2.11 Fire protection and fire safety in buildings

Revised: 2017-01-09

Technical conditions for projecting, basic equipment, implementation and structural arrangement of fire equipment of buildings, constructions and fire-fighting accessories.

Valid for: Buildings, constructions, their equipment and accessories

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The latest updated version of this ITS is available at the “http://cts.skoda-auto.com/” web site, the company is not obliged to notify their business partners on the ITS update. Therefore we strongly recommend that everybody checks the ITS regularly. These documents become valid on the date of their last update. For the contracts signed is decisive the validity of the ITS at the time of the order. Note: In case of any differences between the Czech, English or German language mutation of this ITS, the Czech version takes precedence. The Czech version is available at http://cts.skoda-auto.com/.

First issue: 2009-06-12

<table>
<thead>
<tr>
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<th>Date</th>
<th>Note</th>
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<td>1.</td>
<td>2010-12-21</td>
<td>Completely reworked</td>
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<td>2.</td>
<td>2017-01-09</td>
<td>ITS reworked and supplemented</td>
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</table>
1 GENERAL
The Internal Technical Standard is used to maintain a fire safety level of buildings and technological equipment in all the plants of the company ŠKODA AUTO a.s. It serves for maintaining an acceptable level of risk and amount of damage that can be caused by an emergency. The standard has been processed in compliance with applicable legal regulations and normative requirements in the fire protection department and fire safety of buildings.

2 ABBREVIATIONS
ATS Automatic mains power supply and diesel generator switch
ČSN Czech national standard
FDS Fire detection system
ES European standard
CFRS Company fire rescue service
ITS Internal technical standard
FSS Fire safety solution
FSB Fire safety in buildings
FSE Fire safety equipment
PFE Portable fire extinguisher
FP Fire protection
FS Fire shutter
FD Fire department
AFFES Automatic fixed fire extinguishing systems
AAED Automatic air-exhausting device
UPS Uninterruptible power source
UPS FP Uninterruptible power source for FSE
AC Air conditioning
VdS Vertrauen durch Sicherheit Test room

3 BASICS
Every project (even technology projects) and project documentation in all their stages are to be submitted for approval to the PPB departments - Fire protection planning and SO/1 - Company Fire Rescue Service. The submitted documentation in Czech language must have the following scope:
for the PPB department – Fire protection planning:
- 1x printed form (drawings and their supplements must be in colour) or electronically if agreed upon
The observation to the submitted project documentation is given by PPB department – Fire protection planning within 14 days, unless agreed otherwise.

3.1 Project proposal
It must contain all the requirements with applicable legal regulations and normative requirements. It must also be based on the requirements referred to later in this ITS.

Each project documentation must include fire safety solutions (FSS), including drawings to the fire safety in buildings. The project documentation must also include the documentation of the fire safety equipment (AAED, AFFES, etc.), if it is considered for the given purpose (including the drawing supplements). Finally, the escape routes designation project must be part of the project documentation.

When determining the boundary area of a fire department and its fire safety equipment, the fire safety solution designer is obliged to abide by the following:

a. given the size of the production facilities, their daily production and (im)possibility of their full replacement in case of fire, it is necessary to consider the coefficient of consequent damage $k_7$ as follows:
   - paint shops: $k_7 = 3$;
   - stacker system warehouses (HRL): $k_7 = 3$;
   - other buildings: $k_7 = 2$;

b. due to the fact that the buildings belonging to the Technical development - Česana, ŠPC Řepov, polygon Úhelnice and STC Kosmonosy are located outside the main premises of ŠKODA AUTO a.s. in Mladá Boleslav, and that there is no established company's FRS independent unit, it is not possible to count automatically on an intervention of fire fighters in time zone H1. This must be shown by calculating the time from noticing the fire until initiating fire-fighting by the CFRS units. If the calculation is not performed or fails to comply, it is necessary to count on time zone H2 at least (it is not counted by the coefficient $c_2$ according to ČSN 73 0802 or $\Delta c_1$ according to ČSN 73 0804);

c. fire department or the entire building in question must be equipped with the FSE which are prescriptively required and with those that are required by the Group's directive - the so called Brandschutz Matrix. The Group's directive requirements concerning the specific equipment of individual buildings according to their scope are listed in Annex no. 1., which is an integral part of this ITS

d. The FDS must be installed into all newly designed or renovated areas, (does not apply to rooms without a fire risk - e.g. lavatories). The entire fire department, in which the construction or renovation is taking place, must be equipped with the FDS. The project and implementation must be addressed via the FIO/33 department - the FDS system coordinator.

e. An internal notification and emergency system must be installed into all newly designed or renovated buildings. All areas affected by construction or renovation works must be equipped with
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the project and implementation must be addressed via the SO/1 department - the system coordinator. The scope of installation must be agreed with the SO/1 department (Mr Cihelník, Mr Žižka) - the system coordinator.

In the case of design modifications, extensions, building-in etc. for the existing halls or buildings, it is the responsibility of the FSS processor to contact the PPB department whether a complete FSS has already been made for the given building. If so, the fire safety solution processor must build on this solution while ensuring the inclusion of the projected modification (division into FD, changes to fire resistance, deployment of PFES etc.), so that this comprehensive FSS is always updated and corresponds to the latest issued and approved level of project documentation (e.g. building permit documentation, change of construction before its completion). If they do not do so, and a complete FSS already exists, the processor must provide an update of the comprehensive FSS for the given building at their own expense. The comprehensive FSS of the actual condition is handed over for archiving to the PPB departments - Fire protection planning as well as SO/1 in the Czech language (both in printed and electronic forms).

The FSB drawings must contain all the essentials in compliance with Article 41 of the Decree of the Ministry of the Interior of the Czech Republic no. 246/2001 Coll., on fire prevention, as amended (as well as the overall FSS, regardless of the level, type and scope of project documentation - SPD, CPD, DCR - documentation of the construction realisation) and further requirements according to ČSN 01 3495 – Drawings in civil engineering.

The drawings must be clear concerning the building division into the fire departments (FD), fire resistance designation according to ČSN 73 0810, ČSN 73 0802 and ČSN 73 0804, fire departments equipped with the FSE, escape routes designation (incl. type designation - e.g. PER (Protected Escape Route) "B"), direction of escape, deployment of PFES, deployment of emergency lightning, internal and external supply points (for the evidence that the requirements of ČSN 73 0873 are met – sample drawing, see Annex no. 2 of this ITS).

3.2 Final version of the project documentation
It is subject to the final written approval of the PPB department - Fire protection planning, before submitting to the concerned government authorities.

The project documentation is presented in the Czech language (to the extent specified in Chapter 3).

Any comments from the process of project approving from the PPB departments - Fire protection planning and SO/1 must be complemented and taken into account in it.

4 FIRE SAFETY EQUIPMENT
The fire safety equipment (FSE) is designed according to valid normative standards and requirements listed in this ITS! At the same time, the requirements for designing FSE must be met according to the Decree of the Ministry of the Interior of the Czech Republic no. 246/2001 Coll., on fire prevention, as amended. The FSE project documentation must also include instructions and deadlines for carrying out regular inspections and checks of FSE within the time limits stipulated by the Decree of the Ministry of the Interior of the Czech Republic no. 246/2001 Coll., or shorter.

Before placing the FSE into service, a coordinating performance test of this equipment must be carried out in compliance with ČSN 73 0875 art. 4.8.2. This test must be carried out with the
participation of all the FSE suppliers, successive facilities and the FSS designer. The coordinating performance test is technically provided by an FDS technician (FIO/33 department) and managed by the FSS designer. All the links between individual FSE will be tested during this test as designated by the FSS designer in their report! The performance test must be carried out without any defects, otherwise the defect(s) must be removed and the performance test must be carried out again from the beginning!

4.1 Fire safety equipment in buildings
The building in question must be equipped with the FSE according to applicable normative and legal regulations. In addition, the Group fire protection requirements must be met – see Annex no. 1., which is an integral part of this ITS.

4.2 Automatic air-exhausting device
In the premises of the company ŠKODA AUTO a.s., a natural system of automatic air-exhausting devices is preferentially installed. The system must meet the requirements listed below. If it is necessary to use a forced system of automatic air-exhausting device (as required by legislation), the exact procedure is specified by the FSS processor.

4.2.1 Project documentation
When designing the AAED project documentation, it must be based on the valid set of standards ČSN 73 0802, ČSN 73 0804, ČSN 73 0810 and (ČSN) EN 12101, or NFPA 204, NFPA 92, VDI 3564 and other applicable legal provisions. It must also be based on the requirements specified in this ITS.

4.2.2 Requirements for the design of dampers

4.2.2.1 Material of dampers
Vent dampers must be made entirely of corrosion resistant metal materials.

<table>
<thead>
<tr>
<th>Damper base</th>
<th>- welded aluminium construction, alloyed aluminium AlMg3.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damper wings</td>
<td>- from extruded profiles made of aluminium alloy AlMg3.</td>
</tr>
</tbody>
</table>

The only exception to the material design is the pressure and dust sealing and transparent polycarbonate hatch filling.

Each vent damper must contain the following basic components:
- actuating cylinders;
- a thermal fuse with the activation temperature of 68°C, 93°C, 110°C, 141°C (as required by the PPB departments – Fire protection planning and SO1);
- pressure cylinder with the M18 x 1.5 thread;
- pressure switch.

Every damper wing must have at least 3 hinges. Two-wing devices are required with a multi-chamber polycarbonate filling thick 16 mm, hailstorm resistant according to standard SIA 280, in an opal colour or limpid with a UV layer. Hatch fillings can also be with a full filling (double-surface aluminium with internal insulation) or a glass filling (insulating packet of glass).
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The actuating cylinders must have the arrestment in both the open position (in case of fire) and the close position. In case of a loss of pressure in the pipeline, the AAED dampers must not close of itself. Reverse spring loaded closing etc. is not acceptable. The actuating cylinders must be maintenance-free – they must be loaded with a durable lubricant that does not require maintenance; the piston rod in the closed position is protected from dirt.

4.2.2.2 Damper design
The vent damper hatches must have an inclination of at least 6° in order to ensure drainage of rainwater and dirt; the vent damper profiles must be equipped with integrated ducts for water leak drainage around the polycarbonate panels.

The device hatches must open by more than 90° to the device axis. This utilises the entire geometrical area of the damper with both the fire and the normal ventilation.

Hatch butt hinges – made of an aluminium alloy with a Teflon coated pad (maintenance-free design). Each hatch wing is to be connected to the base by at least 3 pieces of hinges.

Girders for mounting pneumatic pistons (engines) must be made of at least a 4 mm thick plate for safe storage of pistons (engines) for opening.

The vent dampers must be of such construction that they can be incorporated into an air shaft with an optimal clear width of 2.5 to 3 metres.

The control system must be designed to overcome the pressure force of 500 N/m² and impact force of 1500 N/m².

For the normal ventilation, the damper opens always with the same drive as in case of fire; this way, its performance capacity is checked (appropriate performance capacity for the installed devices is required according to ES 12101-2 – type B ventilation, Re 1000).

Minimal performance requirements for the largest dimension of the vent damper:
Re1000, SL500, T(-5) or T(-15) for Vrchlabí, WL3000, B300 according to ČSN ES 12101-2.

4.2.2.3 Wall equipment
As for the AAED roof dampers, similar requirements are used for the wall equipment, if applicable.

