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CLASSIFICATION REPORT

ACCORDING TO ČSN EN 13501-2:2003

1. GENERAL INFORMATION

Subject of classification:	**Fire resistance of service ducts and shafts**
Element name and type:	Service ducts and shafts from Grenamat AL boards
Identification Number:	**PK2-13-07-901-A-0**
Date of issue:	2007-09-17
Report holder:	**Grena a.s.** Čs. armády 540 391 81 Veselí nad Lužnicí
Issuing organisation:	PAVUS, a. s. Authorised body AO 216 Prosecká 412/74 190 00 PRAHA 9 Czech Republic
Copies in total:	4
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2. INTRODUCTION

2.1. This Classification Report determines the classification of given element in conformity with the proceedings given in ČSN EN 13501-2.

2.2. This Classification Report has 9 pages and should be used as a whole only.

3. DETAILS OF CLASSIFIED ELEMENT

3.1. Function type

The function of horizontal service ducts and vertical service shafts Grenamat AL is to resist to external or internal fire with respect to integrity and insulating ability.

3.2. Description

Service ducts and shafts from Grenamat AL boards with thickness 20 mm, 30 mm, 40 mm and 50 mm are joined together by strips of Grenamat AL boards 10 mm thick.

The horizontal duct is suspended on four steel U-profiles 50 x 35 x 5 mm and anchored to the ceiling construction by threaded steel rods M10.

Joins: Glued with Grena Kleberpaste adhesive and screwed together with wood screws 4,2 × 80 mm in mutual distance of 200 mm, or joined by steel clasps HD 7900 Series, 80/11/1,83 mm in mutual distance of 100 mm.

Fire barrier (plug): Standard rigid wall construction made from aerated-concrete blocks 100 mm thick, joined together by thin-wall adhesive. Standard ceiling construction is assembled from concrete components 110 mm thick. Gap between the specimen and the supporting construction 40 mm wide is filled with blank of Rockwool mineral wool with 80 $kg.m^{-3}$ mass density; the barrier is on both sides covered with Grenamat AL blanks 40 mm thick and 100 mm wide. The blank is anchored to the supporting construction by screws with steel dowels 8 x 80 mm with 200 mm spacing and glued with fire Grena Kleberpaste adhesive.

The design documentation is part of test protocols Pr-06-2.065 and Pr-06-2.066.

4. TEST REPORTS AND TEST RESULTS USED FOR THIS CLASSIFICATION

4.1. Test report

Laboratory name Address Accreditation No.	Test report order party	Report No. Testing date	Test method pursuant to
PAVUS, a. s. Veselí nad Lužnicí AZL č. 1026	Grena a.s. Čs. armády 540 391 81 Veselí nad Lužnicí	Pr-06-2.065 from 2006-06-05 Pr-06-2.066 from 2006-06-13	ČSN EN 1366-5:2004

4.2. Extended application of test results

Establishment name Address	Extended application order party	Report No. Date of issue	Test method pursuant to
PAVUS, a. s. Prosecká 412/74 190 00 Praha 9	Grena a.s. Čs. armády 540 391 81 Veselí nad Lužnicí	Report 506055 2007-09-13	ČSN EN 1366-5:2004

4.3. Exposure conditions

Report No. Specimen	Conditions	
Pr-06-2.065 Service ducts and shafts from Grenamat AL boards 40 mm thick	Thermal exposure Direction of exposure	Standard time/temperature curve Horizontal duct – small cross-section - external Vertical shaft – large cross-section - internal Vertical shaft – small cross-section - external
Pr-06-2.066 Service ducts and shafts from Grenamat AL boards 25 mm thick	Thermal exposure Direction of exposure	Standard time/temperature curve Horizontal duct –large cross-section - external Vertical shaft – large cross-section - internal Vertical shaft – small cross-section - external

