EN

WELDING SOLUTIONS

Rodacciai WELDING

Rodacciai

Rodacciai WELDING

Roda ALLOY

Roda ALLOY 625 | Roda ALLOY 825 | Roda ALLOY 276

Roda ALLOY 82 | Roda ALLOY 617 | Roda ALLOY 622

COMPANY PROFILE

ALMOST 70 YEARS OF EXPERIENCE IN STEEL BUSINESS

Today the Rodasteel Group is an international leader in the production and processing of steel.
Our production and sales locations on three continents (Europe, Asia and America) provide Rodasteel with a widespread sales network to distribute finished products in stainless steels, alloy steels and carbon steels all over the world. The secret of this success is based on an extensive and diversified range of high quality products, on paying attention to the customers, on the ability to innovate continuously and on the experience of Rodasteel people, who know how to identify upcoming market shifts and opportunities.

1956
Foundation of Trafileria Roda &. C. by Giuseppe Roda

1960
Introduction of lead alloy steel processing, considered to be the best in the world

1971
Construction of the new plant in Bosisio Parini

1981
Construction of the Sirone plant, with the rolling mill

1984
Trafileria Roda & C becomes Roda Acciai company

Rodacciai was born in Pusiano (Como) in 1956, when Trafileria Roda & C. was founded by the charismatic and innovative entrepreneur Giuseppe Roda.
Started as a small local company for steel bar cold drawing, in 1960 Trafileria Roda & C. embarked on a path of production verticalisation along the steel processing chain. Thanks to the installation of a hot-working plant, the company expanded its original offer beyond semi-finished cold pressed products, becoming, during the years, an international group in the steel processing sector.
The group is made by two companies: Rodacciai S.p.A. (Italy) and Aceros Inoxidables Olarra S.A. (Spain).
Trasparency, integrity and passion are the main values for the entire group, based on them every decision and action are taken. These principles drive all Rodasteel activities and are the basis of the group's Code of Ethics.

1994

Acquisition of the company Olarra Aceros Inodixables

1995-2005

Expansion of the commercial network in Europe and acquisition of smaller companies

2007-2016

Investments for production expansion

2024

Today, Rodasteel Group is a benchmark in the steel production and processing sector

LABORATORY & QUALITY CONTROL SYSTEM

Rodacciai works with innovative machinery and optimized production processes to guarantee constant and repeatable high quality products over time.
Since 1990 the company has obtained the ISO 9001 system certification, which certifies full compliance with the standards relating to the Quality Management Systems.

