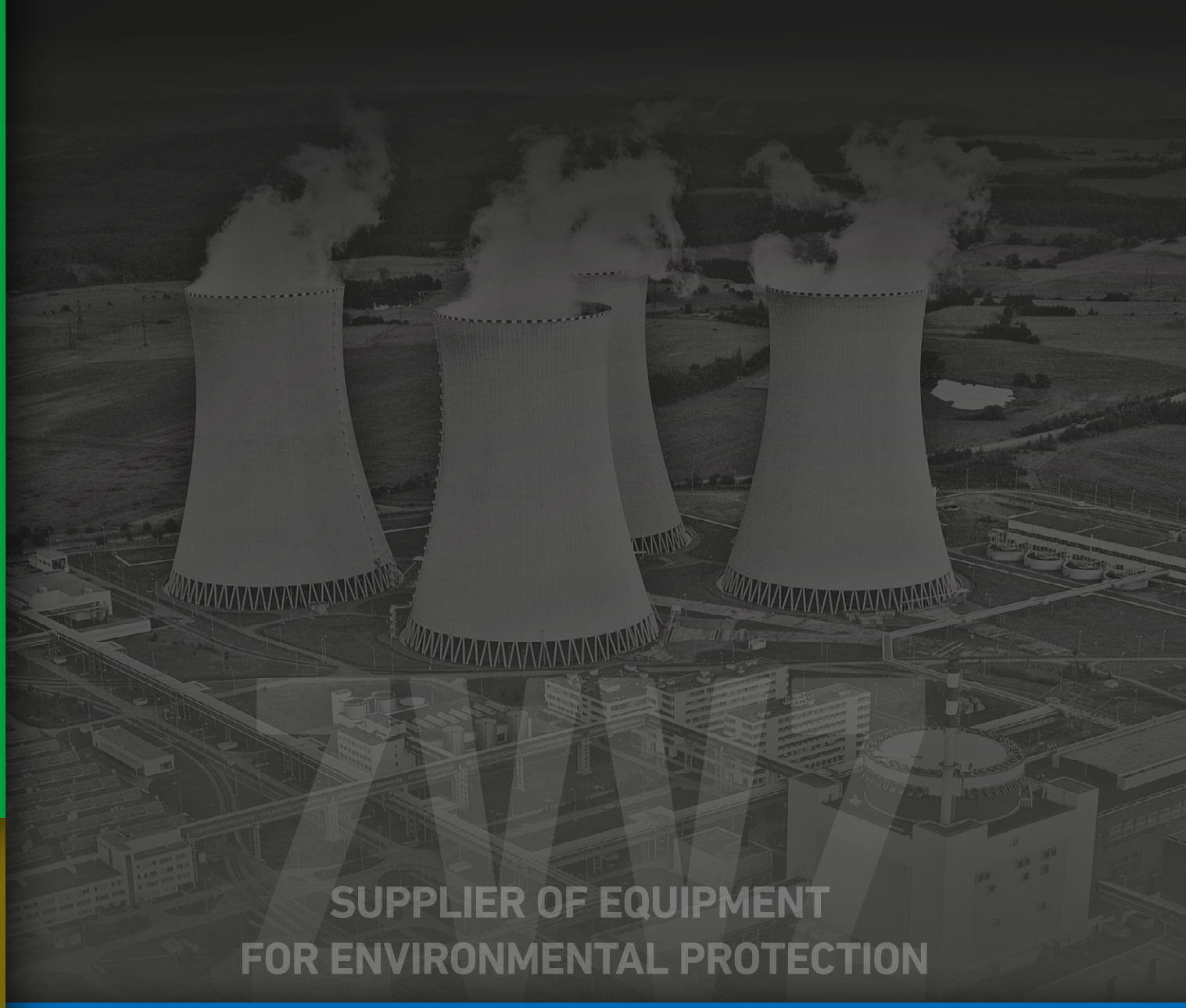


SUPPLIER OF EQUIPMENT
FOR ENVIRONMENTAL PROTECTION

AIR-HANDLING SYSTEMS FOR NUCLEAR POWER PLANTS

ZVVZ ENVEN ENGINEERING
Member of the ZVVZ GROUP

DESCRIPTION

ZVVZ-ENVEN ENGINEERING, A.S., A MEMBER OF THE ZVVZ GROUP, IS THE HOLDER OF KNOW-HOW AND SUCCESSOR OF THE TRADITIONAL ZVVZ SUPPLIER OF ALL AIR-HANDLING EQUIPMENT AND SYSTEMS FOR NUCLEAR POWER PLANTS WITH ALL THE REQUIRED LICENCES AND CERTIFICATES. IT ASSEMBLES ITS TURN-KEY DELIVERIES USING ZVVZ MACHINERY PRODUCTS AND ALSO PRODUCTS FROM OTHER CERTIFIED SUPPLIERS.

