



Designed for Industrial Refrigeration Systems



**CRYO****flex**<sup>TM</sup>

Manufactured by:





***In 2002, one hundred fifty seven Illinois school children became ill within minutes of eating contaminated chicken. The food was contaminated during an ammonia leak at a cold storage facility. It was discovered that ammonia levels in the affected plant were up to 133 times the safe legal limits.***

Failing insulation may seem inevitable. Moisture entering the insulation system is not a question of if, but when and how much. Piping systems are typically the weak link in plant safety. Historically, refrigerant piping has been the system component involved with larger scale ammonia leaks making it a priority to address pipe insulation as part of the plant's mechanical integrity program.

Any area of piping exposed to condensation or temperature cycling is susceptible to corrosion, fatigue and leakage. Research has shown the cost of corrosion is estimated to be between \$10 and \$20 billion annually. Pipe corrosion also leads to unexpected plant and processing problems that erode the bottom line and cause:

- Capital equipment failure and replacement
- Unscheduled repairs
- Labor issues
- Accidents
- Food safety issues
- Unexpected production line shut downs

Do you know how much of your mechanical insulation is missing or damaged? It has been estimated that 10 – 30% of all mechanical insulation is missing or damaged. The reality is that repairs are quite rare and most insulation systems are not promptly repaired or replaced until there is an externally obvious failure of the insulation system.

Whether you need to repair, replace or install new pipe insulation, keep in mind these three key things in determining what mechanical insulation you should use:

1. Easy to install, maintain and repair correctly
2. Meets temperature requirements
3. Offers the industry's best protection against water vapor and moisture – and consequently, corrosion

Cryoflex, flexible closed-cell polyethylene insulation, is the new insulation solution for your piping systems.

## Why Use Cryoflex Polyethylene-based Insulation?

***Poly-eth-yl-ene: a polymer of ethylene; especially: any of various partially crystalline lightweight thermoplastics (CH<sub>2</sub>CH<sub>2</sub>)<sub>x</sub> that are resistant to chemicals and moisture, have good insulation properties, and are used especially in packaging and insulation. (Merriam-Webster)***

Cryoflex polyethylene insulation addresses the key concerns of the industrial refrigeration industry; with exceptionally low water absorption and water vapor permeability rates, Cryoflex acts as a second vapor barrier that helps prevent moisture from reaching the piping system and the resultant corrosion. Cryoflex has less than 1/30th the permeability and 1/10th the water absorption of extruded polystyrene and less than 1/80th the permeability and 1/14th the water absorption of polyisocyanurate insulation.

Polyethylene is a very versatile polymer. It is used in applications requiring resistance to moisture for applications ranging from swimming pool “noodles” to synthetic wine corks to containment booms for oil spills. It is also flexible and rugged, with high abuse uses ranging from roll cage padding to padding for outdoor playground equipment.

Cryoflex is also flexible. It is non-friable, making it highly resistant to damage during shipping, installation, service and inspection. There is no irritant dust from fabrication or field cutting. Cryoflex is easily removed and replaced, making inspections fast and easy, and maintaining the integrity of the insulation system.

Cryoflex offers excellent insulation value combined with industry best moisture and damage resistance, making Cryoflex polyethylene insulation the ideal choice for industrial refrigeration applications.



**CRYOFLEX™, a closed-cell polyethylene foam, is supplied in block, sheet, spiral-formed tube, and extruded tube forms. It is a new insulation solution for applications that require flexibility in a cold environment.**

**CRYOFLEX™ provides improved handling during installation and field fabrications using single seam clam shell application in standard pipe diameters.**

## APPLICATIONS

CRYOFLEX™ is used to insulate industrial refrigeration systems. Its flexible, small, closed-cells offer improved thermal conductivity and low moisture absorption and permeability. Designed for multilayered applications, CRYOFLEX™ provides the ability to build wall thicknesses to 6" while avoiding the waste generated from typical large block fabrications. It also reduces the number of longitudinal seams, therefore allowing fewer paths for water ingress.

CRYOFLEX™ has the highest moisture resistance of any insulation material designed for ammonia refrigeration applications. As the data in table 2 shows, CRYOFLEX™ absorbs significantly less water than polystyrene, polyisocyanurate or phenolic based insulation materials.

