

SPECIFICATION SHEET

Supply, installation and commissioning of a *Pull and Shear Tester* for the ICFO, financed by FEDER Catalunya 2021 - 2027

FILE NUMBER: ICFO-2026-075

CLAUSE 1. Object of the contract	1
CLAUSE 2. Needs to satisfy	1
CLAUSE 3. Technical requirements	1
CLAUSE 4. Power distributions and safety	3
CLAUSE 5. Technical documentation, system layout and services	3
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 object of this contract is the supply, installation and commissioning of a **Pull and Shear Tester** for the ICFO, financed by FEDER Catalunya 2021-2027.

The items to be supplied are classified under the following 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 **Pull and Shear Tester** for its Photonics Packaging line. This equipment will play a key role in the development and optimization of wire bonding and die bonding processes, supporting process validation and quality assurance activities.

The Pull and Shear Tester will enable mechanical testing of wire bonds and die attachments in compliance with industry standards, across a wide range of substrates including: ceramic substrates, PCBs, 8-inch wafers, gold-box packages, etc. The system will incorporate interchangeable load cells and tooling, allowing flexibility to adapt to different test requirements and sample types.

CLAUSE 3. Technical requirements

Minimum mandatory equipment characteristics

The Pull and Shear Tester shall provide, at minimum, the following features, capabilities and specifications:

3.1. The Pull and Shear Tester shall be configured as a flexible and modular testing platform:

- a. Equipped with a motorized head, a motorized substrate holding stage and an optical microscope equipped with a digital camera.
- b. Flexible and modular benchtop platform, allowing futures upgrades configuration changes.
- c. It shall support precision manual and semi-automatic testing and shall be designed to allow future upgrade to fully automatic testing.

3.2. The equipment shall support pull and shear testing on a wide range of bonding assemblies and substrate type:

- a. Wire bonds and thin ribbon bonds, including standard and fine pitches;
- b. Die attach or bonding assemblies of different die sizes;
- c. Compatible with different substrates, including PCB, ceramic substrates, gold-box butterfly housings;
- d. Compatible with 8 inch wafer substrates.

3.3. The proposed solution shall comply with the applicable industry standards for bond/die pull and shear testing:

- a. MIL-STD-883 standard.

3.4. The system shall provide the following minimum force testing capabilities:

- a. Wide force measurement range extending from $\leq 100\text{gf}$ up to at least 200Kg.
- b. Maximum shear force capability of at least $\geq 150\text{Kg}$.
- c. Maximum pull force capability of at least $\geq 100\text{Kg}$.
- d. Force measurement accuracy $\leq \pm 0.1\%$ of full scale.
- e. Sampling frequency $\geq 10\text{KHz}$.

3.5. The tester shall include motorized positioning stages and sample holders with the following formats:

- a. Axis travel speed ranging from at least 5 mm/s to 50mm/s
- b. Minimum travel range of 350mm in the X-axis and 150mm in the Y and Z-axis
- c. Shear tool height positioning accuracy $\leq \pm 1\mu\text{m}$.
- d. Adjustable clamping fixture for holding packaged devices and substrates of various geometries, with a maximum sample width of at least 100mm.
- e. Vacuum-based fixture for handling up to 8-inch wafers.
- f. Capability to accommodate additional sample holders and fixtures to support future testing requirements and different sample types.

3.6. The system shall include a motorized test head equipped with interchangeable load cells and testing tools, including:

- a. The system shall support automated execution of different tests methods using multiple force sensors and/or tools, minimizing operator intervention and manual reconfiguration between tests.
- b. It shall be supplied with at least three (3) force sensors, including:
 - i. One shear sensor with rotational capability
 - ii. One shear sensor without rotational capability
 - iii. One pull-test sensor with rotational capability
- c. It shall be supplied with at least five (5) tools, including
 - i. Three shear tools
 - ii. Two pull tools
- d. The final configuration of shear-test sensors and tools shall be selected from the manufacturer's standard catalogue during contract execution.

3.7. The system shall incorporate a vision system with:

- a. Adjustable microscope mounted on a movable arm, with adjustable height, focus, viewing angle, and magnification
- b. Integrated digital camera for sample inspection, image acquisition
- c. Camera with a minimum resolution of 6 megapixels and a large field of view (FOV) for efficient inspection and alignment of bonds, dies, and substrates.

3.8. The system shall be supplied with the software required to manage all required functionalities to operate the equipment, including:

- a. Process control, monitoring, and data logging capabilities
- b. Compatibility with Microsoft Windows operating systems
- c. Integrated data export functionality, including CSV and XML formats
- d. Integrated SPC and GR&R analysis capabilities to support process control, statistical monitoring, and verification of measurement system performance
- e. A permanent, non-expiring software license

3.9. The system shall be delivered with a complete workstation, including a PC, two screens and two joysticks.

CLAUSE 4. Power distributions and safety

The system shall comply with the following requirements:

- 4.1. Electrical Operation: 230V $\pm 10\%$, 50 Hz, in compliance with UNE-EN 61010-1 (Spanish transposition of IEC 61010-1) or equivalent international/harmonised standard providing an equivalent level of electrical safety.
- 4.2. CE-certification.
- 4.3. Safety interlocks.
- 4.4. Ergonomic system design compliant with SEMI S8 requirements.

