



**APPROVAL CERTIFICATE**

M63018/19/MN/mn

IT FILE 19.IT.3437488.139

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**TYPE APPROVAL CERTIFICATE**

**1. General:**

Name and address of the factory: FIERRE S.r.l. – Via Vigentina 110B – 27100 - Pavia

Type(s) of product and component manufactured: FI-HEG HIGH EXP. FOAM GENERATOR

Type Tests witnessed on March 25, 2019 by M. Nicoletti

**2. Type description:**

- High Expansion Foam Generator **Model FI-HEG**
- EN13565
- Acetone Fire

**3. Conclusion:**

After examination of the following documents:

- test reports for type approval n° M63017/19/MN/mn dated 25/03/2019

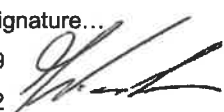

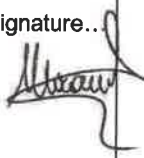
the undersigned, Inspector to Bureau Veritas, certifies that the above type meets the applicable requirements

This entire approval cycle remains valid as long as no significant changes are made to the audited facility, its production rate and its quality system. These conditions shall be assessed and certified once per year by means of a Factory Approval Audit.

This approval is an integral and indissociable part of the certification process managed by Bureau Veritas as defined in BV procedure GM SI 210.

**Attachments:**

- all the examined documents with BV "Reviewed" stamp,
- BV Report M63017/19/MN/mn

<b>Inspected by:</b>		<b>Checked by:</b>	
Name: M. Nicoletti	Signature...	Name: D. Morandin	Signature...
Date of issue: March 26, 2019			
Expiring date: March 25, 2022			
<b>Inspection centre:</b> BV Milan			





*Document No.:*  
*M63017/19/MN/mn*  
*IT FILE 19.IT.3437488.139*  
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## **TEST REPORT FOR TYPE APPROVAL**

### **1. General:**

Name and address of the factory: FIERRE Srl – Via Vigentina 110B – 27100 - Pavia

Type(s) of product and component manufactured: FI-HEG HIGH EXP. FOAM GENERATOR

Factory Audit Report: ISO 9000 Certificate no. 11777/04/S issued by RINA Exp. 2019-10-12

Type Tests witnessed on March 25, 2019 by M. Nicoletti

### **2. List of examined documents:**

- General Arrangement Dwg. FI-HEG 4
- High expansion foam test procedure No. 25032019
- EN13565

### **3. Observations and results:**

- test conditions:
  - Pressure 4-6 bar;
  - Profilm AR 3-3 Hi-Ex 3% alcohol resistant filming foam
  - Acetone Fire
  - Air temperature: 80°C +/- 10
- Test Report No.: FI-HEG4 ACT

### **4. Conclusion:**

At the request of the above manufacturer, made by its application dated March 25, 2019 and within the general conditions of service of Bureau Veritas and the applicable requirements of BV procedures, the above type test was performed and the results were found satisfactory.

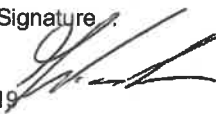
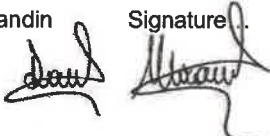



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**TEST REPORT FOR TYPE APPROVAL**

**Attachments:**

- Test Report No.: FI-HEG4 ACT

<b>Inspected by:</b>		<b>Checked by:</b>	
Name: M. Nicoletti	Signature 	Name: D. Morandin	Signature 
Date of issue: March 26, 2019			
<b>Inspection centre:</b> BV Milan			
Distribution: <input checked="" type="checkbox"/> CLIENT <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> <input type="checkbox"/>			

