

Technical Requirements

Project: PF65DL

Section: A. Building Requirements

Architect:

Lead design engineer:

Project Scope

No	Project Section	Code
1	Building Requirements *	A
2	Wind Tunnel Equipment Location *	T
3	Equipment Loads *	E
4	Equipment Bases Tolerance *	H
5	Cooling System *	C
6	Cable Networks *	P
7	Service Floors and ladders*	K
8	Building Markup and Inspection *	M
9	Site work execution program *	X

* - Full versions of all documents are available in the TunnelTech customer portal.
Please register: <http://tunneltech.eu/registration>

PROJECT, SECTION PF65DL Building Requirements					
TITLE Project Scope	CLIENT	DRAWN BY	CHEKED BY	APPROVED BY	DATE
		PROJECT NUMBER PF65DL	DRAWING No A.00	REV 0	

Revision Schedule

No.	Index	Description	Date
0	0	Release of technical requirements	

PROJECT, SECTION		TUNNEL TECH			
PF65DL Building Requirements					
TITLE	CLIENT	DRAWN BY	CHEKED BY	APPROVED BY	DATE
Revisions Schedule		PROJECT NUMBER	DRAWING No	REV	0
		PF65DL	A.0.01		

Project Section Contents (A)

Drw No	Drawing Title	Rev.
A.1.01	Table of Contents	0
A.1.02	Explanatory Note	0
A.1.03	Explanatory Note	0
A.1.04	Explanatory Note	0
A.1.05	Explanatory Note	0
A.2.01 *	Lower Duct and Airjet base levels plan views	0
A.2.03 *	Axial Fans' Outlet Ducts and Waiting Zone base levels plan views	0
A.2.05 *	Axial Fans base and Axial Fans Inlet Duct base levels plan views	0
A.2.06 *	Upper Duct and Top levels plan views	0
A.2.07 *	Section 1A-1A (Longitudinal section)	0
A.2.08 *	Sections 2A-2A, 3A-3A, 4A-4A (Transversal sections)	0
A.2.09 *	Det.1 - Section 2A-2A and Det.2 - Section 8A-8A	0
A.2.02 *	Det. 2. Cable openings. - Airjet base level	0
A.2.04 *	Det. 3. Cable openings. - Waiting Zone base level	0
A.2.10 *	Section 5A-5A (Longitudinal section)	0
A.2.11 *	Sections 6A-6A, 7A-7A (Transversal sections)	0

* - All drawings are available in the full version of the document.

