FINDING SOLUTIONS
IS IN OUR NATURE
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ALIGAL™
Protective Atmospheres for Preserving Food Freshness
Air Liquide was a pioneer in the development of Modified Atmosphere Packaging (MAP) by developing pure and mixed gases with guaranteed low impurity levels.

Bon Appétit with ALIGAL™

Imagine what your performance could be
ALIGAL™ single and mixed gases are designed to satisfy demanding quality requirements of the food industry. They are used extensively in Modified Atmosphere Packaging (MAP) of a wide variety of food products. By preserving the freshest characteristics of foods, and by extending shelf life, ALIGAL™ food-quality gases empower food processors and retailers to:

- Reduce product returns
- Gain greater flexibility in production scheduling
- Improve product consistency
- Control inventory more effectively and economically
- Distribute products over greater distances
- Improve opportunity for branding of value-added products

ALIGAL™ protective atmospheres preserve the natural color and flavor of fresh food. They extend shelf life without chemical additives or preservatives by inhibiting spoilage due to oxidation, bacteria and mold growth usually occurring with food exposed to air.

Packaging in a modified atmosphere makes use of the natural components of air. The goal of MAP is to eliminate or reduce the physical, enzymatic and microbial deterioration that spoils food.
Today’s consumers are more selective when purchasing food. They want fewer preservatives and chemical additives, a more appetizing appearance, plus fresh and delicious flavor, without sacrificing shelf life. Air Liquide, as a long-standing partner of the food industry, has specifically developed our ALIGAL™ products to address these consumer expectations.

ALIGAL™ food-quality gases

Food groups benefit in important ways when ALIGAL™ products are introduced:

- Reduced susceptibility to oxidation
- Improved protection from bacteria and mold
- Enhanced color and overall appearance
- Combination of two or more of the above

Each ALIGAL™ gas has specific properties that address these needs. For instance, carbon dioxide (CO2) has bacteriostatic and fungistatic properties; nitrogen (N2), an inert gas, prevents oxidation; and oxygen (O2), an active gas, maintains the color of meat and is necessary for “living” products like produce to breathe. ALIGAL™ gases can also be used to help prevent physical damage such as crushing.

Many variables, such as ingredients, equipment and process parameters will impact shelf life. Therefore, optimum results will be obtained when each MAP solution is tailored to the specific food product and process. Similarly, strict temperature and sanitation controls are critical throughout the entire process, from receipt of raw ingredients to the packaging and distribution of the finished product.

ALIGAL gases are available in a range of blends appropriate to specific foods and meet standards for approved food packaging uses.

They are colorless and odorless and comply with procedure controls and quality assurance throughout the production process. Strict filling and testing procedures assure a consistent and quality product. ALIGAL™ products can be easily integrated into the MAP system that includes packaging equipment and film.

Keeping Pace in the Marketplace

Smart food processors and retailers use ALIGAL™ products from Air Liquide to help satisfy increasingly more discerning consumer tastes.

Presentation and packaging with ALIGAL™ makes the difference:

- **Maximum** freshness and flavor
- **More** “natural” products that feature reduced use of additives and preservatives
- **Longer** shelf life in the marketplace and storage in the home
- **Easier** to use and consume products with minimal preparation (ready meals, individual portions, etc.)
- **Appealing** packaging that showcases its contents
ALIGAL™ for appetizing presentation

Each ALIGAL™ protective atmosphere has been scientifically formulated to address the specific shelf life requirements of a wide selection of foods, ranging from case-ready meats, fresh poultry, processed meats, cheese and freshly cut salads to prepared entrées, fresh pasta, sandwich kits, snacks and bakery products.

