

## HIEX High-Expansion Foam Generators

### Features

- UL Listed and CE Marked
- FM Approved models available
- LNG specific models available
- Water-powered so no electrical power is required
- Foam capacities of up to 29,900 cfm (847 cmm)

### Application

SKUM HIEX High-Expansion Foam Generators are intended for use in total flooding or local application high-expansion foam systems. Total flooding high-expansion foam systems are commonly used to protect the following hazards:

- Flammable liquid storage areas
- Hazardous waste storage areas
- Ship holds
- Engine rooms

Local application foam systems are commonly used to protect aircraft hangars. High-expansion foam systems are also frequently used to protect LNG facilities. These systems are typically used to control the vaporization rate of LNG spills or reduce the intensity of LNG fires by controlling the rate of vapor release.

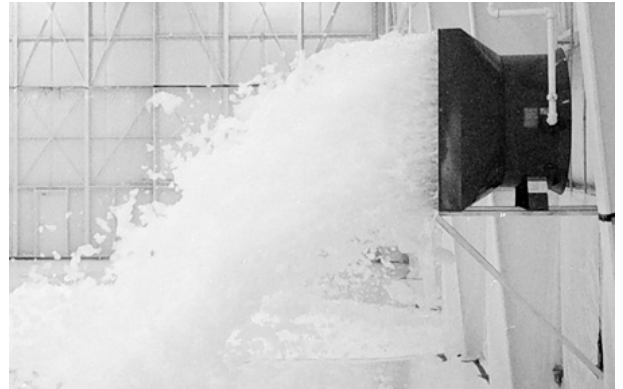
**Note:** High-expansion foam generators used in LNG applications typically require expansion ratios of approximately 500:1.

### Description

SKUM HIEX High-Expansion Foam Generators produce large volumes of foam by coating a stainless steel perforated metal screen with high-expansion foam solution and expanding it with airflow generated by a water-powered fan. When used with SKUM METEOR-X 2% High-Expansion Foam Concentrate, these generators are capable of producing finished foam with expansion ratios from 450:1 up to 987:1, depending on the model and operating pressure.

### Protective Coatings

All generator models are painted using a Corrosion Resistant Epoxy (Epoxy CR) paint system on the housings, supports, and guard screens. Fans are painted using a powder paint system to ensure adherence and paint durability. Both paint systems have been subjected to and passed a minimum of 3,000 hours in salt spray corrosion testing and are suitable for marine and offshore use. The stainless steel foam screens are not painted to avoid inhibiting foam production.



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### Approvals and Certifications

#### UL Listed

SKUM High-Expansion Foam Generators are UL Listed for use with the SKUM METEOR-X 2% High-Expansion Foam Concentrate.

#### FM Approved

The HIEX-5A, HIEX-15A, and HIEX-27 models are FM Approved for use with SKUM METEOR-X 2% High-Expansion Foam Concentrate.

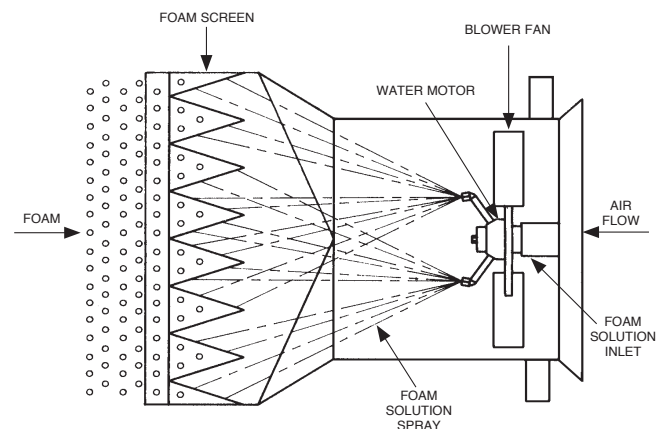
#### CE Marked

All models are CE Marked in conformance with the Machinery Directive 2006/42/EC.