4.2.2.4 Damper shoulder
The stand (rim) under the vent damper can be made of a material additionally treated against corrosion (galvanised, coated, Komaxit) only where it is not exposed to the surrounding environment. No part of the vent damper control may be anchored on this stand (the vent damper must be supplied as a complete unit from the manufacture and shouldered as a module onto an insulated base).

The vent dampers are anchored by bolts with a pad and sealing about every 300 mm up to 500 mm at maximum.

4.2.2.5 The types of used/released AAED devices at ŠKODA AUTO:
- dampers - type Phönix;
- louvres - type SMOKEJET;
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- multipurpose dampers – type MEGA-PHÖNIX and MEGA-SMOKEJET;
- lamella windows - type EUROLAM.

4.2.2.6 Designation of dampers
- Every AAED roof damper must be designated according to ČSN ES 12101-2.

4.2.2.7 Other requirements
Apart from the above mentioned requirements, roof and wall AAED dampers must also correspond to the harmonised standard ES 12101-2 and they must be issued a Certificate of Conformity (test room MPA NRW Dortmund according to DIN ES 12101-2). If there is a product-harmonised standard for the relevant AAED device part, these products must correspond to the relevant harmonised standard (EN 12101 in particular). Preliminary drafts of standards are taken into account but their compliance is required only where the requirements are settled or are notified in advance.

The vent dampers and their components must also correspond to VdS 2159. Compliance with the requirements is documented by presenting the relevant certificate from VdS for the product (presented by the supplier).

4.2.3 Control and trigger
Opening of the AAED smoke dampers in the relevant smoke section will not be activated based on the alarm from EFA button detectors (only from the FDS automatic detectors in the relevant smoke section).

4.2.3.1 Switchboards for the AAED pneumatic control
The control box is to be made of a varnished plate (RAL 3000). The manual trigger switch must be placed under a breakable glass pane in front of the individual section valves. The switchboard enclosure must be of such dimensions so that all the components, including spare cylinders (100% back-up) can fit comfortably into it.
The switchboard type JOFO Pneumatik or Rittal.
The enclosure is equipped with indicators for opening/closing of the sections, daily ventilation, rain, fault.

In order to automatically start the FDS, an eject valve for manual opening with a coil is installed for each smoke section. The switchboards are equipped for the regular daily ventilation (the requirement is governed by a list of operations). In any case, a double-acting control system is required, so it is possible to not only open the vent dampers from the switchboard but also close them without the need for the operating person to climb on the roof. The fire function must be ensured to have priority over the ventilation function.

The placement of control switchboards must be consulted with the PPB departments – Fire protection planning and SO/1.

Each switchboard connected to the pressure manifold must be equipped with a valve to connect to a cylinder (max. 1.5 m above the floor).

4.2.3.2 For each section, the switchboard includes:
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- CO2 bottle for opening the device;
- bottle for closing the device (if the system is not connected to the compressed air in the hall);
- eject valve with a coil and a screw union for the cylinder with the screw thread of M18 x 1.5;
- ventilation valve with a stabiliser for the fire opening and solenoid for the ventilation initiation
- spare bottle for opening and closing the devices (100% back-up).

The switchboard also includes a control valve and the condensate basic filtration unit, including the water separator and the basic electrical equipment to control ventilation from the front of the switchboard (including the required switches, indicators etc.). When the switchboard is shut down from the power supply, the switchboard must ensure continuous readiness for the fire function for the period of 72 hours (if the fault monitoring is implemented, then 30 hours).

The filling content needed for opening the flaps from the switchboard is dimensioned according to the number of dampers, volume of the control cylinders and length of the control pipeline.

The minimum charge content for opening the damper section from the switchboard (in reality, the requirement for the charge content may be higher depending on the volume of cylinders, while the requirement may be lower with the louver devices; the supplier is responsible for correctness.

**Table no. 1: Minimum charge of the CO2 bottle**

<table>
<thead>
<tr>
<th>number of the AAED dampers in the section [pcs]</th>
<th>length of the copper wiring up to [m]</th>
<th>minimum charge of the CO2 bottle</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50</td>
<td>60 g</td>
</tr>
<tr>
<td>3</td>
<td>100</td>
<td>175 g</td>
</tr>
<tr>
<td>5</td>
<td>250</td>
<td>300 g</td>
</tr>
<tr>
<td>8</td>
<td>400</td>
<td>500 g</td>
</tr>
<tr>
<td>12</td>
<td>600</td>
<td>750 g</td>
</tr>
</tbody>
</table>

Cylinders with a screw thread other than M18 x 1.5 are not acceptable for new control installations and reconstructions both with switchboards and vent dampers.

The switchboard must be dimensioned for the fire function of a pressure from 10 – 12 bar and for the regular daily ventilation from 5.5 – 10 bar.

The connection of each ventilation section with the FDS device must be carried out with the 24V / 0.23A signal and a back-flow contact from the pressure sensor in the switchboard. Then each vent damper is to be equipped with a sensor to detect the damper activation when the temperature for opening has been reached. The contact from these sensors (obtained from a pressure limit switch located on each damper) is brought to the point of the AAED switchboard (a message to the CFRS, ensuring a permanent alarm message from the expansion relay).

In the case of the AFFES device installation when fire is detected for the first time, the devices that are open for regular ventilation must be closed with the signal from the FDS. Additionally, the relation of the function of the AAED and AFFES must be assessed, at least the activation temperature range of thermal fuses. The priorities of the AFFES or AAED may be proposed by designers of individual parts. They are obligatorily and firmly determined, however, by the fire safety solution processor after a consultation with the PPB departments - Fire protection planning and SO/1 during the project stage for the building permit.
The AAED switchboard must be powered by 230V. When the AAED is used for regular ventilation, it is necessary to bring compressed air of at least 6 bar to it (the recommended pressure is ≥ 8 bar).

The AAED switchboard must be equipped with a sensor wind-rain (with one or more, depending on the roof size of the given building). Operator panels are used for the manual opening of sections from the opposite side of the hall than the hall switchboard is located.

**4.2.3.3 Control manifolds**

They must be made of two soft copper tubes of the diameter 8/0.8 or 8/1 mm, connected solely by metal fittings with a metal sealing ring and a compression nut.

Downtakes to the multi-group switchboard will be made in metal canals. Manifolds in the hall are to pass under a trapezoidal sheet or under the roof structure. Connecting elements must be placed preferentially so they are accessible from working platforms. Along with the copper wiring, a message cable will be distributed for pressure switches (message to the CFRS).

It must be possible to close all the devices at once from the control box on the floor level.

**4.2.3.4 Electric control switchboards**

The electric control system is used when the pneumatic control is not possible due to technical reasons (e.g. ventilation of staircases). It is particularly the case when there is no compressed air in the hall available and the regular ventilation function is requested, or for smaller units within one fire department or for air inlet wall systems. The control system of the natural AAED must have its own back-up units. A system with 24V control voltage and drives must be used; it is not possible to use 230V drives.

**4.2.3.5 Ventilation holes**

The size of ventilation holes must be specified in the PD and based on the calculation according to the normative requirements for the given action. The PD must also indicate the design of inlets (wall louvres, windows or doors in peripheral walls).

In the case of using wall louvres or windows, no technology can be placed or material stored in the prescribed distance from them (determined by the designer for the AAED part) - functionality limitation of ventilation holes.

In the case of using the peripheral door for an additional air inlet of the AAED system, the opening door function must be permanently ensured (even outside working hours) on the basis of the FDS impulse – the only exception is a service intervention carried out on the door. In order to ensure this functionality, the control unit must be equipped as follows:

- **regular control of the door** (membrane keys) – up / stop / down,
- **lock for the (weekend) door lockout** – the door control is locked by the key. The lockout will put also other devices out of operation (radar, inductive loop, pull switch, activation photocell etc.),
- **emergency door stop** – the arrestment button is used for the emergency door shut-off,
- **lockable main switch** – used only pro for servicing and cutting the door off from the power supply. During a routine operation (even outside working hours) it must be always in the ON position. The key for the lock will be placed in a box under the glass pane in close proximity to the control unit. If necessary, the glass pane is to be broken and the key taken out.

In the case of using the peripheral door for an additional air inlet, it is necessary to design the switching off of air conditioning units in the area of the door (e.g. sahara).
Whenever the door is stopped or locked (except for the case when turning the master switch off), the door must remain under voltage, and it must open when commanded by the FDS.

4.2.3.6 Handover of the system and putting into operation
The installation of the AAED and putting it into operation is to be carried out in compliance with the Decree of the Ministry of the Interior of the Czech Republic 246/2001 Coll., as amended. The following must be also submitted:
- Installation statement of the fire safety equipment,
- Initial operability test (Art. 7 of the Decree of the Ministry of the Interior of the Czech Republic no. 264/2001 Coll.),
- Installation authorisation from the manufacturer,
- MPA NRW certificate,
- Quality management system certificate,
- ES declaration of conformity,
- VdS damper certificate (must be provided by the manufacturer/supplier of the damper).

The device must be substantiated by the documentation of the actual construction, operation and inspection logbook stating the date of the regular inspections, schematic diagram (plan), unambiguous and clear diagram of the control switchboard.

All descriptions on the switchboards must be in Czech and in a major size.

4.3 Automatic fixed fire extinguishing systems
In the premises of ŠKODA AUTO a.s. the following AFFES system types are used:
- sprinkler AFFES,
- INERGEN® 300bar,
- water spray,
- CO₂,
- aerosol AFFES
- OxyReduct
- air - foam fire extinguishing.

Considering the fact that sprinkler AFFES are implemented the most in the premises of ŠKODA AUTO a.s., the requirements for this type of AFFES are listed below. It is true, however, that during the implementation (project, installation, repair etc.) of other listed types of AFFES, it is necessary to follow also the VdS regulations in the designing part and its approval by the VdS inspector (directed by the designer), followed by the VdS inspector's acceptance of the implemented work (directed by the supplier) up to the faultless state, unless agreed otherwise with the PPB departments – Fire protection planning and SO/1.

When implementing the INERGEN® or water spray AFFES, it is necessary to contact the PPB department – Fire protection planning for further specification of the assignment and conditions at early stages of
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the project. It is necessary to notify the PPB department – Fire protection planning about every intention of installing the aerosol AFFES (FireJack), (this applies to both construction technological projects).

New installations of the CO2 extinguishing system are no longer allowed – the exception is the technological device extinguishing that is supplied with the device. It is necessary to inform the PPB departments – Fire protection planning and SO/1 about these installations during the design stage. In the case of modifications and repairs of the existing CO2 extinguishing system, it is necessary to contact the PPB department – Fire protection planning, which will determine the next steps.

Due to the fact that the AFFES system is dedicated fire safety equipment which performs an important function in fire protection at ŠKODA AUTO a.s., the Purchase department may be submitted only the selection of the supplier which is signed by the PPB department – Fire protection planning.

Other types of the AFFES are not allowed to be used at ŠKODA AUTO a.s. - it concerns mainly gaseous fire suppression systems (FM-200®, NOVEC 1230 etc.)

4.3.1 System design
The overall design concept of the fixed fire extinguishing system must be in compliance with this ITS, requirements of ČSN EN 12845 and regulation VdS CEA 4001 in the latest version.

