Purchase Contract

entered into pursuant to Section 2079 et seq. of Act No. 89/2012 Coll., the Civil Code (hereinafter the "**Civil Code**")

I. CONTRACTUAL PARTIES:

1. **Buyer:**

Fyzikální ústav AV ČR, v. v. i.
(Institute of Physics of the Czech Academy of Sciences, public research institution)
with its registered office at Na Slovance 2, ZIP 182 21 Praha 8
represented by: RNDr. Michael Prouza, Ph.D. - Director
Registered in the register of public research institutions of the Ministry of Education, Youth and Sports of the Czech Republic
Id. No.: 68378271
(hereinafter the "**Buyer**")

and

2. **MIT, spol. s r.o.**
with its registered office at Klánova 71/56, 147 00 Praha 4
represented by: Martin Moser, Managing Director
Id. No.: 46348395

(Hereinafter the "**Seller**"; the Buyer and the Seller are hereinafter jointly referred to as the "**Parties**" and each of them individually as a "**Party**").

enter, on the present day, month and year, into this Purchase Contract (hereinafter the "**Contract**").

II. INTRODUCTORY PROVISIONS:

The Seller has been selected as the winner of a public contract awarding procedure announced by the Buyer for the public contract called "**Target tower for E5 vacuum chamber TP21_028**" (hereafter the "**Tender Procedure**").

The public contract is funded from the Operational Programme Research, Development and Education managed by the Czech Ministry of Education, Youth and Sports.

III. SUBJECT-MATTER OF THE CONTRACT:

The Seller shall in return for the purchase price stipulated below manufacture and deliver to the Buyer a 5-axis positioning stage specified herein (including installation distant support, required information and documentation and other required related services) (hereafter the "**Device**") and the Buyer shall take over the Device, all in accordance with the terms and conditions hereof. The Device and related services shall comply with the Annex No 1 hereto Technical Specification and Annex No 2 hereto Seller´s bid.

The preliminary and/or final design of the Device may differ from the technical concept included in the Seller´s bid submitted within the Tender Procedure. In case the preliminary and/or final design differs

from the technical concept, the final design must keep compliance with this Contract and all deviations shall be justified by the Seller to the Buyer by relevant technical reasons. The Buyer shall not refuse its consent without stipulating technically justified grounds for the refusal.

IV. OWNERSHIP TITLE:

The ownership right to the Device passes to the Buyer upon receipt of the final instalment of the Purchase Price by the Seller.

V. PHASING OF THE DELIVERY, DEADLINES, PARTIES´ DUTIES:

1. The Seller shall provide **the preliminary design of the Device to the Buyer within 6 weeks** from the Contract conclusion. Preliminary Design Review shall be executed by the Parties within 8 weeks after the Contract signature.
2. The Seller shall provide **the final design of the Device to the Buyer within 12 weeks** from the Contract conclusion. Critical Design Review of the final design shall be executed by the Parties within 14 weeks after the Contract conclusion. The final manufacturing drawings are subject to the approval of the Buyer. The output of this Qualification of Design phase are the approved manufacturing drawings and design supporting documentation (Qualified design – art. 7.3.1. of Annex No 1 hereto).
3. The Preliminary Design Review and the Critical Design Review may be executed by the Parties via distant communication means (e.g. a videoconference). The Sellers representatives are not obligated to travel to the Buyer´s place for the review meetings.
4. The Seller shall **deliver the Device to the place of delivery within 36 weeks** from the Contract conclusion.
5. The Buyer shall assemble and install the Device in the place of delivery with a distant support provided by the Seller. The Buyer may test the Device on its own costs in the place of delivery before accepting it. The Buyer shall conduct these activities without unreasonable delays.
6. After the acceptance of the Device by the Buyer, the Buyer will integrate the Device to the existing motion control infrastructure of the ELI Beamlines facility. If there are any defects in the Device that can be detected only after integration of the Device to the existing motion control infrastructure, the Buyer will claim such defects without undue delay after detecting them.
7. Where anything in this Contract is subject to approval of the Buyer, the Buyer shall not refuse its approval without stipulating technically justified grounds for the refusal. No approval provided by the Buyer under this Contract releases the Seller from the liability for compliance of the Device with this Contract.
8. Where any requirement of this Contract is formulated as a best efforts duty, the Seller shall exercise all care and efforts expectable from a highly skilled professional to meet the requirement. If the requirement is not met, the Seller shall provide detailed information on the care and efforts made.
9. The Seller must not disclose any concepts, specifications, proposals, studies, programs, plans, drawings, diagrams and other documents produced by the Seller to third Parties without written consent of the Seller with the exemption of providing them to auditing bodies or providing them to third persons where it is necessary for the purposes of operation of the technology of the ELI Beamlines research centre. No provision of the Contract shall be interpreted as transferring to the

Buyer any rights to intellectual property (trademarks, patents, know-how, literary and artistic property, etc.).