### Operation and Maintenance

Refer to the SKUM HIEX High-Expansion Foam Generator Operation and Maintenance Manual for detailed procedures on installation, operation, and maintenance. A printed copy of this manual is included with every generator.

### Foam Generator Components



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## Materials of Construction

SKUM HIEX High-Expansion Foam Generators are manufactured from a combination of carbon steel, stainless steel, and brass components. For materials of construction of the major components, see the following table:

Component	Material		
<b>Model</b>	Standard Models: HIEX-5A, HIEX-15A	Standard Models: HIEX-27	LNG Models: HIEX-5A LNG, HIEX-15A LNG
<b>Housing</b>	Galvanized Steel	Galvanized Steel	316L SS, Pickled and Passivated
<b>Foam Screen</b>	201, 302, or 304 SS	201, 302, or 304 SS	316 or 316L SS
<b>Fan</b>	Carbon Steel*	Carbon Steel*	Carbon Steel*
<b>Water Motor</b>	Brass	Cast Iron/Bronze	Brass
<b>Nozzle(s)</b>	Brass	Brass	Brass

\*Carbon Steel fans are powder painted with a durable, marine-grade paint system for corrosion resistance.

## Performance Data

UL Listed Performance (METEOR-X 2%)										
Generator Model		Part Number	UL Listed Orientation	Inlet Pressure		Flow Rate		Foam Output		Expansion Ratio
				psi	bar	gpm	Lpm	cfm	cmm	
HIEX-5A	Standard	438482	Horizontal or Vertical	50	3.4	61	231	6,658	189	816
	LNG	438489		75	5.2	75	284	9,383	266	939
				100	6.9	87	329	10,655	302	916
HIEX-15A	Standard	438483	Horizontal or Vertical	40	2.8	108	409	12,121	343	840
				50	3.4	119	450	14,491	410	911
				75	5.2	145	549	19,141	542	987
				100	6.9	169	640	21,796	617	965
HIEX-15A	LNG	438491	Horizontal or Vertical	50	3.4	180	681	12,949	367	538
				75	5.2	220	833	17,769	503	604
				100	6.9	260	984	19,503	552	561
HIEX-27	Standard	438487	Horizontal or Vertical	40	2.8	181	685	20,295	575	839
				50	3.4	203	768	23,965	679	883
				75	5.2	243	920	27,303	773	840
				100	6.9	276	1,045	28,802	816	781

**Notes:** METEOR-X 2% concentrate should not be used for salt water applications.

## Performance Data (Continued)

FM Approved Performance (METEOR-X 2%)										
Generator Model	Part Number	FM Approved Orientation	Inlet Pressure		Flow Rate		Foam Output		Expansion Ratio	
			psi	bar	gpm	Lpm	cfm	cmm		
HIEX-5A	Standard	438482	Horizontal	40	2.8	55	208	4020	114	547
				50	3.4	62	235	5184	147	625
	LNG	438489		75	5.2	76	288	7632	216	751
				100	6.9	88	333	7794	221	662
HIEX-15A	Standard	438483	Horizontal	40	2.8	107	405	9540	270	667
				50	3.4	119	450	12150	344	764
				75	5.2	149	562	17100	484	861
				100	6.9	174	659	19296	546	829
HIEX-27	Standard	438487	Horizontal or Vertical	40	2.8	184	697	19548	554	795
				50	3.4	202	765	21600	612	800
				75	5.2	244	924	27036	766	829
				100	6.9	280	1060	29916	847	799

Notes: METEOR-X 2% concentrate should not be used for salt water applications.

## System Calculation for Total Flooding

### Building

- Light steel construction
- Non-sprinklered

### Hazard

- Low density combustibles

### Fill Time

As stated in NFPA 11, the fill time for a non-sprinklered building of light steel construction and a hazard of low density combustibles is a maximum of 3 minutes (T).