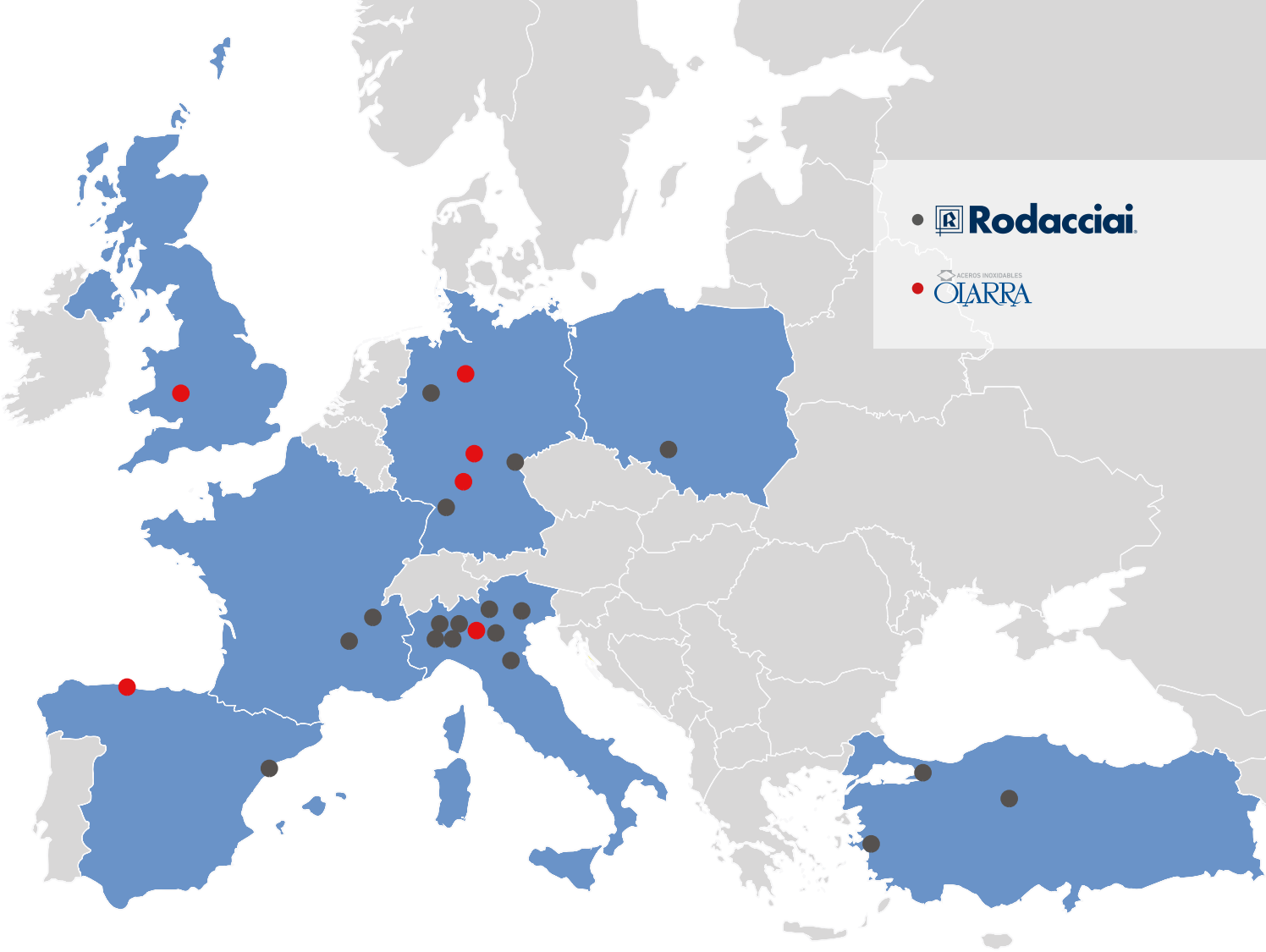
In the continuous development of its Quality Policy, Rodacciai, through its production lines, is able to comply with all the necessary certifications for its products.

Rodacciai | LAB

ALL IN HOUSE CONTROL STRATEGY & BUSINESS PROCESS REENGINEERING

The strategic choices, made in the past, have been allowing the Group to differentiate itself over the time.
It is precisely starting from these choices that the company is today a leader in the cold finished steel market.
Our strategy is composed by: ALL-IN-HOUSE, to guarantee our customers continuous product and process improvement. Each phase is monitored and tracked.

Business Process Reengineering logic identifies 8 phases, including the redefinition of processes, identification of the levels for change, the development of concrete objectives and actions for continuous improvements.
Rodacciai LAB, an important investment in our laboratory and R&D Dept., creates a high value for both the above explained strategy, helping the company to continuous monitoring the products in each singular step.



8 covered nations

27 distribution centres

EUROPE

Rodacciai
Country: Italy
N° of distribution centres: 6
Cities: Bosisio Parini, Torino, Bergamo,Brescia, Padova, Bologna

Rodastahl
Country: Germany
N° of distribution centres: 3
Cities: Deisslingen, Hagen, Oelsnitz

Rodastal PL
Country: Poland
N° of distribution centres: 1
City: Gliwice

Rodacciai S L
Country: Spain
N° of distribution centres: 1
City: Barcelona

BİMEKS ÇELİK
Country: Turkey
N° of distribution centres: 3
Cities: Istanbul, Ankara, Izmir

Euroda Aciers
Country: France
N° of distribution centres: 2
Cities: Cluses, Chasse sur Rhône

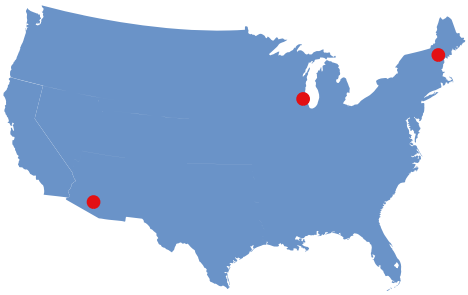
CESI
Country: Italy
N° of distribution centres: 1
City: Piacenza

