

# Nordic Galvanizers' technical delivery conditions for hot-dip galvanizing as contract work

March 2023

## 1.0 Liability in damages

**1.1** The hot-dip galvanizer ("HDG") will take well care of the items delivered for hot-dip galvanizing or other treatment and give them a professionally correct treatment.

**1.2** HDG will exercise the attention and care required but assumes no responsibility to treat items the condition of which is such that they will be damaged or cause damage during treatment, without HDG's knowledge.

**1.3** The instructions as to which requirements to be made of items to be hot-dip galvanized are available in Danish Standards - DS/EN ISO 1461:2022 which includes specific information about film thickness requirements. The Customer should procure a copy from Danish Standards.

## 2.0 Information which the Purchaser must submit to HDG

**2.1** It is the Customer's responsibility that HDG receives the following information which is necessary for HDG to comply with DS/EN ISO 1461:2022.

**A1: Main information** The Customer must inform HDG about the standard's number, i.e. DS/EN ISO 1461:2022, as well as the Customer's special requirements and wishes for special purposes.

**A2: Further information** The following information can be necessary for special purposes, and if so, it must be provided or specified by the Customer according to DS/EN ISO 1461:2022, Annex A.

- a. The composition and properties, if any, of the base metal which may affect the hot-dip galvanizing.
- b. The presence of flame-cut, laser-cut or plasma-cut surfaces on the items.
- c. Specification of significant surfaces, e.g. by way of drawings or suitably marked sample.
- d. Drawing or otherwise to show how irregularities in the surface, e.g. round drops or contact marks, render the hot dip galvanized item unacceptable for its contemplated use. The Customer must discuss how to solve such problems with HDG.
- e. If items sent for hot-dip galvanizing includes internal, ventilated, closed cavities, HDG must be provided with written evidence about such structural details before carrying out the work to ensure that the correct location and size of venting measures have been ensured.
- f. A sample or otherwise to show the required finish.
- g. Special requirements, if any, of pre-treatment.
- h. Requirements for the coating thickness, if any.

- i. Need for or acceptance of hot-dip galvanizing being performed in centrifuge plants and that the coating thereby complies with the requirements specified in Table 4.
- j. Additional treatment or coating, if any, to be applied to the zinc surface after hot-dip galvanizing.
- k. Inspection measures.

**2.2** By request, HDG must submit the relevant information in HDG's possession, including information about the method of repairing un-coated areas.

**2.3** All references above refer to special sections and notes of DS/EN ISO 1461:2022. – Individual quotations may contain deviations from the standard.

**2.4** Such deviations precede the general conditions of sale and delivery and the technical delivery conditions below.

**2.5** These general conditions of sale and delivery and the technical delivery conditions below also apply to all additional services, such as, but not limited to, craning and threading, assembly and mounting, transport and welding.

### 3.0 Hooking, mounting

**3.1** HDG will use the holes, handles, straps, hoops, etc. present on the item for mounting during treatment if they appear to be sufficiently sturdy and in locations suitable for HDG, but HDG cannot assume responsibility for any harmful effects hereof as it is the Customer's responsibility that working points and/or sufficiently sturdy lifting lugs exist. Accordingly, the Customer must provide an explicit warning when delivering the item for hot-dip galvanizing if a risk of harmful effects exist. The burden of proof regarding the provision of such timely warning rests with the Customer.

### 4.0 Compound objects

**4.1** Compound materials will be hot-dip galvanized as one structure. If the Customer wants HDG to dismantle parts and treat them individually, this must be confirmed and stated clearly in the delivery note.

### 5.0 Cleaning, brushing, cutting

**5.1** Cleaning of holes as well as cutting or brushing threads will be performed at a surcharge and only according to prior agreement. The items must be free from burrs from cuttings, bad cuts and wire pieces from welding. Subsequent rust formation may occur after cutting.

### 6.0 Tolerances

**6.1** It is the Customer's responsibility to ensure suitable spaces between adjacent surfaces, such as in hinges or threads, if the parts are to be movable or threadable after hot-dip

galvanizing. – Internal as well as external threads cannot be expected to be threadable after hot-dip galvanizing.

## 7.0 Coverage

**7.1** Any surface part which is not to be hot-dip galvanized must be clearly specified in the order and in the Customer's delivery note.

**7.2** Coverage of such surfaces will be performed at a surcharge.

**7.3** However, the location or extent of a surface may hinder its effective coverage.

## 8.0 Additional cleaning

**8.1** All materials must be free from paint, lacquer, grease, oil, pitting, zinc or other impurities and products which cannot be removed in a standard staining process.

**8.2** The costs of removing such build-ups will be charged to the Customer.

**8.3** When using auxiliary means, such as contrast colour, welding spray, marking writing, cutting oil or coolant etc., the Customer must inform HDG whether this product can be removed in a usual staining process.

**8.4** When using unsuitable "auxiliary means", mechanical cleaning before re-galvanizing or subsequent repairs will be carried out at the Customer's expense.

## 9.0 Welds and other joints

**9.1** The Customer must have cleaned all welds of slag. Slag remnants on the welds will appear clearly black and without zinc after hot-dip galvanizing. – HDG cannot be held responsible for this.

**9.2** Nor can HDG be held responsible for stains and rust formations which are due to remnants of stain acid in leaky welds or narrow spaces, e.g. between bolted or riveted surfaces.

## 10.0 Errors in the initial material

**10.1** HDG cannot be held responsible for errors in the zinc coating which are due to roller errors, weld slag or other errors in the initial material, such as moulding sand included in castings, or cracks in castings which are the result of immersion into the zinc bath because the item has hidden tensions or uneven wall thicknesses.