CRYOFLEX™ is clean and resilient. It will not crack and break during shipping,

installation or in service. CRYOFLEX™ is compatible with most thermo set resin adhesives, including vinyl esters and epoxies. Refer to the CRYOFLEX™ specification and installation guidelines for specific recommendations.

## PHYSICAL/CHEMICAL PROPERTIES

CRYOFLEX™ exhibits the properties and characteristics indicated in the physical properties table when tested as represented. A covering must be used to block ultraviolet radiation and prevent degradation. Other coverings to protect the foam from the elements and to meet applicable fire regulations may also be required.

## ENVIRONMENTAL DATA

CRYOFLEX™ is specifically formulated to provide excellent thermal insulation properties. CRYOFLEX™ manufacturing chemistry is designed for energy conservation and does not harm the earth's ozone layer.

## FIRE PROTECTION

Consideration should be given to the benefits of and the costs of additional fire protection gained by installing automatic fire detection, alarm and suppression systems.

Consultation with local building code officials, design engineers/specifiers or insurance personnel is recommended before application.

## FABRICATION/INSTALLATION

CRYOFLEX™ is easy to fabricate into various sizes and shapes to meet specific design needs. However, because of the critical technical design aspects of many of its applications, Nomaco Insulation recommends that qualified designers or consultants design the total system. Contact a local Nomaco Insulation representative for more specific instructions.

## TECHNICAL SERVICES

Nomaco Insulation can provide technical information to help address questions when using CRYOFLEX™. Technical personnel are available at 866-876-2684.



## SIZES AVAILABLE

	<i>Laminated Block</i>	<i>Sheet</i>
Thickness:	8" (20 cm)	1" (2.5 cm) and 2" (5 cm)
Width:	36" (91 cm)	36" (91 cm)
Length:	48" (122 cm)	48" (122 cm)

Pipe Cover  
 Wall thicknesses 1" (2.5cm) thru 6" (15.2 cm)  
 Standard IPS pipe diameters 1/2" (2.5 cm) thru 24" (61 cm)  
 Length 3 LFT (.9m)

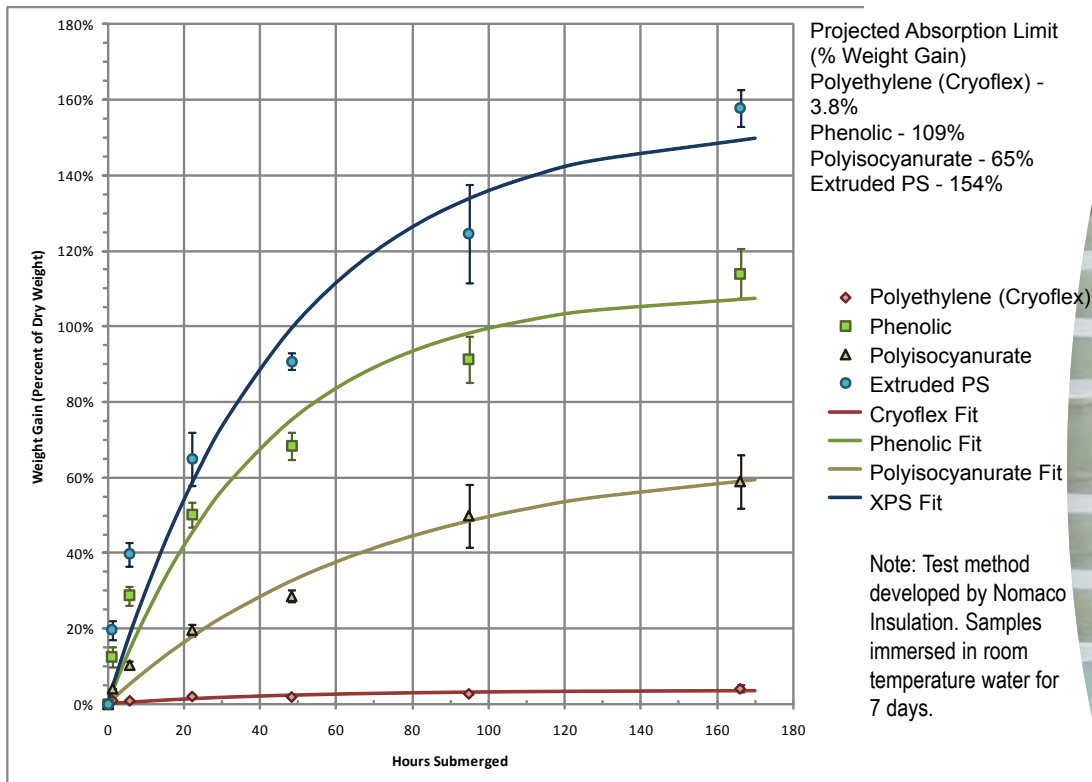
CRYOFLEX™ is distributed through a network of fabricators and distributors. For more information, call 866-876-2684 or visit [www.nomacoinsulation.com](http://www.nomacoinsulation.com).