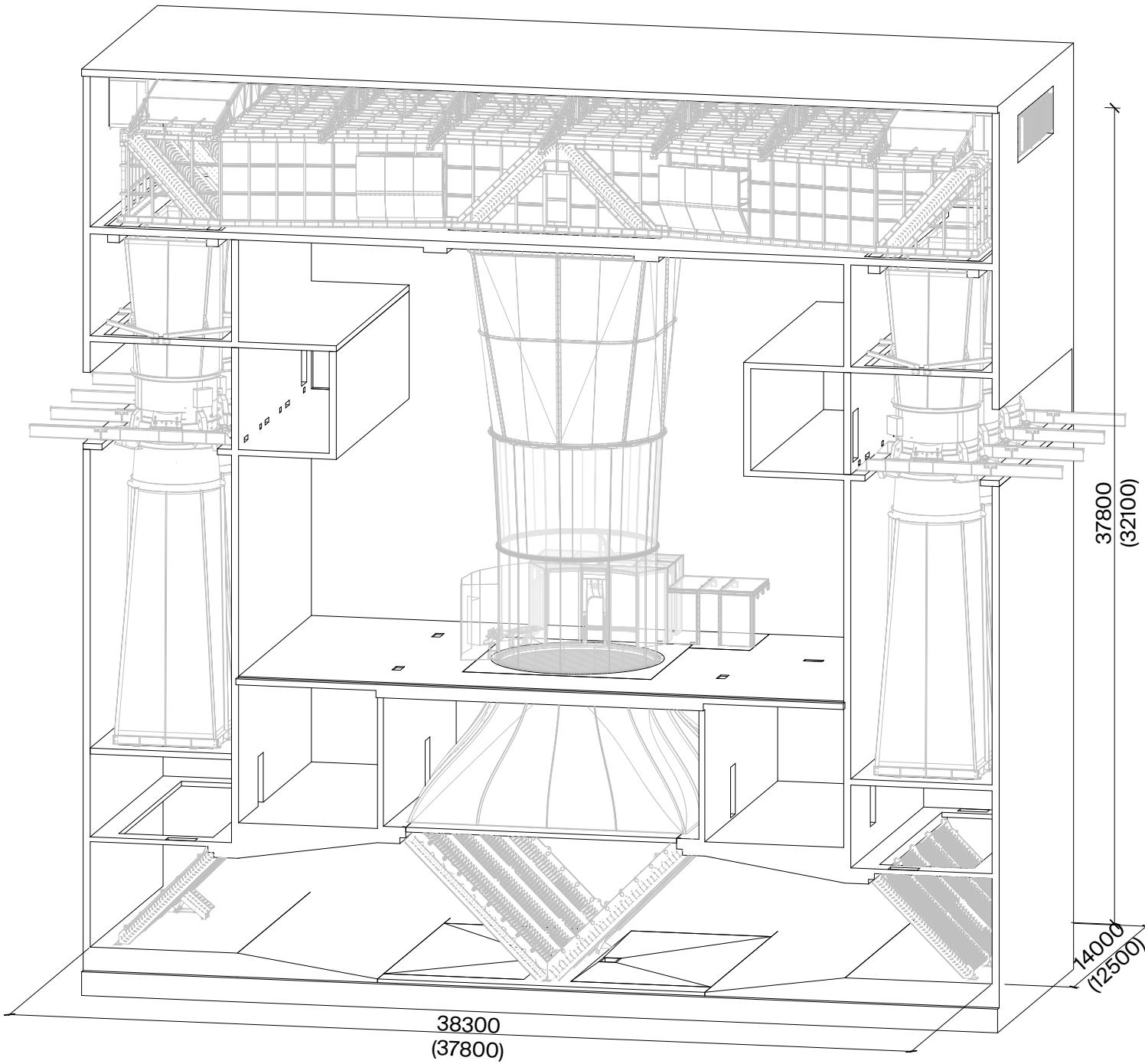
To get the full version please register at <http://tunneletech.eu/registration>

PROJECT, SECTION PF65DL Building Requirements		 TUNNEL TECH			
TITLE Table of Contents	CLIENT	DRAWN BY	CHEKED BY	APPROVED BY	DATE
		PROJECT NUMBER		DRAWING No	REV
		PF65DL		A.1.01	0

Introduction

This section of the technical requirements documentation contains explanations on the following:

- Architectural restrictions for the technological space of the wind tunnel in the building;
- Requirements and recommendations for the technological space of the wind tunnel and ways of access there;
- Specifics of the building design in order to provide the installation, commissioning and maintenance of the wind tunnel.



The recommended size is given above as a main one.
(The minimum possible size for this model is given in brackets.)

PROJECT, SECTION		TUNNEL TECH			
PF65DL Building Requirements					
TITLE	CLIENT	DRAWN BY	CHEKED BY	APPROVED BY	DATE
		PROJECT NUMBER	DRAWING No	REV	0
Explanatory Note		PF65DL	A.1.02		0

Technological space of the wind tunnel

The technological volumes of the wind tunnel are aligned and described in relation to 4 main axes and 7 floors. See the following drawings for the necessary axes positioning and the relative elevations of the levels. The intersections of the 4 principal axes of the wind tunnel mark the centers of the 3 vertical shafts of the technological volumes:

- The central shaft (where the Flight Chamber is located);
- The two side shafts, each has three Axial Fans that create the air flow;
- Centers of the two side shafts are equidistant by 16150 mm from the center of the Flight Chamber shaft (for the recommended dimensions case). The following levels and their relative elevations are crucial for the wind tunnel equipment:

