

# CHEMGUARD High-Expansion Foam Generators

#### **Features**

- UL Listed and CE Marked
- LNG specific models available
- Water-powered so no electrical power is required
- Foam capacities of up to 27,552 cfm (780 cmm)

# Application

CHEMGUARD 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.

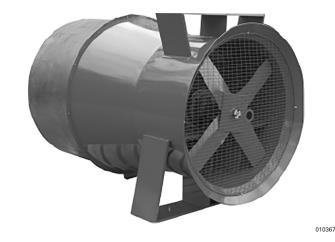
**Note:** High-expansion foam generators used in LNG applications typically require expansion ratios of approximately 500:1.

# Description

CHEMGUARD 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 CHEMGUARD C2 2% High-Expansion Foam Concentrate, these generators are capable of producing finished foam with expansion ratios from 332:1 up to 891:1, 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.



# **Approvals and Certifications**

#### **UL Listed**

CHEMGUARD High-Expansion Foam Generators are UL Listed for use with CHEMGUARD C2 2% High-Expansion Foam Concentrate.

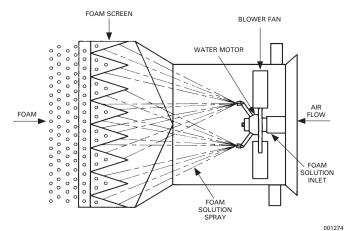
#### **CE Marked**

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

# **Operation and Maintenance**

Refer to the CHEMGUARD 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**

CHEMGUARD 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											
Model	Standard Models:	Standard Models:	LNG Models:	3000WP								
	CHX2000, CHX5000, CHX15000, CHX20000	00, 000, 000										
Housing	Galvanized Steel	Galvanized Steel		Carbon Steel								
Foam Screen	201, 302, or 304 SS	201, 302, or 304 SS	316 or 316L SS	304 SS								
Fan	Carbon Steel*	Carbon Steel*	Carbon Steel*	304 SS Blades, 302 SS Rivets, Zinc Plated Carbon Steel or 304 SS Hub								
Water Motor	Brass	Cast Iron/Bronze	Brass	Cast Iron/Bronze								
Nozzle(s)	Brass	Brass	Brass	Brass								

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

# **Performance Data**

UL Listed Performance (Chemguard C2 2%)											
Generator Model	Material	Part Number	Inlet Pressure		Flow	rate	Foam	Expansion			
			psi	bar	gpm	lpm	cfm	cmm	Ratio		
3000WP	Carbon	703603	40	2.8	57	216	2535	72	332		
	Steel		50	3.4	58	220	3120	88	400		
			60	4.1	60	227	3613	102	449		
			70	4.8	63	238	4014	114	478		
			80	5.5	67	254	4322	122	487		
			90	6.2	72	273	4538	128	476		
			100	6.9	78	295	4661	132	446		
CHX2000	Carbon	704775	40	2.8	32	121	1778	50	421		
	Steel		50	3.4	35	132	2134	60	456		
			60	4.1	38	144	2463	70	485		
CHX2000-SS-LNG	Stainless	704776	70	4.8	41	155	2666	75	485		
	Steel		80	5.5	44	167	2880	82	490		
			90	6.2	47	178	2955	84	475		
			100	6.9	50	189	3166	90	472		
CHX5000	Carbon	704777	40	2.8	55	208	4124	117	561		
	Steel		50	3.4	63	238	5547	157	659		
			60	4.1	68	257	6741	191	747		
CHX5000-SS-LNG	Stainless	704778	70	4.8	73	276	7452	211	761		
	Steel		80	5.5	80	303	8366	237	788		
			90	6.2	84	318	8133	230	729		
			100	6.9	87	329	8635	245	747		
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CHX15000	Carbon Steel	704779	40	2.8	106	401	9066	257	643		
	Jieer		50	3.4	123	466	12243	347	745		
			60	4.1	133	503	15779	447	891		
			70	4.8	144	545	16319	462	848		
			80	5.5	155	587	17945	508	869		
			90	6.2	163	617	18265	517	849		
CHX20000	Carbon	704780	40	2.8	195	738	11145	316	428		
	Steel		50	3.4	219	829	13702	388	468		
			60	4.1	237	897	15151	429	479		
CHX20000-SS-LNG	Stainless	704781	70	4.8	263	996	17558	497	499		
	Steel		80	5.5	273	1033	17989	509	494		
			90	6.2	293	1109	19161	543	490		
			100	6.9	314	1189	21095	597	503		
CHX27000	Carbon	704783	40	2.8	188	712	19459	551	774		
	Steel		50	3.4	205	776	23028	652	842		
			60	4.1	218	825	24819	703	850		
			70	4.8	234	886	26844	760	860		
			80	5.5	246	931	27080	767	823		
			90	6.2	263	996	27316	774	787		
			100	6.9	275	1041	27552	780	750		

