

## Technical Delivery Terms and Conditions for Hot-Dip Galvanising of Steel

### 1. Damage liability

- 1.1 The Hot Dip Galvaniser (HDG) undertakes to take due care of the products received and to carry out technically correct procedures throughout the galvanising process.
- 1.2 The HDG will not accept liability for damage to products caused by the unsuitability of the substrate for the process in question.
- 1.3 Guidelines setting out the requirements for products prior to hot-dip galvanising are provided in the Norwegian standard NS-EN ISO 1461:2022 (*Hot dip galvanized coatings on fabricated iron and steel articles – Specifications and test methods*), and in the book *Varmforzinking* (Hot-Dip Galvanising), published by Nordic Galvanizers. NS-EN ISO 14713-2:2020.

### 2. Information required from customer

- 2.1 The customer is responsible for providing the HDG with the following information necessary to ensure that the HDG can meet the standards set out in the NS-EN ISO 1461:2022 and NS-EN ISO 14713-2:2020 standards.

#### A1: Essential information

The customer shall provide the number of these international standards (NS-EN ISO 1461:2022 and NS-EN ISO 14713-2:2020), with details of any specially tailored requirements and purposes.

#### A2: Additional information

The following information may be required for particular purposes and, if so, must be supplied or specified, as applicable, by the customer in accordance with the NS-EN ISO 1461:2022, Annex A (*Information to be supplied*) and NS-EN ISO 14713-2:2020 standards.

- a) The composition or any specific properties of the substrate metal that may affect hot-dip galvanising
- b) The presence of flame-cut, laser-cut or plasma-cut surfaces
- c) An indication of so-called “significant surfaces”, either in the form of drawings or the provision of suitably labelled samples
- d) Drawings or other means of indicating the locations of surface unevenness, such as rounded drops or contact marks, that will make the coated product unacceptable for its intended purpose. The customer shall discuss solutions to such problems with the HDG
- e) In situations where manufactured products delivered for galvanising include internally-vented and enclosed cavities, written documentation of such design features must be submitted to the HDG prior to the start of work. This is to ensure that the correct placement and size of venting devices are implemented
- f) A sample or other item showing the required finish
- g) Any tailored pre-treatment requirements
- h) Any tailored coating thickness requirements
- i) The need for, or acceptability of, a centrifuged coating designed to meet the requirements set out in Table 4
- j) Any post-treatment processes or over-coating following galvanisation
- k) Inspection procedures

- 2.2 The HDG shall, on request, provide any available and relevant information, including reconditioning methods for uncoated areas.
- 2.3 All of the aforementioned references are taken from the NS-EN ISO 1461:2022 and NS-EN ISO 14713-2:2020 standards. Deviations from these standards may occur in some situations.
- 2.4 Any such deviations take precedence over these General Sales and Delivery Terms and Conditions and the Technical Delivery Terms and Conditions set out below.
- 2.5 These General Sales and Delivery Terms and Conditions and the Technical Delivery Terms and Conditions set out below shall also apply to any additional services such as crane operation and thread cutting, item collection and assembly work (as required), transport and welding, etc.
- 3. Suspension**
- 3.1 Provided that they are sufficiently robust and conveniently located, the HDG will use existing holes, handles, latches, loops and other devices as a means of suspending the product during galvanising. The HDG cannot be held liable for any damage that may result from defects in these devices. The customer is responsible for ensuring that robust lifting points are conveniently located. If there is a risk of damage, the customer must provide clear notification of this on delivery of the product for processing. The burden of proof that such notification was provided in a timely manner rests with the customer.
- 4. Complex structures**
- 4.1 Complex structures are processed as single units. If the customer requires the HDG to dismantle parts and process them separately, this must be clearly stated on the manifest and subsequently confirmed.
- 5. Hole cleaning, wire brushing and re-threading**
- 5.1 Hole cleaning, wire brushing and re-threading (re-cutting) are regarded as supplementary tasks that are only carried out by prior agreement. Parts must not contain machining burrs, jagged cuts or welding wire residues. Rust may develop on threads after re-cutting.
- 6. Tolerances**
- 6.1 The customer is responsible for ensuring that there are adequate gaps between closely adjacent surfaces such as hinges or threaded devices, etc. so that the relevant parts can be articulated after galvanising. It is not reasonable to expect that internal or external threads will articulate properly after galvanising.
- 7. Masking**
- 7.1 All surfaces that the customer does not wish to be galvanised must be clearly marked on the purchase order and on the customer's manifest.
- 7.2 An extra charge will be made for masking surfaces that shall not be galvanised.
- 7.3 It may be difficult to effectively mask some surfaces due to inconvenient location or size.

## **8. Decontamination**

- 8.1 All substrates must be free of paint, varnish, grease, oil, storage rust, zinc, and other contaminants and products that cannot be removed by the standard pickling process.
- 8.2 An extra charge (to be paid by the customer) will be made for additional decontamination tasks.
- 8.3 In situations where a substrate is contaminated by workshop markings made by contrast dyes, weld indicators, marker sprays, drilling or cutting oils, coolants or lubricants, etc., the customer should advise the HDG as to whether or not such markings are likely to be removed by the standard pickling process.
- 8.4 If such markings are difficult to remove, an extra charge (to be paid by the customer) will be made for the necessary mechanical cleaning, re-galvanising or repairs.

