

Technical Newsletter from
ADOR WELDING LIMITED
Formerly **Advani - Oerlikon Ltd.**

PRACTICAL WELDING TIPS FOR DEFECT FREE WELDING OF AUSTENITIC STAINLESS STEELS

INTRODUCTION:

Austenitic stainless steels are one of the most popularly used materials for a variety of applications in industries because of their wide ranging properties like good corrosion resistance to a number of environments, good toughness at sub-zero temperatures, good elevated temperature properties, good weldability etc. Because of their wide spread usage, their welding has always been an interesting subject. Though welding of this group of materials is not rated as difficult, getting good welds which will perform well ultimately in service requires judicious choice of weld metals and also good welding practices. Careless and uncontrolled welding practices may result in welds which will perform very poorly in actual service. In this note an attempt has been made to give in a concise form, many useful tips and details which should be of use for the shop floor welding personnel for producing a good weld which will not only have good properties but also will perform well in service. In most of the cases, corrosion resistance is of great importance and welding should be done in such a way that it doesn't impair the corrosion properties.

DIFFERENCES BETWEEN WELDING MILD STEEL AND STAINLESS STEELS

- Austenitic Stainless steel expands and contracts more than mild steel; so more distortion and so more distortion controls are required.

Product Update

CHAMP 500 / CHAMP 600



SALIENT FEATURES

- Latest PWM inverter technology
- IGBT based
- High efficiency, High power factor and High Reliability factor

More...

Visit our Stand No. 950 – Hall # 4 at SteelFab 2012 at Expo Centre Sharjah, UAE during 9th - 12th Jan., 2012.

- Austenitic Stainless steels have lower thermal conductivity and so heat gets concentrated with the possibility of base metal getting over heated. Heat input controls are required during welding.
- Austenitic Stainless steels have lower electrical conductivity than mild steel. So higher currents can over heat the welding consumables. Normally stainless steel electrodes are therefore made in 350 or 300 mm length.
- Austenitic stainless steels don't harden during heating and cooling; hence no necessity for preheat.
- Austenitic stainless steel can't be gas cut.

PROCESS SELECTION

- Austenitic stainless steels can be welded by many processes like SMAW-GMAW-GTAW-SAW-FCAW. But the most common one is SMAW because of its inherent advantages.

POWER SOURCE SELECTION

- Though low OCV transformers can also be used for the common general applications, for quality work DC+ is preferred.
- For GTAW, use DC-.

CHOICE OF CONSUMABLES

- For all processes, the general rule is to use the consumable classification that matches the base material AISI number; for example AISI 316L is welded with E316L electrode. Only for 304 groups, 308 group consumables are selected.
- In specific cases where properties like corrosion resistance, ferrite controls, and low & high temperature properties are specified, specially modified versions of consumables may have to be selected. Ask and understand these requirements clearly; for example what is the level of ferrite required? Is it ferrite number or ferrite percentage? What is the method of measurement?
- The SMAW electrode usability designations (suffixes) like 15, 16 and 17 offer specific characteristics. Electrodes with a suffix 15 operate in DC+, 16 operates in AC/DC+ and 17 is similar to 16 but with Silica ingredient in the coating. In general select electrodes with a suffix 16 for general applications and for good performance characteristics and 15 for achieving special properties.
- In SMAW electrodes, there are rutile and basic versions and normally the 16 version is rutile and the 15 version is basic. Selecting them is as detailed above.



Provide us 5 email ID's of friends or colleagues who may be interested in receiving our monthly e-newsletter and get a copy of

Thank You Mr. Welder

Free Please send details to cmo@adorians.com

**ADOR Institute of
Welding Technology**



**COURSE SCHEDULE : Jan - Dec.
2012 - ADOR INSTITUTE OF
WELDING TECHNOLOGY**

**Quality Assurance & Control of
Welding (QA-1)
From: 23rd to 26th JAN. 2012**

**Welding Procedures & Qualifications
(QA-2)
From: 20th to 22nd Feb. 2012**

**REFRESHER COURSE IN WELDING
TECHNOLOGY (SC-1)**

- There are also synthetic electrodes which have mild steel core wire but are not preferred for applications where specific properties are required.
- In GMAW selection of proper shielding gas is very critical for good performance. Normally argon or argon-oxygen mixtures are suggested but it is better to consult an expert before performing the welding. This choice will influence metal transfer, penetration etc.
- In FCAW, normally the shielding is CO₂ but there are open arc, self shielded flux cored arc welding wires also. Here again preference is given for non-synthetic FCAW wires.

The TABLE given at the end details some products from our range which are suitable for various materials and applications.

WELDING PROCEDURE DETAILS

- Keep austenitic stainless steel materials and their fabrication activity separately and away from the mild steel fabrication area.
- Don't walk on these materials. Don't scratch them and if they have been supplied with a cover sheet don't remove them unnecessarily.
- Keep the identifications of various grades properly.
- Clean the joint area thoroughly. Use cleaning agents to remove all dirt, oil, grease etc.
- Don't excessively grind since this material has a tendency to work harden.
- Austenitic stainless steels don't require pre-heat and so don't pre-heat the base material. At some places a nominal warming up may be required.
- Use proper jigs and fixtures to control distortion.
- Use lowest possible size of electrode.
- Control heat input during welding and use a low inter pass temperature.
- Don't allow stray cables on the base material. Ensure there are no arc strikes as these spots can become susceptible to corrosion later.
- Use stainless steel wire brushes and not carbon steel wire brushes.
- If you are using carbon arc gouging, ensure the cut surface is ground properly to remove carbon pick up layers.
- Use run-in and run out plates.
- TIG welding is preferred for welding stainless steels of ¼ and below thickness
- In TIG welding, avoid initiating the arc by scratch starting since weld will be contaminated with tungsten; high frequency starting must be used.

CONCLUSIONS

(From: 6th to 10th FEB 2012)

Skill Courses

Our New Toll Free
No. 1-800-233-1071

For Welding &
Cutting Equipment,
Service & Spares

Welding of austenitic stainless steels is not a difficult proposition. But for getting a good service performance of the joint, it should have good properties which can result from a judicious choice of welding consumable and by following correct welding practices.

Table 1:

APPLICATION	AWL PRODUCTS
FOR WELDING 304 GRADES	SUPERINOX 1A (SMAW), MIGINOX 308(MIG), TIGINOX 308(TIG), SUBINOX 308+AUTOMELT S76(SAW)
FOR WELDING 18-8 GRADES FOR APPLICATIONS REQUIRING IMPACT STRENGTH AT MINUS 196 °C	SUPERIONX 1C-15LT
FOR WELDING 304L GRADES WITH CORROSION PROPERTIES	SUPERINOX 1C (SMAW), MIGINOX 308L (MIG), TIGINOX 308L (TIG), SUBINOX 308L+AUTOMELT S76(SAW)
FOR WELDING 316L GRADES	SUPERINOX 2B (SMAW), MIGINOX 316L (MIG), TIGINOX 316L (TIG), SUBINOX 316L+AUTOMELT S76 (SAW)

Please contact cmo@adorians.com or visit www.adorwelding.com for help in selecting consumables for specific applications as well as for establishing suitable procedures.



Project Engineering Solutions



ADOR Institute of Welding Technology



Welding & Cutting Solutions



Centre for Engineering Excellence



WELDERS TO THE NATION SINCE 1951

ADOR WELDING LIMITED

(Formerly known as Advani-Oerlikon Limited)



www.adorwelding.com

cmo@adorians.com

[Contact us](#)