

# Standing the test of time

# 4

## Dimensional stability

In certain cases, fabricated assemblies may be liable to loss of shape when heated to galvanizing temperatures. This is due to the release of stresses induced during manufacture of the steel and in subsequent fabrication operations.

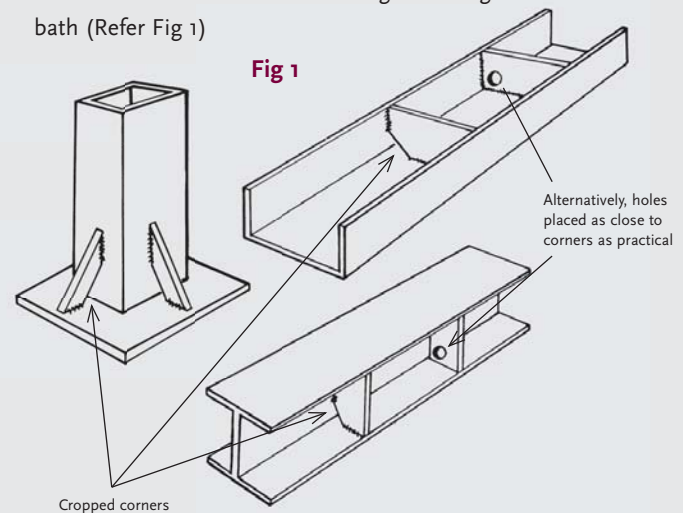
Following these simple recommendations will improve dimensional stability:

- Avoid designs which require double-end dipping to fit into the galvanizing bath. It is preferable to build assemblies and sub-assemblies in suitable modules so that they can be immersed quickly and fully in a single dip (see **Guide Sheet 2**)
- Use symmetrical sections in preference to angles or channels
- Use sections of near equal thickness at joints
- Bend members to the largest acceptable radii
- Accurately preform parts to avoid force or restraint during joining
- Continuously weld joints, if possible using balanced welding techniques to reduce uneven thermal stresses. Balanced, staggered welding is permissible. For staggered welding of material of 3mm and lighter, weld centres should be closer than 100mm
- Design castings to conform to the rules outlined in Guide Sheet 2. Large grey iron castings should always be normalised by the fabricator and then abrasive blast cleaned prior to galvanizing

## Strengthening gussets and webs

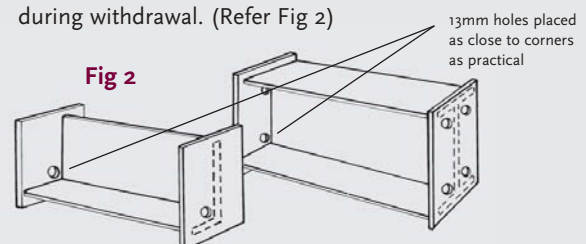
Welded strengthening gussets and webs on columns and beams, along with strengthening gussets in members fabricated from channel sections, should have corners cropped or holed

- 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
- to facilitate drainage during withdrawal from acid and rinse tanks and from the galvanizing bath (Refer Fig 1)



## End plates

Provide holes at least 13mm in diameter in end plates on rolled steel shapes, to allow access of molten zinc in the galvanizing bath and drainage during withdrawal. (Refer Fig 2)



ASTM A384-59 '**Recommended practice for safeguarding against warpage and distortion during galvanizing of steel assemblies**' gives further information. Advice on design to minimise distortion is available from Perry Metal Protection (refer to Guide Sheet 3 for an introduction).

## Corrosion protection

Galvanized coatings provide outstanding corrosion protection for steel. Treatment of design details in accordance with good corrosion design practice will further increase the life of galvanized steel fabrications.

Many of the design requirements for good galvanizing will also ensure good drainage and optimum corrosion resistance.

Fabricated assemblies should be designed to eliminate undrained areas which will collect water and sediment in service, producing localised corrosion pockets.

The following rules should be followed:

- Use butt welds in preference to lap welds
- Where lap welds are used face joints downwards to avoid collection of moisture and sediment
- Avoid use of horizontal boxed sections, ledges, seams and flat undrained areas
- Use rounded internal corners rather than squared corners in vessels and containers to avoid build up of sediment
- Design to eliminate crevices and unnecessary openings
- Avoid contact of galvanized surfaces with brass or copper
- Provide ventilation where possible in condensation areas
- Under conditions of extreme humidity use an inhibitive jointing compound such as Dulux Foster C1 Mastic between contacting galvanized surfaces such as roof overlaps
- Provide maintenance access where anticipated service life of certain components is less than that of the complete structure

### TALKING TECHNICAL

#### *Design, specification and inspection of galvanized products*

To ensure consistently good galvanized steel products, it is essential that the basic requirements outlined in these guides are incorporated at the design and fabrication stages of production.

These technical guides are designed to be introductory only. All design features should be discussed with a member of our advisory team. Close liaison between the design engineer, materials engineer, specifier, fabricator and galvanizer will ensure the highest galvanizing standards. Perry Metal Protection also distributes a free wallchart and a summary booklet.

## Minimum edge distances...

### For holes in structural members

In bolted connections, minimum edge distances from the centre of any bolt to the edge of a plate or the flange of a rolled section should be used as specified in the table below, taken from the Australian Standard 4100 'Steel structures'.

ROLLED EDGE OF A ROLLED SECTION	SHEARED OR HAND FLAMECUT EDGE	ROLLED PLATE, MACHINE FLAMECUT, SAWN OR PLANED EDGE
1.75df	1.50df	1.25df

**Note:** Edge distance may also be affected by clause 9.3.2.4, AS4100

## Metallurgical principles

The galvanizing process has no effect on the mechanical properties of the structural steels commonly galvanized. In susceptible steels the galvanizing process may accelerate the onset of strain ageing which, over time, would occur naturally due to earlier cold working operations.

Strain ageing can be avoided by the use of non-susceptible steels or, when susceptible steels must be used, by adopting the procedures specified in relevant standards, available from Perry Metal Protection.



Perry Metal Protection is a member of the Galvanizing Association of New Zealand, Galvanizers Association of Australia and is ISO9001 certified.

0800 508 506

*For advice on service, quotations and technical knowledge on hot dip galvanizing, contact your local Perry Metal Protection site:*

**Hamilton** 14 Manchester Place, Te Rapa 07 850 0120

**Auckland** 14 Timothy Place, Rosebank 09 820 8471

**Tauranga** 119 Oropi Rd, Greerton 07 541 1344

**Wellington** 129 Hutt Park Rd, Gracefield 04 568 4139

**Christchurch** 5 Chinook Place, Hornby 03 349 0290

Alternatively, visit our website [www.perrymetalprotection.co.nz](http://www.perrymetalprotection.co.nz) or email [enquiry@perry.co.nz](mailto:enquiry@perry.co.nz)