

Best Practice Design for Galvanizing

Using Hollow Sections

Recommended minimum external vent and drain hole sizes and location for hollow sections

All dimensions in mm

Hollow section and nominal dimensions			Number of holes or crops at each end of the hollow section									
			1 hole		2 holes		4 holes		4 holes of 15 mm OR 4 crops of 25 mm AND 1 central hole		2 crops	4 crops
			Diameter of each hole				Diameter of central hole				Size of crop	
CHS	SHS	RHS										
26.9	20 x 20	—	10	10	—	—	—	—	—	—	—	—
33.7	25 x 25	—	10	10	—	—	—	—	—	—	—	—
42.4	30 x 30	—	11	11	10	—	—	—	—	—	10	—
48.3	35 x 35	50 x 20	13	12	10	—	—	—	—	—	11	—
60.3	40 x 40	50 x 25	16	14	11	10	—	—	—	—	13	10
76.1	50 x 50	65 x 35 75 x 25	20	18	14	13	10	10	—	—	16	11
—	—	76 x 38	—	25	—	15	—	11	—	—	20	14
88.9	65 x 65	75 x 50	25	25	16	16	12	11	—	—	25	14
101.6	—	—	30	—	18	—	13	—	—	—	—	—
114.3	75 x 75	100 x 50	30	30	25	19	15	13	—	—	25	17
—	89 x 89 90 x 90	102 x 76 127 x 51	—	35	—	25	—	16	—	—	30	20
139.7	100 x 100	125 x 75 150 x 50	35	40	25	25	18	18	20	20	—	30
—	—	152 x 76	—	45	—	35	—	25	—	35	—	40
165.1	—	—	45	—	30	—	25	—	30	—	—	—
168.3	125 x 125	150 x 100	45	45	30	35	25	25	30	35	20	40
219.1	150 x 150	200 x 100	55	55	40	40	30	30	50	45	35	50
273.1	200 x 200	250 x 150	70	75	50	50	35	40	65	65	60	65
323.9	—	—	85	—	60	—	45	—	80	—	—	—
355.6	250 x 250	300 x 200	—	—	65	65	45	45	85	85	80	80
406.4	300 x 300	350 x 250 400 x 200	—	—	75	75	55	55	100	105	100	95
457.0	—	—	—	—	85	—	60	—	115	—	—	—
508.0	350 x 350	400 x 300	—	—	—	90	65	65	125	125	120	110
610.0	400 x 400	—	—	—	—	100	80	75	150	140	140	130

- Notes:
- Best quality galvanizing is always achieved with fully open ends. Where ends are capped, they must be vented and drain for essential safety and quality reasons.
 - At least one vent hole is required at each end of a capped section and holes must be placed off centre, diagonally opposite, and as near to ends as practical.
 - Internal vent and drain hole sizes differ from the external hole sizes in this Table. Scan the QR code to see details in the full Design Guide.

Handrail Hole Positions

Vent and drain holes in rails and stanchions

Designs which will provide the highest quality HDG finish are:

- Modules within a single plane (straight sections).
- Modular designs that can be bolted together on-site.
- Large vent and drain holes in the hollow sections which will allow the zinc to flow freely and air to escape from inside the article.
- Internal venting of all rail portions inside a stanchion is required if the rail runs continuously through the stanchion.

Designs which will need special consideration to provide the highest quality HDG finish are:

- Handrails with multiple planes (corner or bent sections) so that some parts of the handrail vent and drain slower than others parts within the same handrail. This can affect available hanging angles due to both vent and drain designs and bath size restrictions which could reduce coating quality.
- Vent and drain holes that are internal will need to be verified through the use of external inspection holes.

