CryoMLI®101

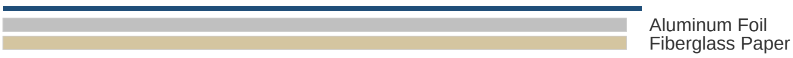
Introduction

CryoMLI® series from East Far are vacuum multilayer insulation materials designed to meet the requirements for storage and transportation of cryogenic media. The insulation structure is optimized with comprehensive evaluation of economy, reliability, space occupancy and construction convenience, minimizing heat ingress from convection, conduction and radiation.

All materials fully comply with GB/T 31480-2015, GB/T 31481-2015 (ISO 201010:2014), NB/T 47059-2017, GB/T 18443-2010, and ASME Boiler and Pressure Vessel Code Section VIII.

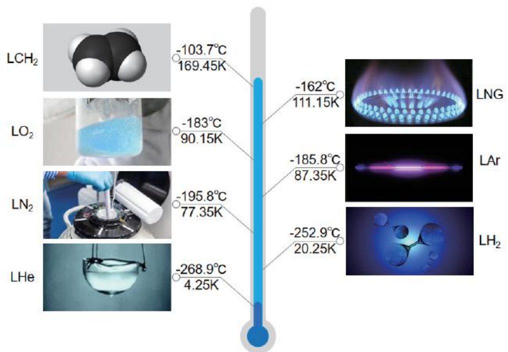
East Far offers CryoMLI®101, CryoMLI®102, CryoMLI®201, CryoMLI®202, CryoMLI®212, and CryoMLI®302. Depending upon the finished product's desired characteristics, these MLI are converted into different forms to fit different situations.

CryoMLI®101 Structure



Application

Cryogenic Liquids



Aerospace & Rocket

Application Market

- Spacecraft
- MRI
- Cylinders
- ISO containers
- Microbulk
- Dewar
- Semitrailer / Rail tanks
- Storage tanks
- Cryogenic transfer line
- Superconducting cables
- Nuclear fusion cryogenic modules

CryoMLI®101 Properties

- **Fire resistant, flame barrier**
- Low thermal conductivity / thermal insulating
- Suitable for temperatures down to 4K(-269°C)
- Easy to wrap, shape or cut
- Excellent chemical stability
- Exceptionally resistant to thermal shock
- Oxygen compatibility

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CryoMLI®101 Structure: Aluminum Foil + Fiberglass Paper

CryoMLI®101 Technical Data

Item	Unit	Technical Specification
Fiberglass Paper basis weight	g/m²	13 ±0.5
Fiberglass Paper thickness	mm	0.06 ±0.01
Fiberglass Paper moisture content	%	< 0.2
Fiberglass Paper loss on ignition	%	< 0.2
Fiberglass Paper thermal conductivity	W/(m·K)	< 0.029
Fiberglass Paper outgassing rate	Pa·m³/(s·g)	$< 1.0\times10^{-8}$
Aluminum foil basis weight	g/m²	17 ±1
Aluminum foil thickness	mm	0.0065
Aluminum foil emissivity	ε	0.028 (@87K, NASA GRC)
Thermal shrinkage rate (180°C, 30min)	%	≤ 0.5
Spacer Gas Permeability	-	Moderate (paper barrier, slower pump-down)
Tensile strength	kN/m	≥ 0.4
Apparent thermal conductivity	W/(m·K)	$< 9.14\times10^{-5}$
Leak outgassing rate	Pa·m³/(s·g)	$< 4.0\times10^{-9}$
Reference Heat Flux (40 layers, 78K-293K)	W/m²	~0.5 (ref: NASA C108, foil + paper)
Operating Vacuum Requirement	-	$< 1\times10^{-4}$ Torr (high vacuum) for rated performance
Appearance	-	Smooth surface, free of impurities
Standard Widths	mm	90 / 100 / 200 / 300 / 910 / 1310 / 1800
Maximum Production Width	mm	1800
Custom Width	-	Available (MOQ and surcharge apply)
Composite Layer Configurations	-	5/5, 10/10, 20/20 (mature); custom available
Recommended Layer Density	layers/mm	1.5 - 2.5
Roll Material — Max Layers	-	Up to 10/10
Shape Customization	-	Supported (vibration knife cutting)
Processing Capabilities	-	Rewinding, sewing, cutting, lamination
Production Method	-	Fully automated mechanical production
Application Temperature Range	-	4K(-269°C) - 623K(350°C)

Custom widths beyond standard options are subject to MOQ and additional processing fees. All CryoMLI® materials support custom shapes, dimensions, and layer counts. Mature composite configurations: 5/5, 10/10, 20/20 layers. Please contact East Far sales team to discuss customization requirements at sale@eastfarcorp.com

Note: Aluminum foil may generate standing waves under acoustic and vibrational modes within blanket geometry. NASA reports this characteristic as a reason aluminum foil is no longer used in spacecraft MLI applications. Source: NASA TFAWS — Multilayer Insulation for In-Space Cryogenic Applications (ntrs.nasa.gov/api/citations/20240010471). Cross-Temperature Performance: Below approximately 70K warm boundary temperature, solid conduction through spacer materials becomes the dominant heat transfer mechanism, surpassing radiation. MLI performance at ultra-low temperature differentials requires careful layer density optimization. Source: NASA/JPL CEC 2015.

