



4Ts of Cold Chain:

Technology,
racking,
temperature-Controlled **T**ransportation

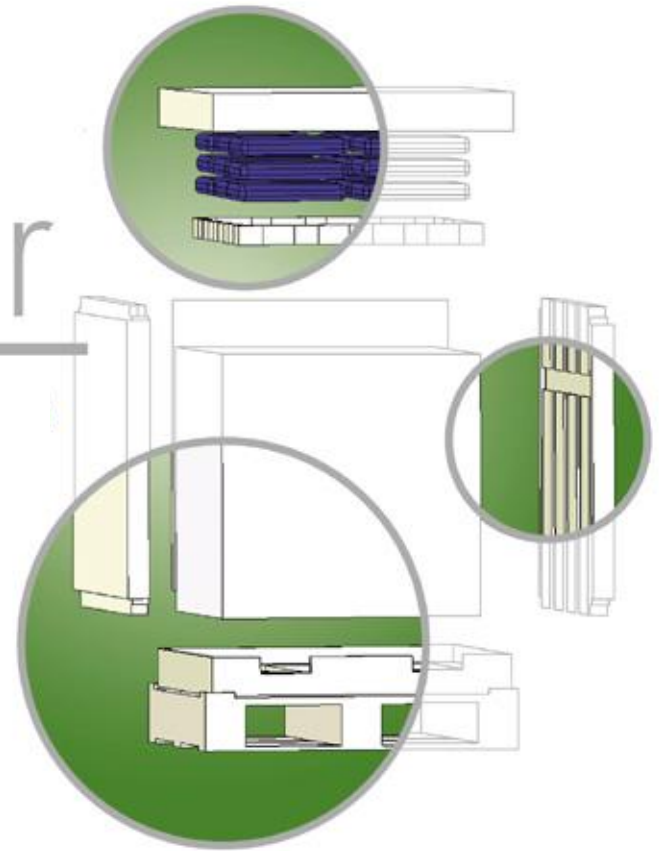
Session Introduction: 4 T's of Cold Chain

4 Best Practice Presentations by Industry Leaders:

1. A Platform Approach to Temperature Assurance Packaging - Rod Derifield, President – EnviroCooler LLC
2. A Practical Approach to the use of MKT in trailer validation - Gary Hutchinson, Director, Global Transportation – Amgen.
3. Advances in Temperature Monitoring RFID Technology - Jim Cox, CEO – TempTRIP.
4. Developing Temperature Controlled Environmental Test Standards - Ed Church, Executive Director – ISTA:

Session Conclusion: Questions & Answers

EnviroCooler



Scalable Product Platforms: A Cost-Effective Solutions Approach

EnviroCooler Confidential



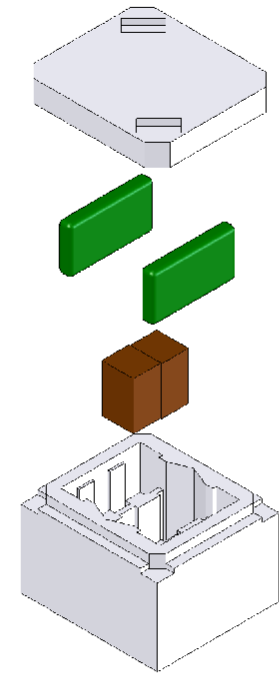
Designs and Manufactures Scalable, Passive, Environmentally- and Cost-conscious Solution Platforms for the safe transportation of Biologic Temperature-Sensitive-Products (TSPs) domestically and internationally.

Designing with Purpose- A Platform Approach

- **Design:** EnviroCooler LLC's design innovations result directly from the application of the scientific principles of thermodynamics to the challenges organizations face when transporting temperature-sensitive-products safely and compliantly around the world.
- **Platform:** EnviroCooler LLC provides a platform approach to design across multiple global supply sources, mitigating your risk by assuring consistency and continuity of product globally, and allowing you to grow, re-align and respond quickly to unexpected business requirements.
- **Scalability:** Because our products are designed by the application of scientific principles, they are scalable to perform at larger or smaller scale.

