

# Fire Safety Plans

**Evaluation of the proposed escape routes  
Administrative building for the District Government of Prague 7**

U průhonu 1338/38

PRAGUE 7



A handwritten signature in blue ink, appearing to be "J. Fait".

Prepared: 2/2016

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## 1. IDENTIFICATION DATA

**TITLE OF BUILDING :** Evaluation of planned escape routes  
Administrative building for the District Government of  
Prague 7

**BUILDING LOCATION :** Prague 7, ul. U průhonu 1338/38

**INVESTOR :**

**LEVEL :** Study

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## **2. INTRODUCTION**

The subject of this documentation is the evaluation of the proposal of the implementation of escape routes in the current administrative object that will be adapted for the use of the District Government of Prague 7. Bearing in mind the time of construction of the building – already under the validity of the current codex of standards ČSN PBS – it is necessary to address the escape routes with full application of ČSN PBS, particularly standard ČSN 730802.

## **3. COMMISSION**

The commission of the investor is to use the interior staircase as the escape route for the entire building, whereby the possibility is also considered of the removal of the exterior staircase that is currently attached to the 3<sup>rd</sup> floor.

## **4. INITIAL DATA**

The structure concerned is an administrative building with one below-ground and 9 above-ground floors, rendered in a non-inflammable reinforced-concrete structure. Each floor will have individual fire protection. Escape routes in the interior space of individual fire sections are implemented as non-protected, the main escape route from the building is implemented as a protected escape route of type B, insofar as it will be extended to the level of the 9<sup>th</sup> floor and on the level of the 1<sup>st</sup> (ground) floor will be separated for fire purposes up to the exit point into open area outside the building. Fire height h (the quota between the floor of the 1<sup>st</sup> level and the floor of the 9<sup>th</sup> level) is 31.34 m.

Number of persons:

	Use	Number proposed in design	Value by ČSN 730818
9 <sup>th</sup> floor -	terrace, ceremonial hall	20	pol. 1.2 - 20
8 <sup>th</sup> floor -	administration, meeting rm.	50	pol. 1.1.3 - 39
7 <sup>th</sup> floor -	administration		pol. 1.1.3 - 47
6 <sup>th</sup> floor -	administration		pol. 1.1.3 - 55
5 <sup>th</sup> floor -	administration		pol. 1.1.3 - 59
4 <sup>th</sup> floor -	administration		pol. 1.1.3 - 59
3 <sup>rd</sup> floor -	administration		pol. 1.1.3 - 59
2 <sup>nd</sup> floor -	administration		pol. 1.1.3 - 59
1 <sup>st</sup> floor -	counter hall		pol. 1.3 - 64
1 <sup>st</sup> (below-ground) -	café, gallery	50	pol. 7.1.1 - max.60

On the above-ground levels 1 through 7, the assumed figures are around 200 employees and 100 visitors.

Total numbers in plan: 420 persons

Total as per ČSN 730818: **539 persons**

Continued presence of persons with limited movement or incapable of movement is not assumed.

#### **4. REQUIREMENTS OF STANDARD ČSN 730802**

The requirements listed below have been set for the conditions of a single escape route (communication vertical) with the possibility of removing the current exterior staircase to the 3<sup>rd</sup> floor.

##### **Statement of the type of protected escape route (PER)**

Requested type of PER as per tab. 16, ČSN 730802 – “B”.

Situation: the present evaluation proposes a single protected escape route of type B.

##### **Requirements for implementation of this PER type B.**

A protected escape route of type B is an escape route that is physically separated from other fire sections by fireproof closures for all openings preventing the passage of smoke – per the proposed solution, these must be fireproof closures of type EI 30DP3-C-S (smoke-tight and self-closing).

The actual implementation of the PER type B could assume the following variants:

a) Part of PER type B is a separately ventilated **fire vestibule**.

For ventilation of the fire vestibule, it is adequate to have an opening window with a geometrical area of at least 1.4 m<sup>2</sup> or ventilation passages with dimensions of ca. 500 mm x 300 mm with air routed up to the ceiling, with intake at floor level, and on each floor of the building.

Other parts of the PER type B must be ventilated in the same way as type A, i.e.