CryoMLI®102

Introduction

CryoMLI® series from East Far are vacuum multilayer insulation materials designed to meet the requirements for storage and transportation of cryogenic media. The insulation structure is optimized with comprehensive evaluation of economy, reliability, space occupancy and construction convenience, minimizing heat ingress from convection, conduction and radiation.

All materials fully comply with GB/T 31480-2015, GB/T 31481-2015 (ISO 201010:2014), NB/T 47059-2017, GB/T 18443-2010, and ASME Boiler and Pressure Vessel Code Section VIII.

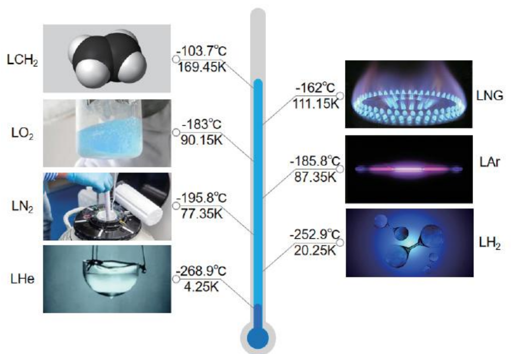
East Far offers CryoMLI®101, CryoMLI®102, CryoMLI®201, CryoMLI®202, CryoMLI®212, and CryoMLI®302. Depending upon the finished product's desired characteristics, these MLI are converted into different forms to fit different situations.

CryoMLI®102 Structure

Double-sided Aluminized PET (Mylar)
Fiberglass Paper

Application

Cryogenic Liquids



Aerospace & Rocket

Application Market

- Spacecraft
- MRI
- Cylinders
- ISO containers
- Microbulk
- Dewar
- Semitrailer / Rail tanks
- Storage tanks
- Cryogenic transfer line
- Superconducting cables
- Nuclear fusion cryogenic modules

CryoMLI®102 Properties

- Low thermal conductivity / thermal insulating
- Suitable for temperatures down to 4K(-269°C), thermal shock resistant up to 423K(150°C)
- Easy to wrap, shape or cut
- Excellent chemical stability
- Exceptionally resistant to thermal shock
- Ultra-low emissivity radiation shield

CryoMLI®102 Structure: Double-sided Aluminized PET (Mylar) + Fiberglass Paper

Double-sided Aluminized PET (Mylar)
Fiberglass Paper

CryoMLI®102 Technical Data

Item	Unit	Technical Specification
Fiberglass paper basis weight	g/m²	13 ±0.5
Fiberglass paper thickness	mm	0.06 ±0.01
Fiberglass paper moisture content	%	< 0.2
Fiberglass paper loss on ignition	%	< 0.2
Fiberglass paper thermal conductivity	W/(m·K)	< 0.029
Fiberglass paper outgassing rate	Pa·m³/(s·g)	$< 1.0\times10^{-8}$
Double-sided Aluminized PET (Mylar) basis weight	g/m²	17 ±1
Double-sided Aluminized PET (Mylar) thickness	mm	0.012
Double-sided Aluminized PET (Mylar) coating	Å	600Å+600Å
Double-sided Aluminized PET (Mylar) emissivity	ε	0.014 (@87K, NASA GRC)
Thermal shrinkage rate (180°C, 30min)	%	≤ 3.0
Spacer Gas Permeability	-	Moderate (paper barrier, slower pump-down)
Comprehensive tensile strength	MPa	≥ 190
Apparent thermal conductivity	W/(m·K)	$< 8.0\times10^{-5}$
Reference Heat Flux (40 layers, 78K-294K)	W/m²	0.66 (ref: NASA A126, DAM + paper)
Operating Vacuum Requirement	-	$< 1\times10^{-4}$ Torr (high vacuum) for rated performance
Standard Widths	mm	90 / 100 / 200 / 300 / 910 / 1310 / 1800
Maximum Production Width	mm	1800
Custom Width	-	Available (MOQ and surcharge apply)
Composite Layer Configurations	-	5/5, 10/10, 20/20 (mature); custom available
Recommended Layer Density	layers/mm	1.5 - 2.5
Roll Material — Max Layers	-	Up to 10/10
Shape Customization	-	Supported (vibration knife cutting)
Processing Capabilities	-	Rewinding, sewing, cutting, lamination
Production Method	-	Fully automated mechanical production
Application Temperature Range	-	4K(-269°C) - 393K(120°C)
Thermal Shock Resistance	-	Up to 423K(150°C)