VI. PURCHASE PRICE AND PAYMENT TERMS

1. The purchase price for the Device is **108.900,- EUR** without value added tax (hereinafter the "**Purchase Price**").
2. The value added tax shall be paid according to the applicable law or international agreements.
3. The Purchase Price is the maximum price for performing this Contract that cannot be exceeded. The Purchase Price includes all costs related to the performance of the Contract, including the cost of transport of the Device to the place of delivery, customs (if applicable), licenses and fees, etc. The Purchase Price is fixed and shall not be changed regardless of the changes of subsuplier prices or changes in the foreign exchange rates.
4. The Purchase Price shall be paid by the Buyer in the following instalments:
   a) The Seller is entitled to invoice 40% of the Purchase Price after approval of the Buyer of the manufacturing drawings and design supporting documentation according to Art. 5.2 hereof;
   b) The Seller is entitled to invoice 30% of the Purchase Price after delivery of the Device to the place of delivery free of transport damage;
   c) The Seller is entitled to invoice 30% of the Purchase Price after execution of the acceptance protocol (as defined below) by the Parties;
5. The Purchase Price for the Device shall be paid on the basis of tax documents – invoices, to the account of the Seller specified in the invoice. The invoices shall have only the electronic form and shall be submitted to the email address: efaktury@fzu.cz.
6. The invoiced amount is due in thirty (30) days of the date of delivery of the invoice to the Buyer. If the invoice stipulates different due period such period is deemed irrelevant and the period stipulated herein applies. Payment of the invoiced amount means the date of its remitting to the Seller's account. In conformity with the applicable tax regulations of the Czech Republic, the tax documents – invoices issued by the Seller hereunder shall include the following details:
   - the business name/designation and registered office of the Buyer
   - the tax identification number of the Buyer
   - the business name/designation and registered office of the Seller
   - the registration number of the tax document
   - the subject matter of the delivery
   - the date of issue of the tax document
   - the date of the supply or the date of acceptance of the taxable consideration, whichever is earlier, if it differs from the date of issue of the tax document
   - the price
   - the registration number of this Contract, which the Buyer shall communicate to the Seller at his request before the invoice is issued
   - declaration that the taxable performance was provided for the purposes of "Advanced Research

Using High Intensity Laser Produced Photons and Particles" project, reg. No. CZ.02.1.01/0.0/0.0/16_019/0000789 or any other project in accordance with instructions provided by the Buyer in advance

and must also comply with any double taxation treaties applicable to the given case.

VII. PLACE OF DELIVERY

The place of delivery is the ELI Beamlines research centre, Za Radnicí 836, ZIP 252 41, Dolní Břežany, the Czech Republic.

VIII. ACCEPTANCE OF THE DEVICE

1. The Device shall be accepted in the place of delivery on the basis of an acceptance protocol if the Device complies with this Contract, all required activities are completed and all required documentation and information is provided by the Seller.
2. The acceptance protocol shall contain the following information:
   - identification of the Seller
   - identification of the Device
   - the list of defects and deficiencies of the Device, if there are any, and the deadlines for their removal, if the Buyer decides to accept the Device despite having defects
   - the signature of the Buyer and the date of acceptance

   (hereinafter the "**Acceptance protocol**").
3. The Buyer may but is not obliged to accept the Device with defects or deficiencies, particularly if the defects or deficiencies do not prevent the Buyer from using the Device for intended use. Should the Buyer accept the Device with defects or deficiencies, the Parties shall list these in the Acceptance protocol, including the manner and deadline for their removal. Should the Parties not agree on the deadline for the removal of any defect or deficiency in the Acceptance protocol, then those must be removed within 30 days from the date of the acceptance.

IX. WARRANTY

1. The Seller hereby provides the warranty of quality for the Device of 1 year from the date of acceptance of the Device subject to the condition of not operating the Device for more than 16 hours per day. Should any documentation related to the Device provided by the Seller indicate any longer warranty of the Device or any its part, such longer warranty applies.
2. The warranty period shall commence on the date of the execution of the Acceptance protocol. However, if the Device is taken over with defects or deficiencies, the warranty period shall commence on the date of the removal of the last defect or deficiency by the Seller.
3. The Buyer shall raise a claim for removal of a defect of the Device without undue delay after detecting the defect, but not later than on the last day of the warranty period, by means of a written notice to the Seller's email address for claims notification set out herein (hereinafter the „**Warranty claim**").

Warranty Claim sent by the Buyer on the last day of the warranty period shall be deemed to have been made in time.

4. In the Warranty claim, the Buyer shall describe the defect and suggest the manner in which the defect is to be removed. The Seller is entitled to decide on the manner of removal of the defect by the following means:
    - the removal of a defect by the delivery of a substitute Device or any its part, or
    - the repair of the defect, or
    - provision of an appropriate discount on the Purchase Price.
5. The Seller agrees to remove the defects of the Device free of charge. If the removal of a defect of the Device requires transport of the Device to the Seller´s place, the Seller shall pay the transport costs there and back.
6. Defects must be removed within the period of 30 days from the date, on which the Warranty Claim was notified to the Seller unless the Buyer and the Seller agree on another term. The Buyer shall agree on longer term if the Seller proves that the period of 30 days is unfeasible for reasons not given on the side of the Seller (e.g. the subsupliers´ delivery terms).
7. The Seller shall remove defects of the Device within periods stated in the Contract also in the instances when the Seller is of the opinion that it is not liable for such defects. In case the Seller will not accept the defect and the Buyer will not agree with such conclusion, the validity of the Warranty Claim shall be ascertained by an expert, which is to be selected by the Buyer but on which the Seller also must agree. In the event the expert declares the Warranty Claim as justified, the Seller shall bear the costs of the expert's assessment. If the Warranty Claim is raised unjustly (according to expert's assessment), the Buyer shall reimburse the Seller all reasonably incurred costs associated with removing the defect.
8. The Parties shall execute a record on the removal of any defect, in which they shall confirm that the defect was removed. The warranty period of the Device shall extend by the time that expires from the date of exercising the Warranty Claim until a defect is removed if the defect prevented the Buyer from using the Device for intended use.
9. In case the Seller fails to remove the defect within the time period set out in the Contract, or within other period as may be agreed by the Parties, or in case the Seller refuses to remedy the defect, the Buyer shall be entitled to have the defect removed at its own cost by a third party, and the Seller shall be obliged to compensate the Buyer for all reasonably incurred costs associated with removing the defect within 30 days of the Buyer's request to do so. Under the condition that the repair was professionally done, the scope and length of the warranty remains unaffected by the defect removal by the third party.
10. The warranty shall not cover defects caused by unprofessional handling, non-compliance with the Seller's written instructions for operation and maintenance of the Device. The warranty shall also