## **9. Welded seams and other fixings**

- 9.1 The customer must ensure that all welded seams are free from welding cinder. Cinder residues will result in clearly-defined, black, uncoated areas following galvanising. The HDG cannot be held liable for such defects.
- 9.2 The HDG cannot be held liable for poorly coated patches and rust caused by weld seepage, such as the emission of pickling solutions from very small cavities in welds (pin holes) or from narrow spaces between two closely adjacent contact surfaces that have been spot welded, bolted or riveted together.

## **10. Substrate defects**

- 10.1 The HDG is not liable for poor applications of the zinc coat following dipping due to milling defects, welding cinder, or other substrate defects such as casting sand inclusions or crack propagation in metal castings, which are the result of hidden stresses in the metal or metal thickness variations.
- 10.2 Deformation and non-alignments due to stresses inherent or induced in the material are not the responsibility of the HDG. An additional charge will be made for preliminary treatments such as pre-heating designed to reduce stresses.

## **11. Changes in materials**

- 11.1 The customer must bear the risk linked to any changes occurring in the materials, such as aging or brittleness resulting from material reactions during processing.
- 11.2 Please note in particular that the hot-dip galvanising of steel with a yield strength of 1000 N/mm<sup>2</sup> or more may result in brittleness. Such materials should not be subject to the hot-dip galvanising process.
- 11.3 Please note also that welding and the flame-, laser- and plasma-cutting of edges will affect silicon content. The HDG is thus unable to guarantee coating thickness or adhesion quality along such edges. We refer to NS-EN ISO 1461:2022, subsection 6.2.3 (*Reference areas*), and the NS-EN ISO 14713-2:2020 standard.

**12. Steel quality**

- 12.1 Certain qualities of steel bond more strongly with zinc than others, resulting in a thicker zinc coat. This will cause the coat to appear dull and grey, and it may be particularly susceptible to mechanical impact due to its poor adhesion. The HDG cannot be held liable for such effects and any additional processes required as a result will be subject to an additional charge.

**13. Venting and draining**

- 13.1 Unvented enclosed cavities must not be galvanised because these may represent a risk of explosions during hot-dip processing. Tanks, closed containers and voids, hollow sub-assemblies (e.g. pipe spools and similar) and gaps between welded surfaces, must all be drilled out to provide vent and/or drain holes. If the product has previously contained a flammable substance, this must be completely removed to prevent the risk of fire and/or explosions.

Individual assemblies may require both vent and drain holes, as well as suspension holes if no other suspension points are available. The drilling of such holes is regarded as a supplementary task. The correct placement of such holes demands specialist technical expertise and should thus either be carried out by the HDG or agreed beforehand in consultation with the HDG. The HDG cannot guarantee the successful galvanising of channel or other closed profiles. Nor can he be held liable for any damage caused to galvanised products, or any collateral damage resulting from subsequent internal corrosion of channel profiles.

**14. Seals and vent pipes**

Except by special agreement, the HDG will not carry out the installation of seals, vent pipes, protective sleeves or similar, on articles received for processing. The installation of such items is regarded as a supplementary service that will be charged to the customer at the customer's own risk.

**15. White rust**

The occurrence of white rust (basic zinc oxide) shall not constitute grounds for return or rejection. We refer to NS-EN ISO 1461:2022, subsection 6.1 (*Appearance*).

**16. Substrate suitability for galvanising**

- 16.1 The customer is responsible for ensuring that the steel types and compositions he submits are suitable for hot-dip galvanisation, i.e. the desired result is achieved by the standard hot-dip process without extended dip time. The selection of steel type and material design shall be made by the customer in compliance with the NS-EN ISO 14713-2:2020 standard.

**17. Reconditioning and touching-up**

- 17.1 Zinc needles and pimples will be ground down and rounded to approximately 1mm in diameter. Flaws such as circular zinc flakes up to 5mm across (that occur typically at the edges and corners of products) will be protected against corrosion by the surrounding zinc coat (cathodic protection). Repair is thus not necessary for protection purposes. In the case of elongated patches of exposed steel where zinc flakes less than 3mm wide have peeled off, such as at edges or similar, these will also be protected. Aftercare measures may include metallisation, zinc paint, or zinc applied with a gas flame. The coat thickness on repaired areas should be a minimum of 100 µm (micrometres).
- 17.2 It is normal for ash residues to collect in inaccessible places on the inside of pipework, pipe spools, enclosed cavities, tanks and containers after hot-dip galvanising. Such residues may

be corrosive and the HDG accepts no liability for such internal corrosion. The HDG will not remove such ash residues or zinc dust that collects in holes, threads and corners.

- 17.3 Based on its professional evaluation, the HDG reserves the right to select the best available method of repair, unless the customer has specified a preferred method at the time of submission of the product.
- 17.4 The HDG is not responsible for overcoating items after hot-dip galvanising. Such processes should be carried out by a paintwork contractor.

