

# INOSSIDABILE

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## Summary

For more detailed information please contact directly the names indicated at the end of each notification

### COVER/PAGES 3/4

#### “RIVAMARE”: DESIGN ICON

(“Rivamare”: icona di design)

*Rivamare* is 11.88 metres (39 ft) long with a full beam of 3.50 m (11.6 ft). This jewel of the sea is dressed in stainless steel elegance: EN 1.4404 (AISI 316L) stainless steel is used for the external and interior design details. It is applied to the prow, the structure of the windscreen, the frame of the central deck glass. At the stern, both bulwarks feature striking grilles in polished stainless steel. Stainless steel was used also for the boarding ladder. It is combined with mahogany in some of the furnishings, such as the folding table, two furniture units situated behind the helm station, and for the handle bars. *Rivamare* is equipped with a pair of D6 400 DPH Volvo Penta engines each generating 400Mhp at 3,500 rpm. The boat can reach a cruising speed of 31 knots and a maximum speed of more than 40 knots.

**Made by:** Ferretti SpA – Via Ansaldo 7 – I-47122 Forlì FC, customer.service@riva-yacht.com, www.ferrettigroup.com / **Design:** Officina Italiana Design Srl – Via S. Tomaso 27 – I-24121 Bergamo, www.italianadesign.it

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#### HOW A SPORTS EXHAUST IS CREATED (Come nasce una marmitta sportiva)

The exhausts shown here are made of EN 1.4301 (AISI 304) stainless steel. The round tube sections range from a minimum diameter of 45 mm, and a thickness of 1.5 mm, up to a maximum of 76 mm, and a thickness of 1.2 mm. The silencers are made of stainless steel strips of 1.5 mm thickness, while the external bottoms are made from deep drawing EN 1.4301 (AISI 304) stainless steel plates, to facilitate the expansion of the silencer caused by temperature changes and avoiding cracking or breaking points. The exhausts have a satin finish. The aesthetically appealing tail pipe is made of AISI 304 with a polish or satin finish, it can also be made from ceramic or carbon.

The welding can be made using MIG, with an AISI 308L wire, or TIG. The choice of stainless steel is due to the material's excellent durability, and to corrosion and high-temperature resistance properties. It is a material that enhances the sound waves emitted by the engine. The company uses hydroforming to manufacture shapes that allow the best flow of fumes, boosting engine power and lowering fuel consumption.

**Producer:** Ragazzon Srl – Via Dei Colli 29/33 – I-31058 Susegana TV, phone +39 0438 73523, fax +39 0438 73342, info@ragazzon.it, www.ragazzon.it

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#### FROM OUR MEMBERS CSM TUBE PRODUCTION OF STAINLESS STEEL WELDED TUBES

(CSM TUBE. Produzione tubi in acciaio inossidabile elettrodotto)

CSM Tube of Cimavilla di Codognè has been active since 1983 and today it is a leading company in the manufacture of stainless steel tubes with a production capacity of more than 50 million metres a year.

CSM Tube produces more than 60 different tube diameters ranging from 4.00 and 28.00 mm and wall thickness ranging from 0.30 to 1.50 mm. CSM Tube can also supply bright heat-treated tubes in controlled atmosphere, either in coils or straight and cut to length up to 20 metres. CSM Tube products comply with international standards for different product types and applications, performing a pressure test of up to 300 bar on 100% of heat-treated tubes supplied in coils. The generally used alloys go from the austenitic, AISI 300 series, to refractory high nickel content alloys (alloy 800 - 825 - 840 and alloy 600 - 601). The CSM Tube management system has ISO 9001:2015, ISO 14001:2004 OHSAS 18001:2007 certification. The production standard complies with the Pressure Equipment Directive (PED) 97/23/EC and AD2000 Merkblatt W2. CSM Transforming is one of the world's first companies to offer “turnkey” solutions for stainless steel tubes, with five cutting lines, tube ends machining and a bending centre. Heat exchangers, automotive, home appliance, and solar energy, are just a few of the applications where CSM Tube tubes are used. CSM Tube is part of the CSM Group: the Group has two production sites in Italy, one in Brazil and a distribution unit in the USA, providing more than 15,000 square metres of production space and more than 100 people: direct employees and co-workers. CSM Group in Italy is composed of: CSM Tube for the production of stainless steel welded tubes; CSM Machinery which produces machinery for heating elements manufacture and automation; CSM Elettronica for hardware and software; and CSM Transforming for cutting and bending. In 2014, the CSM Group acquired OAKLEY. The following year the CSM Tube USA distribution unit was opened. This year's development plans already include the initiation of production in North America.