Custom widths beyond standard options are subject to MOQ and additional processing fees. All CryoMLI® materials support custom shapes, dimensions, and layer counts. Mature composite configurations: 5/5, 10/10, 20/20 layers. Please contact East Far sales team to discuss customization requirements at sale@eastfarcorp.com

Emissivity Temperature Correlation: For double-sided aluminized PET (Mylar), emissivity varies with temperature per the Lockheed/NASA correlation: $\varepsilon \approx 6.8\times10^{-4} \times T^{0.67}$. *Reference values: 300K→0.031, 200K→0.023, 100K→0.014, 77K→0.012, 40K→0.0075, 20K→0.005. Source: NASA/JPL CEC 2015. Cross-Temperature Performance: Below approximately 70K warm boundary temperature, solid conduction through spacer materials becomes the dominant heat transfer mechanism, surpassing radiation. MLI performance at ultra-low temperature differentials requires careful layer density optimization. Source: NASA/JPL CEC 2015.*

CryoMLI®201

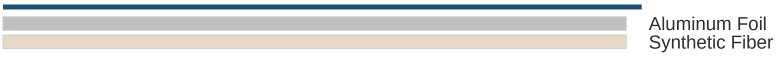
Introduction

CryoMLI® series from East Far are vacuum multilayer insulation materials designed to meet the requirements for storage and transportation of cryogenic media. The insulation structure is optimized with comprehensive evaluation of economy, reliability, space occupancy and construction convenience, minimizing heat ingress from convection, conduction and radiation.

All materials fully comply with GB/T 31480-2015, GB/T 31481-2015 (ISO 201010:2014), NB/T 47059-2017, GB/T 18443-2010, and ASME Boiler and Pressure Vessel Code Section VIII.

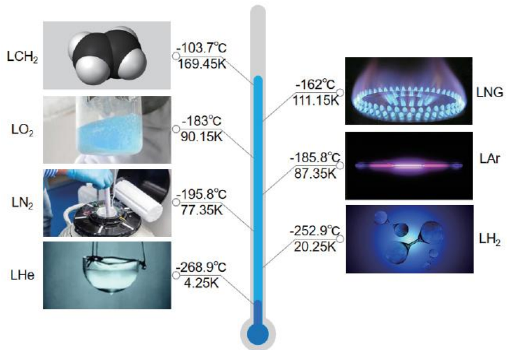
East Far offers CryoMLI®101, CryoMLI®102, CryoMLI®201, CryoMLI®202, CryoMLI®212, and CryoMLI®302. Depending upon the finished product's desired characteristics, these MLI are converted into different forms to fit different situations.

CryoMLI®201 Structure



Application

Cryogenic Liquids



Aerospace & Rocket

Application Market

- Dewar
- Storage tanks
- Cryogenic transfer line
- Cryogenic Valve Box / Cold Box
- Superconducting cables
- Nuclear fusion cryogenic modules

CryoMLI®201 Properties

- Special design for Liquid Nitrogen and Argon
- Low thermal conductivity / thermal insulating
- Suitable for temperatures down to 4K(-269°C)
- Easy to wrap, shape or cut
- Excellent chemical stability
- Exceptionally resistant to thermal shock

CryoMLI®201 Structure: Aluminum Foil + Synthetic Fiber

Aluminum Foil
Synthetic Fiber

CryoMLI®201 Technical Data

Item	Unit	Technical Specification
Synthetic Fiber basis weight	g/m²	15 ±1
Synthetic Fiber thickness	mm	0.08 ±0.01
Synthetic Fiber thermal conductivity	W/(m·K)	< 0.032
Synthetic Fiber moisture content	%	< 10
Synthetic Fiber loss on ignition	%	< 0.3
Aluminum foil basis weight	g/m²	17 ±1
Aluminum foil thickness	mm	0.0065
Aluminum foil emissivity	ε	0.028 (@87K, NASA GRC)
Thermal shrinkage rate (180°C, 30min)	%	≤ 3.0
Spacer Gas Permeability	-	Moderate (fiber mat, moderate pump-down)
Comprehensive tensile strength	MPa	≥ 190
Apparent thermal conductivity	W/(m·K)	$< 1.22\times10^{-4}$
Leak outgassing rate	Pa·m³/(s·g)	$< 2.8\times10^{-7}$
Reference Heat Flux (20 layers, 78K-293K)	W/m²	~1.0 (est., ref: NASA C116, foil + polyester fabric)
Operating Vacuum Requirement	-	$< 1\times10^{-4}$ Torr (high vacuum) for rated performance
Appearance	-	Smooth surface, free of impurities
Standard Widths	mm	90 / 100 / 200 / 300 / 910 / 1310 / 1800
Maximum Production Width	mm	1800
Custom Width	-	Available (MOQ and surcharge apply)
Composite Layer Configurations	-	5/5, 10/10, 20/20 (mature); custom available
Recommended Layer Density	layers/mm	1.0 - 2.0
Roll Material — Max Layers	-	Up to 10/10
Shape Customization	-	Supported (vibration knife cutting)
Processing Capabilities	-	Rewinding, sewing, cutting, lamination
Production Method	-	Fully automated mechanical production
Application Temperature Range	-	4K(-269°C) - 423K(150°C)

