**Fyzikální ústav AV ČR,v. v. i.**

**Personal Safety Interlock System**

**Fixed Price Proposal**

**QXQ1K1017B - V1.5**

8/25/2017

|  |  |
| --- | --- |
| Presented To: | Mr. Michael Prouza, PhD |
|  | Fyzikální ústav AV  182 21 Praha 8  Czech Republic |
| Office of Issue: | Rockwell Automation  Argentinská 1610/4  170 00 Praha 7  Czech Republic |

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| QXQ1K1017A-V1.0 | 12/22/2016 | First issue for customer | Ing. Petr Severyn | V1.0 |
| QXQ1K1017A-V1.1 | 1/17/2017 | Revised issue after clarification meeting on 1/3/2017 | Ing. Petr Severyn | V1.1 |
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| QXQ1K1017B-V1.5 | 8/25/2017 | Revised issue after Official Tender opening | Ing. Petr Severyn | V1.5 |

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# AbreviationS LIST

|  |  |
| --- | --- |
| ABS | Audio Broadcast System |
| BMS | Building Management System |
| C PSI | Central Process Safety Interlock (station/unit) |
| CCTV | Closed Circuit Television |
| CCFs | Common Cause Failures |
| CA | Contracting Authority |
| CDRR | Critical design review report |
| CFE | Customer Furnished Equipment |
| DAP | Delivery at Place |
| DLR | Device Level Ring |
| DI | Digital Inputs |
| DO | Digital Outputs |
| EMC | Electro Magnetic Compatibility |
| EMP | Electro Magnetic Pulse |
| EWS | Engineering Work Station |
| ELI | Extreme Light Infrastructure |
| F2F | Face to Face |
| FAT | Factory Acceptance Test |
| FMECA | Failure mode, effects and criticality analysis |
| F.O. | Fiber Optic |
| FSC | Functional Safety Consultant |
| FSMP | Functional Safety Management Plan |
| HW | Hardware |
| HAZAN | Hazard Analysis |
| HAZOP | Hazard and Operability Study |
| HMI | Human Machine Interface |
| IT | Information Technology |
| IO | Input-Output |
| iPM | Integrated Program Management |
| iPD | Integrated Project Delivery |
| ICD | Interface Control Document |
| LOPA | Layer of Protection Analysis |
| LPSI | Local Process Safety Interlock (station/unit) |
| LV | Low Voltage |
| MCB | Miniature Circuit Breaker |
| NSS | Network Security Services |
| N/A | Not Applicable |
| OJEU | Official Journal of European Union |
| OPC | OLE for Process Control |
| OWS | Operator Work Station |
| OEM | Original Equipment Manufacturer |
| P1 | Parts stock 1st level |
| P2 | Parts stock 2nd level |
| PC | Personal Computer |
| PSI | Personal Safety Interlocking |
| P&IDs | Process & Instruments Diagrams |
| PSU | Process Unit |
| PLC | Programmable Logic Controller |
| PHSERs | Project Health, Safety and Environmental Reviews |
| QMS | Quality Management System |
| RIO | Remote IO unit |
| RFQ | Request for Quote |
| ROHS | Restriction of Hazardous Substances |
| RA | Rockwell Automation |
| SFF | Safe Failure Fraction |
| SIL | Safety Integrity Level |
| SIF | Safety Integrity Level |
| SRS | Safety Requirement Specification |
| SAT | Site Acceptance Test |
| SW | Software |
| SOW | Statement of Work |
| SCADA | Supervisory Control And Data Acquisition |
| TUV | Technisher Uberwachungs Verein |
| UPS | Uninterruptible Power Supply |
| URD | User Requirement Documentation |
| VAT | Value added tax |
| VCD | Verification Control Document |
| VP | Verification Plan |
| VNC | Virtual Network Computing |

# Main Points of Contact

|  |  |  |
| --- | --- | --- |
|  | 1st CONTACT PERSON | |
| Name: | Mrs. Martina Fialková |
| Position: | Authorized Representative - Otidea a.s. |
| Address: | Thámova 32, Praha 8 |
| Phone: | + 420 295 565 125 |
| Email: | Martina.fialkova@otidea.cz |

|  |  |  |
| --- | --- | --- |
| ra_brands_RGB | 1st CONTACT PERSON | |
| Name: | Mr. Anton Bednár |
| Position: | Account Manager |
| Address: | Praha |
| Phone: | + 420 602 624 126 |
| Email: | [abednar1@ra.rockwell.com](mailto:abednar1@ra.rockwell.com) |
| 2nd CONTACT PERSON | |
| Name: | Mr. Petr Severyn |
| Position: | Proposal Leader |
| Address: | Praha |
| Phone: | + 420 602 240 743 |
| Email: | [pseveryn@ra.rockwell.com](mailto:pseveryn@ra.rockwell.com) |

# Executive Summary

This Fixed Price proposal is for a Rockwell Automation (RA) Personal Safety Interlocking (PSI) system for the laser research facility (ELI) currently being built at Dolni Brezany, Czech Republic.

The proposal is provided to detail the technical and commercial scope of supply offered by Rockwell Automation.

The PSI system will consist of the following deliverables:

* Safety Study/Risk Assessment
* Design Development
* PSI system hardware (HW) delivery
* PSI system software (SW) development and delivery
* Testing and validation

The PSI system is a safety system that protects personnel against defined hazards. The main strategy of the system is to confine the hazard within the hazardous area and terminate the hazardous process that can lead to injury or death.

The ELI facility is divided into four functional parts enabling the process and experiments. These are lasers, beam distribution, experimental areas, and supporting technology (like vacuum, electricity, cooling system etc.). These parts are driven or supported with different automation (local control systems, central control system etc.), and safety, security and monitoring systems. Each particular technology is located in the dedicated area. These areas contain hazards which are identified with a hazard identification process.

The PSI is one of the layers of protection. Other layers, such as passive shielding, signs, alarms, monitoring systems, training of personnel, and so on are used in conjunction with the PSI to reduce the risk of injury to a tolerable level.

The PSI system is a custom made safety system, which combines machine safety and process elements to ensure that potential hazards are minimized. The specifics of this system are that there exists interactions between the technologies used, experiments and users, which have to be taken in account.

Rockwell Automation is proud to propose a solution to this project that leverages our global leadership in safety applications, Functional Safety Consultants (FSC) team and experienced solution delivery team to develop and deliver a cost effective, quality solution to the ELI.

We have assembled an experienced team for this project that consists of the globally certified FSC team, technical leadership from UK (experienced in similar applications), and an experienced delivery team from Czech Republic.

# Statement of Work

## Pricing Summary

This Proposal is based on Rockwell Automations understanding of the supplied bid materials and requested scope. All prices are in EUR, VAT and all other applicable taxes are not included.

The total system prices provided in this Proposal is based on the purchase of the full scope of supply. Unless unit pricing is specifically called out as an add or delete price, any itemized unit pricing is approximate and provided for informational purposes only and does not constitute an offer.

**TOTAL PRICE: 1 268 392 EUR**

### Pricing Breakdown

Following breakdown is shown for informational purpose only.

|  |  |
| --- | --- |
| *Item* | *Price (EUR)* |
| RA HW (PLC HW, Network components, Safety components, HMI Panels, server) | [VYPUŠTĚNO] |
| RA SW (Visualization, Historization, engineering SW, virtualization) | [VYPUŠTĚNO] |
| 3rd party hardware and installation (Cabinets drafting, manufacturing, delivery, cables, cabling, Alarm panels, erecting, installation) | [VYPUŠTĚNO] |
| EMP filters and cabinets | [VYPUŠTĚNO] |
| Safety analysis | [VYPUŠTĚNO] |
| Engineering labour (software design, software development, testing, implementation, commissioning) | [VYPUŠTĚNO] |
| Travel expenses, delivery to the site | [VYPUŠTĚNO] |
| Project management, administration | [VYPUŠTĚNO] |
| Maintenance - bundles services (2Y) | [VYPUŠTĚNO] |
| Hourly rates (30h of FSE, Solution Architect, Engineer) | [VYPUŠTĚNO] |
|  |  |
| **Total amount in EUR currency** | **€ 1,268,392.00** |

### 

### Maintenance Services price breakdown

The Detailed proposal for Maintenance services is shown at attachment B. Following table shows the price breakdown:

|  |  |  |  |
| --- | --- | --- | --- |
| *Item* | *Unit price in EUR excl VAT* | *Number of units* | *Price per item in EUR excl. VAT* |
| Critical parts on-site availability service (1 year) | €4137 | 2 | €26 368 |
| Remote support services (1 year) | €3251 | 2 |
| Technical emergency support - 48 hours (1 year) | €5796 | 2 |

### Option 3 – E2 – full functionality PSI system upgrade

This Option offers engineering & HW for upgrade E2 to full function – with assumptions used within proposal and the knowledge at time of this proposal.

|  |  |
| --- | --- |
| *Item* | *Price (EUR)* |
| E2 PSI System upgrade to full functionality | € 63 200.00 |

### Option 4 – Additional HAZOP/LOPA visit

This Option offers an additional visit for HAZOP/LOPA – extra to scope shown at section 1.6.2.5.

|  |  |
| --- | --- |
| *Item* | *Price (EUR)* |
| Additional HAZOP / LOPA visit (2 people on site for 4 days)  Travel expenses, per diems, lodging included | € 15,700.00 |

### Option 5 – Cyber Security Analysis

This Option offers Cyber Security/NSS analysis for protection of PSI against external Cyber-attack – Further information is shown in attachment C

|  |  |
| --- | --- |
| *Item* | *Price (EUR)* |
| NSS assessment | € 9,800.00 |

## Invoicing Schedule

Please direct all order correspondence to:

**Rockwell Automation s.r.o.**

Argentinská 1610/4

Praha 7

Czech Republic

We propose following Invoicing milestones and payments, which are according requested schedule: *QXQ1K1017B Annex No. 6 Contract\_A2\_Schedule of Deliverables.xlsx* The payments could be changed according to the required project phasing, time schedule or as mutually agreed.

| *Milestone* | *Payment Percent* | *Accumulative Percent* |
| --- | --- | --- |
| **At Purchase Order Confirmation** | **20** | **20** |
| **Upon delivery of SRS (Safety Requirements Specification)** | **20** | **40** |
| **Upon delivery of Design Documents (Electrical design and Functional)** | **20** | **60** |
| **After Delivery HW to Client facility** | **20** | **80** |
| **After Validation of installed system (by Phases)** | **15** | **95** |
| **After handover of final Documentation** | **5** | **100** |
| Payments are due 30 days from date of the invoice. | | |

## Validity of Proposal

This Proposal is valid for 30 days.

## Delivery

Total scope delivery from Kickoff till Site acceptance is approximately 18 months from acceptance of Purchase Order.

Delivery DAP – Fyzikální ústav AV ; as per INCONTERMS 2010

## Warranty

The proposed warranty is 24 months.

## Statement of Work Summary

This Proposal is for Rockwell Automation PSI system development, manufacturing, delivery, installation and commissioning.

The following are the main system and project phases:

* Safety Study/Risk Assessment
* Design and Architecture Development
* PSI system hardware production
* PSI system software development
* Factory Acceptance Test (FAT)
* Delivery goods to site
* Delivered hardware and software installation
* Testing and validation

**Rockwell Automation has divided the Scope of Work into three areas of responsibility:**

* Rockwell Automation Responsibilities
* Services Not Covered
* Fyzikální ústav AV Responsibilities

### Basis for the Proposal

The proposal is based on the following received documentation:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No** | **Document name:** | **Type:** | **Title:** | **Date/Revision/Status:** |
| [1] | Invitation + TD.pdf | pdf | Invitation to negotiate | 14.08.2017 |
| [2] | Annex No. 1 - 2.docx | docx | User requirement | 14.08.2017 |
| [3] | Annex No. 3 Technical Specifications - Requirements Specification Document including the PSI part 1.pdf | pdf | User requirement - Deliverables | 14.08.2017 |
| [4] | Annex No. 3 Technical Specifications - Requirements Specification Document including the PSI part 2.pdf | pdf | User requirement - Safety system description | 14.08.2017 |
| [5] | Annex No. 4 - Clarification of Requirements on the PSI System.pdf | pdf | User requirement - clarification | 14.08.2017 |
| [6] | Annex No. 5 - PSI system - Maintenance Services.pdf | pdf | User requirement – maintenance services | 14.08.2017 |
| [7] | Annex No. 6 Contract for Work.docx | docx | Contract template | 14.08.2017 |
| [8] | Annex No. 6 Contract\_A2\_Schedule of Deliverables.xlsx | xlsx | Payment Milestones | 14.08.2017 |
| [9] | Annex No. 7 Total Bid Price Table.xlsx | xlsx | Price table | 14.08.2017 |
| [10] | Annex No. 8 Schedule of Deliverables of the Phase 1.xlsx | xlsx | Time schedule E1-L1 | 14.08.2017 |

### Rockwell Automation Responsibilities

These sections define the scope and content of the solution proposed for the Fyzikální ústav AV Personal Safety Interlock System project.