**CSM TUBE SPA** – Via del Lavoro, 60 – I-31013 Cimavilla di Codognè TV, phone +39 0438 471100, fax +39 0438 470606, info@csmtube.com, www.csmtube.com

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#### STAINLESS STEEL HYBRID LASER-ARC WELDING: FERRITE VALUATION AND SCHAEFFLER DIAGRAM ADAPTATION

(La saldatura ibrida laser-arco di acciai inossidabili: valutazione della ferrite e adattamento del diagramma di Schaeffler)

**1. Introduction** - The purpose of this study was to determine whether and how much the percentage of ferrite provided by the Schaeffler diagram deviates from that present in the fusion area of stainless steel joints made using innovative welding process such as the hybrid laser-arc. The discovery of its potential is at the base of its growth at industrial level and in the research field in recent years.

**2. Materials, filler metals and type of joints made** - Stainless steel used as parent metals are two austenitic types specifically X5CrNi18-10 and X5CrNiMo17-12-2, and a biphasic, grade X2CrNiMoN22-5-3. For the American Welding Society AWS A5.9 classification, ER308L, ER316L and ER2209 were used as welding materials. Five types of head-to-head joints were made: three homogeneous, two heterogene-

ous (Tab. 1). The preparation was of the type with straight edges, and full penetration was achieved in a single pass on plates which were 5 and 6 mm thick.

**3. The hybrid process development and Point Count method.** In the first phase of the experimental programme, the adjustment of individual processes was carried out, continuous filler wire welding and laser process, followed by a hybrid process regulation and manufacturing of the joints under analysis. For each joint, several cross-sectional welds were drawn to allow the count of ferrite  $\delta$  in the fusion zone using a Point Count method; this was carried out according to the ASTM E562-11 standard.

**4. Ferrite  $\delta$ : The Schaeffler percentage and calculated value.** To calculate the Chromium and Nickel equivalent and the identification for the Schaeffler diagram coordinates, a chemical test of parent and filler metals was needed. The dilution ratio was evaluated by using a graphics software applied to the joint's macrographic sections.

The example is the Schaeffler diagram of the heterogeneous joint made with the two types of austenitic stainless steel (Fig. 1). Table 1 shows the difference between the value of ferrite from the Schaeffler diagram and the average of those obtained through the Point Count for the different joint types. The collected data was reported on individual graphs to enable a comparison.

**4.1. Austenitic matrix joints** - Figure 2 shows the percentages of ferrite calculated with the Point Count, their average value and the Schaeffler value for each joint type. The graph demonstrates the tendency of the diagram to underestimate the ferritic phase content and the reduced dispersion that characterises the ferrite values obtained from the Point Count in the different joint types. It should be noted that, as the ferrite number decreases, there is an increase in the difference between the expected and the calculated value: from 0.5% to 1.8%.

**4.2. Austenitic-ferritic matrix joints** - In these types of joint in contrast with austenitic steels, the decrease in the percentage of ferrite shows a reduction in the difference between the expected and the obtained value (Fig. 3).

**5. Conclusion: variation of iso-ferrite straight lines.** The percentages of ferrite detected with the Point Count were reported on the Schaeffler diagram, assigning the new-found value to the iso-ferrite lines. As can be seen in Figure 4, next to the new percentages, the original ferrite value was followed by the observed increase (or decrease, depending on the joint type). In conclusion, using the hybrid laser-arc and considering the joints it made, the reliability of the ferrite content provided by the Schaeffler diagram decreases by moving away from the homogeneous joints made with X5CrNi18-10 stainless steel. This deviation is moderate in austenitic steel but becomes more noticeable in joints between pieces of austenitic-ferritic steels.

The article was written by Eng. Alessio Bazurro, as



part of a Master's thesis in Mechanical Engineering Design and Production - University of Genoa. It was based on the experimental work performed at the Istituto Italiano della Saldatura (Italian Institute of Welding), in collaboration with Centro Inox, University of Genoa - Department of Mechanical Engineering (Prof. Eng. Carla Gambaro), Istituto Italiano della Saldatura (Eng. Giovanni Battista Garbarino).