Custom widths beyond standard options are subject to MOQ and additional processing fees. All CryoMLI® materials support custom shapes, dimensions, and layer counts. Mature composite configurations: 5/5, 10/10, 20/20 layers. Please contact East Far sales team to discuss customization requirements at sale@eastfarcorp.com

Note: Aluminum foil may generate standing waves under acoustic and vibrational modes within blanket geometry. NASA reports this characteristic as a reason aluminum foil is no longer used in spacecraft MLI applications. Source: NASA TFAWS — Multilayer Insulation for In-Space Cryogenic Applications (ntrs.nasa.gov/api/citations/20240010471). Cross-Temperature Performance: Below approximately 70K warm boundary temperature, solid conduction through spacer materials becomes the dominant heat transfer mechanism, surpassing radiation. MLI performance at ultra-low temperature differentials requires careful layer density optimization. Source: NASA/JPL CEC 2015.

CryoMLI®202

Introduction

CryoMLI® series from East Far are vacuum multilayer insulation materials designed to meet the requirements for storage and transportation of cryogenic media. The insulation structure is optimized with comprehensive evaluation of economy, reliability, space occupancy and construction convenience, minimizing heat ingress from convection, conduction and radiation.

All materials fully comply with GB/T 31480-2015, GB/T 31481-2015 (ISO 201010:2014), NB/T 47059-2017, GB/T 18443-2010, and ASME Boiler and Pressure Vessel Code Section VIII.

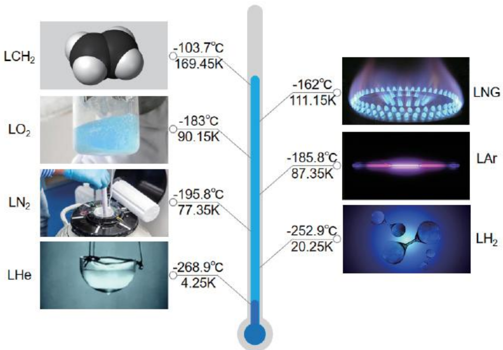
East Far offers CryoMLI®101, CryoMLI®102, CryoMLI®201, CryoMLI®202, CryoMLI®212, and CryoMLI®302. Depending upon the finished product's desired characteristics, these MLI are converted into different forms to fit different situations.

CryoMLI®202 Structure

Double-sided Aluminized PET (Mylar)
Synthetic Fiber Paper

Application

Cryogenic Liquids



Aerospace & Rocket

Application Market

- Spacecraft
- MRI
- Cylinders
- Dewar
- Cryogenic transfer line
- Cryogenic Valve Box / Cold Box
- Superconducting cables
- Nuclear fusion cryogenic modules

CryoMLI®202 Properties

- Special design for Liquid Nitrogen and Argon
- Low thermal conductivity / thermal insulating
- Suitable for temperatures down to 4K(-269°C), thermal shock resistant up to 423K(150°C)
- Easy to wrap, shape or cut
- Excellent chemical stability
- Exceptionally resistant to thermal shock

CryoMLI®202 Structure: Double-sided Aluminized PET (Mylar) + Synthetic Fiber Paper

Double-sided Aluminized PET (Mylar)
Synthetic Fiber Paper

CryoMLI®202 Technical Data

Item	Unit	Technical Specification
Synthetic Fiber Paper basis weight	g/m²	15 ±1
Synthetic Fiber Paper thickness	mm	0.08 ±0.01
Synthetic Fiber Paper thermal conductivity	W/(m·K)	< 0.032
Synthetic Fiber Paper moisture content	%	< 10
Synthetic Fiber Paper loss on ignition	%	< 0.3
Double-sided Aluminized PET (Mylar) basis weight	g/m²	17 ±1
Double-sided Aluminized PET (Mylar) thickness	mm	0.012
Double-sided Aluminized PET (Mylar) coating	Å	600Å+600Å
Double-sided Aluminized PET (Mylar) emissivity	ε	0.014 (@87K, NASA GRC)
Thermal shrinkage rate (180°C, 30min)	%	≤ 3.0
Spacer Gas Permeability	-	Moderate (fiber mat, moderate pump-down)
Comprehensive tensile strength	MPa	≥ 190
Apparent thermal conductivity	W/(m·K)	$< 1.22\times10^{-4}$
Leak outgassing rate	Pa·m³/(s·g)	$< 2.8\times10^{-7}$
Reference Heat Flux (40 layers, 78K-294K)	W/m²	~0.7 (est., ref: NASA A126, DAM + paper)
Operating Vacuum Requirement	-	$< 1\times10^{-4}$ Torr (high vacuum) for rated performance
Appearance	-	Smooth surface, free of impurities
Standard Widths	mm	90 / 100 / 200 / 300 / 910 / 1310 / 1800 / 2000
Maximum Production Width	mm	2160
Custom Width	-	Available (MOQ and surcharge apply)
Composite Layer Configurations	-	5/5, 10/10, 20/20 (mature); custom available
Recommended Layer Density	layers/mm	1.0 - 2.0
Roll Material — Max Layers	-	Up to 10/10
Shape Customization	-	Supported (vibration knife cutting)
Processing Capabilities	-	Rewinding, sewing, cutting, lamination
Production Method	-	Fully automated mechanical production
Application Temperature Range	-	4K(-269°C) - 393K(120°C)
Thermal Shock Resistance	-	Up to 423K(150°C)