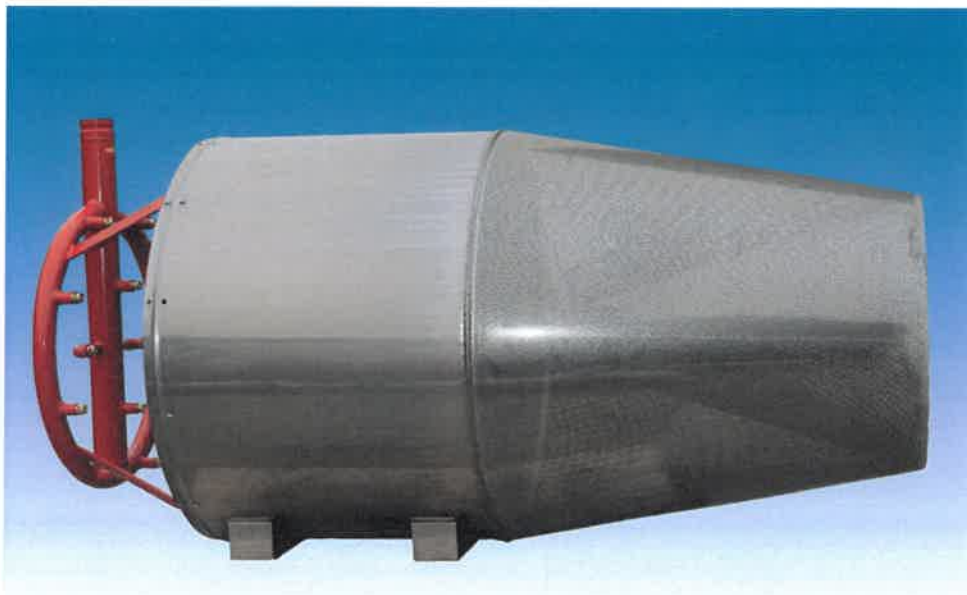
**Fierre Srl**

Registered Office and Administration: Via Vigentina 110/B – 27100 Pavia (PV)  
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**Test Report No.: FI-HEG4 ACT**

# TESTING PROCEDURES AND REPORTS HIGH EXPANSION FOAM GENERATOR Mod. FI-HEG 4

## Test witnessed by Bureau Veritas Inspector Certificate n° M63018/19/MN/mn



0	ISSUED	26-03-19	M.R.	M.R.	F.R.
REV.	DESCRIPTION	DATE	EDITED	VERIFIED	APPROVED

## Fierre Srl

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### Test Report No.: FI-HEG4 ACT

## Introduction

This manual has been produced to test the correct operation of the high expansion foam generator model FI-HEG 4.

The test has been specifically carried out in an oversized area compared to the minimum size required by current standards, in order to simulate the actual conditions of a real installation, especially by taking into account a foam drop of 9 mt high in order to assess the real impacts of the extinguishing agent on the ground.

Test carried out in a Fire House of the following dimensions:

Area	6.65 x 7.55 Mt.
Height	9.990 Mt.
Height of installation	9.0 Mt.

The test has been carried out in compliance with the parameters of standards EN 13565-2, taking into account the volume to be saturated, including the multiplication factors CN and CL.

## 1 Hydraulic and Mechanical Tests

In compliance with standards EN 13565-1 ENCLOSURE "A" EN 13565 4.3.1, a hydrostatic tightness test at 16 bar for 60' has been carried out, followed by a mechanical tightness test at 36 bar for 1'. The test has been successfully carried out on the manifold.



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### Test Report No.: FI-HEG4 ACT

## 2 Functional Tests

The first test carried out with water only has specified the foam generator flow rate. With the second test carried out with foam, we have specified the equipment performance. The test has been carried out with hot and polluted air generated by Acetone UN1090 batch n°2110 combustion.

Foam production, its correct mixing and the supply pressure have been tested with the following equipment:

- ✓ transit time flowmeter MANUFACTURER: BIEMME TECNOLOGIE INDUSTRIALI - MOD: TTFM100B-HH-NG - SERIAL NO.: 2018000011922
- ✓ Pressure meter MANUFACTURER: GEFRAN – MOD: TK-E-1-M-B03D-M-V – TYPE: 2130X000X00
- ✓ Data recording PLC: MANUFACTURER: JUMO LOGOSCREEN nt – MOD: B 706581.1

The test have been carried out by continually recording the flow rate and pressure values by using TV cameras located inside different parts of the rooms. The video recordings have not been included in this report but can be viewed in the offices of Fierre S.r.l.