CLAUSE 5. Technical documentation, system layout and services

The tenderer shall include in its technical proposal a documentation package, containing the following information:

Technical documentation:

- 5.1. Datasheets, technical brochures, or equivalent official manufacturer documentation describing the proposed equipment, demonstrating compliance with each of the minimum mandatory technical requirements set out in Clause 3 of this Technical Specification Sheet. Failure to provide sufficient documentation to verify compliance with any minimum mandatory requirement may result in the exclusion of the tender.
 - *Automatic evaluation criteria:* The tenderer shall only be required to provide supporting documentation for those automatically evaluable criteria set out in Annex 2 of the Administrative Clauses that ICFO expressly identifies as requiring documentary substantiation, and only in respect of the specific improvements that the tenderer chooses to offer. No documentation shall be required for criteria or options that the tenderer does not offer. Documentation not submitted within the tender deadline for a criterion that the tenderer has chosen to offer cannot be supplemented at a later stage, and the corresponding criterion will be scored as not offered.
- 5.2. Comprehensive system user manual, including both hardware and software descriptions, routine servicing and troubleshooting.

System Layout and Services Documentation.

5.3. System layout, including overall footprint and height, weight, drawings and description of the different system components.

5.4. Installation and start-up requirements, including required utilities, service connections, and any applicable environmental specification.

CLAUSE 6. Transportation, installation, start-up

6.1. Transport and delivery

- a. The contract includes the supply, transportation, installation and commissioning of the system at ICFO's facilities, as well as all components and consumables required for initial start-up, and any works or services necessary for its correct and full operation.
- b. The contractor shall deliver the system to ICFO's facilities. Accordingly, the contractor shall bear all costs and risks associated with transport, export and import licences, customs clearance and duties, import taxes, and any other charges arising until the system is made available at ICFO's premises. The contractor shall take out and maintain adequate transport insurance covering the full replacement value of the system until the moment of formal reception by ICFO.
- c. 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.

6.2. Installation and placement

- a. The system shall be placed at the location designated by ICFO. The contractor shall cover all costs, organisation and coordination related to placement, including the provision of any specialised equipment or vehicles, and any necessary disassembly and reassembly of components required for building access or internal transportation, strictly following the route and access conditions specified by ICFO.

Note: *The designated location has level, step-free access. Delivery shall be performed using a vehicle equipped with a loading ramp or liftgate, together with appropriate wheeled handling equipment. Any deviation from the agreed access route requires prior written authorisation from ICFO.*

6.3. Packaging management

- a. The contractor shall be responsible for the removal and proper disposal of all packaging materials upon delivery and unpacking of the system, in compliance with Ley 7/2022, de 8 de abril, de residuos y suelos contaminados para una economía circular, and any applicable waste management regulations. Where the contractor determines that original packaging must be retained during the warranty period for potential return or re-shipment purposes, it shall notify ICFO in writing at the time of delivery. In such cases, the contractor shall store the packaging at its own cost and risk, unless ICFO agrees in writing to provide on-site storage space.

6.4. System qualification

- a. Site Acceptance Test (SAT) will be required as part of the delivery and acceptance process of the equipment.
- b. It shall include, at minimum:
 - Machine parameters verification, such as motorized stages speed, automatic test head tool selection, etc. demonstrating compliance with the specification.
 - Demonstration of pull and shear testing using representative samples provided by ICFO.
- c. Successful completion of the SAT shall trigger the formal act of reception (Acta de Recepció) pursuant to Article 210 LCSP. ICFO shall issue the Acta de Recepció within one (1) month of SAT completion.

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

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

7.1. 1-year Full Warranty covering all parts and components of the system irrespective of the original manufacturer of each component. The warranty period shall begin to run from the date of the formal acceptance record (Acta de Recepció) referred to in Clause 6. The warranty shall cover, at a minimum and at no additional cost to ICFO:

- a. Replacement or repair of any part or component that fails or is found defective during normal operation, regardless of the component's manufacturer.
- b. All costs of diagnosis, disassembly, repair or replacement, reassembly, and recommissioning, including consumables required for the repair.
- c. Travel, accommodation and subsistence costs of all service engineers required for on-site intervention.
- d. Shipping, insurance and handling costs for any component transported between ICFO and the contractor's facilities.

7.2. 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.

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

7.4. 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

8.1. A minimum of 1 day of mandatory training for ICFO staff shall be included, at the ICFO facilities, scheduled on a mutually agreed date.

8.2. 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.

8.3. 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

9.1. The maximum execution period of the contract shall be **THIRTEEN (13) WEEKS**, counted from the day following the date of its formalisation.

9.2. This period includes all the necessary phases for the full performance of the contract described in Clause 6, from manufacturing to the formal acceptance of the equipment at ICFO's facilities.

CLAUSE 10. Tender budget

10.1. The maximum tender budget (Presupuesto Base de Licitación) for the supply, installation and commissioning of the system is **68.000,00 €** (VAT excluded).

10.2. Payment terms: full payment will be made in a single instalment, once the final reception certificate (Acta de Recepción) covering supply, installation and commissioning is issued, within thirty (30) days following said record.

Castelldefels, on the date of its digital signature

Prof. Dr. Valerio Pruneri

Group Leader Optoelectronics – ICFO