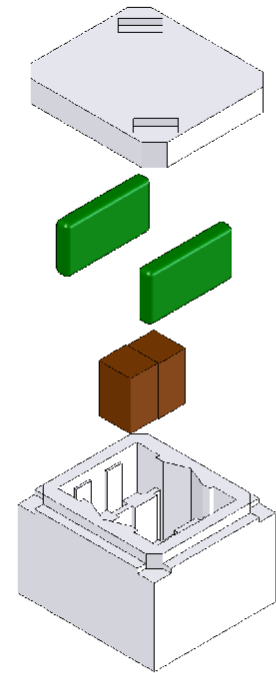
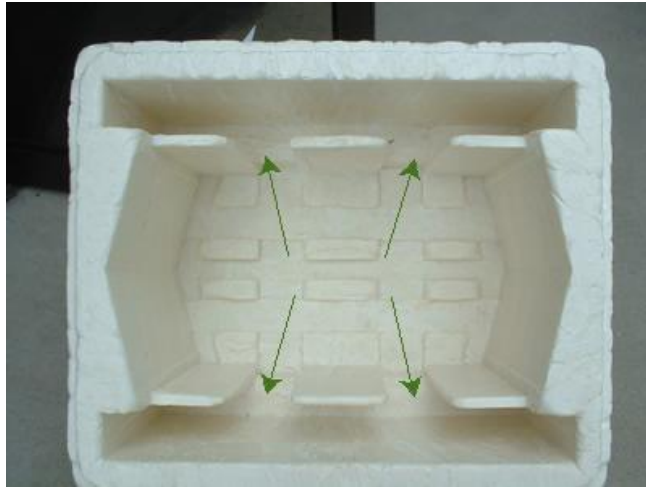
Ice-Locker® Platform

- Coolant Cavities hold gel packs or dry ice in place
- Separates product load from coolant, reducing risk of product load damage from directly physical contact or condensation.
- Coolant Cavity wall thickness regulates the rate of transfer of energy from coolant into product load.



Convection Engine® Platform

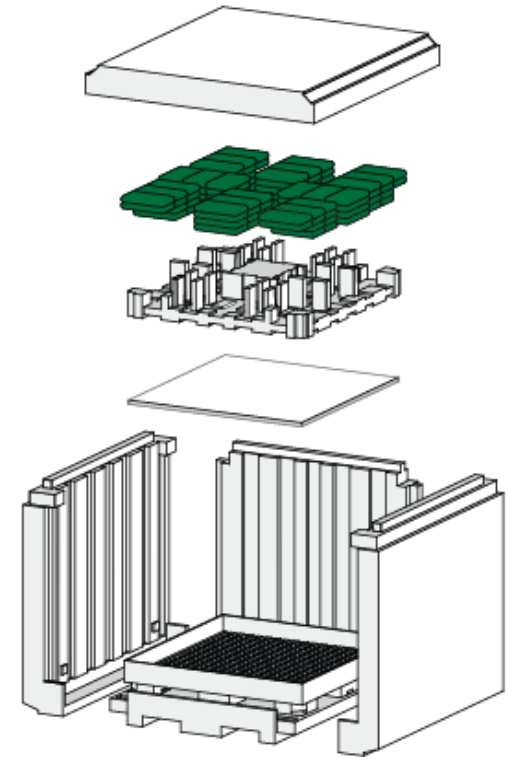
- Coolant Cavities hold gel packs or dry ice in place
- Separates product load from coolant, reducing risk of product load damage from directly physical contact or condensation.
- Coolant Cavity wall thickness & number of 'vents' regulates the rate of transfer of energy from coolant into product load.
- V or U-Shaped walls allow channeling of hot and cold air away from product load, reducing the temperature gradient across the product load.
- Base channels allow the movement of air 360° around product load
- Air is kept in motion – convection.



