Corrosion Control

The rate of corrosion can be controlled by either modifying the metal or the environment.

Control of corrosion by Modifying the Metal

1. By selection of the metal
2. By using pure metal
3. By using Alloying
4. By using Proper Design

(i)Avoid galvanic corrosion (ii) Avoid sharp corners and bends

(iii) Drainage affects corrosion (iv) Avoid crevices

(i)Avoid Galvanic Corrosion

If two different metals are joined, galvanic corrosion will occur. In such a case galvanic corrosion is prevented by

(a) Selecting the metals as close as possible in the electrochemical series.

(b)Providing smaller area for cathode and larger area for anode.

c) Inserting an insulating material between the two metals

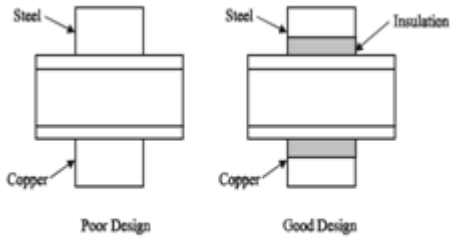

Fig. 2.12 Insulation avoids galvanic corrosion

(ii)Drainage Affects Corrosion

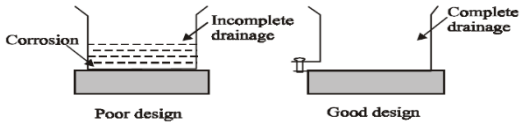

Fig. 2.13 Drainage affects corrosion

Tanks and other containers must be designed in such a way that, the whole of the liquid should be drained off completely.

(iii)Avoid Sharp Corners and Bends

Sharp corners or edges should always be avoided, and hence erosion corrosion can be avoided by smooth corners or curved pipe bends

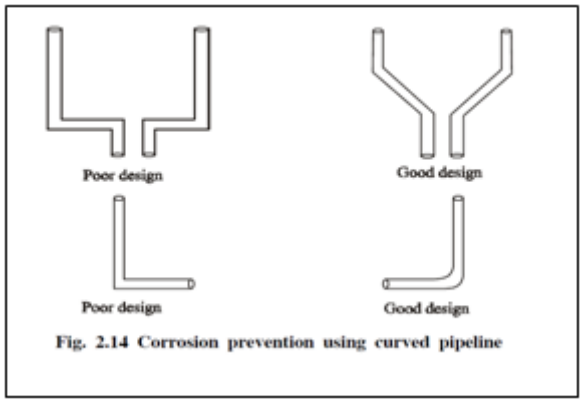

Fig. 2.14 Corrosion prevention using curved pipeline

(iv)*Avoid Crevices*

Crevices allow moisture and dirt, which results in increased electrochemical corrosion. This can be prevented by filling the crevices with a filler.

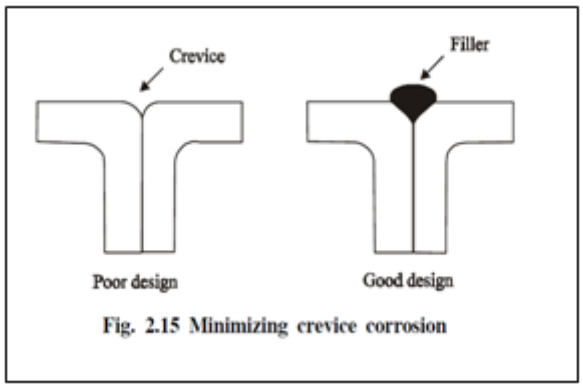

Fig. 2.15 Minimizing crevice corrosion

By Cathodic Protection

The principle involved in the cathodic protection is to force the metal to behave like a cathode. The important cathodic protections are

(i) Sacrificial anodic protection.

(ii) Impressed current cathodic protection

(i) Sacrificial Anodic Protection Method

- The metallic structure to be protected is made cathode by connecting it with more active metal (anodic metal). So that all the corrosion will concentrate only on the active metal.
- The artificially made anode thus gradually gets corroded protecting the original metallic structure.
- Hence this process is otherwise known as sacrificial anodic protection.
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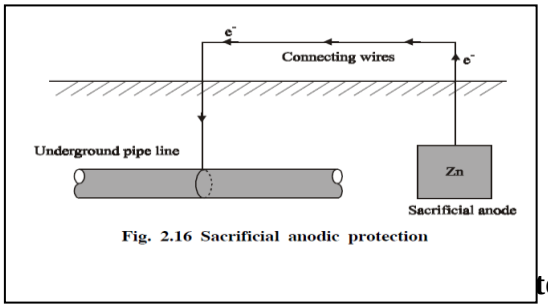

Fig. 2.16 Sacrificial anodic protection

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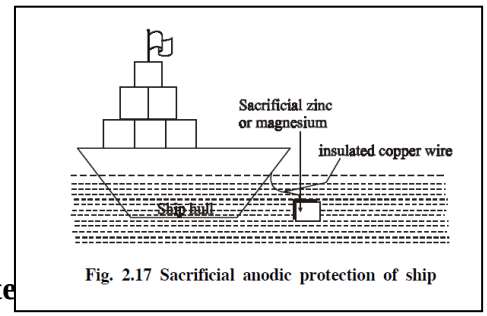

Fig. 2.17 Sacrificial anodic protection of ship

This method is used for the protection of ships and boats. Sheets of Mg or Zn are hung around the hull of the ship Zn or Mg will act as anode compared to iron (ship or boat is made of iron), so corrosion concentrates on Zn or Mg. Since they are sacrificed in the process of saving iron, they are called sacrificial anodes.

- Protection of underground pipelines, cables from soil corrosion.
- Insertion of Mg sheets into the domestic water boilers to prevent the formation of rust.
- Calcium metal is employed to minimize engine corrosion.

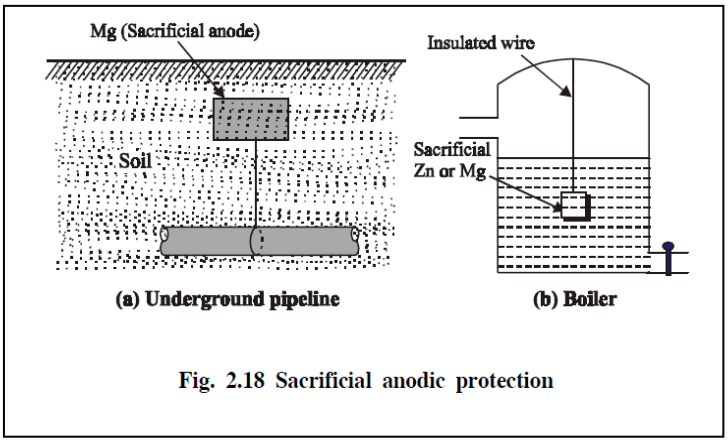

Fig. 2.18 Sacrificial anodic protection