Furmanite
Pipe Freezing Service

The efficient and cost-effective non intervention method for temporary piping system isolation

Pipe freezing allows on-line maintenance on a treated water line.

Benefits

Pipe freezing is widely acknowledged as a safe, reliable and highly cost-effective method of temporary pipe isolation and as a result offers a number of major benefits:

- No need to drain down systems, thus avoiding costly and time-consuming venting procedures.
- No need to arrange for the bulk transfer or storage of possibly toxic or corrosive fluids.
- Cuts losses of expensive liquids, such as treated water and systems inhibitors.
- Overcomes the problems of handling hazardous materials and enhances safety when working on lines containing contaminated or volatile liquids.
- In many cases pipe freezing allows maintenance work to be carried out without interruption to continuous process systems.

Furmanite has over 25 years experience of working on pressurised systems. Our comprehensive service provides you with a complete pipe freezing package to meet all your maintenance requirements, from initial site survey through engineering assessment and preparation, the provision of all the necessary technicians and equipment, to completion of the project and recommissioning of the system.

All procedures are carried out by our fully trained and qualified technicians working in accordance with strict safety requirements and job procedures to ensure that the highest of standards are maintained.

Engineering support

Furmanite's pipe freezing service is supported by the company's engineering department with access to personnel with extensive research and development and practical experience in the method, allowing detailed engineering assessment and job preparation for the most demanding of applications. Furmanite has teams of professional engineers and designers, CAD, machining and fabrication facilities, all with the ability to undertake the manufacture of bespoke equipment quickly and cost- effectively in-house, assuring you of the fastest response.

Pipe freezing allows maintenance to be carried out on-line

FURMANITE™

MAXIMISING ASSET UPTIME

Heat flux monitoring system

An important aspect of our pipe freezing procedure is the use of the latest Heat Flux Monitoring techniques. The use of Furmanite Heat Flux instrumentation systems offers considerable operational and safety advantages:

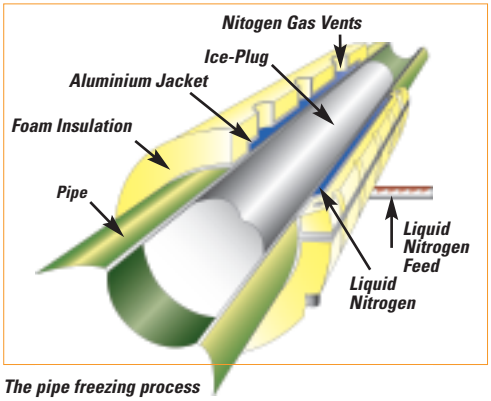
- Growth of the plug is monitored, alerting operators to any problems which may arise due to excessive temperature or flow.
- Final plug formation is positively confirmed, prior to intervention.
- The thermal stability of the plug can be constantly checked, providing early warning of any change in conditions that might threaten the integrity of the isolation.

Quality and Safety

Furmanite pipe freezing procedures specify the use of personal oxygen monitors

Furmanite's standard pipe freezing procedures specify the use of personal oxygen monitors for all pipe freezing personnel, to guard against the risk of oxygen deficiency due to vented nitrogen gas.

The pipe freezing process is fully controlled by formal written procedures which form part of Furmanite's ISO9001 quality control system. All cryogenic equipment is regularly inspected, maintained and certified, to statutory requirements (and beyond where necessary).



The pipe freezing process

How it works

Pipe freezing involves the use of liquid nitrogen in the controlled formation of a solid ice plug inside the pipeline using specialist equipment and techniques. Once formed, the plug is able to withstand very high differential pressures and provide reliable and effective isolation of the line while modifications or repairs are carried out.

The process is suitable for use on a wide variety of pipe materials and contents, including:

Typical pipe materials:

- Carbon Steel
- Nickel Alloy
- Copper-based Alloys
- Kunifer
- Aluminium Alloys
- Stainless Steel

Subject to certain qualifications, coated and lined pipes can also be frozen.

Typical pipe contents:

- Water
- Acids
- Coolants
- Paints
- Alcohols
- Oils
- Liquid Food Products
- Various Chemicals

Applications

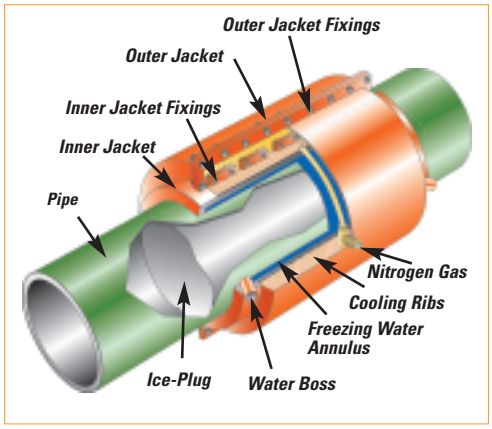
Pipe freezing has many applications in a variety of industries, including nuclear and fossil power generation, offshore oil and gas production, refineries and petrochemical plants.

Single or multiple freeze isolations can be applied on-line in pipes up to 48" in diameter, to allow:

- Valve repair/replacement
- Pipe modifications/maintenance
- Miscellaneous intervention procedures

Typical pipe freezing applications include:

- Cooling Water
- Fire Protection Systems
- Process Systems
- Fuel Oil Lines
- Sludge Lines
- Hydraulic Control Lines
- Domestic/Utility Water Systems
- Hydrocarbon Risers
- Water Injection Lines
- Drill Pipe Sea Water Ballast
- Heat Exchanger Lines
- Boiler Feed and Condensate Systems
- Lube Oil/Governor Oil
- Pressure Vessel Cooling Systems
- Chilled Water Systems



Controlled temperature isolation

Controlled isolation

Furmanite's controlled pipe freeze isolation technique uses gaseous nitrogen and ensures that the equipment is not taken outside its design limits, reducing the risk of embrittlement. The freezing jacket provides an annulus around the pipe into which gaseous nitrogen is introduced, with no direct contact between the gaseous nitrogen and the pipe.

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