

### FIRE RESISTANCE EXPERT JUDGEMENT REPORT WITH CLASSIFICATION FIRES-JR-003-19-NURE

Loft shutter with folding timber ladder, type LWF Loft shutter with folding steel ladder, type LMF Loft shutter with folding steel scissor ladder, type LSF

This is an electronic version of a classification report which was made as a copy of classification report officially issued in a paper form. The electronic version of a classification report shall be used only for informative purpose. Any information listed in this classification report is the property of the sponsor and shall not be used or published without written permission. Contents of this file may only be modified by the editor i.e. FIRES, s.r.o., Batizovce. Sponsor is allowed to publish this classification report in parts only with written permission of the editor.





# FIRE RESISTANCE EXPERT JUDGEMENT REPORT WITH CLASSIFICATION

## FIRES-JR-003-19-NURE

Name of the product:	Loft shutter with folding timber ladder, type LWF Loft shutter with folding steel ladder, type LMF Loft shutter with folding steel scissor ladder, type LSF
Sponsor:	FAKRO SP z o.o. ul. Węgierska 144a 33-300 Nowy Sącz Poland
Prepared by:	FIRES, s.r.o. Approved Body No. SK01 Osloboditeľov 282 059 35 Batizovce Slovak Republic
Task No.:	PR-18-0390
Date of issue:	31. 01. 2019
Reports: Copy No.:	3 2
Distribution list:	
Copy No. 1	FIRES, s. r. o., Oslobodite'ov 282, 059 35 Batizovce, Slovak Republic (electronic version)
Copy No. 2	FAKRO SP z o.o., ul. Węgierska 144a, 33-300 Nowy Sącz, Poland (electronic version)
Copy No. 3	FAKRO SP z o.o., ul. Węgierska 144a, 33-300 Nowy Sącz, Poland

This expert judgement report with classification may only be used or reproduced in its entirety.



#### 1. INTRODUCTION

This expert judgement report with classification defines the resistance to fire classification assigned to the loft shutter with folding ladder.

At the time of fire test [1], there was no test method to determine the fire resistance of non-loadbearing horizontally oriented doors/ shutters. Therefore the testing laboratory FIRES, s.r.o. realized fire test [1] acc. to EN 1634-1: 2014. While previous edition of the standard of 2008 was also valid for non-loadbearing horizontally oriented doors/ shutters, the standard 1634-1: 2014 did not comment the possibility of using this test method to determine the fire resistance of such oriented doors/shutters. (This situation has been persisting so far.)

This expert judgement report defines field of application which is outside the field of direct application according test standard. This expert judgement expresses the opinion of the FIRES and is based on the experience or internal rules of FIRES.

In February 2015, the testing laboratory FIRES, s.r.o. issued Fire resistance expert judgement report with classification No. FIRES-JR-008-15-NURE for the classified product. The validity of the document will expire on 03.02.2019. The document FIRES-JR-003-19-NURE supersedes Fire resistance expert judgement report with classification No. FIRES-JR-008-15-NURE. In comparison with previous judgement report, a new one includes different field of product application (see paragraph 4 and 6.2 of this document).

#### 2. DETAILS OF CLASSIFIED PRODUCT

#### 2.1 GENERAL

The element is used as a non-loadbearing horizontally oriented shutter with fire separating function from below. The product is installed in the ceiling of family houses, administrative and multifunctional buildings.

Normally the product is maintained in the closed position. The product is not fitted with a lock. In closed position, the hatch is pressed (by springs) against the gaskets in the shutter frame. Once the hatch is tilted, the force decreases and the user can operate it with little effort. The hatch has got a holder that allows fastening the hook which is the end of the rod. Opening the hatch requires only pulling the holder in the hatch by means of the rod and overcoming the force that the hatch is pressed with.