#### Deliverables

| Document  reference | Function | In Scope (Y/N) | Remark / Details |
| --- | --- | --- | --- |
|  |  | | |
| [9] : | **General requirements** |  |  |
| REQ-014864/A | The Supplier shall deliver: |  |  |
|  | Interface Control Document (ICD) | Y |  |
|  | Risk analysis | Y | Provided by FSC (TUV certified department) |
|  | Safety requirements documentation (SRS) | Y | Provided by FSC (TUV certified department) |
|  | Design of the PSI system | Y |  |
|  | HW and SW supply | Y | Additional item added for clear understanding of scope |
|  | Software | Y |  |
|  | Installation | Y | Additional item added for clear understanding of scope |
|  | Verification, testing and validation | Y |  |
|  | User Documentation (including maintenance plan) | Y |  |
|  | Technical documentation (including documented source code, calculation/verification of SIL) | Y |  |
|  | Documentation of the project management (including Project management plan, verification-validation plan, verification-validation documentation, etc.) | Y |  |
|  | Tools and software for further development and maintenance | Y | Engineering station with development SW. |
|  | **Functional and Performance requirements** |  |  |
| REQ-014865/A | The PSI system shall protect personnel against hazards defined in risk analysis. | Y | The protection level will be defined by safety assessment |
|  | **Design requirements** |  |  |
| REQ-014866/A | The PSI system shall be designed to conform to the PSI functional concept | Y | The PSI system comply to PSI functional concept [3], [4] and [5]:  Following main clarifications were taken from concept and site meeting clarifications   * 1 Central PSI + 9 LPSI PLC unit required * Safety Assessment could have influence on design |
| REQ-013708/A | The PSI system shall be designed, implemented, tested, verified and validated in compliance with the most appropriate of the international standards IEC 62061, IEC 61511, and IEC 61508. | Y | FSC team, (TUV certified) will provide safety assessment and verification analysis,  IEC61508:2010 will be used for analysis, SIL determination and validation, see chapter 1.6.2.5.1, 1.6.2.5.2, 1.6.2.5.3. |
| REQ-013681/A | The PSI system shall be independent safety system. | Y | System will be independent as complex and local units are designed for local independence as well. |
| REQ-013682/A | The PSI system shall be a combination of mechanical and electronic system.  NOTE: Preferably the PSI is based on Electrical/Electronic/Programmable Electronic technology. Where operationally more practical (e.g. to interlock experimental chambers) or in the EMP zones, the system shall be based on mechanical key/lock system. | Y | As defined in proposal chapters: Required system is set of mechanical, electrical and electronic devices dedicated to each area, considering EMP zones and other environmental conditions. |
| REQ-013684/A | The PSI system shall be fail-safe designed.  NOTE: All situations that do not agree with the PSI permitted status shall lead to fail-safe status of the PSI. | Y | The system components used allow the HW and SW setup up to SIL 3 level. The final SIL level will depend on safety assessment which will consider all available inputs (requests, hazards, devices specifications, required standards). |
| REQ-013685/A | All fail-safe states shall be defined and documented by the Supplier and agreed with the Contracting Authority (CA). | Y |  |
| REQ-013686/A | The PSI system shall represent barrier between personnel and operational hazards which are within the scope of the PSI. | Y |  |
| REQ-013687/A | The PSI system shall provide safe access to the hazardous areas. | Y |  |
| REQ-013689/A | The PSI system shall monitor the status of all the PSI controlled devices. | Y |  |
| REQ-013692/A | PSI shall include manually activated emergency stop buttons (ESTOP) accessible to personnel in controlled area and control rooms. | Y |  |
| REQ-013693/A | Usage of only one single interlocked device between hazard and occupied area shall not be allowed.  NOTE: The PSI design shall be designed in the manner that several interlocked devices are implemented in line to assure proper safety level. For the case of a failure of interlocked device, there must be at least one other to overtake the action (e.g. shutter and beam dump). Where this is feasible different technologies shall be used. | Y | Determined SIL level will specify the needs accordingly, all components used in current design are safety certified products fulfilling all appreciated standards. |
| REQ-013694/A | Remote control of any hazardous device, technology, or process shall be possible when hazardous area is vacated. | Y | The PSI system will be designed, programmed and certified in the way, which will ensure the required procedures are functional and safe. |
| REQ-014867/A | The PSI system shall establish and maintain the area safety modes.  NOTE: The area safety modes are important to manage safety at the different stages of operation. | Y | The PSI system will be designed, programmed and certified in the way, which will ensure the required procedures are functional and safe. |
| REQ-013695/A | The PSI system shall automatically take action to alert personnel to the presence of hazard.  NOTE: The PSI system shall provide the sufficient level of information to alert personnel to the presence of hazard in the hazardous area. | Y | The system will have several ways of alerting personnel to the presence of hazards. |
| REQ-013696/A | The PSI system shall provide visual warning against the hazards and indication of the safe/unsafe status of the area and their modes.  NOTE: The modes shall be clearly visualized and displayed in suitable colours. | Y | The visual information is provided by:   * SCADA at operator level * HMI Touch screen panels at Local Control rooms * Information light panels inside Laboratories according [9] requirements * Information light panels outside Laboratories according [9] requirements |
| REQ-013698/A | The PSI system shall provide comprehensive visualized information to safety personnel.  NOTE: Safety personnel shall have an access to comprehensive information about the statuses of each hazardous area. This information shall be displayed on LED panel in safety office. | Y |  |
| REQ-013700/A | The PSI system shall provide operational personnel with information about action taken to mitigate the risk. | Y | This is subject of safety assessment |
| REQ-013701/A | The PSI system shall not allow the operation when the safe conditions are not achieved. | Y |  |
| REQ-013703/A | The PSI system shall provide an interface for communication with other facility systems and subsystems, including safety systems. | Y | The interfaces are included (as described in proposal) to the Laser system, Access system, Laser distribution system, Monitoring System, Control System, Audio broadcast System and Fire Alarm System. |
| REQ-013704/A | Where applicable all the PSI electronic components shall be located outside of EMP zone.  NOTE: Electrical components in general are sensitive for EMP (they can be either destroyed or EMP can disable their function). Thus all electronic components of PSI must be located outside of EMP area with respect to the distance for its maintenance. These components can be located in shielded racks. | Y | Devices in EMP zone and its connection are considered with appropriate protection. |
| REQ-013705/A | All electronic components shall be designed to sustain the environment conditions in areas where installed.  NOTE: The environmental conditions can vary based on the performed activities within the area. These include temperature, humidity, level of ionizing radiation, air pressure, vibrations, electromagnetic pulse (EMP) etc. These conditions for each particular area shall be defined. | Y |  |
| REQ-013706/A  MOM 4th meeting | The PSI system shall provide door locks under the exclusive control of the PSI.  NOTE: All doors leading to hazardous area must be exclusively controlled with the PSI. The PSI system shall provide automated or mechanical door locks enabling this function.  On the site meeting was found that door independent locks aren’t necessary if the doors will be secured by position safety sensors. | Y | Basis on risk assessment will be used the lockers or current access system locks, with additional control of those device + safety position doors sensing. |
| REQ-014868/A | In the case of existence another system of access control, the PSI system shall always have priority. | Y |  |
| REQ-013710/A | The PSI system shall be connected to UPS and emergency power source.  NOTE: All identified electrically supplied components of the PSI system shall have power backup. These components shall be defined in risk analysis. | Y | System will be connected to ELI UPS. |
| REQ-013711/A | The PSI system shall be designed based on the hazard identification and risk analysis. | Y | The PSI Systems will be designed in accordance with the Safety Requirement Specification (SRS) which is derived from the hazard identification and risk assessment. |
| REQ-013714/A | The PSI system shall be robust against common failure modes including loss of power, communication errors, mechanical damage or security threats. | Y |  |
| REQ-013716/A | Operation shall not be allowed when any PSI function or device is suspected of being defective or compromised | Y | PSI action on detection of a failure is defined in the SRS. |
| REQ-014973/A | Final technical solution of the PSI system shall be compatible with the Pilz hardware.  NOTE1: Laser personal safety interlocks are built on the Pilz hardware and they shall be integrated into final technical solution of the PSI system.  NOTE2: The Pilz hardware documentation will be provided by the CA. | Y | Yes interface with Pilz is assumed in Laser rooms, hardwired in this moment. If required and supplier will deliver, Pilz PLCs are capable to provide safety communication with Rockwell Automation PLCs. |
| REQ-014974/A | The Supplier shall synchronize the design of the PSI system with safety shutters to the beam distribution.  NOTE: The safety shutters to the beam distribution are not a subject of this delivery. These shutters will be developed by FZÚ. | Y | Proposed Safety assessment includes assessment of safety shutters. |
| REQ-014869/A | The implementation of all functional, performance and design requirements (see chapters 2. General system requirements, 3. Functional and Performance requirements and 4. Design requirements) shall be verified during each execution stage of the VP and commissioning of the PSI system. | Y |  |
|  | **Transportation and Installation requirements** |  |  |
| REQ-015206/A | The transportation to the final destination and the installation of the technologies and the instruments shall be conducted by the Supplier. | Y |  |
| REQ-015207/A | The Supplier shall ensure that their activities at the premises and the installation of devices will be performed without contaminating the place of installation unnecessarily. The premises include rooms with normal cleanliness and cleanrooms of class 8 and 7 according to ČSN EN ISO 14644. | Y |  |
| REQ-015208/A | The transportation and Installation procedures shall be discussed and reviewed by the CA's installation officer and shall be compliant with the CA's installation regulations.  NOTE: These regulations shall be defined by the CA and provided to the Supplier after Contract signature and before detailed design Contract phase. | Y |  |
| REQ-015209/A | All participants to the installations shall undertake a lecture by the CA regarding safety, cleanliness, protection of the environment and working methods before starting their activities on the premises. The content of the lecture shall be adequate to the working area and the work activities expected. | Y |  |
| REQ-015210/A | The Supplier shall allow supervising the activities related to the transportation and installation by the CA.  NOTE: Any acts of supervision shall not mean that the CA assumes additional liability of any kind exceeding its liabilities according to the Contract. | Y |  |
| REQ-015211/A | The technologies and instruments shall be delivered in protective package preventing damage and contamination and a minimum of two plies separate clean packaging. The technologies shall be cleaned and packaged complying the cleanliness of class 7 according to ČSN EN ISO 14644. | Y |  |
| REQ-015212/A | The Supplier and the CA shall agree on the cleaning method to clean devices without decreasing the devices' performance and to avoid contamination of clean space.  Note: The cleaning methods may use high temperatures (baking out), high gas flow (dry air) and specialised chemical cleaning liquids (alcohol, Isopropyl alcohol, demineralised water). | Y | The optimal cleaning method will be defined in delivered documentation |
| REQ-015213/A | The clothing used at the installations shall conform to international standards (ČSN EN ISO 14644) of cleanliness and the standards of the clean room class (Class 7 or 8), in which the installation is carried out, in order to avoid contamination of the room and the equipment room.  NOTE: The clothing is at the expenses of Supplier. | Y |  |
| REQ-015214/A | All transportation and installation tools and equipment entering the clean rooms shall be cleaned and reviewed by the CA's approved methods. The Supplier and the CA shall agree on the cleaning method to clean tools and equipment used at the installation without decreasing their performance or safety.  NOTE: Some tools can be provided by the CA upon agreement. | Y |  |
|  | **Quality assurance** |  |  |
| REQ-014484/A | The Supplier shall prepare, maintain and implement Quality Assurance Plan (QAP) in accordance with the CA requirements.  NOTE 1: The Supplier shall provide to CA QAP for agreement and approval.  NOTE 2: The CA can assist with the QAP definition.  NOTE 3: The Supplier shall report QAP progress to the CA.  NOTE 4: The Supplier shall identify the personnel responsible for implementing QAP. | Y | The Quality plan and other project documentation will be provide according iPM standard which is used by Rockwell Automation and certified RA Project Managers. |
| REQ-014485/A | The QAP shall include the scope and objectives of the Product such as:   * a simple statement of the purpose and expected outcomes of the proposed software and hardware; * Conditions of the validity of the software and hardware i.e. limitations, operational ranges etc.; * How the quality requirements will be ensured. | Y | The Quality plan and other project documentation will be provide according iPM standard which is used by Rockwell Automation and certified RA Project Managers. |
| REQ-014488/A | The QAP shall define how non-conformances will be identified and controlled to prevent misuse (see REQ-014957/A). | Y |  |
| REQ-014951/A | If the Supplier delegates the quality assurance tasks to other organization it shall be done in a documented and controlled way monitored by the Supplier. | Y | Quality is maintained within RA, according RA quality rules. |
| REQ-014949/A | Besides applying the international recognized standards (see REQ-013708/A), the Supplier shall also apply the best practice where applicable for quality assurance programme. | Y |  |
|  | **Documentation** |  |  |
| REQ-014952/A | The Supplier shall provide accompanying technical documentation for the Product.  NOTE: The scope of the accompanying technical documentation for the product shall be agreed with the CA. | Y |  |
| REQ-014953/A | Documentation shall be supplied in all following formats: hardcopy and PDF/A. | Y |  |
| REQ-014954/A | The Supplier shall provide following type of documents:   1. 3D model (if available); 2. 2D drawings; 3. Printable format for text documents. | Y | 3D is not applicable |
| REQ-014955/A | The Supplier shall use following data formats:   * \*.JPG * \*.PDF/A * CAD 2D: \*.dwg * CAD 3D: STEP type files (\*.stp;\*.ste;\*.step) * text processors \*.doc, \*.docx, OpenDocument Format * spreadsheet processors \*.xls, \*.xlsx, OpenDocument Format * presentations \*.ppt, \*.pptx; OpenDocument Format * \*.HTML | Y |  |
|  | **Quality control** |  |  |
| REQ-014957/A | The Supplier shall establish and maintain a non-conformance control system compatible with CSN EN ISO 9001: 2010 edition 2. | Y | RA is ISO certified |
|  | **Materials cleanliness** |  |  |
| REQ-014956/A | The materials used in the PSI system, installed within clean room areas, shall conform to the international standards (ČSN EN ISO 14644) and the standards of the clean room (ISO class 7 and 8) of resistance to material outgassing to avoid the risk of contaminating the cleanroom.  NOTE: The material used in clean rooms will be identified by the CA. | Y |  |
|  | **Calibration** |  |  |
| REQ-014958/A | Upon request of the CA, the Supplier shall provide a Calibration Certificate of measuring equipment or device which was used within the system design, production, implementation, and testing.  NOTE: The Calibration Certificate shall conform to the international standards (see ISO/IEC GUIDE 99:2007, 2.39). | Y |  |
|  | **Verification Requirements** |  |  |
| REQ-014872/A | The verification process shall demonstrate that the deliverable Product meets the specified CA requirements and is capable of sustaining its operational role through:   1. Verification planning; 2. Verification execution and reporting; 3. Verification control and close-out. | Y | The RA and FSC departments are certified by independent institutes provided shown in proposal. |
| REQ-014873/A | The Supplier shall define the verification approach according to the Contract realisation phases by conducting the following steps:   1. Identify and agree with the CA the set of requirements to be subject of the verification process. 2. Select the methods and levels of verification, associated model philosophy, verification tools.   Identify the stages and events in which the verification is implemented | Y | The Safety assessment is defined to four phases according project design. Methodology, verification and models are explained in detail in chapter 1.6.2.5 |
| REQ-014874/A | The verification approach shall be defined by the Supplier in the Verification Plan (VP) for approval by the CA prior to implementation. | Y |  |
| REQ-014875/A | Verification shall be accomplished by one or more of the following verification methods:  1. review (including review of design and documentation);  2. inspection;  3. test (including functional demonstration);  4. analysis. | Y | Methodology, verification and models are explained in detail in chapter 1.6.2.5 |
| REQ-014878/A | A review of design programme shall be defined in the VP | Y |  |
| REQ-014880/A | A review of documentation shall be applied on the final Product before starting the delivery to CA site. | Y | Please see execution plan described in section 1.6.6.3 |
| REQ-014881/A | The list of closed-out requirements and the list of unclosed-out requirements shall be made with VCD | Y |  |
| REQ-014882/A | The results of review of design shall be documented in approved Critical design review report (CDRR) or within the document corresponding to the Contract conditions.  NOTE 1: The content of CDRR shall be agreed and approved by the CA.  NOTE 2: The CA can provide to the Supplier the template of CDRR report. | Y | The proposed approach is use the design review process within the PSS QMS, this provides a design review at key project stages, namely functional design, detailed design and test procedure design.The term critical design review is therefore not used within the RA QMS. |
| REQ-014921/A | A Critical design review shall involve all requirements of the corresponding RSD to be applied in the phase of design. | Y |  |
|  | **Inspection** |  |  |
| REQ-014883/A | An inspection programme shall be defined in the VP | Y |  |
| REQ-014884/A | The list of closed-out requirements and their physical location and presence, and the list of unclosed-out requirements shall be made with VCD | Y |  |
| REQ-014885/A | The results of inspection shall be documented in approved VCD document | Y |  |
|  | **Test** |  |  |
| REQ-014886/A | The analysis of data derived from testing shall be an integral part of the test and the results included in the test report. | Y | Please see chapter 1.6.7 |
| REQ-014887/A | The test protocols shall be made by the Supplier and approved by the CA. | Y |  |
| REQ-014888/A | The list of closed-out requirements and the list of unclosed-out requirements shall be made with VCD | Y |  |
| REQ-014889/A | The Supplier shall prepare a test programme for the Product in conformance with the VP | Y |  |
| REQ-014890/A | The test programme shall be defined in the specific chapter of the VP | Y |  |
| REQ-014891 | The test programme shall be approved by the CA. | Y |  |
| REQ-014910/A | The results of the test shall be documented in the appropriate Test Report and tracked in the VCD | Y |  |
| REQ-014894/A | When the test objectives include the demonstration of qualitative operational performance (functional demonstration), the execution shall be observed and results recorded.  NOTE: Functional demonstration is a subset of tests. | Y |  |
|  | **Analysis** |  |  |
| REQ-014895/A | An analysis programme shall be defined in the VP | Y | As mentioned above – the significant part of proposal is dedicated for analysis. |
| REQ-015259/A | The analysis programme shall be approved by the CA. | Y |  |
| REQ-015260/A | The list of closed-out requirements and the list of unclosed-out requirements shall be made with VCD | Y |  |
| REQ-015261/A | The results of the analysis shall be documented in the appropriate Analysis Report and tracked in the VCD | Y |  |
|  | **Verification and Verification plan (VP)** |  |  |
| REQ-014905/A | The Supplier shall provide the Verification plan (VP) for the reviews as agreed with the CA. | Y | Safety study/verification is part of proposal, the safety standards which will be followed define how the verification should be done. Details are described in section 1.6.2.5 |
| REQ-015262/A | In the VP the Supplier shall describe HOW and WHEN each of the technical requirements is to be verified. | Y |  |
| REQ-014906/A | The contents of the VP shall be approved by the CA. | Y |  |
| REQ-014899/A | Verification planning to assess feasibility and support programmatics shall be done in the early phases of the Product Contract execution phases (as defined in the Contract).  NOTE: Programmatics means support equipment and verification timescale estimation. | Y |  |
| REQ-014944/A | The technical consultation between the Supplier and the CA shall involve agreement on the methods, levels of verification, and verification tools to be used for verifying individual requirements specified in this RSD.  NOTE: Also the consultation shall be aimed to define the structure of the VP especially to define what should be verified at Supplier site and what should be verified at CA site (final Product). | Y |  |
| REQ-014909/A | The Supplier shall assign clear responsibility for the implementation of the VP (see chapter 7.3). | Y |  |
| REQ-014911/A | The verification results shall be recorded by the Supplier in reports and provided to the CA. | Y |  |
| REQ-014931/A | The rules for the analysis, inspection and review of design shall be defined in writing before their execution.  NOTE: For example, analysis, inspection or review of design procedures. | Y |  |
| REQ-014912/A | The Supplier shall establish and maintain the system of verification process documentation | Y |  |
| REQ-014913/A | Verification documentation shall consist of following basic types of documents:   * VP, Verification Plan * Verification Reports including: CDR Report and Tests, Analyses, Inspection reports; * VCD, Verification Control Document | Y |  |
| REQ-014914/A | The verification reports shall be submitted to the CA for the review as agreed with the CA after corresponding verification activity completion, within the time frame agreed with the CA.  NOTE: Verification activity can be design and documentation review, test and analysis of the Product. | Y |  |
| REQ-014920/A | The Supplier shall provide the design documentation related to critical design review.  NOTE: Content of design documentation shall be agreed with CA. | Y |  |
| REQ-014937/A | The verification process shall be considered completed when the CA approves the VCD by confirming that:  1. Identified requirements have been verified successfully;  2. All detected non-conformances have been solved according to the REQ-014957/A and associated Product verification objectives are reached.  2. Documented evidence is recorded in the VCD (see chapter 7.5.2.1). | Y |  |
| REQ-014904/A | Verification close out status shall be assessed and approved by the CA for the Product at the end of each Contract execution phases (as defined in the Contract). | Y |  |
|  | The Verification Control Document (VCD) | Y |  |
| REQ-014943/A | The Supplier shall provide a Verification Control Document (VCD) for the reviews as agreed with the CA.  NOTE: Guidelines for VCD preparation shall be provided by the CA | Y |  |
| REQ-014945/A | The Supplier shall update the VCD to indicate which requirements will be verified by the Supplier at the Supplier’s premises and which requirements will be only verified after installation in the CA environment, in order to complete the Product acceptance stage (as defined in the Contract).  NOTE: The VCD shall be updated and provided to the CA after completion of each verification stage (as defined in the Contract). | Y |  |
|  | **Other close-out documents** |  |  |
| REQ-014948/A | The Supplier shall make available to the CA for consultation the VCD’s (see chapter 7.5.2.1) supporting documentation in addition to the reports. | Y |  |
|  | **Acceptance stage** |  |  |
| REQ-015264/A | Acceptance shall be carried out on the final Product in the CA environment. | Y |  |
| REQ-015265/A | The Supplier shall provide initial and continuing training and support to the CA which allows the Product successful operation and maintenance. | Y | The Operators and Maintenance application training is included in the scope of proposal. |
| REQ-015263/A | The supplier shall establish and provide to agree to CA an acceptance test plan specifying the intended acceptance tests with tests suited to the target platform (CA’s environment).  NOTE: Acceptance test plan shall be a part of the VP | Y |  |
| REQ-015266/A | The Supplier shall support the CA’s acceptance reviews, inspection and testing of the Product.  NOTE: The results of the acceptance inspection, review and testing shall be documented with VCD | Y |  |
| REQ-015268/A | In case of successful acceptance stage the CA shall provide to the Supplier signed Acceptance Protocol (as stipulated in the Contract). | Y |  |
| REQ-015269/A | In case of unsuccessful acceptance stage the CA shall provide to the Supplier Non-Conformance Report (NCR) and process according to the REQ-014957/A shall be applied. | Y |  |
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#### Design and Architecture