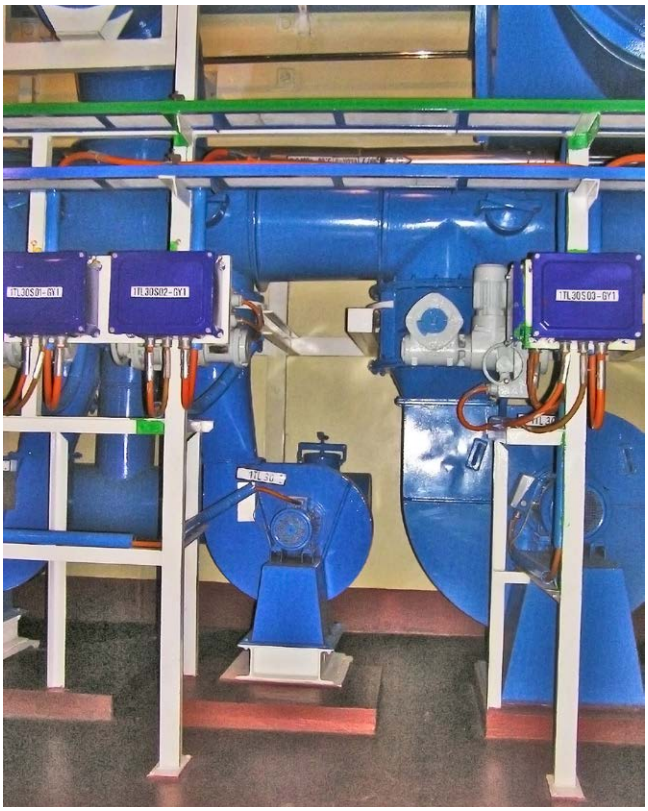
The air-handling equipment for nuclear power plants and its systems are of immense importance from the aspect of nuclear power (NP) safety. This equipment assures not only operation of the nuclear power station during normal operating mode, but is also practically the only crucial element that assures actual safety within the NP complex and also in its surrounding area in the event of potential risk of nuclear fall-out.

