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**Technical specifications for the procurement and
installation of inlet filters (airlocks)
for PRIMA building 1**

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ABSTRACT

This document defines the technical specifications for the supply and installation of entry filters ("airlocks") for the pedestrian access doors and material entry doors of building 1 of PRIMA. The inlet filters will be installed inside the building itself.

Table of contents

ABSTRACT.....	2
1. Introduction	4
2. Terms and Definitions	4
3. Applicable Documents.....	4
4. Openings subject to intervention	5
5. Technical specifications for inlet filters.....	5
5.1. Pedestrian doors.....	5
5.2. Material entry doors (A e C)	7
5.3. Central material entrance door (B).....	8
6. Site inspection.....	9
7. Work Breakdown Structure.....	9
8. Delivery, milestones and scheduling.....	11
8.1. Milestones	11
8.2. Deliverables.....	12
8.2.1. Management documentation.....	12
8.2.2. Technical documentation	12
8.2.3. Manufacturing Design Report and detailed drawings	12
8.2.4. On Site Assembly Plan	13
8.2.1. On Site Acceptance Test Plan	13
8.2.2. On Site Acceptance Tests Report.....	13
8.2.3. ADP and as-built drawings.....	13

1. Introduction

The PRIMA (Padova Research on Injector Megavolt Accelerated) test facility in Padua hosts two experiments with the aim of developing a high-energy (1 MeV) and high-power (16.5 MW) neutral particle injector which will serve to heat the plasma of the international ITER experiment whose main mission is to demonstrate the feasibility of controlled thermonuclear fusion with magnetic confinement.

Inside PRIMA building 1, from early 202 is expected the arrival of components of significant dimensions for high vacuum installation which require operating with an adequate level of cleanliness inside the building. This document defines the technical specifications for the supply and installation of entry filters ("airlocks") for the pedestrian access doors and the doors for the entry of materials of PRIMA building 1 to ensure internal operation in cleanliness conditions at least equivalent to ISO class 8 (according to ISO14644-1 standard).

2. Terms and Definitions

Term	Definition	Acronym
KoM	Kick-Off Meeting of the Contract	KoM
MITICA	Megavolt I Ter Injector & Concept Advancement.	MITICA
PRIMA	The overall Neutral Beam test facility hosting the MITICA and SPIDER experiments. Padova Research on Injector Megavolt Accelerated	PRIMA
Consorzio RFX	Consorzio RFX is a Research Organization promoted by CNR, ENEA, Università di Padova, Acciaierie Venete S.p.A. and INFN.	RFX
Site	The location where the system or equipment object of these technical specifications will be installed. The Site considered in this document is the PRIMA Site in Padova (Italy)	---
Supplier	The successful Bidder (Tenderer or Applicant) is referred in the document as the "Supplier".	---

3. Applicable Documents

Ref number	Document title	Doc Number
AD1	SAFETY RISKS INFORMATION AND EMERGENCY PLAN OF NEUTRAL BEAM TEST FACILITY (NBTF)	SPP/NT/10 rev. 3

AD2	Supplier Requirements	Quality	<i>F4E-OFC-582-03-ST4.1.A_RFX-PRIMA-TS-015_PRIMA_Airlocks_Supplier_Quality_Requirements_r0</i>
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4. Openings subject to intervention

Fig. 1 (upper part) shows the front and (lower part) the plan view of building 1 of PRIMA with the openings towards the outside identified for the purpose of the intervention.