### Building Area

100 ft (30.5 m) × 30 ft (9.1 m) = 3,000 ft<sup>2</sup> (278 m<sup>2</sup>)

### Building Height

10 ft (3 m) = Volume (V) of 30,000 ft<sup>3</sup> (850 m<sup>3</sup>)

### Calculation Without Sprinklers

$$R = (V/T) \times C_N \times C_L$$

$$R = \text{Rate of Discharge in cfm}$$

$$V = \text{Submergence Volume in ft}^3$$

$$T = \text{Submergence Time in minutes}$$

$$C_N = \text{Compensation for normal shrinkage (1.15, constant)}$$

$$C_L = \text{Compensation for leakage}$$

1.0, no leakage

1.2, moderate leakage

$$\begin{aligned} R &= (30,000 \text{ ft}^3 / 3 \text{ min}) \times 1.15 \times 1 = \\ &= 10,000 \times 1.15 \times 1 \\ &= 11,500 \text{ cfm required} \end{aligned}$$

### Metric Calculation

$$\begin{aligned} R &= (850 \text{ m}^3 / 3 \text{ min}) \times 1.15 \times 1 \\ &= 283.3 \times 1.15 \times 1 \\ &= 326 \text{ cmm required} \end{aligned}$$

326 cmm / 189 cmm per Metric HIEX-5A @ 3.4 bar  
= 1.73 generators

## System Calculation for Local Application

Group II aircraft hangar using outside air to generators.

### Hangar to be protected

- Group II hangar measuring 33,000 ft<sup>2</sup> (3066 m<sup>2</sup>)
- Sprinkler system (wet pipe) for 0.17 gpm/ft<sup>2</sup> over 5000 ft<sup>2</sup> (6.9 Lpm/m<sup>2</sup> over 465 m<sup>2</sup>)

### Fill time

As stated in NFPA 409, fill depth of 3 ft (0.9 m) within one minute (T) with sufficient foam concentrate for 12 minutes total.

### Building Area

150 ft × 220 ft = 33,000 ft<sup>2</sup> (45.7 m × 67.1 m = 3066 m<sup>2</sup>)

### Foam Volume (V)

33,000 ft<sup>2</sup> × 3 ft = 99,000 ft<sup>3</sup> (2803 m<sup>3</sup>)

### Calculation With Sprinklers

$$R = ([V/T] + R_s) \times C_N \times C_A^*$$

$$R_s = \text{Rate of foam breakdown by sprinklers} \\ 10 \text{ cfm/gpm} \times \text{sprinkler system discharge in} \\ \text{gpm (0.075 cmm/Lpm} \times \text{sprinkler discharge} \\ \text{in Lpm)}$$

$$C_N = \text{Compensation for normal shrinkage (1.15 constant)}$$

$$C_A^* = \text{Compensation for inside air (1.20 constant)}$$

$$C_L = \text{Leakage factor (not required for local application systems)}$$

$$\begin{aligned} R &= ([99,000 \text{ ft}^3 / 1 \text{ min}] + 8500 \text{ cfm}) \times 1.15 \\ &= 107,500 \times 1.15 \\ &= 123,625 \text{ cfm minimum required} \end{aligned}$$

123,625 cfm / 27,303 cfm per HIEX-27 @ 75 psi  
= 4.53 generators

### Metric Calculation

$$\begin{aligned} R &= ([2803 \text{ m}^3 / 1 \text{ min}] + 241 \text{ cmm}) \times 1.15 \\ &= 3044 \times 1.15 \\ &= 3501 \text{ cmm minimum required} \end{aligned}$$

3501 cmm / 773 cmm per HIEX-27 @ 5.2 bar  
= 4.53 generators

**Therefore, use five HIEX-27 generators at 27,303 cfm (773 cmm) each.**

\*Inside air may be used with AHJ approval. When using inside air, Tyco Fire Protection Products recommends using the 20% compensation factor (C<sub>A</sub>) noted in the calculation for R. Contact Tyco Fire Protection Products Technical Services with questions on use of inside air for high-expansion foam systems.