not apply to defects caused by intentional conduct.

11. This email address: servis@mit-laser.cz serves as a defect notification address.

X. CONTRACTUAL PENALTIES

1. In the event that the Seller is in delay with due delivery of the Device to the place of delivery within the term set forth in Art. V.4. hereof (after due verification of the Device at the Seller´s place), the Seller shall pay to the Buyer the contractual penalty in the amount of 0.05% of the Purchase Price without VAT for each, even commenced day of delay.
2. Total amount of the contractual penalty for delay with the delivery of the Device shall not exceed 5% of the Purchase Price.
3. If the Seller fails to remove a defect within the periods stipulated in the Contract, the Seller shall pay to the Buyer a contractual penalty in the amount of 10 EUR for each defect and for each day of delay.
4. No delay penalty may be requested by the Buyer if a delay on the side of the Seller is caused by documented impact(s) of the covid-19 pandemic on the Seller and the respective obstacle could have been overcome only with unreasonable costs or efforts.
5. If the Buyer fails to pay the Purchase Price within the deadlines set out in this Contract, the Buyer shall pay the Seller interest on delay in the amount set forth by the applicable law for each day of delay.
6. The obliged Party must pay any contractual penalties/ interests to the entitled Party not later than within 15 calendar days of the date of receipt of the relevant claim from the entitled party.

XI. TERMINATION OF THE CONTRACT, VIS MAJOR

1. This Contract may be terminated by agreement of the Parties or by withdrawal from the Contract on the grounds stipulated by law or by the Contract.
2. The Buyer is entitled to withdraw from the Contract without any penalty if any of the following events occur:
    i) the Seller has materially breached the obligations imposed on it by the Contract, especially a) by being in delay with meeting any deadline hereof for more than 3 months, b) the Device is defective and such defect is not removed within 3 months from notifying the Seller of such fact, or c) the same defect that prevents the Buyer from using the Device for intended use occurs more than two times;
    ii) insolvency proceedings are initiated against the Seller's assets,
    iii) should it become apparent that the Seller provided information or documents in the Seller's bid, which are not true and which could have influenced the award of this Contract to the Seller.
3. The Seller is entitled to withdraw from the Contract in the event of material breach of the Contract

by the Buyer, especially by delay with due payment of any instalment of the Purchase Price longer than 3 months.

Vis major circumstances

4. Circumstances constituting vis major shall be constituted by such circumstances / obstacles which arose independently of the will of the obliged Party, and which prevent fulfilment of that Party's obligation, provided that it could not be reasonably expected that the obliged Party could overcome or avert this obstacle or its consequences, and furthermore that such Party could foresee such obstacle when it entered into the respective covenants. Vis major shall not be constituted by obstacles that arose only after the obliged Party was in default with fulfilment of its obligations, or which arose in connection with its economic situation.

   Any particular effects or impacts on the Seller or his performance under this Contract of the Covid-19 epidemic that meet the conditions above will be considered as a vis major cases despite the fact of the existence of the epidemic on the date of the signature of this Contract.

5. Should a situation occur, which a Party could reasonably consider to constitute vis major, and which could affect fulfilment of its obligations hereunder, such Party shall as soon as possible notify the other Party and attempt to continue in its performance hereunder in a reasonable degree. Simultaneously, such Party shall inform the other of any and all its proposals, including alternative modes of performance, however, without consent of the other Party, it shall not proceed to effect such alternative performance.

6. If a situation constituting vis major occurs, the deadlines imposed hereunder shall be extended by the period of the documented duration of the said vis major. The obliged Party shall properly document to the other Party the start and the finish of the vis major period.

XII. REPRESENTATIVES OF THE PARTIES

1. The Buyer has appointed the following authorised representative for communication with the Seller in relation to this Contract:

   Sebastian Lorenz, email: Sebastian.Lorenz@eli-beams.eu, +420 266 051 391

2. The Seller has appointed the following authorised representative for communication with the Buyer in relation to this Contract:

   Martin Moser, email: moser@mit-laser.cz, Phone: +420 777 708 930

XIII. CHOICE OF LAW

1. This Contract and all the legal relationships arising out of it shall be governed by the laws of the Czech Republic.

2. Any disputes arising out of this Contract or legal relationships connected with the Contract shall be

resolved by the Parties amicably. In the event that a dispute cannot be resolved amicably within sixty (60) days, the dispute shall be resolved by the competent court in the Czech Republic based on an action filed by any of the Parties.