BioSphere® Platform

Combines Ice-Locker and Convection Engine Technology

- Coolant Cavities hold gel packs or dry ice in place
- Separates product load from coolant, reducing risk of product load damage from directly physical contact or condensation.
- Coolant Cavity wall thickness & number of 'vents' regulates the rate of transfer of energy from coolant into product load.
- V or U-Shaped walls allow channeling of hot and cold air away from product load, reducing the temperature gradient across the product load.
- Base channels allow the movement of air 360° around product load
- Air is kept in motion – convection

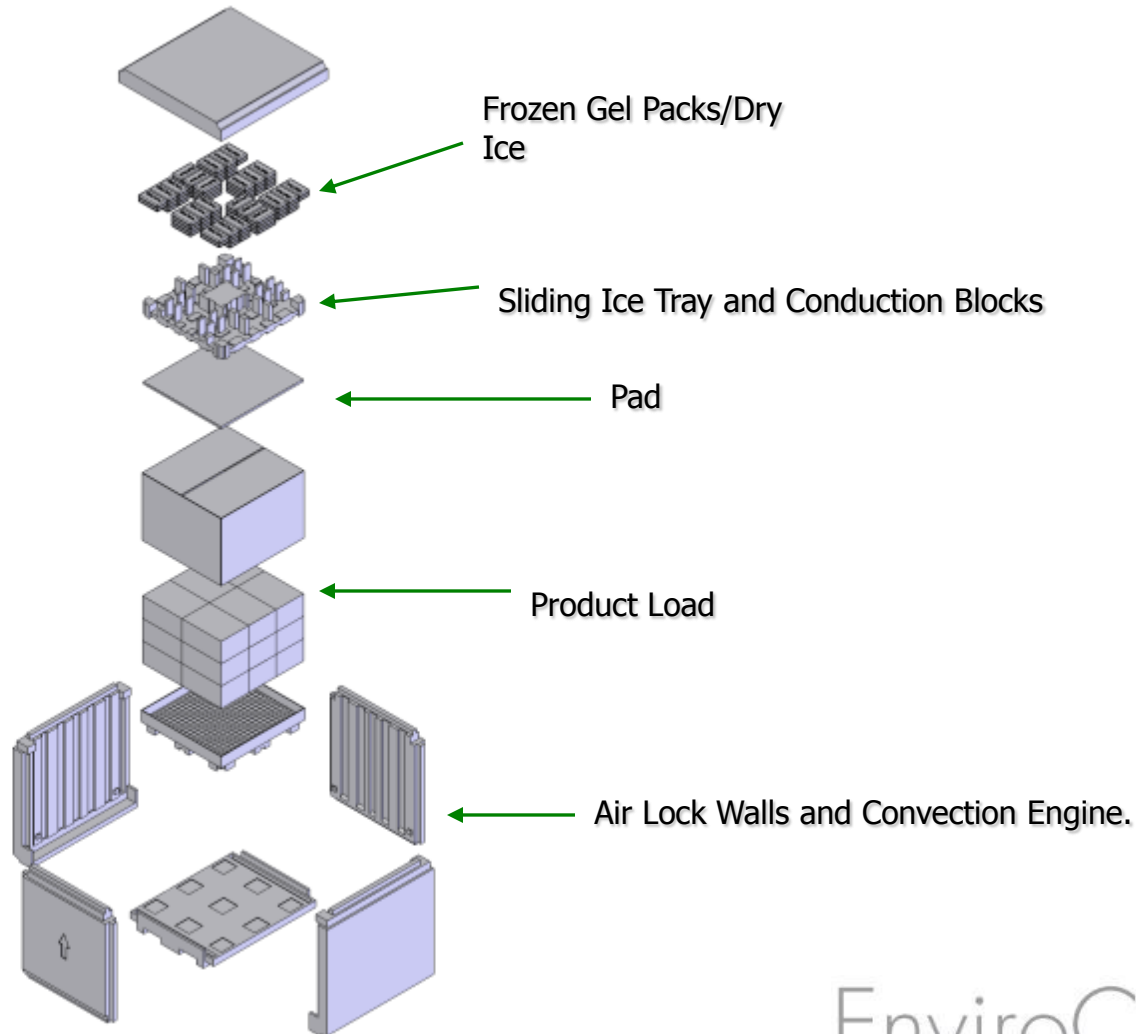


BioSphere Design Innovations

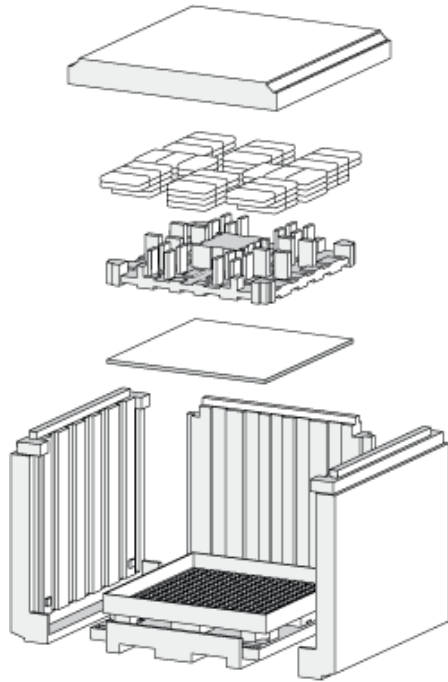


EnviroCooler LLC
a Lifoam Company

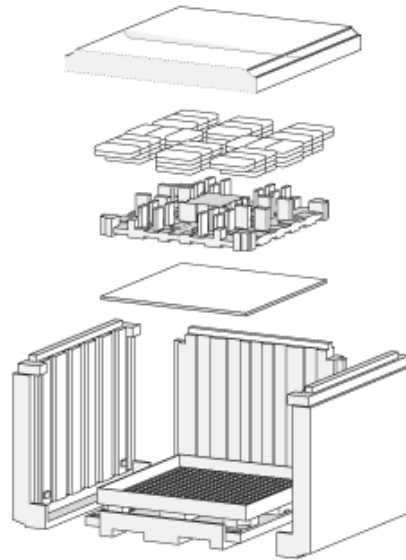
BioSphere[®]: 1 Pack-out for hot/cold



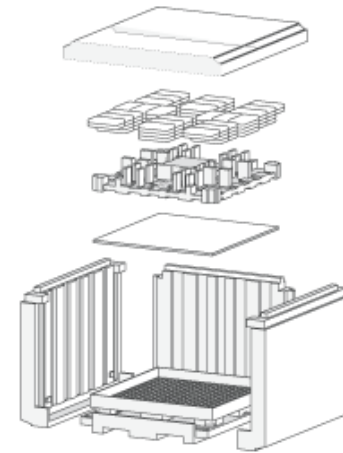
For all your Pallet Loads