## 3 Test Result

Flow rate test:

Pressure (bar)	Flow rate (lpm)	K (lpm@1bar)
5,3	415	180,26



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### Test Report No.: FI-HEG4 ACT

#### Foam expansion test:

Mixing ratio	3%
Fire fighting foam used	Profilm AR 3-3 Hi-Ex
Burned substance	Acetone UN1090 batch n°2110
Local area	50.2 m <sup>2</sup>
Analysed test duration	t=60''
Pressure at the equipment	5.3 bar (records and chart file enclosed)
Height of foam achieved	3,6 mt.
EN 13565 coefficients	CN 1,15 CL 1,2
Volume produced	250 Mc
Generator flow rate	415 lpm
Expansion ratio	1:602

## 4 Conclusion

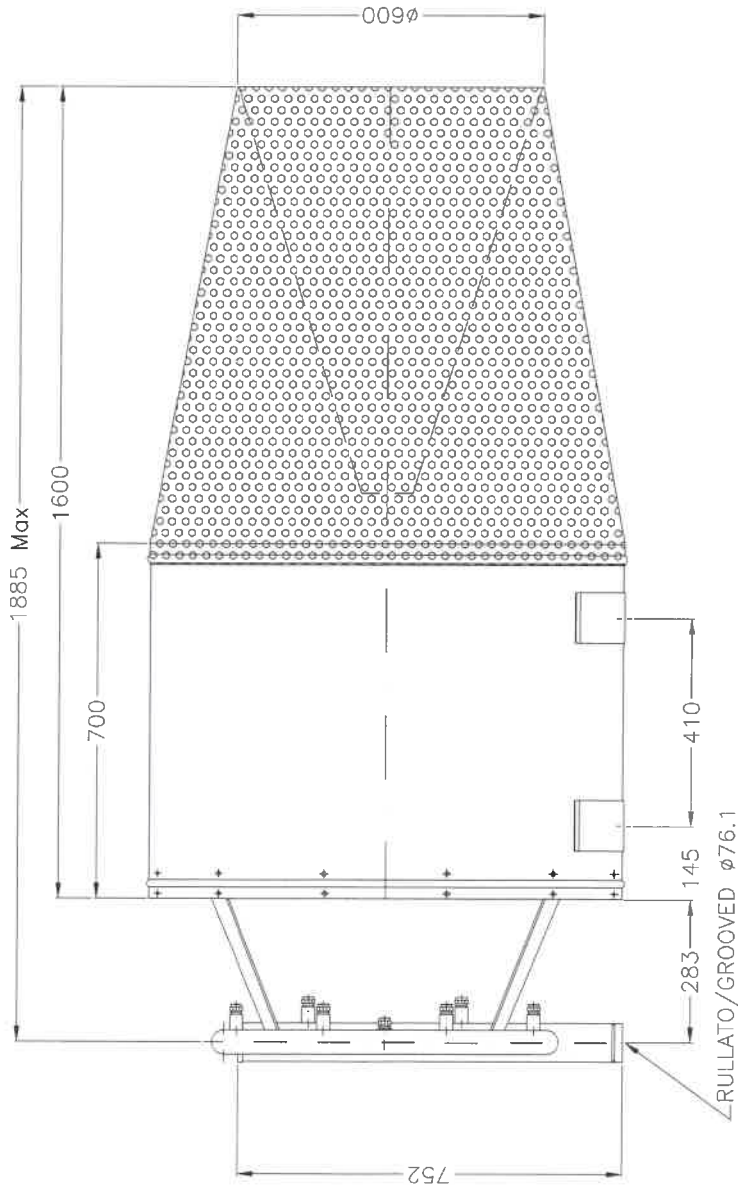
In date 25-03-2019, thanks to the presence of Bureau Veritas Inspector as witnessed Notified Body, we declare that the high expansion foam generator mod. FI-HEG 4 with a flow rate of 415 lt/min at 5,3 bar, performed an expansion ratio of 1:602 aspirating hot and polluted air generated by Acetone combustion. Used foam concetrate has been Profilm AR 3-3 Hi-Ex mixed at a 3%.