The system design is based on the received documentation, clarifications, and meetings during the proposal period, which is currently over one year. The result is the System Architecture (shown below) which we believe is best fitted to ELI’s purposes.

From our meetings we understand that ELI doesn’t need to have a high availability system, because the type of application allows to make interruptions, or postponing the experiment in case of component failure – this means that redundancy, hot-standby of all components is not required. The solution of the system availability could is managed by offered spare parts and maintenance services.

We have designed [VYPUŠTĚNO]. Therefore the solution is providing the required availability and is cost effective.

The PSI system combines aspects of both machine and process safety elements and therefore there is not an appropriate application sector international safety related standard available. The generic standard IEC61508:2010 Functional Safety of Electrical / Electronic / Programmable Electronic Safety Related Systems has therefore been selected by Rockwell Automation as the most appropriate international safety related standard for this application.   It should however be recognized that this generic standard addresses both product & application requirements as well as the development of product & application sector standards and therefore certain requirements may not be applicable to the PSI system application.

The PSI system will be designed, implemented, tested, verified and validated in compliance with the relevant requirements to meet the objectives of the standard. The safety life-cycle phases, related activities, roles and responsibilities of project personnel and the documents produced in compliance with IEC61508:2010 will be specified by Rockwell Automation n their Functional Safety Management Plan (FSMP).

The offered system is designed to allow upgradeability and scalability. [VYPUŠTĚNO]. The system allows to include additional [VYPUŠTĚNO]. [VYPUŠTĚNO]. An upgrade of local Remote IO could be done easily by adding another cards or even communication modules to the communication loop.

[VYPUŠTĚNO]

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All system communications will be [VYPUŠTĚNO]. [VYPUŠTĚNO].

* [VYPUŠTĚNO]

#### Estimated quantity of Inputs and Outputs

The following IO counts were used as the basis of this proposal – the system is designed for the amounts shown in table below.

[VYPUŠTĚNO]

At this time al IO cards are Safety Digital IO cards only.

If required by design, or defined by risk analysis differently the cards [VYPUŠTĚNO].

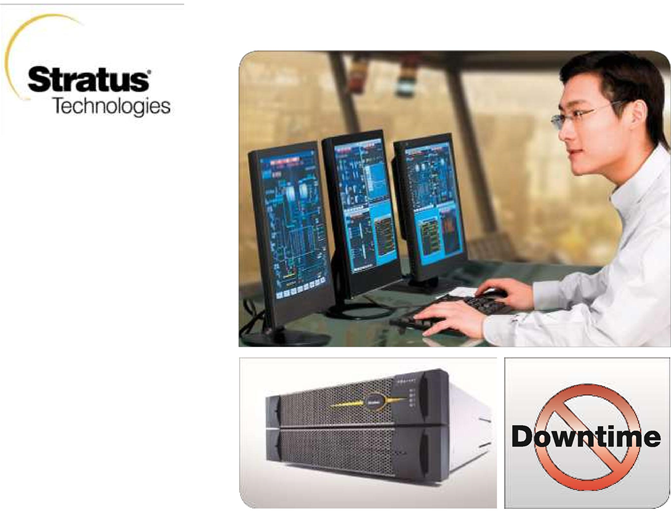
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| **Room** | **Digital Inputs** | **Digital Outputs** | **Remark:** |
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##### Central server and visualization system

###### Hardware

[VYPUŠTĚNO]

We propose a high availability system server. The fault tolerant server will ensure high availability of visualization. Visualization in our system has no safety function and is mainly dedicated to monitoring, however we consider it as an important part of system, which is better to have always available. It will be provided on [VYPUŠTĚNO]. The hardware will be located in server room in a dedicated cabinet and secured by delivered locked covers. Data storage capacity estimated for this server will allow min. [VYPUŠTĚNO].



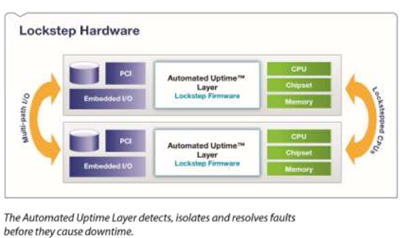
[VYPUŠTĚNO] eliminates single points of failure and addresses the hardware, software and serviceability issues that can lead to downtime and corruption or loss of critical data.

**Lockstep hardware**

Duplex fault-tolerant hardware components process the same instructions at precisely the same time. [VYPUŠTĚNO] — without any downtime or data loss.

[VYPUŠTĚNO]

[VYPUŠTĚNO] — before they impact your system. This transparent error handling shields the operating system, middleware and application software. Even in-memory data is constantly protected. Each part could be on-time exchanged.



###### Software

[VYPUŠTĚNO]

##### [VYPUŠTĚNO]

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Typical [VYPUŠTĚNO] Architecture (final configuration depends on individual room requirements)

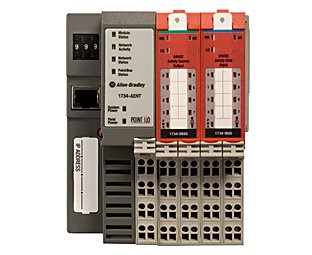
Our ControlLogix® 5570 Controllers are available in standard, safety, extreme temperature, and On-Machine models suitable for process, motion, discrete, and high-availability applications. As part of our Integrated Architecture™ system, these controllers use the Studio 5000 Automation Engineering & Design Environment™ and common network protocols. These high-performance controllers provide a common control engine with a common development environment for all control disciplines. It is estimated use of L72S controllers for LPSI and L73S controller for central PSI.

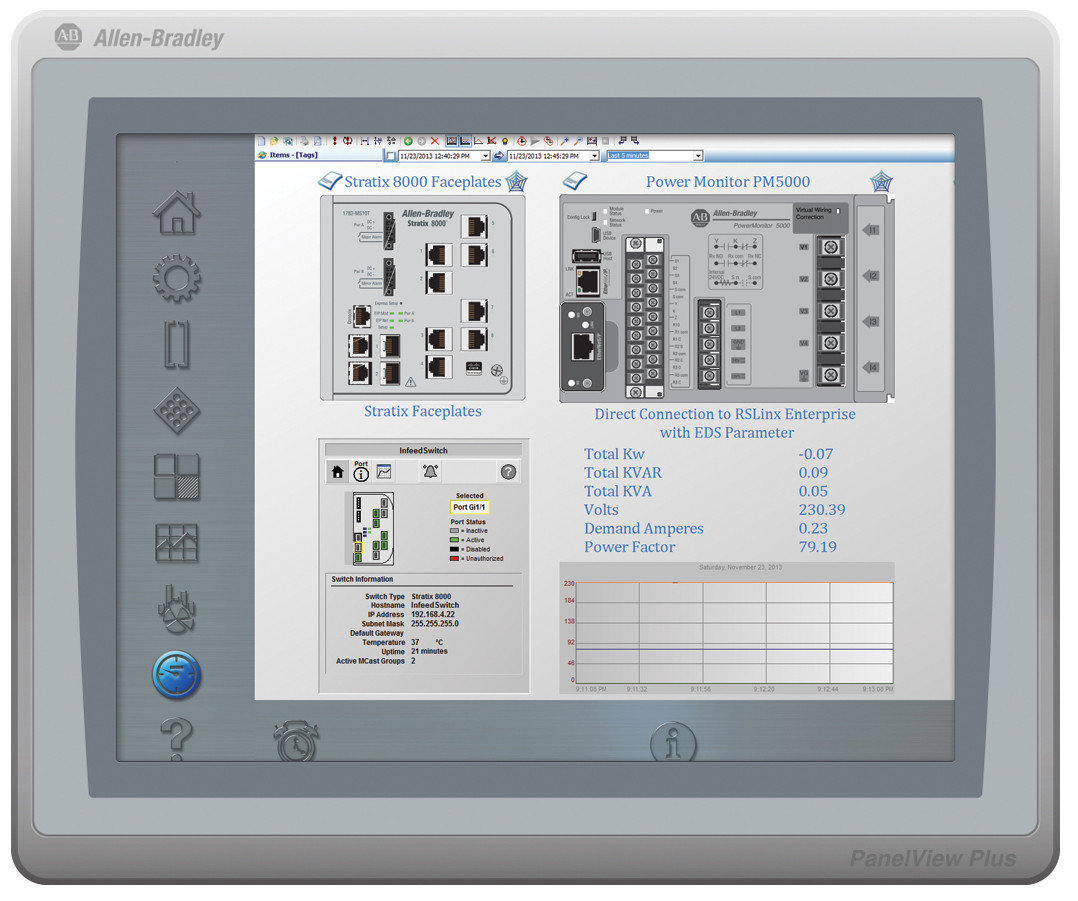
**GuardLogix Safety Controllers**

* Provides safety and integrated motion in the same chassis
* Offer TUV certification for SIL 3 functional safety (controller and safety partner required)
* Simplifies machine architecture and reduce system footprint with the Armor GuardLogix controller
* Can operate in environments with -25...70°C (-13...158°F) when used independently

The GuardLogix controller isn’t just a safety controller, it’s a standard ControlLogix processor plus safety features that helps ensure SIL 3, PLe safety control. With its two-processor architecture (1oo2), the GuardLogix system consists of a safety primary and a safety partner processor. A system benefit is that it’s still a single project. The safety partner is a part of the system and is automatically configured, with no setup, configuration or download to the safety partner required.

POINT Guard I/O™ modules are safety-rated I/O modules designed to fit into the standard POINT I/O™ system, offering automation and safety functionality in a maximum density I/O solution. POINT Guard I/O communicates by using the CIP™ safety protocol over EtherNet/IP™ for GuardLogix™ controllers.

Features:

* Fits into the standard POINT I/O™ system
* Communicates by using the CIP™ Safety protocol over EtherNet/IP™ for GuardLogix™ controllers
* For EtherNet/IP connectivity, use a POINT I/O EtherNet/IP adapter (1734-AENT, 1734-AENTR)
* 24V DC I/O circuits
* Eight inputs or eight outputs

HMI in operator rooms will be our Bulletin 2711P PanelView™ Plus 7 Graphic Terminals performance version with display size 15 in. You can use FactoryTalk® View Machine Edition to build your application and help simplify configuration and strengthen your Integrated Architecture solution. These terminals include Ethernet connectivity and enable you to monitor applications from remote locations with VNC connectivity.

###### Local Vizualization

For local visualization at laboratories and operator rooms will be used 3 devices:

* [VYPUŠTĚNO]

##### Safety systems

[VYPUŠTĚNO]

###### [VYPUŠTĚNO]

[VYPUŠTĚNO]

###### [VYPUŠTĚNO]

[VYPUŠTĚNO]

##### The cabinets and installation

[VYPUŠTĚNO]

The Attachment D shows installation BOM.

**LV Directive**

Typically Cenelec Guide 32 is used to assess the conformity of the control panels supplied to the principal elements of the safety objectives listed in Annex 1 of 2014/35/EU.

The equipment supplied utilizes components / sub-assemblies complying with the relevant European Harmonized Standards as published in the relevant section of the OJEU, and is installed in accordance with the manufacturer’s instructions and “Good Engineering Practice” in general accordance with BS EN 60204. A Declaration of Conformity with the LV Directive 2014/35/EU is provided

**EMC Directive**

The control panel equipment supplied is considered, in accordance Article 19 of the directive, as “apparatus intended for operation in a given fixed installation which is otherwise not commercially available” and therefore Articles 6 to 12 and Articles 14 to 18 of the directive are not compulsory.

The equipment supplied utilizes components / sub-assemblies complying with the relevant European Harmonized Standards as published in the relevant section of the OJEU, and is installed in accordance with the manufacturer’s instructions and “Good Engineering Practice”.

The equipment supplied therefore meets the Essential Requirements of Article 6 of the directive.

A technical file is maintained by Rockwell Automation and a Declaration of Conformity is not required.

#### Project initialization

At first stage after contract signature and kick-off our team will define FS Management Plan, which will identify how we will achieve compliance with IEC 61508 standard.

#### Safety Studies

This safety study is the most important part of project after contract signature. The safety studies will define the risks and recommend the solution. Within this proposal we have carried out an evaluation and preliminary safety design based on the received documents, meetings and site visit.

At the time of this proposal the technology was not installed or even designed. Therefore after the safety assessment there is a strong likelihood that there will be changes to the proposed scope. If any changes are required to ensure the system functionality and safety then these will be subject of additional costs. These changes will be handled via the change order process as additions to the contract value.

This proposal offers safety studies for the development of a Personal Safety Interlock (PSI) System for the ELI Beamlines facility.

