

**TECHNICAL SPECIFICATIONS**

**FOR THE SUPPLY OF**  
**AN “HERMETIC PARALLEL SEAM SEALING SYSTEM”**  
**FOR**  
**SCUOLA SUPERIORE SANT’ANNA**

**CUP CIPE: J54I19000460006**

**CIG: 7986802582**



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# INTRODUCTION

For the packaging of optoelectronic and silicon photonics devices to be used in the space environment, one of the most important technologies is the hermetic sealing of the package.

The purpose is to insulate the delicate optical components inside the package from the external environment that could affect the performance during lifetime. For Space applications this is requested to guarantee the expected high level of reliability.

The hermetic sealing is obtained soldering a lid over the package, operating inside a specific glove box where the internal atmosphere (nitrogen mixed with helium) is adequately controlled. Inside the glove box the level of oxygen has to be reduced at minimum possible so that when the soldering is completed, the gas inside the package is mainly an inert one (nitrogen). The small percentage of helium, on the other side, will allow checking the level of hermeticity obtained through a fine leak testing.

It is also necessary to guarantee the proper epoxy outgassing. This is obtained with a vacuum oven that allows heating up the parts to be sealed and allows venting out the epoxy residual species that could affect the optical components inside the package.

The requested system, as a unit, must include 3 main parts/equipment:

- A glove box with airlock
- A seam sealer welder
- A vacuum bake oven

Modularity of the system for future improvements and upgrades is properly valued.

## 1. Technical specifications: minimum requirements

### 1.1 System Hardware configuration

#### Vacuum Bake Oven Requirements

- Stainless steel fabricated
- Heated shelves
- Doors interlock
- Temperature controllers
- Vacuum pumping system
- PLC controlled
- Modularity

#### Glove box with airlock Requirements

- Stainless steel fabricated
- Safety glass viewing window

- Oval glove ports
- Internal lighting
- Complete cabling feed-through
- Moisture monitoring
- System to reduce moisture and oxygen inside box
- Helium/Nitrogen mixing supply
- Doors interlock
- Modularity

### **Manual Seam sealer unit Requirements**

- 4 axis stepper controlled welding robot (X, Y, Z.  $\Theta$ )
- Roller electrodes
- Welder Power supply
- PLC controlled process
- Capability for square and rectangular packages
- Full data logging
- Emergency stop
- Safety interlocks
- Lid alignment aid

The three equipments will have to be fully integrated in a single cohesive system. The entire system must be PLC controlled for process developments, process control, sensors control, data logging.

### **1.2 Process configuration**

- ❖ Sealing of 30 packages to be defined and supplied by Scuola Superiore Sant'Anna

### **1.3 Conditions**

- ❖ Conformity to CE standard and certification
- ❖ Availability of spare parts guaranteed for minimum 10 years
- ❖ Warranty 1 year after "acceptance" (see 3.2 for acceptance definition)
- ❖ Shipment and installation included to:  
Scuola Superiore Sant'Anna (TeCIP Institute)  
Via Giuseppe Moruzzi 1  
56127 Pisa (Italy)

## 2. Technical specifications: evaluable features

### 2.1 Hardware configuration

- ❖ Modularity: possibility to upgrade the system with another glove box for laser welding technology upgrade
- ❖ Modularity: possibility to have in the future laser welding system to be placed inside glove box
- ❖ Extra sensors for internal atmosphere controls
- ❖ Automated seam sealing machine (instead of manual)

### 2.2 Other

- ❖ Consumable spare parts kit for yearly maintenance
- ❖ Extra heated shelves for bake oven

## 3. Installation, acceptance, documents

### 3.1 Installation and equipment move-in

1. Supplier must check in advance before delivery for the correct placement and connection, facilities presence, flow and pressure value.
2. Supplier is in charge for the move-in of the equipment inside the Inphotec Area once delivered (see Appendix 4.3)
3. Scuola Superiore Sant'Anna, is in charge for the hook-up