Full-Load Size



Half-Load Size



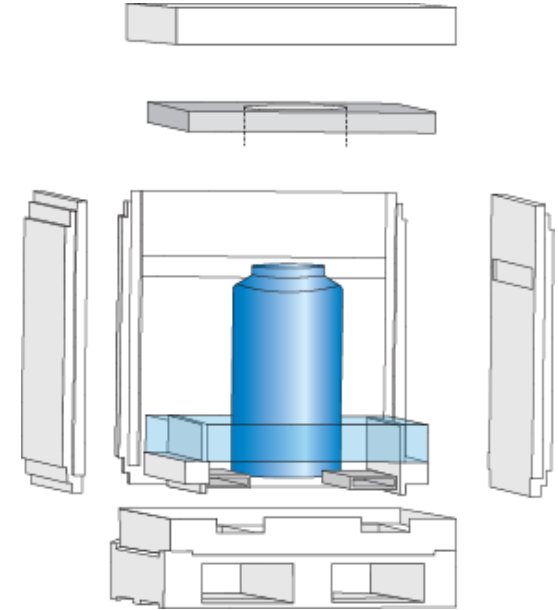
Quarter-Load Size

EnviroCooler BioSphere: A Scalable Pallet Platform

EnviroCooler LLC
a Lifoam Company

CryoSphere® Platform

Uses Ice-Locker Technology on Larger Scale



EnviroCooler LLC
a Lifoam Company

Raw Material Platforms

Polyurethane (PUR)

R-Value ~ double that of EPS

Water-blown – no CFCs/HCFCs

Rigid to provide increase physical protection

Montreal Compliant

Cradle-to-Cradle Product Lifecycle

Re-useable

Global Recycling Network

Expanded Polystyrene (EPS)

Lower R-Value than PUR

No CFCs/HCFCs

Lightweight material reduces transportation cost

Smart manufacturing processes reduce carbon footprint

Cradle-to-Cradle Product Lifecycle

Re-useable

Recycling Network – Alliance of Foam Packaging Recyclers

Global Supply Platform

EnviroCooler LLC has a network to provide our Cooler Solutions worldwide.