## Ordering Information

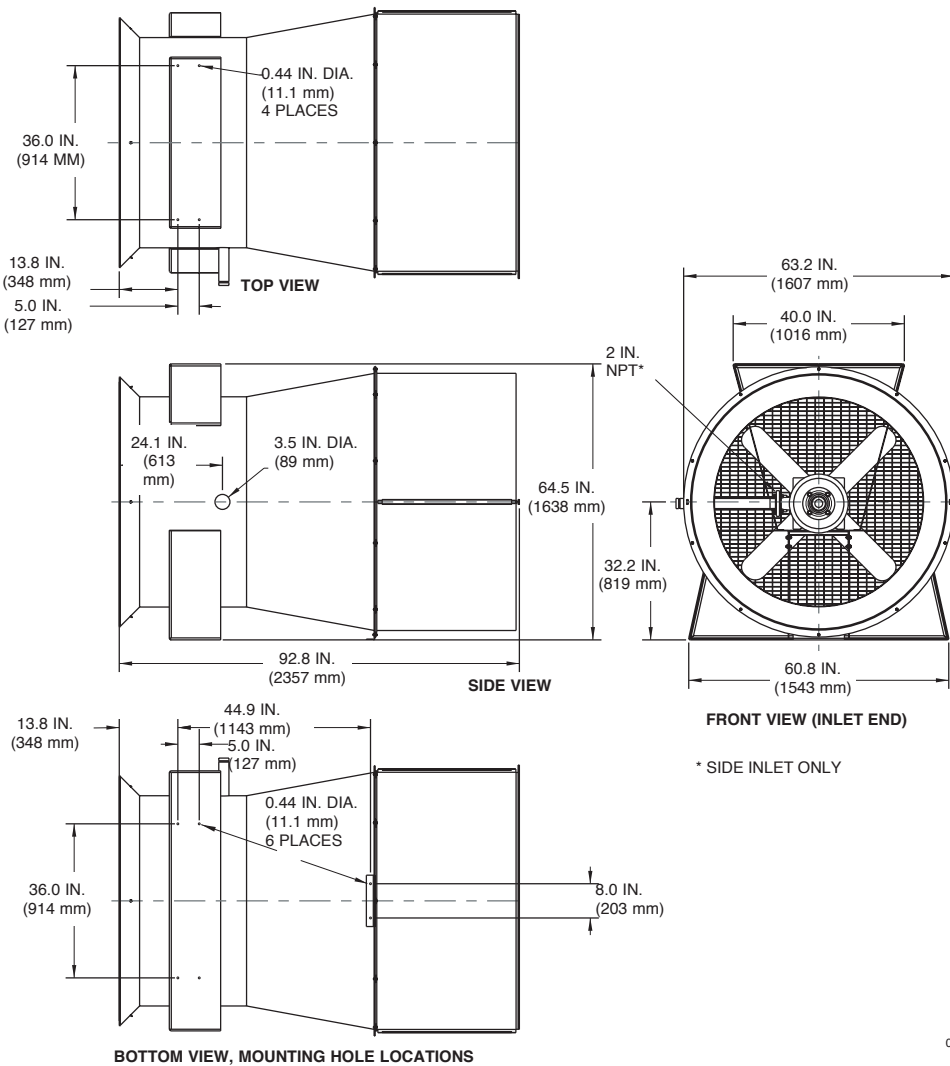
### Standard Models (Carbon Steel Construction)

Part Number	Generator Model	Weight		2% Approvals
		lb	(kg)	
438482	HIEX-5A	255	(116)	UL, FM, CE
438483	HIEX-15A	397	(180)	UL, FM, CE
438487	HIEX-27	720	(327)	UL, FM, CE