Custom widths beyond standard options are subject to MOQ and additional processing fees. All CryoMLI® materials support custom shapes, dimensions, and layer counts. Mature composite configurations: 5/5, 10/10, 20/20 layers. Please contact East Far sales team to discuss customization requirements at sale@eastfarcorp.com

Emissivity Temperature Correlation: For double-sided aluminized PET (Mylar), emissivity varies with temperature per the Lockheed/NASA correlation: $\varepsilon \approx 6.8\times10^{-4} \times T^{0.67}$. *Reference values: 300K→0.031, 200K→0.023, 100K→0.014, 77K→0.012, 40K→0.0075, 20K→0.005. Source: NASA/JPL CEC 2015. Cross-Temperature Performance: Below approximately 70K warm boundary temperature, solid conduction through spacer materials becomes the dominant heat transfer mechanism, surpassing radiation. MLI performance at ultra-low temperature differentials requires careful layer density optimization. Source: NASA/JPL CEC 2015.*

CryoMLI®212

Introduction

CryoMLI® series from East Far are vacuum multilayer insulation materials designed to meet the requirements for storage and transportation of cryogenic media. The insulation structure is optimized with comprehensive evaluation of economy, reliability, space occupancy and construction convenience, minimizing heat ingress from convection, conduction and radiation.

All materials fully comply with GB/T 31480-2015, GB/T 31481-2015 (ISO 201010:2014), NB/T 47059-2017, GB/T 18443-2010, and ASME Boiler and Pressure Vessel Code Section VIII.

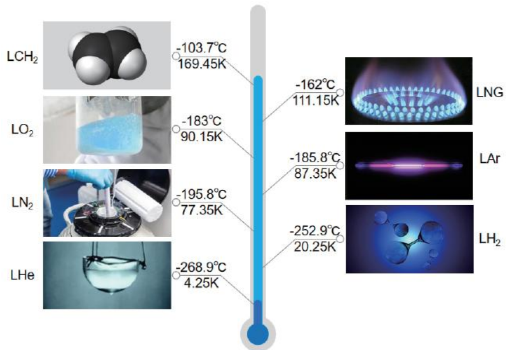
East Far offers CryoMLI®101, CryoMLI®102, CryoMLI®201, CryoMLI®202, CryoMLI®212, and CryoMLI®302. Depending upon the finished product's desired characteristics, these MLI are converted into different forms to fit different situations.

CryoMLI®212 Structure

Double-sided Aluminized PET (Mylar)
Non-woven Fabric (Polyester)

Application

Cryogenic Liquids



Aerospace & Rocket

Application Market

- Spacecraft
- MRI
- Cylinders
- Dewar
- Cryogenic transfer line
- Cryogenic Valve Box / Cold Box
- Superconducting cables
- Nuclear fusion cryogenic modules

CryoMLI®212 Properties

- Special design for Liquid Nitrogen and Argon
- Low thermal conductivity / thermal insulating
- Suitable for temperatures down to 4K(-269°C), thermal shock resistant up to 423K(150°C)
- Easy to wrap, shape or cut
- Excellent chemical stability
- Exceptionally resistant to thermal shock

CryoMLI®212 Structure: Double-sided Aluminized PET (Mylar) + Non-woven Fabric (Polyester)

Double-sided Aluminized PET (Mylar)
Non-woven Fabric (Polyester)

