

CRYOCRETE™

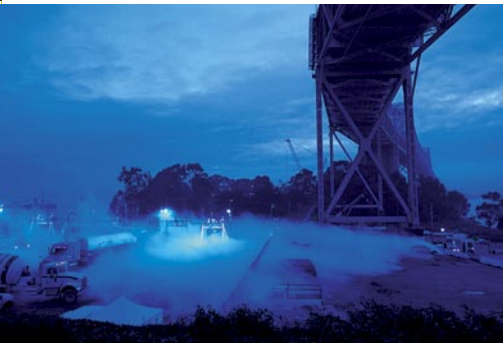


concrete
cooling
with liquid
nitrogen
using
Air Liquide's
injection
lance
technology

CryoCrete™ is the ideal solution for handling the most demanding cooling requirements and pour temperature specifications, especially during extremely hot weather conditions.

Mass pour jobs including caps and columns, bridge decks and power plants have all been poured using CryoCrete™.

CRYOCRETE™



Bridging the Bay

Air Liquide was involved at the very foundation of building the largest and most visible public works project that Northern California has seen in decades—the San Francisco-Oakland Bay Bridge. With Air Liquide CryoCrete™ liquid nitrogen, the bridge's foundation of steel and reinforced concrete was chilled to the optimum temperature for pouring. The 40-hour pour utilized some 550 loads of concrete and 60,000 gallons of liquid nitrogen, which was injected into individual concrete loads at an Air Liquide injection staging area under the Bay Bridge in the middle of San Francisco Bay. This process assured that each shipment of concrete would be individually checked to affirm that it was delivered at the optimum pouring temperature to meet construction standards of the successful project.

Benefits of CryoCrete™

- Liquid nitrogen cooling has shown to have no adverse impact on slump, air content, set time, or density
- Flexible and accurate temperature adjustments with greater and more rapid cooling compared to ice or chilled water
- No more ice or chilled water handling

As a means of cooling concrete, nothing matches liquid nitrogen in delivering more uniform and often more cost-effective results.

Cooling one yard of concrete from 95° F to 80° F using CryoCrete™ Injection Technology could save you \$2.30/yd versus using ice.

Air Liquide Scope of Supply

- Install concrete cooling, CryoCrete™ nitrogen injection technology
- Install liquid nitrogen tank and pressure control equipment
- Operational check of liquid nitrogen injection unit
- Train customer personnel in the proper operation of the equipment

Customer Scope of Supply

- Install concrete foundation for liquid nitrogen tank and CryoCrete™ injector (drawings supplied by Air Liquide)
- Provide electrical connections (120 VAC, single phase-20Amp-60Hz)
- Obtain all permits and licenses pertinent to the installation
- Provide any other utilities as specified by Air Liquide

Typical Analysis for Cooling one yard of Concrete from 95°F to 80°F (20,000 yds/year)

Operating Parameter	Chilled Water Operation	Ice Operation	CryoCrete™ Nitrogen Operation
Chill Water, Ice or Nitrogen Cost (includes equipment)	Chill water not possible. Chill water temperature required = 17°F (freezing)	\$10.30/yd	\$8.50/yd
Maintenance & Power	Will not meet specification temperature	\$0.30/yd	N/A
Labor		\$0.20/yd	N/A
Total Cost		\$10.80/yd	\$8.50/yd

Savings compared to Ice = \$2.30/yd or 22%

Plus:

- No limit on batch time associated with ice mixing/handling

Contacts

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Founded in 1902 and now present to 70 countries with 36,000 employees, Air Liquide is the world leader in industrial and medical gases and related services. The Group offers innovative solutions based on constantly enhanced technologies to help manufacture many indispensable everyday products and preserve life.

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