ALFER
Country: Italy
N° of distribution centres: 1
City: San Giuliano Milanese

ISM
Country: Germany
N° of distribution centres: 3
Cities: Mulhem, Vaihingen, Francoforte

OLARRA
Country: Spain
N° of distribution centres: 1
City: Bilbao

USA



OLARRA - Italia
Country: Italy
N° of distribution centres: 1
City: Brescia

OLARRA U.K LTD
Country: Great Britain
N° of distribution centres: 1
City: Cleobury Mortimer

RodaSpecialtySteel
Country: USA
N° of distribution centres: 3
Cities: Los Angeles, Chicago, New Jersey

STAINLESS STEELS FOR WELDING

Stainless steel wires and rods of various types are used as welding filler materials for the production of electrodes and for MIG, TIG and Submerged Arc welding. According to the requirements austenitic, martensitic, ferritic or austenitic-ferritic (duplex - super duplex) stainless steels, are being used.

The use of selected wire rods with controlled impurity levels guarantee an optimal weld, both from the point of view of the mechanical strength and in terms of the presence of delta ferrite, i.e. corrosion resistance.

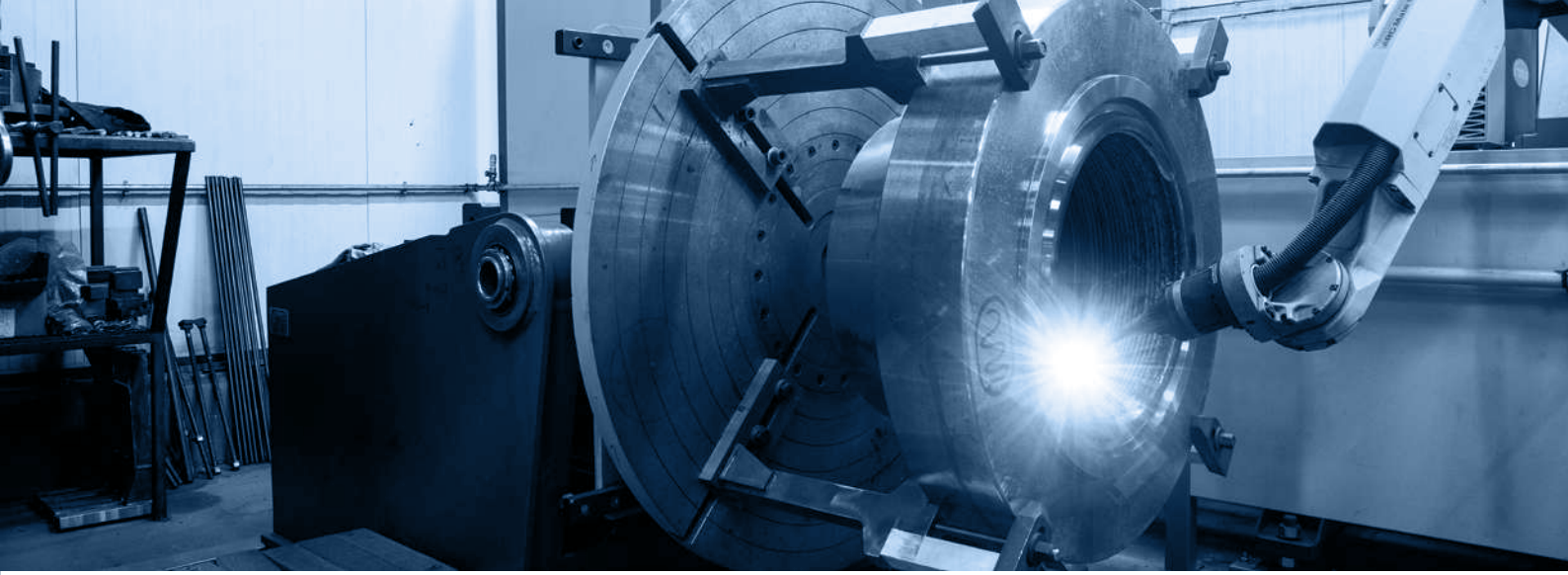
Furthermore the chemical composition of the materials are specially researched in order to be compatible with all principals international standards, including the European standard EN ISO and American standard AWS.

