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the European Union



Buyer's Purchase Contract no: 023103/2024/00

Seller's Purchase Contract no:

PURCHASE CONTRACT

within the meaning of Section 2079 et seq. of Act No. 89/2012 Coll., the Civil Code (hereinafter referred to as the "Civil Code"), entered into on the date, month and year set forth below and on the following terms and conditions by the following parties

THE BUYER

Name: Brno University of Technology
Component part: Central European Institute of Technology
Seat: Purkynova 656/123, 612 00 Brno, Czech Republic
Public university, not registered in the Commercial Register
Address of the Brno University of Technology: Antoninska 548/1, 601 90 Brno
Represented by: prof. Ing. Radimír Vrba, CSc., Director of Central European Institute of Technology
Id. No.: 00216305
Tax Id. No.: CZ 00216305

Buyer's contact persons for technical matters:

xxx

Buyer's contact person for contractual matters:

xxx

Address for sending electronic tax documents: xxx

and

THE SELLER

Name: RAITH GmbH
Seat: Konrad-Adenauer-Allee 8, 44263 Dortmund, Germany
Registration in the Commercial Register HRB 8984 (register at Local Court Dortmund)
Represented by: Dr. Michael Steigerwald or Benjamin Oevermann
Id. No.: HRB 8984
Tax Id. No.: DE 124 727 617
Bank details: xxx

Contact person of
the Seller:

[xxx](#)

(hereinafter also jointly referred to as the "Parties")

I. SUBJECT OF THE PURCHASE

- 1) The subject of purchase under this Contract is the Electron beam lithography tool with an acceleration voltage of 100 kV system Raith EBP5200Plus.

The Subject of the Purchase is specified in more detail in the technical description, which is an integral part of this Contract as its Annex No. 1 and further in the terms and conditions of the public tender entitled "Elektronový litograf 100 kV/Electron beam lithograph 100 kV". The specifications for this public tender are also available under ID 2934 on the website <https://tenderarena.cz/dodavatel/zakazka/696343>.

- 2) The Seller undertakes by this Contract:

- a) hand over the Subject of the Purchase to the Buyer and enable the Buyer to acquire ownership of such a Subject of the Purchase;
 - b) fulfil the conditions of the public tender referred to in point 1 of this Article;
 - c) perform other obligations set forth in this Contract;
- and the Buyer agrees to take over the Subject of the Purchase and pay the purchase price.

- 3) The Seller and the Buyer further agree that, in addition to the above mentioned, the Seller is also obliged and agrees to:

- a) deliver the Subject of the Purchase to the location designated by the Buyer for that purpose, including unloading from the vehicle and placing the Subject of the Purchase at the designated location, whereby the Buyer reserves the right to specify the designated location within the place of performance;
- b) assemble and install the Subject of the Purchase at the place of performance, including the connection to the sources of the necessary wiring. The material necessary for the assembly and installation is included in the Purchase price;
- c) put the Subject of the Purchase into a fully functional and operational state at the place of performance, including the installation and commissioning of the software;
- d) demonstrate the operation of the Subject of the Purchase and to verify the parameters required by the Buyer. The result of the verification shall be part of the handover protocol. The result of the verification must show that the Purchased Item is fit for its purpose. In the case of calibratable components of the Subject of the Purchase, these components shall be delivered with a calibration certificate;
- e) perform acceptance tests - the requirements for acceptance tests are set out in Annex 1 to the Contract and all requirements must be met;
- f) properly acquaint and train the operator in accordance with the requirements set out in Annex 1 to the Contract;
- g) grant the Buyer the rights of use (necessary licenses, if licenses are required) to the delivered software, which is part of the Subject of the Purchase, for an unlimited period of time;
- h) provide free of charge updates and upgrades to the supplied software, which is part of the Subject of the Purchase, for the duration of the quality warranty;
- i) make the operator of the equipment familiar with the maintenance of the Subject of the Purchase;
- j) provide the Buyer with manuals for the use of the Subject of the Purchase and user guides in Czech and/or English in an electronic form;
- k) provide the Buyer with a printed version of the user manual describing the basic operation of the device in Czech and/or English;

- l) submit inventories of individual items of the Subject of the Purchase;
- m) provide any other necessary supplies or services not expressly mentioned in the Contract, if they are necessary for the proper and timely performance of this Contract, without affecting the purchase price.

II. PURCHASE PRICE

- 1) The Buyer agrees to pay to the Seller the purchase price in the amount of:

Purchase price excl. VAT	62 474 500 CZK
Amount of VAT in CZK	FOREIGN SUPPLIER
Purchase price incl. VAT	62 474 500 CZK

** In case of a foreign supplier, the Buyer shall pay VAT according to the applicable legal regulations in the Czech Republic.*

- 2) The reward for any licenses is included in the purchase price.
- 3) The Seller is entitled to issue an advance invoice for the maximum amount of 60% of the purchase price including VAT, i.e. 37.484.700,00 CZK, which the Buyer is obliged to pay. The Seller shall be entitled to issue the advance invoice after the conclusion of the Contract, but not before the Buyer has received the electronic original of the guarantee instrument or the original guarantee instrument issued by the bank with the meaning of Article III of this Contract. The Warranty Certificate shall be delivered to the Buyer's contact person for contractual matters listed on page 1 of this Contract. In case an advance invoice is issued by the Seller and paid by the Buyer, the amount paid on the basis of the advance invoice shall be calculated against the purchase price.
- 4) The Seller is entitled to issue a tax document after the Subject of Purchase has been transported to the place of performance. This is for an amount up to a maximum of 30% of the purchase price including VAT if an advance invoice has been issued. If the Seller has not exercised its right to issue an advance invoice pursuant to Section 3 of this Article of the Contract, the Seller shall be entitled to issue a tax invoice up to a maximum of 80% of the purchase price including VAT after the delivery of the Purchased Item to the place of performance. The delivery of the Purchased Item to the place of performance shall be confirmed by a mutually signed protocol of delivery of the Purchased Item to the place of performance.
- 5) For the remaining part of the purchase price, the Seller will issue a tax document (invoice) based on the handover protocol of the Subject of the Purchase to the Buyer (i.e. after meeting all the requirements for the Subject of the Purchase specified in Article I of the Contract), which will be confirmed by a mutually signed handover protocol. This also applies in case of acceptance of the Subject of the Purchase with defects or imperfections.
- 6) The tax documents due date is 30 days from the date of their delivery to the Buyer.
- 7) The Seller acknowledges that
 - a) the Subject of the Purchase will be paid from the grant funds provided for the implementation of the project from the Johannes Amos Comenius Operational Programme, CzechNanoLab+, and that
 - b) the tax document must indicate financing of the project to which the Subject of the Purchase related, i.e. reg. no. CZ.02.01.01/00/23_015/0008200 CzechNanoLab+.

III. SECURING ADDITIONAL SELLER'S COMMITMENTS

- 1) If the Seller establishes a bank guarantee within the meaning of Section 2029 of the Civil Code to secure all claims of the Buyer against the Seller arising in connection with the performance of this Contract, the Seller is entitled to issue an advance invoice according to Article II, paragraph 3 of this Contract.
- 2) In case the Seller fails to establish a bank guarantee within the meaning of paragraph 1 of this Article, the Seller shall not be entitled to issue an advance invoice and paragraphs 3 to 7 of this Article shall not apply.
- 3) The bank guarantee must be issued in the currency specified in this Contract for the amount corresponding to the amount of the required advance payment of the purchase price including VAT rounded up to the nearest thousand.
- 4) The Buyer shall be entitled to request performance in connection with the bank guarantee in cases where, as a result of the Seller's failure to fulfil any of its obligations under this Contract, the Buyer is entitled to payment of a contractual penalty, to a compensation or to other types of monetary payment during the term of the bank guarantee under the terms of this Contract. The Buyer shall be entitled to exercise the right to performance under the bank guarantee even if the Seller fails to return the monetary performance in accordance with Article VI of this Contract.
- 5) The bank guarantee will expire 20 months from Contract signing.
- 6) The issuance of the bank guarantee shall be evidenced by the Seller to the Buyer by an electronic original of the guarantee instrument or the original of the guarantee document issued by a bank established and operating under Act No. 21/1992 Coll., on Banks, as amended, in favour of the Buyer as the beneficiary. The bank guarantee shall be issued as irrevocable and unconditional, and the bank shall undertake to perform without objections and on the basis of the first call of the beneficiary. The Buyer declares in writing that s/he releases the bank from all obligations under the bank guarantee within 14 days after the delivery of a faultless Subject of the Purchase, or after the removal of defects and imperfections if the Subject of the Purchase has been accepted with defects or imperfections.
- 7) Before requesting the performance in connection with bank guarantee, the Buyer shall notify the Seller in writing of the amount of the required performance from the bank. The Seller is obliged to deliver the Buyer a new guarantee instrument in the same wording as the previous guarantee instrument, in the original amount of the bank guarantee, always within 14 calendar days after the bank guarantee has been drawn. If the Seller fails to meet the obligation in accordance with the previous sentence, the Buyer shall be entitled to withdraw from the Contract.

IV. PENALTY CLAUSES

- 1) The penalty clause set out in this Article shall replace the relevant penalty clause set out in Article VII, paragraph 2 of the General Purchasing Conditions of the BUT (hereinafter referred to as the "GPC").
- 2) If the Seller is in default in fulfilling his responsibility to hand over the Subject of the Purchase to the Buyer, he is obliged to pay the Buyer a contractual penalty:
 - a) for the first 30 days of delay in the amount of 0.05 (in words: zero point five hundredths) % of the purchase price excluding VAT for any (initiated) day of delay;
 - b) if the Seller continues to be in delay in fulfilling his responsibility, starting from the 31st day of delay in handing over the Subject of the Purchase, the Seller is obliged to pay the Buyer a contractual penalty of 0.1 (in words: zero point one tenth) % of the purchase price excluding VAT for any (initiated) day of delay.

- 3) For the purposes of this Contract, the maximum penalty specified in Article VII (2) of the GPC is limited to 10 (in words: ten) % of the price of the Subject of the Purchase excluding VAT.

V. PLACE AND TIME OF PERFORMANCE

- 1) The Seller undertakes to:
- I. hand over to the Buyer the aforementioned Subject of the Purchase no later than **18 months** from the effective date of the Contract, but at the same time **no later than 31 December 2026**, whichever is earlier;
 - II. consider the delivery of the Subject of the Purchase later than 31 December 2026 to be late performance for the purposes of this Contract within the meaning of Section 1980 of the Civil Code;
 - III. The Buyer expressly notifies that he has no interest in the delayed performance according to point II. of this paragraph; in accordance with § 1980 of the Civil Code, the obligation shall cease with the beginning of the delayed performance of the Seller, unless the Buyer notifies without undue delay that he insists on the fulfilment of the Contract.
- 2) The Seller shall fulfill his responsibility to hand over the above mentioned Subject of the Purchase by its acceptance as faultless by the Buyer.
- 3) The Seller also agrees to inform the Buyer sufficiently in advance (at least 2 months) that it intends to transport and/or hand over the Subject of the Purchase, otherwise the Buyer is not obliged to take over the Subject of the Purchase. If the Seller notifies the Buyer in time in accordance with the previous sentence, the Buyer undertakes to allow the Seller access to the place of performance.
- 4) The Seller agrees to hand over the Subject of the Purchase at the following place:
- CEITEC BUT, xxx, Purkynova 656/123, 612 00 Brno, Czech Republic
- 5) The Buyer declares that the persons authorised on its behalf to take over the Subject of the Purchase and to sign the protocol of transport of the Subject of Purchase and the handover protocol are listed on page 1 of this Contract as contact persons in technical matters.
- 6) The Seller acknowledges that the Buyer specifically requested the delivery of all the required documents for the Subject of the Purchase in accordance with Art. IV (3) of the GPC.

VI. ARRANGEMENTS FOR TERMINATION OF THE CONTRACT

In case of termination of the Seller's obligation under this Contract otherwise than by its proper performance, in particular in the case of termination of the Contract by the Seller's delay under Article V, paragraph 1, item III. of this Contract or by withdrawal from the Contract, the parties shall reimburse each other for everything that has been mutually performed so far in the following manner:

- a) The Seller is obliged to return all monetary performance received by the Buyer within 21 days of the termination of the Seller's obligation to perform. This shall also apply to the amount corresponding to the advance under Article II, paragraph 3 of this Contract, if the advance has been paid to the Seller, and also to the amount corresponding to the amount under Article II, paragraph 4 of this Contract, if it has already been paid;
- b) The Buyer shall return the Subject of the Purchase to the Seller to the extent in which it was transported to the place of performance, if it has already been transported. Any dismantling and removal of the Subject of the Purchase shall be arranged by the Seller at its own expense in full, while the Buyer shall allow the Seller access to the place of performance for any dismantling and removal of the Subject of the Purchase.