*Excerpt taken from the Nordic Galvanisers Guidelines.*

*For more information, please visit the Nordic Galvanisers website:*



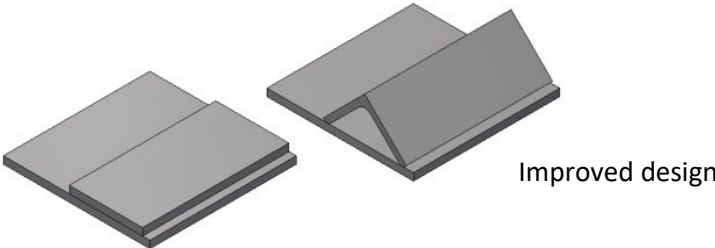
Stockholm, Sweden, tel. +46 (0)8 446 67 60

info@nordicgalvanizers.com,

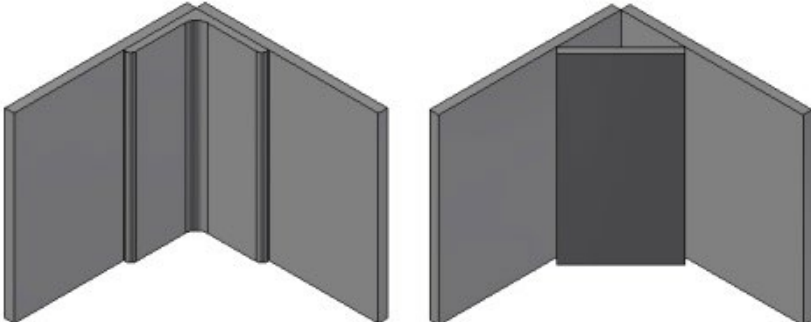
[www.nordicgalvanizers.com](http://www.nordicgalvanizers.com)

We refer also to the reference: NL 09 "General Delivery Terms and Conditions" (*Alminnelige leveringsbetingelser*).

# Suggestions for product design and hole drilling prior to hot-dip galvanising

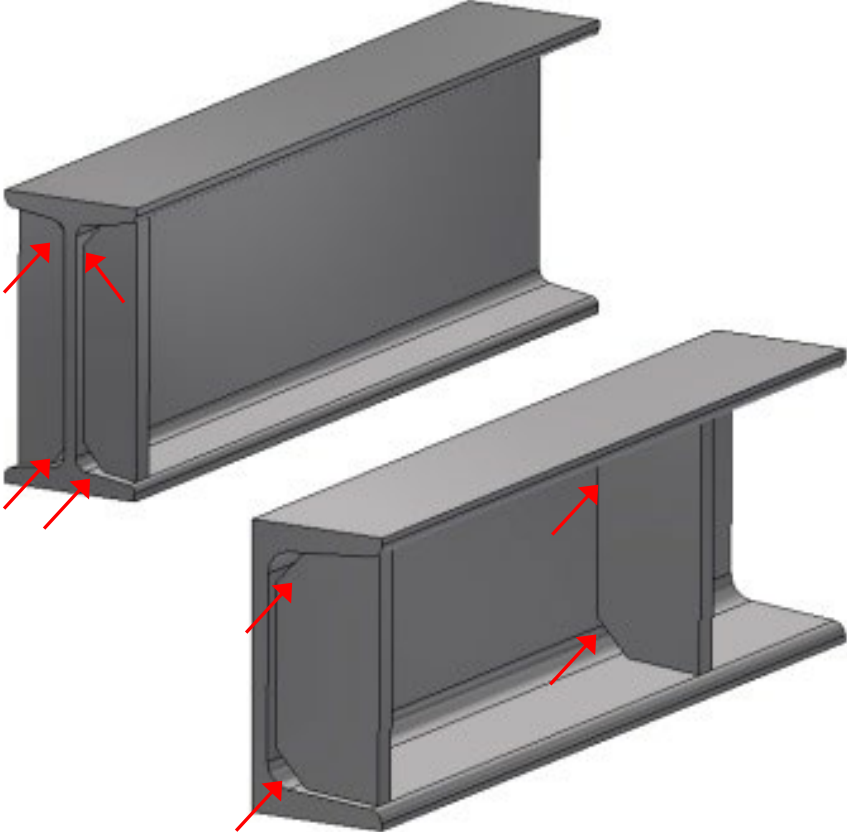


Unsuitable design (pre-treatment fluids may seep out following HDG)