**10.2** HDG is not responsible for deformations and warping which are the result of existing or new tensions in the material and measures, if any, to prevent this, e.g. pre-heating, will be performed at a surcharge.

## 11.0 Material changes

**11.1** The Customer is responsible for changes in the item's materials, e.g. aging or other brittleness caused by the material's reaction during the treatment.

**11.2** Please note that in hot-dip galvanizing of steel with a tensile strength of 1000 N/mm<sup>2</sup> or above, hydrogen embrittlement may occur which is why such materials should not be treated in a contract galvanizing plant.

**11.3** Please note in particular that flame / plasma cutting or laser cutting of edges will affect the silicon content which is why HDG does not guarantee the film thickness and adhesion to these. To be sure to achieve the required layer thicknesses and to ensure sufficient cohesion or adhesion of the coating, flame cut, laser cut, and plasma cut surfaces should be cold worked until unaffected material and sharp edges are removed before handing over to the hot-dip galvanizer. See also point A.2, b) and ISO 14713-2:2019, 6.6.1.

## 12.0 Steel grade

**12.1** Some steel grades alloy more severely with the zinc than others and will therefore have a thicker zinc layer. This thicker zinc layer is often matt and grey and very vulnerable to mechanical impacts due to the inferior adhesion. – HDG cannot be held responsible for this, and special costs, if any, for the hot-dip galvanizing of such steels are subject to a surcharge.

## 13.0 Vents, drains, boring

**13.1** If closed cavities are immersed into a hot-dip galvanizing bath, it presents a risk of a violent and hazardous explosion due to the sudden evaporation of unexpected included liquids. Containers, closed vessels, closed cavities, hollow structural components, e.g. in pipe structures and similar, as well as spaces between welded surfaces must be bored to ensure venting and drainage. If the item contained a flammable substance, it must be completely cleaned of it as it could otherwise catch fire or explode. The individual parts may require hooking holes if no other suitable hooking options exist. Boring holes is subject to a surcharge. The decision about the location of the holes requires special expert knowledge and should therefore be left to HDG or agreed with HDG in advance. HDG reserves its position in relation to hot-dip galvanizing of closed profiles such that HDG is not responsible for damage to the galvanized product or damage caused by it which is due to internal corrosion of the profile as HDG points out that ash remains may occur inside pipes which cannot be removed by HDG. Such ash remains may be corrosive and HDG denies the responsibility for such corrosion from within.

## 14.0 Packing flanges and ventilation pipes

**14.1** HDG will not accept delivery and mounting of packing flanges, ventilation pipes, protective sockets and similar unless a special agreement has been made. Such services are provided at a surcharge and without any responsibility.

## 15.0 Oxidising

**15.1** The development of Oxidising is not a cause for discarding, see DS/EN ISO 1461:2022 (Clause 6.1).

## 16.0 The material's suitability for hot-dip galvanizing

**16.1** The Customer is responsible for the steel types and steel composition being suitable for hot-dip galvanizing to ensure that the target quality can be achieved in a normal, routine immersion process (without extended immersion times). The Customer selects the steel and material design according to DS/EN ISO 14713 (2019).

**16.2** In hot-dip galvanizing of aluminium-calmed steel with a low content of silicon (Si <0.03 w%), it can be very difficult to meet the requirements for film thickness, even at extended immersion times in the molten zinc, see DS/EN ISO 1461:2022. If the reactivity is too low, HDG cannot influence it by extending the immersion time. For items with steel profile thicknesses above 3 mm made from steel with compositions  $\leq 0.01\%$  silicon, which also have aluminum content  $> 0.035\%$ , and which exhibit very low reactivity during hot-dip galvanizing and therefore cannot meet the minimum hot-dip galvanizing layer thickness in table 3, the next lowest category of steel profile thickness, specified in column 1 of table 3, shall be used. See further information under point 6.5 of DS/EN ISO 1461:2022. If lower than normal layer thicknesses cannot be accepted, the steel must be blast cleaned before hot-dip galvanizing. Alternatively, a steel type with a higher silicon content can be used,  $>0.15\%$  w%. See Clause 12.1 regarding the use of steel with a very high silicon content. Contact HDG for advice and instructions.

## 17.0 Completion of materials (finishing)

**17.1** Pointed zinc spikes and beads must be sanded and rounded to approximately 1 mm. Damage such as small, circular zinc scaling with a width of up to 5 mm which is typically seen on material edges and corners will be cathodically protected by the surrounding zinc coating which is why repairs are not required in relation to the corrosion protection. The steel surface of long zinc scaling with a width of less than 3 mm which may occur on edges of items, etc. will also be cathodically protected. Subsequent repairs, if any, will be made by zinc spraying, zinc based paint or soldering zinc. The film thickness of repaired areas must be at least 100  $\mu\text{m}$ .

**17.2** Ash remains at inaccessible places of pipes, pipe structures, internal cavities, tanks and containers after hot-dip galvanizing are normal. These ash remains may be corrosive and HDG denies the responsibility for such corrosion from within. HDG will not remove any ash remains and accumulated zinc from holes, threads, corners, etc.

**17.3** If the Customer has not made requirements in relation to a specific repair method at the delivery of materials for hot-dip galvanizing, at the latest, the best suited method will be chosen according to the professional assessment of HDG.

**17.4** HDG will not prepare the materials for paint after hot-dip galvanizing as this treatment is