VII. QUALITY WARRANTY

- 1) The Buyer and the Seller agree that the warranty period for the Subject of the Purchase as well as for each of its parts is **12 months** from the date on which the Subject of the Purchase was accepted by the Buyer as faultless.
- 2) If a longer warranty period is stated for any part of the Subject of the Purchase in the warranty certificate or other warranty declaration, this longer warranty period shall apply. The Seller shall have obligations for defective performance at least to the extent which the obligations of defective performance of the manufacturer of the Subject of the Purchase continue.
- 3) During the warranty period, the Seller is obliged to carry out all service and preventive inspections, inspections of the electrical equipment, safety and technical inspections and other examinations, services, inspections and maintenance, checks, etc. required by the legislation in force.
- 4) Shall the Subject of the Purchase have any defects, these shall be dealt with in accordance with the provisions set out in Article V. of GPC, unless otherwise demonstrably agreed between the Seller and the Buyer in accordance with Article XII. of GPC and within the meaning of Act No. 134/2016 Coll., on Public Procurement, as amended (hereinafter referred to as the "PPA").

VIII. INSURANCE

The Seller agrees that for the entire duration of its obligations under the Contract (i.e. until the end of the warranty period for any part of the Subject of the Purchase, including the fulfillment of its duties arising from any defects claimed by the Buyer under the warranty) to have an insurance contract, the subject of which will be the insurance of the Seller's liability for damages incurred by the Buyer or third parties on their property in connection with the performance of the Contract as a result of the Seller's activities in case of causing damage, with a limit of insurance benefits of at least CZK 40,000,000.-- (in words: forty million) or the equivalent in euros. The liability insurance shall also include the obligation to compensate for a damage or an injury caused by a defective product or defective work. The Seller undertakes to present this insurance policy to the Buyer's contact person for inspection at any time upon request. Failure to comply with the obligations under this provision shall constitute a significant breach of the Contract.

IX. FINAL PROVISIONS

- 1) The following annexes form an integral part of this Contract:

- a) Annex 1 – Technical description of the Subject of the Purchase.
- b) Annex 2 – Service contract (after warranty service)

The Parties agree that in case of any inconsistencies or contradictions, the Articles I. to IX. of the Contract take precedence over any annexes to the Contract. Furthermore, the Parties agree that in case of any inconsistencies or contradictions between individual annexes, the annex, whose numerical identification specified in this paragraph is lower, shall prevail.

- 2) This Contract also includes the General Purchasing Conditions of the BUT in the version effective on the date of the commencement of the tender procedure on the basis of which this Contract is concluded (hereinafter referred to as "GPC"). The GPC have the character of commercial terms and conditions within the meaning of Section 1751 of the Civil Code and regulate the rights and obligations of the Seller and the Buyer in case that these are not specified in this Contract. Also, with regard to this, and so as to avoid any speculations, the Parties declare and agree that the Contract referred to in the GPC means this Contract. Both Parties also agree that in case of any divergence between the provisions of the Contract and the GPC, the provisions of the Contract shall always apply. The GPC is available at <http://vut.cz/vnp> and the Seller, by his signature below, confirms that he has read the text of the GPC in detail and that he is therefore familiar with it.

- 3) The Seller is not entitled to transfer its rights and obligations under this Contract to a third party. Section 1879 of the Civil Code shall not apply. The aforementioned does not exclude the reserved possibility of changing the Seller in the course of performance under this Contract in accordance with Section 100(2) of the PPA.
- 4) The Seller agrees to tolerate the publication of this Contract including any amendments by the Buyer in accordance with Section 219 of the PPA.
- 5) By signing this Contract, the Parties confirm that they are aware that this Contract is subject to the obligation of publication in accordance with Act No. 340/2015 Coll., on the Register of Contracts, as amended. The publication of the Contract is arranged by the Buyer.
- 6) This Contract shall enter into force on the date of signing by both Parties and shall become effective on the date of the publication of the Contract in the Register of Contracts.
- 7) If any provision of the Contract becomes invalid or ineffective, this shall not affect the other provisions of this Contract, which shall remain valid and effective. In such case, the Parties undertake to replace the invalid or ineffective provision with a valid and effective provision that best fulfils the originally intended purpose of the invalid or ineffective provision, by means of an agreement.
- 8) This Contract contains a complete statement of the subject matter of the Contract and of all the particulars which the parties intended and intend to stipulate in the Contract and which they consider important for the binding nature of this Contract. No representation made by the parties in the negotiation of this Contract or any representation made after the execution of this Contract shall be interpreted contrary to the express provisions of this Contract and shall create any obligation on either party.
- 9) This Contract shall be concluded by electronic means by each party to the contract affixing its recognised electronic signature.
- 10) The Parties confirm that they have read this Contract before signing it and that they agree with its contents. They affix their signatures to this effect.

In Brno

In Dortmund

17.12.2024 el. podpis

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prof. Ing. Radimír Vrba, CSc.,
Director of CEITEC BUT
for the Buyer

19.12.2024 el. podpis

.....

Benjamin Oevermann
Head of Sales
for the Seller

Příloha 1 - Technický popis Předmětu koupě
Annex 1 - Technical description of the Subject of the Purchase
Veřejná zakázka: Elektronový litograf 100 kV / Electron beam lithograph 100 kV

1. General requirements / obecné požadavky:

<p>The tender concerns an Electron beam lithography tool with an acceleration voltage of 100 kV, which is used for nanostructures prototyping in the field of nanoscience and nanotechnology.</p> <p>An accelerating voltage of 100 kV enables precise writing of the fabricated structures by Gaussian beam with a resolution in order of several nanometers using commonly available commercial resists for electron beam lithography.</p> <p>The requested assembly has to contain a fully functional technological entity including a complete vacuum system, a cooling system, a stable electron source, an electron column, a chamber, an interferometric stage, multi-cassette loadlock including substrate holders with different parameters, an electron deflection system, a pattern generator, a complete electronic system, control data station with the possibility of remote access, dedicated software package to operate electron beam writer.</p>	<p><i>Zadávací řízení se týká pořízení elektronového litografu s urychlovacím napětím 100 kV, který slouží k prototypování nanostruktur pro oblast nanověd a nanotechnologií.</i></p> <p><i>Urychlovací napětí 100 kV umožňuje přesný zápis vyráběných struktur Gaussovským svazkem s rozlišením v řádu jednotek nanometrů při využití běžně dostupných komerčních rezistů pro litografii elektronovým svazkem.</i></p> <p><i>Požadovaná sestava musí obsahovat plně funkční technologický celek zahrnující kompletní vakuový systém, chladič systém, stabilní zdroj elektronů, elektronový tubus, komoru, interferometrický stolek, více-kazetovou zakládací komoru včetně držáků substrátů s různými rozměry, vychylovací systém elektronů, generátor vzorů, kompletní elektronický systém, řídicí datastanici s možností vzdáleného přístupu, SW balík k ovládání elektronového litografu.</i></p>
<p>The system has to meet safety criteria (CE certification), ionizing radiation less than 1 uSv/h at a distance of 0.1 m, used lasers classified as class 1 have to be covered so that they are not accessible to the operator in normal mode and are safe for the eye. The noise the entire system produces is lower than 70 dB(A).</p>	<p><i>Přístroj musí splňovat bezpečnostní kritéria (CE certifikace), ionizující záření menší než 1 uSv/h ve vzdálenosti 0,1 m, použité lasery klasifikovány jako třída 1 zakrytovány tak, aby v normálním režimu nebyly přístupné pro obsluhu a byly bezpečné pro oko. Hluk produkovaný celým systémem je menší než 70 dB(A).</i></p>
<p>The EBL system has to be brand new, not used by other customers nor for demonstrations of the 100kV EBL technology.</p>	<p><i>EBL systém musí být zcela nový, nepoužitý jinými zákazníky ani pro demonstraci 100kV EBL technologie.</i></p>
<p>This specification determines the minimum requirements of the contracting authority for the Object of the Contract; the Supplier adds the trade names of the goods offered, where it is appropriated, or adds a quotation and technical description to the offer, all the requirements set out in this Annex must be fulfilled. This annex will be an integral part of the purchase contract.</p>	<p><i>Tato specifikace určuje minimální požadavky zadavatele na předmět zakázky, dodavatel doplní obchodní názvy nabízeného zboží tam, kde je to vhodné, případně přiloží do nabídky vlastní cenovou nabídku a technický popis, přičemž všechny požadavky uvedené v této příloze musí být splněny. Tato příloha bude nedílnou součástí smlouvy.</i></p>
<p>The technical requirements for the entire EBL system and the system's individual parts are listed in the tables below.</p>	<p><i>Technické požadavky na celý EBL systém a na jednotlivé části systému jsou uvedeny v tabulkách níže.</i></p>

Příloha 1 - Technický popis Předmětu koupě

Annex 1 - Technical description of the Subject of the Purchase

Veřejná zakázka: Elektronový litograf 100 kV / Electron beam lithograph 100 kV

2. Characteristic of the place of instalation, available conections, requirements for the instalation / Charakteristika místa instalace, dostupné přípoje, požadavky na instalaci:

<p>The place of installation is a Nanofabrication laboratory in the ISO 5 cleanroom environment (cleanness class 100) in building C, the Central European Technology Institute of Technology BUT in Brno (CEITEC BUT). The room is located on the first floor of the building, but the part with cleanrooms has no ground floor or basement underneath, and it is placed directly on the soil. There is also an existing concrete block in the room to place the main part of the tool, which is the most sensitive to vibrations. Adjacent to the laboratory room is also a technical service room usable for the installation of some supporting equipment.</p>	<p><i>Místo instalace se nachází v nanofabriční laboratoři v prostředí čisté laboratoře ISO 5 (čistota třídy 100) v budově C Středoevropského technologického institutu VUT v Brně (CEITEC VUT). Místnost je umístěna v prvním patře budovy, jejíž část s čistými laboratořemi nemá žádné přízemí ani podzemní prostory vespod; je umístěna přímo na povrchu země. V místnosti se také nachází již existující betonový blok pro umístění hlavní části zařízení, která je nejcitlivější na vibrace. K místnosti laboratoře přiléhá technická servisní místnost využitelná pro instalaci části podpůrných zařízení.</i></p>
<p>The overall 100kV system with its necessary parts for running must fit into the areas marked in Annex D (Diagram of the place of performance) by blue-hatched area and red-hatched area. The main unit must stand on the concrete block inside the blue-hatched area.</p>	<p><i>Celý 100kV systém se součástmi nezbytnými k běhu musí pasovat do oblastí vyznačených v příloze D (Schéma místa plnění) modrou šrafovanou výplní a červenou šrafovanou výplní. Hlavní jednotka musí stát na betonovém bloku uvnitř modré šrafované oblasti.</i></p>
<p>There is a double floor with 60 cm space under the tread surface (50 cm is usable) accros whole Nanofabrication laboratory.</p>	<p><i>V celé laboratoři Nanofabrication je dvojitá podlaha s prostorem 60 cm pod nášlapnou plochou (použitelných je 50 cm).</i></p>
<p>There are electricity, water, and gas distributions (nitrogen and CDA with max pressure 0.6 MPa as standard) under the raised floor where needed for the instruments. Also, other distributions from the technical service room to the main laboratory can be placed under the raised floor.</p>	<p><i>Pod zdvojenou podlahou jsou umístěny rozvody elektřiny, vody a plynu (standardně dusík a CDA s max. tlakem 0,6 MPa). Pod podlahu lze umístit i další rozvody z technické místnosti do hlavní laboratoře.</i></p>
<p>The supplier has to carry out a site survey as a part of preparation for the installation on its costs.</p>	<p><i>Dodavatel musí v rámci přípravy instalace na své náklady provést průzkum místa.</i></p>
<p>The main system (with all necessary parts that have to be in the close vicinity), pre-alignment microscope (if it is in the form of an individual station), and operator's place with the main PC has to be installable, serviceable and fully functional in the cleanroom described above. The neighbouring technical service room is available for accessories installation, such as UPS, chiller(s), electronics, vacuum pumps and power distributing device(s). The main part carrying the electro-optical column must fit on the above described concrete block used for vibration damping.</p>	<p><i>Hlavní systém (se všemi potřebnými částmi, které musí být v těsné blízkosti), zarovnávací stanice s optickým mikroskopem (pokud je ve formě samostatné jednotky) a pracoviště operátora s hlavním PC musí být instalovatelné, servisovatelné a plně funkční ve výše popsané čisté laboratoři.</i> <i>Sousední technická servisní místnost je k dispozici pro instalaci příslušenství, jako je UPS, chladič (chladiče), elektronika, vakuové vývěvy a zařízení pro rozvod energie. Hlavní část obsahující tubus s elektronovou optikou musí být umístěna na výše specifikovaný betonový blok sloužící k tlumení vibrací.</i></p>