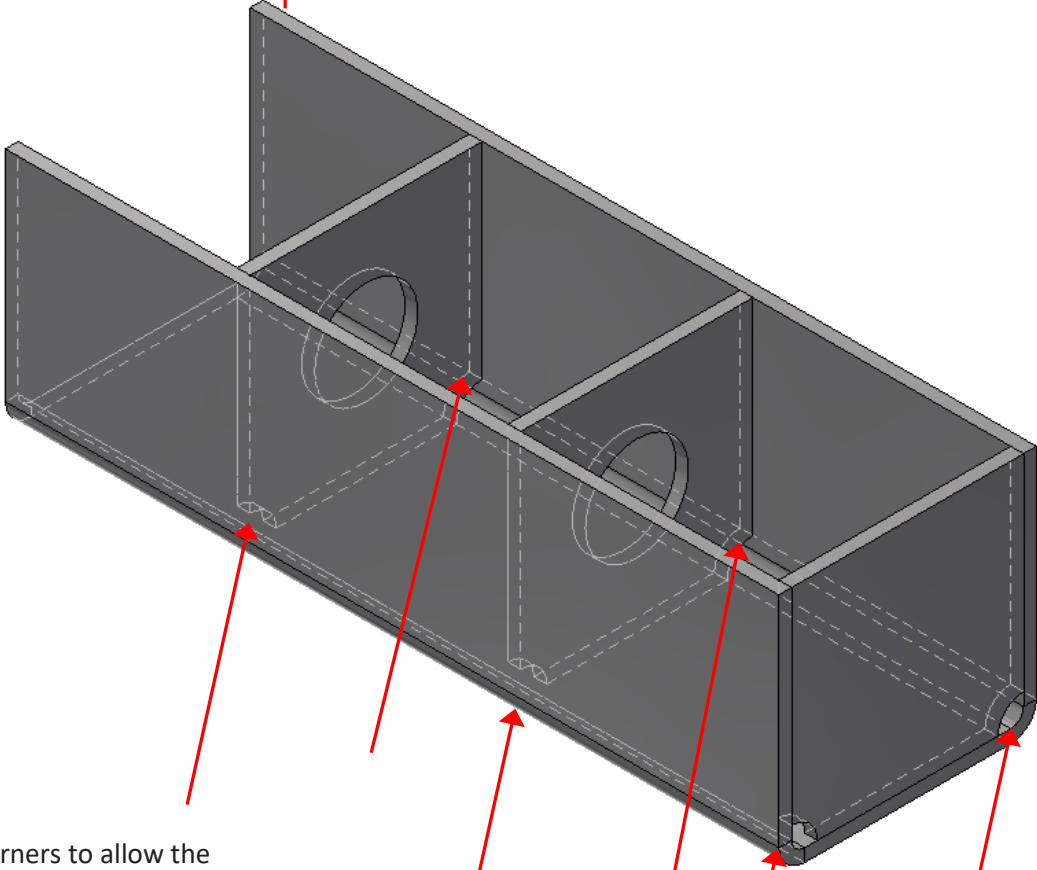
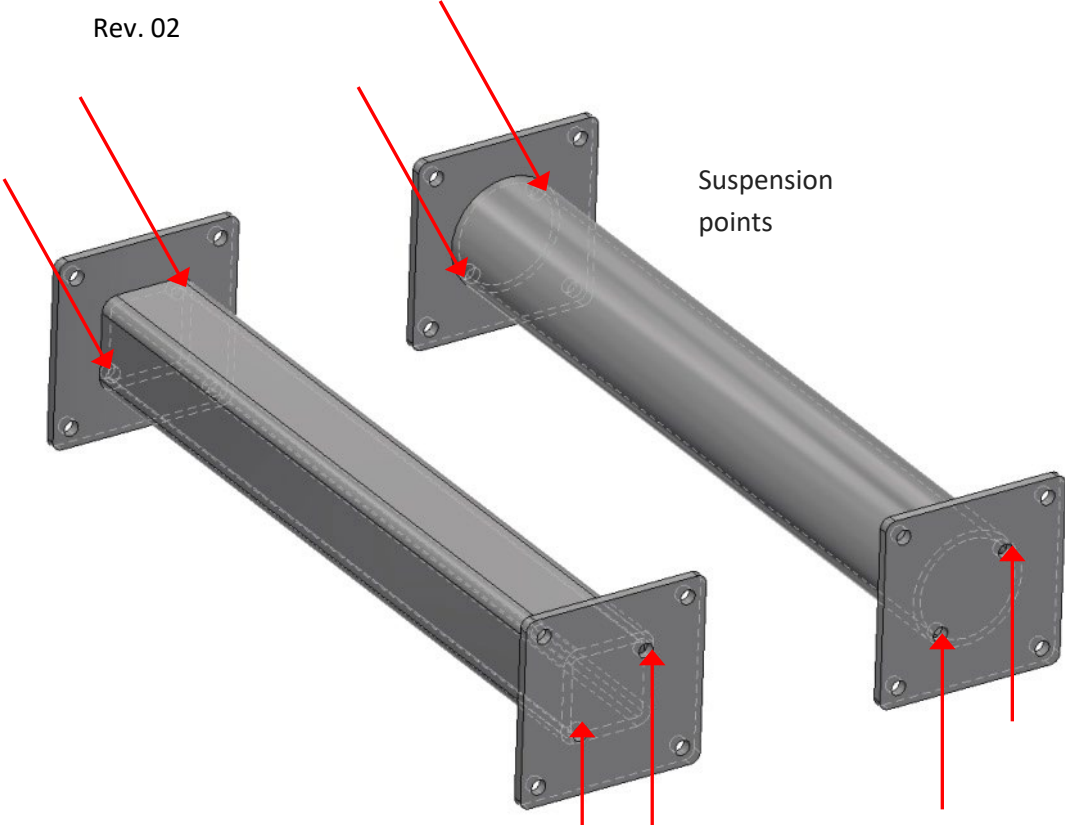
Unsuitable design (pre-treatment fluids may seep out following HDG)

