Public

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EQUIPMENT SPECIFICATIONS DOCUMENT

Stacking machine

EOTP	
OS	
Platform	
Ref Invest Plan	

	Name	Function	Signature / Date
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Document Revision Table

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Purchasing Department	- SMA Manager	1 copy (email)
Department	- Head of Department +Deputy	1 copy (email)
	- Safety Engineer	1 copy (email)
	- Quality Engineer	1 copy (email)
	- Facility Manager	1 copy (email)
	- Laurent LE MENTEC (si la circulaire 51 « marchés sensibles » est applicable dans la demande de consultation)	1 copy (email)
Division	- Head of Division	1 copy (email)
	- Installation Manager(s)	1 copy (email)
Laboratory and platforms	- Head of Laboratory	1 copy (email)
	- Equipment Project Manager (Pour classement avec dossier équipement)	1 copy (email)
	- Platform Manager	1 copy (email)
	- Writer(s)	1 copy (email)
CSOP	- Equipment purchasing coordinator	1 copy (email)

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1. PURPOSE

This specification document defines the supply, on behalf of the CEA, of an equipment designated as Stacking machine. The equipment must be installed at the site Grenoble in the building D2A.".

The installation work for the equipment will be subject to analysis following the selection of the equipment.

If the technical specifications or requested documents cannot be met, the supplier must clearly specify this in their commercial offer by at least filling out the comment section of Appendix 1 of this specification document.

2. DEFINITION

In this document, the contractor is referred to as “the supplier”.

The instructing party is referred to as “CEA”.

3. GLOSSARY

- LITEN : Laboratoire d’Innovation pour les Technologies des Energies Nouvelles et les nanomatériaux
- RCA : Remote Control Access (Prise en Main A Distance : PMAD)
- INES : Institut National de l’Energie Solaire (Bourget du Lac site)
- MTBF : Mean Time Between Failure
- MTTR: Mean Time To Repair
- MTBI : Mean Time Between Interrupts
- FAT : Factory Acceptance Tests
- SAT : Site Acceptances Tests
- Facilities : This term refers to everything that must be put in place around the equipment to enable its installation and proper operation (premises, power supply, fluids, gases, utility networks, ventilation, safety systems, etc.)
- Generation 3 battery (Gen 3): Battery which consists in an electrode n°1 made of NMC or LFP coated on a current collector and an electrode n°2 made of graphite coated on a current collector.
- Generation 4 battery (Gen 4): Battery that may consist in an electrode n°2 made of lithium metal.

4. APPLICABLE DOCUMENTS

The supplier shall comply with the documents and all procedures in force at CEA/GRENOBLE. Below is a non-exhaustive list:

- EQ/CS23-10: Règles applicables aux entreprises extérieures (French version)
- EQ/CS23-11: Applicable rules for outside companies (English version)

These documents shall be available for consultation upon request by the supplier.

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5. INTERFACE CLIENT – PRESTATAIRE

The technical contacts for the basic and additional services are:

Mrs Le Comte Annaïg

Tel : +33 (0)4 38 78 09 99

Email : annaig.lecomte@cea.fr

6. CONFIDENTIALITY

The supplier undertakes to keep confidential and shall refrain from disclosing to any third party, without written approval from CEA, the whole or part of information and/or knowledge belonging to CEA or any third party, that it may obtain or may have obtained during the service performed on behalf of CEA.

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7. TECHNICAL SPECIFICATIONS

7.1. Description of the main function

The equipment will enable the assembly of battery stacks, consisting in an electrode #1, a separator, and an electrode #2 to produce battery prototypes, while preserving the integrity of the electrodes used.

The equipment must be equipped with at least three storage compartments (or magazines) for the electrodes.

Operating conditions:

- Installation in a temperature-controlled dry room.
- Operation by multiple trained operators.

7.2. Sub-functions of the equipment

The general operating principle of the equipment is the following:

1. Electrode storage:
    - Electrode #1 and electrode #2 are pre-cut and stored within the equipment in specific compartments (magazines) before the beginning of the stacking operations.
2. Separator storage:
    - The separator is installed in the equipment before the beginning of the stacking operations.
3. Picking, alignment, and positioning of electrode #1.
4. Alignment and positioning of the separator.
5. Picking, alignment, and positioning of electrode #2.
6. Repetition of the steps 3 to 5 *x* times.
7. Extraction of the stack from the machine.

The machine must be capable of performing the functions described in the following paragraphs:

1. Handle multiple different electrode formats.
2. Produce stacks for different generations of batteries.
3. Avoid damaging electrodes during picking and positioning phases.
4. Ensure proper alignment of the stack.
5. Allow for fully autonomous operation by the technical team trained on the equipment's operation.
6. Ensure optimal machine performance within a dry room environment.

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7.3. Expected performances

The functions and sub-functions of the equipment are described in the subsequent paragraphs and categorized according to the following classification:

- F0 = mandatory minimum requirement, must be quoted in the main offer, not negotiable;
- F0* = mandatory, must be quoted in the main offer, can be negotiated during the negotiation phase;
- F1 = Mandatory type of Option: The supplier must obligatorily include an offer with the specified option, otherwise the offer will be considered irregular and eliminated. The CEA reserves the right to decide whether to exercise this option or not, but the price of the option must be clearly stated in the offer. The price of mandatory options will be included in the overall budget for the comparison of offers.
- F2 = Non Mandatory type of Option: The supplier has the discretion to propose or not propose the specified option. If the option is not proposed, the supplier will not necessarily be disqualified. The CEA reserves the right to decide whether to exercise the option or not.

The functions and sub-functions of the equipment are classified in the subsequent table.