<table>
<thead>
<tr>
<th>Applications</th>
<th>Recommended ALIGAL Product</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bakery Products</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breads</td>
<td>2 or 15</td>
<td>ALIGAL™ extends mold-free shelf life of baked goods and delays onset of rancidity.</td>
</tr>
<tr>
<td>Breakfast pastries, muffins</td>
<td>13 or 15</td>
<td></td>
</tr>
<tr>
<td>Dessert breads and cakes</td>
<td>13 or 15</td>
<td></td>
</tr>
<tr>
<td>Par-baked bread</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>Dairy Products</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Block cheese</td>
<td>2</td>
<td>The fungistatic properties of ALIGAL™ result in extended shelf life.</td>
</tr>
<tr>
<td>Shredded cheese</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Yogurt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>Dry Foods</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coffee</td>
<td>1</td>
<td>ALIGAL™ provides additional protection against product crushing (i.e. potato chips, tortilla chips, nuts).</td>
</tr>
<tr>
<td>Snack foods</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Freshly Cut Produce</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshly cut salad</td>
<td>1</td>
<td>When combined with permeable packaging films, ALIGAL™ decreases the respiration rate of fresh produce (product-specific).</td>
</tr>
<tr>
<td>Sliced tomatoes</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Fresh Raw Meats</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fresh ground beef</td>
<td>28</td>
<td>By promoting the formation of oxymyoglobin, ALIGAL™ maintains the natural red meat color and product appeal (i.e. beef, pork, lamb, veal). Aerobic spoilage bacteria (i.e. Pseudomonas spp.) are inhibited.</td>
</tr>
<tr>
<td>Poultry, chicken parts (bulk)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Poultry, chicken parts (retail)</td>
<td>13 or 15</td>
<td></td>
</tr>
<tr>
<td>Raw uncurved sausages</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Retail meat cuts</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td><strong>Prepared Foods</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooked entrées</td>
<td>13 or 15</td>
<td>ALIGAL™ helps preserve the organoleptic quality of prepared foods while delaying microbial spoilage.</td>
</tr>
<tr>
<td>Cooked lasagna</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Deli salads</td>
<td>12 or 13</td>
<td></td>
</tr>
<tr>
<td>Fresh refrigerated pasta</td>
<td>12 or 13</td>
<td></td>
</tr>
<tr>
<td>Sandwiches</td>
<td>13 or 15</td>
<td></td>
</tr>
<tr>
<td><strong>Processed Meats</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beef jerky</td>
<td>1</td>
<td>The bacteriostatic properties of ALIGAL™ result in extended shelf life.</td>
</tr>
<tr>
<td>Cooked sausages</td>
<td>13</td>
<td>The balance gas displaces oxygen from the package and prevents slices from sticking together, protecting the product from oxidation and ensuring easy peel-off (i.e. cooked ham, turkey, corned beef, salami).</td>
</tr>
<tr>
<td>Deli meats/cold cuts</td>
<td>13 or 15</td>
<td></td>
</tr>
</tbody>
</table>
CRYO IMMERSION UNIT - ACC™

Versatile cryogenic freezing system featuring continuous current liquid nitrogen immersion freezing.

The patent pending CRYO IMMERSION UNIT - ACC™ - continuous current nitrogen immersion freezer - was developed by Air Liquide experts to offer versatility in freezing while maximizing product quality of small, diced, sticky and liquid products.
THE CRYO IMMERSION UNIT - ACC™

- Freezes and crusts a wide variety of products without generating buildup on conveyer belts
- Exceeds sanitation standards
- Simplified installation requiring only a single blower exhaust system

Continuous Current: A new concept in cryogenic freezing

The CRYO IMMERSION UNIT - ACC™ system has revolutionized IQF processing of small, sticky and high-value products with continuous current liquid nitrogen immersion freezing.

A continuous current of liquid nitrogen moves the product through the freezing process instead of using a belt for transporting product through the liquid nitrogen bath thus minimizing any product deformation due to belt marks.

Easy to sanitize and maintain

The hydraulically powered lift system raises the freezer top, exit conveyor, and impellor system, giving 360-degree access for sanitation and maintenance.

Versatile and simple

The CRYO IMMERSION UNIT - ACC™ can be used as a stand-alone freezing system or in conjunction with a post-cool tunnel or spiral freezer for high volume production.