Thanks to the quality of its stainless steel welding wire products, Rodacciai supplies all the major welding houses and electrode manufacturers in Europe, USA and throughout the world, supplying the products in a variety of packaging forms in order to satisfy any customer requirements.

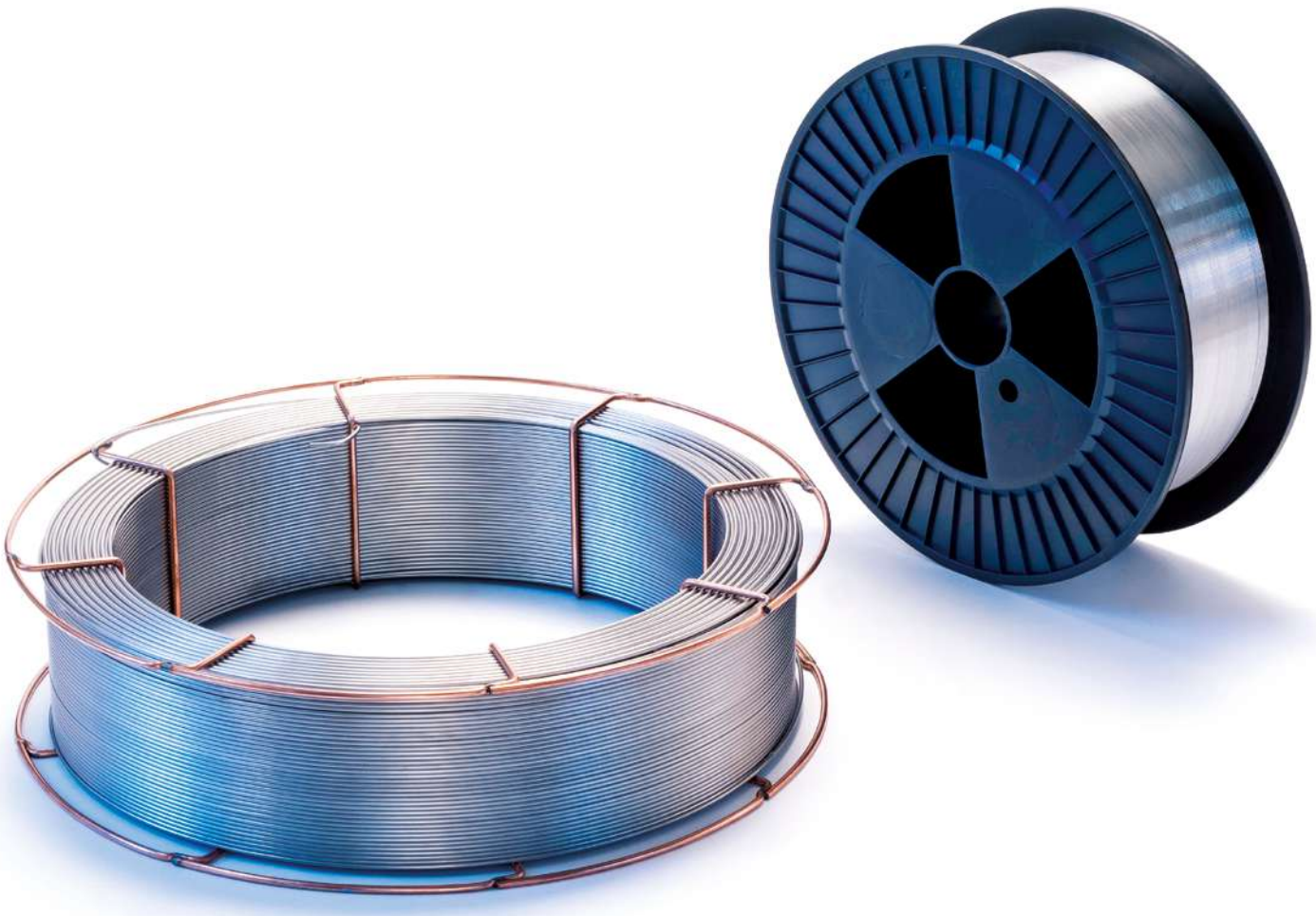
Rodacciai produces according to a Quality Assurance System in accordance with the EN ISO 9001:2015.