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### STAINLESS STEEL TANKS (Serbatoi in acciaio inossidabile)

The products described here are the result of the multi-year experience of a company that designs tanks for civil and industrial plants. Tanks for internal and external use, for water treatment, oenological industry and agricultural and food sector, are made of EN 1.4301 and EN 1.4404 (AISI 304 and 316L) stainless steel. The welds are made using the TIG process. For the oenological sector, stainless steel tanks are used for grape fermentation, self-draining and manual wine making machines, and for storing and preserving wine. For the agricultural and food industry, the silos are of a modular type suitable for industrial storage capacities of any bulk product and allow complete emptying and filling with another product without prior cleaning. This complies with the health standards for foodstuff preservation. The sophisticated surface finish of the materials guarantees low bacterial retentivity and rapid sanitisation of the containers, while the high reliability of the automatic welding systems and the quality of the components used ensures a secure seal in any condition.

**Producer:** SteelTech Srl – Via Vecchia Molfetta 14 – I-70033 Corato BA, phone +39 080 8721785, fax +39 080 3591770, info@steeltech.info, www.steeltech.info

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### THE PROFESSIONAL KITCHEN... IN THE GARDEN

**(La cucina professionale... in giardino)**  
“Green” and “Swing”, made of EN 1.4509 (441) stainless steel, are a new focus in conviviality moments. Perfect for most demanding customers in terms of design and elegance, “Green” has a large teak shelf surrounding the hob unit. Essential lines and highly functional - “Swing” is a great classic. “Swing” is solid thanks to its completely stainless steel structure, it is ideal for a perfect outdoor living thanks to its two handy side shelves with a burner for sauce cooking. Both design features do not preclude technical performance: steel casting burners of 6 kW, EN 1.4509 stainless steel frame, with a thickness of 0.8 mm and a Scotch Brite finish.

**Producer:** Steel Srl – 41012 Carpi MO – Via dell'Agricoltura 21, tel. 059.645180, fax 059.6220804, steel@steel-cucine.com, www.steel-cucine.com / **Stainless steel manufactured by:** Aperam Stainless Services & Solutions Italy S.r.l. – Divisione Massalengo – 26815 Massalengo LO – Loc. Priora, tel. 0371.49041, fax 0371.490475, leonardo.frosali@aperam.com, www.aperam.com

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### GRADUATED SCALE - THE STAINLESS STEEL OF THE FERRITIC SERIES EN 1.4016 (AISI 430) GUARANTEES PRECISION AND INALTERABILITY OVER TIME

**(Scale graduate. Acciaio inossidabile della serie ferritica EN 1.4016, AISI 430, per garantire precisione ed inalterabilità nel tempo)**  
Here are some graduated scales which were used on woodworking machines, and designed to define the exact angle of cut. The components are made from 1.2 mm thick sheet metal. The “square” sheet metal from which 6 or 8 pieces can be obtained is chemically engraved and subsequently cut with a laser. The graduated scales made from AISI 430 have

been tested with other scales made from EN 1.4509 (441) and AISI 304, looking for corrosion resistance. A Salt Spray Test was used. After 20 hours, the three materials behaved almost the same. AISI 430 was chosen as the basic material. The test took up to 72 hours. At the end of the tests, the best results were shown by AISI 304 followed by 441 and AISI 430.

**Producer:** Stanley Black & Decker, Inc. - DeWalt Industrial Tools SpA – Via B. Buoizzi 1 – I-06071 Ellera di Corciano PG, www.stanleyblackanddecker.com

### THE CONTRIBUTION OF STAINLESS STEEL IN THE FUNCTIONAL RECOVERY OF THE VENETIAN ARSENAL

#### (Il contributo dell'acciaio inox per il recupero funzionale dell'Arsenale di Venezia)

The Venetian Arsenal is a complex of exceptional historical value. For several years, the Municipal Administration along with various active players, was involved in the transformation and management of the area, and has developed a project for the restoration of the entire complex. Stainless steel, in the form of tie rods and accessories, was used to ensure the safety and durability requirements during design. 540 metres of permanent 40 mm diameter stainless steel tie rods were used for the vaults and foundations. AISI 304 and 316 stainless steel was used for the side stiffening panels of the UPN 220 profiles and the additional chains in the vault area.