Our experts will provide start-up support and training for your personnel on safety, operations, maintenance and sanitation. As your plant processing needs evolve, Air Liquide will be there to provide ongoing service and technical support.

ALIGAL is a trademark of L’Air Liquide, Société Anonyme pour l’étude et l’exploitation des procédés Georges Claude. © 2015 Air Liquide Industrial US L.P.
The ALIGAL™ FZ freezing tunnel was developed by Air Liquide experts to offer the versatility to efficiently freeze nearly any food product while providing maximum freezing capacity.

The ALIGAL™ FZ:
- Maximizes throughput with its stainless steel design and top-lift system.
- Achieves safety and sanitation standards.
- Simplifies installation requiring only a single blower exhaust system.
Streamline and expand your process

The ALIGAL™ FZ freezing tunnel has been designed to meet the needs of food processors seeking increased productivity, excellent sanitary design, ease of operation and maintenance with a minimal capital and installation cost.

Easy to clean and sanitize

Constructed of stainless steel with a seamless, molded, gel-coated fiberglass body, the ALIGAL™ FZ sets a new standard in ease of sanitation and hygienic design.

Two sanitary seals, removable in seconds, separate the top and bottom half of the ALIGAL™ FZ. The conveyor belt is raised for complete access above and below the belt for cleaning and sanitation of the entire interior of the tunnel. The curved surfaces and self-draining design keep your freezer clean and eliminate trapped water or food particles.

Safety features

- Built-in processing environment monitoring system.
- Safety interlocks.
- Top lift system allows freezer to open with touch of a button.

Maximized throughput

The ALIGAL™ FZ contains up to 33% more freezing zone and 50% increase in convection when compared to other systems of similar footprint. Six (6) top fan motors provide high speed convection to utilize the maximum amount of refrigeration delivered to your product from each pound of cryogen consumed.

Processors can benefit from the ALIGAL™ FZ with more productivity at a reduced operating cost.

<table>
<thead>
<tr>
<th>Product</th>
<th>Possible Freezing Capacity (lbs/hour)</th>
<th>Possible Freezing Capacity (kg/hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hamburger</td>
<td>1,200</td>
<td>550</td>
</tr>
<tr>
<td>Cooked sausage link</td>
<td>1,100</td>
<td>500</td>
</tr>
<tr>
<td>Pizza</td>
<td>2,700</td>
<td>1,225</td>
</tr>
<tr>
<td>Layer cake</td>
<td>900</td>
<td>400</td>
</tr>
<tr>
<td>Fish fillet</td>
<td>1,350</td>
<td>600</td>
</tr>
<tr>
<td>Burrito</td>
<td>1,900</td>
<td>850</td>
</tr>
</tbody>
</table>

*Freezing capacity is specific to product weight, dimensions, total heat removed and other production factors. Consult with your Air Liquide representative for a detailed production capacity and operating cost for your product.
CRYOGENIC BOTTOM INJECTION is the ideal solution for reducing and maintaining the temperature of meat, dough, pasta and other products during mixing and kneading. Using either liquid CO₂ or liquid nitrogen, CRYOGENIC BOTTOM INJECTION is efficient and environmentally friendly.

CRYOGENIC BOTTOM INJECTION. The cool solution for top quality.
CRYOGENIC BOTTOM INJECTION

Liquid CO₂ or liquid nitrogen is injected into the lower part of the mixing equipment directly into the food product. The cryogen is uniformly mixed with the product. The gas generated penetrates the product, thus lowering its temperature. In contrast to the traditional top injection system, this technology allows a 10 to 15% reduction of liquid CO₂ or nitrogen consumption.