4.4. Test results

Report No.	Properties monitored	Result
Pr-06-2.065 Service ducts and shafts from Grenamat AL boards 40 mm thick	***Specimen 01*** *– horizontal duct – 200x200 mm – external fire* **Integrity:** Sustained flaming: Gap gauge: Cotton pad: **Insulation:** Average temperature rise: Maximum temperature rise: Maximum temperature rise in the duct:	 62 minutes, without failure 62 minutes, without failure 62 minutes, without failure 62 minutes, not reached 62 minutes, not reached 34 minutes
	Specimen No. 02 *– vertical shaft – 200x200 mm – external fire* **Integrity:** Sustained flaming: Gap gauge: Cotton pad: **Insulation:** Average temperature rise: Maximum temperature rise: Maximum temperature rise in the shaft:	 105 minutes, without failure 105 minutes, without failure 105 minutes, without failure 105 minutes, not reached 105 minutes, not reached 40 minutes
	Specimen No. 03 *– vertical shaft – 1000x500 mm – internal fire* **Integrity:** Sustained flaming: Gap gauge: Cotton pad: **Insulation:** Average temperature rise: Maximum temperature rise: Average temperature rise - panel: Maximum temperature rise - panel:	 105 minutes, without failure 105 minutes, without failure 105 minutes, without failure 73 minutes 75 minutes 105 minutes, not reached 90 minutes
Pr-06-2.066 Service ducts and shafts from Grenamat AL boards 25 mm thick	***Specimen 01*** *– horizontal duct – 1000x500 mm – external fire* **Integrity:** Sustained flaming: Gap gauge: Cotton pad: **Insulation:** Average temperature rise: Maximum temperature rise: Maximum temperature rise in the duct:	 105 minutes, without failure 105 minutes, without failure 105 minutes, without failure 105 minutes, not reached 100 minutes 23 minutes

Report No.	Properties monitored	Result
	***Specimen No. 02** – vertical shaft – 200x200 mm – external fire*	
	Integrity:	
	Sustained flaming:	105 minutes, without failure
	Gap gauge:	105 minutes, without failure
	Cotton pad:	105 minutes, without failure
	Insulation:	
	Average temperature rise:	105 minutes, not reached
	Maximum temperature rise:	105 minutes, not reached
	Maximum temperature rise in the shaft:	23 minutes
	***Specimen No. 03** – vertical shaft – 1000x500 mm – internal fire*	
	Integrity:	
	Sustained flaming:	105 minutes, without failure
	Gap gauge:	105 minutes, without failure
	Cotton pad:	105 minutes, without failure
	Insulation:	
	Average temperature rise:	52 minutes
	Maximum temperature rise:	54 minutes
	Average temperature rise - panel:	105 minutes, not reached
	Maximum temperature rise - panel:	60 minutes

4.5. Conclusions of extended application of test results:

On the basis of fire resistance test results and unidirectional non-stationary heat transfer calculations were in the extended application of test results conclusively determined fire resistance values of installation ducts and shafts from Grenamat AL boards.

Fire resistance values determined in extended application of test results for the assessed installation shafts and ducts from Grenamat AL boards, in dependence on the thickness of Grenamat AL boards used and on the fire effects, are as follows:

[1] Service shafts and ducts from Grenamat AL boards 20 mm thick

$$\mathbf{E\ 30\ (i\rightarrow o) - V_e\ /\ EI\ 30\ (i\rightarrow o) - V_e}$$
$$\mathbf{E\ 30\ (i\leftarrow o) - H_o\ /\ EI\ 15\ (i\leftarrow o) - H_o}$$
$$\mathbf{E\ 30\ (i\leftarrow o) - V_e\ /\ EI\ 15\ (i\leftarrow o) - V_e}$$

[2] Service shafts and ducts from Grenamat AL boards 30 mm thick

$$\mathbf{E\ 90\ (i\rightarrow o) - V_e\ /\ EI\ 45\ (i\rightarrow o) - V_e}$$
$$\mathbf{E\ 60\ (i\leftarrow o) - H_o\ /\ EI\ 20\ (i\leftarrow o) - H_o}$$
$$\mathbf{E\ 90\ (i\leftarrow o) - V_e\ /\ EI\ 20\ (i\leftarrow o) - V_e}$$

[3] Service shafts and ducts from Grenamat AL boards 40 mm thick

$$\mathbf{E\ 90\ (i\rightarrow o) - V_e\ /\ EI\ 60\ (i\rightarrow o) - V_e}$$
$$\mathbf{E\ 60\ (i\leftarrow o) - H_o\ /\ EI\ 30\ (i\leftarrow o) - H_o}$$
$$\mathbf{E\ 90\ (i\leftarrow o) - V_e\ /\ EI\ 30\ (i\leftarrow o) - V_e}$$

[4] Service shafts and ducts from Grenamat AL boards 50 mm thick

E 90 (i→o) – v_e / EI 90 (i→o) – v_e
E 60 (i←o) – h_o / EI 30 (i←o) – h_o
E 90 (i←o) – v_e / EI 30 (i←o) – v_e

5. CLASSIFICATION AND AREA OF DIRECT APPLICATION

5.1. Reference

This classification has been done in conformity with clause 7.5.10 of ČSN EN 13501-2.

