



**BUREAU
VERITAS**

APPROVAL CERTIFICATE

M63077/21/MN/mn

IT FILE 21.IT.3989562.138

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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 July 26, 2021 by M. Nicoletti

2. Type description:

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

3. Conclusion:

After examination of the following documents:

- test reports for type approval n° M63076/21/MN/mn dated 26/07/2021

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 M63076/21/MN/mn

Inspected by:

Name: M. Nicoletti

Signature...

Date of issue: July 26, 2021

Expiring date: July 25, 2024

Inspection centre: BV Milan

Checked by:

Name: D. Morandin

Signature...





**BUREAU
VERITAS**

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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 July 26, 2021 by M. Nicoletti

2. List of examined documents:

- General Arrangement Dwg. FI-HEG 4
- High expansion foam test procedure No. 26072021
- EN13565

3. Observations and results:

- test conditions:
 - Pressure 4-6 bar;
 - Sabofoam Plurex M 3% synthetic foam
 - GPL Fire
 - Air temperature: 80°C +/- 10
- Test Report No.: FI-HEG4-2021

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.

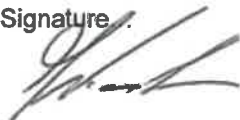
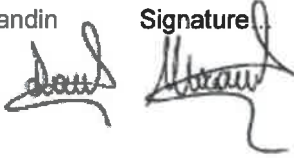



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TEST REPORT FOR TYPE APPROVAL

Attachments:

- Test Report No.: FI-HEG4-2021

| | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|--------------------|------------------------------------------------------------------------------------------------|
| Inspected by: | | Checked by: | |
| Name: M. Nicoletti | Signature:  | Name: D. Morandin | Signature:  |
| Date of issue: July 26, 2021 |  | | |
| Inspection centre: BV Milan | | | |
| Distribution: <input checked="" type="checkbox"/> CLIENT <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> <input type="checkbox"/> | | | |

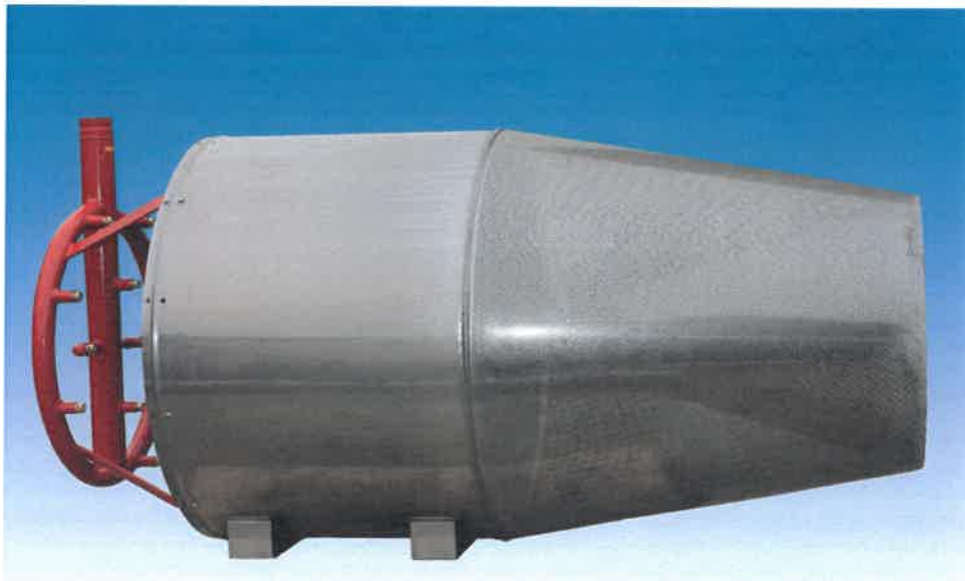
Fierre Srl

Registered Office and Administration: Via Vigentina 110/B – 27100 Pavia (PV)
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Test Report No.: FI-HEG4-2021

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

**Test witnessed by Bureau Veritas Inspector
 Certificate n° M63077/21/MN/mn**



| | | | | | |
|------|-------------|----------|--------|----------|----------|
| 0 | ISSUED | 26-07-21 | M.R. | M.R. | F.R. |
| REV. | DESCRIPTION | DATE | EDITED | VERIFIED | APPROVED |

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Test Report No.: FI-HEG4-2021

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 impact 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-HEG4-2021

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 GPL 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 Fierre S.r.l. offices.