... Improves your cooling process
- Optimized and standardized quality for your products
- Uniform and fast cooling through multiple injection points
- Shorter mixing/kneading times
- Improved cooling efficiency: 10 to 15% savings in liquid CO₂ or nitrogen
- No product freezing
- Efficient cryogen usage due to direct injection into the product

... Guarantees optimum performance
- Optimum positioning of the injection nozzles
- Precise injection angle eliminates product freezing inside the nozzles
- High cryogen injection pressure prevents product backing into the nozzles

... Is easy to install
- Compact unit requiring minimum modifications to the mixer
- The equipment can be installed on any conventional mixer/kneader

... Is cleaning- and operator-friendly
- All parts are easily accessible
- Easy disassembly for cleaning
- Operator-friendly, simple process control

Typical Nozzle:

1. Meat
2. Mixing screw
3. CO₂/N₂ direct injection at the bottom
4. Insulated cryogenic supply
5. Nozzle (including solenoid valve, insulation, quick coupling and frame)

5a. Quick coupling
5b. Stainless steel flange
5c. Nozzle
5d. Cryogenic valve
5e. End fitting
5f. CO₂/N₂ supply
5g. Shut-off valve
5h. Solenoid valve
CRUST FLOW™-P is the ideal solution for surface freezing and hardening of fragile, soft or sticky products without product deformation or sticking! Our innovative nitrogen saturation technique transforms the plastic conveyor belt into a quick-freezing sponge for fast processing with little waste.

CRUST FLOW-P. Keeping your product in shape!
CRUST FLOW™-P

... is your guarantee for best quality and efficiency
- Product does not stick to the belt
- No product deformation
- No belt marks

... is the key
- To expanding your product line
- To simplifying your process

... is flexible
- Can be used in combination with other mechanical or cryogenic freezing equipment
- Easily integrates into existing production lines
- Efficiently freezes thin products

... is highly productive
- Short residence times
- High performance, even for small products
- Continuous product processing
- Throughputs of 1,000 to 5,500 lbs/hr

... is easy to install
- The complete, fully assembled unit reduces installation time
- Small footprint
- Easy to integrate

... is cleaning- and operator-friendly
- All parts are easily accessible
- Freezer top can be raised for easy cleaning
- High quality stainless steel construction

Technical Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Overall Length</th>
<th>Overall Width</th>
<th>Overall Height (freezer top raised)</th>
<th>Inlet Height (adjustable)</th>
<th>Belt Width (useable / total)</th>
<th>Weight (empty)</th>
<th>Power Supply</th>
<th>Power Use</th>
<th>Compressed Air Supply</th>
<th>Compressed Air Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>4.2 m 13'-9&quot;</td>
<td>1.5 m 5 pi</td>
<td>1.7 m 5'- 7&quot;</td>
<td>from 0.97 m to 1.04 m</td>
<td>0.41 m 16&quot;</td>
<td>1315 kg</td>
<td>480 VAC 1.5 kW</td>
<td>3,26 Nm³/h 115 scfh</td>
<td>621 kPag 90 psig</td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>4.2 m 13'- 9&quot;</td>
<td>1.7 m 5'- 7&quot;</td>
<td>2.3 m 7'- 7&quot;</td>
<td>from 0.97 m to 1.04 m</td>
<td>0.58 m 23&quot;</td>
<td>1451 kg</td>
<td>60 Hz 2.2 kW</td>
<td>3,26 Nm³/h 115 scfh</td>
<td>621 kPag 90 psig</td>
<td></td>
</tr>
<tr>
<td>800</td>
<td>4.2 m 13'- 9&quot;</td>
<td>1.9 m 6'- 3&quot;</td>
<td>1.7 m 5'- 7&quot;</td>
<td>from 0.97 m to 1.04 m</td>
<td>0.81 m 32&quot;</td>
<td>1588 kg</td>
<td>3 Ph 2.7 kW</td>
<td>3,26 Nm³/h 115 scfh</td>
<td>621 kPag 90 psig</td>
<td></td>
</tr>
</tbody>
</table>

Standard models are shown in the table; other sizes are available on request. Specifications are subject to change without notice.
Find out how our fresh approach to food processing can benefit your business.

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