In case of various requirements between ČSN EN and VdS, it is necessary to meet the higher design requirement. In the event of ambiguities/contradictions, it is necessary to contact the PPB departments – Fire protection planning and SO/1.

According to VdS, it is possible to implement the AFFES in the higher (grade 1) and the lower (grade 2) standard:
- AFFES grade 1: particularly with higher demands on water sources;
- AFFES grade 2: the entire installation surface max. 50.000 m²; it is not particularly required to install pressure vessels (approval is necessary by the PPB departments – Fire protection planning and SO/1).

Protection by the sprinkler AFFES must be done in the entire building. If the PPB departments – Fire protection planning and SO/1 agree, it is possible to omit the protection in the following areas:
- fire protected and separated escape routes,
- areas with other fire extinguishing systems,
- other areas as per VdS CEA 4001 - see paragraph 4.1.

4.3.2 AFFES components
The components must be approved for the use in the Czech Republic with certificates PAVÚS/TAZÚS and they must be also certified by VdS and comply with Annex I VdS CEA 4001 as amended.

All used components of the AFFES must be usable for the operating pressure PN16.

The supplier must use the components as per table no. 2 due to the unified service, training, maintenance and manipulation.

Any exception to each specific case is possible only with a written approval of the PPB departments – Fire protection planning and SO/1.

Table no. 2: AFFES permitted components
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<table>
<thead>
<tr>
<th>Main pumps – machine set</th>
<th>Speck / Nijhuis / Holzhauer (not represented in the Czech Republic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main pumps – diesel engine</td>
<td>Iveco / John Deer / Doosan</td>
</tr>
<tr>
<td>Supplementary pumps</td>
<td>KSB-Movitec, Grundfos, Speck</td>
</tr>
<tr>
<td>Circulating pumps / for heating</td>
<td>KSB-Movitec, Grundfos</td>
</tr>
<tr>
<td>External steel tanks</td>
<td>Kohimex Type KKL (including thermal insulation)</td>
</tr>
<tr>
<td>Compressor</td>
<td>Orlík (including pressure tank passport)</td>
</tr>
<tr>
<td>Pressure tanks for the AFFES</td>
<td>Step Trutnov, Abersfelder, Vaněk, ČKD Dukla</td>
</tr>
<tr>
<td>Valve stations</td>
<td>Tyco / Fire &amp; Security (Grinell)</td>
</tr>
<tr>
<td>Flow detectors in the engine room</td>
<td>Potter Electric Signal Company LLC</td>
</tr>
<tr>
<td>Flow-meter</td>
<td>Turbolux (SITRANS F), Kirchener&amp;Tochter (SMB)</td>
</tr>
<tr>
<td>Fire Alarm Control Panel</td>
<td>ESSER (Typ:8000 c(m))</td>
</tr>
<tr>
<td>Cable trays</td>
<td>ARKYS (Type:Mercur2) EI min 60 minutes</td>
</tr>
<tr>
<td>Fittings connected by a slot joint</td>
<td>Grinell, Victaulic</td>
</tr>
<tr>
<td>Suspension system, anchoring</td>
<td>Síkla, Hilti</td>
</tr>
<tr>
<td>Sprinkler heads and nozzles</td>
<td>Tyco / Fire &amp; Security</td>
</tr>
<tr>
<td>AFFES engine room filling points – mobile fire-fighting equipment</td>
<td>SILEA S.p.A., FLEX TECH</td>
</tr>
</tbody>
</table>

### 4.3.3 Project documentation

The documentation must be submitted to the extent specified in chapter 3 and include a definite documentation stage. Each stage of the project documentation must include all parts listed in table no.3.

All electronic and paper documents, particularly the Installation certificate, inventory of sprinklers, technical report and protocols will be stamped and signed by a responsible person (otherwise invalid).

Table no.3: Contents of the individual stages of documentation

<table>
<thead>
<tr>
<th></th>
<th>SPD/CPD</th>
<th>TD</th>
<th>PID</th>
<th>DABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation certificate</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Technical report incl. basic parameters of the engine room, valve station / preliminary hydraulic calculation</td>
<td>Yes/No</td>
<td>Yes/Yes</td>
<td>Yes/Yes</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Position plan of the assessed part / as per VdS:</td>
<td>No/No</td>
<td>No/No</td>
<td>Yes/Yes</td>
<td>Yes/Yes</td>
</tr>
<tr>
<td>Updated overall position plan / as per VdS:</td>
<td>No/No</td>
<td>No/No</td>
<td>Yes/Yes</td>
<td>Yes/Yes</td>
</tr>
<tr>
<td>Diagram of the assessed part:</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Updated overall diagram:</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Complete hydraulic assessment</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Drawing documentation without dimensions</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Drawing documentation incl. dimensions and cross sections</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Protocols (pressure tests, flushes, performance)</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Additional information regarding the documentation:

**SPD / CPD: Site permit / construction permit documentation**

**TD: Tender documentation, Supplier selection documentation:**

They must be within the scope of and contain all requirements according to the current regulations in force ČSN EN 12845, or according to VdS CEA 4001, incl. basic hydraulic calculations to verify parameters of the water machine and the pump performance of the sprinkler engine room, whose design parameters must meet the investor's requirements regarding the planned use of protected areas as well as any possible changes to the use of partial areas.
The hydraulic calculations must include a description and analysis of the calculation output (from the point of hydraulics, the most and least convenient areas in terms of pressure and water volume), description of requirements, effective areas from individual valve stations, points below the curves – as per ČSN EN and incl. a diagram description – performance characteristics of the designed pumps.

**PID:** Project implementation documents:
The implementation project must be approved by the PPB departments - Fire protection planning, SO/1 before initiating the installation at the latest. The VdS protocol without defects must be ensured in parallel.

**DABC:** Documentation of the actual building construction:
An inspection protocol without defects done by the VdS inspector must be submitted with the implemented work of the AFFES.

The approval of the project documentation by the VdS inspectors is directed by the project documentation processor.
Financial costs related to the VdS inspection and issuing the relevant protocol during the implementation stage are directed by the supplier of the AFFES technology.
The VdS organisation’s contact on behalf of ŠKODA AUTO a.s. is the PPB department – Fire protection planning.
Each planned acceptance of the AFFES device must be notified to the PPB department – Fire protection planning or SO/1.

**The list of documentation for a work handover:**
- Initial operability test (Art. 7 of the Decree of the Ministry of the Interior of the Czech Republic no. 264/2001 Coll.),
- installation notification (in the case of a certified supplier),
- installation certificate / see paragraph 3.4.2. VdS CEA 4001 as amended,
- detailed inventory of sprinklers,
- declaration of conformity with the standard - ČSN EN and VdS,
- proof of the performed pressure test and the flush of wet branches, (individually for each control valve),
- proof of the performed pressure test and the flush of dry branches, (individually for each control valve),
- protocol on the operator training,
- handover protocol of the AFFES supplier,
- AFFES inspection logbook
- AFFES operating instructions,
- operating and maintenance instructions from manufacturers of individual components that constitute the AFFES,
- documentation to the monitoring system of the AFFES (CPD, initial inspection of the el. device and certificates of individual components),
- documentation to the electric wiring of the AFFES (CPD, initial inspection of partial components, certificates of individual components).

**Pumps:**
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- data sheet(s) of the pump with the curve and the VdS number,
- protocol on the test run of the pump (90 min), including the protocol on the performance measurement of the pump,
- pump: the type and the VdS number of the distribution box of the pump.

**Pressure vessel:**
- protocol on the construction and pressure test of the pressure vessel,
- protocol of the initial inspection of the pressure vessel.

**Hydraulic calculations corresponding to ČSN EN and VdS as amended from approved or recommended software:**
- they must be within the scope of and contain all requirements according to the current regulations in force ČSN EN 12845, or according to VdS CEA 4001, incl. basic hydraulic calculations to verify parameters of the water machine and the pump performance of the sprinkler engine room, whose design parameters must meet the investor's requirements regarding the planned use of protected areas as well as any possible changes to the use of partial areas,
- the hydraulic calculations must include a description and analysis of the calculation output (from the point of hydraulics, the most and least convenient areas in terms of pressure and water volume), description of requirements, effective areas from individual valve stations, points below the curves – as per ČSN EN and VdS incl. a diagram description – performance characteristics of the designed pumps,
- the calculations will be handed over, including legible isometries and tables on equivalent lengths and dimensions of the pipelines,
- handover of the hydraulic calculations - the hydraulic output handover arranged according to nodal points from a pump / to a pump.

**Drawings:**
- clear diagram of the AFFES (max. size A2) is to include:
  All components of the device (dry, wet valve stations incl. accessories, flow detectors, system with antifreeze).
  The example is shown in figure P3.1 in Annex no. 3;
- plans of the pipeline network of all levels, recording the most and the least convenient area with hydraulic values (actual area, intensity, sprinkler K-factor); Legibly – 1:50, 1:100, 1:150, 1:200.
- axonometry

### 4.3.4 Project design criteria
Design criteria (classification, intensity, effective area, minimum pressure on the sprinkler head etc.) must comply with ČSN EN 12845, VdS CEA 4001 as amended.

**Table no. 4: Reference classification of stored materials:**

<table>
<thead>
<tr>
<th>Types of material, semi-finished products or parts generally assessed incl. packaging material</th>
<th>BG / Fire hazard category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Single-wall plastics PP/PE/PS - flow with a calorific value &lt;25 MJ/kg</td>
<td>Cat. IV or HH54</td>
</tr>
<tr>
<td>2) Plastics PP/PE/PS - non flow, multi-wall with a calorific value ≥ 25 MJ/kg</td>
<td>Cat. IV or HH54 +Annex K7 (VdS CEA 4001)</td>
</tr>
</tbody>
</table>
In all areas intended for storage where the AFFES is installed, the highest classification category HHS 4 must be always considered for the possibility to change the type of stored material without the necessity to modify the AFFES (provided that the layout of shelves is maintained). All logistic areas are to be designed for the intensity of 30mm/m².min in order to use the maximum storage height of block storage. The ceiling protection over the logistic areas with shelves are to be designed with the same pipeline dimension as the areas without shelf protection. The reduction of hydraulic parameters will be carried out only by sprinklers with a lower K-factor. (Example: sprinkler - K160 will be replaced by sprinkler K80 over the shelves).

Sprinkler head protection in the shelves
A solution method to protect sprinkler heads in the shelves is designed in Annex no. 6. Specific solutions of individual cases must be always discussed with VdS before the start of the actual implementation.

The prerequisites of the design parameters efficiency are shown in table no. 5:

1) The stated classification of goods/material corresponds to the border heights stipulated by the table.

2) It is necessary to discuss the maximum storage height, particularly the one in the storage areas considering the height and type of the shelves no later than at the project stage - CPD. The supplier of the project documentation is responsible for the design intensity within the limits of the concept.

4.3.5 Selecting the supply of water and electricity
The choice of water supply and electricity must comply with ČSN EN 12845 and VdS CEA 4001 as amended.

Note: a design example: for category 1 as per VdS CEA 4001 as follows: Device of 5,000 up to 30,000 sprinklers: 2 pumps (E+D), 2 feed tanks +1 pressure tank.

4.3.6 Engine room and valve station rooms
Any plan to build a new FFES engine room and valve station rooms is necessary to be notified to the PPB departments - Fire protection planning and SO/1, which will look into such investment project.

The ceiling must be designed in such way that it is possible to suspend the needed technology and manifolds onto it.