Polyurethane (PUR)

-

Expanded Polystyrene (EPS)

-

Gel Packs

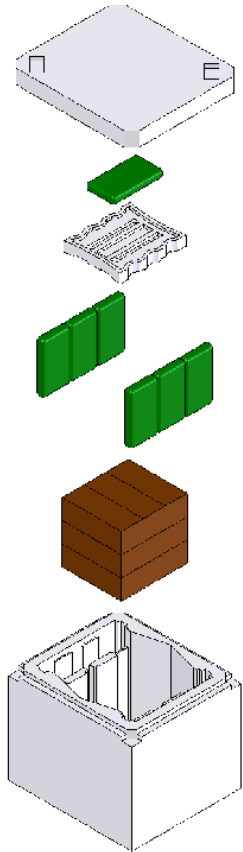


EnviroCooler® LLC Platform Benefits

- ✓ Universal Pack-out: always packed the same way whether winter or summer origins or destinations.
- ✓ Universal Pack-out: always packed out the same way whether minimum or maximum load shipments.
- ✓ Pack-out Uniformity: same pack-out configuration is used whether the Ice-Locker® is made from polyurethane or expanded polystyrene.
- ✓ Ease of Use: training is easy, simple and quick packed-out. No multiple additional components like vacuum panels, complicated corrugated inserts, refrigerated and frozen gel packs, various sized gel packs, or EPS panels.
- ✓ Frozen Coolant: only use frozen gel packs in pack-out configuration. One size of coolant required for all pack-out configurations.
- ✓ Coolant-Product Separation: frozen coolant is kept separated from the product load to avoid damage to product through contact or condensation.
- ✓ Global Supply: All designs are manufactured globally with EnviroCooler's 16 years of experience couples with the continual backing and investment of an S&P 500 parent company ensuring stability in supply partnership.
- ✓ Environmentally Conscious: all products can be recycled, re-used, or disposed of in an environmentally conscious method.

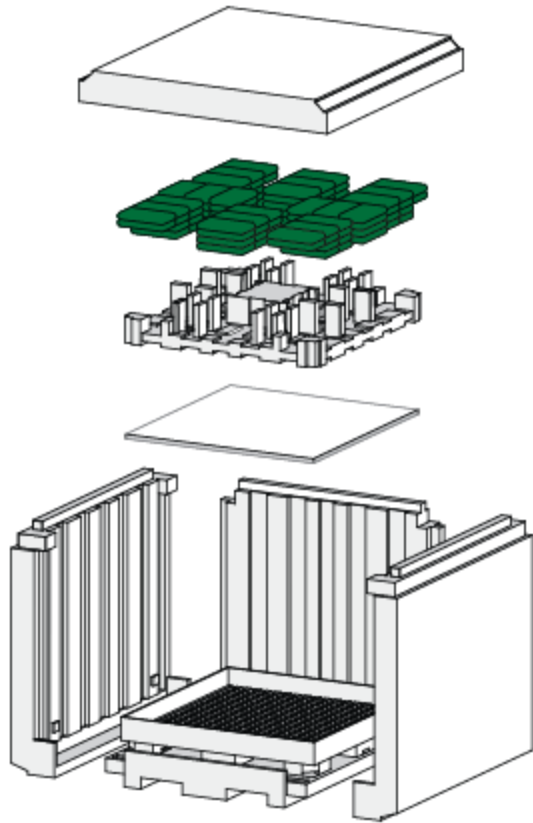
Platform Success – Long Lane Cooler Solutions

Innovation Success – Parcel Loads (PUR)