CryoMLI®212 Technical Data

Item	Unit	Technical Specification
Non-woven Fabric (Polyester) basis weight	g/m²	15 ±1
Non-woven Fabric (Polyester) thickness	mm	0.08 ±0.01
Non-woven Fabric (Polyester) thermal conductivity	W/(m·K)	< 0.032
Non-woven Fabric (Polyester) moisture content	%	< 10
Non-woven Fabric (Polyester) loss on ignition	%	< 0.3
Double-sided Aluminized PET (Mylar) basis weight	g/m²	17 ±1
Double-sided Aluminized PET (Mylar) thickness	mm	0.012
Double-sided Aluminized PET (Mylar) coating	Å	600Å+600Å
Double-sided Aluminized PET (Mylar) emissivity	ε	0.014 (@87K, NASA GRC)
Thermal shrinkage rate (180°C, 30min)	%	≤ 3.0
Spacer Gas Permeability	-	Moderate-High (non-woven structure, better pump-down)
Comprehensive tensile strength	MPa	≥ 190
Apparent thermal conductivity	W/(m·K)	$< 1.22\times10^{-4}$
Leak outgassing rate	Pa·m³/(s·g)	$< 2.8\times10^{-7}$
Reference Heat Flux (40 layers, 78K-293K)	W/m²	~0.5 (est., ref: NASA Cryolam, DAM + non-woven polyester)
Operating Vacuum Requirement	-	$< 1\times10^{-4}$ Torr (high vacuum) for rated performance
Appearance	-	Smooth surface, free of impurities
Standard Widths	mm	90 / 100 / 200 / 300 / 910 / 1310 / 1800 / 2000
Maximum Production Width	mm	2160
Custom Width	-	Available (MOQ and surcharge apply)
Composite Layer Configurations	-	5/5, 10/10, 20/20 (mature); custom available
Recommended Layer Density	layers/mm	1.0 - 2.0
Roll Material — Max Layers	-	Up to 10/10
Shape Customization	-	Supported (vibration knife cutting)
Processing Capabilities	-	Rewinding, sewing, cutting, lamination
Production Method	-	Fully automated mechanical production
Application Temperature Range	-	4K(-269°C) - 393K(120°C)
Thermal Shock Resistance	-	Up to 423K(150°C)

Custom widths beyond standard options are subject to MOQ and additional processing fees. All CryoMLI® materials support custom shapes, dimensions, and layer counts. Mature composite configurations: 5/5, 10/10, 20/20 layers. Please contact East Far sales team to discuss customization requirements at sale@eastfarcorp.com

Emissivity Temperature Correlation: For double-sided aluminized PET (Mylar), emissivity varies with temperature per the Lockheed/NASA correlation: $\varepsilon \approx 6.8\times10^{-4} \times T^{0.67}$*. Reference values: 300K→0.031, 200K→0.023, 100K→0.014, 77K→0.012, 40K→0.0075, 20K→0.005. Source: NASA/JPL CEC 2015. Cross-Temperature Performance: Below approximately 70K warm boundary temperature, solid conduction through spacer materials becomes the dominant heat transfer mechanism, surpassing radiation. MLI performance at ultra-low temperature differentials requires careful layer density optimization. Source: NASA/JPL CEC 2015.*

CryoMLI®302

Introduction

CryoMLI® series from East Far are vacuum multilayer insulation materials designed to meet the requirements for storage and transportation of cryogenic media. The insulation structure is optimized with comprehensive evaluation of economy, reliability, space occupancy and construction convenience, minimizing heat ingress from convection, conduction and radiation.

All materials fully comply with GB/T 31480-2015, GB/T 31481-2015 (ISO 201010:2014), NB/T 47059-2017, GB/T 18443-2010, and ASME Boiler and Pressure Vessel Code Section VIII.

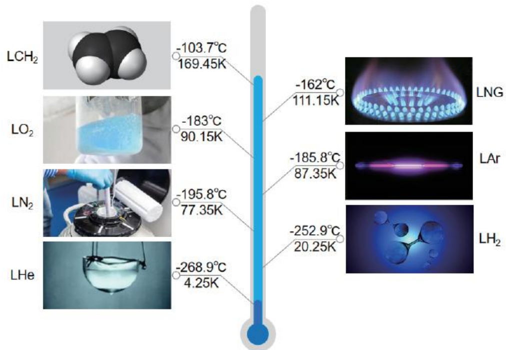
East Far offers CryoMLI®101, CryoMLI®102, CryoMLI®201, CryoMLI®202, CryoMLI®212, and CryoMLI®302. Depending upon the finished product's desired characteristics, these MLI are converted into different forms to fit different situations.

