2.4 Containers and Tubular Fabrications

1. General

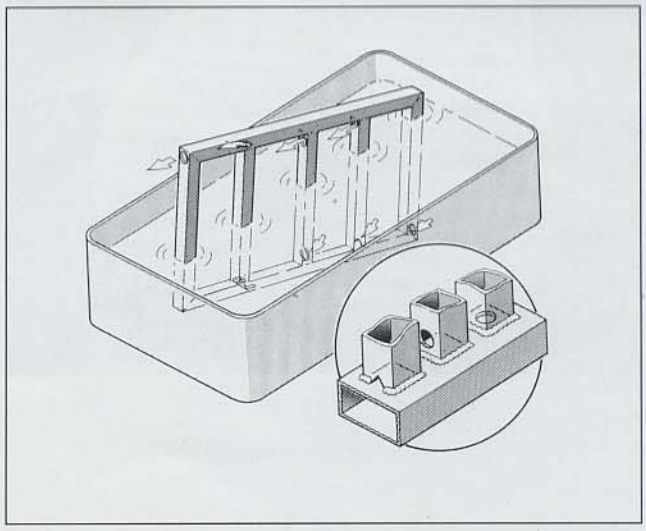
Processes in the galvanizing plant, such as degreasing, pickling, rinsing, fluxing and actual hot dip galvanizing itself involve immersion in baths. It is important therefore that the liquid in the bath can reach into every corner and crevice – even with hollow components.
In hot dip galvanizing vessels and hollow fabrications are coated on the inside as well as on the outside surface. For this to be successful, fabrications must be constructed in such a way that when the are immersed in the galvanizing bath the zinc can enter the steel fabrication quickly. The air in the hollow spaces is expelled and the molten zinc should drain off easily on withdrawal. An explosion may occur in the galvanizing bath if liquid remains in a closed compartment when it is immersed in the molten zinc. When heated to 450 °C vapour can generate an excess pressure of up to 200 bar and burst the fabrication. Such an event can be extremely dangerous for the operators in the galvanizing shop. (Fig. 1.)

Fig. 1: Explosion Damage due to improper venting.

2. Tubular Fabrications

Well-positioned venting and draining holes of adequate size are of vital importance if high quality galvanizing is to be achieved.
The method of suspension of the fabrications in the galvanizing plant (usually at an angle) should always be borne in mind when drilling the holes (Fig. 2). For this reason it is important to ensure that the holes are drilled as far as possible in the corners of fabrications. It is difficult to drill the holes after fabrication and it is therefore better to drill them before assembly when they can often be located so that they are hidden from view in service.
The size of the hole depends of the volume of gas to pass through the vents which in turn depends on the length and diameter of the steel fabrication. The sizes in Fig. 3 give an indication of the requirements.

Fig. 2: Method of placing holes for correct venting of hollow structure.



3. External Galvanizing of Tubes and Containers

In special cases, for example with heat exchangers, it may be necessary to galvanize the tubes on the outside only. This is considerably more expensive than galvanizing both the inside and outside. The slight saving in zinc does not justify the greater expense involved in this type of galvanizing unless there are compelling technical reasons. Fabrications which are to be galvanized on the outside only must be sealed in such a way that no solution or molten zinc can penetrate the inside. In order to relieve the high pressure which can build up in closed tubes, such fabrications must be provided with a rising pipe to vent excess pressure (Fig. 4). The material used for sealing the joints must be capable of resisting the pickling solution as well as the molten zinc.

A special problem is the enormous buoyancy created when tubular fabrications are galvanized on the outside only. Because the density of zinc is about seven times that of water, dipping sealed hollow bodies into the zinc melt produces a buoyancy which is also seven times greater than if it were in water. Such tubular fabrications must be provided with additional weight, sometimes of several tonnes, in order to ensure that they are fully immersed into the galvanizing bath. The fabrications to be galvanized must bear the load produced by the buoyancy as well as that due to the weight.