XIV. SOCIAL, ECOLOGICAL AND INNOVATIVE ASPECTS

The Buyer aims to conclude contracts with suppliers that take into account and implement the principles of social responsibility, ecological sustainability and innovation. Therefore, the Seller shall ensure that:

a) this Contract is performed only by persons that are employed in accordance with the applicable legal regulations (no illegal or child workers);

b) while performing this Contract, all applicable health and safety regulations and rules at work place are observed;

c) all persons performing this Contract are employed under fair and non-discriminatory working conditions;

d) if presented with different manners of fulfilling this Contract, the Seller shall select the solution/process that is in accordance with the principles governing nature conservation and nature protection, ecological sustainability and ecological waste management; and

e) if presented with different manners of fulfilling this Contract, the Seller shall select the solution/process that is the most innovative.

XV. INTELLECTUAL PROPERTY AND CONFIDENTIALITY

1. All designs, plans and technical documents relating to the Device or to its manufacturing which have been submitted to the Buyer before or after the Contract's conclusion remain the property of the Seller.
2. Drawings, technical documents or other technical information received by the Buyer shall not, without the consent of the Seller, be used for any other purpose than that for which they were provided or for the purposes stated in Art. 5.9 of this Contract. They may not, without the consent of the Seller, otherwise be used or copied, reproduced, transmitted or communicated to a third party.
3. The conclusion of this Contract gives to the Buyer only the right of use for the use of the Device.
4. A proposal, software and all technical documents delivered or send by the Seller shall always remain its own property even though a participation to the cost was requested from the Buyer.
5. No term or condition of this Contract shall be interpreted as giving to the Buyer any right as matter of industrial property (brand, patent, and know-how, artistic and literary property).

XVI. FINAL PROVISIONS

1. The Contract with all annexes represents the entire and complete agreement between the Buyer and the Seller.
2. The Seller shall not be entitled to assign any rights or obligations arising in connection herewith to a third party. The Buyer is entitled to set off any even yet undue of its financial claims towards the Seller

against any financial claim of the Seller (e.g. the claim for the Purchase Price payment).

3. In the event that any of the provisions of this contract shall later be shown or determined to be invalid, putative, ineffective or unenforceable, then such invalidity, putativeness, ineffectiveness or unenforceability shall not cause invalidity, putativeness, ineffectiveness or unenforceability of the Contract as a whole. In such event the Parties undertake without undue delay to subsequently clarify any such provision or to replace after mutual agreement such invalid, putative, ineffective or unenforceable provision of the Contract by a new provision, that in the extent permitted by the laws and regulations of the Czech Republic, relates as closely as possible to the intentions of the Parties to the Contract at the time of entering hereto.
4. This Contract is subject to mandatory publication according to the applicable Czech law.
5. This Contract becomes valid as of the day of its execution by the authorised persons of both Parties.
6. This Contract may be changed or supplemented solely in writing.
7. The following Annex form an integral part of the Contract:

   Annex No. 1: Technical Specification

   In case of any discrepancies between this Contract and its Annex, the provisions of this Contract shall prevail.
8. The Parties, manifesting their consent with the entire the Contract, affix their signatures below.

Seller:	Buyer:
_____	_____
Name: Martin Moser	Name: RNDr. Michael Prouza, Ph.D.
Position: Managing Director	Position: Director

Annex 1 Technical Specification

Confidentiality Level	*BL - Restricted for internal use*	**TC ID / Revision**	00288475/D
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OBS code	*863 Electron Acceleration*		
PBS code	*E.E5.PSE*		
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Document Type	*Specification (SPE)*		

[RSD product category C]

Target tower for E5 vacuum chamber

TP21_028

Keywords

Target Holder, multi-axis positioning stage, high precision mechanics

	Position	**Name**
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Approved by			
Name (Approver)	*Position*	*Date*	*Signature*
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1.	S. Lorenz	2021-03-15	Draft	A
2.	A. Grudinová	2021-03-23	Version for review	B
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1. Introduction

1.1. Purpose

This Requirements Specification Document (RSD) lists the technical requirements and constraints on product applying in RP2 program of ELI project. This can lead to the identification of product interfaces with the ELI science based technology and ELI building facility. This RSD also acts as the parent document for the technical requirements that need to be addressed in lower level design description documents.

1.2. Scope

This RSD contains all of the technical requirements: functional, performance and design, delivery, safety and quality requirements for the following product (tender number: ***TP21_028***): **5-axis Positioning Stage for ELBA Beamline Targets** (further "Target Holder").

The product is integral part of the standalone technology "Electron Beam Accelerator for Fundamental Sciences and Applications (**ELBA**)" and is registered in the PBS software under the following PBS code: *E.E5.PSE.* This product will be placed in the E5 hall.

1.3. Terms, Definitions and Abbreviations

For the purpose of this document, the following abbreviated terms are applied:

Abbreviation	Meaning
A	Analysis (as a verification method)
AR	Analysis Report
CA	Contracting Authority (Institute of Physics of the Czech Academy of Sciences)
CDRR	Critical Design Review Report
ELI	Extreme Light Infrastructure
EMP	Electro Magnetic Pulse
FD	Functional Demonstration (as a verification method)
FTR	Factory Test Report
HV	High Vacuum
I	Inspection (as a verification method)
NCR	Non-Conformance Report
NVR	Non-Volatile Residue
R	Review (as a verification method)
RD	Reference Documents
RP2	Research program 2
RSD	Requirements Specification Document
T	Test (as a verification method)
UHV	Ultra High Vacuum
VCD	Verification Control Document
VR	Verification Report

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1.4. Referenced documents

Code	TC ID	Name
RD-01	00272188	DIR20 ELI name convention and addressing for electrical components_V01
RD-02	00288475	ELI_Standard_Stepper_Motor_Connection

1.5. References to Standards

If this document includes references to standards or technical documents the CA allows/permits also another equal solution to be offered. If the Supplier offers another equal solution the CA shall not reject its bid, once the Supplier by appropriate means in the bid proves that the offered supplies, services or works meet in an equivalent manner the requirements including references to standards or technical documents.