CryoMLI®302 Structure

Double-sided Aluminized PET (Mylar)
Synthetic Fiber Net

Application

Cryogenic Liquids



Aerospace & Rocket

Application Market

- Spacecraft
- MRI
- Cylinders
- ISO containers
- Dewar
- Cryogenic transfer line
- Cryogenic Valve Box / Cold Box
- Superconducting cables
- Nuclear fusion cryogenic modules

CryoMLI®302 Properties

- Better performance than CryoMLI®101 composite type
- Low thermal conductivity / thermal insulating
- Suitable for temperatures down to 4K(-269°C), thermal shock resistant up to 423K(150°C)
- Easy to wrap, shape or cut
- Excellent chemical stability
- Exceptionally resistant to thermal shock
- Special design for frontiers science

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CryoMLI®302 Structure: Double-sided Aluminized PET (Mylar) + Synthetic Fiber Net

Double-sided Aluminized PET (Mylar)
Synthetic Fiber Net

CryoMLI®302 Technical Data

Item	Unit	Technical Specification
Synthetic fiber net basis weight	g/m²	15 ±1
Synthetic fiber net thickness	mm	0.12 ±0.02
Synthetic fiber net moisture content	%	< 0.2
Synthetic fiber net thermal conductivity	W/(m·K)	< 0.336
Synthetic fiber net outgassing rate	Pa·m³/(s·g)	< 3.5×10^{-7}
Double-sided Aluminized PET (Mylar) basis weight	g/m²	17 ±1
Double-sided Aluminized PET (Mylar) thickness	mm	0.012
Double-sided Aluminized PET (Mylar) coating	Å	600Å+600Å
Double-sided Aluminized PET (Mylar) emissivity	ε	0.014 (@87K, NASA GRC)
Thermal shrinkage rate (180°C, 30min)	%	≤ 3.0
Spacer Gas Permeability	-	High (open mesh structure, efficient vacuum pumping)
Comprehensive tensile strength	MPa	≥ 190
Apparent thermal conductivity	W/(m·K)	< 8.17×10^{-5}
Outgassing rate	Pa·m³/(s·g)	< 2.8×10^{-7}
Reference Heat Flux (40 layers, 78K-305K)	W/m²	0.38 (NASA A139, DAM + Dacron net); 0.26 (60 layers, NASA A138)
Operating Vacuum Requirement	-	< 1×10^{-4} Torr (high vacuum) for rated performance
Appearance	-	Smooth surface, free of impurities
Standard Widths	mm	90 / 100 / 200 / 300 / 910 / 1310 / 1800 / 2000
Maximum Production Width	mm	2160
Custom Width	-	Available (MOQ and surcharge apply)
Composite Layer Configurations	-	5/5, 10/10, 20/20 (mature); custom available
Recommended Layer Density	layers/mm	0.8 - 1.5
Roll Material — Max Layers	-	Up to 10/10
Shape Customization	-	Supported (vibration knife cutting)
Processing Capabilities	-	Rewinding, sewing, cutting, lamination
Production Method	-	Fully automated mechanical production
Application Temperature Range	-	4K(-269°C) - 393K(120°C)
Thermal Shock Resistance	-	Up to 423K(150°C)

Custom widths beyond standard options are subject to MOQ and additional processing fees. All CryoMLI® materials support custom shapes, dimensions, and layer counts. Mature composite configurations: 5/5, 10/10, 20/20 layers. Please contact East Far sales team to discuss customization requirements at sale@eastfarcorp.com

Emissivity Temperature Correlation: For double-sided aluminized PET (Mylar), emissivity varies with temperature per the Lockheed/NASA correlation: $\varepsilon \approx 6.8\times10^{-4} \times T^{0.67}$*. Reference values: 300K→0.031, 200K→0.023, 100K→0.014, 77K→0.012, 40K→0.0075, 20K→0.005. Source: NASA/JPL CEC 2015. Cross-Temperature Performance: Below approximately 70K warm boundary temperature, solid conduction through spacer materials becomes the dominant heat transfer mechanism, surpassing radiation. MLI performance at ultra-low temperature differentials requires careful layer density optimization. Source: NASA/JPL CEC 2015.*

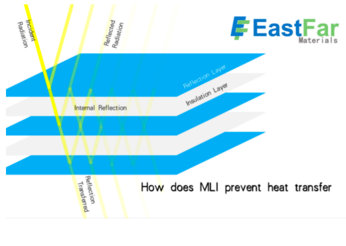
CryoMLI® VDMix

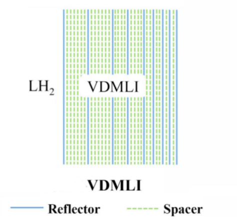
Introduction

CryoMLI® series from East Far are vacuum multilayer insulation materials designed to meet the requirements for storage and transportation of cryogenic media. The insulation structure is optimized with comprehensive evaluation of economy, reliability, space occupancy and construction convenience, minimizing heat ingress from convection, conduction and radiation.

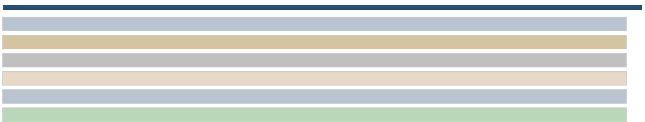
All materials fully comply with GB/T 31480-2015, GB/T 31481-2015 (ISO 201010:2014), NB/T 47059-2017, GB/T 18443-2010, and ASME Boiler and Pressure Vessel Code Section VIII.

