

HOT DIP GALVANIZING FOR GENERAL AND ARCHITECTURAL PURPOSES

(Amended May 2006)

The achievement of a quality hot dip galvanized coating, for general and architectural use, is dependent on many issues, some controllable and some not. This checklist addresses the issues that can be controlled by the designer and those controllable by the galvanizer.

AG – Architectural Quality additional to SANS 121 (SABS ISO 1461).

See also HDGASA 03-2006.

GG – Normal General Hot Dip Galvanizing to SANS 121 (SABS ISO 1461)

Y/N – Was this criteria achieved, yes / no?

Design Aids:

#1- SPG – “Steel Protection by Hot Dip Galvanizing and Duplex Coatings” or “Design for Hot Dip Galvanizing”, wall chart, contact the Association for a copy. The latter publication is free plus postage.

Reference can also be made to SANS 14713.

Duplex Coatings:

#2- Provided the primer is applied shortly (within 4 hours in moist conditions and within 8 hours in dry conditions) after hot dip galvanizing has been carried out; passivation by the galvanizer should be excluded. This step in the process is extremely important, if intercoat adhesion is to be achieved. If application of the paint coating cannot be guaranteed to be applied shortly after hot dip galvanizing and particularly in moist environments, passivation by the galvanizer should be encouraged. The reason for the latter instruction is to prevent the formation of wet storage stain, which must be removed prior to painting.

Lead Times:

#3- In the case of large contracts, the galvanizer should be involved at the programming stage with the fabricator and the end user. Hot dip galvanizing is normally the final process after fabrication and prior to delivery and erection. If sufficient time for hot dip galvanizing, cleaning, fettling and inspection is not provided in the overall programme, costly delays may occur at the erection stage.

Certificate of Conformance:

#4- A certificate of conformance is required to ensure that all fettling prior to coating inspection is done by the galvanizer and not by other parties, who do not necessarily understand the consequence of over cleaning.

Aluminium versus Silicon Killed Steel:

#5- Tube and pipe and most plate work 3mm thick or less is manufactured from aluminium killed steel whereas hot rolled structural steel is silicon killed.

Note: This checklist is to be used as a guideline and although fairly comprehensive, suitable information may still be added.

No	The Specifier and Designers Criteria:	AG	GG	Y/N
1	Discuss requirements with Hot Dip Galvanizers Association Southern Africa and/or the selected galvanizer/s before designing commences.	P1	P1	
2	The specifier or designer to ensure all steelwork contractors are informed in writing of the architectural hot dip galvanizing requirements prior to the finalisation of the tender.	P1		
3	Make use of an Association Galvanizing Member recommended by the HDGASA.	P1	P1	
4	Make the requirements known to the galvanizer, in writing , together with a sketch or sample, before placement of the order. Further discussion with the galvanizer may be required.	P1		
5	Make use of the Association wall chart- "Design for Hot Dip Galvanizing". #1	P1	P1	
6	Choose correct steel type – see table 1. If possible all parties related to the project to purchase the specified steel from the same or specified suppliers. Insist on the steel chemical analysis certificates for record purposes and issue copies to the galvanizer. #5	P1	P1	
7	Ensure components can be dipped in a single immersion or alternatively discuss the impact of double end dipping with the selected galvanizer / Association.	P2	P2	
8	Optimize size of filling, draining and vent holes, see SPG or wall chart. #1	P1	P1	
9	Optimize position of filling, draining and venting holes, see SPG or wall chart. #1. If necessary unwanted holes can be closed after hot dip galvanizing, contact the HDGASA for details.	P1	P1	
10	Should painting of the hot dip galvanizing be specified, ensure that instructions stating "No passivation is required – substrate is to be painted", is handed to the galvanizer, at order stage, unless specifically discussed and excluded. #2	P1	P1	
11	Select significant surfaces, highlight on drawing or sketch and discuss with galvanizer / Association.	P1	P1	
12	If necessary, hot dip galvanize a sample and establish acceptance / rejection criteria.	P1	P1	
13	Specify the correct temporary-marking pen for fabrication marking. (A 50/50 PVA paint to water mix, works well for temporary marking)	P1	P1	
14	Ensure that if permanent marking, such as welded lettering is used it will be appropriately hidden from final view.	P1		
15	Specify all flame cut edges to be thoroughly ground, ideally 2mm into the parent material.	P1	P1	
16	If deemed necessary, to minimize handling damage ensure correctly positioned lifting lugs are provided or if not acceptable, soft lifting slings are used, by all parties, including the galvanizer, the transporter, the off loader and the erector, etc. The use of the former is possibly more appropriate.	P1	P1	
17	Specify welding that is fit for purpose; do not allow over welding.	P2		
18	Should stick welding be used, ensure that all weld slag is comprehensively removed by abrasive blasting or grinding prior to delivery to the galvanizer. (Excessive weld porosity can have a marked effect on the quality of the hot dip galvanized coating).	P1	P1	