2. General System Requirements

REQ-032306/A

The Supplier shall deliver the Target Holder with the following components:

- Three translation stages with the minimum travel ranges:
  - X: 20 mm
  - Y: 10 mm
  - Z: 20 mm
- Around Z rotation stage with 360° travel range
- Around Y rotation stage (goniometer) with +/- 5° travel range
- 5 high vacuum stepper motor gears to drive each stage independently
- At least 1 meter long vacuum cabling connecting the actuators and feedthroughs plus at least 2 meter long extension cables
- Spare parts: one motor gear and one in-vacuum cable

Verification method: I – inspection, T – Test (Functional Demonstration)

REQ-032341/A

Wherever possible for the supplier, the supplier shall use the most innovative products, services or procedures when preforming the contract.

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3. Functional, Performance and Design Requirements

3.1. General Requirements

REQ-032342/A

If at any stage of the design or manufacturing it is clear to the Supplier that an advantage could be gained by a modification of the original design, the Supplier shall bring it to the attention of the CA.

REQ-032343/A

Any dimensional or design modifications that may arise as part of detailed manufacturing design shall be consulted with and approved by the CA.

Verification method: R – review

3.2. Target Holder System

3.2.1. Design Requirements

REQ-032344/A

The target holder shall be directly mountable on the optical table with M5 screw holes. The design of the target holder mount shall be consulted and approved by the CA.

Verification method: T - test

REQ-032345/A

The maximum dimensions of the Target Holder in its central position (all the stages in the central possition) shall be 270 x 270 x 220 mm (length x width x height) excluding motor gears and 350 x 350 x 220 mm including motor gears.

Verification method: T - Test

REQ-032346/A

The axis of rotation around Y should be 350±1 mm above the optical table (stages being in the central position).

Verification method: T - Test

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REQ-032347/A

The Target Holder shall hold load of at least 10 kg.

Verification method: T – Test (functional demonstration)

REQ-032348/A

The size of the top plate shall be at least 100 (along the laser focus, X-axis) x 150 (Y-axis) mm.

Verification method: T – Test (functional demonstration)

REQ-032349/A

The arrangement of the screw holes on the top plate shall be consulted with and approved by the CA.

Verification method: R – review

REQ-032350/A

The Z-translation stage shall have 4 high precision guidings in order to reach a high stiffness of the Target Holder.

Verification method: R – review

REQ-032351/A

Scope of delivery shall include high-vacuum compatible NC limit switches for homing of each stage.

Verification method: R – review

REQ-032352/A

Precautions shall be taken in design of vacuum components to avoid trapped volumes in vacuum spaces which could result in virtual leaks. These spaces shall be suitably vented.

Verification method: R – review

3.2.2. Linear Stages

REQ-032353/A

The linear stages shall be able to provide <= 1 μm steps in each direction.

Verification method: R – review, T – test

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REQ-032354/A

The repeatability of the positions shall be < 3 µm.

Verification method: R – review, T – test

REQ-032355/A

The speed of the linear stages should be >= 100 µm/s.

Verification method: R – review, T – test

REQ-032356/A

The translations shall be obtained through screw-nut system with a preload spring in order to avoid the backlash.

Verification method: R – review

3.2.3. Rotation Stages

REQ-032357/A

The rotation stages shall be able to provide <= 0.001º steps.

Verification method: R – review, T – test

REQ-032358/A

The speed of the rotation stages should be >= 0.1 º/s.

Verification method: R – review, T – test

REQ-032359/A

The rotation stages shall also integrate a preload by spring in order to avoid backlash and improve stability during steady state.

Verification method: R – review

3.2.4. Stepper Motors

REQ-032360/A

Scope of delivery shall include high-vacuum compatible stepper motors to drive each stage independently. These motors will be driven in by the – existing motion control infrastructure of the CA, which is based on Phytron MC+ 93/70-H stepper motor drivers; the supplier shall ensure compatibility with its parameters:

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- Peak phase current between 0.3-9A
- Supply voltage 24-70VDC
- Step resolution up to 1/512 steps
- Winding resistance >0.1Ω and <10 Ω for full power
- Winding inductivity of one phase >0.5 and < 10 mH.
- Stepper motors may either have 8 leads; in this case to be specified for wiring in parallel; or 4 leads

Detailed wiring documentation for the controlling motion system can be provided by the CA on request.

Verification method: R – review

REQ-032361/A

The used motor gears shall have stainless steel housing and shall be dedicated to high vacuum (10^{-7} hPa) class applications.

Verification method: R – review

REQ-032362/A

The used motor gears shall be radiation resistant up to the level 10^2 J/kg.

Verification method: R – review

REQ-032363/A

The used motor gears shall be operated in open-loop control (without encoder).