Using Hot-Rolled Sections

Beams

Leave gaps between Cleats and Flanges

Channels

All Cleats, Gussets, Stiffeners to have corners sniped

Angles

End plates to be vented

Snipe Guide

Nominal Section	Snipe Size (mm)
PFC 150 to 250 above 250	25x25 30x30
Angle 100 to 150 above 150	25x25 30x30
UB up to 250 above 250	25x25 30x30
UC up to 200 above 200	25x25 30x30

(For the smaller sections, a hole is the more preferred option for venting)

Overlapping Surfaces

Holes in one member only

Large Overlapping Areas

Example: Crane Beams

Progressive vent holes required. Hole size to be equal or greater than steel thickness, with a minimum ø12mm

Recommendations for minimum actions at areas of overlap

Area of Overlap	Recommended Action
Up to 10,000 mm ²	Fully sealed weld
10,000 to 100,000 mm ²	In diagonally opposite positions, either 2 x ≥ Ø12 mm holes at the corners, or 2 x ≥ 25 mm spacing of welds at the corners
100,000 to 250,000 mm ²	Either 4 x ≥ Ø12 mm holes at corners, or 4 x ≥ 25 mm spacing of welds at the corners
≥ 250,000 mm ²	In diagonally opposite positions, either ≥ 12 mm holes at the corners and circumferentially at least every 300 mm from the corners ≥ 25 mm spacing of welds at the corners and circumferentially at least every 300 mm from the corners

For designs with intermittent welds the space between overlapping surfaces of two components should be at least **2.5mm**.

Zinc Trap or Air Pocket

Hole positioned close to corner

Angles

Channels

No special venting or draining provisions are required

Purpose of Venting and Draining – External Holes

Sealed Unit
Super heated steam inside leads to explosions

One Hole
Will vent steam but unit will float

Two Holes
Allows unit to vent and drain and to be galvanized inside and out

Hole Position

- Holes should be placed as close to corners and/or connections as practical.
- Holes must be located as close to the high and low points of hollow sections as possible to prevent air locks, entrapment of pre-treatment chemicals and zinc puddling.

Hole Size

- Absolute minimum hole size is ø10mm
- Hole diameters should be at least the same size as the steel thickness.
- Having bigger holes (where feasible) is always better for the galvanizing outcome.

Hanging for Drainage Quality

Zinc drips off causing spikes and a very rough surface

Natural drain to one point. Remember to ensure suitable hanging points to minimize touch marks

Where possible, think 45 degrees!

Open Ends Preferred A

Properly Drained Preferred B

Centre Hole Unsatisfactory

Zinc Trap

Open Ends Preferred A

Opposite Drain Holes Preferred B

Centre Hole Unsatisfactory

Completely sealed fabrications cannot be galvanized

Open Mitted Joints

Open Ends

IMPORTANT! External inspection hole required to check internal venting (min ø10mm)

Thick + Thin = Distortion

Thin sheet

Heavy angle

Avoiding Distortion – Basic Design Rules

- Maximise the uniformity of heat transfer into and out of the steel.
 - Ensure venting and draining is adequate. This will allow the article to be immersed in and withdrawn from the molten zinc as quickly as possible.
 - Minimise section thickness variations wherever possible in the fabrication.
- Remember, steel will expand around 5mm per metre over its length at 450°C
- Minimise the effect of stresses while the article is in the molten zinc.
 - Use symmetrically rolled sections in preference to angle or channel frames. I-beams are preferred to angles or channels.
 - Ensure assembly and welding techniques minimise stresses in components making up the article.
- Avoid designs that require double dipping. It is preferable to build assemblies and sub-assemblies in suitable modules allowing for quick immersion and galvanizing in a single dip so the entire article can expand and contract uniformly.
- Ensure the structural design of the item is sufficient to support its own weight at 50% of the steel's specified yield strength.
- Avoid using large areas of thin (under 8mm), unbraced flat plate.
- Use temporary bracing or reinforcing on thin-walled and asymmetrical designs.

Identification Markings

012

Permanent identification

Recommended methods are:

- Heavily embossed markings
- Punched markings
- Welded markings

Temporary identification

Before and after galvanizing: recommend use of heavily embossed metal tags, generally attached to the article via wire.

Only before galvanizing: recommend water-based paints/markings pens.

Identification methods not acceptable:

- Oil-based paints/markings pens
- Stickers

Do Not Use OIL PAINTS