Příloha 1 - Technický popis Předmětu koupě
Annex 1 - Technical description of the Subject of the Purchase
Veřejná zakázka: Elektronový litograf 100 kV / Electron beam lithograph 100 kV

Technical specification documents have to be delivered with an offer.	<i>Dokument technických specifikací musí být dodány s nabídkou.</i>
Acceptance test documentation are parts of delivery. The acceptance tests have to be performed as Factory acceptance, and part of the acceptance tests has to be repeated after installation at the customer site - Customer acceptance.	<i>Součástí dodávky je dokumentace k akceptačním testům. Akceptační testy musí být provedeny jako tovární testy z výroby a část akceptačních testů se musí opakovat po instalaci u zákazníka - přejímka zákazníkem.</i>

3. Technical Description / technická specifikace:

see sheets A, B, C and D of this document (file)

viz listy A, B, C a D tohoto dokumentu (souboru)

Příloha 1 - Technický popis Předmětu koupě
Annex 1 - Technical description of the Subject of the Purchase
Veřejná zakázka: Elektronový litograf 100 kV / Electron beam lithograph 100 kV
LIST A - Basic features

A	Basic features/základní požadavky	Mandatory/ Požadováno	Assessed/ Hodnocený	Offered value / Nabízená hodnota
A1	100 kV Electron Beam Lithography system with all necessary parts for independent operation. <i>100 kV systém pro litografii elektronovým svazkem se všemi komponenty nezbytnými pro chod zařízení.</i>	YES ANO		Offered as described on the left.
A2	The control computer with the graphical user interface provides all the necessary software and hardware solutions for controlling and monitoring the whole lithography system and its parts (Column, pumping, cooling, UPS, etc.) <i>Řídicí počítač s grafickým uživatelským rozhraním poskytující veškeré potřebné softwarové a hardwarové řešení pro řízení a monitorování celého litografického systému a jeho částí (tubus, čerpání, chlazení, UPS atd.)</i>	YES ANO		Offered as described on the left.
A3	A minimum number of users (with their own user account) who can simultaneously work on the machine's server in the graphical user interface (preparing jobs, defining global and local mark positions, putting the jobs in the queue, etc.) <i>Minimální počet uživatelů (s vlastním uživatelským účtem), kteří mohou současně pracovat na serveru přístroje v grafickém uživatelském rozhraní (příprava úloh, definování poloh globálních a lokálních značek, zařazování úloh do fronty atd.)</i>	1 1	YES ANO	Yes, actually better value offered: 62 -- see F1
A4	Possibility of monitoring and controlling the system using a remote connection within the BUT local network. <i>Možnost monitorovat a ovládat systém pomocí vzdáleného připojení v rámci lokální sítě VUT.</i>	YES ANO		Yes, offered as described on the left.
A5	Software solutions for the optimisation of micro and nanofabrication. Advanced data preparation integrates layout operation, proximity effect and process correction, shape fracturing, field positioning, write sequence control and electron-beam simulation. Import/Export is available for all major layout and lithographic machine formats (file/s with designs, field positioning, etc.). <i>Softwarové řešení pro optimalizaci mikro a nanofabrikace. Pokročilá příprava dat integruje práci s rozvržením návrhu, korekci proximity efektu a procesu, rozložení tvaru na základní jednotky, polohování zápisového pole, řízení sekvence zápisu a simulaci elektronového svazku. Import/Export je k dispozici pro všechny hlavní formáty rozvržení a formáty litografického zařízení (soubory s designy, definicemi pozic zápisových polí atd.).</i>	YES ANO		Offered as described on the left.
A6	Software for Monte Carlo (MC) simulation that computes the electron-solid interaction of any arbitrary material stack and performs advanced process calibration for electron beam Proximity Effect Correction (PEC). Software with an easy-to-use interface for defining the required parameters (material data, stack parameters, acceleration voltage), running the MC simulation, visualising the 2D r-z simulation results (energy spread at different resist thicknesses) and extracting the 1D Point spread function (PSF), which can then be used for PEC. The software includes a comprehensive material database, which includes all standard materials and can easily be expanded with custom materials by defining the new material's stoichiometry and mass density. Functionalities such as fitting to Gaussian functions, averaging, convolution of PSFs, determination of base dose factors between PSFs and powerful visualisation enable the user to analyse, compare and optimize PSFs. <i>Software pro Monte Carlo (MC) simulace, který počítá interakce elektronů s pevnou látkou libovolného složení z hlediska materiálu a pořadí vrstev a provádí pokročilou kalibraci procesu s korekcí efektu blízkosti elektronového osvitu (Proximity Effect Correction - PEC). Software s uživatelsky přehledným rozhraním pro definování požadovaných parametrů (údaje o materiálu, parametry vrstev, urychlovací napětí), spuštěním MC simulace, vizualizací výsledků simulace 2D r-z (rozložení energie v různých tloušťkách rezistu) a extrahování 1D funkce bodového rozptylu (PSF), která je použitelná pro PEC. Software obsahuje komplexní databázi materiálů zahrnující všechny standardní materiály a lze ji snadno rozšířit o vlastní materiály definováním stechiometrie a hustoty nového materiálu. Funkce, jako je fitování Gaussovských funkcí, průměrování, konvoluce PSF, stanovení základních dávkových faktorů mezi PSF a výkonná vizualizace umožňující uživateli analyzovat, porovnávat a optimalizovat PSF.</i>	YES ANO		Offered as described on the left.
A7	Pattern preparation PC – compatible computer platform for system operation and running software (ad A5 and A6). This PC will be placed outside of the cleanroom. <i>Počítač pro přípravu litografických předloh - kompatibilní počítačová platforma pro ovládání systému a provoz softwaru (ad body A5 a A6). Toto PC bude umístěno mimo čisté prostory.</i>	YES ANO		Offered as described on the left.
A8	Software possibilities of the pattern preparation PC (ad A7). Softwarové možnosti počítače pro přípravu litografických předloh (ad A7).	<i>design and job preparation</i>	YES ANO	Yes, design and job preparation as described on the left is offered and included (and more -- see F2).
A9	All the licences for the machine operation, software solutions and data operation are perpetual. <i>Všechny licence na provoz přístroje, softwarová řešení a datové operace jsou trvalé.</i>	YES ANO		Yes, all offered licenses are perpetual.
A10	UPS system (Uninterruptible Power Supply) ensures the operation of the device/necessary components for a required period. After this time period, steps will be taken to protect the filament. <i>UPS systém (nepřerušitelný zdroj napájení), který zabezpečuje chod přístroje/nezbytných součástí po požadovanou dobu. Po uplynutí této doby budou podniknuty kroky k ochraně vláknna.</i>	5 min	YES ANO	Yes, offered as described on the left, the actual operation time offered is > 25 min -- see F3.

A	Basic features/základní požadavky	Mandatory/ Požadováno	Assessed/ Hodnocený	Offered value / Nabízená hodnota
A11	<p>Vacuum system requirements: main chamber, emission chamber and loadlock (chamber with a multi-cassette system allowing sample holder transfer to the main chamber) are pumped with pre-vacuum pump and individual evacuation pumps (e.g. turbomolecular, dry, ion pumps). Standard process pressure values for the main chamber (a), emission chamber (b) and cassette storage loadlock (c) are better than</p> <p>Požadavky na vakuový systém: hlavní komora, emisní komora a základací komora (obsahující multi-kazetový systém umožňující přesun držáku vzorku do hlavní komory) jsou čerpány předčerpávací vakuovou vývěvou a samostatnými vývěvami (např. turbomolekulární, suché, iontové pumpy). Hodnoty standardního operačního tlaku pro hlavní komoru (a), emisní komoru (b) a loadlock (c) jsou lepší než</p>	<p>(a) 1×10^{-4} Pa (b) 5×10^{-6} Pa (c) 150 Pa</p>		Yes, vacuum system offered as described on the left (for emission chamber and main chamber) or offered with better value (for loadlock: 5×10^{-6} Pa).
A12	<p>Cooling system with circulating water to remove waste heat from the unit and adjust the temperature around the stage and column of the machine.</p> <p>Systém chlazení s cirkulující vodou k odstranění zbytkového tepla z jednotky a udržení stálé teploty okolo stolku a tubusu zařízení.</p>	<p>YES</p> <p>ANO</p>		Yes, offered as described on the left.
A13	<p>Alignment/pre-alignment optical microscope station with xy stage for precise marks position localization on the substrate. This station is equipped with a camera, and the view is monitored by software.</p> <p>Zarovnávací stanice s optickým mikroskopem s xy stolem pro přesné vyhledávání pozic značek na substrátu. Tato stanice je vybavena kamerou a obraz je monitorován softwarem.</p>	<p>YES</p> <p>ANO</p>	<p>YES</p> <p>ANO</p>	Yes, offered as described on the left -- see F4.
A14	<p>The alignment/pre-alignment optical microscope station (A13) allows the user to localize marker positions for later using during lithography.</p> <p>Zarovnávací stanice s optickým mikroskopem (A13) umožňuje uživateli lokalizovat polohy značek pro pozdější použití během litografie.</p>	<p>YES</p> <p>ANO</p>	<p>YES</p> <p>ANO</p>	Yes, offered as described on the left -- see F4 and F5.
A15	<p>The stage on the alignment/pre-alignment optical microscope imitates the chamber stage, is situated exactly in the chamber, or ensures conformity in the coordinate system in a different way</p> <p>Stolek optického mikroskopu imituje stolek v hlavní komoře, nachází se přímo vevnitř komory nebo jiným způsobem zajišťuje shodu mezi souřadnými systémy.</p>	<p>YES</p> <p>ANO</p>		Yes, offered as described on the left.