Verification method: R – review

3.2.5. Vacuum Compatibility

REQ-032364/A

All the vacuum components of the Target Holder shall be high vacuum compatible and shall be able to be totally operated under vacuum level up to 10^{-6} mbar. All vacuum surfaces shall be made of ultra-low outgassing material and shall be cleaned and packaged with best efforts to meet the following cleanliness level per MIL–STD-1246C superseded by IEST-STD-CC1246D:

- Particle level: 130 (guaranteed); 100 (best efforts);
- Non-Volatile Residue (NVR) level: A/10 = 0.1 μg/cm^2.

Verification method: R – review, T – test

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REQ-032365/A

Outgassing of the complete Target Holder shall be checked through RGA test by the Supplier. The result should fit the following criteria:

- Amplitude of all peaks > 44 AMU are no higher than 1/20 of the 44 AMU peak.
- Peak at 43 is not higher than 1/10 of the 44 peak.
- Peak at 45 can be corrected by assuming a contribution from ^{13}C , which is approximately 1.1 %.

Verification method: T – test

3.2.6. Cable Requirements

REQ-032366/A

Scope of delivery shall include feedthroughs and in-vacuum cabling compatible with high-vacuum standards and operation in EMC-environments.
Air-side cabling to the motion control infrastructure will be realized by the CA.

Verification method: R – review

REQ-032367/A

All the in-vacuum connectors shall be Ultra High Vacuum (10^{-9} hPa) compatible.

Verification method: R – review

REQ-032368/A

Feedthroughs shall be based on D-SUB-9 connectors.

Verification method: R – review

REQ-032369/A

In-vacuum cabling shall be realized as following:

- Screened shielded-twisted pair cables with polyimide overall jacket shall be used; cable length from in-vacuum connectors to motor/limit switches shall be at least 1 meter long.
- The supplier shall also include 2 meter long extension for the in-vacuum cablings.
- Device wires for motors, associated limit switches, and if available, built-in RTDs of motors, shall be spliced closely to the device housing (<10cm) using single SUB-D crimp contacts.

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Mated pins shall be protected with a sheath of PTFE or Polyimide shrink tubing.
- Loose SPC braids shall be applied; and secured on device housings with stainless clamps.
- Motors + associated limit switches shall be combined in single vacuum-compatible SUB-D connectors; with housing according to MIL-C-24308 standards; following the CAs' internal standard pinout scheme.
- RTDs, if available, may be combined in separated SUB-D connectors.

*NOTICE: An example for 1 motor + set of limit switches + set of RTDs is provided as **RD-02**. The materials mentioned are recommended, and known to be compliant with the vacuum requirements. The supplier shall provide equivalent documentation for the cabling prior to manufacturing, and the final implementation is subject to approval of the CA. The products mentioned in **RD-02** present solutions already used in Eli-Beamlines and serve to present the interface between the existing infrastructure and the Target Holder.*

Verification method: R – review

REQ-032370/A

Naming conventions in electrical documentation shall follow the ELI-internal wiring (**RD-01**); and identifiers for motors/limit switches will be communicated to the CA upon approval of the in-vacuum cabling documentation, within a 1 week lead-time.

Verification method: R – review

REQ-032371/A

The supplier shall perform a movement test using the supplied cables; and provide documentation.

Verification method: R – review, T - Test

3.2.7. Serviceability and Spare Parts

REQ-032372/A

One motor gear, and one vacuum cable (at least 1 m long) shall be delivered with the Target Holder as spare parts.

Verification method: R – review

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REQ-032373/A

The availability of all components (or of equivalent components that can replace original components) that may need replacing over the lifetime of the system will be guaranteed for at least 5 years.

Verification method: R – review

REQ-032374/A

The supplier shall identify critical components of the system and provide information about the parts, typical lifetimes, cost, lead times. The supplier shall provide information about the requirements and procedures for replacement in case of failure (e.g. onsite/offsite; required special equipment, environmental conditions, expected downtime etc).

Verification method: A – Analysis, R – review

REQ-032375/A

The supplier shall provide instructions about required or recommended maintenance activities, and a list of consumables including order information, cost and typical usage rates.

Verification method: R – review

4. Transportation and Installation Support

4.1. General Requirements

REQ-032376/A

The vacuum components of the Target Holder shall be cleaned and packaged in clean environment of class 5 according to ČSN EN ISO 14644 (equivalent to ISO 14644) or cleaner.

Verification method: I - Inspection

REQ-032377/A

The Target Holder shall be delivered in protective packaging preventing damage or contamination.

Verification method: I – inspection

REQ-032378/A

The transportation of the Target Holder to ELI-Beamlines facility shall be ensured by the Supplier.

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REQ-032379/A

The transportation and installation procedures shall be discussed and can be reviewed by the CA's installation officer.
NOTE: The CA will assemble and install the Target Holder after its receipt in the ELI Beamlines facility. The CA may on its costs test the assembled and installed Target Holder before accepting it.
The Supplier shall provide distant support (e.g. via telephone, teleconference etc.) to the CA during assembly and installation of the Target Holder.

Verification method: R – review

5. Safety Requirements

REQ-032380/A

The Supplier shall document that the conformity assessment has been carried out and other related duties have been performed regarding the product to be supplied according to:

- government regulation No. 118/2016 Sb., on conformity assessment of electrical equipment designed for use within certain voltage limits, as amended (implementing Directive 2014/35/EU)
- government regulation No. 176/2008 Sb., on technical requirements on machinery, as amended (implementing Directive 2006/42/EC)
- government regulation No 481/2012 Sb., on the restriction of the use of certain hazardous substances in electrical and electronic equipment, as amended (implementing Directive 2011/65/EU)
- potential other legal acts of the Czech Republic that may apply
- or equivalent legal acts of another country that implement the above listed acts of the ES/EU so that the requirements for the sale of the product in the Czech Republic are met.

