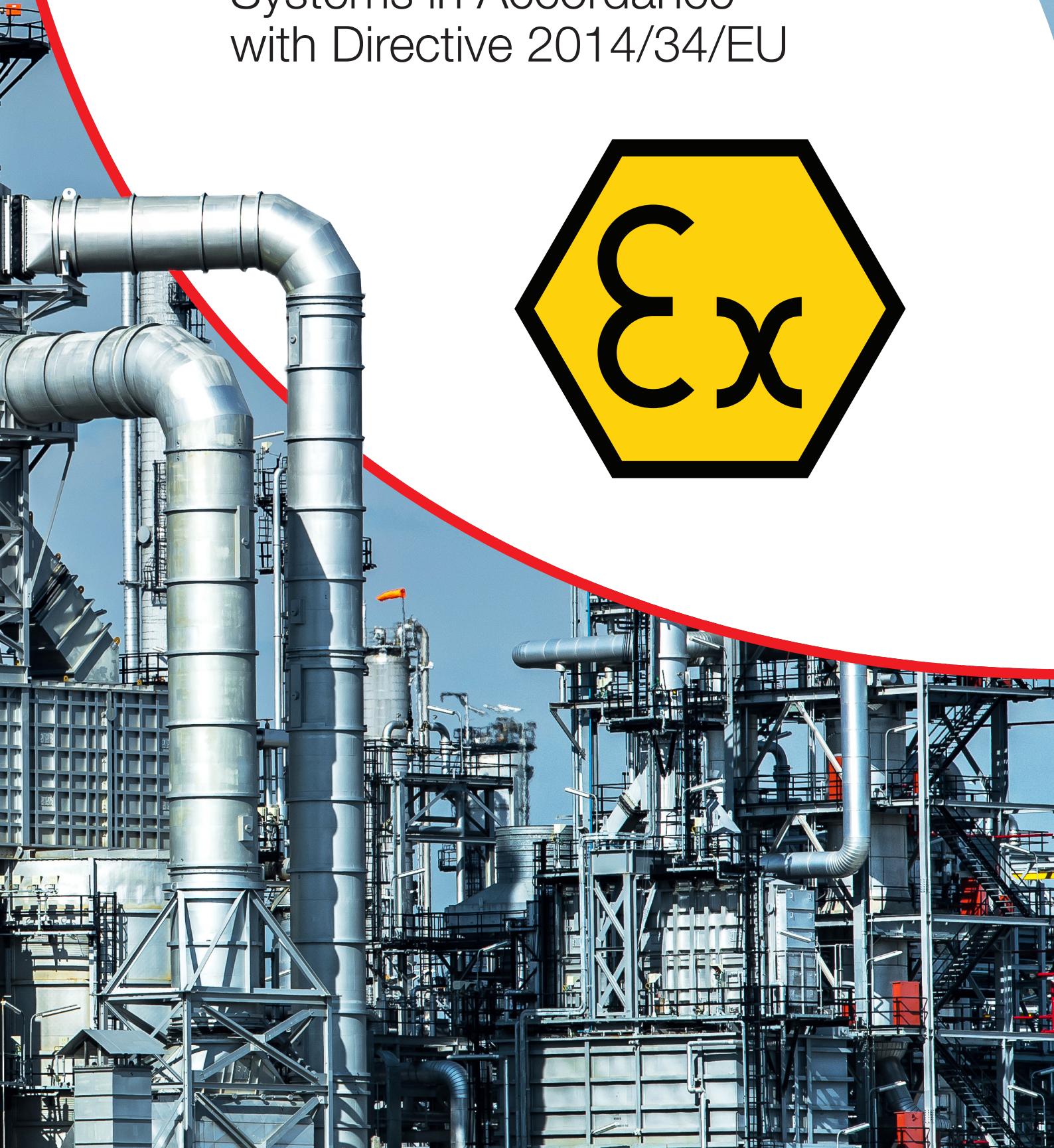




## ATEX

Vacuum Pumps and  
Systems in Accordance  
with Directive 2014/34/EU



# Certified process safety

To serve the safety requirements of applications incorporating the use of flammable gases, Leybold has certified a wide range of products according to ATEX Directives.