1. **Lower Duct base level.** The base face for the Lower Turning Vanes Blocks;
2. **Airjet base level.** The base face of the Airjet;
3. **Axial Fans Outlet Duct base level.** The base face of the Axial Fans Outlet Ducts;
4. **Waiting Zone base level.** The base surface of the Lower Ring with the Safety Net, the base face of the Waiting Zone frame, finish floor thickness;
5. **Axial Fans base level.** The base face (or faces) of the Fans Suspension in both side shafts; and the Variable Frequency Drives (VFDs);
6. **Axial Fans Inlet Ducts base level.** The base face of the Axial Fans Inlet Ducts suspension in both side shafts;
7. **Upper Duct base level.** The base faces of the Upper Axial Fans Turning Vanes Blocks above the both side shafts (see below, the requirements for the beams serving as the base to the containers). The 250 mm high bases for the Upper Flight Chamber Turning Vanes Block and the Air Exchange Diffusers.

Dimensions of the technological space of the wind tunnel

The internal dimensions of the technological space of the wind tunnel are shown in the following architectural drawings.

All dimensions (linear, radial and elev. marks) that are shown in the architectural drawings are dictated by the wind tunnel technology. The dimensions must be respected in order to provide the wind tunnel equipment installation, functioning and maintenance.

Dimensions marked with '#' and '*' are shown only as a reference and are not dictated by TunnelTech.

Prior to the wind tunnel equipment installation the measurements of the technological space must be conducted by the contractor. The measured data must be provided by the contractor to TunnelTech in accordance to "Building Markup and Inspection" section of the technical requirements documentation.

If, according to the measurements' report, the precision of the structure is not sufficient for the equipment installation purposes, after carefull consideration TunnelTech might request the contractor to fix. The process of installing wind tunnel equipment in a building can't begin until all changes and control measurements have been made.

See the "Building Markup and Inspection" section of the technical requirements documentation for further information.

PROJECT, SECTION PF65DL Building Requirements		T U N N E L T E C H 			
TITLE Explanatory Note	CLIENT	DRAWN BY	CHEKED BY	APPROVED BY	DATE
		PROJECT NUMBER	DRAWING No	REV	
		PF65DL	A.1.03		0

The specifics of installation, commissioning and maintenance of the wind tunnel by levels of the building.

Lower Duct base level.

Two pits for collecting water and draining must be provided on the foundation slab.

A slope between the base faces of the Lower Turning Vanes Blocks must be organized on the foundation slab to direct the water to the draining pits.

The Lower Duct base level can be accessed via a door from the other volumes on the level or via two manholes in the slab above the level. The general requirement for the door or the manhole cover is that it must be airtight to withstand the pressure up to 2000Pa. The final position of the door/manhole must be confirmed with TunnelTech.

It is recommended to treat the concrete surfaces of the Lower Duct base level with an anti-dusting solution and with an antiseptic solution. The treatment should be conducted in accordance to the manufacturer manual.

Airjet base level.

To provide access to the side shafts during the installation and commissioning of the wind tunnel equipment technical openings must be provided. After the wind tunnel equipment is installed, access to the side shafts is necessary for further equipment maintenance

The dimensions of the three openings in the floor slab must be respected in relation to the principal axes of the wind tunnel equipment with the tolerance of -20mm .. +20mm.

Axial Fans' Outlet Ducts base level.

To provide access to the side shafts during the installation and commissioning of the wind tunnel equipment technical openings must be provided. After the wind tunnel equipment is installed, the access to the side shafts on the level is not needed and the openings can be bricked or filled with other material to reduce the noise propagation.

The access to the central technological room, where the Airjet is located, must be provided for installation, commissioning and maintenance of the Wind Tunnel. The power distribution panels and the control panels for the Flight Chamber lighting and Control Room are to be installed in the room. The technical requirements documentation section "Cable Networks" will provide the detailed information on the electrical and control equipment requirements.

The dimensions of the three openings in the floor slab must be respected in relation to the principal axes of the wind tunnel equipment with the tolerance of -20mm .. +20mm.

Waiting Zone base level.

The final position of the Waiting Zone and the Airlock and their attachment to the building structure must be clarified in course of the project. The slab elevation and the thickness of the finish floor under the Airlock and the Waiting Zone must be implemented in accordance with the technical requirements.

