DESIGN FOR GALVANIZING

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.

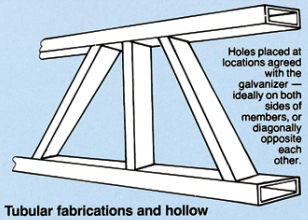
Adoption of the following design practices will ensure the safety of galvanizing personnel, ease the galvanizer's task, and produce optimum quality galvanizing.
If in doubt concerning preferred design details check with your galvanizer or Galvanizers Association of Australia.

Size and shape

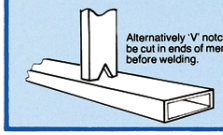
Almost any component can be galvanized by designing and building in modules to suit available galvanizing facilities, but it is wise to check work dimensions with your galvanizer at an early design stage.

Safety

Vessels and hollow sections, including those in small diameter tubular fabrications, *must* be 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.



Tubular fabrications and hollow structurals
Closed sections must never be incorporated. Provide vent holes at least 25% of internal diameter or diagonal dimension at locations agreed with the galvanizer. For 100 x 100 SHS use 36mm dia hole; note that multiple vent/drain holes can be used to achieve same result.

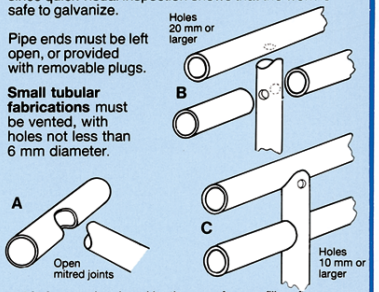


Welded pipe sections
Closed sections must never be incorporated. Sections should be interconnected using open mitred joints as illustrated at 'A', or interconnecting holes should be put in before fabrication as in 'B'.

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

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

Small tubular fabrications must be vented, with holes not less than 6 mm diameter.

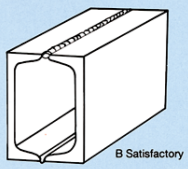


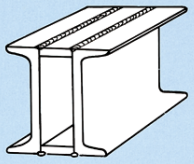
Unwanted vent holes may be closed by the use of epoxy filler after galvanizing and filing off flush with surrounding surfaces.

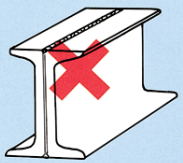
Overlapping surfaces
Avoid narrow gaps between plates, overlapping surfaces, and back-to-back angles and channels.

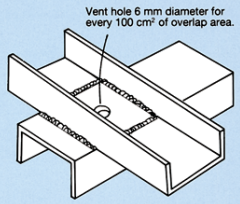
When small overlaps are unavoidable, seal edges by welding.

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





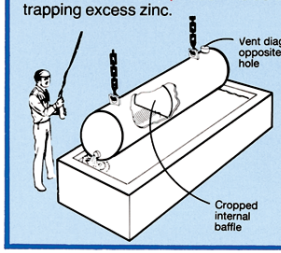




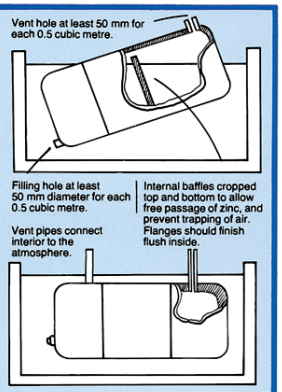
Larger overlapping surfaces
If contacting surfaces cannot be avoided, a hole 6 mm in diameter for every 100 cm² of overlap area should be placed in one of the members, and the perimeter of the contacting area should be continuously welded. The vent hole in one member will ensure the safety of galvanizing personnel and prevent damage to the article.

When both internal and external surfaces are to be galvanized at least one filling and draining hole must be provided, with a vent diagonally opposite to allow the exit of air during immersion. Holes should be at least 50 mm diameter for each 0.5 cubic metres.

Internal baffles should be cropped as illustrated. Manholes should finish flush inside to prevent trapping excess zinc.