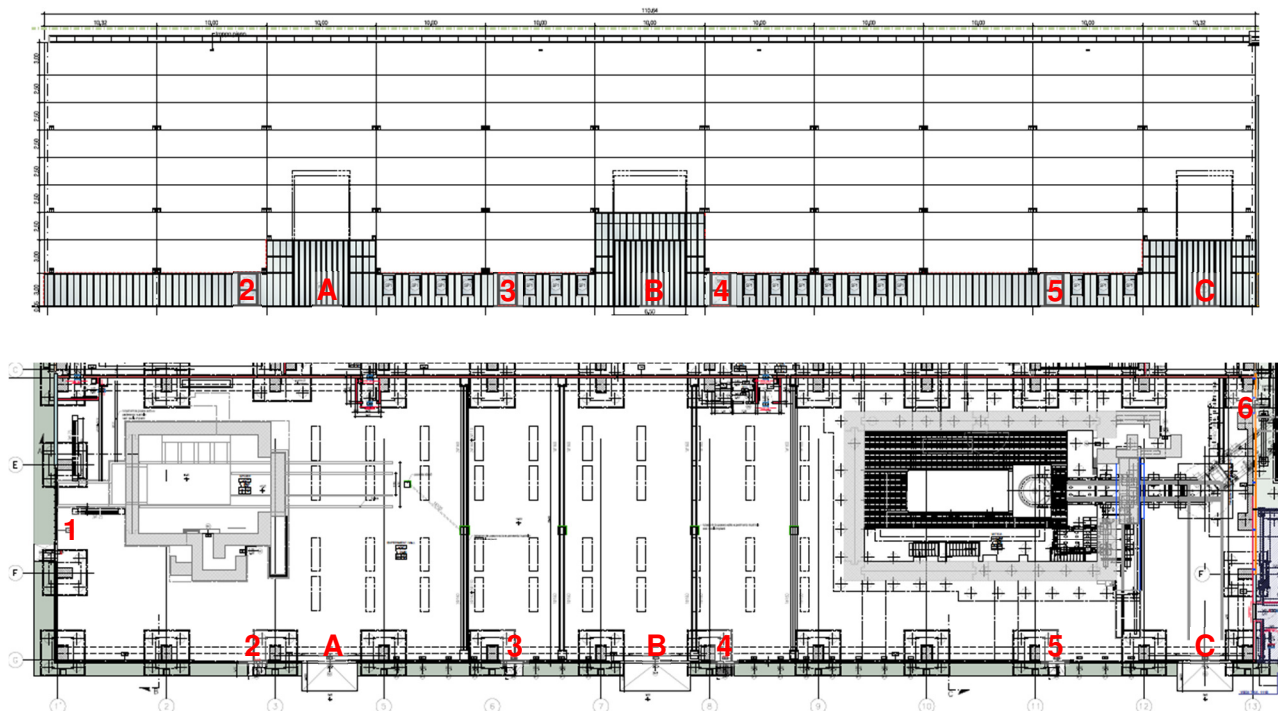


Fig. 1 - Building 1: front view (upper part) and plan view (lower part) of PRIMA building 1 with identification of the openings towards the outside.

5. Technical specifications for inlet filters

The openings to be equipped with inlet filters are listed below.

As a general prescription, all the structural materials shall be protected to avoid oxidation and rusting. The treatment (hot dip galvanization, painting or other) shall be proposed by the Supplier and agreed with RFX.

5.1. Pedestrian doors

The pedestrian doors (identified with numbers from 1 to 5 in Fig. 1) have the same passage opening with dimensions of 1350 mm (B) x 2220 mm (H) (Fig. 2 represents the internal view of door n° 2). The door identified with number 6 in Fig. 1 is of a different type, with a passage opening measuring 1240 mm (B) x 2720 mm (H) (Fig. 3 represents the internal view of door n° 6).



Fig. 2 - Building 1: pedestrian door n°2.



Fig. 3 - Building 1: pedestrian door n°6.

Requirements/specifications for pedestrian door inlet filters:

- they must be installed inside the building to ensure at least a contamination class: ISO8 at rest (according to ISO 14644-1);
- the useful internal dimensions must allow the entry of personnel with small materials; indicatively, the filter can extend inwards for approximately 2000 mm (exact dimensions to be determined during the on-site inspection);
- they must be equipped with a self-closing internal door, equipped with an anti-panic handle and opening in accordance with the existing doors (Fig. 2 e Fig. 3);

- the door must be equipped with a transparent window or porthole;
- the filter must be equipped with internal lighting if the minimum ambient brightness is not guaranteed with both doors closed (in this case the electrical power required shall be specified).