5.2. Classification

5.2.1. Service shafts and ducts from Grenamat AL boards 20 mm thick

Vertical shaft – internal fire – standard ceiling construction – concrete

R	E	I	W		T	-	M	C	S	G	K
	30	30									

Classification of fire resistance:

E 30 (i→o) – v_e / EI 30 (i→o) – v_e

Horizontal duct – external fire - standard wall construction – concrete

R	E	I	W		T	-	M	C	S	G	K
	30	15									

Classification of fire resistance:

E 30 (i←o) – h_o / EI 15 (i←o) – h_o

Vertical shaft – external fire - standard ceiling construction – concrete

R	E	I	W		T	-	M	C	S	G	K
	30	15									

Classification of fire resistance:

E 30 (i←o) – v_e / EI 15 (i←o) – v_e

5.2.2. Service shafts and ducts from Grenamat AL boards 30 mm thick

Vertical shaft – internal fire – standard ceiling construction – concrete

R	E	I	W		T	-	M	C	S	G	K
	90	45									

Classification of fire resistance:

E 90 (i→o) – v_e / EI 45 (i→o) – v_e

Horizontal duct – external fire - standard wall construction – concrete

R	E	I	W		T	-	M	C	S	G	K
	60	20									

Classification of fire resistance:

E 60 (i←o) – h_o / EI 20 (i←o) – h_o

Vertical shaft – external fire - standard ceiling construction – concrete

R	E	I	W		T	-	M	C	S	G	K
	90	20									

Classification of fire resistance:

E 90 (i←o) – v_e / EI 20 (i←o) – v_e

5.2.3. Service shafts and ducts from Grenamat AL boards 40 mm thick

Vertical shaft – internal fire – standard ceiling construction – concrete

R	E	I	W		T	-	M	C	S	G	K
	90	60									

Classification of fire resistance:

E 90 (i→o) – v_e / EI 60 (i→o) – v_e

Horizontal duct – external fire - standard wall construction – concrete

R	E	I	W		T	-	M	C	S	G	K
	60	30									

Classification of fire resistance:

E 60 (i←o) – h_o / EI 30 (i←o) – h_o

Vertical shaft – external fire - standard ceiling construction – concrete

R	E	I	W		T	-	M	C	S	G	K
	90	30									

Classification of fire resistance:

E 90 (i←o) – v_e / EI 30 (i←o) – v_e

5.2.4. Service shafts and ducts from Grenamat AL boards 40 mm thick

Vertical shaft – internal fire – standard ceiling construction – concrete

R	E	I	W		T	-	M	C	S	G	K
	90	90									

Classification of fire resistance:

E 90 (i→o) – v_e / EI 90 (i→o) – v_e

Horizontal duct – external fire - standard wall construction – concrete

R	E	I	W		T	-	M	C	S	G	K
	60	30									

Classification of fire resistance:

E 60 (i←o) – h_o / EI 30 (i←o) – h_o

Vertical shaft – external fire - standard ceiling construction – concrete

R	E	I	W		T	-	M	C	S	G	K
	90	30									

Classification of fire resistance:

E 90 (i←o) – v_e / EI 30 (i←o) – v_e

5.3. Area of direct application

- Service ducts and shafts may be installed in similar type of wall or ceiling construction with thickness and mass density identical or greater than those of wall or ceiling tested.
- Service ducts and/or shafts exposed to external fire may be installed with cross-section dimensions from 200 mm x 200 mm up to 1250 mm x 1000 mm (width x height).
- Service shafts exposed to internal fire may be installed up to dimensions of 1250 mm x 1000 mm (width x height).
- The results can be used for shafts, containing common installations and for ducts having maximum duct bottom load of 200 N/m^2.
- Suspending equipment shall be made from steel and shall as robust, so that the design tensile stress of all vertically oriented components does not exceed 9 N/mm^2 and the shear stress of screws Class 4.6 in the meaning of EN ISO 898-1 does not exceed 15 N/mm^2 (for fire resistance up to 60 minutes inclusive); for fire resistance from 60 minutes to 120 minutes inclusive does not exceed 6 N/mm^2 and the shear stress of screws Class 4.6 in the meaning of EN ISO 898-1 does not exceed 10 N/mm^2.

6. LIMITATIONS

6.1. Restrictions

Time limitation of the classification report validity is 5 years from the date of its issuing.

6.2. Warning

This classification report does not represent type approval or certification of the product.

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