It is necessary to ensure: adequate ventilation, lightning incl. emergency lightning, protected access (arrival of CFRS units and their mobile equipment to the entrance to the building, the access road and the entrance to the building must not be located in a fire hazard area etc.).

4.3.6.1 Requirements for the AFFES engine room / pumping station
- the engine room must be built as a separate fire department with a fire resistance of min. EI 60 with access from the outside and must be protected by sprinklers,
- to install a heating system in the engine room - +15°C, to provide air exchange in the engine room, to ensure the heating monitoring (transmitted to the CFRS dispatch centre by the FDS system)
- to fit the current laminated diagram of the whole system on an appropriate scale (to update when extended),
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- to fit the current general plan of the entire device (to update when extended)
- to keep spare sprinklers of each used type in the amount as per ČSN and VdS,
- to ensure drainage
- if the engine room is located underground without the possibility of direct ventilation, it is necessary to provide forced ventilation with the temperature and humidity monitoring

4.3.6.2 Requirements for the AFFES valve station rooms
- A valve station room must be fire-separated with a minimum resistance of EI 60 with access from the outside of the building as per the standards mentioned above,
- to fit the current laminated diagram of the system and the diagram of the protected areas - the general plan on an appropriate scale (to mark the local part) - see Fig. P3.1 and P3.2 in Annex no. 3; including an indication of the maximum storage height, intensity of the sprinkler heads, classification in terms of storage and hazard, number of fitted heads.
- to ensure drainage
- to install a heating system +15°C, to provide air exchange in the valve room, to ensure the heating monitoring (transmitted to the CFRS dispatch centre by the FDS system)
- if the valve room is located underground without the possibility of direct ventilation, it is necessary to provide forced ventilation with the temperature and humidity monitoring

4.3.6.3 Sprinkler feed tanks
In order to operate the sprinkler fire extinguisher, a sufficient quantity of extinguishing medium must always be provided for the operating time stipulated as per the above mentioned standards. It is necessary to take into account a possible connection of a hydrant system or water curtains to the AFFES.

When constructing new facilities, it is necessary to thoroughly discuss all the possibilities of future expansions with the investor as well as the maximum projected design intensity of sprinkling. Only tanks with full capacity are to be installed!

a) Technical parameters:
The tank capacity is determined on the basis of the hydraulic calculation increased by reserves allowing a future expansion of the AFFES.

It is always necessary to implement at least 2 inexhaustible sources with regard to a possible future expansion. Every inexhaustible source should not be smaller than:
- 810 m3 without connection of external hydrants,
- 1026 m3 (810+216) with connection of external hydrants to the AFFES engine room,
- other cases must be discussed with the PPB departments – Fire protection planning and SO/1.

b) Type:
- Underground tanks
- Aboveground tanks

Underground tanks
As a water source, an underground tank with a suction sump and effective capacity can be installed according to the requirements of the implementation project documentation. The filling water must
comply with the water quality as per category I 6 according to ČSN 757221 with a permissible impurity content of 0.5% of the volume quantity and with a diameter of particulate matter up to 0.5mm. No addition agents may be added to the water that would influence its physical and chemical properties. The provision of the water purity in the source must comply with ČSN 752411. No addition agents preventing water freezing may be added to the water. The volume of the required water supply must be renewable within 36 hours.

The tank has anti-corrosion riser pipes or a ladder down to the bottom of the tank. For carrying out inspections, the tank must be fitted with a removable hatch of the minimum dimension 800 x 800 mm. The hatch must be made so that daylight, drips and other fluids and impurities are prevented to enter. The tanks must be installed with ventilation and an emergency spillway of a minimum area 125 cm². The safety spillway must be fitted at least 5 cm above the highest water level of the tank. The minimum required water level and its overlap and draw-down in the tank must be monitored. Water level detection sensors will be placed inside the tank. The tank filling will be carried out automatically via the water level sensors. The automatic filling will be provided through shut-off fittings with electric drive. It is possible to fill the tank manually by opening the closure damper DN 100. It is possible to drain the tank by the discharge pipe into the existing sewerage system by gravity or displacement.

**Aboveground tanks**

These are aboveground full plate segmental ones without internal insert or lining (i.e. type KOHIMEX KKL), with the external mineral insulation under the overlay. The supplier of the AFFES delivers the tanks fully fitted: the tank with complete equipment, including the starter strip to which the tank is sealed. The raft foundation of impermeable concrete (waterproof) is not part of the supplier's technology. The minimum water level above the bottom must be 0.3 m and the maximum water level under the ceiling of the tank must be at least 0.5 m but also under the level of the installed inspection platform. All discharge or spillway pipes from the tanks must be installed into an established shaft (individually for each tank) inside the engine room of the minimum dimensions 0.5 x 0.5 x 0.5m with grating and discharge sewer pipes of at least DN150. An anti-odour siphon must be assembled from the pipeline fittings DN150 (it is possible to use an anti-odour damper as an alternative – but this is necessary to discuss first with the PPB departments – Fire protection planning and SO/1). Filling must be done through float valves - or manually as an alternative (it is necessary to agree on this with the PPB departments – Fire protection planning and SO/1).

c) **Overlay specifications:**

The tank overlay will be identical both from the inside and the outside incl. the roof overlay (see Fig. 2). The overlay must be done as follows:

- painted trapezoidal Al plate (waves in the vertical direction),
- thermal insulation - hydrophobised Rockwool of minimum thickness 100 mm,

The details concerning the plating of the tank insulation will be approved by the investor before installation (the colour will be determined by the investor according to the valid graphic manual ŠKODA AUTO a.s. according to the shade RAL - the current standard is RAL 9006; the orderer may designate a combination of more colours).
d) Equipment:
Each AFFES feed tank must be equipped as follows:
- Roof platform + inspection hole,
- Ladder from the roof of the engine room to the roof of the tank (usually around 3000 mm),
- Inspection entrance from a level of ±0.000m (from the engine room),
- Tank spillway brought down to the engine room min. DN 150,
- Inspection platform,
- Monitoring - water level, temperature etc. (transmitted to the CFRS).
The components listed in this section (except for monitoring) must be made of steel with a surface treatment - hot-dip galvanisation.

e) Heating:
The heating of the AFFES feed tanks must be done by a hot-water electric boiler.
The constant heating V1 will be performed individually for each tank from the central hot-water pipeline in the premises. The connection for the hot-water heating will be terminated by an end cap in the AFFES engine room. The heating will be provided by a heating loop placed at the bottom of the tank (stainless steel braided bellows hose), supplied from the central distribution point of hot water.

Assembly V1: performance determined by the size of the tank
- stainless steel braided bellows hose BHC, type KBN1 U1 – 16 / , PN 97, external ø around 35-38, terminated by a compression nut with the internal thread,
- support structure of the heating hose (laid down in the drawing documentation),
- electrically operated shut-off fitting, including a control system and necessary components for ensuring the proper operation of the heating unit (safety valves, cabling, thermo-regulator, temperature sensors etc.).
In case of heating failure or shutdown from the central pipeline source, the backup electric tank heating will be used V2a/b (individually for each tank):

**V2a:**
The electric heating will be installed using heaters fitted in the flow boiler with the forced water circulation by the circulating pump. The boiler will be separate for each tank and located inside the engine room.

**Assembly V2a:**
- exchanger / flow boiler, Ø300, height 1000 mm (min. hot-dip galvanisation).
- el. spirals (X kW – based on the heat balance calculation, for each insulated tank),
- circulating pump (supplier KSB),
- switchboard with control and switching (switches at +6°C and switches off at +10°C),
- emergency thermo-regulator, safety valve, pipes and shut-off fittings.

**V2b:**
Electric boiler PZP Prima. The heating power will be designed on the basis of the overlay heat dissipation balance calculation. The boiler will be separate for each tank and placed inside the engine room.

**Assembly V2b:**
- compact electric boiler PZP Prima complemented by an additional circulating pump (supplier KSB) (X kW - based on the heat balance calculation, for each insulated tank).

### 4.3.6.4 Pressure tanks

The pressure tank is required for categories 1 and 2 in the AFFES design (see 4.3.1). The minimum volume of one pressure tank: 25 m³ (from which 15 m³ is water). The following supply of air must be provided - 18 m³/h (min. DN 20) and water - 6 m³/h (min. DN 40).

The pressure tank (PN16) must be evaluated both with the new design and with an extension whether the operating pressure is sufficient.

The automatic filling of the pressure vessel is required from 10 000 sprinklers. The requirement is defined in terms of the automatic filling of water into the pressure tank; filling of air is not necessary.

When installing two pressure tanks, it is necessary to perform a “series” connection.

All discharge or spillway pipes from the pressure vessels must be installed into one established shaft of the minimum dimensions 0.5 x 0.5 x 0.5m with grating and discharge sewer pipes of at least DN150. An anti-odour siphon must be assembled from the pipeline fittings DN150 (it is possible to use an anti-odour damper as an alternative - but this is necessary to discuss first with the PPB departments – Fire protection planning and SO/1).

### 4.3.6.5 Main pumps

The AFFES main pumps must be made in the efficiency class IE 3,4 as per the Group standard.

The size of the pumps is determined by the hydraulic calculation for the least convenient effective area in the entire facility. This preliminary hydraulic calculation incl. ISOMETRY must be already part of the documentation no later than at the CPD stage.
The pumps are activated by pressure drop on two pressure switches (manostats, range 1-16 bar). The first pumping device must automatically activate when pressure in the system drops down to at least 0.8·P, where P is the pump pressure into the closed valve. If there are two pumping devices installed, the second pump must activate before pressure drops down to at least 0.6·P. After activation, the pumps must run until being MANUALLY stopped on the switchboard of the respective pump.

The pumps are used with the inlet disposition and with an electric or diesel engine. Cooling of the diesel generator must be controlled by a servo drive with the return spring.

Drip heads from the pump and drainage of the cooling water must be installed into an established shaft (individually for each pump) of the minimum dimensions 0.5 x 0.5 x 0.5 m with grating and discharge sewer pipes of at least DN150. An anti-odour siphon must be assembled from the pipeline fittings DN150 (it is possible to use an anti-odour damper as an alternative – but this is necessary to discuss first with the PPB departments – Fire protection planning and SO/1).

a) Pumps with electric engines:
The supply of electricity must be always provided, i.e. the connection must be linked before the main electric disconnecting switch (DEON). At the same time, each element between this connection and the pump switchboard must be described according to the requirements of the above mentioned regulations:

“ELECTRICITY SUPPLY FOR THE SPRINKLER PUMP ENGINE - DO NOT SWITCH OFF IN CASE OF FIRE”

b) Pumps with diesel engines
Supplying with fuel must be done for at least 6 hours of operation.

Exhaust pipes to the diesel pumps must be installed with damping and thermal insulation (max. temperature of the pipe is usually around 570°C) + insulation overlay with Al plate. Other parts of the exhaust pipe must be painted with a special anti-burn paint.

c) Technical parameters (in detail as per the above mentioned regulations):
Minimum number: 2x sprinkler pump (main and 100% back-up).