## The European ATEX Directive 99/92/EG

European Directive 99/92/EG - also referred to as the ATEX Operator Directive - requires the creation of an explosion protection document. In this document, the operator defines minimum requirements regarding the safety engineering aspects of an application. The operator must define explosion zones for both the inside and outside of the equipment.

- **Zone 0:** An area where an explosive atmosphere is present continuously or for long periods (e.g., inside fuel tanks)
- **Zone 1:** An area where an explosive atmosphere is likely to occur occasionally during normal operation (e.g., near valves or pumps)
- **Zone 2:** An area where an explosive atmosphere is not likely to occur during normal operation, and if it does, will exist only for a short time (e.g., well-ventilated areas near equipment)

In assessing equipment explosion zones, the user is often challenged by the specificities of the vacuum process. Processes often handle potentially flammable gas mixtures far below minimum ignition pressures. As such, no ignition is possible inside the process chamber, independent of the gas composition. However, inside the pump, these gases are compressed up to atmospheric pressure, and minimum ignition pressures are exceeded. This must be considered when examining the the vacuum pump system's inside and exhaust. It must either ensure that the gas-mixture stays outside the explosive range (e.g., by inert gas dilution) or an Ex-Zone must be defined for these areas.

## Product Classification

Leybold offers an array of vacuum pumps which comply with the safety and health requirements as specified in ATEX Directive 2014/34/EU. If the user defines an Ex-Zone according to ATEX Directive 99/92/EG for the inside (i) or outside (e) of a vacuum system, the appropriate ATEX Equipment must be selected in order to operate safely.

- **Category 1:** Equipment suitable for Zone 0. Must remain safe even with two independent faults.
- **Category 2:** Equipment suitable for Zone 1. Must remain safe with one expected fault.
- **Category 3:** Equipment suitable for Zone 2. Safe under normal operation.

If the category differs between the inside (i), i.e., the process side and the outside (e) - pump sections which do not come into contact with the process gas - this is stated separately. Additionally, a classification is effected according to gas groups and temperature classes.

When certifying ATEX-products, Leybold takes all potential ignition sources of its vacuum pumps into consideration.

These include, for example:

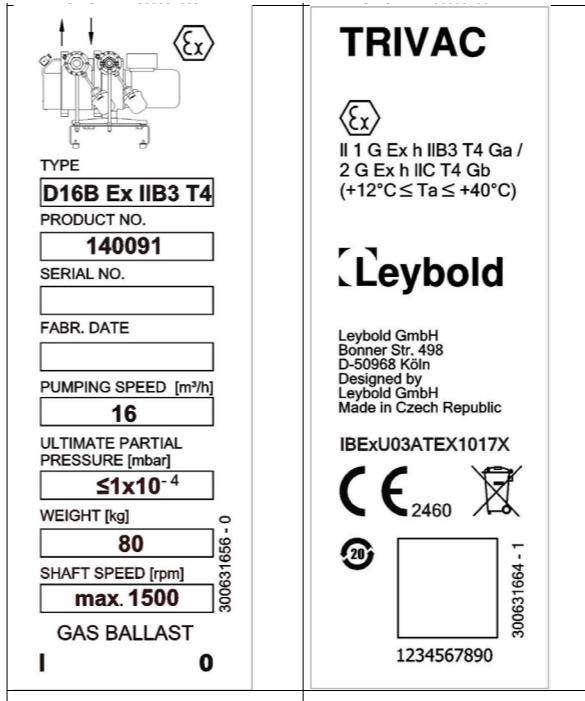
- **Hot surfaces**
- **Compression heat**
- **Mechanically-produced sparks**
- **Sparks caused by static electricity**
- **Flames and hot gases**
- **Chemical reactions**