### 3.2 Acceptance

Installation and commissioning, followed by process start-up with demonstration of defined process specification must be performed onsite by the Supplier. It is expected a 30 packages sealing demonstration with packages supplied by Scuola Superiore Sant'Anna after mutual agreement on dimensions. The hermeticity obtained will be tested on site in accordance with MIL-STD -883G method 1014.12

### 3.3 Documents

Supplier must:

1. Detail configuration of the system and list of parts and components
2. Detail all technical specification as for the minimum requirements
3. Deliver layout of installation and the list of the facilities required for a proper functioning of the system
4. Deliver safety instructions
5. CE conformity declaration.

The compliance of the equipment to the minimum requirements and evaluable features must be evident in the documentation (1 - 5).

## 4. Appendix

### 4.1 Summary table of minimum requirements

The compliance of the equipment to the minimum requirements must be evident in the documentation ([paragraph 3.3](#)).

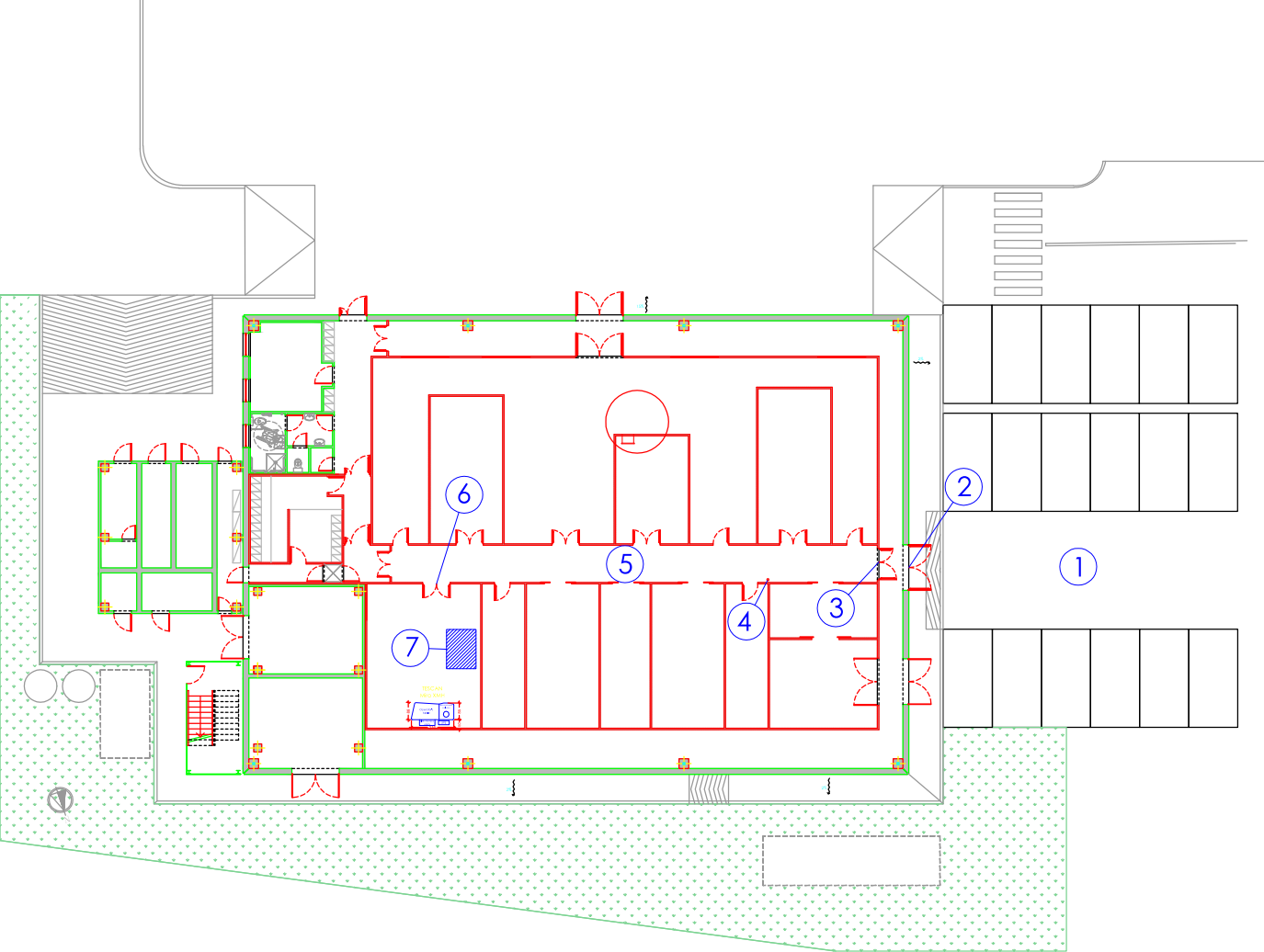
Parameter	Target Specs	Note
Bake Oven with water cooling system	yes	Oven temperature up to 200C or more
Heated shelves	yes	
Vacuum pumping system for baked oven	yes	Less than 1mbar within oven chamber
Oven temperature controller	yes	Temperature tolerance: +/- 3 degrees or better
Oven PLC control	yes	
Oven Doors interlocks	yes	
Stainless steel fabricated glove box with airlock	yes	Internal dimensions appropriate to house the Seamwelder and guarantee easy handling of parts to be sealed
Safety Glass viewing Window	yes	
Oval glove ports	yes	
Box Internal Lighting	yes	
Moisture monitoring	yes	
System to reduce moisture and oxygen inside glove Box	yes	
Complete cabling	yes	To interconnect all system units
Helium/Nitrogen mixing supply	yes	Relative percentages manually programmable
Glove box doors interlock	yes	
Seamwelder manual unit: 4 axes controlled welding robot.	yes	Square or rectangular packages dimensions range from 3 to 100 mm
Axes X, Y, Z, $\Theta$ (rotation)	yes	X,Y,Z accuracy: +/- 20 microns or better
Power supply unit for seam sealer unit	yes	Current control for process control
PLC controlled unit	yes	
Roller electrodes	yes	Copper and/or tungsten
Lid alignment aid	yes	
Conformity	CE mark	
PLC controlled system	yes	
Full data logging	Yes	
Safety interlocks	yes	
Warranty	1 year	
Shipment and installation (except for hook up)	included	