The objectives are to:

* assess the risks to personnel safety which may arise as a result of hazards associated with the operation of the facility;
* determine the required level of risk reduction and express this in terms of Safety Integrity Level (SIL) and target failure measures for the proposed PSI Safety Instrumented Functions (SIFs);
* develop a Safety Requirement Specification (SRS) for each SIF;
* review and demonstrate that the SIFs meet the required safety integrity;
* document each stage of the process in a formal Safety Studies reports.

The generic standard IEC61508:2010 Functional Safety of Electrical/ Electronic/ Safety Related Systems applies to all safety-related systems and applications, and has therefore been selected as the applicable standard for this application.

The safety-related activities, roles and responsibilities of project personnel, and the documents produced in compliance with IEC61508:2010 will be specified by the project Functional Safety Management Plan (FSMP).

The following activities are proposed as part of the Safety Studies:

**Project Kick-off Meeting**

* Two FSC consultants will attend a project kick-off meeting in the Czech Republic for up to 3 days for familiarization, detailed project planning and information gathering.

**Combined HAZOP and SIL Determination Studies**

* Conduct a combined Hazard and Operability (HAZOP) Study and SIL Determination Study using Layer of Protection Analysis (LOPA) for each room in turn. The combined study will be facilitated by two FSC consultants, in workshop meetings in the Czech Republic. Each works
* HAZOP is expected to take 4 days and it is assumed that there will be 4 such workshops in total.
* Each HAZOP visit will be planned and mutually agreed in advance for availability all required participants
* The HAZOP will identify and formally document hazards that have the potential to cause harm or damage as a result of the operability and maintainability of the facility.
* The LOPA will assess the risks which may arise as a result of the identified hazards, determine the required level of risk reduction and express this in terms of SIL and target failure measures for the SIFs that will form the PSI.
* On completion of the workshops, FSC will prepare and issue a formal HAZOP and SIL Determination Report which will document study process and provide a definitive list of hazards, and the overall safety requirements necessary to provide adequate protection

**Safety Requirement Specification**

* Develop a Safety Requirement Specification (SRS) which will specify safety requirements for each SIF, as described in following section. FSC will complete the safety-related requirements, derived from the SIL Determination Study, and will work with ELI and their suppliers, to specify any functional or performance requirements necessary for achieving the required safety integrity.
* FSC will prepare and issue a formal SRS. The report will be prepared from FSC offices in Horsham and will be subject to approval by ELI.

**SIL Verification Study**

* An analysis of the resulting SIFs, against the targets identified in the Safety Requirement Specification, will be carried out as described in the section bellow.
* FSC will prepare and issue a formal SIL Verification Report documenting the analysis for all safety functions

**Functional Safety Assessments**

* Functional Safety Assessments (FSA) will be scheduled in the FSMP, and carried out at key stages in order to ensure that the identified hazards are properly controlled and that an independent judgement can be arrived at, of the functional safety and safety integrity achieved.
* The FSAs and the requirement for independence are described in below

**This quotation is based on the following assumptions**

* The scope of the safety study has been interpreted from the Scope of Supply document.
* It is assumed that the project meetings will be held in the Czech Republic. Should the location of these activities differ then additional agreed incurred expenses will be charged.
* Based on the information provided, for the combined HAZOP and SIL Determination workshops, there will be no more than 50 hazards to be assessed.
* It is assumed that the scope of the study includes the following 5 experimental halls:
  + E1 – Material and Big Molecular Applications;
  + E2 – X-Ray Sources\*;
  + E3 – Plasma Physics;
  + E4 – ELIMAIA Ion Acceleration;
  + E5 – Electron and X-ray Sources.

Note that E6 is not used at this stage and is excluded from the scope.

A phased approach is planned on a per room basis allowing for up to 4 visits of 4 days per workshop.

\* Note that E2 has a reduced complexity and will be covered during these 4 visits, therefore a separate visit for this hall is not required.

* It is also assumed that the workshops can be completed in this proposed time but should the scope be significantly more than this proposal, then any additional agreed visits will be subject to additional charge according proposed Option.
* It is assumed that only the risks to personnel and public safety will be assessed as part of this study. If there is a requirement to review environmental or commercial risks, then ELI should make available appropriate maximum tolerable risk criteria. FSC can advise on appropriate criteria if required.
* As a minimum for the combined HAZOP and SIL Determination workshops, the personnel defined in section bellow, should be made available. It is assumed that ELI will co-ordinate the availability of information and the attendance at the workshops of appropriate personnel.
* It is assumed that the SRS and subsequent SIL Verification will only address SIFs that have a target of SIL1 or above.
* It is assumed that the scope of the SIL Verification will include final elements and field devices and that for items that form part of a safety function, that are outside of Rockwell’s scope of supply, adequate information on these devices will be provided by ELI.
* It is assumed that ELI will provide the necessary drawings and design descriptions in order to complete the FMECA required for the Laser Shutter Assembly. It is anticipated that the initial analysis will be carried out at FSC Offices in Horsham and a review with ELI personnel will be scheduled at a convenient time during the visits.
* A cost for conducting FMECAs for any additional component developments, if required, will be subject to a separate quotation.
* Should it be necessary to include external systems or vendor packages, then ELI will provided adequate information on these systems, including functional and interface specifications.
* RA will schedule Functional Safety Assessments (FSAs) into the FSMP, and will carry these out at key stages in order to ensure that the identified hazards are properly controlled and that an independent judgement can be arrived at, of the functional safety and safety integrity achieved. Details of the FSAs and the requirement for independence are described in section below.

**Related documents:**

* Functional Safety of Electrical/ Electronic/Programmable Electronic Safety Related Systems. IEC61508:2010.
* Personal Safety Interlock System (Functional Concept Description).
* AIChE Centre for Chemical Process Safety, Layer of Protection Analysis (LOPA), 2001.
* IEC 61784-3: Edition 2.0 2010-06, Industrial Communication Networks – Profiles – Part 3: Functional Safety Fieldbuses – General Rules and Profile Definitions.

##### Hazard Identification and SIL Determination

###### Approach

Hazard Identification and SIL Determination will be conducted on a room by room basis, in a series of workshops. This will enable the availability of relevant information and the attendance of appropriate expertise to be planned and co-ordinated.

Up to 4 workshops will be held at ELI premises in the Czech Republic. Each workshop is expected to take up to 4 days and will include:

* Hazard identification using a Hazard and Operability (HAZOP) workshop;
* SIL Determination using a Layers of Protection Analysis (LOPA) workshop.

On the completion of all required workshops, the Hazard and SIL Determination will be documented in a formal Hazard and SIL Determination Report.

###### Hazard Identification

The objective of each HAZOP will be to identify and formally document, hazards associated with the operation and maintenance of one of the rooms of the ELI Beamline facility.

The HAZOP will be conducted in order to:

* determine hazards or hazardous events associated with the facility and associated equipment;
* determine the sequence of events that lead to the hazard;
* determine the potential risks involved and associated consequences;
* record resulting actions required to mitigate the hazard;
* document each stage of the process and provide a visible and traceable analysis.

The HAZOP a structured brainstorming meeting between interested parties, whereby guidewords are used to stimulate ideas about possible hazards. The identified hazards, along with any actions for further investigation and other relevant, supporting information will be captured on HAZOP worksheets.

ELI are required to co-ordinate information and personnel with the appropriate expertise and knowledge for each specific room.

###### SIL Determination

As the HAZOP will be conducted on a room by room basis, and will require the availability of certain information and the attendance of appropriate personnel, it is considered that the corresponding SIL Determination workshop for the room under consideration, will be held immediately following the HAZOP.

The SIL Determination will be conducted using the Layers of Protection Analysis (LOPA) technique in order to:

* analyze risks to personnel safety;
* identify any shortcomings and express these in terms of their SIL targets;
* document each stage of the process and provide a visible and traceable analysis.

###### LOPA Technique

The LOPA will be conducted in accordance with the guidelines provided in the AIChE Centre for Chemical Process Safety document. The technique considers each hazard identified in the HAZOP, and documents the initiating cause and the protection layers that prevent or mitigate hazards to personnel safety. This technique provides traceability by cross-referring to each hazard identified in the HAZOP. The total amount of risk reduction is then determined and the need for additional risk reduction analyzed and expressed in terms of SIL.

If additional protection is required in the form of a SIF, the methodology allows the determination of the required Probability of (dangerous) Failure on Demand (PFDavg) or Probability of (dangerous) Failure per Hour (PFH). The analysis, along with any actions for further investigation and other relevant, supporting information will be recorded on the LOPA worksheets.

For this application, LOPA is considered to be adequate and to provide the most appropriate, clear and traceable technique for determining SIL requirements. However, Fault Tree Analysis (FTA) may be used in the case of high demand or continuous safety function requirements, or in determining initiating event frequencies, where the initiating causes are particularly complex. The techniques to be applied will be determined during the LOPA workshop.

###### HAZOP/LOPA Study Team

It is important that the HAZOP/LOPA team is made up of personnel who will bring to the study, the best balance of knowledge and experience, of the facility being considered. It is important that ELI schedule each room to be addressed and arrange for information to be available, and for the appropriate personnel to attend.

The attendees may be from ELI or from third-party original equipment manufacturers (OEMs) or suppliers. A typical HAZOP/LOPA team is made up as follows.

| **Name** | **Role** |
| --- | --- |
| Chair | Someone experienced in the techniques but not directly involved in the design, to ensure that each scenario receives adequate evaluation and discussion.  **To be provided by FSC.** |
| Scribe | To document the analysis process, ensure that actions are captured, problems are documented and recommendations passed on.  **To be provided by FSC.** |
| Facility / Control and Instrument Engineers | Someone with relevant technical knowledge of the facility under analysis. Good working knowledge of the facility diagrams and room layout.  **To be provided by ELI. May be ELI or OEM staff.** |
| User / Operator | To consider the system in use and question its operability, and the effect of deviations.  **To be provided by ELI. May be ELI or OEM staff.** |
| Maintainer | Someone concerned with maintenance of the facility.  **To be provided by ELI. May be ELI or OEM staff.** |
| A design team representative | To explain any design details or provide further information.  **To be provided by ELI. May be ELI or OEM staff.** |

###### 

###### Information Requirements for the Study

During the HAZOP and LOPA processes, a discussion regarding the operation and maintenance of the facility will take place and information must therefore be available so that all attendees, have a clear understanding of how hazards may arise within the facility, their initiating causes, the preceding sequence of events and the potential consequences that may result.

Such information must therefore be provided by the expertise, experience and knowledge of the workshop attendees, and supported by an examination of system documentation.

The following information should therefore be provided by ELI to conduct the study:

* Details of design intent including design descriptions, design features, functional and environmental specifications;
* Operating philosophy description, facility usage or estimated duty cycle, shift patterns and room occupancy during setting up and making safe;
* Physical facility layout diagrams or plans;
* Physical layouts and electrical schematics of control systems, schematics of utilities, electrical, pneumatic or hydraulic power supplies;
* Details of safeguards including physical barriers, mechanical protective systems, third-party systems such as F&G, radiation detection, CCTV etc.,
* Maintenance philosophy, expected scheduled maintenance requirements.

It is understood that for early stages of the project, many of the documents suggested will not be available, but as much information as possible, appropriate to the room or facility being analyzed, should be provided.

###### Venue, Meeting Room and Visual Aids

It is assumed that the client will provide an appropriate venue, refreshments, meeting room and suitable visual aids including a digital projector for use with a laptop computer.

###### Hazard Identification and SIL Determination Report

FSC will prepare and issue a formal combined Hazard Identification and SIL Determination Report which will present the identified hazards and the required risk reduction expressed in terms of safety integrity levels.

The report will document the study process and provide a traceable and visible analysis, draw conclusions, and where appropriate recommendations will be made to enable the stated objectives to be achieved. All calculations will be presented and all data used will be traceable to published sources.

The report will be prepared in FSC Offices in Horsham, U.K

##### Safety Requirement Specification

###### Safety Integrity Requirements of Safety Instrumented Functions

The SIL of each SIF must be communicated to the design team by the SRS to ensure the design meets the SIF safety integrity requirements during implementation. The SRS is the basis of the SIF validation.

Following completion of the SIL Determination, the SRS will be created. It is assumed that the SRS will only include SIFs that have a target of SIL1 or above.

###### Framework for the SRS

The SRS should contain both functional and integrity requirements for each SIF and should provide sufficient information to design and engineer the PSI. It should be expressed and structured to be clear, precise, verifiable, maintainable and feasible such as to aid comprehension by those who are likely to use the information at any phase in the lifecycle.

The SRS should include statements on the following for each SIF:

* Description of the SIF;
* Safe state definition for the SIF;
* Demand rate;
* Proof test intervals;
* Response time to bring the process to a safe state;
* SIL and mode of operation (demand or continuous);
* Process measurements and their trip points;
* Process output actions and successful operation criteria;
* Functional relationship between inputs and outputs;
* Manual shutdown requirements;
* Energizing or de-energizing to trip;
* Resetting after a shutdown;
* Maximum allowed spurious trip rate;
* Failure modes and PSI response to failures;
* Starting up and restarting the PSI;
* Interfaces between the PSI and any other system;
* Application software;
* Overrides / inhibits / bypasses and how they will be cleared;
* Actions following a PSI fault detection.

###### SRS Deliverable

The SRS will include safety requirements derived from the SIL Determination, and also SIF performance requirements which must be provided by ELI and appropriate OEMs. The SRS will be prepared in FSC Offices in Horsham, U.K. but FSC will work with ELI to incorporate functional and performance requirements, where appropriate.

The completed SRS will be subject to approval by ELI.

##### SIL Verification Study

###### Objective of the SIL Verification

The objective of the SIL Verification is to evaluate the proposed SIFs against the specified SIL targets in accordance with the requirements of IEC61508. The SIL Verification forms part of the Realization Phase and aims to:

* assess the identified SIFs of the PSI against the SIL targets specified in the SRS;
* provide a visible and traceable analysis that is documented in a formal SIL Verification Report.

It is assumed that the SIL Verification will only include SIFs that have a target of SIL1 or above.

###### Requirements for Compliance to IEC61508

The purpose of the SIL Verification is to document the quantitative and qualitative assessments for the specified safety functions. Figure 1 shows the overall structure of the Verification showing the parts of the standard that apply.

Figure 1. Verification Process

###### Scope of Analysis

The scope of the SIL Verification will include the following clauses from IEC61508:2010:

* Hardware safety integrity architectural constraints (IEC61508-2, 7.4.4);
* Quantifying the effect of random hardware failures (IEC61508-2, 7.4.5);
* Requirements for avoidance of systematic faults (IEC61508-2, 7.4.6);
* Requirements for control of systematic faults (IEC61508-2, 7.4.7);
* Requirements for system behavior on detection of a fault (IEC61508-2, 7.4.8);
* Additional requirements for data communications (IEC61508-2, 7.4.11).
* Requirements for Software (IEC61508-3).

The analysis will include each identified safety function from sensors, through logic solver to the final actuated element.

###### SIL Verification Process

Safety Lifecycle

The SIL Verification study forms part of the Realization Phase (Phase 10) of the safety lifecycle of IEC61508 and will document the quantitative and qualitative assessments for the specified safety functions.

The steps in the validation process are summarized in the following sections:

Requirements for Hardware Fault Tolerance (IEC61508-2, 7.4.4)

Determine equipment Safe Failure Fraction (SFF) and identify the loop configuration required to achieve each SIL in terms of the minimum architectural constraints.

For all new component developments that will form part of a safety function, it will be necessary to carry out a Failure Modes, Effects and Criticality Analysis (FMECA) in order to determine the SFF. Assembly drawings and a design description is required to undertake each analysis, which is expected to take 2 man weeks.

It is understood that the Laser Shutter Assembly is one such new development but the same analysis and resource commitments will be required for all such new components. All other field devices are assumed to be standard machine safety components.

The FMECA report will document the study process and provide a traceable and visible analysis, draw conclusions, and where appropriate recommendations will be made to enable the stated objectives to be achieved. All calculations will be presented and all data used will be traceable to published sources.

Quantifying the Effects of Random Hardware Failure (IEC61508-2, 7.4.5)

Determine the target failure measure, i.e. the Probability of dangerous Failure on Demand (PFDavg) or Probability of dangerous Failure per Hour (PFH) by Reliability Block Diagram (RBD) or other appropriate technique.