The quotation must include delivery, professional on-site installation and disposal of any processing scraps and waste.

Option (to be quoted separately):

- possible filtering unit: specify load characteristics and electrical power required.

5.2. **Material entry doors (A e C)**

The material entrance doors (identified with the letters A and C in Fig. 1) have both the same passage opening with dimensions of 5440 mm (B) x 5920 mm (H) (Fig. 4 represents the internal view of door A). Both doors are manually operated with the leaves opening inwards; the open doors occupy approximately 1300 mm.



Fig. 4 - Building 1: material entry door A.

Inlet filter requirements/specifications for doors A and C:

- they must be installed inside the building to ensure at least a contamination class: ISO8 at rest (according to ISO 14644-1);
- the filter can extend inwards for approximately 2000 mm (exact dimensions to be determined during the on-site inspection);
- they must be equipped with a rapid motorized internal closure (vertically foldable tarpaulin) resistant to wind for the time necessary to let the material in before closing the existing external doors; the characteristics of the load and the required electrical power shall be specified;
- the structure must be equipped with transparent window(s) or portholes;
- internal lighting must be provided if the minimum ambient brightness is not guaranteed with both doors closed.

The quotation must include delivery, professional on-site installation and disposal of any processing scraps and waste.

Options (to be quoted separately):

- possible filtering unit: specify load characteristics and electrical power required.

5.3. Central material entrance door (B)

The central material entrance door of the building (identified with the letter B in Fig. 1) has the maximum passage opening, with dimensions of 7100 (B) mm x 5920 mm (H) (Fig. 5 represents the internal view of door B).

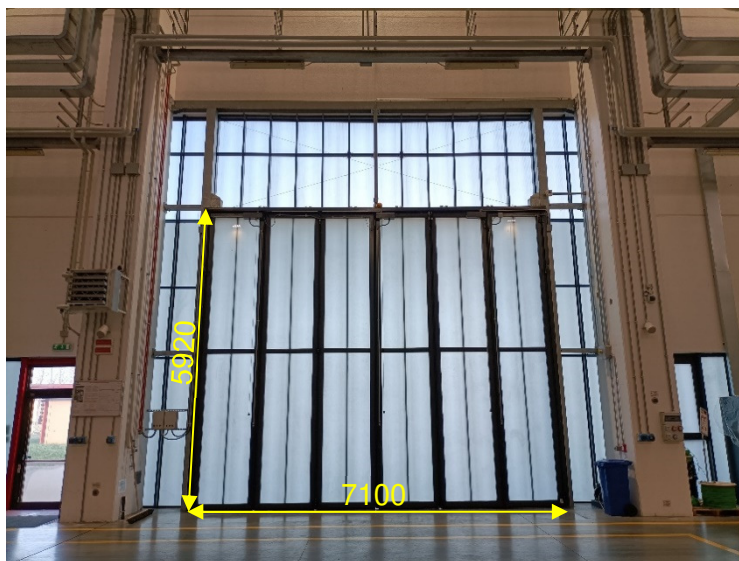


Fig. 5 - Building 1: material entry door B.

This door will constitute the exclusive entry route for the transport of components of significant dimensions.

The creation of an inwardly extensible structure is required as shown in Fig. 6; on the right side of the same Fig. 6 an example of a possible constructive application is represented.

