

Technical and Process Safety Sharing

Corrosion Under Insulation (CUI)

What is Corrosion Under Insulation (CUI)?

Corrosion under insulation (CUI) is due to water ingress into insulation, resulting in corrosion of insulated equipment and pipes. This is typically caused by damaged insulation, where moisture build-up can cause corrosion. As the corrosion may be hidden under the insulation, detection is often difficult.

There are various types of CUI, for example chloride, galvanic, acidic or alkaline.

Failures from CUI can lead to potential loss of containment and process safety incidents such as fire, explosion or toxic release.



Corrosion under insulation on a piping. Courtesy:
<https://www.russelltech.com/News/ArtMID/719/ArticleID/255/Mitigating-The-Risks-Of-Corrosion-Under-Insulation-With-Russell-NDE-Systems>

How does Corrosion Under Insulation (CUI) happen?

Water ingress into an insulation layer can cause the metal underneath the insulation layer to be in contact with oxygen in the water. Over time, pitting occurs on the metal surface. If there is no early detection, the pitting may aggravate and result in deeper pits. This could eventually lead to loss of containment.

Water ingress into insulation is often due to the following:

- Poorly designed and/or installed protective finish or cladding
- Cladding joint sealant or moisture barrier breakdown
- Mechanical damage of cladding material.

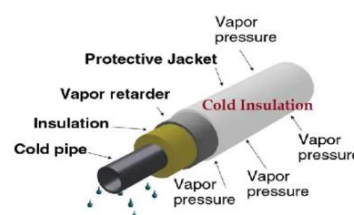
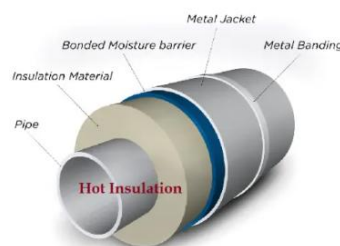


Corrosion under insulation found on pipe Courtesy:
<https://conceptgroupplc.com/glossary/what-is-corrosion-under-insulation/>

Preventive Measures – What can we do?

To prevent CUI, the following measures can be implemented:

- Equipment design – e.g. Insulation material selection, cladding selection
- Weather and/or moisture barrier to be applied
- Install insulation based on approved procedure
- Adequate maintenance and inspection program
- Avoid stepping on insulated piping for preservation of the cladding.



Typical piping insulation. Courtesy:
<https://whatispiping.com/piping-insulation/>

References:

1. <https://www.aiche.org/resources/publications/cep/2014/january/cep-process-safety-beacon-corrosion-under-insulation-cui>
2. <https://www.nationalboard.org/Index.aspx?pageID=184>
3. https://www.petrosync.com/blog/corrosion-under-insulation-cui/#How_To_Prevent_Corrosion_Under_Insulation