

Design for Hot Dip Galvanizing

General Design Guidelines

Certain rules must be followed when designing components for galvanizing, but the rules are readily applied and in many cases they are simply those which are good practice to ensure maximum corrosion protection.

Adoption of these guidelines will ensure the safety of galvanizing personnel, ease the galvanizer's task and produce optimum quality galvanizing. If in doubt concerning preferred design details, check with Galvan Industries, Inc.

Size and Shape

Almost any component can be galvanized by designing and building modules to suite available galvanizing facilities, but it is wise to check work dimensions with your galvanizer at an early design stage.

Safety

Vessels and hollow sections including those in smaller diameter tubular fabrications must vented to atmosphere for the safety of galvanizing personnel and to prevent possible damage to the article. At galvanizing temperatures, moisture trapped in closed sections is converted rapidly to superheated steam, generating explosive forces unless vented.

About Galvan Industries, Inc.

Since 1958, Galvan Industries has provided the ultimate in corrosion control to steel fabricators and manufacturers. The first hot-dip galvanizing operation in the Carolinas, the company has grown to become the largest capacity contract galvanizer in the Southeast.

For details, or to place an order, call Galvan Industries at 1-800-277-5678, Fax (704) 455-5215; e-mail: sales@galvan-ize.com.



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Welded pipe sections

Closed sections must never be incorporated. Sections should be interconnected using open mitered joints as illustrated in "A" or interconnecting holes should be put in before fabrication, as in "B".

Alternatively, external holes may be positioned as shown in "C", a method which is often preferred by the galvanizer, since quick visual inspection shows that the work is safe for galvanizing.

Pipe ends must be left open, or provided with removable plugs.

Small tubular fabrications must be vented with holes not less than 3/8" in diameter.

Tubular fabrication, hollow structurals

Vent holes must be provided, preferably 25% of internal diameter for sections up to 6 inches in diameter. This percentage can be dependent on the shape of the fabrication, and consultation with Galvan at the design stage is recommended.

Alternatively, V-notches can be cut in ends of members before welding.

Close unwanted vent holes with lead plugs filed flush with surrounding material.

Overlapping surfaces

Avoid narrow gaps between plates, overlapping surfaces, and back-to-back angles and channels.

When small overlaps are unavoidable, seal edges by welding.

When left unsealed, small overlaps may trap pickle acid which can later escape to discolor or damage the galvanized coating.

Vent hole is 1/4" in diameter for every 15 sq. in. of overlap area.

Large overlapping surfaces

If contacting surfaces cannot be avoided, a hole 1/4" in diameter for every 15 sq. in. should be placed in one of the members, and the perimeter of the contacting area should be continuously welded. The vent hole in one member will ensure the safety of galvanizing personnel and prevent damage to the article.

A. Satisfactory
 B. Satisfactory
 C. Unsatisfactory

Tanks and closed vessels

When internal and external surfaces are to be galvanized, at least one filling and one draining hole must be provided with a vent diagonally opposite to allow the exit of air during emersion. Holes should be at least 2" in diameter for each 17 cubic feet. Internal baffles should be cropped. Manholes should finish flush to prevent trapping excess zinc.

When vessels are not to be galvanized inside, extended vent pipes must be fitted, to allow air to exit above the level of molten zinc in the galvanizing bath.

Vent holes least 2" in diameter for each 17 cubic feet.

Internal baffles cropped top and bottom to allow free passage of zinc and to prevent trapping of air. Flanges should finish flush inside.

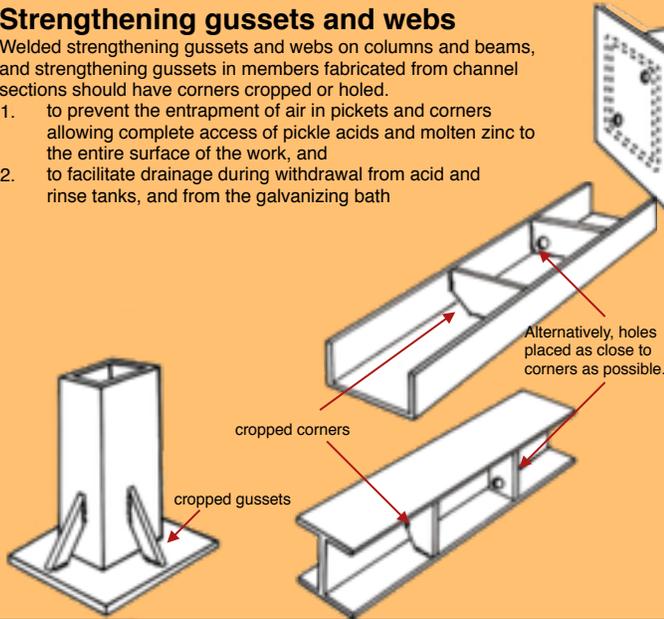
Vent pipes connect tank interior to atmosphere.