No	The Specifier and Designers Criteria (cont):	AG	GG	Y/N
19	If the build-up of zinc at a weld is unacceptable for aesthetical reasons, request that the correct welding wire or rod be used. Some welding materials are reactive wrt hot dip galvanizing and can result in a thicker coating on the deposited weld. Discuss with the HDGASA.	P1		
20	Simplify componentry – Simple structures – Better coating quality Complex structures – Harder to manipulate in the galvanizing bath, more control, cleaning and fettling necessary.	P1	P1	
21	Simplify complex structures by making use of bolting where possible or alternatively design for after galvanizing welding, by using a suitable mask such as “Galvastop”, which can be easily cleaned, successfully welded and correctly repaired.	P1	P1	
22	Discuss packaging / dunnage requirements with the galvanizer during transport and ensure that ample site stacking facilities are provided. A hot dip galvanized coating is applied in a factory and then transported to site where frequently the components are thrown off the truck. Inappropriate offloading may lead to unnecessary mechanical damage of the coating. As the components are generally not wrapped, coating discolouration due to contaminants being deposited by wet trades, i.e. angle grinding of wet clay bricks in the presence of hot dip galvanized components, should be prevented.	P1	P2	
23	Discuss the appropriate repair method, if repair is deemed to be necessary, with the galvanizer. Silver spray paint is not acceptable. The silver spray paint may be initially more aesthetically acceptable while the hot dip galvanized coating is shinny, but will ultimately stand out and be aesthetically unacceptable, when the hot dip galvanized coating begins to weather to a matt dull grey appearance. Furthermore, most silver spray paints do not provide the same protection as a good zinc rich epoxy for repair purposes.	P1	P1	
24	Discuss the maximum size of coating repair allowable when alterations or adjustments are made on site, with the appropriate contractors. Get HDGASA recommendation.	P1		
25	Discuss inspection of the components prior to these leaving the galvanizer’s premises.	P1	P1	
26	Ensure that a certificate of conformance in accordance with the specification, has been obtained from the galvanizer. #4	P1	P1	
27	Ensure that selected galvanizers use their appropriate identification paint, (if acceptable to the client) before delivering the components to site. Furthermore, identification paint is to be applied only to areas identified on the drawings by the architect or consultant or if not available in non-significant areas, particularly if the component is not to be over coated with a paint system.	P2	P2	
28	Allow sufficient time for the hot dip galvanizing process to take place, ideally 3 to 7 working days, unless other arrangements have been made. #3	P1	P1	

No	The Galvanizers' Criteria:	AG	NG	Y/N
1	At the tender stage, enquire whether the components are to be hot dip galvanized to an architectural standard. If yes, ensure that the enquirer understands the specifier and designers criteria and has a copy of this check list.	P1		
2	If an architectural finish is required, obtain a sketch indicating significant surfaces or a sample which may be hot dip galvanized, for discussion purposes.	P1		
3	Insist on the appropriate steel chemical analysis certificates for galvanizing control and record purposes.	P1	P1	
4	Ensure that significant surfaces if necessary have been discussed and agreed on.	P1	P1	
5	Ensure components can be dipped in a single immersion, unless discussed with the fabricator / customer / specifier or the Association.	P1	P1	
6	Ensure when offloading plain steel components, that any transport damage is recorded and the client appropriately notified.	P1	P1	
7	Ensure that reasonable fill, draining and vent holes have been provided.	P1	P1	
8	Ensure that filling, draining and vent holes have been positioned correctly.	P1	P1	
9	When handling the component, make use of lifting lugs if supplied or alternatively use soft lifting slings after hot dip galvanizing.	P1	P1	
10	Ensure the use of optimum aluminium content in the zinc bath.	P1	P2	
11	Based on the chemical analysis of the steel, discuss immediate water quenching after galvanizing, if necessary to limit iron/zinc alloy build-up with reactive steel. The galvanizer should also be aware of the increased likelihood of distortion with certain components when quenching and discuss these with the customer/ Association. (This is only necessary if the appropriate steel has not been specified and steel used is reactive to molten zinc).	P1	P1	
12	Ensure all agreed upon significant surfaces have been cleaned and free of imperfections after hot dip galvanizing, according to instructions.	P1	P1	
13	Ensure adequate fettling of the components using appropriate methods, particularly with reference to lumps, runs and excessive surface roughness, especially on significant surfaces, while taking care not to excessively clean the surface, leading to uncoated areas. Discuss flame cleaning vs mechanical cleaning, with specifier/customer.	P1	P1	
14	Zinc spray paint is not acceptable. Ensure that the specifier is informed of the method of renovation of uncoated areas that might occur due to air entrapment during galvanizing or as a result of mechanical damage at the galvanizer.	P1	P1	
15	Passivating chemical in the quench water must be excluded if subsequent painting is to shortly follow hot dip galvanizing. See #2	P2	P2	
16	Ensure that inspection of the components is carried out before and after hot dip galvanizing, to the customers requirements. Issue a certificate of non-conformance before galvanizing or conformance with SANS 121, after hot dip galvanizing.	P1	P1	
17	Ensure that any identification paint used by the galvanizer, (unless specifically excluded by the client) is applied in an agreed upon location, or on a non-significant surface of the component.	P1	P2	

Table 1

IDEAL STEEL FOR HOT DIP GALVANIZING
<i>INDUSTRIAL AND MINING APPLICATIONS</i>
<ul style="list-style-type: none"> • Silicon (Si) – 0,15 to 0,3% Max • Phosphorus (P) – 0,02% Max
<i>ARCHITECTURAL APPLICATIONS</i>
<ul style="list-style-type: none"> • Silicon (Si) – 0,03 Max with Phosphorus (P) – equal or less than 0,01%
Or
<ul style="list-style-type: none"> • Silicon (Si) – 0,15 to 0,25% with Phosphorus (P) – equal or less than 0,02%