## 4.2 Summary table of evaluable features

The compliance of the equipment to the technical specification assessable as improvements must be evident in the documentation ([paragraph 3.3](#)).

Summary Evaluable Features (quantitative evaluation)			
Item	Parameter	Evaluation system	Max points
Hardware			
A.1	Modularity: possibility to upgrade the system with another glove box for laser welding technology upgrade	If the upgrade is NOT possible = 0 If the upgrade is possible= 8 points If the glove box for laser welding is already present in the system = max points	20
A.2	Modularity: possibility to upgrade the system with a future laser welding system	If the upgrade is NOT possible = 0 If the upgrade is possible = max points	15
A.3	Extra sensors for internal atmosphere controls	If the parameter is absent = 0 If the parameter is present = max points	10
A.4	Automated seam sealing machine (instead of manual)	If the automated welder is absent = 0 If the automated welder is present = max points	20
Other			
B.1	Consumable spare parts kit for yearly maintenance	If the parameter is absent = 0 If the parameter is present = max points	2
B.2	Extra heated shelves for bake oven	If the parameter is absent = 0 If the parameter is present = max points	3
MAX TECHNICAL POINTS			70

### 4.3 Inphotec Area Details for Move-In





1. Unloading area. Confined and accessible by lorry.
2. Door #1. 15 cm step to climb. Width 2.3 m.
3. Door #2. Width 1.6 m.
4. Safety basin and shower, removable. Width after basin removal 1.7 m.
5. Corridor. Width 1.9 m.
6. Door #3. Width 1.45 m. Height 2.2 m
7. Position of the machine.