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Annex 1 - Technical description of the Subject of the Purchase
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LIST B - Specification Electron Column

B	Specification – Electron column / Specifikace - Elektronový tubus	Mandatory/ Požadováno	Assessed/ Hodnocený	Offered value / Nabízená hodnota
B1	Electron beam energy <i>Energie elektronového svazku</i>	50 keV* 100 keV*		50keV and 100keV offered
B2	High-brightness Thermal Field Emission Gun (Schottky emitter) with a typical lifetime of min. 18 months <i>Žhavená autoemisní katoda s vysokým jasem (pracující na bázi Schottkyho efektu) s dobou provozu typicky min. 18 měsíců</i>	YES ANO		Yes, offered as stated on the left with a tycal lifetime of 18 months
B3	Electron beam (spot) with a Gaussian profile. Minimum spot size at an acceleration voltage of 100 kV less or equal <i>Elektronový svazek (stopa) s Gaussovským profilem. Minimální velikost stopy pro urychlovací napětí 100 kV menší nebo rovno</i>	≤ 1.9 nm		1.9nm (compliant)
B4	Minimal beam current (calibrated and guaranteed by the vendor in the specification of the machine) at an acceleration voltage of 100 kV less or equal <i>Minimální proud ve svazku (kalibrován a garantován výrobcem ve specifikaci přístroje) pro urychlovací napětí 100 kV menší nebo rovno</i>	≤ 50 pA*		50pA (compliant)
B5	Maximal beam current** (calibrated and guaranteed by the vendor in the machine specification) at an acceleration voltage of 100 kV. **With this beam current, the machine has to be able to recognize the marks on the calibration sample and has to be able to proceed with all the automatic calibration procedures (beam, aperture(s) and stigmators centering, focus, distortion correction). ☐ <i>Maximální proud ve svazku** (kalibrován a garantován výrobcem ve specifikaci přístroje) pro urychlovací napětí 100 kV.</i> <i>**S tímto proudem ve svazku musí být přístroj schopen rozpoznat značky na kalibračním vzorku a projít všechny automatické kalibrační procedury (centrování svazku, apertur(y) a stigmatóru, zaostření, korekci zkreslení).</i>	200 nA* 	YES ANO	Yes, offered is actually a higher max. current: 350nA (see F6)
B6	Beam current uniformity up to 100 nA on 1mm Write field from peak to peak <i>Konstantnost proudu od menších proudů až do 100 nA na 1mm zápisovém poli od piky k piku</i>	≤ 1 %*		<= 1% offered (compliant)
B7	Beam current drift (current stability) from peak to peak/hour in maximum without periodic calibration of the beam at a factory pre-defined beam current <i>Maximální drift proudu ve svazku (stabilita proudu) od piky k piku za hodinu bez průběžné kalibrace svazku na proudu předdefinovaném výrobcem</i>	≤ 1 %*		<=1% offered (compliant)
B8	Beam position stability from peak to peak/hour on 1mm Write field at a factory pre-defined beam current <i>Stabilita pozice svazku od piky k piku za hodinu na 1mm zápisovém poli na proudu předdefinovaném továrnou</i>	≤ 60 nm*	YES ANO	Offered value actually better: <=20nm (see F7)
B9	The main field distortion of the 1mm Write field at 100 kV <i>Zkreslení hlavního pole na 1mm zápisovém poli na 100 kV</i>	< ±50 nm*	YES ANO	Yes, offered value actually better: <= +/-15nm (see F8)
B10	Fully automated calibration and alignment procedures (automatic, dynamic off-axis focus, stigmation and field distortion corrections) <i>Plně automatická kalibrace a zarovnávací procedury (automatické, dynamické mimoosé zaostřování, korekce astigmatismu a zkreslení pole)</i>	YES ANO		Yes, offered as described on the left
B11	A time needed for the change of current from 1 nA to 100 nA.** **The beam current uniformity across the writing field, beam current drift and beam positioning stability after the switching must be within the values given in B6, B7 and B8. <i>Čas potřebný pro změnu proudu z 1 nA na 100 nA.**</i> <i>**Homogennost elektronového svazku napříč zápisovým polem, drift proudu ve svazku a stabilita pozicování svazku po přepnutí musí odpovídat hodnotám daným v B6, B7 and B8.</i>	max. 12 hours max. 12 hodin	YES ANO	Yes, offered value actually better: <= 15min (see F9)
B12	Automatic compensation of difference in substrate height/tilt <i>Automatická kompenzace rozdílné výšky/naklonění substrátu</i>	YES ANO		Yes, offered as described on the left
B13	Automatic aperture changer with automatic calibration of the aperture position (apertures defining current ranges) <i>Automatický měnič apertur s automatickou kalibrací pozice apertur (clonky definující rozsahy proudů)</i>	YES ANO		Yes, offered as described on the left.
B14	Electrostatic beam blanker <i>Elektrostatiký beam blanker (zařízení pro zatemnění svazku)</i>	YES ANO		Yes, offered as described on the left.
B15	Detector(s) for mark recognition, alignment and SEM imaging (Scanning Electron Microscopy technique) be able to achieve recognisable contrast over the whole scanning area <i>Detektor(y) pro rozpoznávání značek, zarovnávání a SEM zobrazování (technika rastrovací elektronové mikroskopie, zkratka z anglického pojmenování) umožňující dosáhnout rozpoznatelný kontrast v celé oblasti skenování</i>	YES ANO		Yes, offered as described on the left.

* The parameters will be proven in the acceptance test at the factory site and the acceptance test at the installation site.

* Parametry budou prokazovány při akceptačním testu ve výrobním závodě a při přejímacím testu v místě instalace.

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LIST C - Stage and Sample Holders

C	Specification – Stage and sample holders / Specifikace - Posuvný stolek a držáky vzorků	Mandatory/ Požadováno	Assessed/ Hodnocený	Offer / Nabízeno
C1	Sample holders capable of mounting different substrate sizes <i>Držáky vzorků s kapacitou pro uchycení různých velikostí substrátů</i>	YES ANO		Yes, available as described on the left.
C2	Maximum loadable substrate size <i>Maximální velikost substrátu, který může být založen</i>	8" wafer 7" mask/a		Yes, 8" wafers and 7" mask holders are available and loadable.
C3	Minimum sample size that can be fixed on the sample holder, loaded and exposed (xy dimensions) <i>Minimální velikost vzorku, který může být umístěn na držák vzorků, založen a exponován (xy rozměry)</i>	5 x 5 mm		Yes, 5mm*5mm samples could be handled as described on the left.
C4	The maximum thickness of the sample (t in direction of the z- axis) that can be fixed on the sample holder, loaded and exposed is <i>Maximální tloušťka vzorku (t ve směru osy z), který může být umístěn na držák vzorků, založen a exponován je</i>	at least / alespoň 6 mm	YES ANO	Yes, actually 10mm thick samples could be handled as described on the left -- see F10
C5	Sample holders/cassettes: 1) holder/s specially made for two 4" wafers; 2) holder specially made for a 5" mask; 3) holder specially made for a 6" mask; 4) piece part holder/s supporting thick samples up to the maximum thickness defined by the machine and supporting pieces from 5x5mm to 3" with at least four positions. <i>Držáky vzorků/kazety:</i> 1) držák/y speciálně vyrobené na dva 4" wafery; 2) držák speciálně vyrobený na 5" masku; 3) držák speciálně vyrobený na 6" masku; 4) držák/y malých vzorků podporující tlusté vzorky do maximální tloušťky definované přístrojem a pro vzorky od 5x5 mm do 3" s alespoň čtyřmi pozicemi.	YES ANO		Yes, all included in the delivery as described on the left.
C6	Multicassette loadlock system with fully automated robot handling. Loading and exchanging cassettes (sample holders) is capable of fully automatic operation and is controlled via software. The minimum number of cassette positions in this system is <i>Zakládací komora s multikazetovým systémem s plně automatizovaným robotickým podavačem. Zakládání a výměna kazet (držáků vzorků) běží plně automaticky a je ovládána ze softwaru. Minimální počet pozic pro kazety v tomto systému je</i>	min. 6	YES ANO	Yes, offered as described on the left, with actually 10 positions; see F 11
C7	Multicassettes loadlock system (C6) is fully evacuated with pump downtime <i>Zakládací komora s multikazetovým systémem (C6) je plně zčerpána s časem vyčerpání</i>	< 10 min		Yes, compliant < 10min is offered
C8	Sample holder exchange time from the multicassettes loadlock system to the stage in the main chamber or vice versa <i>Čas potřebný na výměnu držáku vzorku z multikazetového systému v zakládací komoře na stolek v hlavní komoře nebo naopak</i>	< 300 s		Yes, actually better value offered: < 120 sec for each way.
C9	The range of the stage traverse (mechanical) in xy axis <i>Rozpětí pohybu posuvného stolku (mechanického) v osách xy</i>	min. 170 x 170 mm*	YES ANO	Yes, actually better value offered: 210mm*210mm; see F12.
C10	Resolution of the laser interferometric stage movement (in xy axis) <i>Rozlišení pohybu laserového interferometrického stolku (v osách xy)</i>	max. 0.62 nm	YES ANO	Yes, actually better value offered: 0.15nm -- see F13
C11	Stage movement speed in the faster axis direction (in the xy plane) <i>Rychlost pohybu stolku ve směru rychlejší osy (v rovině x a y)</i>	min. 15 mm/s*	YES ANO	Yes, actually better value offered: 60mm/s -- see F14
C12	Stage movement speed in the slower axis direction (in the xy plane) <i>Rychlost pohybu stolku ve směru pomalejší osy (v rovině x a y)</i>	min. 15 mm/s*	YES ANO	Yes, actually better value offered: 40mm/sec -- see F15
C13	Stepping time for movement from one 1 mm Write field (WF) to the next, including time needed for acceleration, deceleration and settling time of the stage. The vibration of the stage should be smaller than 2 nm in x and y axes. <i>Čas potřebný na pohyb stolku z jednoho 1 mm zápisového pole (WF) na sousední včetně času potřebného na zrychlení, zpomalení a ustavení stolku. Vibrace stolku by měly být menší než 2 nm v ose x a y.</i>	max. 2 s*	YES ANO	Yes, actually better value offered: <=150msec -- see F16
C14	Ability to compensate** z position inaccuracy (substrate non-flatness) on the fully reflective substrate in the minimum range of **Using a combination of precise optical height sensing measurement and the correction of working distance or stage position in the z- axis <i>Možnost kompenzovat** nepřesnost pozicování v ose z (nerovinnost substrátu) na plně reflexním substrátu v minimálním rozmezí</i> ** Použitím kombinace přesného měření optickým snímáním výšky a korekce pracovní vzdálenosti nebo polohy stolku v ose z	min. ±50 um*	YES ANO	Yes, actually better value offered: 5mm -- see F17

C	Specification – Stage and sample holders / Specifikace - Posuvný stolek a držáky vzorků	Mandatory/ Požadováno	Assessed/ Hodnocený	Offer / Nabízeno
C15	<p>Ability to compensate** z position inaccuracy (substrate non-flatness) in the minimum range of ± 50 um on the fully reflective substrate with the accuracy and reproducibility (3 sigma) of</p> <p>**Using a combination of precise optical height sensing measurement and the correction of working distance or stage position in the z- axis</p> <p><i>Možnost kompenzovat** nepřesnost pozicování v ose z (nerovinnost substrátu) v minimálním rozmezí ± 50 um na plně reflexním substrátu s přesností a opakovatelností (3 sigma)</i></p> <p><i>** Použitím kombinace přesného měření optickým snímáním výšky a korekce pracovní vzdálenosti nebo polohy stolu v ose z</i></p>	< 1 um*	<p>YES</p> <p>ANO</p>	<p>Yes, actually better value offered: $\leq 100\text{nm}$ -- see F18</p>
C16	<p>The ability of height sensing system measurement to work without z -stage move on the transparent and reflective substrate in the range of ± 100 um (5" chromium glass mask with an area for which the chromium is removed with a tilt of at least 1 um/mm) with the reproducibility (3 sigma) of**</p> <p>** Difference in measured height on two spots on a glass mask in close proximity, of which one is with and the other without a chromium layer, should differ only in the range of the chromium layer thickness</p> <p><i>Schopnost měření optickým snímáním výšky bez použití pohybu stolu v ose z na transparentním a reflektivním substrátu v rozsahu ± 100 um (5" skleněná chromová maska s oblastí, kde chrom je odstraněn, a s nakloněním alespoň 1 um/mm) s reprodukovatelností (3 sigma)</i></p> <p><i>**Měřená hodnota v oblastech v těsné blízkosti místa na masce s a bez chromové vrstvy by se měla lišit v rozsahu tloušťky chromové vrstvy samotné</i></p>	< 10 um*	<p>YES</p> <p>ANO</p>	<p>Yes, actually better value offered: $\leq 100\text{nm}$ -- see F19</p>
C17	<p>Motorized z -stage with the positioning resolution of 1 um or less and with the travel range of 10 mm or more</p> <p><i>Motorizovaný posuv stolu v ose z s rozlišením pozicování 1 um nebo méně a s rozsahem pohybu 10 mm nebo více</i></p>	<p>YES if it is a part of offer</p> <p>ANO pokud je nabízeno</p>	<p>YES</p> <p>ANO</p>	<p>Yes, offered as described on the left, with better resolution of $0.1\mu\text{m}$ -- see F20</p>
C18	<p>Stage movement method during exposition</p> <p><i>Způsob pohybu stolu během zápisu</i></p>	step and repeat / krok a opakuj		<p>Yes, offered as described on the left (step and repeat with stitching).</p>
C19	<p>The stage or sample holders have to be equipped with Faraday cup and multiple markers for beam calibration</p> <p><i>Stolek nebo držáky vzorků musí být vybaveny Faradayovou celou a vícenásobnými značkami sloužícími ke kalibraci svazku</i></p>	<p>YES</p> <p>ANO</p>		<p>Yes, all offered sample holders comprise a Faraday cup and markers for beam calibration.</p>