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-HEG4-2021

Foam expansion test:

| | |
|---------------------------|-------------------------------------------|
| Mixing ratio | 3% |
| Fire fighting foam used | Sabofoam Plurex M |
| Burned substance | GPL |
| Local area | 50,2 m ² |
| Analysed test duration | t=60'' |
| Pressure at the equipment | 5,3 bar (records and chart file enclosed) |
| Height of foam achieved | 4,12 mt. |
| EN 13565 coefficients | CN 1,15 CL 1,2 |
| Volume produced | 285,52 Mc |
| Generator flow rate | 415 lpm |
| Expansion ratio | 1:688 |

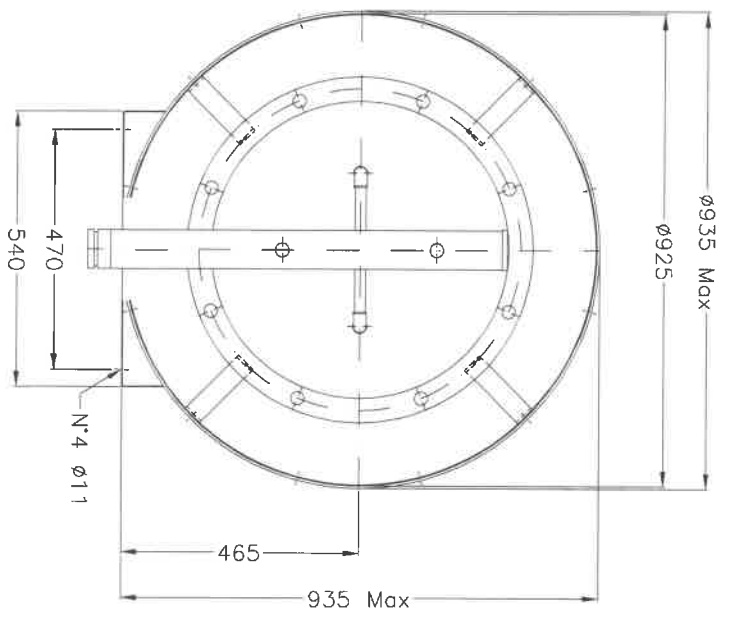
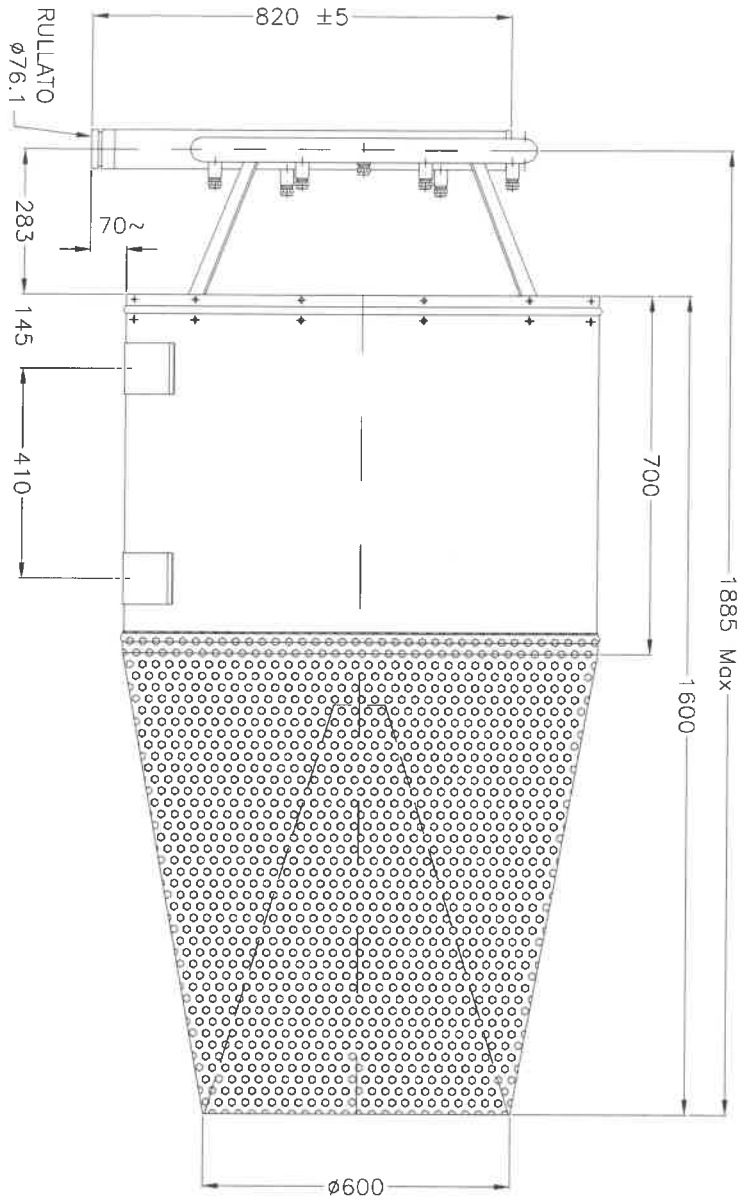
4 Conclusion

