming

Clean process
Stainless steel body

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