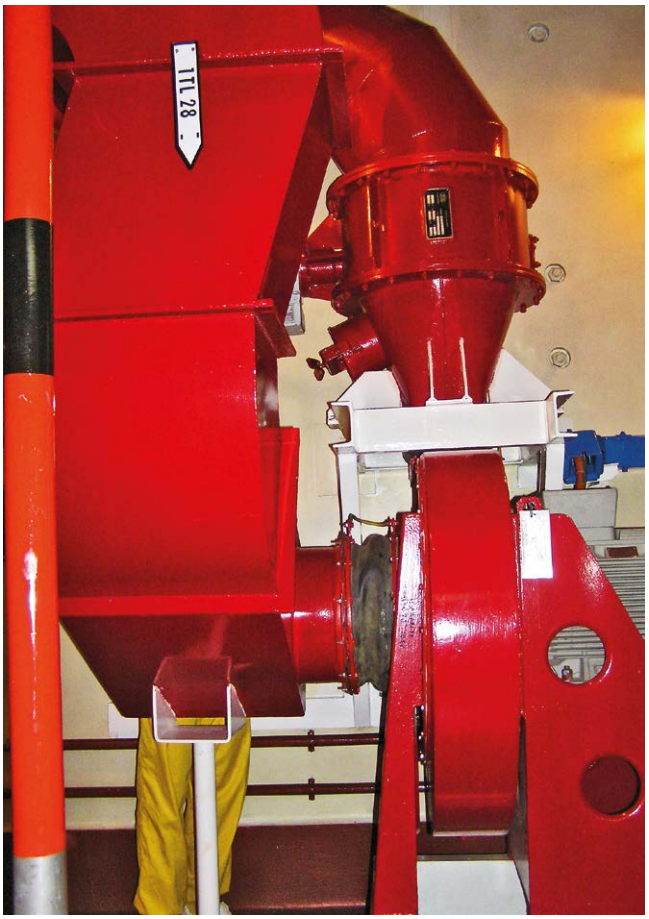
Air-handling systems are located in all main and auxiliary buildings and operations in the field of NP.

THE AIR-HANDLING SYSTEMS IN THE REACTOR, WHICH ARE DIVIDED INTO THREE SECTIONS, ARE CRUCIAL FOR SAFETY:

› hermetic zone;
› air-tight or controlled zone;
› air-handling supply systems.

A number of air-handling systems operate in each of the aforementioned sections, each with a different function and of a different level of importance, and assure circulation, exhaust and supply of air. The air-handling systems also have the corresponding modes to the reactor modes, which govern and determine their operation.





Attention is focused on the operating reliability of air-handling machinery and maintenance of operability under emergency conditions. Just like other air-handling systems for active operations, the basic rules for ventilating these operations are also observed in the field of NP.

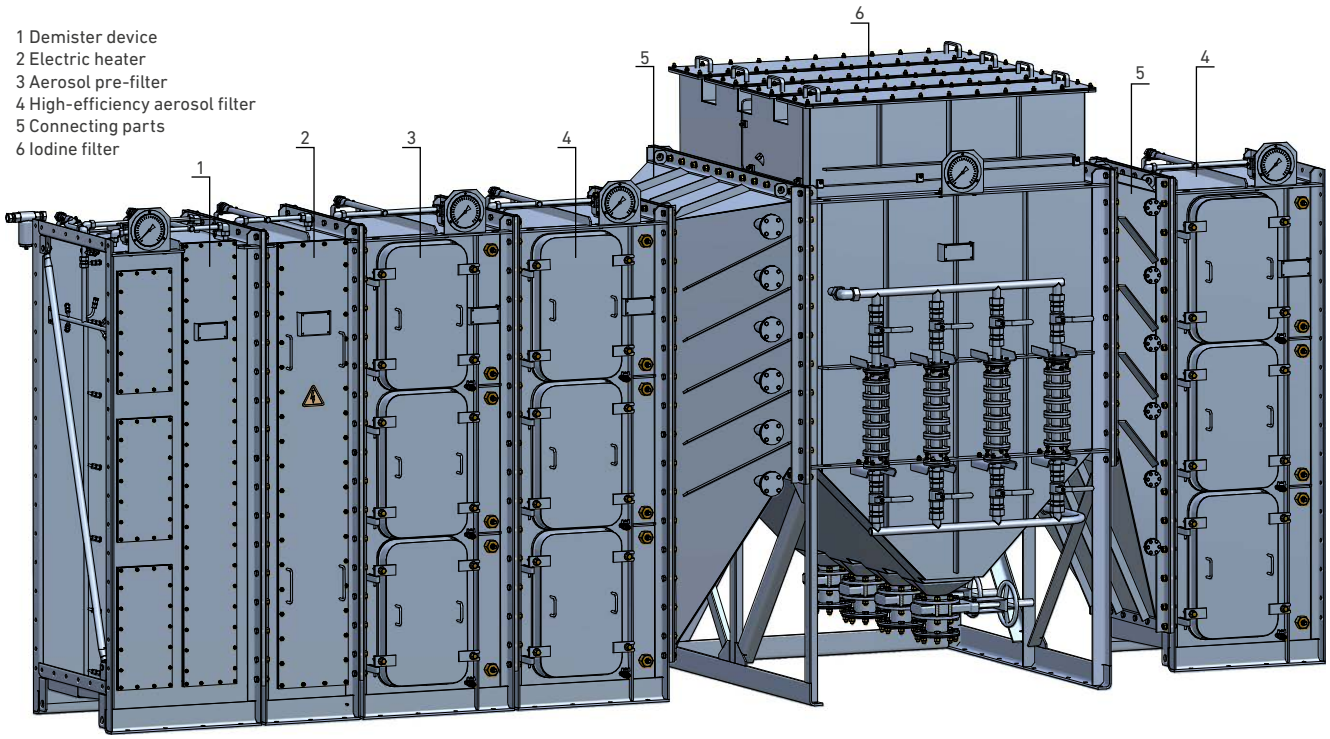
Ventilation and air-conditioning systems in buildings – so-called building air-handling – is a supplementary part of air-handling systems for safe operation in the field of NP.