Assuming that the targets are achieved, the proof test interval and repair and maintenance strategy can be optimized whilst still ensuring that the SILs are achieved in service.

The calculations will make use of supplier failure rate data if available, industry specific data, or other appropriate traceable reliability data, as necessary. Key assumptions will be discussed and agreed with the client.

The PFDavg/PFH of each safety function due to randomly occurring hardware failures, must not exceed the target failure measure specified.

FSC will develop a model to calculate the PFDavg/PFH of each safety function, due to randomly occurring hardware failures, taking into account:

* the architecture of the safety function;
* the estimated rates of dangerous failures detected by diagnostic tests;
* the estimated rates of dangerous failures that are undetected by diagnostic tests;
* the susceptibility of the safety-related system to Common Cause Failures (CCFs);
* the diagnostic coverage and associated diagnostic test interval;
* the intervals at which proof tests are undertaken to reveal dangerous faults that are not detected by diagnostic tests;
* the repair times for detected failures.

If the calculations show that the target failure measure is not achieved then alternative strategies and recommendations will be made.

Accounting for Common Cause Failures

Common Cause Failures (CCFs) are failures that may result from a single cause but simultaneously affect more than one redundant channel. They may result from a systematic fault and the contribution of CCFs in parallel redundant paths is accounted for by inclusion of a β-factor in accordance with IEC61508-6, Annex D.

The β-factor model assesses the degree of channel separation, design with common cause awareness, diagnostic coverage and self-test frequency and whether the operating environment will be controlled to limit common cause failure risk. It also assesses whether the system maintainers are aware of the risks of common cause failures and whether maintenance of redundant channels is staggered.

The β-factor model is the preferred technique because it is objective and provides traceability in the estimation process.

Requirements for the Avoidance and Control of Systematic Faults (IEC61508-2, 7.4.6, 7.4.7, 7.4.10)

In addition to quantitative measures established to meet SIL requirements, there are also qualitative measures to meet. One of these is the avoidance and control of systematic faults.

The standard requires that those organizations that have overall responsibility for one or more phases of the E/E/PES or software safety lifecycles shall specify management and technical activities necessary to ensure that the safety-related systems achieve and maintain the required level of risk reduction.

The SIL verification will evaluate the suitability of selected components and sub-systems. The control and avoidance of systematic faults will be addressed by a qualitative assessment of the techniques and measures adopted. The following compliance routes, will be considered:

**Route 1S** – compliance with the requirements for the avoidance and control of systematic faults in accordance with IEC61508-2, 7.4.6 and 7.4.7.or;

**Route 2S** – compliance with the requirements for evidence that the equipment is proven in use in accordance with IEC61508-2, 7.4.10.

Route 1S evidence will be acquired through consideration of the OEM process and procedures. The assessment will therefore be based on an engineering judgment of the adequacy of compliance to the requirements for the application.

Route 2S will be used when there is documentary evidence of equipment usage and returns. Failure rates will be calculated using the Χ2-distribution with a 70% confidence level.

Requirements for System Behavior on Detection of a Fault (IEC61508-2, 7.4.8)

The detection of a dangerous fault by diagnostic tests, proof tests or other means shall result in a specified action to achieve or maintain a safe state.

Assessment of the behavior of the system on detection of a fault will be achieved by reference to the SRS [1.6.2.5.2].

Additional Requirements for Data Communications (IEC61508-2, 7.4.11).

Safety-related communications between systems and subsystems, will be assessed in accordance with the requirements of IEC61508.

The underlying communications channel will be considered as a black channel and the systematic measures taken to ensure the failure performance will be assessed in accordance with IEC61508-2, 7.4.11, IEC61508-3 and IEC61784-3.

Requirements for Software (IEC61508-3).

The application software will be developed in accordance with RA QMS procedures and the product safety manual. Compliance and suitability will confirmed during the FSA.

Information Requirements for SIL Verification

For items outside of Rockwell’s scope of supply, the following information is to be provided by ELI in order to begin the SIL Verification analysis:

* Component details, manufacturer, type/part number.

SIL Verification Report

The compliance assessment of the specified SIFs against the required SIL targets will be documented in a formal SIL Verification Report. The report will provide traceable and visible analysis and conclusions, and where appropriate recommendations will be made.

The SIL Verification report will be prepared in FSC offices in Horsham.

##### FUNCTIONAL SAFETY Assessments

###### Independence

The objective of a Functional Safety Assessment (FSA) is to arrive at an independent judgement on the adequacy of the functional safety achieved by the PSI based on compliance with IEC61508:2010.

The FSA activities proposed here, will be carried out by an Independent Safety Assessor (ISA), competent Rockwell personnel, independent of the project and independent of FSC’s scope outlined in this proposal.

###### FSA Stages

A Functional Safety Assessment (FSA) will be carried out at the following project stages:

|  |  |
| --- | --- |
| Stage 1 | Following the Safety Requirement Specification. |
| Stage 2 | Following the Realization (Design and Engineering). |
| Stage 3 | Following Installation, Commissioning and Validation. |

The Stage 3 FSA shall be completed before hazards are introduced.

###### FSA Activities

For each FSA, the following activities are proposed:

|  |  |
| --- | --- |
| **Assessment Planning:** | ISA to provide a FSA schedule to the project team, outlining timescales, and detailing the documents required for review. |
| **Document Review:** | ISA to conduct a review of the project documentation and identify any further information that is required for the FSA. |
| **FSA Report:** | ISA to document the findings of the FSA in a formal report making recommendations where required.  Where a judgement of compliance is made, references to supporting evidence will be provided. Where a judgement of non-compliance is reached, recommendations for rectifying shortfalls will be provided.  Each FSA Report will contain a summarized and agreed list of findings and recommendations together with a declaration that each SIF is either compliant / mostly-compliant / non-compliant. |

It is assumed that in addition to the document review, discussions can take place via Skype or telephone and it is estimated that for each FSA, 5 man days should be allowed. It is also anticipated that a 1-day visit for FSA Stage 2 and a 2-day visit for FSA Stage 3 to witness testing may be required.

##### FUNCTIONAL SAFETY CONSULTANCY

###### FSC Capability

In support of this proposal, FSC offer:

* + CASS certification of Functional Safety capability;
  + world recognized expertise in the field of Functional Safety, IEC61508 and the application of International Standards to safety systems;
  + industrial experience in product certification, throughout the world, of systems where safety is of paramount importance.

###### Key FSC Personnel

Keith J Kirkcaldy BEng, MSc, CEng, MIET

TÜV FS Expert (191/12)

Over 15yrs safety related experience including systems assurance and the design and development of safety-critical and safety-related systems. Performed SIL Validations in accordance with IEC61508 and R&A studies on safety-related systems. He has chaired Hazard and Operability (HAZOP) Studies, Project Health, Safety and Environmental Reviews (PHSERs) and conducted Hazard Analyses (HAZAN). Familiar and experienced in the use of R&A analysis techniques such as reliability assessment, FMEA, FMECA, FTA and RBD.

Deepti Chauhan BEng, MSc, MIET

TÜV FS Eng (3257/11)

Deepti has worked in the Oil and Gas Industry both on-shore and off-shore since 2006. Her work includes the Dunbar Project PCS, Safety Systems and Fire and Gas Systems and Britannia Platform Functional Design, HMI Specification and HVAC software design. Deepti has also provided numerous SIL targeting and SIL assessment studies for diverse systems and industries and working in the middle-east, has produced QRA Studies for some of the largest on-shore fields in the world.

###### Independence

Functional Safety Consultancy (FSC) is an independent organization within Rockwell Automation Limited providing a wide range of safety engineering and consultancy services to the Oil, Gas, Petrochemical, Nuclear and other industries where safety is paramount importance.

FSC Experience

Recent FSC experience includes:

|  |  |
| --- | --- |
| **Client Name:**  [VYPUŠTĚNO] | |
| **Project name and Description:** | [VYPUŠTĚNO] |

|  |  |
| --- | --- |
| **Client Name:**  [VYPUŠTĚNO] | |
| **Project name and Description:** | [VYPUŠTĚNO] |
| [VYPUŠTĚNO] |
| [VYPUŠTĚNO] |

|  |  |
| --- | --- |
| **Client Name:**  [VYPUŠTĚNO] | |
| **Project name and Description:** | [VYPUŠTĚNO] |

#### Project execution

The knowledge about project execution at proposal stage was limited due not specified detailed schedule of technology delivery to all Laboratories and rooms.

In this moment is known schedule of first phase E1-L1. The next phases are not detailed, but best assumed to fit ELI expectations. Partial delivery of E2 in next phases and E2 full scope offered as option, what will be delivered in later stage in case of request.

The 1st phase E1-L1 schedule is best known in this moment, however the technical details of related technologies can’t be currently known.

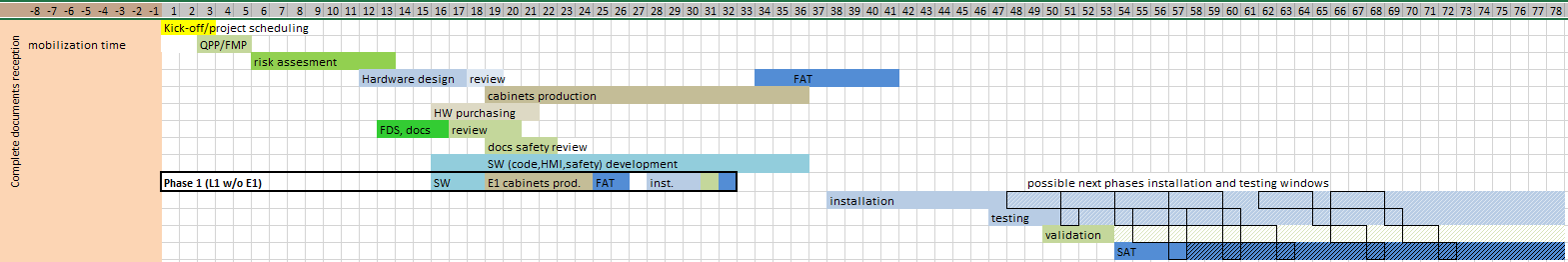
The risk analysis, design and required delivery time will be key factors for final technical scope of E1-L1 delivery. [VYPUŠTĚNO] the time of first phase; all of that will be decided after project Kick-off and risk analysis.

The similar mutual agreements will be done for next project phases.

#### Preliminary time schedule

The following picture shows our presumed time schedule. The time schedule include the Phase 1 delivery for E1 room based on latest information – E1+L1 project schedule is shown in required Annex: *QXQ1K1017B Annex No. 8 Schedule of Deliverables of the Phase 1.xlsx*

A more detailed time schedule will be prepared on ELI information about technology delivery and readiness of 3rd party systems and mutually agreed. The higher resolution image is shown at section 6



#### On-site activities – start-up and commissioning

On-site activities are allowed for an installation of four phases during max. period of 6 months. Our assumption is that our personnels will be present during our activities - time of installation, testing and validation only.

In this moment is known that E1 without L1 will be done first, that is reflected in our time schedule. The estimate is now ready also for next phases to be done, only the limit is to be done in during estimated 6 month period.

We are prepared to update time schedule after reception of complete ELI timeline.

#### On-site activities – application training

Based on mutual agreement during site activities will be provided application training. The training will be provided for max. 5 working days at ELI premises. ELI will ensure the rooms and accessory for the training. Training will be based on Operators and maintenance manual.

We presume 3 persons participation. The presumption is that participants will have skills about control system and used products. If required RA can propose product training for used products, the product trainings are not a part of this proposal.

### Services Not Covered

Furthermore, the following services, products and activities are expressly excluded from this offer’s Deliverable Items:

* Anything already explicitly excluded in the previous chapters. In particular: development of software, for any external (third-party) system; and related activities like specification and validation for such customizations.
* Consultancy and/or meetings with suppliers at sites other than defined in this Proposal. Meeting at other locations are possible by individual agreement, but travel expenses will be charged (cost +10% fee) against individual proof in this case.
* Any translation of standard language (English, Czech) of supplied documents.

### Project specific assumptions & exclusions

* ELI will cooperate and provide sufficient documents, hardware documentation and specification for safety studies

### Fyzikální ústav AV Responsibilities

In order to work collaboratively on this project, the following items are identified as being the responsibility of Fyzikální ústav AV :

1. Provide the User Requirement Document (URD) and specification of process or user required specification no later than the kick off meeting
2. Provide the detail specification of instrumentation no later than the kick off meeting
3. Provide technology information (e.g. IO lists, P&ID drawings, layouts etc.)
4. Provide Rockwell Automation with a purchase order in order to kick-off the proposed project.
5. Provide information and data (e.g. Specifications, Control drawings, logistics data etc.) requested by Rockwell Automation in a timely fashion.
6. Provide workspace, phone access and network access for at least three Rockwell Automation consultants.
7. Provide support, access and if needed accompany personals during site activities at site premises
8. Make the process and systems available to Rockwell Automation during the mutually agreed upon schedule for the purpose of implementing the services and equipment described in this Proposal.
9. Work closely with Rockwell Automation during the initial project phase to implement efficient change management.
10. Provision of appropriate personnel(s) in support of SIL determination workshops
11. Identification of stakeholders and steering committee.
12. Identification of a single organizational point of contact. (Project Manager).
13. Identification of a single technical point of contact.
14. Timely response to inquiries for technical or other project related information (general project rule: 5 business days).
15. Timely approval of project documentation (general project rule: 5 business days).
16. Document changes to the project definition and scope.
17. Coordination of all contractors on site and any other 3rd parties, which are not under direct control of Rockwell Automation.
18. Preparation of site to be fit for delivery of the scope of this Proposal by Rockwell Automation.
19. Except as specifically agreed upon in writing as part of maintenance or support contract, is responsible for:

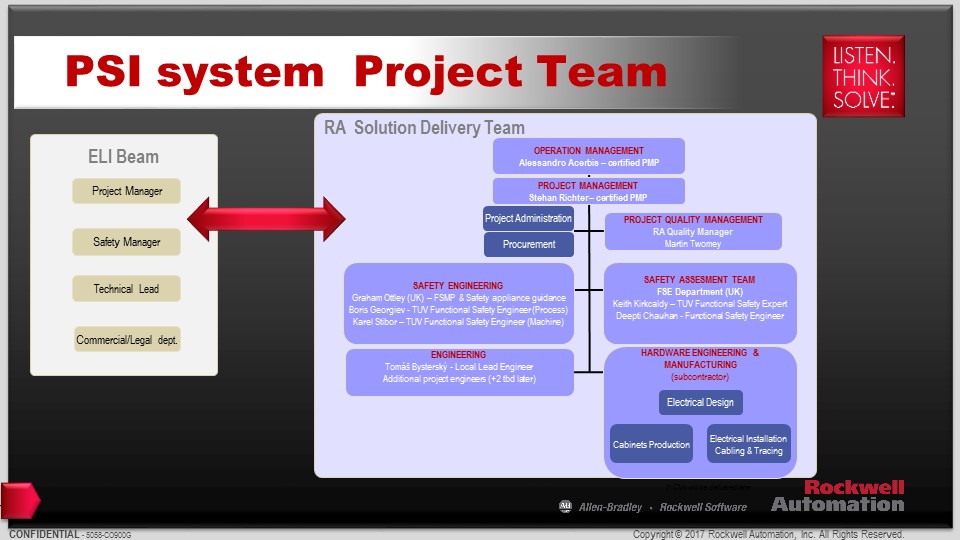
* Properly using, calibrating, operating, monitoring and maintaining the Products and System consistent with all Rockwell Automation or third party provided instructions, warnings, recommendations, and Product and System documentation;
* Ensuring that properly trained personnel use, operate and maintain the Products and System at all times;
* Staying informed of Product updates and alerts, and implementing all updates and fixes;
* Notifying Rockwell Automation of any problems with the Products or System;
* All other factors affecting the Products or System that are outside of the direct control of Rockwell Automation.

### Proposed Organization chart

Rockwell Automation is proposing an approach to this project that leverages our global experience with similar applications and standards to develop and deliver a cost effective, quality solution to the ELI plant.

We have assembled an experienced team for this project that consists of technical leadership from UK, certified FSE team from UK, a team of development and hardware engineers from Czech Republic and Slovakia.