### LNG Models (Stainless Steel Construction)

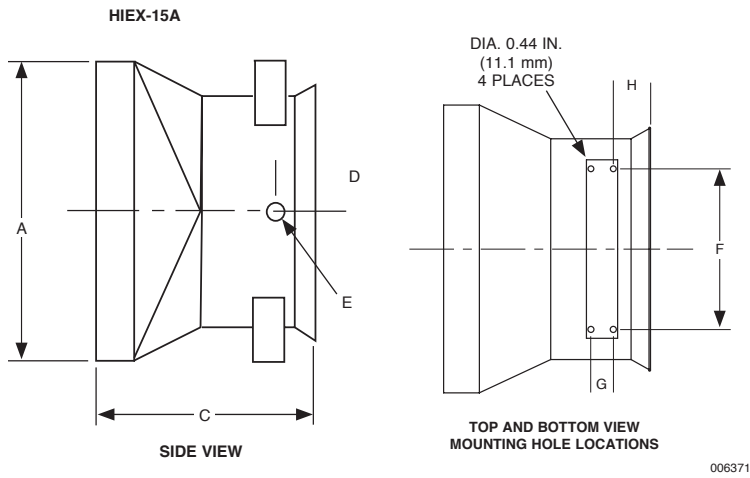
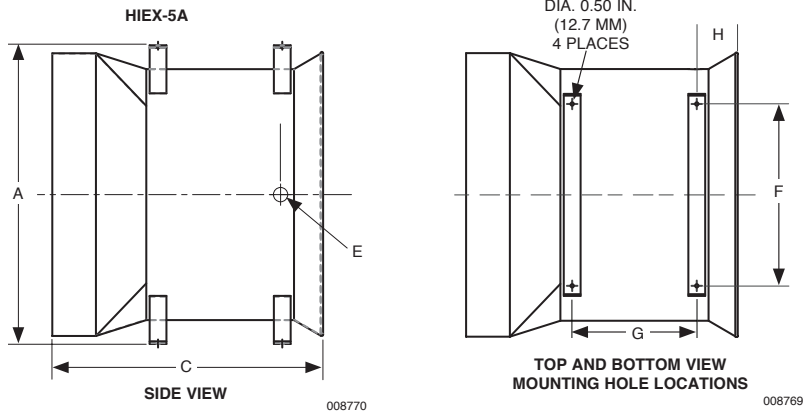
Part Number	Generator Model	Weight		2% Approvals
		lb	(kg)	
438489	HIEX-5A LNG	255	(116)	UL, FM, CE
438491	HIEX-15A LNG	398	(180)	UL, CE

## HIEX-27 Dimensions

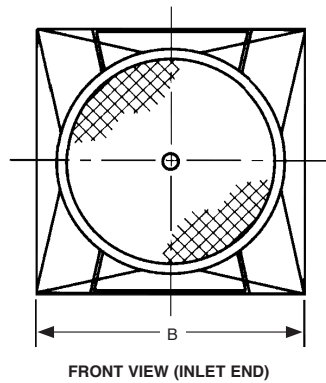


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# General Dimensions



ALL GENERATORS EXCEPT HIEX-27



Model	A		B		C		D		NPT - in.	F		G		H	
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)		in.	(mm)	in.	(mm)	in.	(mm)
HIEX-5A	44.5	(1130)	42.1	(1069)	40.3	(1024)	6.4	(154)	1.5	27.0	(686)	18.5	(470)	6.1	(156)
HIEX-15A	64.0	(1629)	64.0	(1629)	46.0	(1178)	8.5	(219)	2.0	36.0	(914)	5.0	(127)	8.0	(213)
HIEX-15A (LNG)	64.0	(1629)	64.0	(1629)	46.0	(1178)	8.5	(219)	2.0	36.0	(914)	5.0	(127)	8.0	(213)

**Note:** The converted values in this document are provided for dimensional reference only and do not reflect an actual measurement. SKUM, and the product names listed in this material are marks and/or registered marks. Unauthorized use is strictly prohibited.