Minimum power of the pumps: \( Q = 9000 \text{ l/min} \rightarrow H = 90 \text{ m} \)

The sprinkler main pumps with new installations must not, in terms of performance, put into the closed system more than 11 bar, i.e.: \( Q = 0 \text{ l/min} \rightarrow \text{PMAX} = 11.0 \text{ bar} \)

d) Refuelling – pumping stations:
Refilling the fuel tanks for diesel pumps must be provided by a pump located on the pump set or in its close proximity. It must be provided individually for each pump and must be accessible from the floor level of the engine room.
The diesel generator is to be equipped with an inflow filling pipe with the throat for a filler gun.

The fuel tank of the diesel generator must be equipped with a fuel level indicator located on the diesel generator set so that the indicator is visible when refuelling.
4.3.6.6 Valve stations

a) Valve station types
All valve stations must in its design comply with the requirements as per 4.3.1. In order to ensure the AFFES compatibility, the valve stations must come from the manufacturer GRINNELL (Tyco Fire Suppression & Building Products).

It is possible to use the following valve stations:
- wet valve station with the delay chamber,
- dry valve station with the accelerator or rapid deaerator (no combination is possible),
- another type of system / valve station is necessary to be consulted with the PPB departments – Fire protection planning and SO/1.

Each valve station will be equipped with a flash detector and a fire bell. It is recommended to install additional shut-off fittings over the valve stations for easier maintenance as well as time and costs savings related to discharging the valve stations;

b) Size of valve stations:
The maximum area protected by one wet control valve, including all the sprinklers in a subordinate set extension, must not be larger than:
- Moderate risk, including all the slight risk sprinklers: 12.000 m²
- Severe risk, including all the moderate and slight risk sprinklers: 9.000 m²

The total size of all new and modified or extended valve stations, including shelves, will be defined in the AFFES technical report. The recalculation must correspond to the requirements in 4.3.1 of this ITS.

c) Wet valve station
When installing a part of the pipeline system in areas where it is not possible to annually guarantee a temperature higher than 4°C, the pipeline heating is used.
The installation conditions must comply with the requirements in 4.3.1 of this ITS.

d) Dry valve station
A dry valve station will be assembled in accordance with the manufacturer's instructions.

The longest period for test fittings of the dry system and the water jet must be shorter than 60 seconds.

The components for supplying the valve stations with air:
- compressor: min. power 6 m³/hour,
- reverse damper and protecting fitting,
- 1.5 mm bypass curtain.

For the dry system distribution, the supply of air must be used from the central air distribution system (if located in the building) with a compressor back-up installed in the area of dry valve stations.

It is not possible to replace the dry system with the wet system with an anti-freeze additive due to a disapproval from the PSU department - Ecological and labour protection.
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**e) Designation of the valve stations:**
Each valve station must be labelled with a designation with the following basic information, i.e.
- valve station number, type (wet, dry),
- protected area (must correspond to the position plan),
- to fit the position plan at each valve station
- fire classification,
- number of installed / countable sprinklers or the total area of the valve station,
- K-factor of the test sprinkler.

**f) Drip / sewage tank under the valve station distributor:**
The sewage tank will be always made waterproof from homogeneous polypropylene boards, or it will be brick with a water-resistant paint up to the tank height.
Drainage from the drip tank must be made by the sewerage pipeline DN 150. An anti-odour siphon must be assembled from the pipeline fittings DN150 (it is possible to use an anti-odour damper as an alternative – but this is necessary to discuss first with the PPB departments – Fire protection planning and SO/1).

**4.3.6.7 Flow detectors**
The flow detectors must be installed wherever a valve station protects more than one floor or an otherwise separated area. Each flow detector will be installed incl. a test assembly accessible from the floor level.

The signal from the flow detector is possible to transmit:
- the signal scans the FDS system and then transmits it to the AFFE monitoring system,
- the signal scans the AFFE monitoring system and then transmits it to the FDS system.

The execution of the signal scanning and its transmission will be determined by the PPB departments – Fire protection planning and SO/1.

**4.3.6.8 AFFES monitoring**
The AFFES in the buildings of ŠKODA AUTO a.s. must be automatically monitored according to the requirements in 4.3.1 of this ITS.

The monitoring of faulty states and the transmission of fire signals will be carried out within the ESSER fire alarm systems (Type: IQ8 Control C/M incl. a control panel) in a circular network.
The monitoring fire alarm system must be placed into each engine room and valve station area in the most convenient way for the operator (as close to the entrance to the engine room as possible) or as required by the PPB departments – Fire protection planning and SO/1.
Used cables and conductors must comply with the prescribed fire resistance, including clips and cable trays – according to the requirement in 4.3.1 of this ITS.

Reference list of the required monitored states (as per 4.3.1):

**a) Shut-off fitting monitoring (SOF):**
- reduced tank filling,
- for the pump suction,
- for the displacement of the pumps,
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- for the displacement of the pressure vessel,
- for the displacement of the pressure vessel,
- for the pump test pipe
- for the pipe up to the bell,
- before (or after) the valve station,
- for the engine inlet into the pump diesel engine.
- refrigeration monitoring

b) Fluid level monitoring (FL):
- in the feed tank,
- in the pressure tank,
- in the watering tank of the pump (only during suction),
- in the fuel tank for the diesel pump.

c) Operating pressure monitoring (OP):
- in the pressure vessel,
- in the dry system,
- in the system

d) Other monitoring

<table>
<thead>
<tr>
<th>- temperature and flooding</th>
<th>- engine room and valve stations</th>
</tr>
</thead>
<tbody>
<tr>
<td>- outage</td>
<td>- voltage on the switchboard of the pump (E-/D)</td>
</tr>
<tr>
<td>- shut down</td>
<td>- monitoring control panels</td>
</tr>
<tr>
<td>- break / short circuit of a cable</td>
<td>- pumps</td>
</tr>
<tr>
<td>-</td>
<td>- for starting the pumps</td>
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<tr>
<td>-</td>
<td>- fire pressure switches</td>
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<tr>
<td>-</td>
<td>- flow detectors</td>
</tr>
<tr>
<td>- temperature in the main tanks</td>
<td></td>
</tr>
</tbody>
</table>

e) Synoptic operator panel:
An up to date synoptic LED operator panel connected from a separate distribution box must be fitted in the sprinkler engine room. All the shut-off fittings influencing the proper system functioning must be monitored and individually identifiable on the LED panel display. The synoptic operator panel consists of the Koppler 32EA output module, whose LED outputs perform status visualisation of the main components in the AFFES on the technological scheme.
f) **The following signals must be transmitted to the permanent operator station:**
- fire from each valve station – individually,
- fire from each flow detector – individually,
- operation of the main and the backup pump – individually,
- conjugated fault of the main and the backup pumps – jointly,
- summary fault of the AFFES.

Fire at each valve station must be signalled by a complementary flash light or beacon, located over the valve station.

In order to transmit the signal to the SO/1 dispatch centre, it is possible to carry out a preparation or connection to the ESSER NET according to the requirement of the PPB departments - Fire protection planning and SO/1.

**4.3.6.9 Electrical wiring**

When using only electric pumps for supplying the AFFES at the first level, their functionality must be maintained from two sources independent of each other.

Used cables and conductors must meet the prescribed fire resistance, including bushings and cable trays as per the requirement in 4.3.1. The cable wiring for pump switching must be monitored for a short circuit and break. All the AFFES cable wiring must be placed into separate cable trays (tray type: Mars or Merkur2 from the manufacturer Arkys). The exception is a connection to the actual end devices in the maximum length of 0.5 m.

Electrical switchboard boxes must allow a synoptic operator panel to be built-in (i.e. the electrical switchboard EPB Pilbram). The main switchboard must be equipped with a voltage and current meter at all phases.
4.3.6.10 Filling point for the fire equipment

The system will enable an emergency power supply by the FRS mobile equipment HZS through at least two B75 connections. Each connection must be separated from the collector by a cap, so more hoses can be connected simultaneously. The collector will have the possibility of drainage. It is also necessary to maintain a free space around the caps, so it is possible to tighten a hose with a spanner to the connection (at least 30 cm around each connection). The position and direction of the connections must be done in such a way that the connected hoses are not broken under pressure. The shut-off slide valve and the reverse damper with the bypass DN 75 will be placed in the engine room.

A part of the defined area of the sprinkler FFES engine room must be a filling point for the fire equipment as per ČSN 73 0873, including an area for setting up a tank during the filling (everything in regard to the particular equipment of the CFRS). The location must be done in order to ensure passage (i.e., reversing and turning of vehicles is ruled out). The source of water cannot be the main feed tanks of the engine room. The filling point must be connected to an industrial or potable water supply by which the sprinkler AFFES engine room is fed. The implementation of the filling point technology (arm) - see Figure no. 4 (manufacturer and model of the type SILEA S.p.A).

The material of pipes and fittings of the filling point - stainless steel or anti-corrosive light alloys (Al).

On its part of the supply pipe, the technology of the filling point must be equipped by an electric-controlled damper with an electric servo drive; the damper control must be in appropriate coverage and in the handle place of the "B" arm end part. The servo drive must allow smooth opening and stopping in any position with regard to a safe flow regulation. The damper must allow manual opening and closing in case of a power outage. The arm must allow drainage during the winter season. The drain pipe must be ended into one of the sewage shafts inside the engine room.

Fig. 4 - Filling arm for the fire equipment

4.3.7 Pipeline network

All used pipe parts and components for the AFFES system must be usable for the operating pressure of 16 bar (PN16).
2.11 Fire protection and fire safety in buildings

4.3.7.1 Ground manifolds
The requirements for the ground pipeline between the AFFES engine room and the valve stations in the building:
- underground pipes from ductile interlocking cast iron DN 300, incl. fittings, transitional flanges,
- shut-off fittings (slide valves, dampers) DN 300,
- each valve station must be fed from two sides (DN 300)
- underground pipe connections must correspond to the requirements of directive EN545.

The pipeline must be situated below the frost line in all its length. All bends and joints must be secured against dislocation by a concrete footing.
During the PID stage, a ground pipework project will be submitted either as a separate supplement or by integration into the AFFES documentation. The project will clearly define the route, material, placement depth and pipeline dimensions.

Individual implementation stages of laying and backfilling the ground pipeline must be carried out according to the requirements of the PPB departments - Fire protection planning and SO/1 and in compliance with the ČSN and VdS CEA 4001 standards as amended.
Pressure and impact tests are performed in compliance with the VdS CEA 4001 standard as amended.

4.3.7.2 Connecting the valve station rooms
Each AFFES valve station room connected with the AFFES engine room must be always supplied by two pipelines of the same dimension. The inlet pipes from the engine room must always supply the valve station distributor from two different sides. Each inlet pipeline must be brought to the valve station room from a different direction (placed in a different ditch).

In the case of placing both main ground manifolds into one ditch, the pipelines must be installed side by side in a minimum distance of 0.5 m – an approval is necessary by the PPB departments – Fire protection planning and SO/1.

The distributor located in the valve station must be equipped with a shut-off fitting, so that it is possible to shut down only a part of the distributor when needed. According to the Group's requirements on fire protection, it is necessary to divide the distributor no more than by 5 valve stations. In the case of a simultaneous occurrence of both ceiling and shelf protection on a specific protected area, it is necessary to place the valve stations, so in case of shutting down a part of the distributor with the ceiling protection, the valve stations of the shelf protection of the protected area are in operation – applies also vice versa.
When implementing more than 10 valve stations on a distributor, it is necessary to maintain the division by the maximum of 5 valve stations, whereas it is necessary to adjust the power supply of the distributor from the inlet ground pipeline, so it is possible to shut down any part of the distributor while maintaining the function of the remaining part – more power points. A specific solution is always required to discuss with the PPB departments – Fire protection planning and SO/1.