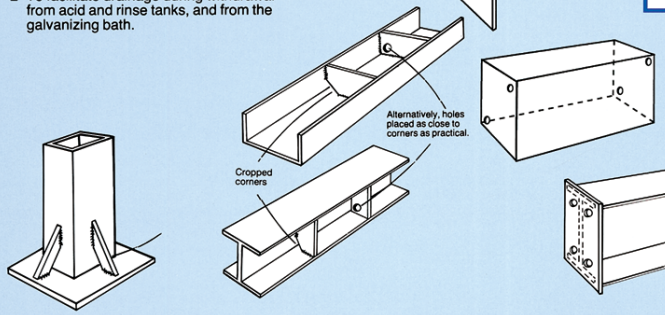


When vessels and air receivers etc are not to be galvanized inside, 'snorkel' tubes or extended vent pipes must be fitted after discussion with the galvanizer, to allow air to exit above the level of molten zinc in the galvanizing bath.

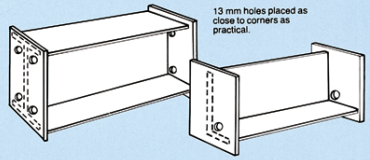


ZINC
Associate of International Zinc Association

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 pockets 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.

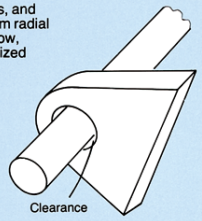


End plates
Provide holes at least 13 mm diameter in end plates on rolled steel shapes, to allow access of molten zinc in the galvanizing bath and drainage during withdrawal.



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.

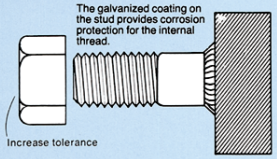
Shaft or spindle size	Minimum radial clearance
Up to 10 mm diameter	1 mm
10 to 30 mm diameter	2 mm
Over 30 mm diameter	2.0 to 2.5 mm



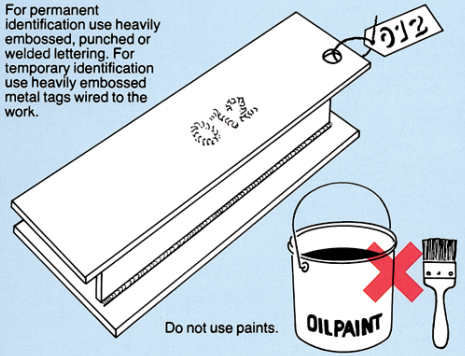
Internal threads and nuts must be tapped oversize after galvanizing to accommodate the thickness of the galvanized coating on the stud or bolt.

Australian Standard 1214 specifies the following oversize tapping allowances:

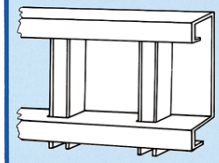
Nominal diameter of internal threads	Allowance, mm
Up to M22	0.40 mm
M24	0.45 mm
M27	0.50 mm
M30	0.55 mm
M36	0.60 mm
M36-48	0.80 mm
M48-64	1.0 mm

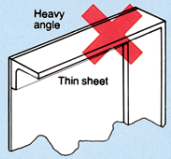


Identification markings
For permanent identification use heavily embossed, punched or welded lettering. For temporary identification use heavily embossed metal tags wired to the work.



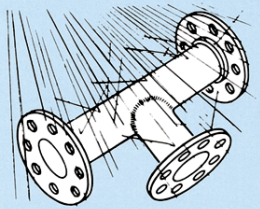
Distortion
Distortion can be prevented or minimised by:
1 Use of symmetrical designs
2 Use of relatively uniform sections
3 Use of accurately preformed members to avoid locked-in stresses
4 Use of balanced or staggered welding techniques to avoid locked-in stresses
5 Large open fabrications and tanks may require temporary cross stays to prevent distortion during galvanizing





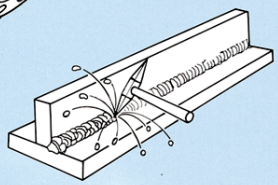
Materials suitable for galvanizing
All ferrous materials are suitable, including stainless steel parts, and sound stress-free castings.

Brazed assemblies may be galvanized, but check first with your galvanizer. 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 slags
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, brackets, hooks or jigs must be provided with significantly large suspension holes or fittings. If in doubt check with your galvanizer