

TECHNICAL GUIDE

# Avoiding CUI on Chilled Water or Refrigerated Systems

ArmaFlex® Advice from the Experts

[www.armacell.us](http://www.armacell.us)



## TECHNICAL GUIDE – CUI

### Prevention and Performance

Chilled water or refrigeration systems which are properly designed, specified and insulated provide trouble-free insulation performance for the life of the system. Corrosion under insulation (CUI) is a common concern in chilled water or refrigeration systems because the equipment operates below the ambient temperature making condensation a huge source for moisture. Designing an efficient system involves specifying the right type and thickness of insulation is a preventative best practice.

There are multiple design factors and recommendations to consider when insulating chilled-water, refrigeration, and below-ambient piping systems.

- Use correct thickness of insulation for design parameters. Visit [www.armacell.us](http://www.armacell.us) for more information or to contact our Technical team.
- The installation of the insulation should follow recommended procedures in the Armacell North American Application Manual. All openings, protrusions, gaps, etc. need to be properly sealed with an Armacell recommended adhesive.

For more info: <https://www.armacell.us/solutions-center/document-downloads/mechanical-insulation/installation-manuals/>

- Cooling and refrigeration systems must be turned off and at room temperature during install to prevent trapping of moisture inside insulation. Corrosion Under Insulation (CUI) can occur due to water entrapment.

For more info: [https://www.armacell.us/fileadmin/user\\_upload/White\\_Papers/Armacell\\_ChilledWater.WhitePaper.EN.US.2020.pdf](https://www.armacell.us/fileadmin/user_upload/White_Papers/Armacell_ChilledWater.WhitePaper.EN.US.2020.pdf)

### What happens if there is not enough insulation or the materials are improperly installed?

- Moisture can form and become trapped between the insulation and pipe surface.
- If the pipes are iron or steel, there is the possibility that rust will form. Continued exposure to rust with ArmaFlex insulation has been known in certain circumstances to cause thinning of the insulation thickness. This only occurs when there is a failure to insulate with the proper thickness of insulation and / or the insulation was not properly installed per the Application Manual.



### What if a failure has occurred – Can the system be repaired?

- First, identify all areas where moisture is present between the insulation and piping. This may extend beyond the identified failure point as moisture will travel the path of least resistance within the system.
- The insulation in these areas will need to be removed to allow for proper inspection

of the piping system. If rust or corrosion is found, one should seek advice from the pipe manufacturer or an engineer to determine the correct course of action for remediation.

- A rust inhibitor coating is recommended for the piping to protect the metal surface prior to reinsulating the repaired pipe section(s). Refer to pipe manufacturer or inspecting engineer for recommended coating.
- Armacell insulation materials can then be reinstalled making sure the insulation has proper thickness and is sealed, taking care that the insulation is terminated to the piping at any change in direction. Correct insulation sizing can be calculated by the Armacell Technical team.

The fact that closed-cell structures are inherently durable and virtually impermeable to water means better lifetime efficiency. This is recognized in ASHRAE Fundamentals 2017 which suggests that cold pipe systems be protected through the use of very low permeance insulating material with a water vapor transmission rate (WVT) of 0.10 per inches or less. Closed-cell elastomeric foam, specifically ArmaFlex, has a very low permeability rating of 0.05 and resists condensation which causes corrosion. Therefore selecting closed-cell elastomeric foams is one sure way to prevent moisture on piping systems.

Note: In constant high humidity areas, above 80% relative humidity, where vapor partial pressure drive is constant on the insulation, it may be necessary to install zero perm jacketing to prevent reduction in thermal performance of the insulation and to prevent formation of condensation. Please contact your Armacell representative for assistance.



Insulation cell collapse due to CUI on pipes masked by the insulation.

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As the inventors of flexible foam for equipment insulation and a leading provider of engineered foams, Armacell develops innovative and safe thermal, acoustic and mechanical solutions that create sustainable value for its customers. Armacell's products significantly contribute to global energy efficiency making a difference around the world every day. With 3,135 employees and 24 production plants in 16 countries, the company operates two main businesses, Advanced Insulation and Engineered Foams. Armacell focuses on insulation materials for technical equipment, high-performance foams for high-tech and lightweight applications and next generation aerogel blanket technology.

For more information, please visit:  
[www.armacell.us](http://www.armacell.us)