Connecting individual parts of the AFFES in the valve station rooms must be carried out as follows:
- inlet pipeline x distributor – flange,
- distributor x shut-off fitting (damper, slide valve) – flange,
- shut-off fitting x valve station – flange,
- valve station x main pipeline – flange.
The distributor must be brought to the construction site already welded in one piece (in a certified workshop as per ISO 9001). If this cannot be met, the distributor may be assembled in the valve station room. In this case, it must be connected by flanges that will be welded onto the distributor in a certified workshop before bringing it to the construction site.

4.3.7.3 Aboveground manifolds
At all times during the transportation to the construction site until its physical installation and connection into the closed system, the pipeline must be provided with plugs on all branches and outlets and stored in such a way that the pipeline does not lie directly on the ground.

a) Pipeline connection specifications:
Main and distribution pipeline in a dimension (>DN 50):
   - seamless steel pipeline connected by couplings (by splining) or flanges;

Distribution pipeline (<DN 65):
   - seamless steel pipeline connected by couplings (by splining) or threads;

Branches from standardised pipeline must be implemented:
   - by welding,
   - by saddle clamps and spline pipe tee fittings.

b) Designation:
Every bifurcation of an inlet pipeline must be visibly and indelibly labelled describing from which valve station the manifold is supplied.

c) Pipeline surface finish:
Wet manifolds:
   - baked powder colour.
Note.: For repairs and additional connections, it is possible to use a synthetic paint (1x undercoat, 2x topcoat).

Dry manifolds:
   - hot-dip galvanisation without any further modifications from the internal and external sides of the pipeline.
Note.: It is possible to use a zinc paint for repairs.

d) Technical specification:
Ceiling manifolds must be prefabricated in a prefabrication workshop.
When installing the AFFES, standardised pipeline must be used; see Table no. 6 (minimum wall thickness). The default values for main manifolds (DN65-DN300) are considered according to the standard ČSN EN 1020 and the values for secondary manifolds (DN25-DN50) according to ČSN EN 10255+A1. The minimum values must be in compliance with the conditions stipulated by manufacturers of hydraulic splined couplings. A deviation from the manufacturer can be only into positive values with respect to the pipeline thickness.

The investor has the right to return the whole delivery of pipelines (dispatched on the same day) if they discover deficiencies in the above mentioned requirements during a spot check.
Table no. 6: Minimum pipeline thickness (in mm)

<table>
<thead>
<tr>
<th>DN</th>
<th>Thread</th>
<th>Outside-Ø</th>
<th>DIN 2440</th>
<th>DIN 2448</th>
<th>DIN 2458</th>
<th>ISO 65 M</th>
<th>ISO 65 L2</th>
<th>ISO 4200</th>
<th>Sch. 10</th>
<th>Sch. 40</th>
</tr>
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<tbody>
<tr>
<td>20</td>
<td>¼</td>
<td>26.9</td>
<td>2.65</td>
<td>2.3</td>
<td>2.0</td>
<td>2.6</td>
<td>2.3</td>
<td>2.3</td>
<td>2.6</td>
<td>3.4</td>
</tr>
<tr>
<td>25</td>
<td>1</td>
<td>33.7</td>
<td>3.25</td>
<td>2.6</td>
<td>2.0</td>
<td>3.2</td>
<td>2.6</td>
<td>2.6</td>
<td>2.6</td>
<td>3.7</td>
</tr>
<tr>
<td>32</td>
<td>1⅛</td>
<td>42.4</td>
<td>3.26</td>
<td>2.6</td>
<td>2.3</td>
<td>3.2</td>
<td>2.6</td>
<td>2.6</td>
<td>2.6</td>
<td>3.6</td>
</tr>
<tr>
<td>40</td>
<td>1½</td>
<td>48.3</td>
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<td>3.7</td>
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<td>50</td>
<td>2</td>
<td>60.3</td>
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<td>2.9</td>
<td>2.3</td>
<td>3.6</td>
<td>2.9</td>
<td>2.6</td>
<td>2.8</td>
<td>3.9</td>
</tr>
<tr>
<td>65</td>
<td>2⅛</td>
<td>76.1</td>
<td>3.65</td>
<td>2.9</td>
<td>2.6</td>
<td>3.6</td>
<td>3.2</td>
<td>2.6</td>
<td>2.8</td>
<td>3.0</td>
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<tr>
<td>80</td>
<td>3</td>
<td>88.9</td>
<td>4.05</td>
<td>3.2</td>
<td>2.9</td>
<td>4.0</td>
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<td>4</td>
<td>114.3</td>
<td>4.50</td>
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<td>4.5</td>
<td>3.6</td>
<td>3.2</td>
<td>3.0</td>
<td>6.0</td>
</tr>
<tr>
<td>125</td>
<td>5</td>
<td>139.7</td>
<td>4.85</td>
<td>4.0</td>
<td>3.6</td>
<td>5.0</td>
<td>3.6</td>
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<td>6.6</td>
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<tr>
<td>150</td>
<td>6</td>
<td>161.1</td>
<td>4.85</td>
<td>4.0</td>
<td>3.6</td>
<td>5.0</td>
<td>3.6</td>
<td>3.4</td>
<td>6.6</td>
<td></td>
</tr>
<tr>
<td>150</td>
<td>6</td>
<td>168.3</td>
<td>4.5</td>
<td>4.0</td>
<td>4.0</td>
<td>4.0</td>
<td>3.4</td>
<td>7.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200</td>
<td>8</td>
<td>219.1</td>
<td>6.3</td>
<td>4.5</td>
<td>4.5</td>
<td>4.5</td>
<td>4.5</td>
<td>4.5</td>
<td>4.6</td>
<td></td>
</tr>
<tr>
<td>250</td>
<td>10</td>
<td>273.0</td>
<td>6.3</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
<td>4.8</td>
<td>4.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>300</td>
<td>12</td>
<td>323.9</td>
<td>7.1</td>
<td>5.6</td>
<td>5.6</td>
<td>5.6</td>
<td>5.6</td>
<td>5.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>350</td>
<td>14</td>
<td>355.6</td>
<td>8.0</td>
<td>5.6</td>
<td>5.6</td>
<td>5.6</td>
<td>5.6</td>
<td>5.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**e) Protection of driveways and passageways:**

Driveways and passageways into buildings must be protected by an appropriate type of the AFFES.

If the driveways and passageways are located near shelters with dry branches of the AFFES, they will be connected to this piping.

Otherwise the driveways and passageways must be protected by an open drencher system in combination with a local fire detector (located in the passageway) and an electromagnetic valve located on the watered pipeline in a tempered area of the building (hall).

**4.3.7.4 Suspension systems**

The main and distribution pipelines must have a sufficient number of fixed points for capturing axial forces - at least one per straight section - made by a bracket console and a round / hose clamp.

The suspension system must be always composed of components from only one manufacturer-supplier of the system (Hilti, Sikla). The suspension system must comply with the requirements in 4.3.1.

Unless specified otherwise, the suspensions for steel pipes must not have more than 4 m of spacing in between. For pipes with a diameter greater than DN 50, these distances can be increased by 50% if the following conditions are met:

- two independent suspensions are fixed right onto the construction of the building,
- using a suspension able to support a 50% heavier load than the specifications in VdS CEA 4001 as amended.

Note: The above mentioned applies also to end pipes.
When using mechanical couplings, the suspension must not be more than 1 m from each joint (at least from one side); at the same time, there must be at least one suspension in each section of the pipeline.

The distance from the last sprinkler to the suspension must not be greater than:
- 0.9 m for pipes of the diameter 25 mm,
- 1.2 m for pipes of a diameter greater than 25 mm.

The distance from any standing sprinkler to a suspension must not be less than 0.15 m.

Vertical pipes must have additional suspensions in the following cases:
- pipes longer than 2 m,
- pipes intended for the water supply to individual sprinklers longer than 1 m.

Table no. 7: Requirements for the suspensions

<table>
<thead>
<tr>
<th>DN pipes</th>
<th>Bearing capacity in [N]</th>
<th>min. cross section in [mm²]</th>
</tr>
</thead>
<tbody>
<tr>
<td>d ≤ 50</td>
<td>2,000</td>
<td>30 (M8)</td>
</tr>
<tr>
<td>50 &lt; d ≤ 100</td>
<td>3,500</td>
<td>50 (M10)</td>
</tr>
<tr>
<td>100 &lt; d ≤ 150</td>
<td>5,000</td>
<td>70 (M12)</td>
</tr>
<tr>
<td>150 &lt; d ≤ 200</td>
<td>8,500</td>
<td>125 (M18)</td>
</tr>
<tr>
<td>200 &lt; d ≤ 250</td>
<td>10,000</td>
<td>150 (M18)</td>
</tr>
<tr>
<td>250 &lt; d ≤ 300</td>
<td>12,500</td>
<td>180 (M20)</td>
</tr>
</tbody>
</table>

4.3.7.5 Sprinkler heads
In order to ensure the AFFES compatibility, the sprinkler heads must come from the manufacturer GRINNELL (Tyco Fire Suppression & Building Products). The sprinkler heads with the K-factor 80,115,160 are used.

The ceiling protection must have one level lower RTI sensitivity than the sprinkler heads in the shelf;

4.3.7.6 Fittings
Freely accessible fittings must be secured against unauthorised manipulation!

a) Alarm fittings:
Each free end of the main and distribution pipeline network >DN 50 must be terminated by an alarm fitting of at least DN 50 from which no other manifold may be connected.

b) Discharge and deaerator fittings:
To install an appropriate number of discharge and deaerator fittings.

Discharge fittings must be always terminated in a tempered area. Each discharge fitting must be fitted with a terminal for connecting a hose (e.g. C52) with a cap and brought down to a minimum level of 1.8 m over the floor. If this cannot be implemented (incompatibility with the manufacturer's technology etc.) an agreement with the SO/1 department is necessary.
c) Test fittings:
The whole AFFES device incl. all partial components must be testable. These are mainly:
- valve station and flow detector test,
- main and backup pump test (dimension to 120% of the maximum flow),
- system monitoring,
- functionality of pressure and float switches,
- flow test of an individual fire group (K-factor of the smallest sprinkler);

Each control valve circuit must contain at least one test fitting with a fitted K-factor according to the installed heads.

d) Condensation fittings:
Condensation drainage from the dry systems must be always terminated in a tempered area; the pipeline providing the condensation drainage must be sufficiently downcome and dimensioned with regard to its length.

4.4 Fire shutters

Note: The use of the water curtain as a fire shutter at ŠKODA AUTO is done only in exceptional cases after a consultation with the PPB departments – Fire protection planning and SO/1.

4.4.1 Types of fire shutters
a) Conveyor
The FS position is monitored through the FDS - the position "OPEN" or "CLOSE" is scanned according to the conveyor.

b) Service – the FS position is not monitored.
- gravitational,
- motor controlled,
- manually controlled.

4.4.2 Automatic closing of the fire shutter
Autonomous detection sensors serve for closing the fire shutters. Closing the fire shutters from the fire detection system is used only in exceptional cases:
- requirement of legislative provisions / normative standards,
- requirement of the PPB departments – Fire protection planning and SO/1.

