ICFO | Finançat per la Unió Europea | Generalitat de Catalunya

# SPECIFICATION SHEET

## Supply, installation and commissioning of a *Wafer De-Bonding Line* for the ICFO, financed by FEDER Catalunya 2021-2027

**FILE NUMBER: ICFO-2026-049**


CLAUSE 1. Object of the contract ....... 1
CLAUSE 2. Needs to satisfy ....... 1
CLAUSE 3. Technical requirements ....... 2
CLAUSE 4. Power distributions and safety ....... 4
CLAUSE 5. System layout and services ....... 4
CLAUSE 6. Transportation, installation, start-up ....... 4
CLAUSE 7. Warranty and Follow-on Support ....... 5
CLAUSE 8. Training ....... 6
CLAUSE 9. Delivery and Installation Time ....... 6
CLAUSE 10. Tender budget ....... 6

## **CLAUSE 1.** Object of the contract

The purpose of this contract is the supply, installation and commissioning of a "***Wafer De-Bonding Line***" for the ICFO, financed by FEDER Catalunya 2021-2027.

The types of items supplied are linked to the CPV (Common Public Procurement Vocabulary) **38000000-5** Laboratory, optical and precision equipment (except glasses).

## **CLAUSE 2.** Needs to satisfy

PhotonChip is a platform project that will help bring photonic technologies, in particular integrated photonics and photonic chips, from scientific feasibility to prototype stage to be applied in, for instance, communications as 6G transceivers, sensors, quantum computing and technology platforms.

Once operational, PhotonChip will cover the whole photonic chip value chain (design, packaging, testing) and train new experts thanks to dedicated programs.

As part of the Institute of Photonic Sciences (ICFO), PhotonChip will use advanced technologies as quantum technologies for cybersecurity, virtual and augmented reality, artificial intelligence, and machine learning.

In the development of the project, ICFO needs to acquire a ***Wafer De-Bonding Line*** to extend the ICFO Packaging Line capabilities. This system will enable temporary wafer bonding and subsequent de-bonding processes, needed to support and process thin and fragile wafers substrates used in ICs 3D interconnections and hybrid integration technologies.

As such, the Wafer De-bonding Line must comprise the following equipment units, all of them capable to handle up to 200mm wafers:

A. A wafer de-bonder system suitable for mechanical debonding or release of temporary bonding processes

B. A wafer cleaner station for effective removal of de-bonding adhesive residues.

C. A wafer spin coating system for the uniform application of bonding adhesives on wafers.

D. And a wafer baking hot plate for curing or soft-baking adhesives following spin coating.

## **CLAUSE 3.** Technical requirements

**Technical proposal structure - minimum mandatory equipment characteristics**

The Wafer De-Bonding Line shall incorporate all the functionalities and components needed to perform, at minimum, de-bonding of temporary bonding processes realized with adhesives.

The Wafer De-Bonding Line shall comprise the units detailed below. All units shall operate in semi-automatic mode: manual wafer loading and handling, and automatic execution and control of the processes.

The minimum mandatory technical specifications of each unit are detailed in the following sections.

A. Wafer de-bonder system suitable for thermal slide-off de-bonding process of temporary bonding. The system shall include:

    1. Both top and bottom heaters with the following specifications:
        a. Capability to support process temperatures up to 200 ºC.
        b. Independent temperature control of top and bottom heaters.
        c. Rapid cooling capability with forced water cooling and programmable cooling set point (at least for the top heater).
    2. De-bonding motion control system enabling precise and controlled slide-off speed.
        a. Motorized horizontal axis for controlled debonding speed during slide off de-bond procedure
        b. Capacity of automatic transfer of de-bonded thin wafers onto wafer carriers.
        c. Recipe controlled speed of all axes
    3. Thermal de-bonding chucks for 100 and 200 mm wafers, providing vacuum holding.
    4. Aluminium carrier suitable for thin wafers, including a compatible wafer cassette.

B. Wafer cleaner station designed for effective adhesive residue removal using solvents. The station shall comprise:

    1. Top-side rinsing process with the capability of using two different solvents, including:
        a. The chemistry cabinet and pressurized tanks for the two solvents.
        b. Digital flow meters on both chemical dispensing lines for precise flow control.
    2. Spin drying capability with speed up to 3000 rpm.
    3. Nitrogen drying nozzle to assist wafers with high topography drying.
    4. Integrated ESD control solution, incorporating an ionizer bar, charge plate and charge monitor.
    5. Chuck compatible with 8 inch film frames for wafer mounted on film frames.
    6. Wafer chuck for thin wafers of 100 mm and 200 mm diameter.