4. Vessels

The above information is also generally relevant for vessels but the design should ensure that connections, flanges and plugs are positioned so as to be flush with the inside surface of the vessel as far as possible (Fig. 5 a). This will ensure that there are no pockets of air to cause defects and no zinc is left inside to reduce the volume of the container. Air pockets may also be caused by vents which have not been positioned on the top-most part of the vessel (Fig. 5 b). Strengtheners and stiffeners should also be located in such a way as to prevent air pockets from forming.
Large and heavy vessels can more readily be safely galvanized if they are provided with the appropriate lifting lugs.

Hot Dip Galvanizing Data Sheet GA

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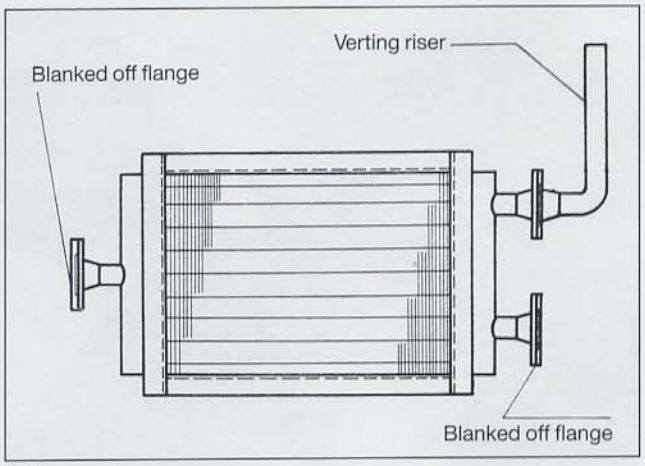

Fig. 3

Fig. 3: Single side galvanizing of fabrication showing used pipe.

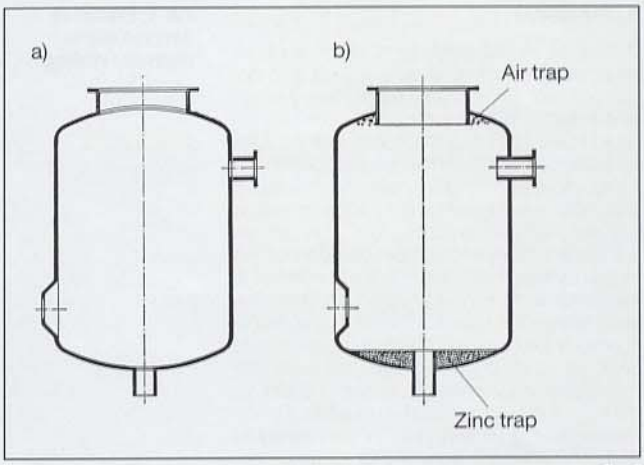

Fig. 5

Fig. 5a: Internal flanges and pipes must be flush with internal faces.

Fig. 5b: Vents must be positioned at top-most point.

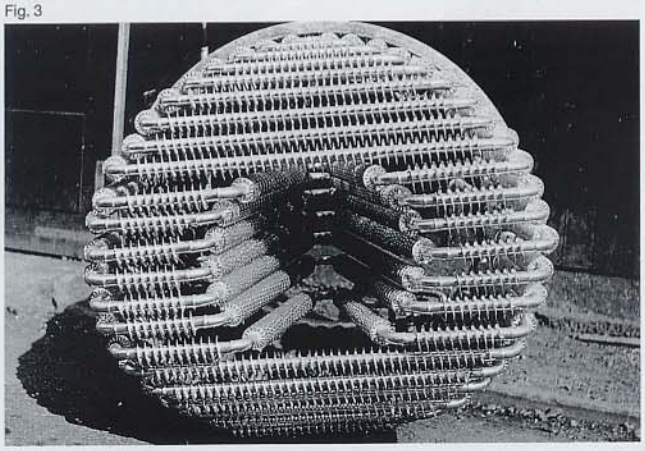

Fig. 4

Fig. 4: Galvanized condenser

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