The impulse for closing a FS must be carried out by a circuit-opening contact.

Closing of a FS must be signalled optically by an orange colour beacon and acoustically by a siren (a different tone from the FDS siren).

For one-wing sliding telescopic fire shutters, the optical signalling must be located in the upper half of the internal overrun side of the casing.
For retractable, rolling, two-wing, sectional, roller fire shutters, the optical signalling must be located on both sides of the fire separating construction. If there are safety features installed on a fire shutter (e.g. optical barrier, safety skirt), these features must not have any influence on the functionality of the fire shutter.

4.4.3 Technical requirements for the implementation of the detection sensors
The function of autonomous detection sensors must not be affected by any device (air conditioning, Sahara etc.)

Always one pair of sensors is fitted - optical-smoke and thermal sensors. The sensors must be fitted from both sides of the fire separating construction (fire shutter).

a) Optical-smoking:
They are to be placed as close as possible to the ceiling construction (the distance between a sensor and the ceiling construction cannot be more than 2.5m).

b) Thermal:
They are to be placed just above the building opening for the fire shutter.

4.4.4 Manual control
Each fire shutter must allow for its manual closing and emergency manual opening (for the motor-controlled opening operation) via a button with an appropriate text under the glass pane - button Lites MHA (or MHU) 904 (Fig. 5).

When using the button for the emergency opening, the FS must open, stay in the open position for the maximum of 5 seconds and then close again.

The buttons for manual controlling of the fire shutter must be placed from both sides of the fire separating construction in the design described below.

The bottom edge of the button must be placed in a height of at least 1.2 m, while the upper edge of the button no more than 1.5 m from the floor.
4.4.4.1 Colour design of the control
The colour design of the control must not be mistakable with the FDS button detector, i.e. it cannot be in a red colour design.

a) Emergency closing of the fire shutter - blue colour.
If the button is used for the closing function, it will be in a blue colour and supplemented with indelible lettering of the minimum font size of 5 mm: "FIRE SHUTTER CLOSING" under the glass pane.

![Fig. 6: Colour design of the closing button](image)

b) Emergency opening of the fire shutter - green colour
If the button is used for the opening function, it will be in a green colour and supplemented with indelible lettering of the minimum font size of 5 mm: "FIRE SHUTTER OPENING" under the glass pane.

![Fig. 7: Colour design of the opening button](image)

4.4.5 Power supply and backup
A backup power supply must be ensured for the buttons used for the fire shutter:

1. Option:
   - storage battery with a capacity of at least 5 cycles (1 cycle = opening and closing) or for 2 hours of an emergency state.
2. Option
   - connection to the central UPS.

4.4.6 Designation of the fire shutters
The designation as per Art. 5 of Decree no. 202/1999 Coll., which establishes technical conditions of fire doors, smoke control doors and smoke control fire doors, as amended.
The designation "FIRE SHUTTER, CLOSE" must be placed on fire shutters in production and warehouse premises. The designation will be implemented as an ordinary sticker of the size 200 x 100 mm (see Fig. 8).

![Fig. 8: Designation of a manually controlled FS](image)

The following FS parts must be designated with an appropriate fire resistance:
   a) door wings;
   b) door casing;
   c) door fittings;
   d) door closer.
The designation must be carried out in an indelible and non-removable way on a metal plate or stamped directly on the FS individual components.

4.4.7 Ensuring operability
If there is a damage risk to the FS or to any of its functional parts due to the regular operation, features that will protect the FS against operational mechanical damage (for example protective posts) must be installed.

Blocking a fire shutter with a key may be performed only in the close position – provided that no escape route passes through the fire shutter.
A service intervention from a specialised company for the conveyor system FS must be initiated within 2 hours from the notification. The regulation must be guaranteed by the company in writing prior to its selection as the supplier for the shutter.

If, for operational reasons, it is requested to secure the door fire shutter in the open position, it is necessary to design holding magnets connected to the FDS.
4.4.8 Fire shutter documentation must contain (for acceptance)
- FS original documentation,
- declaration of conformity of the installed device,
- protocol on the operability check with all requirements as per Art. 7 Par. 8 of Decree no. 246/2001 Coll., establishing the fire safety conditions and the administration of the governmental fire supervision (on fire prevention), as amended,
- supplier's declaration that the FS periodic check of operability can be done also by another authorised company / person.

4.4.9 Conveyors
If a conveyor passes through a fire separating partition, the fire shutter installation must be always addressed in relation to the conveyor system and their mutual relations. After raising the fire alarm, an immediate vacation of the area under the fire shutter (clearing out) must be provided even in case of a power outage or conveyor breakdown in order for the fire equipment to work correctly. The mutual relations and coordination of the whole system will be determined by the FSS designer.

4.4.10 FTS logistics, automatic logistic system AGV and other automated logistic systems moving along fixed routes
When designing automatic logistic systems moving along fixed routes (e.g. automatic trucks fastened with magnetic strips and marks), it is necessary to proceed in accordance with the established terms of the fire safety in buildings, and it is necessary to take into account the device installation by the FSS designer. When designing automatic logistic systems, the fire-fighting and the evacuation of people must not be adversely affected in any way (escape routes and exits must be permanently open); when passing with an automatic logistic truck through various fire departments, it is necessary to take the fire shutter function into account and address their mutual relation.

4.5 Supplying with fire water
When designing the security of individual actions, one must proceed in accordance with ČSN 73 0873 and the requirements specified further.

4.5.1 Internal supply points
When designing the area coverage of fire water, it is based only on the length of the hose - the discharge range of 10 m is not included in the area coverage. This dimension (design) method includes a margin for dispositional changes, layout of material, vehicles, advertising boards etc. (i.e. the hose length is calculated for the actual route, which cannot be precisely determined when designing it).

In areas with substances for which water as an extinguisher is unsuitable or less effective, it is necessary to install internal supply points with means to add a suitable wetting agent (solid cartridge +hose nozzle e.g. POK ¾ - GHT – see Fig. 9) - consultation for a suitable design with the SO/1 department.

4.5.1.1 Components of the internal supply point box must include:
- form-stable hose of the minimum length of 30 m, wound on a drum, with the hose nozzle DN 25,
- FDS button detector (if this system is installed in the building),
- place to store the PFE,
- means for admixing a suitable wetting agent (solid cartridge) - see the condition above,
2.11 Fire protection and fire safety in buildings

- photo-luminescent informative signs on an aluminium base, dimension 150 x 150 mm, about the stored FP material resources and the FSE components (e.g. the FDS button). It depends on the existence and luminous range of emergency lights.

The hydrant cabinet is fitted so that the drum axis is in a height of 1.1 m up to 1.3 m above the floor. They must be positioned so that they are easily accessible.

The FDS button detector must be placed on the hydrant cabinet in a height of 1.2 m (bottom edge) up to 1.5 m (upper edge) above the floor. The position height applies also to the placement of the FDS button on any vertical construction.

If the layout of installed components limits or restricts the orientation of people, an appropriate fire sign put on a visible place is used in order to designate them – photo-luminescent on an aluminium base of the minimum dimension 200 x 200 mm.

4.5.2 External supply points

In the premises of ŠKODA AUTO a.s. only aboveground fire hydrants are designed. The right type of aboveground hydrants must be selected according to the dimension of the fire water distribution pipeline (potable / industrial):
- ≥ DN 200 - aboveground hydrant DN 100 with discharge throats 2xB75, 1xA110,
- < DN 200 - aboveground hydrant DN 80 with discharge throats 2xB75.

In the case of a possible replacement, the hydrant must be fitted with shear bolts that are put above the modified terrain (only crushed rock backfill is allowed).

In the event that it is not possible to use an aboveground fire hydrant, an underground fire hydrant DN80 must be used – the use of an underground fire hydrant must always be approved by the PPB department – Fire protection planning SO/1!

5 ESCAPE ROUTES

5.1 Designing and planning

Unless stated otherwise, the designing and planning of escape routes is based on corresponding provisions of the series of standards in force ČSN 73 08xx or the planning of escape route lightning must be based on the standard ČSN EN 1838 and other applicable provisions – in particular, the luminous intensity and uptime must be met as per standard requirements. No stickers with escape route directions may be put on the lightning that is planned as emergency lightning. If there is a request for architectural, aesthetic or other reasons to back-light the escape route directions, this must be done separately and powered from its own battery supply. In other cases, these escape route directions must be carried out according to the requirements presented in the following chapter.

For protected escape routes from the buildings that are ventilated by force, pressure or combination, it is necessary, prior to putting the building into operation (before the final inspection), to carry out a functionality verification of the fire ventilation of the protected escape route in compliance with the methodology of the Ministry of the Interior, the General Directorate of the Fire Rescue Service Czech Republic: "Metodický postup pro ověřování funkčnosti požárního odvětrání (Methodical procedure for verifying the fire ventilation functionality)" from the 15th May 2010. This performed test must be supported with the implementation report with relevant stamps and signatures, which must state that
the designed ventilation of the protected escape route is functional. Financial costs of carrying out this test (or tests) are directed by the supplier of the building until the removal of all defects and the issue of a positive report on functionality.

5.2 Designation of escape routes
The escape routes from buildings to the open space must be designated by safety signs, tables etc. according to the applicable series of standards ČSN 73 08xx. The placement of safety signs and tables must conform to the normative requirements. The implementation of these signs and tables must be carried out as per ČSN ISO 3864 and must be photo-luminescent on an aluminium base (see Fig. 10) with the minimum dimension 200 x 100 mm (administrative buildings) or 300 x 150 mm (production and warehouse areas). It is also possible to be implemented as lightning (ideally from both sides).

![Fig. 10: Escape route and emergency exit designation example](image)

In the case of the text designation for the exit from the escape route to the open space, the text must be written in Czech as "ÚNIKOVÝ VÝCHOD" (lettering "EXIT" is not permissible).

5.3 Exits from escape routes
All emergency exits from buildings which are regularly locked electronically (i.e. also the exits that are/will be equipped with a device for checking the entry and exit – card readers) must automatically open after the fire alarm (FDS) has been raised or during a power outage. At the same time, the manual opening via the button under a protective glass must also be enabled (see Fig. 11a).

In the event that the projected building is planned to have turnstiles or card gates on exit routes (e.g. from the entrance hall), their automatic folding (opening) must be ensured when the FDS is raised or during a power outage. At the same time, the manual opening via the button located at the reception and the button under a protective glass located on the turnstile must be enabled (see Fig. 11b).

For opening gates and turnstiles, the green button Lites MHA 904 will be used. The button will be placed on a photo-luminescent safety pane with the text and pictograph on an aluminium base. The button will directly interrupt the power supply of the magnetic lock (the signal path through the control unit is not possible).
2.11 Fire protection and fire safety in buildings

Revised: 2017-01-09

Fig. 11: Buttons for opening escape routes

All devices that influence the proper function of the system (escape route) become dedicated fire safety equipment (FSE). I.e., further requirements apply to them – freely laid cables and cable trays must meet the requirements for the fire reaction category (according to the European Commission Decision 2006/751/ES), surface spread of flame, cable circuit integrity as per ČSN IEC 60331, category of the cable functionality and cable support construction for supplying the FSE as well as the requirements for cable resistance when exposed to fire – for cables of small cross sections (as per ČSN EN 50200). Everything is included also in ČSN 73 0848 – Fire safety in buildings – Cable distribution. All parts of the system from the cable distribution through control units to end el. magnetic locks must be certified for such use as well as for the requested uptime no less than for the whole duration of escape (all requirements must be part of and given to the FSS).