C. Wafer spin coating system for the uniform application of bonding adhesives on wafers, with the following capabilities:

    1. Programmable spin speed control with a maximum speed of at least 10.000 rpm
    2. Programmable dispense arm, comprising:

   a. Two independent dispenser arms, each supporting up to three different adhesive supply lines.
   b. Syringe-based dispensing system suitable for low volume production, with programmable dispense rate and adjustable suck-back function to ensure clean cutoff.
   c. Integrated solvent nozzle for top side edge bead removal using appropriate solvents.
3. Back Side Rinse system, including dedicated nozzle for removal of backside contamination during coating.
4. Capability of bowl washing using solvents.
5. Automatic process cover to improve coating uniformity.
6. Chemistry management system within the machine enclosure, including two solvent supply tanks with valve for vent and pressurizing and level sensor integrated in the software.
7. Modular design allowing integration of additional process modules (e.g. hot plates, chill plates) as optional or future upgrades.
8. Chuck for 100 and 200mm wafers, wafer thickness from 0.2 mm to 1 mm.

D. Wafer baking hot plate suitable for curing or soft-baking of adhesives or waxes for temporary bonding applications, incorporating the following specifications:

   1. Maximum operating temperature of at least 150 ºC, including an integrated temperature controller and power supply.
   2. Protective hot plate cover to ensure stable baking conditions.
   3. Solvent exhaust connection for safe removal of vapor generated during baking
   4. $N_2$ purge capability.
   5. Vacuum chuck for 100 and 200 mm diameter wafer.

E. Auxiliary equipment. All auxiliary equipment required for the operation of above system units, including vacuum pumps, cooling units and/or chemical cabinets where applicable, shall be included within the scope of supply.

F. Temporary bonding process development. Development and documentation of a temporary bonding process recipe for at least one application, including definition process parameters and de-bonding validation.

**Software requirements**

1. The system shall include the software required to manage all required functionalities described above, including process control, monitoring and data logging.

2. The software shall be installed on the system, and shall be supplied with a permanent (non-expiring) license.

3. Any PC required for system operation or software execution shall be supplied as part of the system.

**Technical documentation or manuals to be delivered**

A set of documentation shall be provided, covering the following topics:

- Comprehensive system user manual, including both hardware and software descriptions, routine servicing and troubleshooting.

**CLAUSE 4.** Power distributions and safety

The system shall include:

- Electrical Operation: 230V ±10%, 50 Hz (per UNE-EN 61010-1, Spanish adoption of IEC 61010-1)
- CE-certification.
- The system will be fully protected against unexpected power cuts and, in that case, will be fully safe for the operators. A quick and easy turning on of the system has to be possible after a power cut.
- Safety interlocks and emergency stop system.

**CLAUSE 5.** System layout and services

The proposal shall include a set of "system layout and services documentation", containing the following information:

- System layout, including overall footprint, weight, drawings and description of the different system components.
- Installation and start-up requirements, including required utilities, service connections, and any applicable environmental specification.

**CLAUSE 6.** Transportation, installation, start-up.

- Contract includes the installation and start-up of the system, including system checking, functional tests and the supply of all those elements necessary for its correct operation.

- The proposal will include transportation to ICFO's facilities including insurance and all export/import and customs duties.

- Any other customs or miscellaneous expenses, unexpected and not covered in the tender, which may arise until the equipment arrives at ICFO, must initially be borne by the Supplier and will be reimbursed by ICFO upon submission of supporting documentation proving the actual incurrence of such expenses.

- The machine will be placed in the designated location by ICFO. The contractor shall cover all costs, organization, and coordination related to the placement, including the provision of any required specialized equipment or vehicles, as well as any necessary component disassembly and reassembly for unloading and transportation inside the building, strictly following the route specified by ICFO.

  Note: Designated location has level, step-free access. Delivery using a truck equipped with a loading ramp or liftgate, together with appropriate wheeled handling equipment, is recommended to facilitate safe installation.

- The contractor will be responsible for the removal and proper disposal of the packaging when the machine is delivered and unpacked, or its storage during the warranty period in case the original packaging needs to be kept.