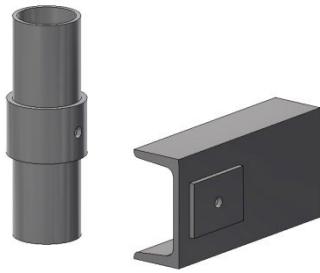
Improved design



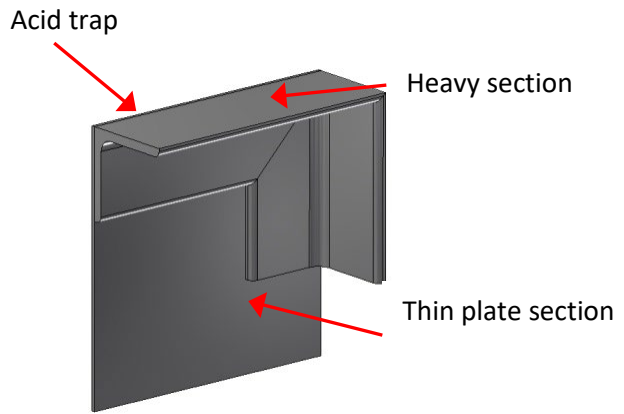
Cropped corners to facilitate drainage

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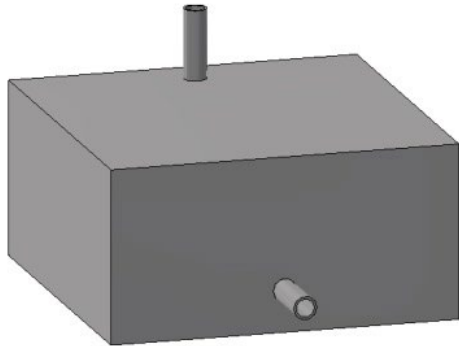




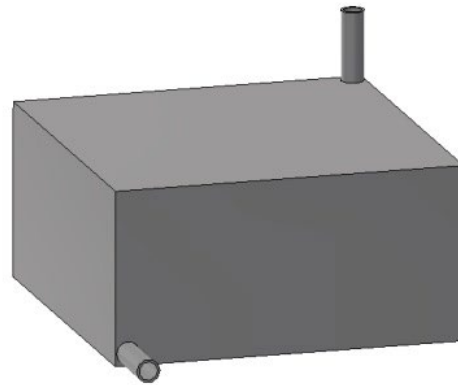
Objects with welded-on reinforcements and lap joints must be provided with holes if the contact area between the sections is greater than 7 cm<sup>2</sup>. Acid traps that may arise must be accepted because the explosion hazard becomes too great if no hole is drilled



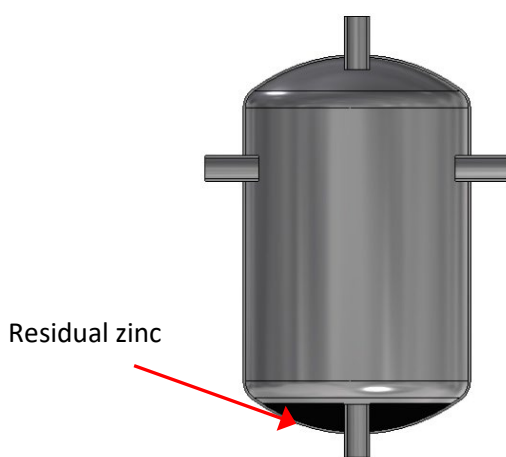
Do not weld together sections that differ markedly in thickness. Variations in heating and cooling rates after dipping may result in deformation



