Short title of the Project
Contracted Party (short form)

IDENTIFICATION

Project identification	
Full title of the project	
Contracted Party (full name)	
Principal Investigator	
Phone number	
E-mail address	
Author of this report	
Phone number	
E-mail address	
Date of completion of the report	
Principal Investigator ELI-ALPS	
Technical Contact ELI-ALPS	

DOCUMENT VERSION

Modified by	Date (dd/mm/yyyy)	Revision number	Changes made
		v1.	
		v2.	

SZÉCHENYI 2020

TABLE OF CONTENTS

I. Introduction

Basic concepts, scope etc.

II. General description of the system

II. 1. Block diagram

2D block diagram

key subsysems and their connections, for example

- in case of lasers: CEP-stabilized oscillator, front-end, amplification stage 1, etc.
- in case of secondary sources: polarization gating chamber, laser focusing chamber, harmonic generation chamber

system interface and boundaries defined towards the facility, total dimensions of the system, layout in the laboratory

II. 2. General scientific description and function

the scientific detailed description of the complete system, include all the relevant necessary scientific references and documents commenting on the functional and scientific capabilities and potential of the system

II. 3. Beam and optical aspects

Optical layout of the complete system (emphasizing major optical components) detailing the following

- Beam / optical interface and boundaries
- 2D block diagrams
- 3D model/layout for optics and beam diagnostics
- Modeling, simulations, pre-calculations

II. 4. Vacuum and mechanical aspects

vacuum and mechanical layout of the sytem (with indication of foreseen vacuum levels and clear indication/description of differential pumping stages, also identifying vacuum components, gauges, valves, etc.)

- Vacuum and mechanical boundary, interfaces
- 2D block diagrams, PID diagrams
- 3D models/layout for vacuum/mechanics
- Modeling, simulations, pre-calculations

II. 5. Machine Protection Aspects, Personal Safety Aspects

- Risk assessment for PSS and MPS (Risk probabilities, risk severity and overall risk - calculated as a weighted mean between probability and severity - should be presented for each activities, risk sources, risks, and mentioning the possible consequences and contingency plans)
- Design of schematic of the local PSS and MPS
- Logical organization of PSS and MPS
- Control elements of PSS and MPS (eg. PLCs, computers, etc.)
- Physical elements of PSS and MPS (eg. shutters, etc.)
- Interfacing with the facility wide PSS and MPS (input/output signals), system boundary
- Type of diagnostics to be interfaced to the facility wide PSS and MPS
- General state machine description, input/output signals

II. 6. Electrical controls and diagnostics aspects

specification of the control and diagnostic interfaces and components (actuators, signals, sensors, interlocks, high voltage, etc.)

- Hard-wired boundary, control/monitoring interfaces
- 2D block diagrams, controllers/devices architecture,
- System internals: Definitions and diagrams

II. 7. Integrated IT & Software aspects

specification of the control and diagnostic software (control applications, GUIs, alarms, warnings, logging, storage, network, etc.) in an integrated manner for all connected devices:

- 2D block diagrams: software components, connections & architecture
- Software boundary, sw control/monitoring interfaces, especially standard remote access through standard software API/gateway
- System internals: definitions and diagrams

II. 8. Specifications / acceptance criterias of the system

the contracted and further specs may be necessary for the intermediate visits, FAT and SAT (see III.9 and III.10 below).

II. 9. Factory Acceptance Test (FAT)

Specificatons and their description of the measurement method, operational conditions during the test, along with the conditions for acceptance at the site of the contractor.

II. 10. Site Acceptance Test (SAT)

Description of the measurement method, operational conditions during the test of each specs of the system described in III.8, along with the conditions for acceptance at the ELI-ALPS site.

III. Description of the sub-systems

III. 1. Sub-system 1 (e.g. CEP-stabilized oscillator)

III. 1. 1. Block diagram

2D block diagram

key subsysems and their connections, for example

- in case of lasers: CEP-stabilized oscillator, front-end, amplification stage 1, etc.
- in case of secondary sources: polarization gating chamber, laser focusing chamber, harmonic generation chamber

sub-system interface and boundaries defined towards the facility, total dimensions of the system, layout in the laboratory

III. 1. 2. Detailed scientific description and function

the scientific detailed description of the specific subsystem, include all the relevant necessary scientific references and documents

III. 1. 3. Beam and optical aspects

Detailed optical layout of the specific system (emphasizing major optical components) detailing the following

- Beam / optical interface and boundaries
- 2D block diagrams
- 3D model/layout for optics and beam diagnostics
- Modeling, simulations, pre-calculations

III. 1. 4. Vacuum and mechanical aspects

vacuum and mechanical layout of the sytem (with indication of foreseen vacuum levels and clear indication/description of differential pumping stages, also identifying vacuum components, gauges, valves, etc.)