Our Global Team will also be providing standards support and application support.



#### Key project participants

##### Functional Safety Experts

**Keith Kirkcaldy**

Head of Functional Safety, EMEA Oil & Gas

Project Experience (details shown in attached CVs):

**Type A (O&G; Industrial Safety):**

[VYPUŠTĚNO]

**Type B (Safety system for Laser laboratories, Research nuclear institutes):**

[VYPUŠTĚNO]

**Deepti Chauhan BEng, MSc, MIET**

TÜV FS Eng (3257/11)

**Type A (O&G; Industrial Safety):**

[VYPUŠTĚNO]

**Type B (Safety system for Laser laboratories, Research nuclear institutes):**

[VYPUŠTĚNO]

##### Safety Engineer/Solution Architect

**Graham Ottley**

Head of Engineering, EMEA Oil & Gas

**Type A (O&G; Industrial Safety):**

[VYPUŠTĚNO]

**Type B (Safety system for Laser laboratories, Research nuclear institutes):**

[VYPUŠTĚNO]

**Karel Stibor**

Solution Architect Safety

**Type A (O&G; Industrial Safety):**

[VYPUŠTĚNO]

**Type B (Safety system for Laser laboratories, Research nuclear institutes):**

[VYPUŠTĚNO]

##### Other Project Team Members

**Alessandro Acerbis**

Operations Manager - PMP certified

**Stephan Richter**

Project Manager - PMP certified

**Boris Georgiev**

Project Engineer – TUV process safety certified

**Tomáš Bysterský**

Project Engineer – TUV machine safety certified

**Martin Twomey**

Quality manager - IDipNEBOSH

#### Project Management Methodology

Rockwell Automation utilizes a proven, scalable and standard methodology for all projects. It covers all phases from receipt of order through to warranty support and forms a comprehensive framework for all project activities. The Project Methodology is under-pinned by Rockwell Automation’s open, inclusive style of project management, encouraging our Customer, the end user, Rockwell Automation and our subcontractors to work as one team. The success of the project is most often achieved by strong Project Management leadership that ensures the success of each member of that team, while pursuing a relentless commitment to achieving key project objectives including on-budget, and on-time performance.

Rockwell Automation’s integrated Project Management Methodology (iPM) is aligned with the Project Management Institute’s (PMI) ‘Guide to Project Management Body of Knowledge’ (PMBOK).

http://rain.ra.rockwell.com/gms/pme/images/i%20iPMlogo.JPGPM is short for Integrated Project Management, our scalable methodology for project management that integrates many key aspects of project management and our business, including:

* Alignment with PMI’s processes, the De-facto standard for project management in the industry
* Integration and Interface with IFS, our Project Finance system
* Alignment with “The Way Forward”
* Coordinated with PME, our Project Management Excellence Training program

#### Project execution and documentation

Rockwell Automation’s Integrated Project Delivery life cycle (iPD) comprises the following main phases:

* Design
* Implementation
* Commissioning

Depending on the product platform being implemented, specifically adapted delivery approaches and system development life cycles are applied.

In the **Design Phase** of a project, the design of the customer’s solution is specified. This design is based on the specified user requirements. As the inputs documents will be used received functional descriptions, other mutually agreed specifications and documents.

The creation of the Functional Design Specification is also based on an analysis of the user requirements and Safety assessment.

A Functional Design Specification (FDS) is generated to define the system functionality, thereby enabling the Customer to confirm that Rockwell Automation’s understanding of the requirements is correct. It is intended to define functionality, e.g. what happens when a particular action occurs or signal changes state. It is not intended to define how the functionality is implemented.

During the FDS development will RA interact with OEM suppliers and ELI to implement latest stages of their development.

The FDS is used as a basis for all further design and project implementation and therefore requires Customer Approval.

The Design Specification covers the various aspects of both the hardware and software design.

In the beginning of design phase will be requested customer review of basic design phase as HMI, software, hardware etc. to confirm the conceptual platform of those works. The review meetings could be done by F2F, tele or video conference, according mutual agreement, customer needs and preference.

In the **Implementation Phase,** the customer solution is developed and assembled in accordance with the outlined specifications. Both Rockwell Automation and 3rd party hardware and software components are used in the implementation of the solution and as such, the components are configured, customized or custom-build, as required.

The Design Specification for software is used for the coding (development) and debugging of the software. The development also contains the necessary testing of individual software items (modules) by the developer. The requirements defined in the Design Specification form the basis for the testing.

Any hardware required for the implementation of the solution may be manufactured by either Rockwell Automation or through a sub-contractor, but would remain in accordance with the same Design Specification.

The resulting system is tested to verify its compliance with the given specifications. All hardware and software is subject to necessary internal testing, before the Customer is invited for a Factory Acceptance Test. The Factory Acceptance Test (FAT) is witnessed by the Customer’s representatives. The purpose of this test is to verify that the software and/or hardware comply with the Functional Specification.

### Testing

Rockwell Automation will internally test the Control system HW and SW after production and development. After that will be provided a Factory Acceptance Test.

We assume following testing activities before delivery, which are result of standard Rockwell Automation process and ELI requirements:

* Internal HW tests after production
* Internal SW tests after development
* FAT – tests of PLC SW,HW and HMI completition with functions checkup

***FAT testing***

All parties will be invited to perform system tests to confirm that the system(s) function as required. The Proposal duration for the FAT is totally 8-10 weeks (supposed split by phases – depending on final time schedule) Rockwell Automation assume that FAT will be executed in production facilities.

We request that an authorized representative from customer is available to witness the tests and accept the results. Where remedial works are non-critical these will take place after completion of the FAT. Accommodation, travel, living, and all other expenses for ELI personnel attending the FAT will be to ELIs account.

The FAT will be a fully documented test. During the FAT the functionality of the different systems will be checked against the scope as outlined in the testing document. All deviations detected in the FAT will be inventoried in the Punch List. The required corrections will be executed by Rockwell Automation after the FAT. The FAT document used for both tests will be developed by Rockwell Automation and needs to be approved by ELI. Additional tests not mentioned in the FAT document will only be executed at extra cost.

***Site testing and SAT***

We assume following testing activities on-site:

* Power up checks, electrical connection tests of power cables etc.
* IO checks
* Functional tests
* Safety tests
* SAT (Site Acceptance Tests) – at the end of All Tests
* Safety validation after SAT

Site commissioning (SAT) will take place after installation, IO checks, Functional and Safety tests will be done.

On completion of the system installation Rockwell Automation will notify ELI that the system is ready for commissioning. Commissioning will be carried out by Rockwell Automation and witnessed by ELI.

Commissioning will start on confirmation from ELI that the following items are complete:

• Mechanical and civil construction completion

• All laboratory room equipment to which we have to interact installation is complete

• All control system equipment is installed

• All 3rd party systems are installed and prepared for connection

•

After that Rockwell Automation will provide the following:

• Installation inspection of the electrical cabinets, instruments and cabling

• Control equipment power-up and component communication test

• Software operation testing

• Visualization testing

• Process operation start-up and working test by individual parts

• Overall working test

• Verification of operation

Those tests will be provided together with ELI representatives and on these tests finalization SAT tests protocol will be signed.

***Safety verification and final validation***

After **SAT** FSE will provide safety validation process which will be last test procedure. After that procedure system will be functional.

### ROHS

1. Customer-Furnished Equipment (CFE) will meet all applicable material restrictions as define in RoHS. If it does not, Customer will notify Supplier prior to shipment of the CFE to Supplier. Customer will defend, indemnify, and hold harmless Supplier, its representatives, agents and employees from and against all claims, damage, losses and expenses, including attorney fees, associated with any requirements or regulations requiring these material restrictions for products or solutions.

2. The EU RoHS regulation takes effect July 22, 2017. Prior to this date, Supplier reserves the right to submit a Change Order proposal for any requirements for RoHS-compliant products or solutions imposed on Supplier from Customer or any third parties empowered to do so.

### Terms and Conditions

The pricing and terms presented in the proposal are based on RFQ conditions stated in Commercial Compliance list and Rockwell Automation’s terms and conditions of System Sales Agreement as contained within or attached to this proposal. Any change of these terms is subject of Rockwell Automation approval and appropriate justification of price. In the event that Rockwell Automation and the Fyzikální ústav AV have established a separate written agreement, which is applicable to the proposed scope of work, such agreement will govern.

## Terms and Conditions of Sale

These Terms and Conditions cover the sale by Rockwell Automation to Buyer of the hardware, software, and/or services (individually a Product and collectively Products) set forth in the Statement of Work, which shall be integrated as set forth in the Statement of Work (collectively the “Work”).

**1. GENERAL.** These Terms and Conditions along with the Statement of Work provided by Rockwell Automation in this proposal (the “Agreement”) is the entire agreement of the parties, superseding any previous agreements and understandings, whether oral or written. In the event of any conflict between the Statement of Work and these Terms and Conditions, the provisions of the Statement of Work shall prevail. This Agreement exclusively will govern the sale and/or licensing by Rockwell Automation of the Work and any other Products furnished under this Agreement. No addition or modification to this Agreement will be binding unless mutually agreed to in writing. Each party rejects any other terms and conditions that are in addition to or not consistent with this Agreement that may be proposed by the other party or that appear or are referenced in Buyer’s purchase order or other requisition or in Rockwell Automation’s invoice.

**2. PRICE.** As provided in the Statement of Work exclusive of applicable taxes and duties unless otherwise specified.

**3. PAYMENT.** Net 10 days from date of invoice issued in accordance with the Pricing and Payment Schedule that is part of the Statement of Work unless otherwise set forth in the Statement of Work.

**4. DELIVERY.** Ex Works Rockwell Automation’s plant or warehouse (per current Incoterms) or as otherwise specified in the Statement of Work (Delivery). In all cases, title transfers to Buyer upon the earlier of Rockwell Automation’s delivery to Buyer or receipt by the first carrier for transport to Buyer, except that title to all intellectual property rights associated with the Work remains with Rockwell Automation or its suppliers and licensors.

**5. ACCEPTANCE.** Acceptance of the Work occurs either (i) on the date the Work conforms to acceptance criteria in the Statement of Work or is otherwise beneficially used by Buyer, but in no event later than 60 days from start-up or 120 days following Delivery whichever occurs first; or (ii) if no acceptance criteria is specified in the Statement of Work then acceptance occurs upon Delivery.

(b) *Interim Approvals*. Any Rockwell Automation provided interim Work deliverable requiring Customer approval pursuant to the Statement of Work will be deemed accepted if formal Customer approval, written or as otherwise required, is not received by Rockwell Automation within two calendar weeks after the date submitted.

**6. CHANGES.** Any change resulting from any of the following circumstances is subject to equitable adjustments to price, scheduling, and other affected terms and conditions:

(a) Buyer requested order changes, including those affecting the identity, scope, and delivery of the Work or Products;

(b) Concealed or otherwise unknown physical conditions differing materially from those indicated or anticipated in the Statement of Work or that otherwise differ materially from those ordinarily found under similar circumstances;

(c) Any delays caused by Buyer, its employees, affiliates, other contractors to Buyer, or any other party within Buyer’s reasonable control;

(d) Any emergency endangering persons or property. In such circumstances, Rockwell Automation may act at its discretion to prevent damage, injury, or loss.

All changes, except actions necessitated by emergencies as provided in (d) above, must be executed by a written change order signed by both parties or otherwise definitively authorized by both parties., Rockwell Automation will not begin work on a change until such change order is properly authorized. All claims relating to a change must be made within a reasonable time after the occurrence giving rise to the claim. If the parties cannot agree on a change in pricing or schedule, it will be resolved pursuant to Section 26, Disputes.

Rockwell Automation reserves the right to substitute using the latest superseding revision or series or equivalent Product having comparable form, fit, and function, and such substitutions shall not be considered changes subject to the other terms of this section.

**7. RETURNS.** All returns of Products will be pursuant to Rockwell Automation’s instructions.

**8. DEFAULT, DELAYS, AND TERMINATION.**

(a) *Default by Rockwell Automation.* If Rockwell Automation is in material default of its obligations in the Agreement, Buyer shall give Rockwell Automation written notice, and Rockwell Automation shall have 5 business days to begin action and 90 days (or longer if agreed to in writing) to cure the default. If Rockwell Automation fails to cure the default, Buyer may terminate this Agreement to the extent that Rockwell Automation is in default. Rockwell Automation’s liability shall be limited to (a) the proportionate price of the terminated portion of the Work and (b) any documented direct excess reprocurement costs incurred by Buyer to complete the Work to a capability not exceeding that provided in the Statement of Work, but Rockwell Automation’s liability for documented direct excess reprocurement costs shall be limited to 110% of any amounts paid for the terminated portion of the Work.

(b) *Convenience of Buyer.* Except as set forth in the Statement of Work, Buyer may terminate this Agreement for convenience prior to shipment by giving written notice to Rockwell Automation. Buyer shall pay for any Work performed before receipt of notice and any additional costs of termination (including third-party commitments, reasonable profit, and overhead as may be more specifically provided in the Statement of Work) upon submission of Rockwell Automation's invoices.

(c) *Delays or Default by Buyer*. If Buyer, its employees, affiliates, other contractors to Buyer, or any other party within Buyer’s reasonable control causes the delivery, installation, or acceptance of the Work to be delayed beyond the time period set forth in the Statement of Work, or if Buyer materially fails to fulfill any condition of the terms of this Agreement, Rockwell Automation may elect to (a) withhold deliveries and suspend Work, or (b) place the Products in storage at Buyer's risk and cost. If such delay or other non-fulfillment is not rectified by Buyer within a reasonable time upon notice, Rockwell Automation may terminate this Agreement, and Buyer shall pay all costs of termination (including third-party commitments, reasonable profit, and overhead) upon submission of Rockwell Automation's invoices.

(d) *Temporary Suspension of Work by Buyer*. Except as set forth in the Statement of Work, Buyer may, by providing prior written notice, request that Rockwell Automation temporarily suspend performance and delivery of the Work, in whole or in part. The notice shall specify the portion of the Work to be suspended, the effective date of suspension, Buyer’s anticipated duration of suspension, and the reasons for the suspension. Rockwell Automation shall suspend Work as requested, except as necessary for the care or preservation of Work previously executed. On or before the date the suspension begins, Buyer must pay Rockwell Automation the unpaid balance of the portion of the Work previously executed plus any additional costs incurred by Rockwell Automation as a result of the suspension. Rockwell Automation shall resume the suspended Work after a change order is executed covering adjustments to the price, schedule, and any other affected terms or conditions resulting from the suspension. Unless otherwise agreed, the maximum cumulative period for suspension is 60 days. Upon expiration of this or any shorter period agreed upon as provided above, Rockwell Automation may terminate this Agreement, and Buyer shall pay all costs of cancellation (including third-party commitments, reasonable profit, and overhead) upon submission of Rockwell Automation's invoices.

**9. FORCE MAJEURE.** Neither party will be liable for any loss, damage or delay arising out of its failure (or that of its subcontractors) to perform due to causes beyond its reasonable control, including without limitation, acts of God, acts of civil or military authority, fires, strikes, floods, epidemics, quarantine restrictions, war, riots, acts of terrorism, delays in transportation, or transportation embargoes. In the event of such delay, performance date(s) will be extended as reasonably necessary to compensate for the delay.

**10. SOFTWARE LICENSESAND OWNERSHIP.**

(a) *Standard Software.* Software comprised of firmware or standard software (including, but not limited to packaged software, Rockwell Automation’s preexisting templates, models and library files, and commercially available software) (collectively “Standard Software”) is subject to Buyer’s acceptance of additional terms and conditions set forth in separate Rockwell Automation or third-party click-wrap license agreements provided with such Standard Software. Such terms and conditions shall be the exclusive terms and conditions applicable to such Standard Software, excluding Buyer’s obligation to pay any license fee which shall be identified in the Statement of Work.

(b) *Documentation and Application Software*. Rockwell Automation hereby grants to Buyer a non-exclusive, non-transferable license to modify and use solely in conjunction with the Work all documentation and any Application Software created by Rockwell Automation as specified in the Statement of Work. Application Software includes application project files for control programming, design, configuration, and visualization in source code and/or scripting code created by Rockwell Automation under the Agreement for operational use with Rockwell Automation’s Standard Software or the Buyer’s system as specified in the Statement of Work. Buyer is solely responsible for its modifications to documentation and Application Software. Except for any Buyer or third-party confidential information, Rockwell Automation retains all right, title, and interest to documentation and Application Software developed by Rockwell Automation. Buyer shall not sublicense or assign the documentation or the Application Software except to a customer who purchases the Work from Buyer. Buyer may make an additional archival copy of such documentation and Application Software for backup.