Natural ventilation:

- Surfaces capable of opening (windows, doors etc) with a surface area of at least 2 m<sup>2</sup> for each floor, insofar as the opening surfaces, or if necessary the supply (exchange) of air can be increased by at least 25% with the input of air in the entrance floor or the lowest floor of the same size;

or

- A ventilation opening with an area of at least 2 m<sup>2</sup>, positioned at the highest point of the escape route (staircase), and an opening of equal size for intake of air from outside, located in the entrance floor or lower; the opening mechanisms of the upper opening and the opening for air input must be equipped with remote control from several locations in the space of the protected escape route, and in all circumstances from the level of the entrance floor.;

or

- ventilation passages placed on every level of the protected escape route, with outtake air at the ceiling and intake of fresh air at the floor level, with a cross-section area for each passage equal on each floor to at least 1 % of the floor area of this part of the escape route that is to be ventilated; if it is possible to close the outtake point of the passage on each floor such that smoke cannot escape through the passage between different floor levels, the outtake and intake passages (ventilation shafts) can be shared for several floors at once (the cross-section area of each passage is calculated as the sum total of cross-section areas of the passages at the outtake point, multiplied by the value of 0.5);

Forced ventilation:

Input of air in quantities corresponding to at least ten times the volume of the space of the protected escape for 1 hour and outtake of air through passages, shafts etc. The supply of air must be ensured without regard to the point where the fire started in the building through reliable equipment for at least a period of 45 minutes.

- b) The PER type B can be equipped with compressed ventilation ensuring a minimum of fifteen times the exchange of air for the volume of the PER type B per hour. This variant does not need fire vestibules; however, it would be necessary to make changes to the current windows (insulation in terms of achieving the required pressure). The supply of air must be ensured without regard to the point where the fire started in the building through reliable equipment for at least a period of 45 minutes. (PER type B can in this case also serve as a firefighting route)

Possibility of using only one escape route from the building per tab. 17, ČSN 730802

**The building as a whole:**

As per item 3b, tab. 17, ČSN 730802, it is possible to use only one PER B under the assumption that on the above-ground floors the building is divided into at least 3 fire sections, and that none of them may contain more than 65 persons – determined by ČSN 730818.

Situation: as per the proposed solution, these conditions are met.

**Fire sections of the offices in the above-ground floors:**

As per item 2, tab. 17, ČSN 730802 it is possible to use one non-protected escape route from a single fire section in the above-ground floors under the coefficients **a = 1.0 max. for 120 persons**

Situation: as per the proposed solution, these conditions are met in each fire section.

**Fire section of the café-gallery on the below-ground level:**

As per item 2, tab. 17, ČSN 730802, it is possible to use one non-protected escape route from a single fire section in the below-ground floors under the coefficients **a = max. 1.1.**

As per item 7.1.3, tab. A.1, ČSN 730802, however, café spaces have the coefficient **a = 1.15, i.e. from a space, respectively fire section, thus defined it is not possible to use a single non-protected escape route.**

Solution: definition of this space, resp. fire section, as a refreshment area, restaurant, etc. With this altered use, it is possible with a single non-protected escape route to evacuate in the fire section of the below-ground floor **max. 30 persons; in other words, it is not possible to assume the projected capacity of 50 persons without ensuring a second escape route from the fire section in the below-ground floor.**

Evaluation of the length of non-protected escape routes in interior spaces of individual fire sections.

Escape routes are routed in a single direction with entrance into the protected escape route. The coefficient is  $a = 1.0$ . Derived from this, the marginal length of the non-protected escape route is **25 m** – measured from the entrance from the most distant room, or from the most distant point of the given fire section to the PER .

Situation:

- 9<sup>th</sup> floor - max. 15 m - acceptable
- 8<sup>th</sup> floor - max. 23 m - acceptable
- 7<sup>th</sup> floor - max. 19 m – acceptable
- 6<sup>th</sup> floor - max. 15 m - acceptable
- 5<sup>th</sup> floor - max. 16 m - acceptable
- 4<sup>th</sup> floor - max. 15 m - acceptable
- 3<sup>rd</sup> floor - max. 15 m - acceptable
- 2<sup>nd</sup> floor - max. 15 m - acceptable

1<sup>st</sup> floor - max. 28 m – here, however, it is possible to calculate escape routes in two directions (the second direction being on the rear side of the building); in this case the marginal length is **40 m** - acceptable

1<sup>st</sup> below-ground floor - max. 22 m - acceptable

### Evaluation of the width of non-protected escape routes in the interior spaces of individual fire sections.

Smallest possible number of escape lanes  $u = E/K$

9<sup>th</sup> floor – 20 : 60 (per tab. 19, ČSN 730802) = 1. Required width – min. 0.55 m

Situation: entrance to PER B has a width min. 0.9 m - acceptable

Max. no. of persons from individual fire sections on other above-ground floors – 64; i.e.