Table 1 – Equipment specifications, functions and sub-functions

Description	Min. acceptance criteria	Max. acceptance criteria	Classification
Stack assembly: Electrode #1 / separator / electrode #2 According to the specifications for the electrodes format #1			F0
Stack assembly: With a total thickness 1,5 mm and 20 mm.			F0
Stack assembly of Gen 3 battery: 2 magazines, no separating layer between the electrodes.			F0
3 electrodes magazines			F0
Electrodes picking shall occur without damaging them			F0
Administrator rights on the equipment for creating, modifying, and deleting production recipes.			F0
Optimal operation of the equipment in a dry room environment			F0
Layers alignement with a precision of 0.2 mm			F0
Stack assembly: Electrode #1 / separator / electrode #2 According to the specifications for the electrodes format #1 Supply the detailed procedure for modifying the format			F0*
Connection interface for a laser cutting module that can be installed on the equipment at a later date.			F0*

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Addition of an extra magazine, increasing the total number from 3 to 4.	3 magazines	4 magazines	F0*
Waste management strategy for the magazine #4 or another dedicated compartment.	Compartment dedicated to waste/rejects	Additionnal magazine that could also be used of stack an extra layer	F0*
Stack assembly of Gen 4 battery: With lithium electrodes with a thickness between 30 and 150 µm, separated with a protective layer.			F1
Costing of all tooling required to produce a stack according to format #2.	Complete list, detailed procedure, and costing of the tooling required to switch between format #1 and format #2.		F1
Supply of a laser cutting module for lithium metal.	Possibility of adding a cutting module or a connection interface for an independent laser module at a later stage.	Adding a laser cutting module at a later stage.	F2
Integration a of peel-off solution to remove the protective layers separating the electrodes			F2
Advanced-level maintenance training for 2 people (see § 15.3)			F2

7.3.1. Working with multiple electrodes formats

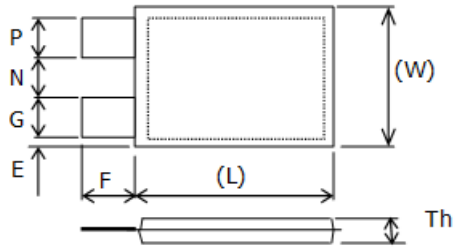
The equipment must enable the handling of various electrode and separator formats.

Format #1 is the default format; the equipment must be supplied with all the tooling required to perform stacking using this format.

The equipment must be technically capable of performing stacking using Format # 2. The specific tooling required for stacking using Format # 2 must be quoted as a mandatory option.

After training by the supplier, the CEA team must be able to perform the tooling changeover in complete autonomy. The supplier must specify all the means implemented in the equipment for the format changeover, including the list of operations and adjustments required and the estimated duration of these steps.

Table 2 – Dimensions of one electrode #1 or #2 according to the format #1

		min	max		
Format #1	L	48	52	mm	
	W	48	52	mm	
	Th	30	200	µm	
	P	8	12	mm	
	N	6	34	mm	
	G	8	12	mm	
	E	0	10	mm	
	F	15	25	Mm	
	Weight	0.3	5	g	

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Table 3 - Dimensions of one electrode #1 or #2 according to the format #2

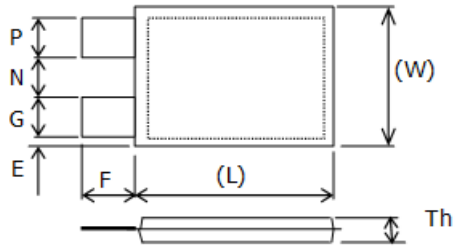
		min	max		
Format #2	L	139	142	mm	
	W	84	87	mm	
	Th	50	200	µm	
	P	8	12	mm	
	N	40	74	mm	
	G	8	12	Mm	
	E	0	10	mm	
	F	15	25	mm	
	Weight	0.5	5	g	

Table 4 – Dimensions of separator

		min	max		
Separator	W	50	100	mm	
	Th	10	150	µm	

A layer is defined as the stack of one electrode #1, one separator and one electrode #2. The number of layers will be between 6 and 60. The total thickness of the final stack will be between 1.5 mm and 20 mm.

7.3.2. Produce stacks for several battery generations

The equipment must enable stacking operations for generation 3 batteries (Gen 3), and as a mandatory option for generation 4 batteries (Gen 4).

Gen 3 batteries consist of a graphite electrode, while Gen 4 batteries consist of a lithium electrode.

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Stack assembly of Gen 3 battery:

Electrodes #1 and #2 are pre-cut and stored in dedicated magazine. The electrodes are piled up without a separative protective layer.

The equipment could work with 2 magazines, one per electrode type.

Stack assembly of Gen 4 battery:

This specification is required as a mandatoty option.

The material for electrode #2 might be lithium metal, either deposited on a current collector or not.

Electrodes #1 and #2 are pre-cut and stored in a dedicated magazine. When electrode #2 consists of lithium metal, the electrodes are separated by a protective layer. The equipment must be capable of removing the protective layer and pick up the lithium metal electrode to perform the stacking process.

Validation of this step will be assessed through a series of tests defined in Annex 4.

The thickness of the lithium metal shall be between 30 µm and 150 µm.

As a mandatory option the equipment must be equipped with a connection interface for a laser cutting module that can be installed at a later stage. The installation of a lithium metal laser cutting module must be quoted in the proposal as a non-mandatory option.

The equipment must be capable of operating with at least three magazines: one magazine per electrode type and an additional magazine for an extra layer.