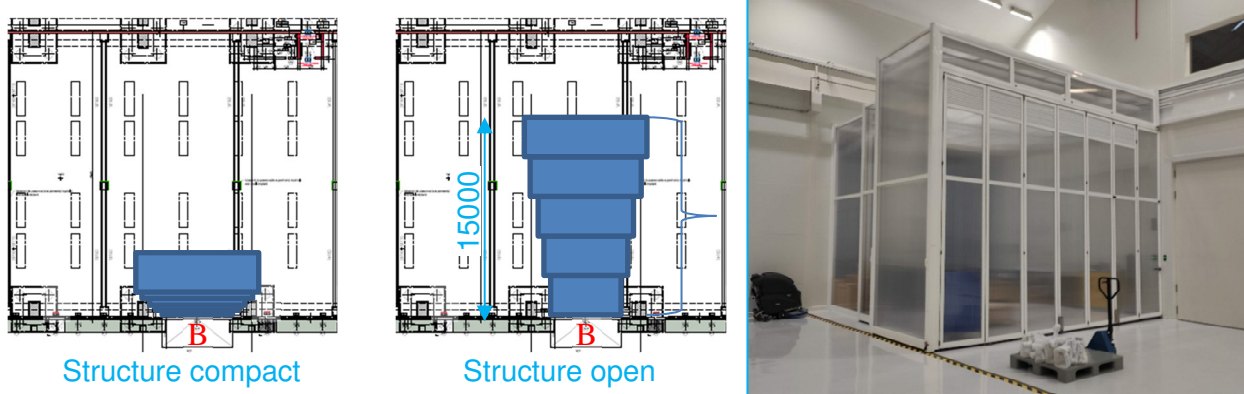


Fig. 6 - Plan view of building 1 with extendable inlet filter in compact position (left) and open inside (centre). On the right, an example of possible construction application.

The typical entry sequence for vehicles is as follows:

- 1) the filter, with a compact situation (Fig. 6 left), is extended towards the inside of the building for approximately 15 m (Fig. 6 centre) keeping its internal door closed;
- 2) the external door B is opened to allow entry of the vehicle with the goods to be unloaded/loaded inside the building;
- 3) the trailer is detached from the tractor; once this latter has exited, the external door B is closed and the air contained in the filter is purified/conditioned for the necessary time;
- 4) the internal door of the filter is opened and the filter is compacted (Fig. 6 left) to allow goods unloading/loading operations;
- 5) once concluded the previous operation, the filter is extended again towards the inside of the building and its internal door is closed (Fig. 6 centre);
- 6) the external door B is opened to allow entry of the tractor which transports the trailer outside;
- 7) once the latter has come out, the filter is compacted (Fig. 6 left) and the external door B of the building is closed.

Requirements/specifications of the filter for the main inlet door B:

- it must be installed inside the building, with a solution that can be extended up to approximately 15 m; it ensures at least a contamination class ISO8 at rest (according to ISO 14644-1);
- in closed position (Fig. 6 left), the residual space inside the building shall be as small as possible (ideally contained in about 3 m);
- the movement must be electric (specify load characteristics and electrical power required), accompanied by the necessary equipment according to applicable regulations (signalling, interlocks, etc.);
- only if they are necessary, any ground guides for movement must be removable;
- air conditioning and filtering is to be carried out preferably by "washing", deriving an air flow from the building and expelling the contaminated contents of the airlock towards outside or alternatively by treating the airlock air using an air conditioning/dedicated filtering, complete with a system that signals the achievement of the necessary ISO8 class cleanliness of the air; whatever the solution adopted, the characteristic of the load and the required electrical power must be specified;
- the structure must be equipped with transparent window(s) or portholes;
- internal lighting must be provided if the minimum ambient brightness is not guaranteed with a closed structure.


The quotation must include delivery, professional on-site installation and disposal of any processing scraps and waste.

6. Site inspection

Upon request, it is possible to arrange an on-site inspection for the checks necessary to issue the offer.