64 : 60 (per tab. 19, ČSN 730802) = 1.5. Required width – min. 0.8 m

Situation: entrance to PER B has a width min. 0.9 m - acceptable

1<sup>st</sup> below-ground floor – 60 : 60 (per tab. 19, ČSN 730802) = 1. Required width – min. 0.55 m

Situation: entrance to PER B has a width min. 0.9 m - acceptable

### Evaluation of the width of the PER from the above-ground floors

Number of persons – 20+39+47+55+59+59+59+59=397

Number of persons evacuated by staircase

E = 397

Number of evacuated persons per escape lane of PER B

K = 300

Evacuation coefficient

s = 1

Lowest number of escape lanes

$u = 1.5 = 0.9$  m

Actual width of staircase

1.5 m Acceptable

### Evaluation of the width of the PER at the point of exit into outside space

Number of persons – 20+39+47+55+59+59+59+59+64+30 =491

Number of evacuated persons at the point of exit to outside

E = 491

Number of evacuated persons per escape lane of PER B

K = 400

Evacuation coefficient

s = 1

Lowest number of escape lanes

$u = 1.5 = 0.9$  m

Actual width of door at exit point must be min.

0.9 m Acceptable

### Evaluation of the dimensions of the PER as per article 9.11.11, ČSN 730802

Requirement – the dimensions of the PER B must allow for presence of 40% of the total number of evacuated persons (per ČSN 730818) assigned to the specific escape route.

Dimensions of the PER between two floors – ca 32 m<sup>2</sup>. Total: 32 x 8 = 256 m<sup>2</sup>

From this, it ensues that the dimensions of the evaluated PER B are sufficient for up to 1024 persons (0.25 m<sup>2</sup>/person). 40% of the total number of persons – 491 x 0.4 = 196 persons – suitable.

### Equipment of the escape routes

- All doors passed by the escape route must allow for easy and quick passage, prevent clothing snags etc., and in their locking mechanisms not prevent the evacuation of persons escaping or entering firefighters. Doors along escape routes should either allow continually free passage in the escape direction, or if they are equipped with special security locks (e.g. coded cards), they must in the event of the evacuation of persons be automatically blocked and able to be opened without any further action; coded cards and the like are not to be used on doors of the protected escape route. Doors along escape routes that are in normal circumstances locked. Locking doors in rooms intended for

sleeping should be equipped such that in emergency situations they can be opened from outside.

- Doors along escape routes must open in the direction of escape.
- All horizontally sliding doors must have the possibility of being opened by hand.
- Floors on both sides of doors along the escape route must have the same height level for the distance of the width of the door leaf, with the exception of doors opening to the outside, for which the ground level (sidewalk etc.) may be up to 180 mm lower. Doors along the escape route should not have thresholds, with the exception of doors from the rooms or functionally connected groups of rooms (e.g. residential units) from which the escape route begins.
- Escape routes and doors along escape routes must be marked per the standard ČSN EN ISO 7010, such that the markings must be visible even in the event of a breakdown of electrical energy.
- For all double-leafed fire doors, self-closing mechanisms will be installed on both leaves, and with the inclusion of a coordinator for the correct closing of the two leaves.
- The PER B must be equipped with emergency lighting as well as electrical illumination.
- All doors along escape routes will have fittings in the direction of escape that will allow for opening by hand, without the use of other implements, and even in the event that the door is locked or otherwise barred.
- Doors leading from adjoining fire sections to the PER B must be smoke-resistant.
- Fire doors on escape routes in the direction of the PER B must have the possibility of being opened by hand, and even in the case of installed card readers. This requirement applies for opening doors in the direction of escape, i.e. to the PER.

## **5. CONCLUSION**

In terms of the commission, i.e. the use of a single protected escape route and the removal of the current outdoor staircase to the 3<sup>rd</sup> floor, it is possible to conclude that under the assumption of the fulfilment of all of the requirements stated in the present evaluation, this variation is feasible. In terms of the actual implementation of a protected escape route of type B, the evaluator recommends the variation (bearing in mind the current layout, actual functionality and cost) in which the entire space of the PER B is ventilated by pressure.