(c) In the absence of a separate Rockwell Automation license agreement for software provided by Rockwell Automation under a Statement of Work, Rockwell Automation hereby grants Buyer a non-exclusive, non-transferable license to use such software solely in conjunction with the Work for the project identified in the Statement of Work without the right to sublicense, disclose, disassemble, decompile, reverse engineer, or otherwise modify the software (except for modifications of Application Software as set forth above). Ownership of the respective Rockwell Automation or third-party software shall remain with Rockwell Automation or the third party.

(d) *Ownership of Pre-existing Intellectual Property.* Each party shall own all right, title, and interest in all patents, trademarks, copyrights, confidential information, trade secrets, mask rights, and other intellectual property rights as it owned on the date of this Agreement.

(e) *No Other Licenses*. Except as expressly set forth in this Agreement, no license under any patents, trademarks, copyrights, confidential information, trade secrets, mask rights, or other intellectual property rights is granted or implied by either party.

**11. WARRANTY.**

(a) *Warranty for the Work*: Rockwell Automation warrants to Buyer for the lesser period of 18 months from delivery or 12 months from startup, that the Work will perform as stated in the Statement of Work and the Products will be free of defects in material, fabrication, and workmanship provided that: (1) the operating conditions and use of the Work are in accordance with any standards set forth in the Statement of Work, Rockwell Automation's published specifications, and applicable recommendations of Rockwell Automation; and (2) the installation, adjustment, tuning, and start-up of the Work have been properly performed in accordance with Rockwell Automation’s published specifications and any applicable recommendations of Rockwell Automation. Repaired or replacement Products provided pursuant to subparagraph (d) below are similarly warranted for the longer period of six months from date of shipment or the remainder of the original warranty term.

*(b) Products* *Warranty*: Rockwell Automation warrants to Buyer for the period of 18 months from shipment, that the Products will be free of defects in material, fabrication, and workmanship provided that: (1) the operating conditions and use of the Products are in accordance with any standards set forth in the Statement of Work, Rockwell Automation's published specifications, and applicable recommendations of Rockwell Automation; and (2) the installation, adjustment, tuning, and start-up of the Products have been properly performed in accordance with Rockwell Automation’s published specifications and any applicable recommendations of Rockwell Automation. Repaired or replacement Products provided pursuant to subparagraph (d) below are similarly warranted for the longer period of six months from date of shipment or the remainder of the original warranty term.

*(c) Services Warranty*: Rockwell Automation warrants to Buyer for the period of 30 days from the date services are provided that services shall be performed in a workmanlike manner conforming to standard industry practice.

(d) *Remedies*: Remedies under this warranty will be limited to, at Rockwell Automation’s discretion, replacement, repair, re-performance, modification, or issuance of a credit for the purchase price of the Products involved, but only after Rockwell Automation’s receipt of Buyer’s written notification of non-conforming Products or Work and the return of such products pursuant to Rockwell Automation’s instructions. Replacement Products, at Rockwell Automation’s discretion, may be new, remanufactured, refurbished, or reconditioned. If the repair, re-performance, or replacement does not cure the defective performance, Buyer may request emergency on-site service, which will be at Rockwell Automation’s expense (consisting of time, travel, and expenses incurred by Rockwell Automation related to such services). If the defective performance is not due to warranted defects in the Work or Products, the on-site service will be at Buyer’s expense. On-site warranty services performed at Rockwell Automation expense shall not include removal or reinstallation costs related to large-scale assemblies such as motors or transformers. The foregoing will be the exclusive remedies for any breach of warranty or breach of contract arising from warranted defects.

(e) *General*: Warranty satisfaction is available only if (a) Rockwell Automation is provided prompt written notice of the warranty claim, and (b) Rockwell Automation’s examination discloses that any alleged defect has not been caused by misuse, neglect, improper installation, operation, maintenance, repair, alteration, or modification by other than Rockwell Automation, accident, or unusual deterioration or degradation of the Products or Work or parts thereof due to physical environment or electrical or electromagnetic noise environment.

(f) THE ABOVE WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES AND CONDITIONS, WHETHER EXPRESSED; IMPLIED OR STATUTORY, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE.

**12. INTELLECTUAL PROPERTY INDEMNITY.**  Rockwell Automation will pay costs and damages finally awarded in any suit against Buyer to the extent based on a finding that the design or construction of any Work or Products as furnished, infringe any patent, utility model, copyright, or trademark granted or registered in the country of Rockwell Automation’s shipping destination, provided that, Buyer: (i) promptly informs Rockwell Automation of the alleged infringement in writing; (ii) provides Rockwell Automation the exclusive right to defend and settle the suit, at Rockwell Automation’s expense; and, (iii) provides all reasonable information and assistance requested for the defense. Rockwell Automation shall have no liability for any infringement that is based upon or arises out of: (a) compliance with Buyer’s instructions, specifications or designs; (b) use of Work or Products in a Buyer or third-party process; or, (c) combinations with other equipment, software or materials not supplied by Rockwell Automation. The foregoing states the sole and exclusive obligations of Rockwell Automation for intellectual property infringement.

**13. GENERAL INDEMNITY.** Rockwell Automation agrees to indemnify the Buyer from any suit or proceeding by third parties (which are not Rockwell Automation employees) for damage to third-party tangible property and for bodily injury to the percentage extent directly caused by Rockwell Automation’s negligence in the performance of this Agreement. This indemnity is contingent upon Buyer giving Rockwell Automation prompt notice of any such suit or proceeding and all necessary information and assistance so that Rockwell Automation may defend or settle such claim and provided Buyer does not take any adverse position in connection with such claim. If any such damage or injury is caused by the joint or concurrent negligence of Rockwell Automation and Buyer, or any agent, subcontractor, or supplier to Buyer, each party shall pay for its own defense, and the liability of each party shall be borne in proportion to the party’s negligence.

**14. DISCLAIMER AND LIMITATION OF LIABILITY.** TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, NEITHER PARTY SHALL BE LIABLE TO THE OTHER PARTY FOR ANY BUSINESS INTERRUPTION OR LOSS OF PROFIT, REVENUE, MATERIALS, ANTICIPATED SAVINGS, DATA, CONTRACT, GOODWILL, OR THE LIKE (WHETHER DIRECT OR INDIRECT IN NATURE) OR FOR ANY OTHER FORM OF INCIDENTAL, INDIRECT, OR CONSEQUENTIAL DAMAGES OF ANY KIND. EACH PARTY’S MAXIMUM CUMULATIVE LIABILITY RELATIVE TO ALL OTHER CLAIMS AND LIABILITIES, INCLUDING OBLIGATIONS UNDER ANY INDEMNITY, WHETHER OR NOT INSURED, WILL NOT EXCEED THE LESSER OF $1,000,000 OR THE COST OF THE WORK. ROCKWELL AUTOMATION DISCLAIMS ALL LIABILITY RELATIVE TO GRATUITOUS INFORMATION OR ASSISTANCE PROVIDED BY BUT NOT REQUIRED OF ROCKWELL AUTOMATION BY THE STATEMENT OF WORK. ANY ACTION BY EITHER PARTY MUST BE BROUGHT WITHIN 18 MONTHS AFTER THE CAUSE OF ACTION ACCRUES. THESE DISCLAIMERS AND LIMITATIONS OF LIABILITY WILL APPLY REGARDLESS OF ANY OTHER CONTRARY PROVISION AND REGARDLESS OF THE FORM OF ACTION, WHETHER IN CONTRACT, TORT (INCLUDING NEGLIGENCE AND STRICT LIABILITY), OR OTHERWISE. EACH PROVISION OF THIS AGREEMENT THAT PROVIDES FOR A LIMITATION OF LIABILITY, DISCLAIMER OF WARRANTY OR CONDITION OR EXCLUSION OF DAMAGES IS SEVERABLE AND INDEPENDENT OF ANY OTHER PROVISION. THIS PROVISION EXTENDS TO THE BENEFIT OF ROCKWELL AUTOMATION’S PARENT, SUBSIDIARIES, AFFILIATES, VENDORS, APPOINTED DISTRIBUTORS, AND OTHER AUTHORIZED RESELLERS AS THIRD-PARTY BENEFICIARIES.

**15. BUYER SPECIFICATION.**

(a) Unless otherwise specified in the Statement of Work, Rockwell Automation does not warrant or indemnify and will not otherwise be liable for (i) design, materials, or construction criteria furnished or specified by Buyer and incorporated into the Work or Products, (ii) products supplied by, made by or sourced from Buyer or other manufacturers or vendors specified by Buyer; or (iii) commercially available computer software, hardware, and electrical components. (Such Buyer supplied/specified products shall include but not be limited to any identified in the Statement of Work.) Any warranty or indemnity applicable to such Buyer supplied/specified products will be limited solely to the warranty or indemnity, if any, extended by the original manufacturer or vendor other than Rockwell Automation to the extent permissible thereunder.

(b) *RoHS:* Buyer supplied/specified products will meet all applicable material restrictions as defined in RoHS. If it does not, Buyer will notify Rockwell Automation prior to shipment of the Buyer supplied/specified products to Rockwell Automation. Buyer will indemnify Rockwell Automation against any claim arising out of Rockwell Automation’s use of Buyer supplied/specified products.

**16. INSURANCE.** During the term of this Agreement, Rockwell Automation shall maintain, at its sole expense, the following minimum insurance coverages:

(a) *Workers’ Compensation*: statutory in accordance with applicable law;

(b) *Employer’s Liability*: $1,000,000 per accident, per employee, per disease;

(c) *Commercial General Liability*: $2,000,000 per occurrence single limit of liability, $2,000,000 general aggregate that shall include but not be limited to contractual liability, premises liability, advertising liability, and product liability; and

(d) *Commercial Automobile Liability*: $2,000,000 per occurrence combined single limit of liability, covering all owned, leased, and non-owned vehicles.

**17. BUYER INFORMATION.**

(a) Buyer represents and warrants that it has the rights to the information provided or made available by Buyer to Rockwell Automation, including but not limited to technical specifications, drawings, source code, application code, communication interfaces, protocols, and all other documentation (collectively “Buyer Information”), for Rockwell Automation to perform its obligations under this Agreement and that such access to and use of Buyer Information under this Agreement will not infringe or violate any agreement, confidentiality obligations, copyrights, or other intellectual property rights of the original vendor or any other third party. Buyer agrees to indemnify Rockwell Automation from any claims arising out of Rockwell Automation’s use of Buyer Information pursuant to the Statement of Work.

(b) In Rockwell Automation’s performance of services, sales activities, or in connection with Buyer’s use of Rockwell Automation Products, Rockwell Automation may obtain, receive, or collect data or information, including Buyer’s contract information, computer system profile, Rockwell Automation Product installation data, and Buyer’s usage specific data of Rockwell Automation Products (collectively, the "Data"). In such cases, Buyer grants Rockwell Automation a non-exclusive, worldwide, royalty-free, perpetual, non-revocable license to use, compile, distribute, display, store, process, reproduce, or create derivative works of the Data solely to facilitate the performance of sales and services by Rockwell Automation and its affiliates (including, but not limited to, quality, safety, energy, and security analytics, product and service diagnostics and prognostics, and reporting), and to facilitate or improve Buyer’s use of the Products. In addition, Buyer grants Rockwell Automation and its affiliates a license to use and aggregate the Data in support of Rockwell Automation’s marketing and sales activities. Rockwell Automation and its affiliates may also use this information in the aggregate, in a form which does not personally identify Buyer, to improve Products and Rockwell Automation may share anonymous aggregate data with our third party suppliers and service providers.

**18. SAFETY AND STANDARDS.**

(a) Rockwell Automation is responsible for compliance of the Work with laws, regulations, and standards, including safety regulations and standards, of the country where the Work will be located that are applicable to the Work at the effective date of this Agreement,.

(b) Buyer must inform Rockwell Automation of any other laws, regulations, or standards that may apply to the Work. Rockwell Automation will be responsible for compliance with such other safety or other standards only if documented in the Statement of Work.

(c) Rockwell Automation is not responsible for laws, regulations, or standards that apply to Buyer’s (or end user’s, if different from Buyer) facility, equipment, process, information system, or data.

**19. SITE RULES, LICENSES, PERMITS, SITE PREPARATION.**

(a) Rockwell Automation agrees to comply with all applicable posted site rules of Buyer (unless inconsistent with the obligations set forth in the Statement of Work) and any additional Buyer’s site rules that have been incorporated into the Statement of Work.

(b) Buyer is responsible for:

(1) all licenses, permits, clearances, and site access rights;

(2) all sites being ready and equipped with all necessary Buyer furnished equipment and facilities;

(3) the sites, including any required Buyer fixtures or facilities being safe, hazard free, structurally sound, and sufficient;

(4) reasonable access to the worksite;

(5) properly using, calibrating operating, monitoring and maintaining the Work consistent with all Rockwell Automation or third-party provided instructions, warnings, recommendations and documentation; and

(6) all other factors affecting the Work that are outside of the direct control of Rockwell Automation.

(7) indemnifying Rockwell Automation for any claims to the percentage extent directly caused by Buyer’s breach of the obligations listed in section 19(b) above.

**20. QUALITY, INSPECTIONS AND TESTING.**

(a) Rockwell Automation maintains ISO 9001-2000 certified quality systems globally at its major production facilities.

(b) Unless otherwise agreed in the Statement of Work, customer inspection and testing prior to delivery will be limited to witnessing Rockwell Automation’s standard factory tests of the Work or Products on the date scheduled by Rockwell Automation. All such tests will be subject to reasonable advance notice and may be subject to additional charges.

**21. GOVERNMENT CLAUSES AND CONTRACTS.** No government contract clauses, specification, or regulations apply to the Work, Products, or otherwise to this Agreement except to the extent agreed in writing by Rockwell Automation.

**22. EXPORT CONTROL.** Products and associated materials supplied or licensed hereunder may be subject to various export laws and regulations. It is the responsibility of the exporter to comply with all such laws and regulations Notwithstanding any other provision to the contrary, if U.S. or local law requires export authorization for the export or re-export of any Product or associated technology, no delivery can be made until such export authorization is obtained, regardless of any otherwise promised delivery date, and Rockwell Automation will be relieved of any obligation relative to the delivery of the Product(s) or Work subject to such delayed authorization without liability of any kind to Buyer or any other party. Further, if any required export authorization is denied, Rockwell Automation will be relieved of any further obligation relative to the sale and/or license and delivery of the Product(s) or Work subject to such denial without liability of any kind to Buyer or any other party. Rockwell Automation will not comply with boycott related requests except to the extent permitted by U.S. law and then only at Rockwell Automation’s discretion.

**23. ASSIGNMENT.** This Agreement may not be assigned in whole or in part by either party without the written consent of the other. However, consent will not be required for internal transfers and assignments between party and its parent company, subsidiaries, or affiliates as part of a consolidation, merger, or any other form of corporate reorganization.

**24. EMPLOYEE SOLICITATION.** During the term of this Agreement and for 12 months following its termination, Buyer agrees that if it hires any employee of Rockwell Automation with whom the Buyer has had contact as a result of this Agreement, it will pay Rockwell Automation 50% of the hired Rockwell Automation employee’s annual salary.

**25. INDEPENDENT CONTRACTORS.** The parties at all times will be independent. Neither party is an employee, joint venturer, agent or partner of the other; neither party is authorized to assume or create any obligations or liabilities, express or implied, on behalf of, or in the name of the other. The employees, methods, facilities, and equipment of each party at all times will be under the exclusive direction and control of that party.

# 26. DISPUTES. The parties will attempt in good faith to promptly resolve any dispute by negotiations between representatives who have authority to settle the dispute. Any dispute not resolved by negotiation may then be submitted to a court of competent jurisdiction in accordance with the terms provided in this Agreement. These procedures are the exclusive procedures for the resolution of disputes between the parties.