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LIST D - Patterning

D	Specification - Patterning / Specifikace - Paternování	Mandatory/ Požadována	Assessed/ Hodnocený	Offered value / Nabízená hodnota
D1	Vector scan exposure method Vektorový způsob zápisu	YES ANO		Yes, offered as described on the left.
D2	Maximal stepping speed of pattern generator with the resolution specified below in D3 <i>Maximální rychlost kroků generátoru paternů (předloh) s rozlišením definovaným níže v D3</i>	at least/alespoň 125 MHz	YES ANO	Yes, 125 MHz offered as described on the left - see F21.
D3	Resolution of the clock frequency of the pattern generator <i>Rozlišení hodinového taktu generátoru paternů (předloh)</i>	≤ 100 ns	YES ANO	Yes, actually better value offered: 0.1 nsec -- see F22.
D4	Dual coils - (a) MAIN coil for precision placement of the beam (DAC for beam positioning) and (b) SUBFIELD deflector for high-speed writing (DAC for beam scanning) <i>Duální cívky - (a) HLAVNÍ cívka pro přesné umístění svazku (DAC pro pozicování svazku) a (b) vychylovací cívka pro rychlý zápis do DÍLČÍHO POLE (DAC pro skenování svazkem)</i>	YES ANO		Yes, offered as described on the left.
D5	(a) Number of bits of the MAIN FIELD deflection system for the beam positioning regarding the DAC converter <i>(a) Počet bitů vychylovacího systému pro pozicování svazku v HLAVNÍM POLI s ohledem na DAC převodník</i>	at least/alespoň 20 bit		Yes, 20 bit offered as described on the left.
D6	(a) MAIN write field sizes <i>(a) Velikosti HLAVNÍHO zápisového pole</i>	at least 3 fixed values/alespoň 3 pevné hodnoty: 100 um, 500 um and 1000 um		Yes, the three write field sizes as mentioned on the left are included in the offer (more possible).
D7	(a) Variability of the address grid of the MAIN FIELD for 500um field size <i>(a) Variabilita adresné mřížky HLAVNÍHO POLE pro 500um velikost pole</i>	fixed value / pevná hodnota: 1 nm/pixel or/nebo 0.5 nm/pixel	YES ANO	Yes, even both values for the address grid as mentioned on the left are offered. Other address grid values also possible: see F23.
D8	(b) Number of bits of SUBFIELD deflection system for beam scanning regarding the DAC converter <i>(b) Počet bitů vychylovacího systému pro skenování svazkem v DÍLČÍM POLI s ohledem na DAC převodník</i>	at least/alespoň 14 bit		Yes, 14 bit offered as described on the left.
D9	(b) sizes of the SUBFIELD deflection beam positioning system with the calibration guaranteed in the specifications of the machine <i>(b) velikost DÍLČÍHO POLE daná vychylovacím systémem pro pozicování svazku s kalibrací garantovanou ve specifikaci přístroje</i>	1 defined size of subfield / 1 definovaná velikost dílčího pole	YES ANO	Yes, actually many different subfield sizes are definable and included in the offer: see F24.
D10	Resolution of the whole deflection system on the writefield with the size of 1 000 um <i>Rozlišení celého vychylovacího systému na zápisovém poli o velikosti 1 000 um</i>	≤ 1 nm	YES ANO	Yes, actually better value offered: 0,08nm -- see F25.
D11	Minimal writing area capability (xy plane) <i>Minimální rozsah zápisové plochy (xy rovina)</i>	150 x 150 mm ² *	YES ANO	Yes, actually better value offered: 205mm*205mm -- see F26.
D12	Minimum average linewidth for write field 100 x 100 um ² @100 kV (line width acquired throughout the field including centre, left and right parts for top, for bottom and for middle locations) <i>Minimální šířka čáry pro zápisové pole 100 x 100 um² @100 kV (šířka čáry získaná v celém poli včetně pozic ve středu, vlevo a vpravo pro horní, pro spodní a pro střední umístění)</i>	≤ 8 nm*		Yes, offered as stated on the left: <=8nm.
D13	Minimum average linewidth for write field 1 000 x 1 000 um ² @100 kV (line width acquired throughout the field including centre, left and right parts for top, for bottom and for middle locations) <i>Minimální šířka čáry pro zápisové pole 1 000 x 1 000 um² @100 kV (šířka čáry získaná v celém poli včetně pozic ve středu, vlevo a vpravo pro horní, pro spodní a pro střední umístění)</i>	≤ 20 nm*	YES ANO	Yes, actually better value offered: <=15nm -- see F27
D14	Stitching accuracy for write field 100 x 100 um ² or larger @100 kV with exposed structures distributed along the whole boundary area**. The absolute error value of measurement along the whole boundary area is: **Test will be done by exposing 3x3 fields with small overlap, where each write field has at least 8 exposed structures (xy verniers, dots, crosses etc.) for the measurement (1 in each corner, at least 1 on each edge). All the overlapped structures (of neighbouring fields) will be counted in the absolute error value measurement. <i>Přesnost sešívání polí pro zápisové pole 100 x 100 um² nebo větší @100 kV s exponovanými strukturami rozmístěnými podél celé oblasti hranic polí**. Absolutní hodnota chyby pro měření okolo celého zápisového pole je: **Test bude proveden expozicí 3x3 polí s malým přesahem, kde každé zápisové pole má minimálně 8 exponovaných struktur (xy noniusů, teček, křížků atd.) pro měření (1 v každém rohu, minimálně 1 na každém okraji). Všechny překrývající se struktury (sousedních polí) budou započítány do měření absolutní chyby.</i>	≤ 20 nm*	YES ANO	Yes, actually better value offered: <=8nm -- see F28

Příloha 1 - Technický popis Předmětu koupě
Annex 1 - Technical description of the Subject of the Purchase
Veřejná zakázka: Elektronový litograf 100 kV / Electron beam lithograph 100 kV
LIST E - Supply Requirements

E	Specification - Supply requirements / Specifikace - Požadavky na dodání	Mandatory/ Požadováno	Assessed/ Hodnocený	Offered value / Nabízená hodnota
E1	Transport costs up to the loading and unloading and placement at the CEITEC Nano building, assembly, connection to the supplies, demonstration and verification of guaranteed parameters at the place of installation are included. The subject of the public contract shall be handed over to the contracting authority no later than 18 months after the effective date of the contract. <i>Součástí dodávky jsou transportní náklady včetně vykládky a umístění na místo plnění CEITEC Nano, sestavení na pracovišti, připojení k pracovním médiím, demonstrace a verifikace garantovaných parametrů na místě instalace. Předmět veřejné zakázky bude odevzdán zadavateli nejpozději 18 měsíců od účinnosti smlouvy.</i>	YES ANO		Yes, offered as described on the left. Hand over to the contracting authority no later than 18 months after the effective date of the contract.
E2	Part of the supply and installation has to be on-site training for system operation (SW and HW including routine maintenance training) and application training in the range of at least five training days for two persons. <i>Součástí dodávky a montáže musí být školení pro obsluhu zařízení (SW a HW včetně školení běžné údržby) a aplikační školení na místě instalace v rozsahu alespoň pěti školících dnů pro dvě osoby.</i>	YES ANO		Yes, offered as described on the left. 5 days of training on site for two persons is part of the supply.
E3	The supplier provides a full warranty for components and complete system from the date of customer acceptance under standard conditions for <i>Dodavatel poskytuje plnou záruku na komponenty a kompletní systém od data převzetí zákazníkem za standardních podmínek v délce</i>	min. 12 months min. 12 měsíců		Yes, the supplier provides a full warranty as described on the left for 12 months.
E4	The warranty service (ad E3) includes all parts, labour and travel expenses needed for the non-issue operation of the EBL system. The waiting time for an initial response by the service support centre is less than 72 hours. The warranty also covers annual preventive maintenance with system calibration and consumable coverage (like electron source, apertures, related materials etc., if needed). <i>Záruční servis (ad E3) zahrnuje všechny části, práci a cestovní náklady potřebné pro bezproblémový provoz EBL systému. Čekací lhůta na prvotní reakci servisního centra je méně než 72 hodin. Záruka také pokrývá každoroční preventivní údržby zahrnující kalibraci systému a poskytnutí spotřebního materiálu (jako zdroj elektronů, clonky, potřebný materiál atd. pokud je to nutné).</i>	YES ANO		Yes, offered as described on the left.
E5	Guaranteed price of the service contract (after-warranty service)** for the specified period starting after the standard warranty (E3). **This service includes annual preventive maintenance with system calibration, consumable coverage (like electron source, apertures, related materials, etc. if required) and software-bug fixing updates at a minimum. Labour and travel expenses is also included. The waiting time for an initial response by the service support centre is less than 72 hours. The period is <i>Garance ceny servisního kontraktu (pozáručního servisu)** po stanovenou dobu, která začíná po uběhnutí doby standardní záruky (E3). **Tento servis zahrnuje minimálně každoroční preventivní údržbu včetně kalibrace systému, poskytnutí spotřebního materiálu (jako zdroj elektronů, clonky, potřebný materiál atd. pokud je to nutné) a aktualizace softwaru opravující chyby. Práce a cestovní výdaje jsou také zahrnuty. Čekací lhůta na prvotní reakci servisního centra je méně než 72 hodin. Stanovená doba je</i>	min. 3 years min. 3 roky		Yes, guaranteed price of the service contract (after-warranty service) with conditions as described on the left is offered for 3 (three) years.
E6	The guaranteed price for 1 year of the service contract. The price from 20 k€ to 70 k€ will be evaluated. <i>Garantovaná cena servisního kontraktu na 1 rok. Cena bude hodnocená v rozsahu od 20 k€ do 70 k€.</i>	max. 70 k€	YES ANO	Yes, the guaranteed price offered for 1 year of the service contract is within the range given (actually 70k€; see offer form).
E7	The EBL system also allows remote system diagnostics and service intervention via the internet connection if the nature of the issue allows it. <i>EBL systém umožňuje vzdálenou diagnostiku a servisní zásah přes internetové připojení, pokud to povaha problému umožňuje.</i>	YES ANO		Yes, this is possible and offered as described on the left.
E8	The part of the warranty service (E3) and the service contract (E5) is unlimited access to the remote service support via email or phone. <i>Součástí záručního servisu (E3) a servisní smlouvy (E5) je neomezený přístup ke vzdálené servisní podpoře skrze email nebo telefon.</i>	YES ANO		Yes, this is offered and included as described on the left.
E9	Technical support and service availability – by e-mail / phone within standard working hours and working days. <i>Dostupnost technické podpory a servisu – e-mailem / telefonem ve standardních pracovních hodinách a v pracovních dnech.</i>	YES ANO		Yes, this is available and offered as described on the left.
E10	Tutorials and user manuals for EBL system and its parts are provided in electronic versions in Czech or in English language. Delivery contains a printed version of the user manual of the basic instrument operation. <i>Součástí dodávky jsou návody a uživatelské příručky pro EBL systém a jeho součásti dodané v elektronické verzi v českém nebo anglickém jazyce. Dodávka obsahuje tištěnou verzi uživatelské příručky s popisem základního ovládání přístroje.</i>	YES ANO		Yes, all offered as described on the left. Tutorials and user manuals are provided in English in electronic form. Delivery includes a printed version of the user manual of the basic instrument operation.