 Notes: 1. Chemguard C2 2% concentrate should not be used for salt water applications.

 2. Chemguard C2 2% and C2-S 2% concentrates should not be mixed for normal system operation.

# 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 = Rate of Discharge in cfm
- V = Submergence Volume in ft<sup>3</sup>
- T = Submergence Time in minutes
- C<sub>N</sub> = Compensation for normal shrinkage (1.15, constant)
- $C_{L}$  = Compensation for leakage
  - 1.0, no leakage
  - 1.2, moderate leakage
- $R = (30,000 \text{ ft}^3 / 3 \text{ min}) \times 1.15 \times 1 = 10,000 \times 1.15 \times 1$ 
  - = 11,500 cfm required
- 11,500 cfm / 6,741 cfm per CHX5000 @ 60 psi = 1.71 generators

#### **Metric Calculation**

- $R = (850 \text{ m}^3 / 3 \text{ min}) \times 1.15 \times 1$ 
  - = 283.3 × 1.15 × 1
  - = 326 cmm required

326 cmm / 191 cmm per CHX5000 @ 4.1 bar

= 1.71 generators

Therefore, use two CHX5000 generators at 6,741 cfm (191 cmm) each.

# 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**

- $R = ([V/T] + R_s) \times C_N \times C_A^* \times C_L$
- R<sub>s</sub> = Rate of foam breakdown by sprinklers 10 cfm/gpm × sprinkler system discharge in gpm (0.075 cmm/Lpm × sprinkler discharge in Lpm)
- C<sub>N</sub> = Compensation for normal shrinkage (1.15 constant)
- $C_A^* = Compensation for inside air (1.20 constant)$
- C<sub>L</sub> = Leakage factor (not required for local application systems)
- $R = ([99,000 \text{ ft}^3 / 1 \text{ min}] + 8500 \text{ cfm}) \times 1.15$ 
  - = 107,500 × 1.15
  - = 123,625 cfm minimum required

123,625 cfm / 26,844 cfm per CHX27000 @ 70 psi = 4.61 generators

#### Metric Calculation

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

3501 cmm / 760 cmm per CHX27000 @ 4.8 bar = 4.61 generators

# Therefore, use five CHX27000 generators at 26,844 cfm (760 cmm) each.

\*Inside air may be used with AHJ approval. When using inside air, Johnson Controls recommends using the 20% compensation factor ( $C_A$ ) noted in the calculation for R. Contact Johnson Controls Technical Services with questions on use of inside air for high-expansion foam systems.