7. Work Breakdown Structure

The Supply shall be organized by the Supplier according to the following Work Breakdown Structure (WBS) that identifies groups of activities called Work Packages (WP). The following structure shall be adopted for description, plan and organization of the work to be carried out. The Supplier shall integrate the proposed WBS as applicable and shall submit the proposal to RFX for approval.

	<p>Technical specifications for the procurement and installation of inlet filters (airlocks) for PRIMA building 1</p>	<p>RFX-PRIMA-TS-011 rev. 0 23/11/2023 10/13</p>
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WP_0 - Control Plan, Time Schedule and Risk (and opportunity) Management Plan

This Work Package comprises all the efforts related to the timely and appropriate management of the project activities.

This Work Package shall include the preparation and management of the Control Plan, Time Schedule and Risk (and opportunity) Management Plan according to what specified in the Supplier Quality Requirements (AD2).

WP_1 - Engineering

This Work Package shall comprise all the engineering efforts related to the design of the airlocks required in Section 5, including the structural verifications (if any) and the production of all the drawings.

All the drawings and documents drawn up by the Supplier shall be collected in the Manufacturing Design Report. Before starting any purchase and manufacturing activity of the following WP_2, the Supplier shall submit to RFX the Manufacturing Design Report, proving that it complies with all the technical requirements. The Manufacturing Design Report shall be presented by the Supplier and discussed with RFX during a dedicated Design Review Meeting.

Prescriptions contained in AD1 shall be followed for the preparation of all the documentation.

WP_2: Manufacturing

The activities of this WP can start only after the end of WP_1 and upon approval by RFX of the Manufacturing Design Report unless otherwise agreed in writing by RFX. The Supplier shall carry out all the activities necessary for purchase, manufacturing, cleaning, pre-assembly of components or sub-assemblies as foreseen at the Supplier's factory, according to the prescriptions of this Technical Specification and of the approved Manufacturing Design Report.

WP_3: Cleaning, Packing, Transport and Delivery

This Work Package shall comprise all the activities leading to the delivery on-site: cleaning of worked materials, packing and transportation at PRIMA site.

WP_4: on-site assembly and installation

This Work Package shall comprise the installation of the airlocks inside PRIMA Building 1, including the procurement of all the necessary jigs (if any) and tools for assembly. In particular, the Supplier shall carry out the following activities, according to the prescriptions of this Technical Specification and of the approved on-site Assembly Plan:

- Prepare the on-site Acceptance Test Plan
- Assembly at site of the airlocks

Safety prescriptions contained in AD1 shall be followed for the preparation of all the documentation.

WP_5: Acceptance Tests on-site and training



This Work Package shall comprise the preparation and execution of all the foreseen Acceptance Tests on Site, including all the necessary tooling, equipment, measuring systems and manpower.

The Acceptance Tests on-site shall verify that the main functions described in Section 5 of this Technical Specification are assured, according to the prescriptions of the approved on-site Acceptance Tests Plan.

8. Delivery, milestones and scheduling

8.1. Milestones

Milestone ID	Supplier milestone	RFX milestone	Months after contract signature	Associated deliverable
M1	Kick-Off meeting with submission of Control Plan, Time Schedule and Risk (and opportunity) Management Plan		0.5	MD1 Control Plan, Time Schedule and Risk (and opportunity) Management Plan
M2		Approval of Control Plan and Time Schedule	1	
M3	Manufacturing Design Report submission		1.5	TD1 Manufacturing Design Report and detailed drawings
M4		Design Review meeting and Manufacturing Design Report approved	2	
M5	Start of manufacturing		2	
M6	On Site Assembly Plan submission		3	TD2 On Site Assembly Plan
M7	On Site Acceptance Test Plan submission		3	TD3 On Site Acceptance Test Plan
M8		On Site Assembly Plan approved	3.5	
M9		On Site Acceptance Test Plan approved	3.5	
M10	Assembly on site completed		5	

 	Technical specifications for the procurement and installation of inlet filters (airlocks) for PRIMA building 1	RFX-PRIMA-TS-011 rev. 0 23/11/2023 12/13
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M11	On Site Acceptance Test completed and report submission		5.5	TD4 On Site Acceptance Test Report
M12	On Site Acceptance Test report approved		6	
M13	ADP submission		6.5	TD5 ADP and as built drawings

8.2. Deliverables

The deliverables for the Supply, consisting in management and technical documents, are described in this section. The Supplier shall schedule project activities taking into account the due dates for the delivery of the requested documentation. The dates of deliverables are indicated in months from the date of Contract signature in Section 8.1.