The tolerance for the position of the center of the central round opening in plan view in relation to the project values is 15mm;

The tolerance for the actual radius of the central round opening (or the shape of the opening, its' "roundness") is 10mm.

The stability requirement for the slab around the central opening (Lower Ring base slab) is that the slab must not bend or shift more than 5mm. That includes the shifts of the structure (if any) during the first years after the construction.

PROJECT, SECTION PF65DL Building Requirements		T U N N E L T E C H 			
TITLE Explanatory Note	CLIENT	DRAWN BY	CHEKED BY	APPROVED BY	DATE
		PROJECT NUMBER	DRAWING No	REV	
		PF65DL	A.1.04	0	

The specifics of installation, commissioning and maintenance of the wind tunnel by levels of the building.

Axial Fans' base level.

To provide the possibility of extracting the Axial Fans for maintenance after the equipment is installed, the technological openings must be created in the external wall of each side shaft. The openings must have demountable filling. The position and dimensions of the openings must be clarified in course of the project and confirmed with TunnelTech.

The additional beams needed for the Axial Fans extraction are supplied by TunnelTech.

After an Axial Fan is rolled out of a side shaft volume on the additional beams, it is the customer's responsibility to provide a way of replacing the Axial Fan.

Two rooms are required for Variable Frequency Drives (VFDs) and other wind tunnel equipment on the level +17.750. One on a side of each vertical shafts with Axial Fans.

External wide doors to the technological rooms with the Variable Frequency Drives (VFDs) are required for taking the VFDs in and out for maintenance.

An access to the side shafts, where the Axial Fans are located and to the VFDs' rooms must be provided for the installation, commissioning and maintenance.

Upper Duct base level.

Two beams above each of the side shafts are the base of the Upper Axial Fans Turning Vanes Blocks.

The installation sequence for the beams is the following:

1. All the wind tunnel equipment for the side shaft below the Upper Duct base level is installed;
2. The beams are installed on the Upper Duct base level;
3. The Upper Axial Fans Turning Vanes Block is installed onto these beams.

These beams are contractor's responsibility. Their design, position and installation method must be confirmed with TunnelTech.

An access to the Upper Duct base level must be provided for the installation, commissioning and maintenance.

A slope for collecting water in case of emergency malfunction of the cooling system on the upper level must be organised on the level. The water must be directed to the general draining system of the facility.

The wind tunnel equipment is to be attached to the walls of the building on the Upper Duct base level. Therefore, the walls must be calculated and implemented to bear the load of the equipment or must be reinforced with additional beams.

See the separate project section document explaining the positions and values of the loads applied on the walls by the wind tunnel equipment.

Openings in the walls on the Upper Duct base level for air intake and exhaust must be implemented. See the drawings below for positioning of the openings. The minimum free areas for these openings are:

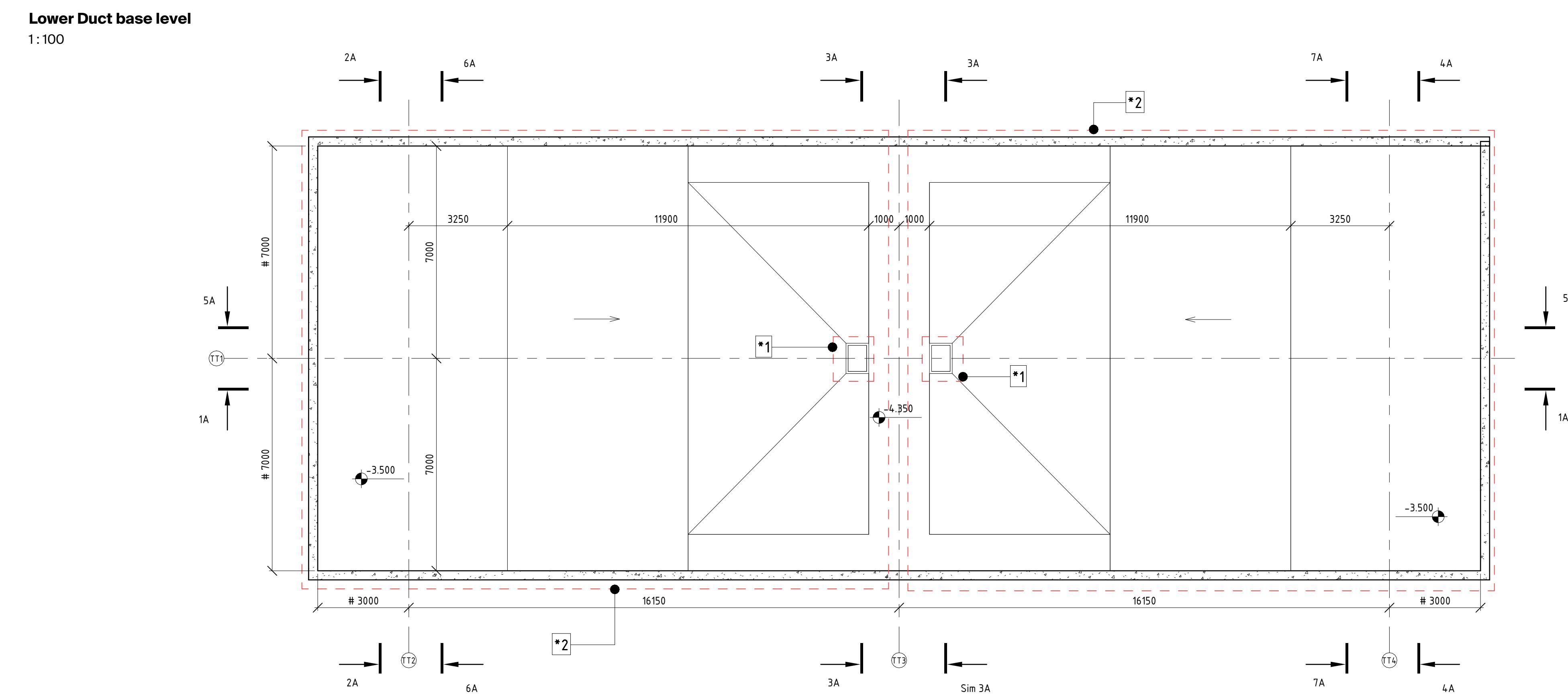
- For each of four air intake openings minimum required free area is 2.25 m², recommended free area is 4-5 m².
- For each of two air exhaust openings minimum required free area is 2 m², recommended area is 4-6 m².

The volumetric flow rates numbers are given for the case when the wind tunnel is running on 100% capacity and the ventilation flaps are open 100%.