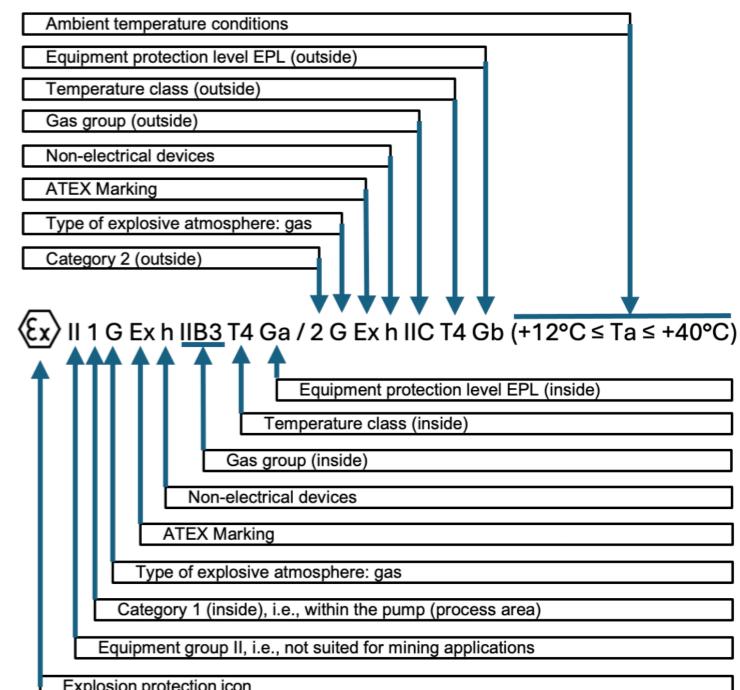
**ATEX Check-list**

To fulfill the requirements of the ATEX Operator Directive, a questionnaire (last page) has been included to assist you in selecting the vacuum pump best suited for your purpose. Please state your specific requirements there. Based on this information, Leybold will prepare an offer without obligation for the corresponding pump to meet your requirements.





Example of an ATEX product labeling



## Typical Applications for ATEX certified vacuum pumps

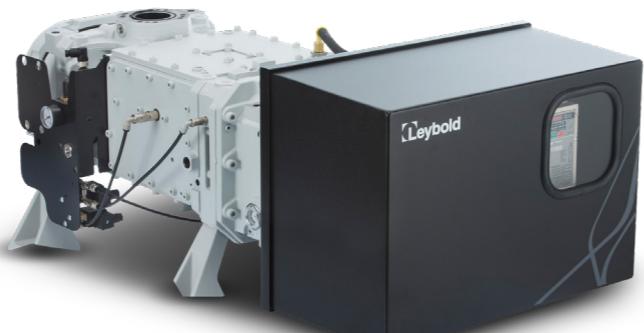
- Pumping of solvents in drying and filling applications
- Evacuation of gas cylinders
- Evacuation of refrigerant systems using flammable refrigerants, such as Propane (R290), Butane (R600) or Isobutane (R600a)
- Pharmaceutical freeze drying
- Handling of flammable gases, such as H<sub>2</sub>, CO or NH<sub>3</sub> in heat-treatment or coating applications
- Pharmaceutical freeze drying
- Power plant generator sealing oil degassing (H<sub>2</sub> removal)
- Kerosene vapor phase drying processes
- Fuel vapor recovery at gas-stations
- Steel degassing processes (e.g., VOD or RH-OB)



## Dry vacuum pumps

### DRYVAC

The DRYVAC is a hermetically-sealed screw vacuum pump with integrated or external frequency converter. It features an extremely compact design, very low energy consumption, high pumping speed, even at rough inlet pressures, high vapor tolerance and lowest heat-to-ambient by an optimized water-cooled design. The DRYVAC product line includes pumps from 200 m<sup>3</sup>/h to 1600 m<sup>3</sup>/h pumping speed, several of these being ATEX-certified. Pumps are available as well for internal (Cat. 2 or 3) as also external ATEX certification (Cat. 3).



DRYVAC DV 300 ATEX Cat. 2(i)/3(o)



SCREWLINE SP 630 B ATEX Cat. 3(i)

### SCREWLINE

The SCREWLINE SP 630 B is the work horse of all dry-compressing screw vacuum pumps. Due to its internally-cooled rotors, this pump excels with low internal temperatures, often enabling it to handle reactive gases with no layer-build-up inside the compression room. Even if internal contamination can't be avoided, the built-in monitoring system will warn the user, and the cantilevered rotor design enables an easy, fast and thorough cleaning of the compression room. The pump is available in fully air-cooled or partly water-cooled versions and is mainly made from aluminum materials, offering the best corrosion resistance for many applications. The SCREWLINE SP 630 B is available in ATEX Cat. 3(i) (inside) versions.