**Production and supply of tie rods:** GeodaG Sistemi Srl – Via G. Donizetti 24 – I-24020 Gorle BG, phone/fax +39 035 340771, info@geodagsistemi.eu, www.geodagsistemi.eu

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### CENTRO INOX DIRECTORY

To make stainless steel use more efficient and to provide the end user with the most dedicated and fast tools, Centro Inox plans to create a “stainless steel platform”. This will have a section dedicated to “who does what”, i.e. a list of “Suppliers” of complementary materials and services that involve the stainless steel industry. Some companies that work in specific sectors will be selected to create a “directory” subdivided into “fields” to give all these companies an excellent visibility using a “VIRTUAL SHOWCASE” organised by Centro Inox, for all potential users.

**For information:** CENTRO INOX – Via Rugabella 1 – I-20122 Milan, phone +39 02 86450559/69 – Fax +39 02 86983932, info@centroinox.it, www.centroinox.it

### FLASH COURSES (Corsi Flash)

The new Centro Inox institutional initiative, which features half-day courses, aims to identify a niche of technicians at a “transversal” level, i.e. coming from various application areas, focusing exclusively on technical issues to provide basic but qualified knowledge, on topics the Association is asked most often. The first “Flash Course” was held on 20 April entitled: “Corrosion tests on stainless steel (from theory to practice)”, held at RTM Breda, Cormano (MI). Followed on 20 June by the Flash Course: “Mechanical tests on stainless steel (from theory to practice)”, held at RTM Breda, Cormano (MI). Given the success of this initiative, the next Flash Courses are already being planned. *We invite you to stay up to date on this initiative by visiting the site:* www.centroinox.it

### 16TH INTERNATIONAL STAINLESS & SPECIAL STEEL SUMMIT

Ljubljana – Slovenia, 5 – 7 September 2017

The event is organised by Metal Bulletin Events and SMR Events. Centro Inox will be the event's media partner.

**For further information:** <http://www.metalbulletin.com/events/international-stainless-special-steel-summit/details.html>

tin.com/events/international-stainless-special-steel-summit/details.html

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### STAINLESS STEEL AS STRUCTURAL MATERIAL IN BUILDING AND INFRASTRUCTURES. DURABILITY - SAFETY - NEW TECHNICAL DIRECTIVES FOR CONSTRUCTION

**(Acciaio Inossidabile quale Materiale Strutturale in Edilizia e nelle Infrastrutture. Durabilità – Sicurezza – Le nuove Norme Tecniche per le Costruzioni)**

Sala Napoleonica - University of Milan  
Milan, 26 October 2017

Ordine degli Ingegneri della Provincia di Milano in collaboration with Centro Inox will co-organise the seminar which is sponsored by Fondazione Promozione Acciaio, Federacciai and CTA - Collegio dei Tecnici dell'Acciaio.

**For information and registration:** CENTRO INOX – Via Rugabella 1 – I-20122 Milan, phone +39 02 86450559/69 – Fax +39 02 86983932, info@centroinox.it, www.centroinox.it

### INOX 2.0 - COMPLETE COURSE ON STAINLESS STEEL. THEORY - PRACTICE - EXPERIENCES

**(INOX 2.0 - Corso completo sugli acciai inossidabili. Teoria - Pratica – Esperienze)**

Provaglio d'Iseo (BS), 8-9-15-16-22-23 November 2017

Centro Inox, in collaboration with AQM, and with Federacciai, Istituto Italiano della Saldatura, and Politecnico di Milano's support, will organise a complete course on stainless steel the next November. The full programme will be in the next issue and can be found at [www.centroinox.it](http://www.centroinox.it).

**For information:** CENTRO INOX, phone +39 02 86450559/69, info@centroinox.it, www.centroinox.it / AQM – G. Zanelli (Ms), phone +39 030 9291782, formazione@aqm.it, www.aqm.it

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### ETEREA, THE STAINLESS STEEL EVOLUTION OF THE LANTERN

**(Eterea, l'evoluzione inossidabile della lanterna)**

Great versatility and excellent performance are the distinctive features of “Eterea” which can illuminate outdoor spaces with its impressive and soft effects, but minimal energy absorption and the highest level of functionality. The essential and contemporary design makes “Eterea” a mobile or fixed light complement, suitable for any outdoor environment.

“Eterea” is available in three finishes and two sizes, it is made of EN 1.4016 (AISI 430) stainless steel and has no visible screws. The handle is made of EN 1.4301 (AISI 304) stainless steel.

**Producer:** Platek Srl – Registered Office: Via Paderno 19 – I-25050 Rodengo Saiano BS – Operating Office: Via Marrocco – I-25050 Rodengo Saiano BS, phone +39 030 6818210, marketing@platek.eu, www.platek.eu / **Design:** Studio Danesi & Buzzoni

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