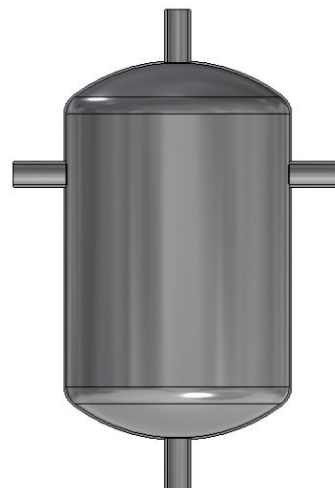
Unsuitable design



Improved design



Unsuitable design

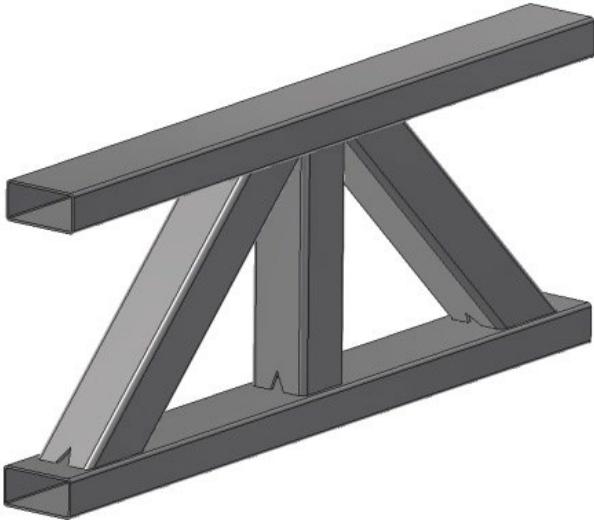
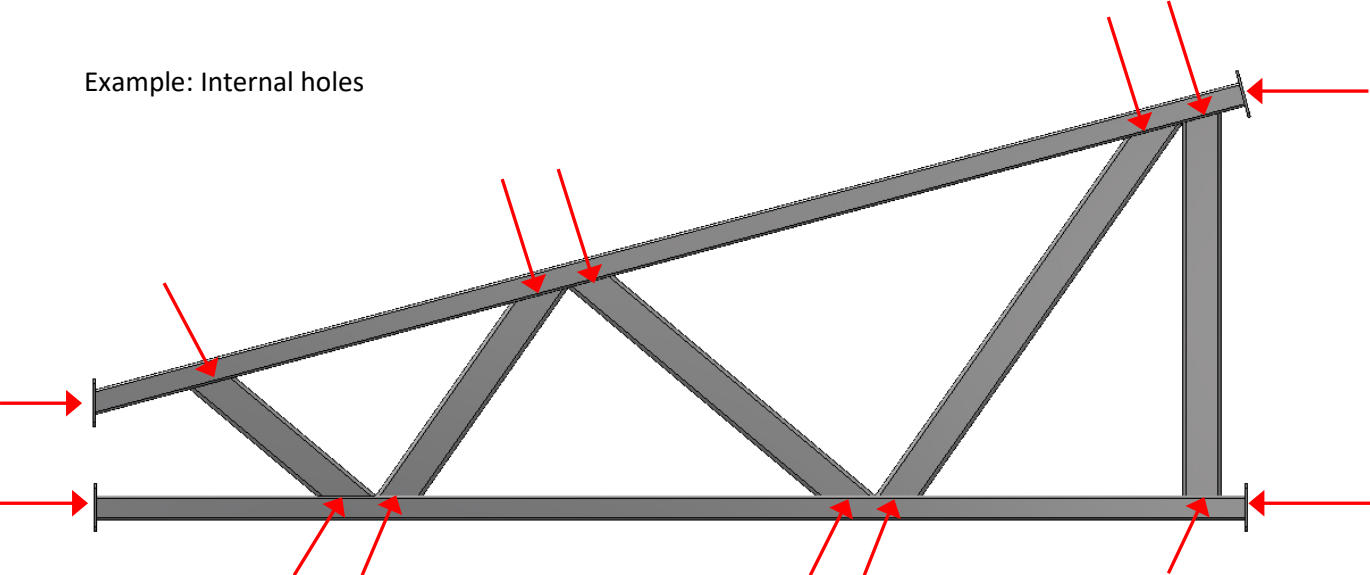


Improved design

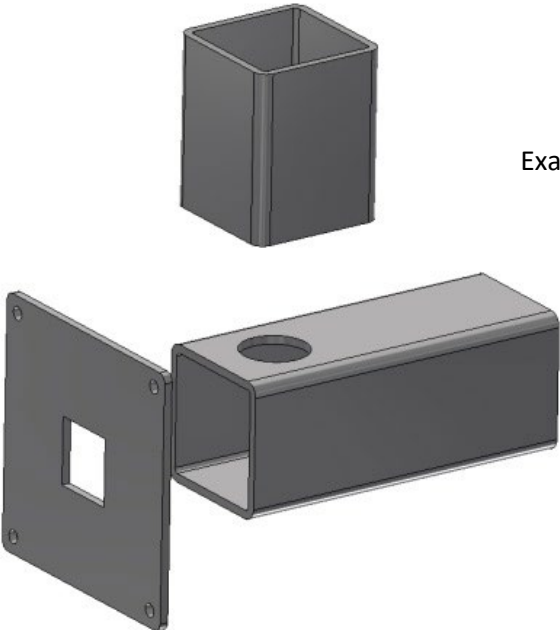
Inward-projecting pipe connections prevent containers from being completely emptied of zinc and flux. Pipe connections should be oriented diagonally close to corners. Pipe connection diameter: 50 mm for each 500 litres container volume is an ideal rule of thumb. Large tanks should be fitted with lifting eyes to facilitate handling