Meeting the said conditions shall be documented by the provision of an (EU/ES) Declaration of conformity, by other relevant documents and by marking the product with the CE mark where it is required by the applicable law. Should the supplier be convinced that any of the above listed acts do not apply on the sale of the product, it should declare and justify such fact. In case that regarding (any of) the supplied product(s) the Supplier is not obliged to assess the conformity under specific legal regulations, the Supplier declares by the conclusion of the contract that the product complies with the general safety requirement stipulated by EU Directive 2001/95/EC and that the supplier duly performs its duties under the said Directive.

Verification method: R - Review

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6. Quality Requirements

6.1. Documentation and Data Control

REQ-032399/A

The Supplier shall provide the Product User Manual as part of the delivered Target Holder. Completeness of the Manual shall be approved by the CA. The Manual shall include the instructions and descriptions regarding the following procedures:

- transport, handling, storage;
- installation, alignment and cleaning;
- description of information necessary to control the Target Holder
- safe operation and maintenance procedures.

Verification method: R - review, I - inspection

REQ-032402/A

The Supplier shall supply the following relevant manufacturing documents:

- all approved by the CA manufacturing drawings, 3D models (if available) and design supporting documentation (i.e. technical documentation);
- all approved by the CA "requests for deviation/wavier from requirements described herein".

Verification method: R - Review

REQ-032403/A

Documentation shall be supplied as hardcopy and electronically (file formats are specified below).

REQ-032404/A

The manufacturing documents shall include accuracy of the manufacturing process. This accuracy shall be also included in the corresponding test reports.

NOTE: The Supplier will specify what can be the maximal difference between specified parameters (in the chapter 3) and the parameters of the final Target Holder.

Verification method: R - review

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REQ-032405/A

The Supplier shall use following data formats:

- *.JPG, *.PNG, *.TIFF, *.PDF/A, *.HTML
- CAD 2D: *.dwg
- CAD 3D: *.stp; *.ste; *.step or other 3D CAD formats agreed with the CA
- text processors *.doc, *.docx, OpenDocument Format
- spreadsheet processors *.xls, *.xlsx, OpenDocument Format
- presentations *.ppt, *.pptx; OpenDocument Format

6.2. Non-Conformance Control System

REQ-032416/A

The Supplier shall establish and maintain a non-conformance control system compatible with ČSN EN ISO 9001 (equivalent to EN ISO 9001).

6.3. Specific Quality Requirements

REQ-032417/A

In case of a warranty repair of the Target Holder by the Supplier, the Supplier shall redo necessary parts of the verification procedure (see chapter 7). The results of this process shall be provided to the CA.
NOTE: Alternatively, the CA may redo the verification procedure itself with the distant support of the Supplier.

REQ-032418/A

The manufacturing documents shall contain strictly the units which are used to define the requirements in the chapter 3.

Verification method: R - review

REQ-032419/A

All tests shall be performed by the measuring instruments with valid metrological confirmation.
NOTE: The CA can request the Supplier to provide the valid Calibration Certificates.

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7. Verification Requirements for the Supplier

The verification process will be performed by the Supplier to demonstrate that the Target Holder meets the specified requirements of the CA.

7.1. General Requirements

REQ-032422/A

The Supplier shall assign clear responsibility for the implementation of the verification process including the following activities:

1. **Verification planning** (via VCD, see chapter 7.2.3);
2. **Verification execution and reporting** (see chapters 7.2.2 and 7.3);
3. **Verification control and close-out** (see chapter 7.3.4).

REQ-032423/A

The verification process shall be accomplished by the Supplier through one or more of the following verification methods:

1. **Review**; Verification via Review **(R)** shall consist of using approved records (examples of such approved records are design documents and reports, technical descriptions, and engineering drawings, manuals and accompanying operation documentation) or evidence that unambiguously shows that the requirement is met.
2. **Inspection**; Verification via Inspection **(I)** shall consist of visual determination of physical characteristics including photographs taken by the Supplier and sent to the CA proving that the specific requirements have been met.
3. **Test** (including functional demonstration); Verification via Test (**T**) shall consist of measuring product performance and functions under realistic operating conditions. When the test objectives include the demonstration of qualitative operational performance (functional demonstration), the execution shall be observed and results recorded.
4. **Analysis**; Verification via Analysis **(A)** shall consist of performing theoretical or empirical evaluations (e.g. mathematical models, calculations and etc.).

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7.2. Verification Documentation

7.2.1. General Requirements

REQ-032424/A

The Supplier shall establish and maintain the system of verification process documentation.

REQ-032425/A

Verification documentation shall consist of following basic types of documents:

- **Verification reports** (see chapter 7.2.2);
- **VCD, Verification Control Document** (see chapter 7.2.3).

REQ-032426/A

The verification report shall be submitted to the CA for the review as agreed with the CA after corresponding verification activity completion, within the time frame agreed with the CA.
NOTE: Verification activity can be design review and analysis during the Target Holder development, test and inspection during the final Target Holder implementation.

7.2.2. Verification Reports (VRs)

REQ-032427/A

The results of a review of design shall be documented in the **Critical Design Review Report** (further "**CDRR**") and tracked in the VCD (see chapter 7.2.3).
NOTE: The CA can provide to the Supplier the template of CDRR.

