



**Innovative
vacuum solutions**
for heat-treatment furnaces



Product / application matrix

Vacuum solutions – optimized by experience

Leybold offers a broad line of vacuum pumps and accessories, enabling the selection of optimum pump systems for all heat-treatment applications.



SOGEVAC B / BR

- Oil-sealed rotary vane pump
- Proven, industrial design
- Air or water cooled
- Best price / suction-speed ratio
- BR-version for demanding duty



DRYVAC DV

- Dry compressing screw pump
- High vapor and particle tolerance
- Lowest power demand
- Fully water cooled, extreme compact design
- Build-in frequency converter
- For medium to big pumping speed



LEYVAC LV

- Dry compressing screw pump
- High vapor and particle tolerance
- Fully water cooled, extreme compact design
- For small to medium pumping speed



VARODRY VDi

- Dry compressing screw pump
- High vapor and particle tolerance
- Lowest power demand
- Fully air cooled and compact design
- For small to medium pumping speed



SCREWLINE SP

- "Heavy-duty" screw pump
- Cantilevered design allows housing disassembly and pump cleaning
- Lowest operation temperatures ensure low layer build-up tendency
- Air or water cooled



STANDARD DUTY

e.g. Tempering, Annealing, Hardening

- Clean furnace outgassing (only air and humidity)
- No vapors or particles

DEMANDING DUTY

e.g. Brazing, Soldering, Nitriding

- Outgassing contains aggressive vapors as flux agents or ammonia
- Condensable vapors

SPECIAL DUTY

e.g. Sintering, MIM, Carburizing

- Outgassing contains excessive vapors or particles
- Condensable vapors as binder or hydrocarbons

Product / Application Fit

- Full application capability
- Cost effective maintenance and service demand
- Optimal cost / performance ratio

- Application capability depends on process details
- More frequent oil-exchanges
- Potential corrosion risk

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- Very frequent oil exchanges
- Risk of pump failures by deposits
- SV-BR-version as alternative for carburizing

- Full application capability
- "Install and forget" solution with application independent standard maintenance and service intervals

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- Application specific system design required
- Deposit removal by dynamic flushing
- Pump wetting could avoid deposits
- Maintenance intervals depending on process

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- Application specific system design required
- Deposit removal by manual cleaning or dynamic flushing
- Pump wetting could avoid deposits
- Maintenance intervals depending on process

Oil-sealed vacuum solutions

for standard duty



Systems based on **SOGEVAC** rotary vane pumps in combination with Roots blowers from the **RUVAC** WA, WS or WH families are the industrial standard for all moderately demanding processes.

- Typical processes:
 - Tempering
 - Annealing
 - Hardening
- Suited for processes with a low particle generation
- Products with moderate surface contamination
- Adaptation to more demanding applications is possible through smart accessories

“Vacuum systems based on SOGEVAC rotary vane pumps deliver the best cost vs. performance ratio for the broad base of less demanding heat treatment applications”

Application Example:

■ **Hardening and tempering of shafts and toothed wheels (gears)**

The application challenge is minor as the vacuum system must mainly handle the initial air and humidity content of the furnace plus small quantities of impurities which evaporate from the product surface.

Solution:

■ **RUTA pump system with rotary vane vacuum pumps from the SOGEVAC line.**

For this application the use of oilsealed rotary vane pumps is economically the best choice since the pumps are not subjected to any major loads. To enable usage also at applications with higher particle contamination the combination with dust-filters is useful.

Dry vacuum solutions

for demanding duty

“Dry screw pumps offer best performance in applications which involve the handling of aggressive vapors. They are also preferred if end users want to minimize their maintenance demands.”



Application Example:

■ **Brazing of automotive heat exchangers**

If the brazing process includes the usage of flux materials to etch the surfaces, then this acidic material evaporates and enters the vacuum system. Such vapor would attack the oil inside oil-sealed pumps and can cause a pump corrosion.

Solution:

■ **RUTA pump system with dry screw pumps from the DRYVAC, VARODRY or LEYVAC line.**

For this application the use of dry screw pumps is the best choice as those pumps have no problem to handle the flux outgassing from the furnace. Thus will stay gaseous and will leave the pump at the exhaust without condensation and without causing any corrosion. The user will not be subject to short maintenance intervals, the standard annual oil-exchange of a dry screw pump is sufficient.

Systems based on **DRYVAC, VARODRY** or **LEYVAC** dry screw pumps in combination with Roots blowers from the **RUVAC** WA, WS or WH families are the optimal solution for more demanding heat-treatment processes.

■ Typical processes:

- Brazing
- Soldering
- Nitriding & Plasma-Nitriding

- Suited for processes which include the handling of aggressive vapors as NH_3 or acidic flux
- Products with high surface contamination
- Suited for users asking for minimized maintenance and service demand
- Build-up of process layers inside compression room can often be removed by flushing the pump with suitable solvents (please contact our application support)

Dry vacuum solutions

for special duty



“Moderate pump temperatures decelerate build-up of layers of caused by reactive hydrocarbon vapors. Dry screw pumps with cleanable compression stage enable a simple on site cleaning by the end user himself, thereby ensuring highest furnace uptime, even for dirty applications.”