# Product Data

**Table 1: PHYSICAL PROPERTIES**

Physical Properties	Nominal	ASTM Standard
Max. temp (°F)	200	C 1427
Min. temp (°F)	-200	C 1427
Density (lb/ft <sup>3</sup> )	1.9	D 1622
Density (kg/m <sup>3</sup> )	31.0	D 1622
pH	6 - 8	
Min Compression Resistance @ 10% Strain (psi)	6.0	D 3575
Thermal Conductivity (btu·in/hr·ft <sup>2</sup> ·°F)		C 518
@ 75	0.261	
@ 50	0.248	
@ -100	0.173	
Dimensional Change @ Max Temp for 24 hours	4%	C 356
Surface Burning Characteristics @ 1" Wall (flame/smoke)	35/115	E 84
Water Absorption by Volume		C 240
@ 2 Hrs	0.01%	
@ 24 Hrs	0.05%	
Water Vapor Transmission Rate (g/h/m <sup>2</sup> ) 1" thick @ 75°F, 50% RH	0.011	E 96
Water Vapor Permeability (grains/ft <sup>2</sup> ·hr·inHg)	0.048	E 96
Coefficient of Thermal Expansion (in/in·°F)	181.6 x 10 <sup>-6</sup>	E 228
Outside Dimensions	Complies	C 585

**Table 2: WATER ABSORPTION OF 12" x 12" x 1" FOAM INSULATION PANELS**



## INSULATION THICKNESS SCHEDULE - FOR REFRIGERATION SYSTEMS (OUTDOOR)

Insulation Thickness to Prevent Condensation or Limit Heat Gain to 8 btu/hr-ft<sup>2</sup>, whichever is Greater

Nominal Pipe Size (in)	Service Temperature, °F							
	-100	-80	-60	-40	-20	0	20	40
0.5	3.5	3.5	3	2.5	2.5	2.5	2	1.5
0.75	4	3.5	3.5	3	2.5	2.5	2	2
1	4	4	3.5	3.5	3	2.5	2	2
1.25	4.5	4	4	3.5	3	3	2.5	2
1.5	4.5	4	4	3.5	3	3	2.5	2
2	5	4	4	4	3.5	3	2.5	2
2.5	5	4.5	4	4	3.5	3	2.5	2
3	5.5	5	5	4.5	4	3.5	3	2.5
4	6	5.5	5	4.5	4	3.5	3	2.5
5	6.5	6	5.5	5	4.5	4	3.5	2.5
6	6.5	6	5.5	5	4.5	4	3.5	2.5
8	7	6.5	6	5.5	5	4	3.5	3
10	7.5	7	6.5	6	5.5	4.5	4	3
12	7.5	7	6.5	6	5	4.5	4	3
14	8	7.5	7	6	5.5	5	4	3
16	8	7.5	7	6.5	5.5	5	4	3.5
18	8	7.5	7	6.5	6	5	4	3.5
20	8.5	8	7	6.5	6	5	4	3.5
Tank Side	9	8	7.5	6.5	6	5	4	3
Tank Top	7.5	7	6.5	5.5	5	4	3.5	2.5
Tank Bottom	12	11	10	9	8	6.5	5.5	4

Assumptions: 1) 100°F Ambient 2) 97°F dew point 3) Horizontal orientation 4) 90% RH  
 Metal outer jacket 5) 7.5 mph wind speed  
 \* Thicknesses calculated per 3E Plus Program. No safety factor included.  
 Actual job site conditions may vary.