CRUCIAL PRODUCTS FOR AIR-HANDLING SYSTEMS IN THE FIELD OF NP

› Radial and axial fans.
› Air-conditioning units for conditioning the air
› Air filters.
› Radiation filters.
› Hermetic seals.
› Shut-off and regulation flaps.
› Flexible dilation inserts.
› Noise suppressors.
› Cooling air-conditioning units and air coolers.
› Anti-explosion devices for protection of buildings.
› Fire protection flaps.
› Noise suppression, fire protection and heat insulation piping.
› Air distribution ducting, including shaped pieces and accessories.
› Special coatings.

FILTRATION EQUIPMENT FOR NUCLEAR POWER PLANTS

Filtration equipment plays an important role in assuring nuclear safety at nuclear power facilities. ZVVZ-Enven Engeneering, a.s. is introducing a new range of filtration equipment utilising a modern design, the parameters of which exceed the previously offered equipment and which is fully comparable to world-class products.



SCOPE

The filtration equipment is mainly intended for capturing radioactive aerosols, iodine and iodine compounds in the air-handling systems of nuclear power plants and facilities of a similar nature of operation.

These systems contribute substantially to assurance of safety requirements under normal, as well as emergency and post-emergency conditions of operation. Filtration systems can be used to renovate existing NP air-handling systems and also for newly constructed nuclear power plants. Other potential areas of application are in the field of research, production and application of radio-isotopes, and possibly in nuclear medicine.

DESCRIPTION OF THE FILTRATION EQUIPMENT

The filtration equipment is designed as a module system. The execution of individual parts allows combination of individual module elements with regard to:

- the required function of the specific air-handling system in individual operating modes,
- the required level of filtration of solid and liquid aerosols and radioactive gas admixtures.

THE BASIC MODULE PARTS OF THE NEW VS FILTRATION EQUIPMENT RANGE ARE

a) VSO demister filter for capturing water mist and droplets.
b) VSP aerosol pre-filter for coarse filtration of aerosols, including removable filtration inserts.
c) VSA aerosol high-efficiency filter for capturing aerosols, including removable filtration inserts.
d) VSE electric heaters intended for heating the filtered air with the goal of reducing relative humidity under marginal conditions before entry into the iodine filter.
e) The VSJ iodine filter for capturing radioactive iodine and its compounds in gaseous state is intended for holding a filling of absorbent.
f) VSS connecting parts and VSN connecting parts for connecting the filtration station to the air-handling ducting.