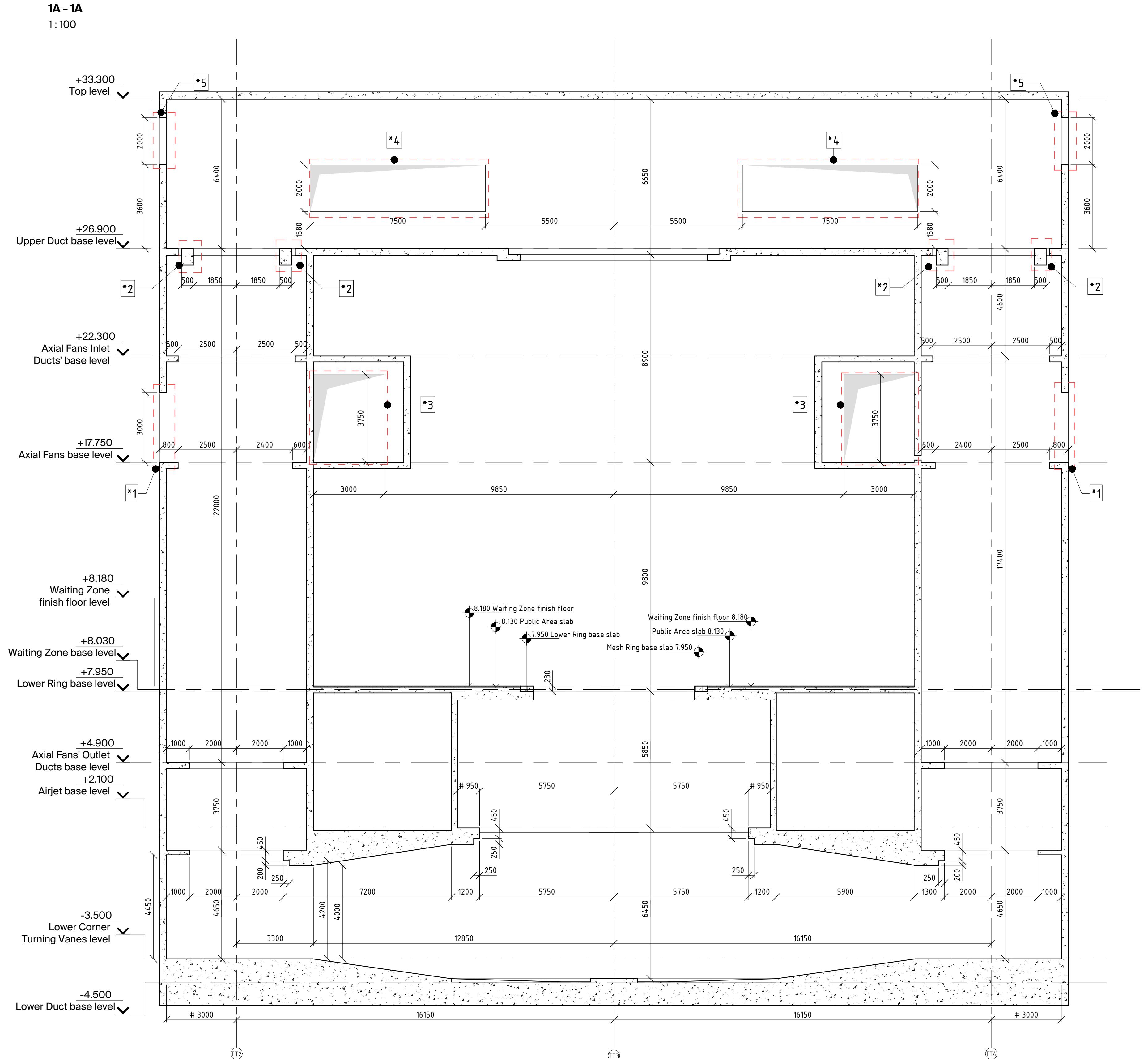
Roof

The structure of the roof is to be installed after the equipment of the Upper Duct is placed in the building. The "Top level" elevation mark represents the height limit of the wind tunnel equipment.

PROJECT, SECTION PF65DL Building Requirements		TUNNEL TECH 			
TITLE Explanatory Note	CLIENT	DRAWN BY	CHEKED BY	APPROVED BY	DATE
		PROJECT NUMBER	DRAWING No	REV	0
		PF65DL	A.1.05		



* - All drawings are available in the full version of the document.
To get the full version please register at <http://tunneltech.eu/registration>



7 - Annotative fram

In the current issue of the document the elevation of the base level is assumed as +0.800. All the elevations in the document are shown relatively to this condition.

Dimensions marked '#' are shown only as a reference

Dimensions marked '*' are shown only as a reference and must be specified and confirmed with the local engineer.

1500. The first 1000 were sold in 1999, and the remaining 500 were sold in 2000.

1000

Section 1A-1A

technological openings with demountable filling are provided to provide the possibility of removing the Axial

our precast concrete or steel beams. Installation sequence: The beams can be installed in the given positions strictly after all equipment on lower levels has been loaded. The beams are contractor's responsibility. Their design,

Wide doors for taking in/out Variable Frequency Drives (VFDs) are required.

Openings in the walls for air intake are required. The minimum free area required for each of the four air intakes is 2.25 m^2 .

Openings in the walls for air exhaust are required. The minimum free area required for each of the two air exhaust openings is 6 m^2 .

S

Re

TUNNEL TECH

A stylized logo consisting of a central vertical oval shape with two diagonal lines extending from its top and bottom ends, creating a shape reminiscent of a tunnel or a V-wing aircraft.

CT, SECTION

Building Requirements

A1) DATE PROJECT NUMBER
0 PE65DI

IG No	REVISION
-------	----------

A.2.07 0
