



Health and Safety Bulletin No. 1

Embrittlement - Serious risk to alloy lifting chain integrity when lifting loads in a corrosive environment

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Background

Alloy lifting chains and associated components (such as hooks, shackles and links) are used widely across a variety of industries and environments to lift and move loads.

There are a number of forms of embrittlement, including hydrogen embrittlement and caustic stress corrosion cracking, which pose an extreme risk to alloy lifting chain integrity. Embrittlement and corrosion can lead to sudden failure during a lift increasing the risk of serious injury or death to those in and around the lifting zone.

Using certain alloy lifting chains, such as Grade T (8, 80, 800) and V (10, 100, 1000), and their components in a corrosive environment can cause embrittlement and corrosion. This can lead to failure of alloy lifting chains and associated components.

Contributory factors

Certain alloy lifting chains, such as Grade T (8, 80, 800) and Grade V (10, 100, 1000), and associated components **may not be suitable** for use where corrosive conditions are present, such as the use of acid or caustic baths and particularly where alloy lifting chains are suspended or immersed.

The steel from which these chains and components are made is susceptible to embrittlement and brittle overload in corrosive environments.

Embrittlement failures require both a corrosive environment and tensile stresses to be present.

Embrittlement can take place without any noticeable visual change to the material's surface.

Corrosive environments are typically found in radiator repair workshops, electroplating workshops, galvanising workplaces or any other industries where items are placed in corrosive baths to clean or treat materials.

The addition of heat, such a heated caustic bath can increase the level of corrosion and embrittlement.

Alloy lifting chains can also be affected if they are used or stored near such corrosives, because of corrosive fumes in the atmosphere.

Actions required

Certain alloy lifting chains, such as Grade T (8, 80, 800) and V (10, 100, 1000), and components **should not be used or stored** where there are corrosive environments due to the use of acid or alkaline products.

A risk assessment should be undertaken where an alloy lifting chain is used or stored in acidic, alkaline or other corrosive environment.

If there is any doubt about the suitability of a chain or other lifting component then users should ensure the chains and components are removed from service immediately and seek advice from a competent person, such as the manufacturer or supplier.

References and further information

Australian Standards

- AS 2321 – *Short-link chain for lifting purposes*
- AS 3775.1 – *Chain slings for lifting purposes – Grade T(80) and V(100), Part 1: Product Specification*
- AS 3775.2 – *Chain slings for lifting purposes – Grade T(80) and V(100), Part 2: Care and use*
- AS 4797 – *Stainless steel chain for lifting purposes*

Health and Safety Executive (HSE), United Kingdom

- [Guidance Note PM39: Hydrogen cracking of grade T and grade 8 chain and components](#)

Note: This Health and Safety Bulletin has been reissued and replaces *WorkSafe Safety alert 5/2019*

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