### RUVC

The RUVC Roots blowers are used in combination with backing pumps to achieve lower pressures, higher pumping speeds and for larger capacities. Leybold offers various ATEX-certified RUVC lines:

#### RUVC WA / WAU

Available from 250 to 2000 m<sup>3</sup>/h pumping speed. These boosters are equipped with standard lip-seal shaft seals and flanged standard motors. They also have internal and external ATEX Cat. 3 certifications.

#### RUVC WH 4400-7000

This range of blowers come in ATEX Cat. 2(i)/3(o) (inside/outside) versions. They feature a hermetically-tight design and a built-in potted motor without shaft seals.



RUVC WA 1001 ATEX Cat. 3(i)

## Oil-sealed rotary vane pumps

### TRIVAC

The TRIVAC B is an industry-proven double-stage rotary vane pump with a performance-driven, low-noise design. ATEX-certified TRIVAC B models feature 4 m<sup>3</sup>/h to 65 m<sup>3</sup>/h pumping speeds. All pump sizes come as standard ATEX Cat. 3(i) (inside) certified and are also available with ATEX Cat. 3(o) (outside) certification.

#### TRIVAC D 16 B ATEX Cat. 1

For special applications, e.g., in the RAC market, which require vacuum pumps to handle Zone 0 gas-mixtures, Leybold offers the TRIVAC D 16 B-ATEX featuring ATEX Cat. 1(i)/2(o) (inside/outside) certification. This pump includes an explosion pressure proven design and is equipped with flame arresters on the inlet and outlet sides, along with pressure and temperature monitoring. The pump is available in different versions for gas-group IIC and IIB3.



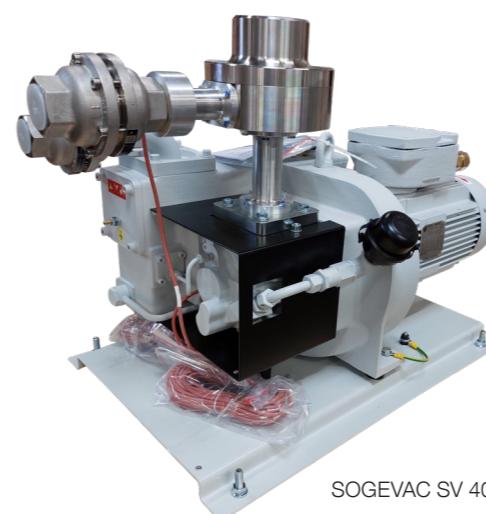
TRIVAC D 16 B ATEX Cat. 1(i)/2(o)



TRIVAC D 65 B ATEX Cat. 3(i)



SOGEVAC SV 300 B ATEX Cat. 2(i)/2(o)



SOGEVAC SV 40 ATEX Cat. 1(i)/2(o)

### SOGEVAC

The SOGEVAC B product family offers a wide array of robust, single-stage rotary vane pumps that excel with the highest pumping-speed performance, low end-pressure, efficient built-in exhaust oil mist separation and a low noise design. ATEX-certified SOGEVAC B pumps are available with 40 m<sup>3</sup>/h to 750 m<sup>3</sup>/h pumping speeds. Pumps are available for internal and external Cat. 2 or 3 ATEX certification.

#### SOGEVAC SV 40 ATEX Cat. 1

For special applications, e.g., for fuel vapor evacuation at gas stations, pumps are required which can handle gas mixtures with a "Zone 0" specification. For those, Leybold offers the SOGEVAC SV 40-ATEX, which is ATEX Cat. 1(i)/2(o) (inside/outside) certified. This pump features an explosion pressure proven design and is equipped with flame arresters on the inlet and outlet sides, along with pressure and temperature monitoring.

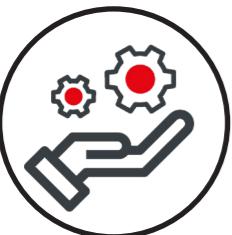
# Pump Systems

## Steel Degassing

Steel degassing processes often include a short-time handling of an explosive gas mixture during each pump-down process. In these cases, ATEX Cat. 2(i) certified users often define Zone 1 for the inside of the vacuum pumps. Leybold offers a vacuum system to fully satisfy this requirement, which is fully built using ATEX-certified pumps and components.