View on holder placed in the hatch:





#### 2.2 PRODUCT DESCRIPTION

Individual types of product (LWF, LMF, LSF) differ from each other only by construction of ladder.

|--|

Ceiling opening dimensions (width x length) [cm]	Overall dimensions of the shutter (width x length) [mm]	Overall dimension of the shutter hatch (width x length) [mm]	The weight of the shutter hatch [kg]
54x113	520 x 1110	494 x 1084	12,3
55x100	530 x 980	504 x 954	11,4
55 x 120	530 x 1180	504 x 1154	12,7
55 x 130	530 x 1280	504 x 1254	13,6
55 x 140	530 x 1380	504 x 1354	14,5
60x100	580 x 980	554 x 954	12,3
60 x 120	580 x 1180	554 x 1154	13,8
60 x 140	580 x 1380	554 x 1354	15,7
70x100	680 x 980	654 x 954	13,7
70 x 120	680 x 1180	654 x 1154	15,8
70 x 130	680 x 1280	654 x 1254	16,8
70 x 140	680 x 1380	654 x 1354	17,9
86 x 130	840 x 1280	814 x 1254	20,8
86 x 140	840 x 1380	814 x 1354	22,1

#### Shutter frame

Rebated shutter frame (Pos. 4) is made from pine timber with dimensions (20 x 220) mm and bulk density higher than 520 kg/m<sup>3</sup>.

Frame of shutter has three lines of sealants (produced by AiB): Santoprene seal SJ531 (Pos.6), Santoprene seal SJ541 (Pos.7) and TPS seal SJ521 (Pos.9).





#### Shutter hatch

Overall thickness of the hatch: 80 mm

Rebated frame of hatch is made from timber profile with cross-section (42x74) mm at the front side and (21x74) mm at the back side with bulk density >520 kg/m<sup>3</sup>. The frame is reinforced by:

- transom timber profile (44x74) mm with distance 426 mm and 1236 mm from the opening edge,
- transom timber profile (23x74) mm with distance 1070 mm from the opening edge.



The core of the hatch consists of 60 mm thick mineral wool Rockwool ROCKLIT 150 (produced by ROCKWOOL Polska Sp z o.o., PL) with bulk density of 150 kg/m<sup>3</sup> and bottom layer of 14 mm thick polystyrene board EPS200-033.

The hatch is covered from both sides by 3 mm thickHDF boards (producer: Kronospan). Boards HDF are glued to the frame and core by glue JOWACOLL 103.15 (producer: JOWAT AG, Germany).

Intumescent tapes, type PROMASEAL PL (producer: PROMAT) with dimensions (2 x 20) mm is placed along the perimeter of hatch.

#### Hardware

The hatch is connected to the shutter frame by:

- 2 pcs of hinges welded with a crossbar, assembly type 12726,
- 2 pcs of springs 12722 (with force 1556 N ± 110 N),
- 2 side supports, type 12721.

All component are produced by FAKRO SP z o.o., PL.



#### FIRES-JR-003-19-NURE





The way of fixation of hinges to the ladder and to the shutter frame:

The way of fixation of side supports/ brackets to the shutter frame:







**Folding ladder** is installed from above of the shutter (i.e. from unexposed side of the product). Folding ladder is designed for room height: 280 cm, 305 cm, 358 cm.

Type of ladder: <u>3- sections steel ladder</u> in case of loft shutter, type LMF.



3- sections steel ladder is made of steel profile (40x20x1 mm). The weight of the ladder is max. 20,8 kg. The total weight of the ladder, hinges, springs and side supports is max. 26,7 kg.

The way of fixation of ladder to the shutter:



More detailed information about product construction is shown in test report [1].



#### 3. TEST REPORTS AND EXTENDED APPLICATION REPORTS IN SUPPORT OF CLASSIFICATION

#### 3.1 TEST REPORTS

No.	Name of laboratory	Name of sponsor	Test report No.	Date of the test	Test method
[1]	FIRES, s.r.o., Batizovce, SR	FAKRO SP z o.o., Poland	FIRES-FR- 246-14-AUNE	16.12.2014	EN 1634-1: 2014

Test specimen was conditioned according to EN 1363-1 before the fire resistance test.

#### 3.2 TEST RESULTS

No./ Test method	Pa	rameter	Results
[1]	applied load		-
EN 1634-1	supporting construction		the standard rigid supporting construction with
			high density – concrete panels, thickness
Loft shutter			150 mm;
(800 x 1400)	temperature curve		standard temperature time curve
mm	loadbearing capac	ity	-
with folding	integrity	cotton pad	55 minutes
steel ladder,		gap gauges	55 minutes no failure
type LMF		sustained flaming	55 minutes
(with springs thermal in 12722)	thermal insulation	l <sub>1</sub>	50 minutes
		l <sub>2</sub>	55 minutes
	radiation		not evaluated*
	mechanical action		-
operability			passed (25 cycles)
	self-closing		not passed
	other parameters		Specimen orientation during the fire test:
			: stairs on unexposed side;
			: fire from the bottom only;

\* Acc. to EN 1363-2, paragraph 8.1, there is no requirement to measure the radiation from a surface with a temperature below  $300^{\circ}$ C because the radiation emitted from such a surface is low (typically 6 kW/m<sup>2</sup> even with emissivity of 1,0).