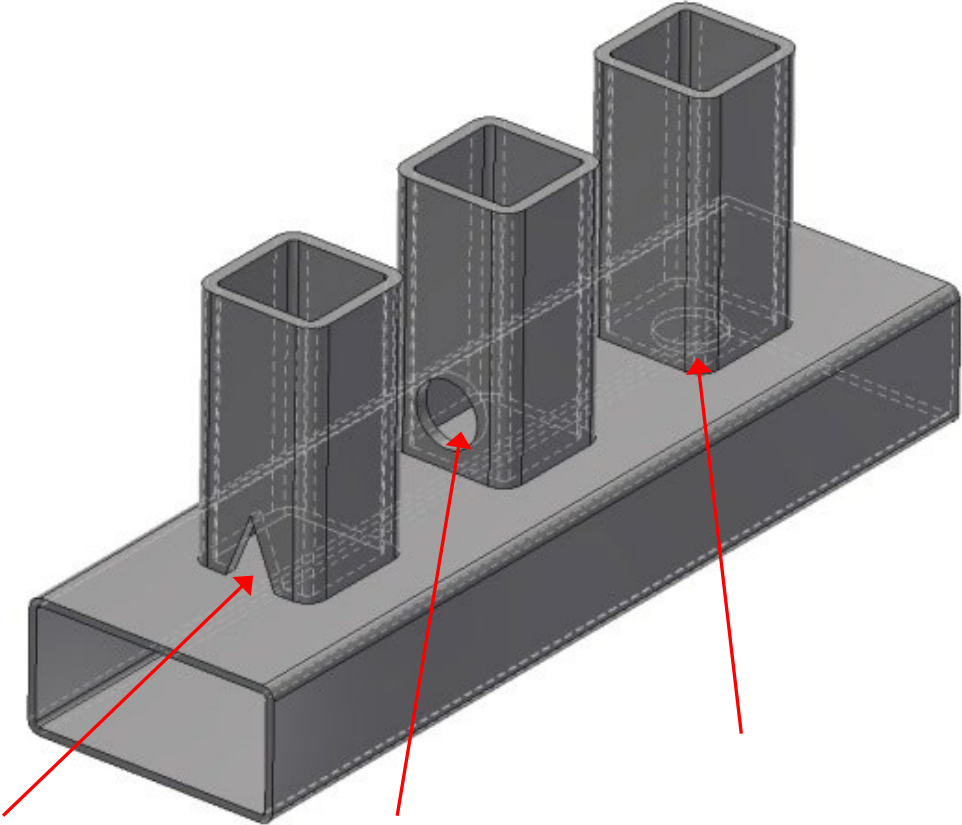
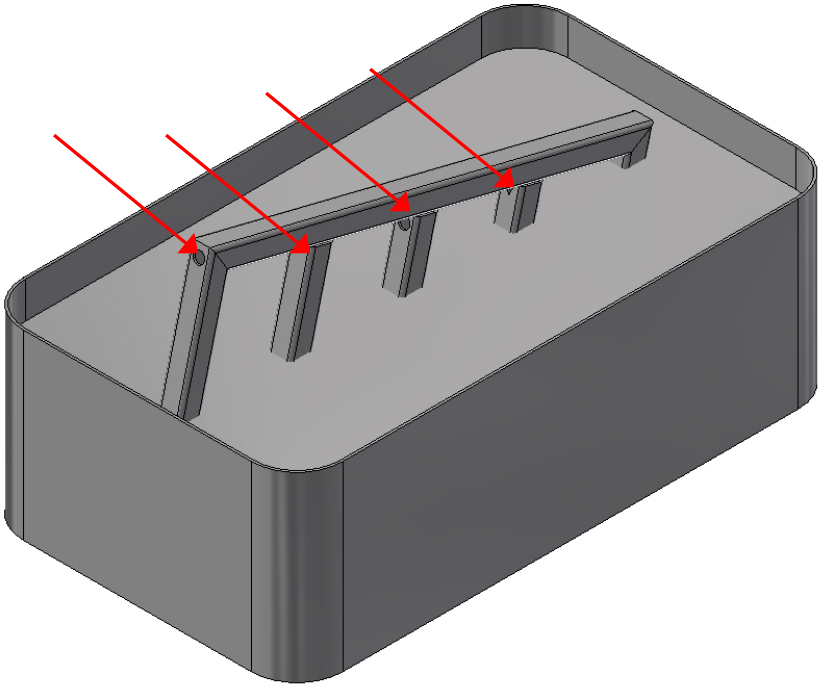
Example: Internal holes