**27. GOVERNING LAW AND FORUM.** This Agreement and all disputes arising under it will be governed by and interpreted in accordance with the internal laws and will be subject to the exclusive jurisdiction of the courts of the state, province, or other governmental jurisdiction in which Rockwell Automation’s principal place of business resides but specifically excluding the provisions of the 1980 UN Convention on Contracts for the International Sales of Goods.

# 28. CONFIDENTIALITY.

(a) During the term of this Agreement and for a period of three years thereafter, each party will maintain in strict confidence all technical and business data and information disclosed by one party to the other that is marked "Confidential” and will not use or reveal such information without the prior written authorization of the other.

(b) “Recipient” and “Discloser” shall refer to Buyer and Rockwell Automation in their respective roles as both recipient and discloser of Confidential Information under this Agreement.

(c) The obligations of confidentiality and non-use will not apply to information (i) that is published or becomes part of the public domain other than by means of a breach of this Agreement; (ii) that the Recipient can prove by written documentation was known to it prior to disclosure by the Discloser; (iii) that the Recipient subsequently rightfully receives from a third party without an obligation of confidentiality; (iv) that the Discloser discloses to a third party on a non-confidential basis; or (v) that was independently developed by the Recipient.

(d) The Recipient shall not use or disclose any Confidential information, except as expressly authorized by this Agreement, and shall protect all such Confidential information using the same degree of care which Recipient uses with respect to its own similar proprietary information, but in no event with safeguards less than a reasonably prudent business would exercise under similar circumstances. Recipient shall take prompt and appropriate action to prevent unauthorized use or disclosure of the Confidential Information.

(e) If any Confidential information must be disclosed to any third party by reason of legal, accounting or regulatory requirements beyond the reasonable control of the Recipient, the Recipient shall promptly notify the Discloser of the order or request and permit the Discloser (at its own expense) to seek an appropriate protective order.

**29. SEVERABILITY.** If a provision of this Agreement is found unenforceable by law, the remainder of this Agreement shall continue in full force and effect. A delay or failure in enforcing any right or remedy under this Agreement shall not prejudice or operate to waive that right or remedy.

**30. COUNTERPARTS.** This Agreement may be executed in multiple counterparts.

**31. NOTICE.** Written notice will be deemed to have been given when the notifying party delivers such notice to the other party or has sent such notice to the other party by certified or registered mail or facsimile (with confirming letter to follow), directed as follows (unless written notice of a change of address has been given in accordance with this paragraph):

# To Rockwell Automation:

# 

# Attn

# :

# Facsimile:

# To Buyer:

# 

# Attn:

# Facsimile:

**32. PUBLICITY**. Buyer agrees that Rockwell Automation may disclose in the ordinary course of business buyer’s name and logo on the Rockwell Automation’s customer list and website. For the work performed pursuant to this agreement, Buyer consents to Rockwell Automation’s desire to publicize the award of this Agreement by creating a brief success story identifying the type of work performed, the Rockwell Automation products and services used, location, industry and customer’s name for marketing purposes only.

**33. LANGUAGE.** The parties acknowledge that they have required that the agreement evidenced hereby be drawn up in English. Les parties reconnaissent avoir exigé la rédaction en anglais du Contrat. In the event of a conflict between the English and other language versions, the English version will prevail.

**34. EXECUTION.** Buyer may accept this Agreement by either signing this Agreement or sending Rockwell Automation a purchase order explicitly referencing on its face this Agreement (e.g., “This order placed in accordance with Rockwell proposal # \_\_\_\_\_\_\_\_\_\_\_\_dated\_\_\_\_\_\_\_\_\_\_\_\_\_ ,” or, simply, “Per Rockwell proposal #\_\_\_\_\_\_\_\_\_\_ dated\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)”.

**Accepted.**

**Customer:**

**Date:**

# Attachment A - RA Bill of Material (BOM)

|  |  |  |
| --- | --- | --- |
| **Product** | **Description** | **Qty** |
| 440T-MSRUE110A | [VYPUŠTĚNO] | 1 |
| 440T-AKEYE100A | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE110A | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE110B | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE110C | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE110D | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE110E | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE110F | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE110G | [VYPUŠTĚNO] | 1 |
| 440T-AKEYE100B | [VYPUŠTĚNO] | 1 |
| 440T-AKEYE100C | [VYPUŠTĚNO] | 1 |
| 440T-AKEYE100D | [VYPUŠTĚNO] | 1 |
| 440T-AKEYE100E | [VYPUŠTĚNO] | 1 |
| 440T-AKEYE100F | [VYPUŠTĚNO] | 1 |
| 440T-AKEYE100G | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE110A | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE11AB | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE11AC | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE11AD | [VYPUŠTĚNO] | 1 |
| 440T-AKEYE10AB | [VYPUŠTĚNO] | 1 |
| 440T-AKEYE10AC | [VYPUŠTĚNO] | 1 |
| 440T-AKEYE10AD | [VYPUŠTĚNO] | 1 |
| 440T-MKEXE24ABAZAZAZAZAZAZAZAZAZAZ | [VYPUŠTĚNO] | 1 |
| 440T-MKEXE12ACAYAYAY | [VYPUŠTĚNO] | 1 |
| 440T-MRPSE11AD | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE110B | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE11BB | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE11BC | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE11BD | [VYPUŠTĚNO] | 1 |
| 440T-AKEYE10BB | [VYPUŠTĚNO] | 1 |
| 440T-AKEYE10BC | [VYPUŠTĚNO] | 1 |
| 440T-AKEYE10BD | [VYPUŠTĚNO] | 1 |
| 440T-MKEXE24BBBZBZBZBZBZBZBZBZBZBZ | [VYPUŠTĚNO] | 1 |
| 440T-MKEXE12BCBYBYBY | [VYPUŠTĚNO] | 1 |
| 440T-MRPSE11BD | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE110C | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE11CB | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE11CC | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE11CD | [VYPUŠTĚNO] | 1 |
| 440T-AKEYE10CB | [VYPUŠTĚNO] | 1 |
| 440T-AKEYE10CC | [VYPUŠTĚNO] | 1 |
| 440T-AKEYE10CD | [VYPUŠTĚNO] | 1 |
| 440T-MKEXE24CBCZCZCZCZCZCZCZCZCZCZ | [VYPUŠTĚNO] | 1 |
| 440T-MKEXE12CCCYCYCY | [VYPUŠTĚNO] | 1 |
| 440T-MRPSE11CD | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE110D | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE11DB | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE11DC | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE11DD | [VYPUŠTĚNO] | 1 |
| 440T-AKEYE10DB | [VYPUŠTĚNO] | 1 |
| 440T-AKEYE10DC | [VYPUŠTĚNO] | 1 |
| 440T-AKEYE10DD | [VYPUŠTĚNO] | 1 |
| 440T-MKEXE24DBDZDZDZDZDZDZDZDZDZDZ | [VYPUŠTĚNO] | 1 |
| 440T-MKEXE12DCDYDYDY | [VYPUŠTĚNO] | 1 |
| 440T-MRPSE11DD | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE110E | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE11EB | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE11EC | [VYPUŠTĚNO] | 1 |
| 440T-MSRUE11ED | [VYPUŠTĚNO] | 1 |
| 440T-AKEYE10EB | [VYPUŠTĚNO] | 1 |
| 440T-AKEYE10EC | [VYPUŠTĚNO] | 1 |
| 440T-AKEYE10ED | [VYPUŠTĚNO] | 1 |
| 440T-MKEXE24EBEZEZEZEZEZEZEZEZEZEZ | [VYPUŠTĚNO] | 1 |
| 440T-MKEXE12ECEYEYEY | [VYPUŠTĚNO] | 1 |
| 440T-MRPSE11ED | [VYPUŠTĚNO] | 1 |
| 440T-AKEYE10xx | [VYPUŠTĚNO] | 25 |
| 800FM-MT44 | [VYPUŠTĚNO] | 32 |
| 800F-ALM | [VYPUŠTĚNO] | 32 |
| 800F-X02D | [VYPUŠTĚNO] | 32 |
| 800F-X11D | [VYPUŠTĚNO] | 32 |
|  | [VYPUŠTĚNO] | 16 |
| 440G-TZS21UPLH | [VYPUŠTĚNO] | 7 |
| 440N-Z21W1PH | [VYPUŠTĚNO] | 75 |
| 800FM-FA9 | [VYPUŠTĚNO] | 32 |
| 800F-ALM | [VYPUŠTĚNO] | 32 |
| 800F-X01 | [VYPUŠTĚNO] | 32 |
| 800F-X10E | [VYPUŠTĚNO] | 32 |
| P2800-1S | [VYPUŠTĚNO] | 1 |
| S0739-CAL | [VYPUŠTĚNO] | 6 |
| S0749A-DG-SE-SE | [VYPUŠTĚNO] | 3 |
| AUL-EC-S0768C | [VYPUŠTĚNO] | 1 |
| M259 | [VYPUŠTĚNO] | 4 |
| D347 | [VYPUŠTĚNO] | 8 |
| D352 | [VYPUŠTĚNO] | 8 |
| V115F | [VYPUŠTĚNO] | 1 |
| B50112F | [VYPUŠTĚNO] | 2 |
| R531F | [VYPUŠTĚNO] | 1 |
| R682 | [VYPUŠTĚNO] | 1 |
| R685 | [VYPUŠTĚNO] | 1 |
| S0753-EVAL | [VYPUŠTĚNO] | 1 |
| S0769A-ESSL | [VYPUŠTĚNO] | 1 |
| DESKTOP PC | [VYPUŠTĚNO] | 2 |
| Laser Printer | [VYPUŠTĚNO] | 1 |
| 9518-HSE1K | [VYPUŠTĚNO] | 1 |
| 9518-HCAL1KENF | [VYPUŠTĚNO] | 1 |
| 9701-VWSTENE | [VYPUŠTĚNO] | 1 |
| 9701-VWSTMENE | [VYPUŠTĚNO] | 1 |
| 9701-VWSS000LENE | [VYPUŠTĚNO] | 1 |
| 9701-VWSCWAENE | [VYPUŠTĚNO] | 2 |
| 1783-MX08S | [VYPUŠTĚNO] | 4 |
| 9324-RLD700NXENE | [VYPUŠTĚNO] | 1 |
| 1756-L73S | [VYPUŠTĚNO] | 1 |
| 2711P-T15C22A9P-B | [VYPUŠTĚNO] | 5 |
| 1756-L72S | [VYPUŠTĚNO] | 9 |
| 1756-EN2TR | [VYPUŠTĚNO] | 10 |
| 1756-A4 | [VYPUŠTĚNO] | 10 |
| 1756-PA75 | [VYPUŠTĚNO] | 10 |
| 1756-L7SP | [VYPUŠTĚNO] | 10 |
| 1756-EN2T | [VYPUŠTĚNO] | 10 |
| 1606-XLS240E | [VYPUŠTĚNO] | 27 |
| 1783-MS10T | [VYPUŠTĚNO] | 14 |
| 1734-AENTR | [VYPUŠTĚNO] | 56 |
| 1734-EP24DC | [VYPUŠTĚNO] | 26 |
| 1783-SFP100LX | [VYPUŠTĚNO] | 32 |
| 1734-OB8S | [VYPUŠTĚNO] | 107 |
| 1734-IB8S | [VYPUŠTĚNO] | 116 |
| 1734-TOP | [VYPUŠTĚNO] | 426 |
| 1783-ETAP2F | [VYPUŠTĚNO] | 15 |

# Attachment B – Maintenance services

See Attached files: *QXQ1K1017B Bundled Contract Agreement Fyzikální ústav AV ČR, v. v. i. .pdf ; QXQ1K1017B Handbook Fyzikální ústav AV ČR, v. v. i. .pdf; QXQ1K1017B Proposal Fyzikální ústav AV ČR, v. v. i. .pdf and QXQ1K1017B Annex No. 7C Spare Parts Price Table.xlsx*

# Attachment C – Cyber security assessment

**Network and Security Services (NSS) value to our customers**

For any kind of automation system today communication is key.

The communication can occur between automation systems or between automation system and SCADA ,HMI ,Historical Databases and even ERP systems.

Ethernet today is often the backbone the communication based on.

Ethernet devices so as switches ,routers and firewalls securely delivers data between the various assets in different location in the plant. This makes Ethernet network infrastructure one of the most important part of the whole production site.

From this prospective the network infrastructure should be carefully planned secure,resilient ,reliable and scalable as possible.

To help customers tackle the complexity of designing and maintaining an IT infrastructure in an OT environment,

Rockwell Automation’s **Network and Security Services** team supports a project or system throughout its lifecycle and assists the customer to reach necessary reductions in design and implementation costs, increase uptime and reduce future maintenance costs.

The lifecycle phases include the following:

* Assess
* Design & Plan
* Implement
* Manage and Monitor

By selecting the Network & Security Services Option, the customer gets the benefit of one single point of contact, Rockwell Automation, for both the Infrastructure and the Software, hence simplifying and accelerating the execution of the project.

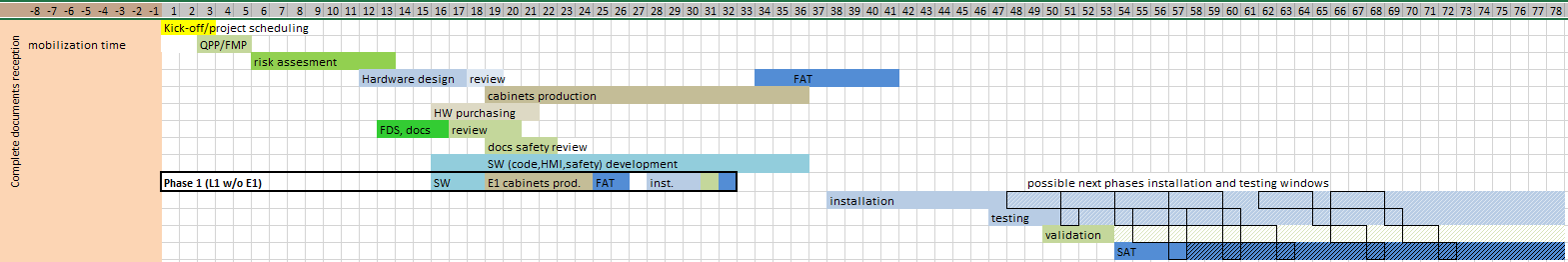
For this activity we allow 5 days security assessment 3 days on site / 1 day offsite to create the report / 1 day travel time.

# Attachment D – Installation BOM

[VYPUŠTĚNO]

# Attachment E – Time schedule

E1+L1 project schedule is shown in required Annex: *QXQ1K1017B Annex No. 8 Schedule of Deliverables of the Phase 1.xlsx*



# Attachment F – Project team CVs and Certificates

Please see following attached documents:

*QXQ1K1017B Acerbis August 2017 - ELI PSI CV submission.pdf*

*QXQ1K1017B Alessandro Acerbis Certificato di Laurea.pdf*

*QXQ1K1017B Boris Georgiev August 2017 - ELI PSI CV submission w Annex.pdf*

*QXQ1K1017B Bystersky\_CV.pdf*

*QXQ1K1017B Bystersky\_Diploma.pdf*

*QXQ1K1017B Bystersky\_TUV.pdf*

*QXQ1K1017B Bystersky\_v50\_1978zb.pdf*

*QXQ1K1017B Chauhan Deepti August 2017 - ELI PSI CV submission.pdf*

*QXQ1K1017B Karel Stibor\_CV.pdf*

*QXQ1K1017B Karel Stibor\_diploma.pdf*

*QXQ1K1017B Kirkcaldy Keith August 2017 - ELI PSI CV submission.pdf*

*QXQ1K1017B Martin Twomey RA Curriculum Vitae\_June 2017.pdf*

*QXQ1K1017B Ottley Graham August 2017 - ELI PSI CV submission.pdf*

*QXQ1K1017B Stephan Richter August 2017 - ELI PSI CV submission.pdf*

*QXQ1K1017B Stephan Richter Uni Karlsruhe Diplom.pdf*

# Attachment G – End User Licence Agreement

See attached file: *QXQ1K1017B Rockwell EULA.pdf*

# Attachment H – Payment & deliverables schedule

See file: *QXQ1K1017B Annex No. 6 Contract\_A2\_Schedule of Deliverables.xlsx*