- Vacuum and mechanical boundary, interfaces
- 2D block diagrams, PID diagrams
- 3D models/layout for vacuum/mechanics
- Modeling, simulations, pre-calculations

III. 1. 5. Machine Protection Aspects, Personal Safety Aspects

- Risk assessment for PSS and MPS (Risk probabilities, risk severity and overall risk - calculated as a weighted mean between probability and severity - should be presented for each activities, risk sources, risks, and mentioning the possible consequences and contingency plans)
- Design of schematic of the local PSS and MPS
- Logical organization of PSS and MPS
- Control elements of PSS and MPS (eg. PLCs, computers, etc.)
- Physical elements of PSS and MPS (eg. shutters, etc.)
- Interfacing with the facility wide PSS and MPS (input/output signals), subsystem boundary
- Type of diagnostics to be interfaced to the facility wide PSS and MPS
- General state machine description, input/output signals

III. 1. 6. Electrical controls and diagnostics aspects

specification of the control and diagnostic interfaces and components (actuators, signals, sensors, interlocks, high voltage, etc.)

- Hard-wired boundary, control/monitoring interfaces
- 2D block diagrams, controllers/devices architecture,
- Sub-system internals: Definitions and diagrams (states & state transitions, commands & control flowcharts, interlocks, etc.)

III. 1. 7. Integrated IT & Software aspects

specification of the control and diagnostic software (control applications, GUIs, alarms, warnings, logging, storage, network, etc.) in an integrated manner for all connected devices:

- 2D block diagrams: software components, connections & architecture
- Software boundary, sw control/monitoring interfaces
- Sub-system internals: definitions and diagrams (states & state transitions, commands & control flowcharts, interlocks, etc.)

III. 1. 8. Specifications / acceptance criterias of the subsystem (optional, if subsystem delivered separately)

the contracted and further specs may be necessary for the FAT and SAT (see III.1.9 and IV.1.10 below).

III. 1. 9. Factory Acceptance Test (FAT) - (optional, if subsystem FAT separately)

Specificatons and their description of the measurement method, operational conditions during the test, along with the conditions for acceptance at the site of the contractor.

III. 1. 10. Site Acceptance Test (SAT) - (optional, if subsystem SAT separately)

Description of the measurement method, operational conditions during the test of each specs of the subsystem described in IV.1.8, along with the conditions for acceptance at the ELI-ALPS site.

III. 2. Sub-system 2

III. 2. 1. Block diagram

III. 2. 2. Detailed scientific description and function

III. 2. 3. …

IV. Auxiliary information and requests

- List of necessary materials and tools to be provided by each party necessary for the installation
- List of relevant & applied EU/EC directives and standards
- Additionally requested room and conditions for power supplies, pre-vacuum pumps, and any other components to be installed outside the lab and not depicted in the 3D model
- Total electrical consumption
- Requested total cooling capacity (by water, by air, and by location).
- Due dates for clarification or completion of not completed / detailed chapters / sub-chapters of the TDR.

V. Appendix: detailed supplementary documentation

As part & finalization of commissioning, the TDR shall be amended/updated with:

- **before start of on-site commissioning:** assembly-, installation- and test plan documentation (including bill of materials, manufacturing drawings, detailed technical diagrams)
- **as the final step of commissioning:** test reports; as-built plans; conformity declarations; operational & maintenance documentation (manuals, instructions)

The TDR together with the *detailed supplementary documentation* shall be sufficient for experienced professionals to implement the system without any additional design effort, especially – but not exclusively - meaning here the corrective maintenance of the system (e.g. a full reinstallation of the command control subsystem). The documentation shall cover each scientific and engineering field in enough detail for an experienced professional of each field: especially targetry, optics, diagnostics, vacuum, mechanics, electrical/electronics, command control, software & IT. The developer shall determine the relevant directives and the harmonised standards specific to the equipment: the equipment shall be designed, implemented and commissioned in conformity with these.

Approbation

..... (Contracted party)

Index			Signature
Written by	*Date*		
	Name/Affiliation		
Approved by	*Date*		
	Name/Affiliation		

ELI-ALPS (Customer)

Index			Signature
Approval	*Date*		
	Name/Affiliation		
Approval	*Date*		
	Name/Affiliation		