Example: External holes

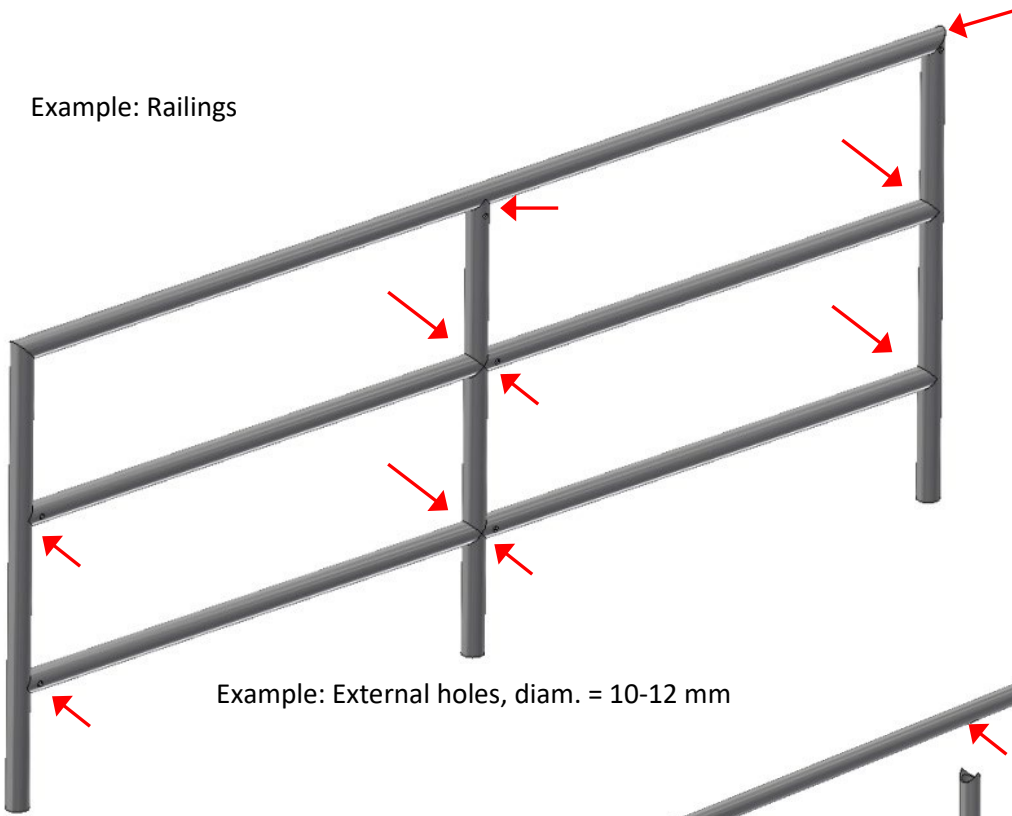


Example: Internal holes



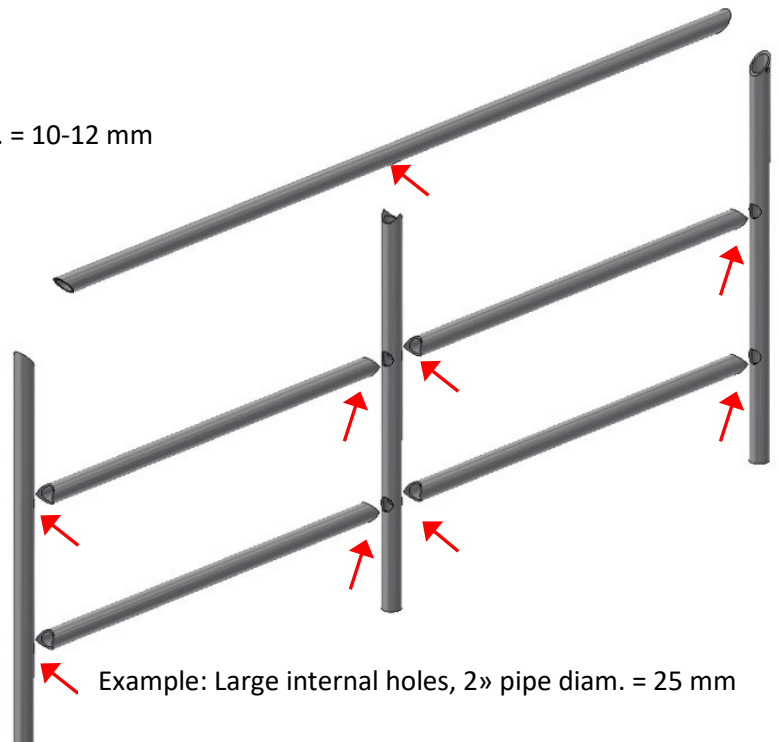
Example: External and internal holes

Example: Railings

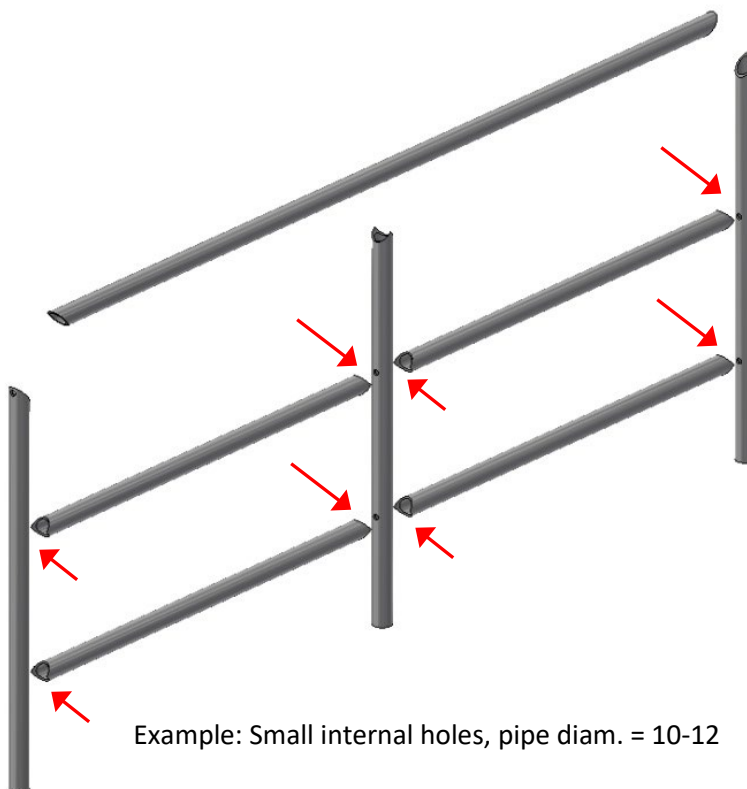


Example: External holes, diam. = 10-12 mm

Inner pipe diameter mm	Hole diameter mm
Less than 13	5-6
13-25	6-8
25-40	8-10
40-50	10-15
50 and greater	>15



Example: Large internal holes, 2» pipe diam. = 25 mm



Example: Small internal holes, pipe diam. = 10-12