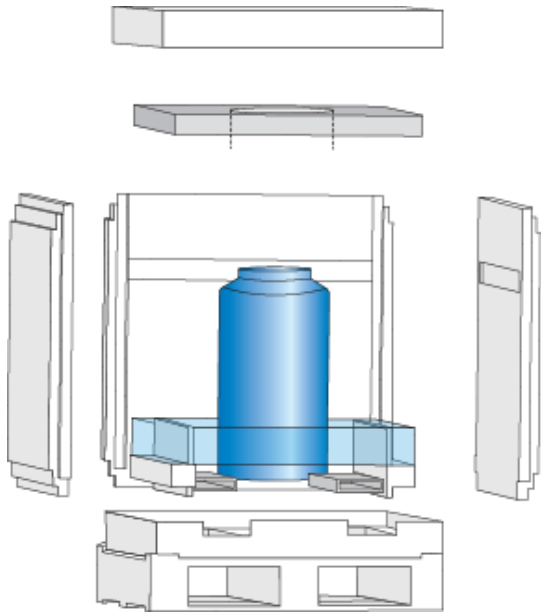
Your Cooler Solution	Acceptance Criteria (Temp (C))	Product Cavity Dimensions (In)	Product Cavity Dimensions (cm)	Verified Performance Duration* (Hrs)
C-186IL	2-8	6 3/16 x 4 9/16 x 6	15.72 x 11.59 x 15.24	72
C-162IL	2-8	8 1/2 x 4 5/8 x 6 15/16	21.6 x 11.8 x 17.62	44
C-155IL	2-8	9 3/8 x 7 3/4 x 7 3/16	24.11 x 19.7 x 15.72	45
C-111IL	2-8	12 x 8 1/4 x 8 3/4	30.48 x 21 x 22.23	96
C-161IL	2-8	14 5/16 x 6 7/8 x 13 3/4	36.4 x 17.46 x 35	48
C-167IL	2-8	14 3/4 x 12 3/4 x 16	37.47 x 32.4 x 40.64	48
C-163IL	2-8	18 3/4 x 12 5/16 x 12 5/8	47.63 x 31.27 x 32.07	48
C-162IL	Frozen (<0)	8 1/2 x 4 5/8 x 6 15/16	21.6 x 11.8 x 17.62	70
C-155IL	Frozen (<0)	9 3/8 x 7 3/4 x 7 3/16	24.11 x 19.7 x 15.72	54
C-111IL	Frozen (<0)	12 x 8 1/4 x 8 3/4	30.48 x 21 x 22.23	120
C-161IL	Frozen (<0)	14 5/16 x 6 7/8 x 13 3/4	36.4 x 17.46 x 35	100
C-167IL	Frozen (<0)	14 3/4 x 12 3/4 x 16	37.47 x 32.4 x 40.64	82
C-162IL	Frozen (<-20)	8 1/2 x 4 5/8 x 6 15/16	21.6 x 11.8 x 17.62	51
C-155IL	Frozen (<-20)	9 3/8 x 7 3/4 x 7 3/16	24.11 x 19.7 x 15.72	64
C-111IL	Frozen (<-20)	12 x 8 1/4 x 8 3/4	30.48 x 21 x 22.23	105
C-161IL	Frozen (<-20)	14 5/16 x 6 7/8 x 13 3/4	36.4 x 17.46 x 35	71
C-167IL	Frozen (<-20)	14 3/4 x 12 3/4 x 16	37.47 x 32.4 x 40.64	51
C-111IL	Frozen ((-40)-(-10))	12 x 8 1/4 x 8 3/4	30.48 x 21 x 22.23	48

Innovation Success – Pallet Loads (PUR)