East Far offers CryoMLI®101, CryoMLI®102, CryoMLI®201, CryoMLI®202, CryoMLI®212, and CryoMLI®302. Depending upon the finished product's desired characteristics, these MLI are converted into different forms to fit different situations.





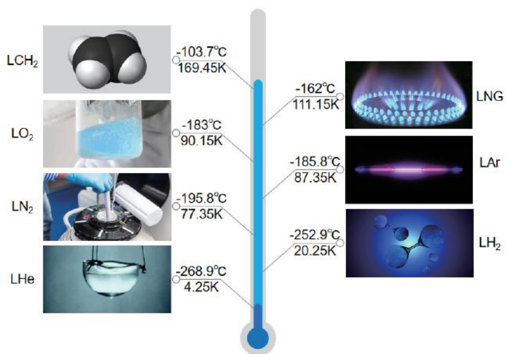
CryoMLI® VDMix Structure



Reflector (Cold Side, Lower Density)
Spacer (Cold Side)
Reflector (Transition)
Spacer (Transition)
Reflector (Hot Side, Higher Density)
Spacer (Hot Side)

Application

Cryogenic Liquids



Aerospace & Rocket

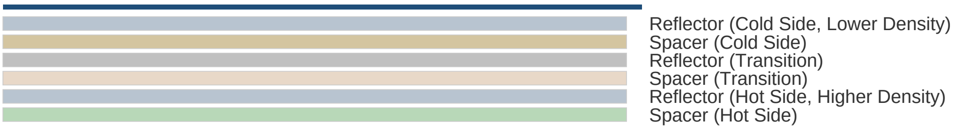
Application Market

- Liquid Hydrogen (LH2) applications
- Liquid Helium (LHe) applications
- Ultra-low temperature research
- Spacecraft and launch vehicles
- Superconducting cable systems
- Nuclear fusion cryogenic modules
- Custom cryogenic vessels
- Specialized industrial cryogenic systems

CryoMLI® VDMix Properties

- Variable density layer configuration for optimized thermal performance
- Lower density on cold side, higher density on hot side for optimized thermal performance
- Custom layer density based on application requirements
- Custom shapes via vibration knife cutting machine
- Tailored dimensions, shapes, and layer counts
- Suitable for ultra-low temperature scenarios below 4K
- Compatible with all CryoMLI® base materials

CryoMLI® VDMix Structure: Variable Density MLI — Custom Composite



CryoMLI® VDMix Technical Data

Item	Unit	Technical Specification
Product Type	-	Variable Density MLI (Custom Composite)
Base Materials	-	CryoMLI® 101 / 102 / 201 / 202 / 212 / 302
Layer Density — Cold Side	layers	Custom (lower density, optimized for conduction reduction)
Layer Density — Hot Side	layers	Custom (higher density, optimized for radiation shielding)
Material Differentiation	-	Different reflector/spacer combinations per side
Standard Widths	mm	90 / 100 / 200 / 300 / 910 / 1310 / 1800 / 2000
Maximum Production Width	mm	2160
Custom Width	-	Available (MOQ and surcharge apply)
Composite Layer Configurations	-	5/5, 10/10, 20/20 (mature); custom available
Roll Material — Max Layers	-	Up to 10/10
Custom Shape Cutting	-	Vibration knife cutting machine
Custom Dimensions	-	Per customer specification
Custom Layer Count	layers	Per customer specification
Processing Capabilities	-	Rewinding, sewing, cutting, lamination
Production Method	-	Fully automated mechanical production
Min Application Temperature	K	Below 4K (custom configurations)
Standards Compliance	-	GB/T 31480-2015, ASME BPVC Section VIII
Production Lead Time	-	Subject to customization scope
Operating Vacuum Requirement	-	< 1×10^{-4} Torr (high vacuum) for rated performance
Recommended Layer Density	layers/mm	Variable (optimized per application)
Reference Heat Flux	W/m²	Custom (dependent on material combination and layer density)

Custom widths beyond standard options are subject to MOQ and additional processing fees. All CryoMLI® materials support custom shapes, dimensions, and layer counts. Mature composite configurations: 5/5, 10/10, 20/20 layers. Please contact East Far sales team to discuss customization requirements at sale@eastfarcorp.com

Spacer Material Comparison (NASA tested): Silk Netting — lowest conductivity, high cost, historical spacecraft standard; Polyester/Dacron Net — low conductivity, high gas permeability, contemporary spacecraft standard; Fiberglass Paper — moderate conductivity, moderate permeability, industrial benchmark; Non-woven Polyester — moderate conductivity, moderate-high permeability; Tissue Paper — highest conductivity, low cost. Source: NASA TFAWS — Multilayer Insulation for In-Space Cryogenic Applications (ntrs.nasa.gov/api/citations/20240010471).