

Preamble for
Architects and
Consulting Engineers
specifying Stainless Steel and for
Quantity Surveyors in the Bill of Quantities

A Basic Guide
covering the Use, Manufacturing, Fabrication
and Installation of Stainless Steel

4 February 2008 (rev. 12-01-09)

GRADE AND FINISH OF STAINLESS STEEL

- Suppliers must adhere to the grade of Stainless Steel as specified, and no alternatives are permitted without written consent from the specifier. It is recommended that grade AISI 316, AISI 444, 2101 or better be used for exterior applications within 4km of the sea, with either a mechanically polished - 400 grit or 600 grit ("mirror" finish). It is highly recommended (especially for coastal conditions) that the mechanical finish receives a final electro-polishing.
- If the Stainless Steel is likely to be immersed in sea water or be subject to splashing by sea water, contact Sassda for material specification recommendations.
- Grade AISI 304 or better may be used inland for both interior and exterior applications. No other grades should be used for decorative applications. The finish may be 180 grit, 400 grit, 600 grit or "brushed" No. 4 (180 grit).
- Grade AISI 430 and AISI 409 may be used in exceptional cases BUT you are advised to contact Sassda prior to specification or installation to ensure that the grade is suitable for the application.
- The finishes must also be adhered to in order to obviate mis-matching on site, especially when other contractors are involved.
- Finishes applied on site should match as closely as possible those of the workshop-fabricated article.
- Any subsequent mechanical polishing must be cleaned thoroughly with water to remove any residues.

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- You should insist on Material Test certificates (in accordance with EN10204) for all Stainless Steel products purchased, showing Producer, Size, Grade, Mechanical and Chemical specifications and the Heat numbers. This information then needs to be checked against the raw material (input physical material) - be it flat product, section, tubular, etc. Where this is not possible due to polished finish, or size, or manufactured product, a letter of conformance or compliance must be requested from the fabricator, installer or raw material supplier.
- The grades of Stainless Steel (AISI 304, AISI 316, AISI 444, 2101) mentioned in this document are those grades fit for the specified purpose. They are easily available in flat product, section and tubular formats. They should be fabricated by fabricators well versed in the manufacture of articles used by the Architectural, Building and Construction sector of industry. Names of suitable fabricators and suppliers are available from the Sassda offices mentioned below, or from the Sassda website, www.sassda.co.za. Should you be recommended grades other than those mentioned above, it is recommended that you contact Sassda as to the suitability and availability of those grades.
- Stainless Steel flat product is supplied in the finishes 2B, BA, #3 and #4 as standard ex stock items, but other finishes are available, including patterned and coloured, but on enquiry.
- Tubular finishes are dealt with under HANDRAILING, BALUSTRADES & STANCHIONS in this publication.
- Stainless Steel sections need to be mechanically finished and polished to match the finishes specified under HANDRAILING, BALUSTRADES & STANCHIONS.

PROTECTION OF SURFACE FINISH

- Care must be taken both by the supplier during delivery, in the factory during cutting/fabrication, and on site to protect the finished article from contamination and mechanical damage. Where practical, should be installed after the completion of other building trades.
- The articles should be wrapped with a protective plastic film. Stainless Steel will suffer contamination especially where "Spirit of Salts" or acid is being applied to surrounding brickwork/concrete during the cleaning-up process.
- Following laser cutting or plasma cutting, the cut (heat affected) area needs to be pickled and passivated. Following welding and fabrication, the finished article will again need to be pickled and passivated.
- Care must be taken to ensure there is no contamination from the grinding of mild steel and where brick cutting takes place.
- At all times dedicated grinding discs, cutting wheels, polishing wheels, etc. must be used.
- Do NOT use discs or wheels that have previously been used on mild steel.
- To ensure the highest corrosion resistance possible of the Stainless Steel, ALL welded items must be pickled using commercially available pastes, gels or solutions or ground to remove weld discolouration, and then thoroughly washed with water to remove all traces of acid, followed by passivation.
- The Stainless Steel in the local affected area should be cleaned and then mechanically polished or buffed to match as closely as possible the parent article.