A management strategy for scrap/waste of electrodes and/or protective layers must be implemented, utilizing either a magazine or a separate compartment dedicated to scraping.

The supplier must quote the capability to remove a protective layer across the three magazines as a non-mandatory option.

7.3.3. No damaging of the electrodes during the pick-up and the positioning phase

The supplier must precisely describe the methods implemented for picking up and positioning the components (electrode #1, separator, electrode #2), particularly to minimize damage (scratching) of the electrodes during these steps.

7.3.4. Ensuring the alignment of the stack

The supplier must precisely describe the methods implemented to ensure the proper alignment of the stack (electrodes and separator), for example mechanical or optical methods. In particular, the supplier must specify how alignment is maintained in the event of electrodes damaging during the pick-up steps.

The maximum misalignment must not exceed 0.2 mm.

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7.3.5. Enabling fully autonomy of the trained CEA team

After training by the supplier, the CEA technical team must be able to program and operate the machine with complete autonomy.

The CEA technical team must be able to create, modify, and delete all production recipes. Recipe programming must allow for the association of a specific magazine with each production step.

7.3.6. Enabling optimum operations in dry room environment

The equipment must operate optimally ion the environment of a dry room.

The supplier must specify the equipment's characteristics regarding total mass, overall dimensions, operating environment, safety, and handling requirements.

7.4. Specifications

7.4.1. Hardware and equipment specifications

Table 5 -Specifications and test conditions for equipment

	SPECIFICATIONS		PROPOSED TEST CONDITIONS					
TEST #	**Acceptance Criteria**	**Equipement Expected Target**	**Test Condition**	**Sample Type/Format (Specify who provide them)**	**Protective layers between electrodes**	**Number of Test Samples**	**FAT ou SAT**	**Test medium (specify who provides it)**
E-1	Alignment	The maximum misalignment at the connection tabs, in all dimensions, must not exceed 0.2 mm.	6-layers stack	Format #1 Gen 3	No	2	FAT	Electrodes and separator CEA
E-2	Alignment	The maximum misalignment at the connection tabs, in all dimensions, must not exceed 0.2 mm.	6-layers stack	Format #1 Gen 4 Electrode #2 = 100 µm-thick lithium metal	Yes	2	FAT	Electrodes and separator CEA

The test E-2 will only be performed if the corresponding option is exercised.

7.4.2. Process specifications

If the test conditions proposed by the CEA are not acceptable or sufficient for the equipment manufacturer, the manufacturer may propose alternative test conditions. These alternatives should be clearly documented and agreed upon by both parties to ensure a comprehensive and fair evaluation of the equipment.

Process 1: Stack assembly of Gen 3 battery

Table 6 - -Specifications and test conditions for process 1

TEST #	Acceptance Criteria	Equipement Expected Target	Test Condition	Sample Type/Format (Specify who provide them)	Protective layers between electrodes	Number of Test Samples	FAT ou SAT	Test medium (specify who provides it)
P1-1	Operating production recipe	Operating production recipe all along the process NA	6-layers stack	Format #1 Gen 3 2 magazines	NA	2	SAT	Electrodes and separator CEA
P1-2	Alignement en fonction du nombre de couches	The maximum misalignment at the connection tabs, in all dimensions, must not exceed 0.2 mm.	20-layers stack	Format #1 Gen 3 2 magazines	N	2	SAT	Electrodes and separator CEA
P1-3	Operating production recipe	Operating production recipe all along the process NA	20-layers stack	Format #1 Gen 3 2 magazines	NA	2	SAT	Electrodes and separator CEA
P1-4	Alignement en fonction du nombre de couches	The maximum misalignment at the connection tabs, in all dimensions, must not exceed 0.2 mm.	20-layers stack	Format #1 Gen 3 2 magazines	N	2	SAT	Electrodes and separator CEA

Process 2 : Stack assembly of Gen 4 battery

Table 1 - Specifications and test conditions for process 2

TEST #	Acceptance Criteria	Equipement Expected Target	Equipment Target Tolerance	Test Condition	Sample Type/Format (Specify who provide them)	Protective layers between electrodes	Number of Test Samples	FAT ou SAT	Test medium (specify who provides it)
P2-1	Operating production recipe	Operating production recipe all along the process	NA	6-layers stack	Format #1 Gen 4 Electrode #2 = 100 µm-thick lithium metal	NA	2		Electrodes and separator CEA
P2-2	Alignement en fonction du nombre de couches	0.2 mm		6-layers stack	Format #1 Gen 4 Electrode #2 = 100 µm-thick lithium metal	Yes for electrode #2	2		Electrodes and separator CEA

The tests P2-1 and P2-2 will only be performed if the corresponding option is exercised.

7.5. Computer specifications

7.5.1. Computer Control

The equipment is controlled from a computer workstation, preferably running the Windows operating system.

7.5.2. Network Connection

The equipment is connected to the CEA network through this PC via a dedicated Ethernet connection. The equipment supplier must ensure that an additional network card is installed in the workstation in case the equipment is connected to the sole available network port.

7.5.3. Instrumentation network cloud

The equipment is connected to a dedicated instrumentation IP network cloud. It follows the principle showed in the following figure:

Main Characteristics of the instrumentation network cloud:

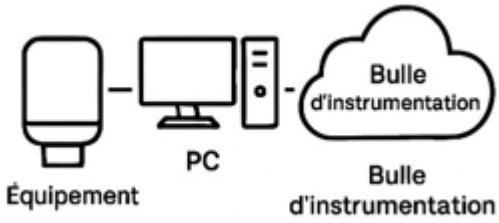


Figure 1 – CEA network connection diagram

- For IT security reasons, there is no internet access or email functionality.
- User session authentication is handled through a CEA Active Directory domain controller.
- Data is uploaded to a shared network storage system.
- Remote access is restricted to CEA's internal IT management service only.