LIST F - Evaluation

4. Hodnoticí kritérium č. 1 - Technické řešení/Evaluation criterion no 1 - Technical solution

Kritérium je rozdeleno na nižšie uvedené subkritéria. Dodávateľ uvede hodnoty pre hodnotenie nižšie v tabuľke

The criterion is divided into the following sub-criteria. The Supplier will indicate the values for evaluation in the table below

F		Sub-criterion/Subkritérium	Sub-criterion points / body subkritéria	Sub-criterion fulfillment level / Úroveň naplnění subkritéria **	points awarded/přidělené body***	Nabídka dodavatele/Supplier Offer	Poznámka k nabídce/Note to the offer (see supplement provided)
F1	Ad A3	A minimum number of users (with their own user account) who can simultaneously work on the machine's server in the graphical user interface (preparing jobs, defining global and local mark positions, putting the jobs in the queue, etc.) <i>Minimální počet uživatelů (s vlastním uživatelským účtem), kteří mohou současně pracovat na serveru přístroje v grafickém uživatelském rozhraní (příprava úloh, definování poloh globálních a lokálních značek, zařazování úloh do fronty atd.)</i>	3	≤ 10	0	62	
				11–60 inclusive	0,75		
				> 60	3		
F2	Ad A8	Software possibilities of the pattern preparation PC (ad A7). <i>Softwarové možnosti počítače pro přípravu paternů (ad A7).</i>	3	Design and job preparation / <i>Příprava desingů a jobů</i>	0	Yes, all functions (design and job preparation, simulating and emulating of machine with pattern generator)/ <i>Příprava desingů a jobů, simulace a napodobení přístroje s generátorem paternů</i>	
				Design and job preparation and simulating (incl. counting of estimated writing time) / <i>Příprava desingů a jobů a simulace (včetně výpočtu očekávané doby zápisu)</i>	1,5		
				Design and job preparation, simulating and emulating of machine with pattern generator/ <i>Příprava desingů a jobů, simulace a napodobení přístroje s generátorem paternů</i>	3		
F3	Ad A10	UPS system (Uninterruptible Power Supply) ensures the operation of the device/necessary components for a required period. After this time period, steps will be taken to protect the filament, e.g. closing the column valve. <i>UPS systém (nepřerušitelný zdroj napájení), který zabezpečuje chod přístroje/nezbytných součástí po požadovanou dobu. Po uplynutí této doby budou podniknuty kroky k ochraně vlákna, např. zavření ventilu k tubusu.</i>	1	≤ 5 min	0	>25 min	
				> 5 min to/až 15 min inclusive / <i>včetně</i>	0,25		
				> 15 min to/až 25 min inclusive / <i>včetně</i>	0,5		
				> 25 min	1		

F		Sub-criterion/Subkritérium	sub-criterion points / body subkritéria	Sub-criterion fulfillment level / Úroveň naplnění subkritéria **	points awarded/přidělené body***	Nabídka dodavatele/Supplier Offer	Poznámka k nabídce/Note to the offer (see supplement provided)
F4	Ad A13	<p>Alignment/pre-alignment optical microscope station with xy stage for precise marks position localization on the substrate. This station is equipped with a camera, and the view is monitored by software.</p> <p><i>Zarovnávací stanice s optickým mikroskopem s xy stolem pro přesné vyhledávání pozic značek na substrátu. Tato stanice je vybavena kamerou a obraz je monitorován softwarem.</i></p>	3	Basic functionality for precise measurement of position in xy / Základní funkcionality pro přesné měření pozice v xy	0	Yes, all functions as written on the left (measurement of xyz) with a z-range from 0 to >=15mm.	
				Precise measurement of position in xy and in z -axis up to 100 um inclusive / Přesné měření pozice v xy a v ose z až do 100 um včetně	0,6		
				Precise measurement of position in xy and in z -axis from 100 um up to 5 mm inclusive / Přesné měření pozice v xy a v ose z od 100 um do 5 mm včetně	1,5		
				Precise measurement of position in xy and in z -axis from 5 mm up to 15 mm inclusive / Přesné měření pozice v xy a v ose z od 5 mm do 15 mm včetně	3		
F5	Ad A14	<p>The alignment/pre-alignment optical microscope station (A13) allows the user to localize marker positions for later using during lithography.</p> <p><i>Zarovnávací stanice s optickým mikroskopem (A13) umožňuje uživateli lokalizovat polohy značek pro pozdější použití během litografie.</i></p>	2	Marker's positions are manually saved to the EBL system / Pozice značek jsou manuálně ukládány do EBL systému	0	Yes, localized marker positions could be electronically submitted to the EBL system	
				Marker's positions are electronically submitted and sent to the EBL system / Pozice značek jsou elektronicky načteny a posílány do EBL systému	2		

F		Sub-criterion/Subkritérium	sub-criterion points / body subkritéria	Sub-criterion fulfillment level / Úroveň naplnění subkritéria **	points awarded/přidělené body***	Nabídka dodavatele/Supplier Offer	Poznámka k nabídce/Note to the offer (see supplement provided)
F6	Ad B5	<p>Maximal beam current** (calibrated and guaranteed by the vendor in the machine specification) at an acceleration voltage of 100 kV. **With this beam current, the machine has to be able to recognize the marks on the calibration sample and has to be able to proceed with all the automatic calibration procedures (beam, aperture(s) and stigmators centering, focus, distortion correction).</p> <p><i>Maximální proud ve svazku** (kalibrován a garantován výrobcem ve specifikaci přístroje) pro urychlovací napětí 100 kV.</i> **S tímto proudem ve svazku musí být přístroj schopen rozpoznat značky na kalibračním vzorku a projít všechny automatické kalibrační procedury (centrování svazku, apertur(y) a stigmátorů, zaostření, korekci zkreslení).</p>	9	at least 200–250 nA*	0	350nA	
				at least 250–300 nA*	1,8		
				at least 300–350 nA*	4,5		
				at least 350 nA*	9		
F7	Ad B8	<p>Beam position stability from peak to peak/hour on 1mm Write field at a factory pre-defined beam current</p> <p><i>Stabilita pozice svazku od píku k píku za hodinu na 1mm zápisovém poli na proudu předdefinovaném továrnou</i></p>	2	40–60 nm* inclusive	0	<=20nm	
				20–40 nm* inclusive	1		
				≤20 nm*	2		
F8	Ad B9	<p>The main field distortion of the 1mm Write field at 100 kV</p> <p><i>Zkreslení hlavního pole na 1mm zápisovém poli na 100 kV</i></p>	2	±30–±50 nm* inclusive	0	<=+/-15nm	
				±15–±30 nm* inclusive	1,2		
				≤ ±15 nm*	2		
F9	Ad B11	<p>A time needed for the change of current from 1 nA to 100 nA.** **The beam current uniformity across the writing field, beam current drift and beam positioning stability after the switching have to be within the values given in B6, B7 and B8.</p> <p><i>Čas potřebný pro změnu proudu z 1 nA na 100 nA.**</i> **Homogennost elektronového svazku napříč zápisovým polem, drift proudu ve svazku a stabilita pozicování svazku po přepnutí musí odpovídat hodnotám daným v B6, B7 and B8.</p>	5	more than 30 minutes up to 12 h*	0	<=15 min	
				15–30 min* inclusive	2,5		
				≤ 15 min*	5		
F10	Ad C4	<p>The maximum thickness of the sample (t in direction of the z -axis) that can be fixed on the sample holder, loaded and exposed is</p> <p><i>Maximální tloušťka vzorku (t ve směru osy z), který může být umístěn na držák vzorků, založen a exponován je</i></p>	2	at least 6 mm but less than 8 mm*	0	10mm	
				at least 8 mm but less than 10 mm*	0,666		
				at least 10 mm but less than 12 mm*	1,333		
				at least 12 mm*	2		

F		Sub-criterion/Subkritérium	sub-criterion points / body subkritéria	Sub-criterion fulfillment level / Úroveň naplnění subkritéria **	points awarded/přidělené body***	Nabídka dodavatele/Supplier Offer	Poznámka k nabídce/Note to the offer (see supplement provided)
F11	Ad C6	Multicassettes loadlock system with fully automated robot handling. Loading and exchanging cassettes (sample holders) is capable of running fully automatically and controlled via software. The minimum number of cassettes positions in this system is <i>Zakládací komora s multikazetovým systémem s plně automatizovaným robotickým podavačem. Zakládání a výměna kazet (držáků vzorků) běží plně automaticky a je ovládaná ze softwaru. Minimální počet pozic pro kazety v tomto systému je</i>	3	at least 6 but less than 8	0	10	
				at least 8 but less than 10	1,5		
				at least 10	3		
F12	Ad C9	The range of the stage traverse (mechanical) in xy axis <i>Rozpětí pohybu posuvného stolku (mechanického) v osách xy</i>	5	at least 170x170 mm ² * but less than 200x200 mm ² *	0	210mm in both directions x and y	
				at least 200x200 mm ² * but less than 210x210 mm ² *	4		
				at least 210x210 mm ² *	5		
F13	Ad C10	Resolution of the laser interferometric stage movement (in xy axis) <i>Rozlišení pohybu laserového interferometrického stolku (v osách xy)</i>	2	0.31–0.62 nm inclusive	0	0.15nm	
				0.16–0.31 nm inclusive	1		
				≤0.16 nm	2		
F14	Ad C11	Stage movement speed in the faster axis direction (in the xy plane) <i>Rychlost pohybu stolku ve směru rychlejší osy (v rovině x a y)</i>	5	at least 15 mm/s but less than 35 mm/s*	0	60mm/sec	
				at least 35 mm/s but less than 55 mm/s*	2,5		
				at least 55 mm/s*	5		
F15	Ad C12	Stage movement speed in the slower axis direction (in the xy plane) <i>Rychlost pohybu stolku ve směru pomalejší osy (v rovině x a y)</i>	5	at least 15 mm/s but less than 35 mm/s*	0	40mm/sec	
				at least 35 mm/s but less than 55 mm/s*	2,5		
				at least 55 mm/s*	5		
F16	Ad C13	Stepping time for movement from one 1 mm Write field (WF) to the next, including time needed for acceleration, deceleration and settling time of the stage. The vibration of the stage should be smaller than 2 nm in x and y axes. <i>Čas potřebný na pohyb stolku z jednoho 1 mm zápisového pole (WF) na sousední včetně času potřebného na zrychlení, zpomalení a ustavení stolku. Vibrace stolku by měly být menší než 2 nm v ose x a y.</i>	4	300–2000 ms*	0	≤150msec	
				150–300 ms* inclusive	1		
				≤ 150 ms*	4		

F		Sub-criterion/Subkritérium	sub-criterion points / body subkritéria	Sub-criterion fulfillment level / Úroveň naplnění subkritéria **	points awarded/přidělené body***	Nabídka dodavatele/Supplier Offer	Poznámka k nabídce/Note to the offer (see supplement provided)
F17	Ad C14	Ability to compensate** z position inaccuracy (substrate non-flatness) on the fully reflective substrate in the minimum range of **Using a combination of precise optical height sensing measurement and the correction of working distance or stage position in the z- axis <i>Možnost kompenzovat** nepřesnost pozicování v ose z (nerovinnost substrátu) na plně reflexním substrátu v minimálním rozmezí ** Použitím kombinace přesného měření optickým snímáním výšky a korekce pracovní vzdálenosti nebo polohy stolku v ose z</i>	2	at least ±50–±100 um*	0	5mm	
				at least ±100–5000 um*	1		
				at least 5 mm*	2		
F18	Ad C15	Ability to compensate** z position inaccuracy (substrate non-flatness) in the minimum range of ± 50 um on the fully reflective substrate with the accuracy and reproducibility (3 sigma) of **Using a combination of precise optical height sensing measurement and the correction of working distance or stage position in the z- axis <i>Možnost kompenzovat** nepřesnost pozicování v ose z (nerovinnost substrátu) v minimálním rozmezí ± 50 um na plně reflexním substrátu s přesností a opakovatelností (3 sigma) ** Použitím kombinace přesného měření optickým snímáním výšky a korekce pracovní vzdálenosti nebo polohy stolku v ose z</i>	2	250–1000 nm*	0	<=100nm	
				100–250 nm* inclusive	1		
				≤ 100 nm*	2		
F19	Ad C16	The ability of height sensing system measurement to work without z -stage move on the transparent and reflective substrate in the range of ±100 um (5" chromium glass mask with an area for which the chromium is removed with a tilt of at least 1 um/mm) with the reproducibility (3 sigma) of** ** Difference in measured height on two spots on a glass mask in close proximity, of which one is with and the other without a chromium layer, should differ only in the range of the chromium layer thickness <i>Schopnost měření optickým snímáním výšky bez použití pohybu stolku v ose z na transparentním a reflektivním substrátu v rozsahu ±100 um (5" skleněná chromová maska s oblastí, kde chrom je odstraněn, a s nakloněním alespoň 1 um/mm) s reprodukovatelností (3 sigma) **Měřená hodnota v oblastech v těsné blízkosti místa na masce s a bez chromové vrstvy by se měla lišit v rozsahu tloušťky chromové vrstvy samotné</i>	3	250–10000 nm*	0	<=100nm	
				100–250 nm* inclusive	1,5		
				≤ 100 nm*	3		
F20	Ad C17	Motorized z-stage with the positioning resolution of 1 um or less and with the travel range of 10 mm or more <i>Motorizovaný posuv stolku ose z s rozlišením pozicování 1 um nebo méně a s rozsahem pohybu 10 mm nebo více</i>	7	NO / NE	0	Yes	
				YES / ANO	7		