[1] The test was discontinued in 57<sup>th</sup> minute because of integrity failure.



#### 4. CHANGES OF THE PRODUCT OR END USE CONDITIONS OUTSIDE OF THE FIELD OF DIRECT OR EXTENDED APPLICATION

- 1. The use of alternative folding ladder in product:
  - : 3 or 4-sections timber ladder in case of loft shutter, type LWF
  - steel ladder of scissor-type in case of loft shutter, type LSF



Alternative ladders are fixed to the loft shutter in the same way as during the test [1].



 In case of room height 358 cm, <u>3- sections steel ladder</u> is made of steel profile (40x20<u>x1,5</u> mm) instead of (40x20x<u>1,0</u>) mm. As consequence of it, FAKRO SP z o.o. modifies upper part of side brackets (screwed to the shutter frame) to increase rigidity and durability of side brackets. This modification can be realized in 3 different ways:

Version 1	with closed profile			
Version 2	with closed profile with technological holes			
Version 3	with flat bar			



Due to the change of steel profile of ladder and modification of upper part of side brackets, the total weight of ladder (including side brackets, hinges, springs) is increased by 3,5 kg. Therefore FAKRO SP z o.o. uses stronger springs 12791 (2042 N) in these product variants –<u>see table below</u>.

3. The usage of the weaker springs 12727 (with force 1280 N  $\pm$  90 N) and 16292 (with force 1125 N  $\pm$  60 N) for smaller loft shutters on conditions defined in the following tables.

		3-sections steel ladder or steel scissor ladder								ions steel l	adder
Room height [cm]			280				305			358	
Ceiling opening dimensions [cm]	60x120	70x120	70x130	70x140	86x130	70x130	70x140	86x130	60x140	70x140	86x140
Place of spring fastening	С	В	В	В	В	В	В	В	В	В	Α
Type of spring	12727	12727	12727	12722	12722	12727	12722	12722	12791	12791	12791



		3 sections timber ladder									
Room height [cm]			28	30					305		
Ceiling opening dimensions [cm]	60x120	70x120	70x130	86x130	70x140	55x120	70x130	86x130	70x140	55x130	55x140
Place of spring fastening	С	С	В	В	В	С	В	В	В	В	В
Type of spring	12727	12727	12727	12722	12727	12727	12727	12722	12722	12727	12722

	4 sections timber ladder					
Room height [cm]		28	30			
Ceiling opening dimensions [cm]	55x100	60x100	70x100	54x113		
Place of spring fastening	С	С	В	В		
Type of spring	16292	16292	16292	16292		

Suitable spring is calculated by FAKRO SP z o.o. taking into account dimensions and the weight of the hatch (including weight of the ladder, springs and side supports) and location of the centre of gravity of the elements. FAKRO SP z o.o. bears full responsibility for correctness of the calculation.

The springs are designed acc. to EN 10270-1 EN 13906-2and the design guide titled "Metal Springs" by Bogdan Baranowski.

Spring force necessary for closing of the shutter and its remaining in closed position depends also on place of springs fastening to the hinge:



4. The lock applied between the middle and the bottom section of the ladder. The lock prevents accidental folding up of the ladder. To fold up the ladder, the hook of the lock shall be pulled deliberately. The ladder can then be freely folded up. The hook of the lock snaps into place automatically under the impact of the spring when unfolding the ladder. The lock is only used in 3-sections steel ladder, to room height of 358 cm.