7.5.4. Connection prerequisites

Prior to network connection, CEA requests that the equipment supplier evaluate the feasibility of:

- Installing CEA's specified antivirus software on the PC (reference available upon request).
- Implementing a process for regular Windows updates with two options :
    - Complete system updates (including all updates).
    - Security-only updates (critical security patches only).

7.5.5. Documentation and procedure

The equipment supplier must document the IT configuration of the equipment for its connection to the CEA network (network interface configuration, protocols to be implemented, ports to be opened, data types, architecture diagram, etc.). The supplier will provide a network connection procedure.

7.5.6. Equipment Supplier IT Contact Availability

Availability of an IT contact from the equipment supplier is requested both prior to and during the network connection process.

7.5.7. Data Export

During operation, if the equipment serves as a data source, data should preferably be exported in flat file formats (TXT, CSV) or office document formats (XLSX, PDF) for deposit in the designated network storage (CEA infrastructure).

7.5.8. User Session Management

- Nominal phase:

The user session is either individual (named) or generic and authenticated through the CEA Active Directory domain controller.

- Maintenance phase:

The user session is local, has administrative privileges, and is named with the Equipment manager ID.

7.5.9. Hard Disk Drive Image

Subject to technical feasibility, CEA will create a disk image of the PC and store it on a network resource. In all cases, the equipment supplier must provide a complete system reinstallation procedure and all necessary source files or binary files (removable media, official download links, software licenses, etc.).

7.5.10. Administrator password

If the PC is running Windows, CEA requests that the equipment supplier provide the password for the ADMINISTRATOR account. This password will subsequently be managed by the IT service provider under CEA's outsourcing contract.

7.5.11. Remote Access Control for maintenance

If requested by the equipment supplier and subject to technical feasibility, an external remote access control for maintenance solution may be implemented based on CEA's service offering. For IT security reasons, consumer-grade remote maintenance software is not permitted. Remote maintenance sessions are scheduled and conducted under continuous supervision by CEA personnel. During these sessions, the equipment is physically disconnected from the instrumentation network cloud.

8. WORK ENVIRONMENT, INSTALLATION LOCATION, LIMITS OF SERVICE

8.1. Limits of services

The limits of Services between CEA and the supplier are the followings:

ITEM	CEA is responsible	Supplier is responsible
Metrology Equipments used for the SAT	X	
Installation and assembly of all materials on site		X
Electrical cabinet hook-up to the CEA power lines	X	

8.2. Environment, Facilities

Tableau 2 – Specifications linked to facilities

Main fluids distribution	Specification for Building D2A 101	Note
Electrical power supply	Voltage: 220 V or 380 V (3 phases)	All electrical installations must meet the European standard UTE18 510
	Frequency: 50 Hz	
Air conditioning	Dry air conditions: -50°C of dew point	All components of the equipment should be compatible with these conditions
	Temperature: 20°C	
Compressed air	Pressure: 7 bars	

The supplier will submit with their offer the requirements for fluids, electrical power, and all other necessary interfaces, and will complete Appendix 2 provided with this specification document. If these elements are not known at the time of offer submission as they require further study, the supplier commits to providing this information no later than 20 weeks (in accordance with “Section 9 Timeline”).

The **neutral grounding system** of the installation (e.g., TT, TN-S, IT) must be explicitly stated in this document. This information must be clearly and unambiguously presented to ensure equipment compatibility and compliance with electrical safety regulations. The neutral grounding system typically used at CEA Grenoble is TN-S.

Important note:

Completing Appendix 2 will enable CEA to create Piping and Instrumentation Diagrams (PIDs) for fluids as well as the PID for electrical power supply. These PIDs will then be validated by the equipment supplier before hook-up preparation work begins. For simpler equipment, PIDs may not necessarily be required.

Communication Between Equipment and Facilities:

When the equipment relies on certain facilities (such as cooling water, ventilation, compressed air, etc.) for safe operation, the supplier must provide CEA with the following during the design phase:

The conditions required for proper equipment functioning.

An analysis of criticality in case of parameter deviations.

This analysis may take the form of an FMECA (Failure Modes, Effects, and Criticality Analysis) or an equivalent method.

Loose of Facility Failure Analysis:

Every potential facility failure—whether isolated or combined with others—must be studied. If a risk is identified, a dedicated section must be included in the documentation.

Safety Signal Integration:

If certain facility parameters could impact:

- The safety of the equipment's process,
- Safe operational mode,
- Overall installation safety,

The supplier must integrate the necessary signals into the safety loop or automation system to enable emergency shutdown or controlled shutdown based on criticality level.

Communication Protocol:

Finally, if the equipment's operation could significantly disrupt the installation's facilities, the supplier must propose to CEA a communication protocol to anticipate and manage these impacts.

8.3. CEA on-site intervention rules

Access to the CEA site is strictly regulated. The applicable conditions are described in documents EQ/CS23-10 (Rules applicable for outside companies) and EQ/CS23-11 (Applicable rules for outside companies), provided with the bid documents. These terms also apply to the subcontractor of the supplier that will deliver the equipment.

Prevention plan:

CEA will establish, in collaboration with the supplier and any subcontractors, a comprehensive prevention plan for the installation and commissioning of the equipment.