cropped internal baffle

Strengthening gussets and webs

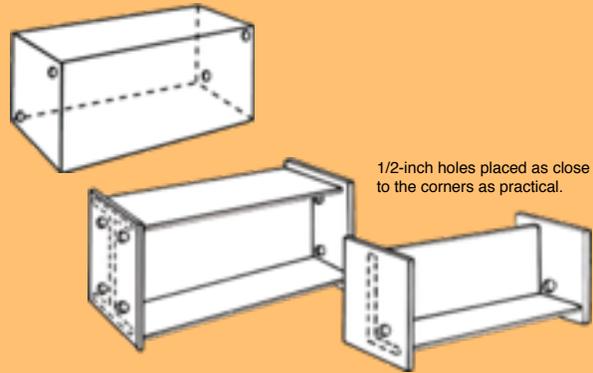
Welded strengthening gussets and webs on columns and beams, and strengthening gussets in members fabricated from channel sections should have corners cropped or holed.

1. to prevent the entrapment of air in pickets and corners allowing complete access of pickle acids and molten zinc to the entire surface of the work, and
2. to facilitate drainage during withdrawal from acid and rinse tanks, and from the galvanizing bath



End plates

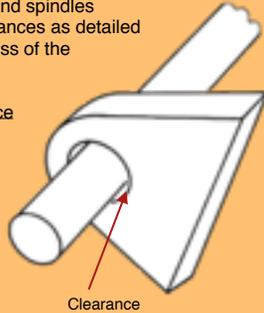
Provide holes at least 1/2 inch in diameter in end plates on rolled steel shapes, to allow access of molten zinc in the galvanizing bath and drainage during withdrawal.



Clearance for moving parts

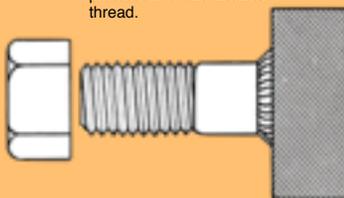
Drop handles, hinges, shackles, shafts, and spindles require provision of minimum radial clearances as detailed in the table below, to allow for the thickness of the galvanized coating.

Shaft diameter	Minimum clearance
up to 3/8"	1/32"
3/8" to 1"	1/16"
More than 1"	1/16" to 3/32"



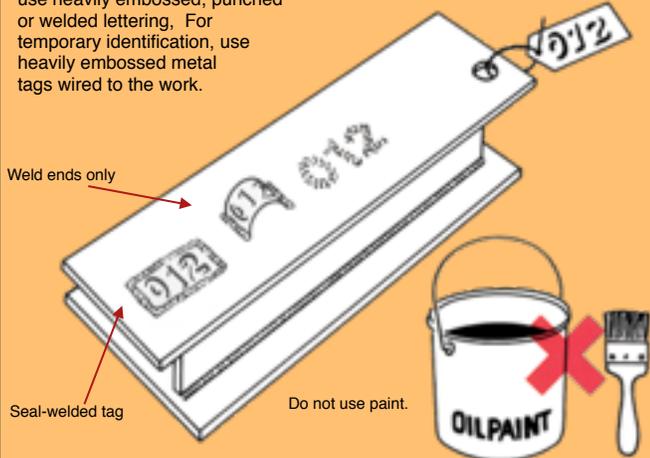
Internal threads and nuts must be tapped oversize after galvanizing to accommodate the thickness of the galvanized coating on the stud or bolt.

Galvanized coating on the nut provides corrosion protection for the internal thread.



Bolt or stud diameter	Minimum overlapping female thread
up to 7/16"	0.016"
3/8" to 1"	0.021"
Over 1"	0.031"

Identification markings For permanent identification, use heavily embossed, punched or welded lettering. For temporary identification, use heavily embossed metal tags wired to the work.



Distortion

Distortion can be prevented or minimized by:

1. Use of symmetrical designs
2. Use of relatively uniform sections
3. Use of accurately preformed members to avoid locked-in stresses
4. Use of balanced or staggered welding to avoid locked-in stresses
5. Large, open fabrications and tanks may require temporary cross stays to prevent distortion during galvanizing.



Materials suitable for galvanizing

All ferrous materials are suitable including stainless steel parts and sound, stress-free castings.

Brazed assemblies may be galvanized, but check first with Galvan. Soft soldered assemblies cannot be galvanized.

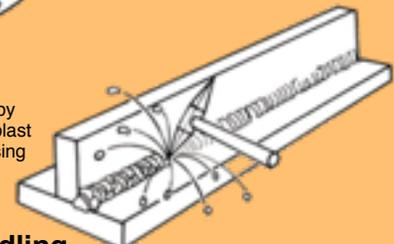


Combinations of ferrous surfaces

Fabrications containing a combination of castings and other steels, and rusted or mill scaled surfaces must be abrasive blast cleaned before galvanizing.

Weld slag

Weld slag must be removed by chipping, grinding, abrasive blast cleaning flame cleaning or using a pneumatic needle gun.



Provision for handling

Work not suitable for handling with chains, baskets, hooks or jigs must be provided with suspension holes or fittings. If in doubt, check with Galvan.