Verification method: R - review

REQ-032428/A

The results of the inspection shall be tracked in the VCD.

Verification method: R - review

REQ-032429/A

The results of the tests shall be documented in the appropriate **Factory Test Report** (further "**FTR**").

Verification method: R – review

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7.2.3. Verification Control Document (VCD)

The Verification Control Document (**VCD**) lists the requirements to be verified with the selected methods at the defined stages of the Target Holder delivery (see chapter 7.3). The VCD is a living document which shall be used throughout the entire Contract delivery and its phases (see chapter 7.3 Phasing of the delivery). The VCD provides traceability during delivery phases.
The VCD represents a formal tool of communication between the Supplier and the CA (formal record, reporting tool).

REQ-032430/A

The Supplier shall provide a **Verification Control Document** (further "**VCD**") for the reviews as agreed with the CA.
NOTE 1: Guidelines for VCD preparation will be provided by the CA.
NOTE 2: The form of VCD will be agreed between the CA and the Supplier based on the best commercial praxis used by the Supplier.

Verification method: R - review

REQ-032431/A

In the VCD the Supplier shall specify **HOW** and **WHEN** each requirement is planned to be verified.

Verification method: R – review

REQ-032432/A

The verification approach shall be submitted by the Supplier in the VCD and approved by the CA prior to implementation.

7.3. Phasing of the Delivery

This chapter is intended to briefly summarize basic milestones of the Contract delivery. These milestones represent gates (checkpoints) where the quality of the delivery is to be evaluated.
Delivery shall not proceed past these gates unless their satisfactory accomplishment is approved by the CA.
Delivery lifecycle shall contain at least the following phases (***quality gates***):

- **Qualification of Design;**
- **Manufacturing;**
- **Delivery and Installation Distant Support;**
- **Acceptance** (performed by the CA).

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REQ-032433/A

Phasing of the delivery shall respect these milestones:

- Preliminary Design Review (PDR) shall be executed 8 weeks after contract signing
- Critical Design Review shall be executed 14 weeks after contract signing
- Final delivery of the complete system to the ELI Beamlines premises shall be executed 36 weeks after contract signing

Any changes shall be consulted and approved by the CA.

7.3.1. Qualification of Design

Summary of what has to be provided by the Supplier in terms of documentation (technical documentation including manufacturing drawings and design supporting documentation, verification reports including CDRR and AR) before starting the manufacturing. The goal is to verify the **manufacturing drawings and design supporting documentation**.

Output of this phase is **Qualified Design and agreed scope of technical documentation**.

REQ-032434/A

Before completion of the Qualification Design phase the Supplier shall provide following information that shall be agreed by the CA:

- structure and content of the verification reports (see chapter 7.2.2);
- structure and content of the VCD ready to be implemented (see chapter 7.2.3).

Verification method: R - review

REQ-032435/A

Before completion of the Qualification Design phase the Supplier and the CA shall agree on:

- final manufacturing drawings provided by the Supplier (see REQ-032402/A);
- acceptance results of design verification submitted by the Supplier in the corresponding CDDR (see REQ-032427/A);
- detailed procedures related to the testing during the Manufacturing phase (see chapters 7.3.2 and 7.3.3);
- common non-conformance control system (see REQ-032416/A).

Verification method: R – review

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7.3.2. Manufacturing

The goal is to demonstrate that the manufactured and assembled Target Holder meets the specified technical requirements (RSD) of the CA.

This quality gate concerns primarily:

- **Inspection of assembled Target Holder**;
- **Testing at the Supplier's site** (factory testing);
- **Cleaning and Packaging**.

Output of this phase is the **Verified assembled Target Holder**.

REQ-032436/A

The results of the verification shall be recorded by the Supplier in the appropriate FTR (see REQ-032429/A) and overall results (including review of documentation/reports and inspection of assembled Target Holder) shall be recorded in the VCD (see chapter 7.2.3).

Verification method: R – review

REQ-032437/A

The final issue of the VCD shall be submitted to the CA after the approval of the last report and before starting transportation of the Target Holder to the place of delivery.

Verification method: R - review

7.3.3. Delivery and Installation Distant Support

The goal is to demonstrate that the delivered and installed final Target Holder meet all requirements specified herein.

This quality gate concerns primarily:

- **Transportation to the final destination** (ELI Beamlines E5 hall);
- **Inspection, assembly, installation and on-site testing of the installed Target Holder by the CA**.

Output of this phase is the **installed Target Holder.**

7.3.4. Acceptance

Acceptance will be carried out by the CA upon completion of the installation of the Target Holder (see chapter 7.3.3). The basis for acceptance will be completed VCD summarizing the overall verification results together with relevant documentation supporting the verification (i.e. VRs, approved manufacturing drawings and 3D model, Product User Manual and etc.).

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In case of successful acceptance phase the CA will provide to the Supplier signed acceptance protocol. In case of unsuccessful acceptance stage the CA will provide to the Supplier Non-Conformance Report (NCR) and ELI non-conformance control process will be applied (see REQ-032416/A).

REQ-032438/A

The Acceptance phase shall demonstrate the following:

- Final Target Holder has been successfully verified by the Supplier and the results of this process have been documented in an appropriate way through VRs (see chapter 7.2.2) and VCD (see chapter 7.2.3);
- All detected non-conformities have been solved in accordance with REQ-032416/A
- Final Target Holder is free of fabrication errors and is ready for the intended operational use.

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