Safety Equipment:

As CEA prohibits the lending of equipment, including safety equipment, the supplier and any subcontractors must provide all necessary safety materials to prevent risks specific to their intervention (PPE, collective protective equipment, etc.). They will ensure the replacement and repair of this equipment and, if applicable, will ensure their personnel are properly trained and aware of its use in accordance with regulations. This equipment must comply with current regulations and have a certificate of conformity.

Collective Safety Equipment:

The supplier and any subcontractors must provide all collective safety equipment aimed at preventing accidents related to the work, such as:

- Marking of work areas.
- Marking of circulation areas.
- Marking of handling areas.
- Marking and installation of barriers around pits and level differences.

They will ensure the installation and removal of this equipment as soon as the service no longer requires the presence of markings.

Specific Access for Deliveries:

Given the access constraints to the CEA site, the supplier must provide a restricted list of individuals authorized to access the CEA:

For EU residents, 10 calendar days before delivery.

For non-EU residents, 25 calendar days before delivery.

8.4. Delivery

Delivery and Installation Organization

For the proper organization of delivery and installation at CEA, a packing list must be communicated to CEA at the kick-off meeting or at least 2 months before delivery. This list should include the following information:

- The total net weight of the shipment.
- The number of packages for transporting the equipment.
- The weight and dimensions (length × width × height) of each package.
- The number of support points (legs) and the weight supported by each.
- Any need for specific tools or a forklift for installation.
- The unloading plans.

Whenever unloading requires lifting equipment (forklifts, cranes, etc.), a safety protocol supplementing the prevention plan must be established before the unloading operation.

All delivered materials must bear the order reference and the recipient's name on each item in the packing list.

Supplier Presence

The supplier must arrange for all necessary measures to unload and install the equipment (unloading plan and installation plan). **The supplier must be present during the unloading of any equipment requiring special monitoring due to its size, value, or complexity.**

Installation Location

The equipment must be installed at the Grenoble site in the D2A building.

Logistical Constraints

The supplier must consider logistical constraints related to equipment placement (maximum space, weight, access through doors, ramps, stairs, elevators, maximum height, etc.). These details are specified in Section 0 and in Appendix 1.

Dimensional and Load Constraints:

Due to footprint constraints in the dry room, the main dimensions of the equipment (without the dosing system) should be as compact as possible with length inferior to 2000 mm and width inferior to 1200 mm. The total height including the dosing system and hopper must be less than 2200 mm.

Packaging and Waste Disposal

The equipment and all its peripherals must be delivered clean and properly packaged. Transport platforms, pallets, and packaging crates must be suitable for the weight and volume of the items to ensure safe transport and avoid any disputes related to improper packaging.

All transport platforms, pallets, and packaging crates must be removed by the supplier (waste disposal from packaging is not handled by CEA).

Delivery Hours

Deliveries will be made between 8:00 AM and 12:00 AM from Monday to Friday.

9. TIMELINE

All the deadlines mentioned below are indicative.

Step	Deadline
Factory Acceptance Test (FAT)	T_0* + 20 weeks
Equipment delivery at CEA site	T_0 + 24 weeks
Training	T_0 + 25 weeks
Site Acceptance Test (SAT)	T_0 + 26 weeks

*T_0 refers to the date of order notification by CEA.

o facilitate compliance with delivery and acceptance deadlines, the supplier must promptly transmit all Appendixes required for equipment installation (fluid requirements, electrical power supply, and any other necessary interfaces (Appendix 2), hazard identification sheet (Appendix 3), equipment consumption data, etc.) or any other necessary elements.

10. QUALITY

For all its activities, the supplier must comply with the requirements of the ISO 9001 standard.

Significant and/or repeated deviations from this specification will be notified to the supplier (via email-anomaly or Improvement Sheet) for corrective action within a specified timeframe. In case of deviations or unperformed corrective actions, penalties will be applied to the supplier in accordance with the contract.

CEA Grenoble reserves the right to verify the effective operation of the system at any time through quality audits, which may be conducted at the supplier's premises and on the CEA Grenoble site.

Any measurements performed by the supplier for acceptance testing must comply with the requirements of Section 7.1.5 of ISO 9001 (Resources for Monitoring and Measurement). If the supplier subcontracts these measurements, they must be accompanied by a certificate of conformity.

11. SAFETY AND COMPLIANCE

As required in CEA's general purchasing conditions, the supplier commits to treating safety as an absolute priority in the design, preparation, and execution of the services covered by the contract.

The supplier acknowledges and applies the "rules applicable to external companies at the Grenoble center" provided with the tender dossier.

The supplier, as well as any subcontractors at any level, must comply with all applicable legislative and regulatory provisions regarding safety and environmental protection.

The equipment must comply with current regulations.

The equipment will be CE certified, bear the "CE marking," and be accompanied by a CE Declaration of Conformity (see § 13 Documentation).

The supplier is requested to seek assistance from a French certification body to verify regulatory compliance from the equipment's design phase.

11.1. Hazard identification

CEA may request the supplier to provide a description of the equipment's residual hazards, including the following information:

- Details about residual hazards for operators.
- Interactions between the equipment and its environment (gas or chemical emissions, electromagnetic fields, noise, etc.…).

If hazard identification is required, CEA will make this request no later than during the market launch meeting. The supplier will base this analysis on Appendix 3 of the Technical Specification Document: Identification of Residual Hazards.

The supplier must submit this analysis to CEA during the design phase (cf.§ 12.1 Documentation).

11.2. Power supply disconnection and separation device

A power supply disconnection and separation device shall be provided on the equipment, for each source of energy of the machine.

11.3. Power supply lockout / tagout device

A power supply lockout / tagout device with dissipation of the residual energy shall be provided on the equipment, for each source of energy of the machine.