# **Ordering Information**

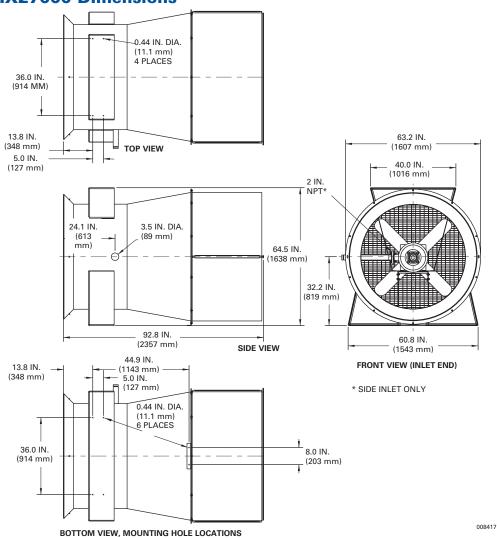
#### Standard Models (Carbon Steel Construction)

	We		
Generator Model	lb	(kg)	C2 2% Approvals
3000WP	115	(52)	UL, CE
CHX2000	73	(33)	UL, CE
CHX5000	255	(116)	UL, CE
CHX15000	397	(180)	UL, CE
CHX20000	398	(180)	UL, CE
CHX27000	720	(327)	UL, CE
	3000WP CHX2000 CHX5000 CHX15000 CHX20000	Generator Model         Ib           3000WP         115           CHX2000         73           CHX5000         255           CHX15000         397           CHX20000         398	3000WP         115         (52)           CHX2000         73         (33)           CHX5000         255         (116)           CHX15000         397         (180)           CHX20000         398         (180)

#### LNG Models (Stainless Steel Construction)

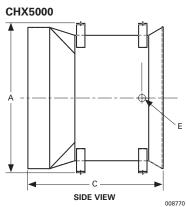
	Weight										
Part Number	Generator Model	lb	(kg)	Approvals							
704776	CHX2000-SS-LNG	73	33	UL, CE							
704778	CHX5000-SS-LNG	255	255	UL, CE							
704781	CHX20000-SS-LNG	398	180	UL, CE							

### **CHX27000 Dimensions**

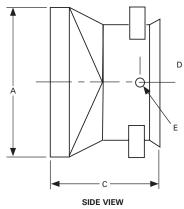


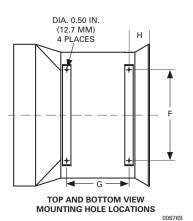
**Note:** The converted values in this document are provided for dimensional reference only and do not reflect an actual measurement. CHEMGUARD and the product names listed in this material are trademarks and/or registered trademarks. Unauthorized use is strictly prohibited.

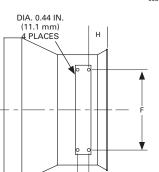
# **General Dimensions**



CHX2000, CHX15000, CHX20000

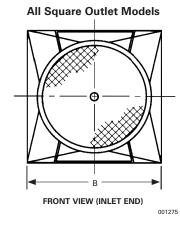






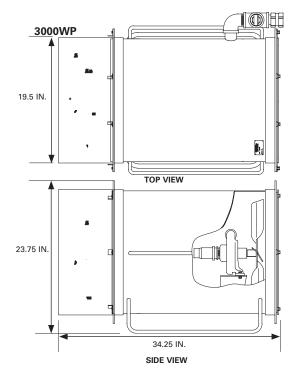
TOP AND BOTTOM VIEW MOUNTING HOLE LOCATIONS

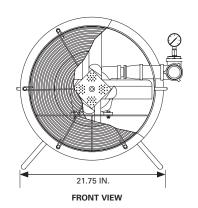
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	A		В		С		D		E	F		G		Н	
Model	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	NPT - in.	in.	(mm)	in.	(mm)	in.	(mm)
CHX2000	25.0	(635)	25.0	(635)	30.1	(764)	3.9	(99)	1.0	16.0	(406)	-	-	3.3	(83
CHX5000	44.5	(1130)	42.1	(1069)	40.3	(1024)	6.4	(154)	1.5	27.0	(686)	18.5	(470)	6.1	(156)
CHX15000	64.0	(1629)	64.0	(1629)	46.0	(1178)	8.5	(219)	2.0	36.0	(914)	5.0	(127)	8.0	(213)
CHX20000	64.0	(1629)	64.0	(1629)	46.0	(1178)	8.5	(219)	2.0	36.0	(914)	5.0	(127)	8.0	(213)

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