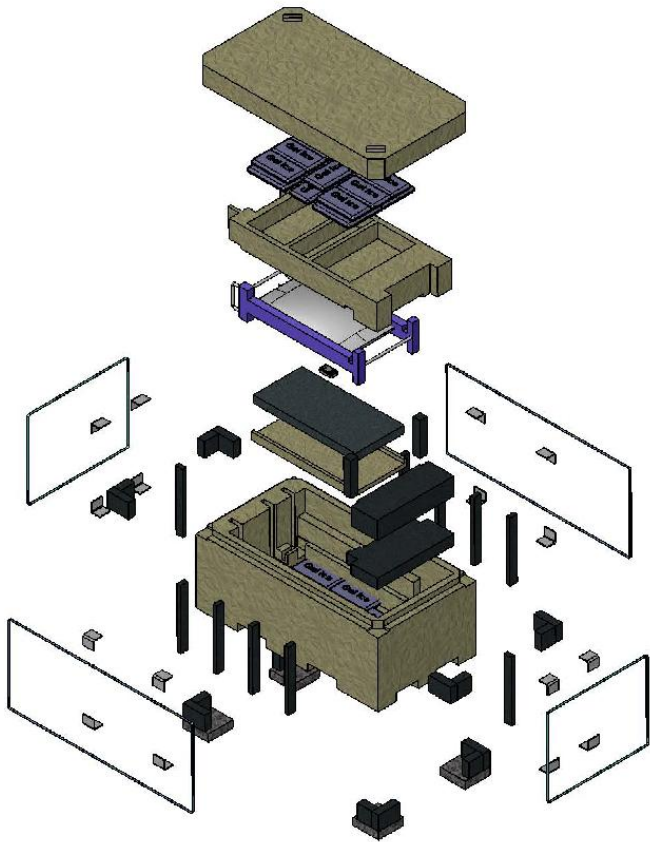
Your Cooler Solution	Acceptance Criteria (Temp (C))	Product Cavity Dimensions (In)	Product Cavity Dimensions (cm)	Verified Performance Duration* (Hrs)
BioSphere P-024	2-8	27 7/8 x 26 7/16 x 20 1/2	70.8 x 67.15 x 52.07	101
BioSphere P-002	2-8	42 1/8 x 39 3/4 x 30 3/8	107 x 101 x 77.15	183
BioSphere P-022	2-8	42 1/8 x 39 3/4 x 13 7/8	108 x 103.5 x 35.2	98
BioSphere P-003	2-8	47 1/4 x 35 1/2 x 13 1/8	120 x 90.2 x 33.3	189
BioSphere P-002	15-25	42 1/8 x 39 3/4 x 30 3/8	107 x 101 x 77.15	72
BioSphere P-024	Frozen (<-0)	27 7/8 x 26 7/16 x 20 1/2	70.8 x 67.15 x 52.07	in process
BioSphere P-022	Frozen (<-0)	42 1/8 x 39 3/4 x 13 7/8	108 x 103.5 x 35.2	in process
BioSphere P-003	Frozen (<-0)	47 1/4 x 35 1/2 x 13 1/8	120 x 90.2 x 33.3	70
BioSphere P-002	Frozen (<-10)	42 1/8 x 39 3/4 x 30 3/8	107 x 101 x 77.15	124
BioSphere P-024	Frozen (<-20)	27 7/8 x 26 7/16 x 20 1/2	70.8 x 67.15 x 52.07	in process
BioSphere P-022	Frozen (<-20)	42 1/8 x 39 3/4 x 13 7/8	108 x 103.5 x 35.2	in process
BioSphere P-002	Frozen (<-20)	42 1/8 x 39 3/4 x 30 3/8	107 x 101 x 77.15	100
BioSphere P-003	Frozen (<-20)	47 1/4 x 35 1/2 x 13 1/8	120 x 90.2 x 33.3	55

Innovation Success – Bottle & Tank Loads (PUR)



Your Cooler Solution	Acceptance Criteria (Temp (°C))	Product Cavity Dimensions (In)	Product Cavity Dimensions (cm)	Verified Performance Duration* (Hrs)
C-133IL	2-8	12 1/2 x 12 1/2 x 17	31.75 x 31.75 x 43.18	101
C-110LL	2-8	12 1/2 x 12 1/2 x 26 1/4	31.75 x 31.75 x 66.7	101
C-133IL	Frozen (<-0)	12 1/2 x 12 1/2 x 17	31.75 x 31.75 x 43.18	168
C-110LL	Frozen (<-0)	12 1/2 x 12 1/2 x 26 1/4	31.75 x 31.75 x 66.7	120
C-133IL	Frozen (<-20)	12 1/2 x 12 1/2 x 17	31.75 x 31.75 x 43.18	168
C-110LL	Frozen (<-20)	12 1/2 x 12 1/2 x 26 1/4	31.75 x 31.75 x 66.7	94
CryoSphere P-007	Frozen (<-20)	125L Cryotank	125L Cryotank	121
CryoSphere P-010	Frozen (<-20)	200L Cryotank	200L Cryotank	156
C-133IL	Frozen (<-70)	12 1/2 x 12 1/2 x 17	31.75 x 31.75 x 43.18	168