F		Sub-criterion/Subkritérium	sub-criterion points / body subkritéria	Sub-criterion fulfillment level / Úroveň naplnění subkritéria **	points awarded/přidělené body***	Nabídka dodavatele/Supplier Offer	Poznámka k nabídce/Note to the offer (see supplement provided)
F21	Ad D2	Maximal stepping speed of pattern generator with the resolution specify bellow in D3	1	at least 125–150 MHz	0	125 MHz	
		Maximální rychlost kroků generátoru paternů (předloh) s rozlišením definovaným níže v D3		at least 150 MHz	1		
F22	Ad D3	Resolution of the clock frequency of the pattern generator	1	10–100 ns inclusive	0	0.1nsec	
		Rozlišení hodinového taktu generátoru paternů (předloh)		0.1–10 ns inclusive	0,5		
				≤ 0.1 ns	1		
F23	Ad D7	(a) Variability of the address grid of the MAIN FIELD for 500um field size	3	fixed value in nm/pixel / pevná hodnota v nm/pixel	0	scaleable in the range of 50%	
		(a) Variabilita adresné mřížky HLAVNÍHO POLE pro 500um velikost pole		scalable in the range of 5% / nastavitelná v rozsahu 5%	0,3		
				scalable in the range of 50% / nastavitelná v rozsahu 50%	3		
F24	Ad D9	(b) sizes of the SUBFIELD deflection beam positioning system with the calibration guaranteed in the specifications of the machine	3	1 fixed size of the subfield or 1 fixed resolution of subfield / 1 pevná velikost dílčího pole nebo 1 pevné rozlišení dílčího pole	0	scaleable subfield with scaleable resolution	
		(b) velikost DÍLČÍHO POLE daná vychylovacím systémem pro pozicování svazku s kalibrací garantovanou ve specifikaci přístroje		> 10 calibrated sizes of subfield with unique resolution / > 10 kalibrovaných velikostí dílčího pole s patřičným rozlišením	0,75		
				scaleable subfield with scaleable resolution / škálovatelné dílčí pole se škálovatelným rozlišením	3		
F25	Ad D10	Resolution of the whole deflection system on the writefield with the size of 1 000 um	2	0.25–1 nm inclusive	0	0.08nm	
		Rozlišení celého vychylovacího systému na zápisovém poli o velikosti 1 000 um		0.1–0.25 nm inclusive	1		
				≤ 0.1 nm	2		
F26	Ad D11	Minimal writing area capability (xy plane)	4	at least 150x150–200x200 mm ² *	0	205x205 mm^2	
		Minimální rozsah zápisové plochy (xy rovina)		at least 200x200–205x205 mm ² *	3,2		
				at least 205x205 mm ² *	4		
F27	Ad D13	Minimum average linewidth for write field 1 000 x 1 000 um ² @100 kV (line width acquired throughout the field including centre, left and right parts for top, for bottom and for middle locations)	2	15–20 nm* inclusive	0	<=15nm	
		Minimální šířka čáry pro zápisové pole 1 000 x 1 000 um ² @100 kV (šířka čáry získaná v celém poli včetně pozic ve středu, vlevo a vpravo pro horní, pro spodní a pro střední umístění)		10–15 nm* inclusive	1		
				≤ 10 nm*	2		
		Stitching accuracy for write field 100 x 100 um ² or larger @100 kV with exposed structures distributed along the whole boundary area**. The absolute error value of measurement along the whole boundary area is: **Test will be done by exposing 3x3 fields with small overlap, where each write field has at least 8 exposed structures (xy verniers, dots, crosses, etc.) for the measurement (1 in each corner, at least		10–20 nm* inclusive	0		

F		Sub-criterion/Subkritérium	sub-criterion points / body subkritéria	Sub-criterion fulfillment level / Úroveň naplnění subkritéria **	points awarded/přidělené body***	Nabídka dodavatele/Supplier Offer	Poznámka k nabídce/Note to the offer (see supplement provided)
F28	Ad D14	<p>1 on each edge). All the overlapped structures (of neighbouring fields) will be counted in the absolute error value measurement.</p> <p><i>Přesnost sešívání polí pro zápisové pole 100 x 100 um² nebo větší @100 kV s exponovanými strukturami rozmístěnými podél celé oblasti hranic polí**.</i> Absolutní hodnota chyby pro měření okolo celého zápisového pole je:</p> <p><i>**Test bude proveden expozicí 3x3 polí s malým přesahem, kde každé zápisové pole má minimálně 8 exponovaných struktur (xy noniusů, teček, křížků apod.) pro měření (1 v každém rohu, minimálně 1 na každém okraji). Všechny překrývající se struktury (sousedních polí) budou započítány do měření absolutní chyby.</i></p>	1	8–10 nm* inclusive	0,8		
				≤ 8 nm*	1		
F29	Ad D15	<p>Stitching accuracy for write field 1000 x 1000 um² @100 kV with exposed structures distributed along the whole boundary area**. The absolute error value of measurement along the whole boundary area is:</p> <p><i>**Test will be done by the exposure of 3x3 fields with small overlap, where each write field has at least 8 exposed structures (e.g., xy verniers, dots, crosses) for the measurement (1 in each corner, at least 1 on each edge). All the overlapped structures (of neighbouring fields) will be counted in the absolute error value measurement.</i></p> <p><i>Přesnost sešívání polí pro zápisové pole 1000 x 1000 um² @100 kV s exponovanými strukturami rozmístěnými podél celé oblasti hranic polí**.</i> Absolutní hodnota chyby pro měření okolo celého zápisového pole je:</p> <p><i>**Test bude proveden expozicí 3x3 polí s malým přesahem, kde každé zápisové pole má minimálně 8 exponovaných struktur (např. xy noniusů, teček, křížků) pro měření (1 v každém rohu, minimálně 1 na každém okraji). Všechny překrývající se struktury (sousedních polí) budou započítány do měření absolutní chyby.</i></p>	2	30–60 nm* inclusive	0		
				20–30 nm* inclusive	1,2		
				≤ 20 nm*	2		

F		Sub-criterion/Subkritérium	sub-criterion points / body subkritéria	Sub-criterion fulfillment level / Úroveň naplnění subkritéria **	points awarded/přidělené body***	Nabídka dodavatele/Supplier Offer	Poznámka k nabídce/Note to the offer (see supplement provided)
F30	Ad D16	<p>Overlay accuracy for write field 100 x 100 μm^2 or larger @100 kV as direct writing with exposed structures distributed across the full field using alignment marks**. The absolute error value of overlay measurement in the whole write field area is:</p> <p>**The test will be done by the exposure of 3x3 fields with small overlap, where each write field has at least 25 exposed structures (e.g. dots, crosses) uniformly distributed for the measurement. All the overlapped structures will be counted in the absolute error value measurement.</p> <p><i>Přesnost překrytí (dalším zápisem) pro zápisové pole 100 x 100 μm^2 nebo větší @100 kV přímým zápisem s exponovanými strukturami napříč celým polem za použití zarovnávacích značek**.</i></p> <p><i>Absolutní hodnota chyby pro měření překryvu v rámci celého zápisového pole je:</i></p> <p><i>**Test bude proveden expozicí 3x3 polí s malým přesahem, kde každé zápisové pole má minimálně 25 exponovaných struktur (např. teček, křížků) rovnoměrně rozmístěných pro měření. Všechny překrývající se struktury budou započítány do měření absolutní chyby.</i></p>	2	10–20 nm* inclusive	0	<=5nm	
				5–10 nm* inclusive	1		
				≤ 5 nm*	2		
F31	Ad D17	<p>Overlay accuracy for write field 1000 x 1000 μm^2 @100 kV as direct writing with exposed structures distributed across the full field using alignment marks**. The absolute error value of overlay measurement in the whole write field area is:</p> <p>**The test will be done by the exposure of 3x3 fields with small overlap, where each write field has at least 25 exposed structures (e.g. dots, crosses) uniformly distributed for the measurement. All the overlapped structures will be counted in the absolute error value measurement.</p> <p><i>Přesnost překrytí (dalším zápisem) pro zápisové pole 1000 x 1000 μm^2 @100 kV přímým zápisem s exponovanými strukturami napříč celým polem za použití zarovnávacích značek**.</i></p> <p><i>Absolutní hodnota chyby pro měření překryvu v rámci celého zápisového pole je:</i></p> <p><i>**Test bude proveden expozicí 3x3 polí s malým přesahem, kde každé zápisové pole má minimálně 25 exponovaných struktur (např. teček, křížků) rovnoměrně rozmístěných pro měření. Všechny překrývající se struktury budou započítány do měření absolutní chyby.</i></p>	2	30–60 nm* inclusive	0	<= 8nm	
				20–30 nm* inclusive	0,5		
				10–20 nm* inclusive	1		
				≤ 10 nm*	2		
F32	Ad D20	<p>The pattern generator reading supports these exposureable structure primitives (all these primitives could be prepared by the algorithm).</p> <p><i>Čtení generátoru předloh podporuje tyto exponovatelné primitivní struktury (všechny primitivní struktury mohou být připraveny pomocí algoritmu).</i></p>	4	trapezoids / rovnoběžníky a lichoběžníky	0	trapezoids, circles, ellipses and user defined primitives are supported all together (as requested by clarification question)	
				circles and ellipses / kruhy a elipsy	2		
				user defined primitives / uživatelsky definované primitivní objekty	4		

F	Sub-criterion/Subkritérium	sub-criterion points / body subkritéria	Sub-criterion fulfillment level / Úroveň naplnění subkritéria **	points awarded/přidělené body***	Nabídka dodavatele/Supplier Offer	Poznámka k nabídce/Note to the offer (see supplement provided)
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* The parameters will be proven in the acceptance test at the factory site and the acceptance test at the installation site.

* Parametry budou prokazovány při akceptačním testu ve výrobním závodě a při přejímacím testu v místě instalace.

** Expressions "at least" and "inclusive" in Sub-criterion fulfillment level column are used for closed interval from respective side "<" and ">". If not mentioned, the interval is open - in mathematical notation "(" and ")".

** Anglické výrazy "at least" and "inclusive" v sloupci Úroveň naplnění subkritéria jsou použity pro uzavřený interval z příslušné strany "<" a ">". Pokud výraz chybí, interval je otevřený - v matematickém zápisu "(" a ")".

*** Decimal point can be in form of "." as in english notation or in "," as in czech notation - depends on the display of the software.

*** Desetinná čárka může být ve formě "." jako v anglickém zápisu nebo "," jako v českém zápisu - závisí to na zobrazení softwaru.

AFTER WARRANTY SERVICE CONTRACT

entered into on the date, month and year set forth below and on the following
terms and conditions by the following parties

THE BUYER

Name: Brno University of Technology
Component part: Central European Institute of Technology
Seat: Purkynova 656/123, 612 00 Brno, Czech Republic
Public university, not registered in the Commercial Register
Address of the Brno University of Technology: Antoninska 548/1, 601 90 Brno
Represented by: prof. Ing. Radimír Vrba, CSc., Director of Central European Institute of Technology
Id. No.: 00216305
Tax Id. No.: CZ 00216305

Buyer's contact persons for technical matters:
xxx

Buyer's contact person for contractual matters:
xxx

Address for sending electronic tax documents: [xxx](#)

and

THE SELLER

Name: RAITH GmbH
Seat: Konrad-Adenauer-Allee 8, 44263 Dortmund, Germany
Registration in the Commercial Register HRB 8984 (register at Local Court Dortmund)
Represented by: Dr. Michael Steigerwald or Benjamin Oevermann
Id. No.: HRB 8984
Tax Id. No.: DE 124 727 617
Bank details: xxx

Contact person of
the Seller: [xxx](#)

(hereinafter also jointly referred to as the "Parties")

I. SUBJECT OF THE SERVICE CONTRACT

- 1) The subject of this Service Contract is service on the Raith EBP5200Plus system as initially offered under the title "Electron Beam lithograph 100kV" (registration number in the Public Procurement Bulletin: Z2024-014426). Later additions to the system are not part of this service contract.
- 2) The Seller undertakes by this Service Contract:
to provide service in accordance with Annex C, Sheet E (of the corresponding purchase contract for the tool), specifically according to the entries E5, E6, E7, E8, E9.
- 3) The service contract includes the following elements: (Seller's item numbers are given as reference)

23568, Base Package:

Priority for Service:

Customer will receive preferred treatment when scheduling service visits on site.

