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.

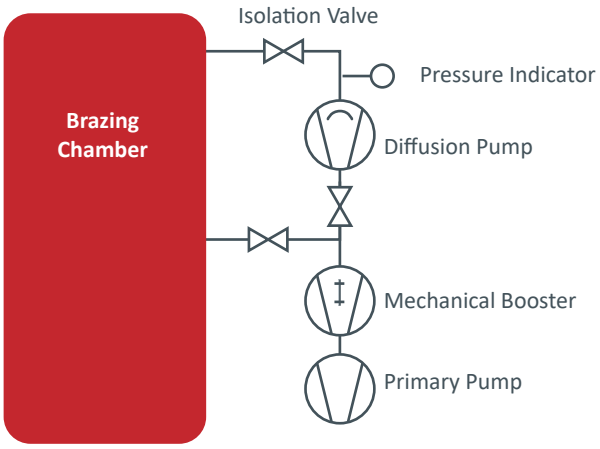
Vacuum aids this process by removing all the gases in the brazing area and improving the metal wetting properties. Vacuum plus high temperature results in decomposing oxide layers.

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<br>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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