5. Additional welds are applied to fix ladder's hinges to the individual sections of LMF ladder:



- 6. Application of alternative mineral wool (instead of Rockwool ROCKLIT 150) used as an insulation core in the hatch. Thickness of alternative mineral wool is 60 mm, its bulk density is 150 kg/m<sup>3</sup> and reaction to fire classification acc. to EN 13501-1 is A1.
- 7. Fixation of ladder to the shutter hardware by means of bolts and nuts M6 instead of blind rivets  $\varnothing$  6 mm:





#### 5. ARGUMENTS IN FAVOR OF THE EXTENSION

Change 1	As the weight of alternative folding ladder is not higher than the
Alternative folding ladder	weight of ladder during the test [1] and the ladder is fixed to the loft
	shutter in the same way as during the test [1], the use of alternative
	folding ladder has no influence on fire resistance of product.
Change 2	Higher weight of ladder is compensated by using of stronger springs
3- sections steel ladder made	which are responsible for keeping shutter in the closed position.
of steel profile (40x20x1,5 mm) +	Modified upper part of side brackets contributes to the higher rigidity
modification of side brackets	and durability of side brackets.
Change 3	Weaker springs are applied in smaller loft shutters on the base of
The usage of the weaker	calculation taking into account dimensions and the weight of the
springs 12727 (1280 N ± 90 N)	hatch (including ladder, springs and side supports) and location of
springs 16292 (1125 N ± 60 N)	the centre of gravity of the elements.
Change 4, 5, 7	
<ul> <li>the lock between the middle</li> </ul>	
and the bottom section of the	
ladder;	From the point of view of fire resistance of product, it is insignificant
<ul> <li>4 welds per a ladder hinge;</li> </ul>	change.
<ul> <li>fixation of ladder to the</li> </ul>	
shutter hardware by means	
of bolts + nuts M6;	
Change 6	As alternative mineral wool has the same thickness, bulk density and
Alternative mineral wool	reaction to fire class as mineral wool used in the test specimen [1], its
used in the hatch	usage in the hatch has no influence on fire resistance of product.
	Moreover, the weight of hatch is not increased, which means that
	product needn't to be equipped with stronger springs.

#### 6. CLASSIFICATION AND FIELD OF APPLICATION

#### 6.1 CLASSIFICATION

The element:

- Loft shutter with folding timber ladder, type LWF
- Loft shutter with folding steel ladder, type LMF
- Loft shutter with folding steel scissor ladder, type LSF

is classified according to the following combinations of performance parameters and classes as appropriate.

# Fire resistance classification from below: E 45 / EI<sub>1</sub> 45 / EI<sub>2</sub> 45 / EW 45

Note: Fire resistance of the product refers only to one side of the classified product, whereupon folding ladder is always located on unexposed side.



#### 6.2 FIELD OF APPLICATION

This classification is valid for the following end use applications:

Materials and construction	<ul> <li>it is allowed to realize all changes described in paragraph 4 of the document.</li> <li>the number, size, location and orientation of any joints in the timber framing shall not be changed;</li> </ul>
Decorative finishes	<ul> <li>where the paint finish is not expected to contribute to the fire resistance of the shutter, alternative paints are acceptable and may be added to the hatch or frame;</li> <li>decorative laminates and timber veneers up to 1,5 mm thickness may be added to the faces (but not the edges) of shutter.</li> </ul>
Permissible size variations	<ul> <li>size increase is not permitted;</li> <li>unlimited size reduction is permitted;</li> </ul>
Fixings	<ul> <li>the number of fixings used to attach the product to supporting constructions may be increased but shall not be decreased and the distance between the fixings may be reduced but shall not be increased;</li> </ul>
Supporting construction and product fixation	<ul> <li>the shutter is fixed in supporting construction made of reinforced concrete with minimum thickness 150 mm by nail plugs Ø 6x80 mm in maximum spacing of 400 mm. The gap between the shutter frame and supporting construction is filled by strips of mineral wool with min. bulk density 60 kg/m<sup>3</sup> and sealed at both sides by mastic PROMASEAL (PROMAT).</li> </ul>
	Uszczelniacz ognioodporny PROMAT PROMASEAL Mastic Izolacja wełna kamienna o gęstości min 60kg/m^3 Drewniana podkładka dystansowa Żelbet Kołek szybkiego montażu Ø 6x80
Gaps	- range of gaps specified by manufacturer:



#### 7. LIMITATIONS

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

The classification is valid until 01. 02. 2024 provided that the product, field of application and standards and regulations are not changed.

Approved:

Signed:

Ing. Štefan Rástocký leader of the testing laboratory



a Mara

Ing. Henrieta Lápková technician of the testing laboratory