HANDRAILING, BALUSTRADES & STANCHIONS

NOTE: All tubular products supplied should conform to ASTM A554/03 with the dimensional size tolerances shown in ASTM A450 / A450M-02, or ISO 1127 D3T3. The Test Certificate supplied by the manufacturer must bear the name of the Manufacturer, Grade, Specification, Finish and Size dimension, as well as full Mechanical and Chemical properties. Test certificates must be issued in accordance with EN10204. Type 3.1 or Type 3.2. Tubes from March 2009 must be continuously marked on the inside with the name of the Manufacturer, Grade, Specification and Size. The test certificates must accompany the goods when the tube is delivered to the fabricator's premises by the supplier. The relevant heat number/s must be shown clearly on each delivery note / waybill as well as on each invoice.

- The diameter, thickness, grade of Stainless Steel, together with the finish of all the material offered, whether in tubular or plate form, must be clearly stated. Failure to do this will be for the suppliers account. When utilising grade AISI 316, AISI 444 or 2101 on external coastal applications, mechanical 400 grit or 600 grit ("mirror") finish followed by electro-polishing is the preferred finish.
- All intersections between uprights and intermediate rails should be fully seal-welded. If this is impractical, the intersections should be tack-welded at the six-o'clock position of the hole in the upright, except on external coastal applications where the tack-weld must be done at the four o'clock or eight o'clock position on the side of the upright not easily visible to the eye. In this instance, the intersections should be fully sealed with a suitable, flexible chloride-free sealant. The method of sealing of holes and crevices should form part of the contract. A weep-hole can be introduced at the floor level of the tubular uprights to allow liquids to drain. The same applies to "stub-on" joints, "dead legs" or where liquid can settle.
- On tubular balustrade systems, angle deviations in the top rail and intermediate rails must be specified as either being by means of mandrel-pulled bends or, alternatively, by means of on-site mitre joints. For pulled bends, the top rail and intermediate rails should have a similar centreline radius.
- All butt joints must be fully circumferentially welded, preferably using the TIG or MIG welding method, ground smooth, pickled and passivated and then polished to match as closely as possible the finish of the parent material tube.
- Stanchions or uprights should be installed by means of either core drilling and fixing with a non-shrink grout, welding to steel stringers, or mounting to adequate base plates with a suitable chemical anchor system. When the base plate method is used, it would be preferable to have the plate and fasteners concealed by a pressed cover flange. All anchors should be Stainless Steel of the same or better grade as the balustrade system.
- If using a pin fix system, the diameter of the solid round bar should be not less than 20mm diameter and should be of the same grade of Stainless Steel as used in the balustrade itself.
- Care should be taken to ensure that hollow blocks are not installed where the stanchions are to be fixed.
- Base plates for stanchions must have a central hole into which the stanchion is inserted and then fully seal welded, or fully sealed with a suitable, flexible chloride-free sealant. The top surface finish of the base plate should match as closely as possible that of the supporting stanchion / work-piece.
- Caps must be fully seal welded and finished to match as closely as possible that of the supporting stanchion / work-piece / tube.

IRONMONGERY

- All window fittings, door handles, light fittings and hinges should be supplied in grade AISI 316 or AISI 444 in coastal areas, whilst grade AISI 304 is suitable for inland regions. Request a letter from the supplier confirming the grade of Stainless Steel. Screws, bolts and nuts should be in the same grade and manufacturer's test certificates must be supplied, showing Grade, Size, Mechanical and Chemical properties.

CABLE / WIRE

- Where Stainless Steel cable is used, should this pass through a tubular stanchion, then the hole in the stanchion should, ideally, be sleeved and fully seal welded at both ends, so as to form a sleeve for the cable to pass through. (This stops the deterioration of the cable from fraying due to the elements and mechanical damage – saw action). The crevice between cable and sleeve should be sealed with a suitable, flexible chloride-free sealant.
- End fittings for wire ropes must be of the same or better grade than the wire rope material being used, and the method of swaging will require that the swaged portion needs to be properly pickled, passivated and rinsed after swaging.
- Please note that extraneous matter does ingress into the cable / wire and this needs extra cleaning.
- Manufacturer's test certificates (in accordance with EN10204) for the Stainless Steel cable / wire must be supplied, showing Producer, Size, Grade, Mechanical & Chemical specifications, and the heat numbers.