Innovation Success – Celsius Pak Loads (PUR)

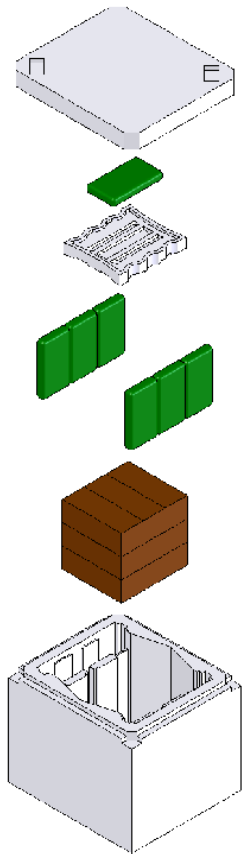


Your Cooler Solution	Acceptance Criteria (Temp (°C))	Product Cavity Capacity	Verified Performance Duration* (Hrs)
P-016/P-032	2-8	16.6L Celsius-Pak	96
P-016/P-032	2-8	8.3L Celsius-Pak	96
P-016/P-032	Frozen (<-20)	16.6L Celsius-Pak	127
P-016/P-032	Frozen (<-20)	16.6L Celsius-Pak	141
P-016/P-032	Frozen (<-20)	8.3L Celsius-Pak	127
P-016/P-032	Frozen (<-20)	8.3L Celsius-Pak	127

Platform Success – Short Lane Cooler Solutions

EnviroCooler LLC
a Lifoam Company

Ice-Locker Platform – Expanded Polystyrene (EPS)



Ice-Locker® ExPrS Cooler	Application (°C)	Performance Duration (Hrs)	Coolant Required	Universal Pack-Out Characteristics:
C-162IL ExPrS	2°-8°	24+	2 x 32 oz gel pack	I.D. (In): 9 1/16 x 4 1/16 x 5 7/9
	0°-10°	41+		O.D. (In): 16 1/8 x 14 3/8 x 12 1/8
	0°-15°	48+		
	0°-25°	72+	4.5 lbs dry ice	Assembled Cooler Weight (Lbs): 4.0
	Frozen (0°C)	39+		Cubic Volume (in3): 273
C-155IL ExPrS	2°-8°	24+	2 x 32 oz gel pack	I.D. (In): 9 3/8 x 7 3/4 x 7 3/16
	0°-10°	38+		O.D. (In): 20 3/8 x 15 1/2 x 13 3/4
	0°-15°	48+		
	0°-25°	72+	11 lbs dry ice	Assembled Cooler Weight (Lbs): 5.24
	Frozen (0°C)	59+		Cubic Volume (in3): 664
	Frozen (<-20°C)	52+		
C-161IL ExPrS	2°-8°	24+	6 x 32 oz gel pack	I.D. (In): 14 5/16 x 6 7/8 x 13 3/4
	0°-10°	48+		O.D. (In): 21 1/2 x 19 1/4 x 20 5/8
	0°-15°	72+		
	0°-25°	72+	25 lbs dry ice	Assembled Cooler Weight (Lbs): 9.0
	Frozen (0°C)	96+		Cubic Volume (in3): 1354
	Frozen (<-20°C)	68+		
C-167IL ExPrS	2°-8°	31+	7 x 32 oz gel pack	I.D. (In): 14 3/4 x 12 3/4 x 16
	0°-10°	45+		O.D. (In): 24 1/2 x 22 x 21 1/2
	0°-15°	54+		
	0°-25°	72+	Assembled Cooler Weight (Lbs): 9.0	
	Frozen (0°C)	In process		Cubic Volume (in3): 3000
	Frozen (<-20°C)	In process		

EnviroCooler Partners