This filtration equipment module solution is a modern concept enabling creation of any arrangement, which will meet requirements for the quality of air filtration in all air-handling systems at nuclear power plants.

FILTRATION EQUIPMENT MATERIAL

a) Individual module parts of the filtration system are made from stainless steel without additional surface protection.
b) VSN connecting parts are made from carbon steel with a coating surface treatment.

From the aspect of the direction of flow of the filtered medium and access for operators, the filtration stations and also the module parts are designed as right and left-hand.

INSTALLATION OF THE FILTRATION EQUIPMENT

The filtration equipment is assembled using individual module parts at the construction site. The individual parts are connected using flange joints. The entire system is anchored to the base using anchoring bolts. The filtration system is fitted with sockets for connecting the required inspection and metering devices and sockets for supplying and removing decontamination solutions.

The filtration system works without operators during the period between replacement of functional fillings and elements. The technical condition of the filtration system is inspected during planned shut-downs of the NP air-handling system according to approved guidelines and methodologies.

The only part of the filtration system requiring management is the electric heater. The electric mains, which are part of the filtration system and its module parts, meets the requirements of standards for the specific working environment.

The material and design of all the module parts of the filtration system, including the dimensions of flange joints, sockets for supplying and removing water, sockets for potential inspection and metering devices, are unified as much as possible.

The service life of the filtration system is 50 years, apart from replaceable functional elements, the service life of which depends on the operating conditions.

TECHNICAL PARAMETERS

The performance and dimension range of filtration equipment is specified for a nominal air flow-rate of 1 700, 3 400, 6 800, 8 000 and 10 200 m^3/h, parallel connection of the specified dimensions is possible for greater air flow-rates.

The separation rate of the filtration system during the nominal air flow-rates is at least 99.99 % for radioactive aerosols and at least 99.99% for gaseous compounds of radioactive iodine.

The initial pressure loss in the filtration system under a maximum arrangement of the module parts does not exceed 2 000 Pa at the nominal air flow-rate.

Permissible leakage of the jacket of the filtration system (after installation) does not exceed the value of 0.003 % of the nominal flow-rate volume at a pressure difference of 2 000 Pa.

The filtration equipment is intended for operation on the suction side of the fan and its design is calculated for a negative pressure of 10 kPa.

The filtration equipment meets increased fire safety requirements. It is resistant to temperatures of up to 100 °C, a relative air humidity of 100 % for extended periods and a vapour-air mixture of a temperature of up to 150 °C for short-term periods of at least 10 hours. The used materials do not promote combustion, with the exception of the absorbent, the ignition temperature of which is higher than 330 °C. The used filtration inserts in the pre-filter have a permanent temperature resistance of 250 °C, the high-efficiency filtration inserts have a permanent resistance to 125 °C, and a short-term resistance to 185 °C.

The filtration system is designed with the goal of complying with 1st category seismic resistance for a maximum calculated earthquake of 8° according to MSK 64 and the corresponding range of reaction in the specific location of use. A test of seismic resistance is carried out for each application by means of calculation on the basis of experimentally obtained values during prototype testing.

The dimensions of the individual cabinets housing the system are chosen so that transport routes in power plants that are already in operation can be utilised as much as possible. In the event of renovation or restriction of the passable profile to 1 600 × 900 mm, we can supply a filtration system disassembled so that all parts of the filtration system can be transported through this size of aperture.

Czech
manufacturer

Worldwide
scope

More than
70 years
tradition

COMPLETE SUPPLIER PROGRAM

- Equipment for flue gas cleaning from solid and gaseous pollutants
- Equipment for pneumatic transport of bulk materials
- Equipment for air conditioning and ventilation of nuclear power plants
- Equipment for building air conditioning and ventilation of industrial buildings, mines, tunnels and subways

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