Custom-made, ATEX-compliant steel degassing system comprising DRYVAC DV 1200 and RUVAC WH 7000



## Customized ATEX Systems

ATEX requirements for the inside or (often) outside of vacuum systems are also available for other markets and applications (e.g., vapor-phase transformer drying or industrial cleaning processes using hydrocarbon solvents, etc.). Leybold can design an ATEX-certified system for most purposes. Simply contact us, and we'd be happy to assist you.



## Hazardous Locations Applications ATEX - Customer Questionnaire

Please complete all relevant sections of this document. This information is needed to ensure that we can fully understand your requirements and provide you with the correct product. For help in completing this form please contact your local Leybold sales team.

### Section 1 – Customer Contact Details

Submitter	Contact partner at the customer responsible for the project
Name of Contact	
Position/Role	
Company Name	
Address	
Postcode	
Country	
Email Address	
Telephone Number	
Fax Number (if available)	
Website URL (if available)	

### Section 2 – Hazardous Location Scheme

	ATEX (Mandatory for use within the EU)	ATEX "EU Type Examination" certificates are provided for ATEX Category 1 equipment & Category 2 electrical equipment. ATEX "Type Examination" certificates may be provided for Category 2 non-electrical and Category 3 equipment as required. Please contact our Sales team to discuss	
		(e.g., IECEx, US (NEC), Canadian (CEC), Russian (EAC), Korean, Chinese, Indian, Brazilian, etc.)	
Other – Please provide details			

### Section 3 – Application & Operating Conditions

For this information, please refer to your site's explosion protection document. According to ATEX workplace directive 1999/92/EC a plant operator is required to create such a document, in which the zoning must be specified. Zoning must be considered separately for the external (ambient) and internal (process) environments for the location in which the pump will be installed.

If you are unsure, please discuss with our sales team. However, Leybold must rely on the information supplied by the customer in this regard and cannot independently validate or confirm the specifics of your application.

Type of application, e.g., freeze drying, steel degassing, etc.	
Please state any other information which may be relevant to this application or attach as a separate document to this application: (e.g., construction material limitations due to pumped process gases)	
Model name or Cat.-No. of requested pump	
Ambient (external) temperature range (Standard is -20°C to +40 °C)	Unless otherwise stated here, a standard range will be assumed
Ambient (external) pressure range (Standard is 0.8 bar to 1.1 bar)	Contact our sales team if equipment is intended to be used outside the 0.8 bar to 1.1 range



External (Ambient) Zone								
GAS (Please mark with an 'X')	Zone 0 / Cat 1		Zone 1 / Cat 2		Zone 2 / Cat 3		Safe Area	
DUST (Please mark with an 'X')	Zone 20 / Cat 1		Zone 21 / Cat 2		Zone 22 / Cat 3		Safe Area	
Internal (Process) Zone								
GAS (Please mark with an 'X')	Zone 0 / Cat 1		Zone 1 / Cat 2		Zone 2 / Cat 3		Safe Area	
DUST (Please mark with an 'X')	Zone 20 / Cat 1		Zone 21 / Cat 2		Zone 22 / Cat 3		Safe Area	

Gas/Dust Group (External)								
GAS (Please mark with an 'X')	IIC		IIIB+H2		IIB		IIA	
DUST (Please mark with an 'X')	IIIC				IIIB		IIIA	
Gas/Dust Group (Internal)								
GAS (Please mark with an 'X')	IIC		IIIB+H2		IIB		IIA	
DUST (Please mark with an 'X')	IIIC				IIIB		IIIA	

Temperature Rating (External)									
T6 (Max 85°C)		T5 (Max 100°C)		T4 (Max 135°C)		T3 (Max 200°C)		T2 (Max 300°C)	
Temperature Rating (Internal)									
T6 (Max 85°C)		T5 (Max 100°C)		T4 (Max 135°C)		T3 (Max 200°C)		T2 (Max 300°C)	

#### Section 4 – Customer's Signature

The applicant confirms that the information provided in this form is correct to the best of their knowledge, and that Leybold shall be informed if this information changes or is found to be inaccurate.									
Signature:									
Print Name:					Date:				