Systems based on **SCREWLINE** SP dry screw pumps in combination with Roots blowers from the **RUVAC** WA, WS or WH families are the “heavy duty” solution even for the most demanding heat-treatment processes.

- Typical processes:
 - Sintering
 - Carburizing
 - Nitro-Carburizing
- Suited for processes which include the handling of cracked hydrocarbon vapors which tend to build layers inside the compression room
- Moderate pump temperatures decelerate build-up of layers
- Products with high surface contamination
- Compression stage can be cleaned manually by end user

Application Example:

■ Sintering of Cemented Carbide Cutting Tools

During the dewaxing process, vapors from the cracking of polymer binders (primarily PEG - Polyethylene glycol) enter the pump and partially condense inside the compression stage of the pump. Oil-sealed pumps can operate unreliably and require frequent maintenance and service. Over time, the dry pumps may accumulate buildup inside the compression stage, which will require cleaning to maintain their proper function.

Solution:

■ RUTA pump system with dry screw pumps from the **SCREWLINE** SP line.

Low temperatures inside the compression stage slow reaction rate of cracked polymer vapors, extending cleaning intervals. Polyethylenglycole buildup can be removed with water flushing. For other polymers like Polypropylene or Polystyrole, other cleaning agents may be used for flushing. Regular manual cleaning ensures a clean compression stage. Paraffin binder vapors can be handled without extra maintenance, as internal temperatures avoid buildup and keep condensate liquid.

Diffusion pumps

for heat treatment with smart power management

“The innovative power efficiency control unit for diffusion and oil vapor jet pumps ensures minimized power consumption perfectly adapted to the current heating demand.”



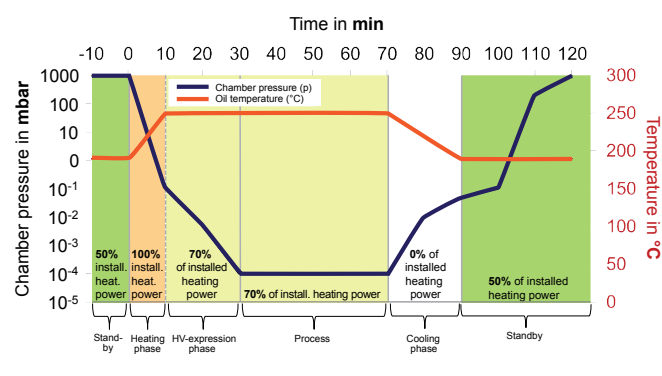
DIP and **DIJ** oil diffusion pumps are high vacuum pumps without wearing and moving components.

The pumping effect of these pumps is created through the diffusion of the gases which are to be pumped into the oil vapor stream. Compared to other high vacuum pumps the pumping speed with regard to the inlet flange diameter is very high.

Leybold can offer a model range between 3,000 l/s to 50,000 l/s for operating pressures between 10^{-1} mbar and 10^{-7} mbar.

- Stable high vacuum
- High forevacuum tolerance
- High pumping speed
- Safe and economical
- CE compliant electronics supplied
- No wear caused by revolving parts
- Simple to operate
- Maintenance friendly design for rapid and simple replacement of the heating elements
- Ample accessories available
- Flexible electrical wiring for worldwide deployment
- Innovative efficiency control

Easy energy saving potential



Minimized energy consumption over the complete furnace process cycle with smart power management



Roots-vacuum boosters

Complete range of industrial Roots-pumps: RUVAC WAU / WSU as economical standard; RUVAC WH as most innovative, compact and robust alternative. Reach highest process control and increased suction speed by use of our matched frequency converters.



Vacuum and pressure gauges

Reliable monitoring and control for all vacuum processes. Robust vacuum sensors designed for demanding industrial environments.



Helium leak detectors

Designed for the requirements of industrial series production. Well-proven and easy to use in production and quality control programs. Proven industrial design with rugged components. Fast operation: Quick run-up and ready to start within seconds.



Turbomolecular pumps

Hydrocarbon-free high-vacuum generation by a wide range of innovative and flexible products. TURBOVAC line with mechanical rotor suspension, TURBOVAC MAG line with magnetic rotor suspension and the TURBOVAC i/iX/iR series with hybrid rotor suspension.



Industrial vacuum valves

A wide selection of reliable vacuum valves of all sizes and with various drive types. Proven robustness for industrial furnaces. KF valves from DN16 to DN50. ISO-K valves from DN 63 to DN 500. ISO-F valves from DN 630 to DN 1000.



Sales and Service

With our comprehensive range of innovative service solutions, we offer excellent support for your Leybold vacuum pumps and we are committed to:

- Providing you with a reliable, first-class service throughout your pump's life cycle, no matter where in the world it is installed
- Maximizing your pump's uptime and ensuring it gets the best possible service
- Offering you specialist support with preventive maintenance and repairs