11.4. Emergency stop



Emergency stop buttons shall feature protection against unintentional operation. See the example on the side picture.

11.5. "Service" nitrogen or compressed air connection

When the equipment uses compressed air or nitrogen for controlling valves, actuators, and other systems, the machine must be equipped with a general shut-off valve.

This valve may be locked in the closed position using a padlock to allow for equipment isolation (maintenance).

There must be one or more purge devices to dissipate residual pneumatic energy stored in the machine after the main valve is closed. This dissipation must be performed without risk to exposed personnel.

11.6. Risks related to electricity

Generalities

The equipment shall comply with the regulations in force, in particular the following Directives:

- "Electrical Equipment" 2017/35/EU;
- "Electromagnetic compatibility" 2014/30/EU;
- "Restriction of the use of certain hazardous substances in electrical and electronic equipment" (2011/65/EU).

11.7. Presence of an uninterruptible power supply (UPS)

If the whole equipment must be supplied by an uninterruptible power supply (UPS), then this power supply shall be provided by CEA.

The supplier shall give all the required information for product definition (voltage, power, battery life).

The supplier shall provide connection terminals on the equipment to connect the uninterruptible power supply.

In the event that only a portion of the equipment is powered by an internal UPS integrated by the manufacturer, the following rules shall be observed:

- An all-pole isolating device shall be installed downstream of the UPS in order to enable maintenance operations.
- If voltage still remains after the master switch of the machine has been turned off, such presence shall be indicated close to the switch.
- All circuits that remain live after switch off shall be marked in orange colour in accordance with standard 60-204.

11.8. Risks related to fire

The detectors integrated into the equipment will not be connected to the building's fire protection system by default, and will only act on the affected equipment and its associated peripherals, if applicable.

If the supplier deems it necessary to connect their fire protection system with the building's fire safety system, they must first consult with CEA to ensure the compatibility of the entire system.

11.9. Risks related to explosion

The equipment shall comply with the regulations in force, especially the "ATEX" Directive 2014/34/EU.

Whenever the equipment is likely to generate an explosive atmosphere, the supplier shall perform an ATEX risk assessment and substantiate the choice of the selected ATEX equipment. The ATEX zoning plan as well as the certificates of conformity of the ATEX items of equipment shall be supplied to CEA.

11.10. Risks related to Chemicals

When the equipment uses chemical products that pose health and safety risks to operators, the supplier must detail in the risk analysis the protective measures implemented during normal, degraded, or maintenance work phases.

- When chemical products (solid, gaseous, or liquid) are supplied by the supplier, they must provide the complete list of products, along with Material Safety Data Sheets in French (MSDS) for each product. CEA will be particularly vigilant about the content, pictograms, and classification used, as well as the provision of a version written in French.
- All equipment containing liquid chemicals must be organized to form a retention system to prevent the spread of these products outside the equipment without intentional action. These retention systems will be equipped with leak detectors reporting information to the equipment's control panel. The activation of a detector will interrupt the automatic power supply to the machine and the circulation of chemical fluids. The detectors will be tested before the equipment is put into operation.
- The operation of the equipment must be controlled by the proper functioning of the extraction system. The extraction level will be continuously monitored by one or more extraction controllers, which will trigger a visual alarm at the workstation (on the equipment, and if necessary on the affected peripherals).
- Note: For automated equipment, this "extraction" alarm may be combined with other types of alarms on the equipment's control panels. The following must be placed under extraction: trays, work surfaces, and generally any location where a leak could occur: presence of fittings, valves, pumps, storage capacities (even closed), canisters, etc.
- The chemical product trays on the benches must be equipped with an automatic drain system with adjustable timing, so that solutions can be automatically directed to the drains in case of prolonged extraction failure.
- For certain process requirements, chemical products may need to be heated. At the end of the operation, these baths are drained to dedicated drains. For temperatures above 60°C and for discharges into the "solvents" drain, a study must be conducted to define the best solution: PVDF material, dilution module, heat exchanger, etc.
- If the solution chosen by the supplier involves the installation of a buffer tank to allow cooling of these effluents, it must be under retention and equipped with an adjustable timing drain system, as mentioned above.
- For equipment with process chambers, the supplier must provide the list of expected by-products in case of chamber opening, to facilitate maintenance operations.
- The supplier will provide CEA with the technical data sheets and SDS for the thermal insulators used, prioritizing the least hazardous thermal insulating products (non-CMR). The use of CMR

Category 1a and 1b is PROHIBITED. The use of thermal insulating products classified as CMR Category 2 must be justified by the supplier and validated by CEA in advance.

- The supplier will provide CEA with the list of refrigerants used in the equipment and the associated SDS.
- If the equipment is likely to contain materials subject to regulations related to perfluoroalkyl and polyfluoroalkyl substances (Decree of June 20, 2023) and "Substances of Very High Concern" (SVHC) (under Regulation (EC) No 1907/2006), the supplier will inform CEA during the design phase.

11.11. Risks related to handling

For those parts of the equipment requiring handling (pumping units, chamber lids, covers, etc.), in particular during maintenance or installation operations, suitable lifting means shall be provided and described in the safety instructions of the equipment.

Systems integrated into the equipment shall be given preference over removable systems.

11.12. Risks related to pressure vessels

The equipment must comply with current regulations, including:

- Pressure Equipment Directive 2014/68/EU.
- The contract holder will provide the following elements with the supplied pressure equipment, at a minimum:
- The pressure equipment conformity declaration;
- The presence of a CE conformity plate on the affected equipment;
- The service instruction manual;
- The maximum allowable pressure (PS) value;
- The maximum allowable temperature (TS) value;
- The useful volume for tanks;
- The diameters of the sections for pipelines, if applicable;
- The calibration certificates and safety accessories certificates.