## INSULATION THICKNESS SCHEDULE - FOR REFRIGERATION SYSTEMS (INDOOR)

Insulation Thickness to Prevent Condensation or Limit Heat Gain to 8 btu/hr-ft<sup>2</sup>, whichever is Greater

Nominal Pipe Size (in)	Service Temperature, °F							
	-100	-80	-60	-40	-20	0	20	40
0.5	2.5	2.5	2.5	2	2	1.5	1.5	1
0.75	2.5	2.5	2.5	2.5	2	2	1.5	1
1	3	2.5	2.5	2.5	2	2	1.5	1.5
1.25	3	3	3	2.5	2	2	1.5	1.5
1.5	3	3	3	2.5	2	2	1.5	1.5
2	3.5	3	3	2.5	2.5	2	1.5	1.5
2.5	3.5	3	3	2.5	2.5	2	1.5	1.5
3	3.5	3.5	3	3	2.5	2	2	1.5
4	3.5	3.5	3	3	2.5	2.5	2	1.5
5	4	3.5	3.5	3	2.5	2.5	2	1.5
6	4	4	3.5	3	3	2.5	2	1.5
8	4.5	4	3.5	3.5	3	2.5	2	1.5
10	4.5	4	3.5	3.5	3	2.5	2	1.5
12	4.5	4	4	3.5	3	2.5	2	1.5
14	4.5	4	4	3.5	3	2.5	2	1.5
16	5	4.5	4	3.5	3	2.5	2.5	1.5
18	5	4.5	4	3.5	3	3	2.5	1.5
20	5	4.5	4	3.5	3.5	3	2.5	1.5
Tank Side	5.5	5	4.5	4	3.5	3	2.5	1.5
Tank Top	5.5	5	4.5	4	3.5	3	2.5	1.5
Tank Bottom	5.5	5	4.5	4	3.5	3	2.5	1.5

Assumptions: 1) 90°F Ambient 2) 80°F dew point 3) Horizontal orientation 4) 80% RH  
 Metal outer jacket 5) 0 mph wind speed  
 \* Thicknesses calculated per 3E Plus Program. No safety factor included.  
 Actual job site conditions may vary.

# CRYoflex™ Installations



Cryoflex has been installed in a national ice cream plant for over two years with no failures. The flexibility of Cryoflex paid off when the proximity of pipes required a little squeezing to get it in place at full thickness. Cryoflex is easy to cut and install, with no dusting typical of other insulations.



Cruz Acosta, President of Texoma Industrial Insulation, has been using and recommending Cryoflex for a variety of applications. *"Cryoflex is quick and easy to install. It is flexible, non-friable, and is resistant to physical damage,"* says Acosta. Cryoflex has the industry's lowest water absorption and water vapor transmission rates.



Cryoflex is available in block form for fabrication of fittings. PTF Insulation Fabricators, Denison, TX, says, *"Cryoflex is easy to work with and the fittings install perfectly."*



Nomaco Insulation performed destructive testing one year after installation to ensure the insulation is performing properly. Cryoflex can be cut (without breaking) and can easily be re-installed.



Cryoflex has also been installed in major poultry, dairy and cold storage facilities.

## About Nomaco Insulation

Established in 1979, Nomaco Insulation is one of the seven operating units of the Noël Group, a privately held organization of unicellular polymer foam manufacturing companies with more than 1,000 employees worldwide. Nomaco Insulation and its sister companies hold over 45 patents for synthetic foam products and processes worldwide.

Headquartered in Tarboro, N.C. and with production facilities in Tarboro and Oklahoma City, Nomaco Insulation is a global leader in polyethylene foam insulation products. Our products are used in residential, commercial and industrial applications. Our insulation brand names include Cryoflex, Nomaco, Imcoa, therma-cel and Arcticflex. Nomaco Insulation developed a unique manufacturing process (patent pending) that allows the factory fabrication of polyethylene insulation in pipe sizes up to 24" and wall thicknesses up to 6" when factory nested. It is this unique process that allows Cryoflex to be manufactured in the range of sizes demanded by the industrial refrigeration industry.

Nomaco Insulation is an active member of the International Institute of Ammonia Refrigeration (IIAR), Refrigeration Engineers and Technicians Association (RETA), the National Insulation Association (NIA), the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and ASTM International (formerly the American Society for Testing and Materials).



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