WELDING

- Only Experienced Stainless Steel welders should undertake the welding of Stainless Steel, using wherever possible the TIG or MIG process.
- This process minimises distortion and allows for neater joints. Care must be taken to avoid burn through, as this is virtually impossible to repair and could result in rejection.
- The type of consumable used for the welding must be equal to or better than the grade of material being welded.
- All welded joints should be cleaned to remove any welding residues by acid pickling and subsequent passivating or grinding. The affected areas should then be thoroughly washed and rinsed with water.

If you are not sure you understand this preamble, please contact SASSDA before quoting or proceeding with the fabrication. Stainless Steel is NOT difficult, but DIFFERENT. Stainless Steel needs less maintenance than other materials BUT it is essential that it is cleaned (washed down) regularly (at the coast, every 4 weeks; inland, every 4 – 6 months)

Any further information on the Usage, Specification, Fabrication, Installation, and Supply of Stainless Steel may be obtained from the Sassda website, www.sassda.co.za, or from:

<u>Gauteng</u>	<u>Kwazulu-Natal</u>	<u>Western Cape</u>	<u>Eastern Cape</u>
Mayleen Keyster T 0861 727 732 F 086 639 4280 Email: mayleen@sassda.co.za	Ian Elsdon-Dew T(031) 201 4850 F(031) 201 4865 Email: dewdrop@absamail.co.za	Michel Basson Cell: 082 778 8882 F (086) 627 1855 Email: mbasson@sassda.co.za	Dave Slater T (046) 648 3172 F (046) 648 3172 Email: slaterd@mweb.co.za

See Notice below about gap width for Balustrading (SABS 0400-1900)

National Building Regulations Balustrades SABS 0400 -1990 - EXTRACT

(NB Please note that gaps between horizontal / vertical components may not exceed 100 mm)

SABS 0400-1990 - The application of the National Building Regulations

Covers provisions for building site operations and building design and construction that are deemed to satisfy the provisions of the National Building Regulations. In certain cases, commentary and illustrations to amplify and explain the application of the deemed-to-satisfy rules are included. Information on standardization of the application of the regulations is contained in a commentary to Part A of the regulations.

MM3 PREVENTION AGAINST FALLING.

- (a) Any flight of steps which contain more than three rises shall have protection on each side provided by a secure wall, screen, railing or balustrade which shall be not less than 1 metre high and so erected that any such wall, screen, railing or balustrade in any occupancy classified E2, E3, H1, H2 or H3 shall not have any opening that permits the passage of a 100mm diameter ball. Provided that such protection in any occupancy not being an occupancy classified E2, E3, H1, H2, H3 or H4 shall consist of at least a handrail with another rail midway between such handrail and the stair tread.**

- (b) (i) Any flight of steps which contains more than five rises shall be provided with at least one continuous handrail extending the length of such flight; provided that this requirement shall not apply to any building classified H4 or within the individual dwelling units in an occupancy classified H3.**
- (ii) Such handrail shall be securely fixed to such wall, screen, railing or balustrade of a height not less than 850 mm and not more than 1 m measured vertically from the pitch line to the upper surface of the hand rail.**
- (iii) Such handrail shall be of such a design and be so fixed that there shall be no obstruction on, above, or near to it which may obstruct the movement of any hand moving along it.**

- (c) (i) Subject to Paragraph B1 any flight which is less than 1.1 metre wide shall have a handrail on at least one side and where the width of any flight is more than 1.1 metre handrail shall be provided on both sides of such flight.**
- (ii) Such handrails shall comply with the requirements contained in Paragraph (b) (ii) and (b) (iii)**

Ends