11.13. Risks related to work at height

In the event that use, maintenance or installation operation of the equipment require access at height, the supplier shall give priority to the installation of collective protective equipment (e.g.: built-in work platform with handrail complying with the standards in force) or, failing that, provide personal protective equipment (e.g.: anchoring points or lifelines complying with the standards in force). In the latter case, the technical documents shall very clearly refer thereto, so that the associated regulatory checks can be implemented.

Where necessary, the associated personal protections may be required.

These shall have been validated by CEA.

11.14. Risks related to artificial optical radiation

These include visible, infrared, and ultraviolet radiation, whether coherent (such as lasers) or incoherent.

The design, implementation, and labeling of the affected equipment must comply with current regulations and standards.

The supplier must provide CEA with information about the artificial optical radiation used in the equipment during the design phase, particularly regarding the risks to users.

11.15. Risks related to noise

If the equipment falls under the definition of a machine, it must comply with current regulations, including Regulation EU 2023/1230.

11.16. Risks related to temperatures

If the equipment falls under the definition of a machine, it must comply with current regulations, including Regulation EU 2023/1230.

11.17. Signalling

If the equipment falls under the definition of a machine, it must comply with current regulations, including Regulation EU 2023/1230.

Residual risks shall be indicated on the machine by means of regulatory hazard pictograms (triangles with yellow background), accompanied by additional text when applicable. In this case, this text shall be written in French.

11.18. Regulatory Inspection

CEA shall have the necessary regulatory inspections carried out by an authorized organization of its choice, in order to verify that the supplied equipment complies with the regulations.

The Supplier shall remedy any non-conformity in the shortest time possible without being able to claim any compensation. Depending on the severity of the detected anomalies, CEA may decide to suspend the commissioning operations until the problems have been solved (refer to Article 30 of chapter 11 of the General Purchasing Conditions).

11.19. Inspection of the work equipment

The equipment must comply with current regulations, particularly Regulation EU 2023/1230. It must be accompanied by:

- The CE marking of the machine;
- The Declaration of Conformity;
- The instruction manual **in French**, including all necessary plans, diagrams, and documents for installation, commissioning, operation, adjustment, assembly, and disassembly.

CEA may arrange for a machine control inspection at the manufacturing site by a certification body of its choice. The report from this manufacturing site inspection must be free of any non-conformities. All remarks made by the certification body must be addressed by the contract holder, who will implement the necessary modifications without requesting any financial contribution from CEA.

In all cases, a second inspection must be conducted after the equipment is installed on-site.

Refer to Chapter 14 CEA will arrange for a machine control inspection at the installation site. The report from this inspection must be free of any non-conformities. All remarks made by the certification body

must be addressed by the contract holder, who will implement the necessary modifications without requesting any financial contribution from CEA.

CEA reserves the right to conduct a second inspection after the non-conformities have been resolved.

If the equipment meets the definition of a machine, the design of the safety-related control systems must be carried out in accordance with the EN ISO 13849-1 standard. The contract holder must provide CEA with:

- The list of safety-related control systems (SRP/CS);
- The reasoning followed during the design (e.g., the faults considered, the faults excluded);
- The result of the required performance level (PLr);
- The achieved performance level (PL);
- The calculation tool used (e.g., SIStema)

11.20. Regulatory electrical inspection

CEA is attentive to the proper sizing of electrical supplies for equipment connected to its electrical network.

To facilitate proper sizing of the power supply, the supplier must provide CEA with all electrical information for the equipment, including cumulative power ratings determined by calculation (e.g., using the ELIE BT tool).

Once the equipment is installed on-site, CEA will arrange for a regulatory electrical inspection before first commissioning by an accredited certification body of its choice.

12. ENVIRONMENTAL CLAUSES

12.1. Material Durability/Facilitating Equipment Maintainability

The Contract Holder commits to implementing all the provisions described in their environmental proposal, which is an integral part of the contract.

In this context, and in accordance with these commitments, the Contract Holder implements all or part of the following environmental measures during the contract execution:

- To design equipment with robust materials and extended lifespan;
- To propose equipment offering scalability or adaptability (e.g., by adding frames);
- To ensure that the components of the equipment are easily disassembled and repairable ;
- To propose training on the use of the Equipment in line with the implementation of the clause.

The Contract Holder remains free to submit any alternative solution within the scope of this clause.

The Contract Holder commits to providing recommendations to extend the lifespan of the Equipment during the contract execution.

13. EQUIPMENT DOCUMENTATION

The equipment supplier commits to providing, no later than before the Site Acceptance Test (SAT), all technical and administrative documentation related to the equipment (non-exhaustive list).

This documentation will include at least:

- The instruction manual written in French including the CE Declaration of Conformity (in accordance with Regulation EU 2023/1230).

- Identification of hazard sources (see Appendix 3) and safety instructions. These documents will enable the development of a risk analysis for the equipment, co-constructed between CEA and the equipment supplier (no later than before the SAT) (see § 11.1).
- If applicable, technical and installation manuals for all commercial devices, accompanied by their calibration certificates, particularly for measurement sensors.
- The list of spare parts and consumables for routine maintenance, with costs and procurement lead times.

If applicable to the type of machine considered (prototype or custom-built with more or less CEA Intellectual Property), the supplier must provide:

- Process plans and diagrams (assembly, piping, and instrumentation).
- The final design file of the equipment.
- Sources of automation and supervision programs, documented and unprotected.
- The diagram of the IT architecture.
- The nomenclature of inputs/outputs (with tag numbers reported on electrical diagrams).
- The manufacturer's file, TQC (Piping, Quality, Control) plans, as well as the electrical and control-command file (including functional analysis and plans).
- If applicable, the ATEX zoning plan of the equipment as well as the conformity certificates of ATEX materials.
- Any other documents required by applicable regulations.