The above data has been obtained by applying standards EN 13565-1 and 13565-2

## 5 Enclosures

- ✓ Continuous pressure reading (the discharge seconds are shown in green)
- ✓ Pressure chart
- ✓ System sketch





**CARATTERISTICHE TECNICHE**

Technical characteristic

CORPO : ACCIAIO INOX

Body : Stainless Steel

CONO EROGATORE : ACCIAIO INOX

Delivery cone : Stainless Steel

SUPPORTI : ACCIAIO INOX

Supports : Stainless Steel

COLLETORE ALIMENTAZIONE : ACCIAIO AL CARBONIO UNI 8863 PN16

Feeding Reiser : Carbon Steel UNI 8863 PN16

UGELLI : OTTONE - (N°12 HEG-4)

Nozzles : Brass - (N°12 HEG-4)

CONNESSIONE : RULLATURA Ø76

Connection : Grooved Ø76

RAPPORTO DI ESPANSIONE @ 5.3 BAR : 1:602 CON FUOCO DI ACETONE

Expansion Ratio @ 5.3 BAR : 1:602 with acetone fire

PESO TOTALE TEORICO : 60 Kg.

Theoretic total weight : 60 Kg.

VERNICIATURA SOLO CROCERA PORTA UGELLI : ROSSO RAL 3000 Sp. => 100 Micron

Painting, only feeding reiser : Red RAL 3000 Thk. => 100 Micron

QUANTITA' RICHIESTA : N° PEZZ

Required quantity : N° piece

PORTATA/DELIVERY : (415 Lt./min @ 5.3 Bar HEG-4)

TITOLO: GENERATORE AD ALTA ESPANSIONE MOD. FI-HEG-4  
Object: MOD. FI-HEG-4 HIGH EXPANSION GENERATOR

REV. N°	DESCRIZIONE/DESCRIPTION	DESEGNATO/DR'N.	DESEGNATO/DR'N.	CONTROLLATO/CK'D.	APPROVATO/APP'D.	DATA/DATE
	CLIENTE: Customer:	DESEGNATO/DR'N.	CONTROLLATO/CK'D.	SCALA/SCALE	FORMATO/SIZE	
		CONTROLLATO/CK'D.	APPROVATO/APP'D.	COMM. N°/JOB N°	ORD. N°	
		DATA/DATE		DIS. N°/DWG N°		

**FIERRE**

S.R.L.

VIA VIGENTINA N° 110 B  
27100 PAVIA - ITALY

Le misure sono espresse in mm / All the dimensions are in mm / MATERIALE: equivalente o superiore al tipo indicato / MATERIAL: equivalent or superior on the type indicated  
LAVORAZIONI MECCANICHE FINO A/UP TO 315 ≤ 1000 > 315 ≤ 1000 > 1000 ≤ 2000 > 2000 ≤ 4000 ULTIME/OVER 4000 RINATURA FLANGE ANSI 125-250 ABRH  
MACHINING ± 0.1 ± 0.5 ± 1.2 ± 2 ± 3  
CARPENTERIA/CAPELLERIA FINO A/UP TO 1000 ± 1 ULTIME/OVER ± 1.5 X METRI/ ANGOLI/ANGLES FINO A/UP TO 6 ± 1' > 6 ± 30 ± 10' > 30 ± 20' ULTIME/OVER 30'  
Il presente disegno è di proprietà FIERRE E' VIETATO riprodurlo e falsificarlo. / This drawing is the property of FIERRE it CAN'T BE reproduced without our written approval  
ROSSO - 0.5 GIALLO - 0.18 VERDE - 0.35 CIANO - 0.7 BLU - 0.13 MAGENTA - 0.25 BIANCO - 0.25 8 - 0.09 9 - 0.09