**Process qualification**

A Factory Acceptance Test (FAT), or pre-acceptance test at the supplier's premises, shall be conducted prior to shipment (ICFO attendance at the FAT is not required). A Site Acceptance Test (SAT) shall be performed following installation of the equipment at ICFO's facilities. Successful completion of the SAT shall constitute the basis for final acceptance of the equipment.

Final acceptance of the system will be granted upon successful completion of the following technical demonstration:

a) Verification and validation of all relevant machine parameters demonstrating full compliance with the Technical Specification, including as minimum: verification of pressure uniformity, vacuum level, heat up ramp rate, alignment precision.

b) Demonstration of the supplier's standard de-bonding process, representative of typical system performance, in accordance with approved SAT protocol. Materials shall be provided by ICFO.

*Protocol in the event of SAT failure and remediation deadlines.*

*Should the equipment fail any of the tests or verifications established in the SAT, the following protocol shall apply:*

1. *Formal notification of failure (Day 0): ICFO shall notify the contractor in writing and through a verifiable channel of the deficient results obtained, specifying in detail the parameters that did not meet the required values and attaching the corresponding measurement reports.*

2. *Corrective Action Plan (deadline: 5 working days from notification): the contractor shall submit to ICFO a written corrective Action Plan, identifying the root cause of the non-compliance, the proposed corrective measures, and an implementation schedule not exceeding 30 calendar days from the date of failure notification.*

3. *Re-execution of the SAT (deadline: maximum 30 calendar days from notification): once the corrective measures have been implemented, the contractor shall repeat the SAT in the presence of ICFO technical staff, within the aforementioned deadline. All costs associated with this repetition shall be borne entirely by the contractor.*

### **CLAUSE 7.** Warranty and Follow-on Support

- 1-year Full Warranty on all parts and components of the system irrespective of the manufacturer. The warranty will include the replacement of any faulty or damaged part(s) during normal use of the system, no matter the manufacturer of the component(s). It will cover any cost related with the disassembly, transportation, reparation and re-assembly of the damaged component(s), including all travelling and living costs of the required service engineer(s). An on-site repair, or a justified alternative to reduce the system down time to the minimum, will always be the first service option. A team of properly qualified and skilled service engineers will have to be available.

- System maintenance support available during, at least 10 years, including access to technical assistance. The supplier shall provide feedback from a qualified technical specialist within 5 working days.

- Spare parts will be available during, at least, 10 years after system supply.

- An estimation of the cost of a warranty extension or available support contract options after warranty period will be included in the proposal.

## **CLAUSE 8.** Training

- System training for ICFO personnel shall be included in the proposal.

- The training shall ensure proper and safe operation of the system and shall cover basic and advanced functionalities, including process development, programming and automation features.

- The training program shall also provide an overview of basic maintenance procedures, covering routine preventive tasks and essential troubleshooting guidelines.

## **CLAUSE 9.** Delivery and Installation Time

The maximum execution period of the contract shall be **SIXTEEN (16) MONTHS**, counted from the day following the date of its formalisation.

Within this period, the supplier must complete the manufacturing, transportation, delivery, installation, integration, commissioning of the system, and the execution of the Site Acceptance Tests (SAT). The delivery time shall therefore be understood as the full period required to complete all contractual obligations up to the successful acceptance of the equipment at ICFO facilities.

## **CLAUSE 10.** Tender budget

- The tender budget (maximum bid price) for the supply is **1.165.000 €** (VAT excluded).

- Payment terms:

  The following payment schedule is proposed, divided into two (2) milestones to ensure clarity and transparent project follow-up:

  **Milestone 1**. A payment of **25%** of the contract value shall be released upon delivery and approval of the following items, subsequent to a Kick-Off Meeting with ICFO personnel:

  a) A complete set of engineering documentation. This shall include system drawings, detailed technical descriptions, operation manuals, and all constructive documentation for the system and its components, including optional items.
  b) Definition and agreement of the de-bonding process recipe development activities, as specified in *Point F* of the Technical Specifications.

c) Submission and approval of a detailed Site Acceptance Test (SAT) protocol, including material requested, test procedures and acceptance criteria.
d) Presentation and agreement of training plan, following technical discussions with ICFO personnel.

Milestone 1 shall be completed within 2 months after the Purchase Order.

**Milestone 2**. The remaining **75%** of the contract value shall be released upon:

a) Completion of the system installation at the designated site, and
b) Successful completion of the Site Acceptance Test (SAT), demonstrating full compliance with the technical requirements.

Castelldefels, on the date of its digital signature

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