14. ACCEPTANCE CONDITIONS

14.1. Acceptance breakdown

14.1.1. [FAT Phase - Factory Control and Testing]

The supplier must propose a procedure for controlling and testing the equipment. This procedure must include the controls and tests requested by CEA (cf. § 0).

The controls carried out at the supplier's site will follow this procedure, which must be submitted to CEA for approval beforehand. After approval of the procedure, CEA will indicate the tests it wishes to attend.

At the end of the FAT, a pre-acceptance proceedings record following CEA's formalism is drawn up and signed by both parties. This pre-acceptance proceedings record allows the acceptance of the factory control file and the listing of reservations.

14.1.2. SAT Phase - Controls and Testing on CEA Site

The tests to be carried out on the CEA site must be defined by CEA and validated by the supplier.

If remarks were made during the factory reception (FAT), it will be necessary to verify that the corrective actions implemented meet the safety requirements.

The acceptance tests must cover all the specifications of paragraph § 0.

Each requirement must be evaluated (compliant/non-compliant/partially compliant), and the results must be recorded.

Before pronouncing the reception, the supplier must submit all the test and control reports carried out during the SAT.

14.2. Acceptance criteria

Acceptance will be granted if:

- The equipment complies with regulatory requirements (see § 11.18).
- The equipment meets all contractual technical requirements (see § 0).

14.3. Final Acceptance Pronouncement on Site

Final acceptance is pronounced when:

- The equipment has been delivered in full.
- Installation, commissioning and start-up are completed.
- Qualification controls and tests have been successfully passed.
- Regulatory compliance has been approved. If applicable, machine compliance according to EU 2023/1230, as per a report issued by a CEA-accredited body, with no non-conformities.
- If applicable, compliance with specific risks (ATEX, pressure equipment, etc.) validated by an accredited body (see§ 11.9).
- The complete equipment documentation has been delivered (see §13).

A proceedings record following CEA's formalism is then drawn up and signed by both parties. This proceedings record allows the acceptance of the control file and, if necessary, the listing of reservations.

15. TRAINING

The supplier commits to provide the following training sessions. A training certificate will be issued by the supplier, listing the trained personnel and their level of intervention.

15.1. Equipment Operation Training

The supplier commits to provide training on the use of the Equipment for 3 people. The supplier will indicate in their offer the number of training days required.

This training will cover, among other topics, equipment operation, automation, and control system handling.

15.2. First-Level Maintenance Training

The supplier commits to providing first-level maintenance training for 2 people. The supplier will indicate in their offer the number of training days required.

This training will include... (to be detailed according to the type of equipment; consult your Platform manager or maintenance team to complete this section).

15.3. Advanced Maintenance Training

In their pricing offer, for informational purposes, the supplier will provide an advanced-level maintenance training for 2 people as a Non Mandatory type of Option. The supplier will indicate in their offer the number of training days required.

16. WARRANTY

The equipment is contractually guaranteed for *X year(s) from the date of acceptance against any defects in material, manufacturing, assembly, and operation, in compliance with the technical specifications of the tender document.

This warranty covers parts (excluding consumables), labor, transportation, and travel.

During the warranty period, the supplier commits to intervening for repairs within 10 days following receipt of an email request for intervention from CEA. These services are performed every day from Monday to Friday, 8 AM to 5 PM.

In case of unavailability, the warranty period is extended by an equivalent duration to the equipment's downtime.

17. MAINTENANCE

At the end of the warranty period, CEA will have the option to subscribe to a maintenance contract.

In their pricing offer, for informational purposes, the supplier will provide as a Non Mandatory type of Option a preventive maintenance service quote which includes:

- Parts and labor for preventive maintenance,
- Corrective maintenance on demand (at hourly rates) with adherence to intervention and repair deadlines.

Following adjustments to CEA's maintenance needs, the maintenance contract may be established after the warranty period through negotiations.

18. ELEMENTS TO PROVIDE IN RESPONSE TO THE CONSULTATION

- Comments from the Equipment Supplier on the Equipment Specification Document (named Appendix 1: “FOR_533_Annexe_1.xlsx”).
- Completed characteristics of fluid requirements, electrical power supply, and all other necessary interfaces (named Appendix 2: “FOR_534_Annexe2.xlsx”).
- Hazard identification sheet (see § 11.1 and Appendix 3: “FOR_535_Annexe_3.xslx”).
- The cost of preventive maintenance service must be specified
- Duration and descriptions of planned training sessions.
- Separated Mandatory and non Mandatory Option quotes

Mandatory and non Mandatory Options:

- **Mandatory Option:** The supplier must obligatorily include an offer with the option, otherwise the offer will be considered irregular. CEA reserves the right to decide whether to exercise this option or not, but the price of the option must be clearly stated in the offer.
- **Non mandatory type Option:** The supplier has the choice to propose or not propose the option. If the option is not proposed, the supplier will not necessarily be disqualified. CEA reserves the right to decide whether to exercise the option or not.

APPENDIXES

FOR 533_Annexe_1.xlsx : Supplier’s feedback on specifications document

FOR534_Annexe_2.xlsx : Specification Datasheet (GB spreadsheet) for tool installation

FOR535_Annexe_3.xlsx : Hazard Identification Sheet (GB Spreadsheet)

Annexe_4.docx