Phone/Email Support:

The customer has unlimited access to our Support Center.

The initial response time by the service support center is less than 72 hours (weekend days (i.e. Saturdays and Sundays) and national, religious or other special holidays observed by Raith B.V. excluded).

Initial response means remote response by one or more of the following means:

email, phone, video conversation, remote diagnostics and remote operation over internet network (the latter two on agreement and with assistance of Buyer's personnel).

Remote Technical Support (RTS):

Use of our RTS over internet may be limited depending on the issue and at the discretion of Raith.

23596, RAITH Software Update Coverage:

All new Raith software releases will be available for the Customer, including specifically bug fixes.

23676, Preventative Maintenance Visit:

The following items will be checked during the annual visit:

- *Initial system checks*
- *Cooling system checks*
- *Vacuum system checks*
- *Electronics checks and calibrations*
- *Performance checks*
- *General system maintenance*
- *Parts sold separately*

Before preventive maintenance actions are started, Raith will review the system for indications of mechanical and electrical defects and run performance checks. Includes travel and labour expenses for the above-mentioned tasks.

This visit is not for corrective service and the scheduling will be made on mutual agreeable dates.

23678, Unlimited Service Visits:

Unlimited number of corrective service visits in case of a system failure or filament (electron source)/aperture exchange. A Raith Engineer will respond on-site as soon as possible. High Priority response times are optional (and not included in this service contract).

23682, Consumables Coverage:

- *(Electron) Source*
- *Apertures*
- *Related seals*
- *Related mounting material*

Covers the cost of these consumable parts, if required, during the contract period. The decision to exchange the consumables is at the sole discretion of Raith, based on stability/drift tests and source behaviour.

- 4) Parts provided under this Service Contract will be delivered according to INCOTERMS 2020 DAP Buyer's loading dock.
- 5) **The provision of spare parts (other than the consumables listed under Article I., number 3, item 23682) is not part of the Service Contract. Such spare parts need to be ordered and paid separately in case of need according to Seller's quotes issued accordingly.**
- 6) Further excluded from the Service Contract are:
 - a) Daily Maintenance work, which should be carried out by the Buyer (as outlined in the relevant Technical Maintenance and Service Documentation).
 - b) Work which results from incorrect repairs, modifications or extensions executed by or on behalf of the Buyer by someone other than the Seller.
 - c) Work which results from failures or loss of facility supplies, like power, air conditioning, gas supply, etc. necessary for the operation of the equipment.
 - d) Work resulted from damage caused by "Force majeure".
 - e) Maintenance of the supply lines and supply sources for the System.
 - f) Repair of damage due to transport of the System or the non-agreed adaptation of "Third party" options.
 - g) Additional training of Buyer's personnel on system operation is not included, but may be purchased separately.

II. SERVICE CONTRACT PRICE AND DURATION

- 1) The Buyer agrees to pay to the Seller the service contract price in the amount of:
70 000 EUR excluding VAT per 12 months term.
- 2) The service contract will be paid for each 12 month's term separately in advance. The payment is due before the beginning of a 12 month's term.
- 3) The Service Contract commences on the day following the expiry of the standard (12 month's warranty) of the tool.
- 4) This Service Contract is null and void in case Seller's tool is not accepted according to the purchase contract or the performance of the purchase contract is terminated before the end of the standard warranty is reached.
- 5) The Service Contract automatically terminates after 36 months.

III. SERVICE CONTRACT CONDITIONS

- 1) The reporting address for service requests is the Helpdesk that can be reached via:

Raith B.V.
De Dintel 27
5684 PS Best
The Netherlands
Tel +31 (499) 336 888
Email: xxx

All Service Requests sent via Email need to be confirmed by Telephone.

Services covered by the Service Contract will be carried out by Seller's personnel from Monday through Friday 8:00 AM until 5:00 PM. National, religious or other special holidays observed by Raith B.V. are excluded.

- 2) a)
Buyer shall enable the Service engineer to start work on the System at the time agreed upon and shall give reasonable co-operation in providing facilities and assistance to Seller for the performance of the services that are covered under this Service Contract. Buyer shall provide storage space, which can and will be locked at Site for on-Site spare parts, tools and instruments. Buyer will provide sufficient working space for the Service engineer(s) and have a representative available who is familiar with the proper operation of the system and has knowledge of the maintenance issues.
- b)
Buyer shall take all reasonable measures to prevent damage to be inflicted upon Seller equipment (other than the System) goods, processes and persons during the execution of maintenance and repair work by Seller. Buyer shall inform and/or instruct employees of Seller and/or (employees of) possible subcontractors as to safety regulations and procedures in force at the Site. Buyer's breach of this provision shall be considered a material breach of this Service Contract.
- c)
Seller may charge the Buyer for extra waiting time caused by the Buyer, which result in delays of the start of the Preventive Maintenance or result in delays during the execution of other work contemplated by this Service Contract. Such extra charges will be in accordance with the costs actually incurred by Seller.
- d)
Buyer shall take care of the day-to-day maintenance of the System according to the instructions given in the relevant Technical Maintenance and Service Documentation. The Buyer shall handle the System carefully and protect it against damage, including especially adverse environmental influences, humidity and dust. The Buyer has to make sure that the environmental conditions as outlined in the Pre-installation requirements are constantly met. The Buyer shall not make or allow to be made any modifications or additions to the System without Seller's written consent.
- e)
Buyer shall make available to Seller free of charge any substrates that might be needed for diagnosis or test during or after maintenance and repair work, to a maximum of twenty-five (25) substrates per year. Buyer's breach of this provision shall be considered a material breach of this Service Contract.
- f)
The cost and responsibility for disposal of by products resulting from Equipment operation remains that of Buyer. Seller reserves the right to reject any replaced parts or components returned to Seller that pose a hazard or have not been properly decontaminated.
- g)
The Buyer is responsible for implementing appropriate safeguards of data and programs. Proper

backup of data and programs are the Buyer's responsibility and are not covered by this Service Contract. Software or System damage as a result of "computer virus" corruption is not covered.

h)

Buyer shall take all reasonable measures to control and protect the distribution of, and access to, Seller proprietary software and User Manuals that are provided with the System.

e)

The Seller BEAMS Software requires specific Linux settings / services to work properly (for instance the settings for the network services). Seen the "openness" of Linux to Buyer interventions and internet updates and configuration changes, the Buyer is not supposed to alter the settings of these crucial services without prior approval of Seller.

IV. PENALTY CLAUSES

Contractual penalties are excluded.

V. PLACE OF PERFORMANCE

- 1) Service will be either carried out on site at the installation place of the tool, or remotely by the support centre of the Seller if the nature of the issue allows for it. The latter option specifically applies for remote system diagnostics.
- 2) Remote support will be provided for all issues not requiring the presence of Seller's engineer on site.

VI. TERMINATION OF THE CONTRACT

- 1) The Service Contract terminates as set out under Article II. above.
- 2) Extraordinary Termination is possible according to the following:
 - a) The Seller has the right to terminate the Service Contract in case the Buyer is overdue with a service contract payment (according to Article II., number 2) for more than 3 months. In this case Seller has no obligation to provide further service under this Service Contract.
 - b) Buyer may terminate the Service Contract at any time with a notice period of 4 weeks.
 - c) Parties may jointly agree on a termination at any time with immediate effect.
 - d) Service Contract may terminate for reasons of Force Majeure as laid out in Article VII below.
- 3) In case of a termination according to b), c), d) in number 2 above Seller will reimburse the Buyer for payments already received by the Seller, but only to the extend of services which were not provided. Payments for completed service terms won't be reimbursed.

VII. LIABILITY

- 1) Seller is obliged to provide services in a good workmanlike manner consistent with industry practices.
- 2) In the event of the occurrence of "Force Majeure" Seller shall be entitled to suspend the execution of this Service Contract for the duration of the prevention or delay caused by such "Force Majeure" without being held responsible for any damages resulting there from to the Buyer. Each party shall inform the other party as soon as possible of the occurrence of such "Force Majeure" circumstances.
- 3) Neither party shall be liable for delays in the performance of this Service Contract due to circumstances beyond either party's control.
- 4) In the event that the period of such delay lasts for a period exceeding three (3) consecutive months, or if in the opinion of both parties it is evident that the prevention or delay will last for

more than three (3) months, either party shall be entitled to terminate this Service Contract without any further obligation due and owing to the other party.

- 5) Barring the event of termination as above, when the state of "Force Majeure" has ended, Seller shall, at the request of the Buyer appraise the condition of the equipment and execute any maintenance or repair work necessary at the Buyer's expense, after which this Service Contract will recommence.
- 6) The expression "Force Majeure" shall mean and include any happening or event beyond both parties reasonable control - whether or not foreseeable at the time of the conclusion of this Service Contract - in consequence of which both parties cannot execute or cannot reasonably or justly be required to execute their obligations. Such circumstances include but are not restricted to: "Force Majeure", natural disasters, civil war, insurrection, fires, floods, strikes, epidemics, governmental regulations, embargoes, non-availability of transport, defaults of suppliers of subcontractors.
- 7) In no event will Seller be liable for indirect, special, incidental or consequential damages arising under this Service Contract or in connection with the services. Seller shall not be liable for any lost revenues or profits, or damage to business reputation, regardless of the theory upon which the claim is based or whether the damages were contemplated by the parties.
- 8) In no event will Seller's liability, in tort, contract or otherwise, including claims for personal injury or property damage, exceed the demanded minimum amount of the insurance benefit as set out in Article VIII. (i.e. Forty Million CZK or the equivalent in EUR), except for reasons enforced by applicable law.

VIII. INSURANCE

The Seller agrees that for the entire duration of its obligations under this Service Contract to have an insurance contract, the subject of which will be the insurance of the Seller's liability for damages incurred by the Buyer or third parties on their property in connection with the performance of the Service Contract as a result of the Seller's activities in case of causing damage, with a limit of insurance benefits of at least CZK 40,000,000.-- (in words: forty million) or the equivalent in euros. The liability insurance shall also include the obligation to compensate for a damage or an injury caused by a defective product or defective work. The Seller undertakes to present this insurance policy to the Buyer's contact person for inspection at any time upon request. Failure to comply with the obligations under this provision shall constitute a significant breach of the Service Contract.

IX. FINAL PROVISIONS

- 1) The following annexes form an integral part of this Service Contract:
Annex 1 and Technical Quote (annexes of the purchase contract describing the required service and the initial tool configuration).
The Parties agree that in case of any inconsistencies or contradictions, the Articles I. to IX. of the Service Contract take precedence over any annexes to this Service Contract.
- 2) The Seller is not entitled to transfer its rights and obligations under this Contract to a third party without written consent of the Buyer.
- 3) The Seller agrees to tolerate the publication of this Contract including any amendments by the Buyer in accordance with Section 219 of the PPA.
- 4) By signing this Contract, the Parties confirm that they are aware that this Contract is subject to the obligation of publication in accordance with Act No. 340/2015 Coll., on the Register of Contracts, as amended. The publication of the Contract is arranged by the Buyer.

- 5) This Contract shall enter into force on the date of signing by both Parties and shall become effective on the date of the publication of the Contract in the Register of Contracts.
- 6) If any provision of the Contract becomes invalid or ineffective, this shall not affect the other provisions of this Contract, which shall remain valid and effective. In such case, the Parties undertake to replace the invalid or ineffective provision with a valid and effective provision that best fulfils the originally intended purpose of the invalid or ineffective provision, by means of an agreement.
- 7) This Contract contains a complete statement of the subject matter of the Contract and of all the particulars which the parties intended and intend to stipulate in the Contract and which they consider important for the binding nature of this Contract. No representation made by the parties in the negotiation of this Service Contract or any representation made after the execution of this Contract shall be interpreted contrary to the express provisions of this Service Contract and shall create any obligation on either party.
- 8) Applicable law is the law of the Czech Republic and the place of jurisdiction is Brno/Czech Republic.
- 9) This Contract shall be concluded by electronic means by each party to the contract affixing its recognised electronic signature.
- 10) The Parties confirm that they have read this Service Contract before signing it and that they agree with its contents. They affix their signatures to this effect.

In Brno

In Dortmund

.....
prof. Ing. Radimír Vrba, CSc.
Director of CEITEC BUT
for the Buyer

.....
Benjamin Oevermann
Head of Sales
for the Seller