In date 26-07-2021, 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 1:688 aspirating hot and polluted air generated by GPL combustion. Used foam concentrate has been Sabofoam Plurex M 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
 COLLETTORE ALIMENTAZIONE : ACCIAIO AL CARBONIO
 Feeding Reiser : Carbon Steel
 UGELLI : OTTONE - (N°12 HEG-4)
 Nozzles : Brass - (N°12 HEG-4)
 CONNESSIONE : FLANGIA PN16 / FILETTATURA Gas / RULLATURA Ø76
 Connection : Flange PN16 / Threaded Gas / Grooved Ø76
 PESO TOTALE TEORICO : 60 Kg.
 Theoretic total weight : 60 Kg.
 VERNICIATURA SOLO CROCCERA PORTA UGELLI : ROSSO RAL 3000 Sp. => 100 Micron
 Painting, only feeding reiser : Red RAL 3000 Thk. => 100 Micron



QUANTITA' RICHIESTA : N° PEZZI
 Required quantity : N° piece
 PORTATA/DELIVERY : (415 Lt./min @ 5.3 Bar HEG-4)

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

| REV. N° | DESCRIZIONE/DESCRIPTION | DESIGNATO/DR.N. | CONTROLATO/CK.D. | APPROVATO/APP.D. | DATA/DATE |
|---------|-------------------------|-----------------|------------------|------------------|-----------|
| 0 | EMESSO PER INFORMAZIONE | | | | |

| CLIENTE: | Customer: |
|----------|-----------|
| | |

| DESIGNATO/DR.N. | R.M. | S.G. |
|-------------------|------|------|
| CONTROLLATO/CK.D. | | |
| APPROVATO/APP.D. | | |
| DATA/DATE | | |

FIERRE

S.R.L.
 VIA VICENTINA N° 110 B
 27100 PAVIA - ITALY

Le misure sono espresse in mm / All the dimensions are in mm | MATERIALE: equivalente o superiore di tipo indicato / MATERIAL: equivalent or superior as the type indicated
 LAVORAZIONI MECCANICHE FINO A/UP TO 315 > 315 < 1000 > 1000 < 2000 > 2000 < 4000 | OUTLET/OVER 4000 | RICAMBI FLANGE ANSI 125/250 ASH
 MACHINING ± 0.1 ± 0.5 ± 1.2 ± 2
 CARPENTERIA/CARPENTRY FINO A/UP TO 1000 ± 1 OUTLET/OVER ± 1.5 X METRI | ANGOLO/ANGLES FINO A/UP TO 6 ± 1" > 6 < 30 ± 10 | > 30 < 120 ± 20" | OUTLET/OVER 30"
 Il presente disegno è di proprietà FIERRE E' VIETATO riprodurre e falsificarlo. / This drawing is the property of FIERRE it CAN'T BE reproduced without our written approval
 ROSSO - 0.3 GALLO - 0.18 VERDE - 0.35 GRANO - 0.7 BLU - 0.13 MAGENTA - 0.25 BIANCO - 0.25 8 - 0.09 9 - 0.09