8.2.1. Management documentation

The documents listed in this Section shall be prepared and delivered as integral part of the Supply.

8.2.1.1. Control Plan, Time Schedule and Risk (and opportunity) Management Plan

The Control Plan, Time Schedule and Risk (and opportunity) Management Plan shall be three separated documents that cover the whole scope of the Contract, including works performed by possible Subcontractors. The contents of the Control Plan, Time Schedule and Risk (and opportunity) Management Plan are described in the Supplier Quality Requirements (AD2).

8.2.1.2. Acceptance Data Package

The Acceptance Data Package (ADP) is the documentation package linked with the final deliverable to be submitted by the Supplier. The Acceptance Data Package for the whole Supply shall be submitted before final approval by RFX and closure of the Contract. This Package will include or will refer to all the Technical Documents listed in the following section, submitted and approved by RFX.

8.2.2. Technical documentation

The technical documents listed in this Section shall be elaborated and delivered in full as part of the Supply. The following documents shall be provided as a minimum during execution of the Contract according to the relevant schedule and work organization (see Milestones in Section 8.1).

8.2.3. Manufacturing Design Report and detailed drawings

At least the following documents and information shall be included in the Manufacturing Design Report:

1. Manufacturing and assembly drawings

2. Draft version of on-site Assembly Plan
3. Draft design/characteristics of electrical system loads.

8.2.4. On Site Assembly Plan

The sequence of assembly activities on Site shall be provided by the Supplier in the on-site Assembly Plan. If some procedures require particular prescriptions, they shall be described in detail in the document.

The assembly time schedule shall also be provided.

The on-site Assembly Plan shall include the DUVRI (Documento Unico di Valutazione dei Rischi da Interferenze) according to art. 26 of D.Lgs 81/08.

The on-site Assembly Plan shall be approved by RFX prior to start any of the assembly activities on Site.

8.2.1. On Site Acceptance Test Plan

The sequence of Acceptance Tests activities on Site shall be provided by the Supplier in the on-site Acceptance Tests Plan.

The on-site Acceptance Tests Plan shall list the visual and functional tests to assure that the requirements given in Section 5 of this Technical Specifications are satisfied.

The on-site Acceptance Tests Plan shall be approved by RFX prior to start any of the Acceptance Tests.

8.2.2. On Site Acceptance Tests Report

The Supplier shall provide written records of all the on-Site Acceptance Tests performed. The Tests Reports shall report the results of the functional tests, which shall be compared with the requirements given in Section 5 of this Technical Specifications and reported in the on-site Acceptance Tests Plan. In case the requirements are not met, the non-conformity shall be put in evidence and a corresponding Non-Conformity Report shall be issued. The Non-conformity Report shall describe the nonconformity and shall specify every possible recovery action or limitation deriving from it. See Supplier Quality Requirements (AD2) for detailed information on Non-Conformity Reports.

In particular the on-site Acceptance Tests Report shall include the on-site Visual Inspection Report.

8.2.3. ADP and as-built drawings

At completion of the procurement the Supplier shall issue the “ADP and as built Drawings” of the airlocks as actually manufactured and assembled on Site. Drawings shall be released both in .dxf and .pdf format.

The ADP must be completed with the necessary documentation, for instance: use and maintenance manuals with spare parts list, as built drawings, any applicable CE certifications and release note (declaration of conformity).