The doors leading from escape routes to the open space, which are mechanically locked during the regular operation, must be equipped with the panic bar fitting (e.g. panic bar fitting of type A as per ČSN EN 179) which enables their opening from the inside also in case of locking.

The motor-controlled doors and gates must also enable the manual opening from the direction of escape.

6 FIRE FIGHTING EQUIPMENT

Its planning is based on the relevant standard ČSN 73 0802 or ČSN 73 0804 and any other requirements specified below.

6.1 Boarding areas and driveways to buildings

Boarding areas must be established for all production facilities projected in accordance with ČSN 73 0804; access for mobile equipment of fire protection units must be ensured from these boarding areas into the facilities as required by the Group fire directive (see Annex no. 1). The minimum size of the entrance gate and the driveway in the facility must be at least 4.0 x 4.5 m (width x height).

In the case of designing a building according to ČSN 73 0802, it is needed to consult the establishing of the boarding area with the PPB departments – Fire protection planning and SO/1.
6.2 External fire fighting routes
All fire ladders must be equipped with the empty fire pipeline "B 75" (dry riser) brought above the roof of the building. Both ends of the dry riser must be fitted with fire half-couplings with caps "B 75". The FSS drawings must contain fire ladders with the dry riser. The dry riser in the building must be physically marked with a white letter "S" on a red background.
If the length of the dry riser is >30 metres, the dry riser must be equipped with a pressurised damper with drainage.

If the fire ladders will not be set up and there will be another way to gain access onto the roof of the building (e.g. through an internal protected escape route), the dry riser must be installed in such a way that the point for connecting the mobile equipment is at the entrance to this protected escape route. Then it must be possible to connect the fire hose "B 75" to the dry riser in every floor. The outfall of the dry riser must be located at the entrance onto the roof from this protected escape route. Both ends and all points for connecting the fire hose located on the dry riser must be equipped with fire half-couplings with caps "B 75".

If the protected escape route serves the FRS units as access onto the roof, the FRS units must be provided with access to this route. Access into the protected escape route will be provided with a card or key inside the key strongbox of the fire protection, which must be placed on the wall next to the entrance door into the protected escape route. Opening the 1st level of the key strongbox (the first door) must be provided by a signal from the FDS after the alarm has been raised in any part of the building.

A roof box with tools for fire protection must be located on the roof at the exit of the ladder or protected escape route.

Each roof box with tools for fire protection must include:
- 3x fire-fighting hose PH B75,
- 3x fire-fighting hose PH C52,
- 1x distributor with ball valve B – CBC,
- 1x hose cap C52/B75,
- 2x hose coupling wrench 110/75,
- 2x hose nozzle C52 TURBO TAJFUN.

In justified cases, the roof boxes with fire protection tools do not have to be installed. The placement of a roof box with fire protection tools is always necessary to be consulted with the PPB departments – Fire protection planning and SO/1.

6.3 Portable fire extinguishers
Only the portable fire extinguishers from the manufacturers specified in Annex no. 4. may be used at ŠKODA AUTO a.s.

Technicians from the SO/1 department are authorised to conduct regular inspections only of the portable fire extinguishers from the specified manufacturers, as per Art. 9 of the Decree of the Ministry of the Interior of the Czech Republic no. 246/2001 Coll.

7 FIRE DAMPERS AND FIRE WALL SHUTTERS
Fire dampers must be installed with a servo drive that will enable them to relaunch into the default state.
Fire dampers and fire wall shutters must be designated in the graphical part of the project documentation (the FSS designer is responsible).

8 DETECTION OF GAS AND INFLAMMABLE VAPOUR LEAKAGE
The system for detection of gas and inflammable vapours must be done with two-level signalling. When reaching the 1st level (10% of the lower explosion limit), the system will signal (optically and acoustically) and start emergency ventilation. When reaching the 2nd level (20% of the lower explosion limit), the system will transmit the signal to the CFRS dispatch centre and shut down the electric wiring without the required coverage.

The FSS processor must set up priorities between the detection device and the FDS system.

9 DOCUMENTATION TO FIRE FIGHTING
The necessity to process documentation when assigning a project will be consulted with the PPB department – Fire protection planning. If the request is confirmed, the documentation will be included into the PD processor's projects. The methodical management and responsibility will be provided by the SO/1 department.

10 USE OF NON-FLAMMABLE INSULATION MATERIALS FOR THERMAL INSULATION OF BUILDINGS
Only non-flammable insulation materials may be used for the thermal insulation of buildings – on the basis of rock wool (applies to both horizontal and vertical constructions).

11 CENTRAL STOP and TOTAL STOP – electricity switching off
Designing always proceeds according to ČSN 73 0848. The cable trays must be designed so that safe switching off of electricity in the building is ensured and thus safe and effective fire-fighting of the fire protection units is provided.

See Annex no. 4 – detailed solution

12 ADDITIONAL REQUIREMENTS
Indoor hall lighting over flammable material must not be made of conventional gas discharge or other high-temperature lamps without lower covers. If there is a requirement for lamps without lower covers, it is necessary to select appropriate lamps for such use (e.g. PHILIPS Master HPI Plus type "P").

When designing roof lights at ŠKODA AUTO a.s., no roof lights that drip or fall off when burning may be used.

It is not allowed to use anti-fire paint or spray for the building and construction protection at ŠKODA AUTO. The construction protection must be done with an anti-fire panelling or any other way proposed by the FSS designer and consulted with the PPB department – Fire protection planning.

Any inspections of the fire safety equipment (includes also fire ladders and dry risers) are provided by the owner of the given equipment (the building / technology manager – see ON 1.050).

Fire safety of machinery and devices working with flammable cutting fluids, gases, dust, vapours or other substances created or used in technical facilities (or these machines work products and semi-finished products from flammable materials) is dealt with and determined in detail in ITS 2.10 Fire protection integrated into technical facilities.
13 LIST OF RECOMMENDED SUPPLIERS
It is presented in Annex no. 5, which is an integral part of the ITS.

If it is necessary to choose another manufacturer due to technical reasons, a written approval of the PPB departments - Fire protection planning and SO/I is necessary as an exception approval according to ITS 1.03 - authorised by the ITS guarantors.

14 EXCEPTION APPROVAL
An exception approval from this ITS is carried out as per ITS 1.03.
## Annex no. 1: Fire safety equipment in buildings

<table>
<thead>
<tr>
<th>Priority</th>
<th>Equipment/Protection Measures</th>
<th>Press shop</th>
<th>Welding shop</th>
<th>Paint shop</th>
<th>Assembly</th>
<th>Foundry</th>
<th>Mechanical processing</th>
<th>Component storage</th>
<th>Welding</th>
<th>Fabricants' / operator</th>
<th>Component testing</th>
<th>Tool shop</th>
<th>Logistics / Fire-fighting with the participation of VdS</th>
<th>Curing areas</th>
<th>Fuel storage areas</th>
<th>Parking areas</th>
<th>Medium supply</th>
<th>O.C. centres reality</th>
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<td>3</td>
<td>Automatic air-exhausting device with the central control</td>
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<td>Fire shutters (gates, A/C conveyors)</td>
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<td>Boarding areas and driveways for the local fire-fighting equipment</td>
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<td>Acceptance of fire extinguishing systems with the participation of VdS</td>
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Priorities (3,2,1) applies only to construction modifications of the existing buildings; for new buildings the colour background applies!

(*) Requirement of Law 240/2000 Coll. on Crisis management (Crisis Act).

(**) This must be ensured for the Paint shop, including handling areas next to lifts (Paint shop)

<table>
<thead>
<tr>
<th>Priority</th>
<th>Circumstances</th>
<th>Without a standard, depends on circumstances</th>
<th>group fire protection requirement, part of the project</th>
<th>Preventive fire protection of buildings</th>
<th>Preventive fire protection of technology</th>
<th>Organisational and operational fire protection</th>
<th>Possibly</th>
<th>CFME</th>
<th>FSESE</th>
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<tr>
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<td>Priority 3 or 2 (depends on circumstances)</td>
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</table>
Annex no. 2: FSB drawing samples

Fig. P2.1: Overall situation
Annex no. 2: FSB drawing samples

Fig. P2.2: Floor drawing
Annex no. 3: AFFES drawing samples

Fig. P3.1: AFFES diagram
Annex no. 3: AFFES drawing samples

Fig. P3.2: Protected areas diagram
Annex no. 4: Switching off the power supply – CENTRAL STOP and TOTAL STOP

CENTRAL STOP

In case of fire, it must be ensured that the electrical devices in the building are centrally switched off, including their backup power sources whose functionality is not needed during fire. At the same time, however, the power supply to the fire safety equipment must be maintained as well as to the devices that must be operational in case of fire - from two independent sources on each other (the disconnection must be done so that the first source (distribution network) must be still able to supply the FSE).

TOTAL STOP

If necessary, it must be possible to switch off all devices in the building or in its part, including the fire safety equipment and its secondary sources (after the TOTAL STOP has been activated, no high/low voltage conductor part may be electrified in the building - the UPS will be disconnected right at the output).

The CENTRAL STOP and TOTAL STOP devices must be operational even during a power outage and must not be activated during a mains power supply outage. The device must be protected against any unauthorised or unintended use. The cable trays must comply with the requirements for the cable trays with the functional integrity.

Basis of supplying the FSE and switching off the electric energy

![Diagram of power supply and switching systems](image)

The end component (buttons) of the CENTRAL STOP and TOTAL STOP devices must be made as arrestment mushroom push-buttons - see types in Fig. P4.2 and P4.3 - and must be placed either individually or in the key strongbox. The final form and placement of the end components must be agreed with the SO/1 department (Mr Cihelník).
Annex no. 5: List of recommended suppliers

1) FSE designers:

AAED (RWA)
- Suppliers with the VdS certification

AFFES
- Suppliers with the VdS certification

2) FSE suppliers:

AFFES:
- Suppliers with the VdS certification

AAED:
- Suppliers with the VdS certification

PORTABLE FIRE EXTINGUISHERS:
- HASTEX and HASPR s.r.o. Pardubic,
- KODRETA MYJAVA s.r.o.,
- KODRETA ŠTEFANOV s.r.o.,
- PYROKONTROL s.r.o. Bratislava,
- TEPOSTOP spol. s.r.o., Pléelouč,

FIRE SHUTTERS (doors excluded)
- JAP – JACINA s.r.o.,
- SCHUPKE s.r.o.,
- STAVOKONSTRUKCE Český Brod a.s.,
- STÖBICH BRANDSCHUTZ s.r.o.,
- ZAPLETAL-KOVO a.s.,

EXTERNAL SUPPLY POINTS:
- HAWLE,
- KRAMMER,
- SCHMIEDING.

Types of aboveground fire hydrants

HAWLE (Krammer) DUO – model K230

![DN 80](image1)

![DN 100](image2)

HAWLE H4 – model 5196 H4 - bypass, stainless

![DN 80 and DN 100](image3)
HAWLE H4 - model 5096 H4 bypass, cast-iron

Types of underground fire hydrants

HAWLE model D 490 - free-flow

DN 80

SCHMIEDING model 393 RD - free-flow

DN 80
Annex no. 6: Sprinkler head protection in the shelves – the pallet stop