In the continuous development of its quality policy, the welding wire products have passed the most difficult tests and have obtained the TÜV / CE (Europe), DB (Germany) and CWB (Canada) product approvals.

In addition Rodacciai stainless steel welding products have been approved and are regularly used by the major car manufacturers worldwide and are also in compliance with the special requirements for the construction of nuclear power plants.

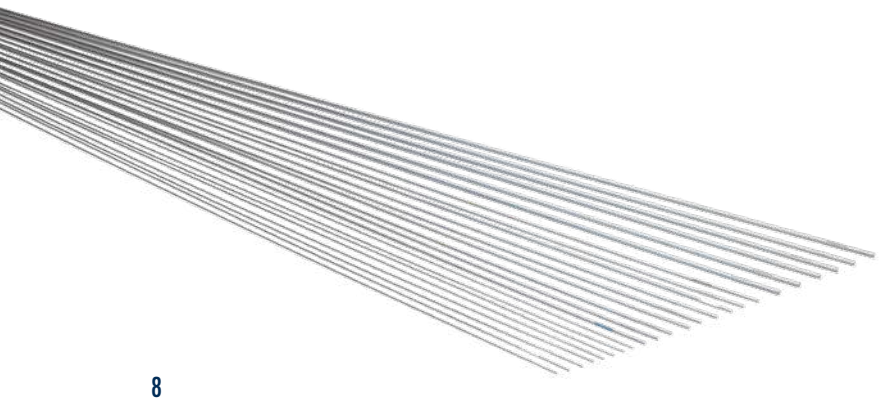


FILLER MATERIALS FOR THE UNION OR CLADDING OF STAINLESS STEELS



CHEMICAL COMPOSITION (BATCH ANALYSIS) %

		C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N	Nb	Ti
RW 307	min	-	5,00	-	-	-	17,0	7,0	-	-	-	-	-
	max	0,08	8,00	0,50	0,030	0,030	20,0	10,0	0,30	0,30	-	-	-
RW 307L	min	-	5,00	0,30	-	-	17,0	7,0	-	-	-	-	-
	max	0,05	8,00	0,70	0,030	0,030	20,0	10,0	0,30	0,30	-	-	-
RW 307SI	min	-	5,00	0,65	-	-	17,0	7,0	-	-	-	-	-
	max	0,10	8,00	1,00	0,030	0,030	20,0	10,0	0,30	0,30	-	-	-
RW 308L	min	-	1,00	-	-	-	19,5	9,0	-	-	-	-	-
	max	0,03	2,50	0,20	0,020	0,030	21,0	11,0	0,30	0,30	-	-	-
RW 308LAWS	min	-	1,00	0,30	-	-	19,5	9,0	-	-	-	-	-
	max	0,03	2,50	0,65	0,020	0,030	21,0	11,0	0,30	0,30	-	-	-
RW 19-9-L	min	-	1,00	0,30	-	-	19,5	9,0	-	-	-	-	-
	max	0,03	2,50	0,65	0,030	0,030	22,0	11,0	0,75	0,75	-	-	-
RW 308LSI	min	-	1,00	0,65	-	-	19,5	9,0	-	-	-	-	-
	max	0,03	2,50	1,00	0,020	0,030	21,0	11,0	0,30	0,30	-	-	-
RW 308H	min	0,04	1,00	0,30	-	-	19,5	9,0	-	-	-	-	-
	max	0,08	2,50	0,65	0,020	0,030	21,0	11,0	0,30	0,30	-	-	-
RW 309L	min	-	1,00	0,30	-	-	23,0	12,0	-	-	-	-	-
	max	0,03	2,50	0,65	0,020	0,030	25,0	14,0	0,30	0,30	-	-	-
RW 309SI	min	-	1,00	0,65	-	-	23,0	12,0	-	-	-	-	-
	max	0,12	2,50	1,00	0,030	0,030	25,0	14,0	0,75	0,75	-	-	-
RW 309LSI	min	-	1,00	0,65	-	-	23,0	12,0	-	-	-	-	-
	max	0,03	2,50	1,00	0,020	0,030	25,0	14,0	0,30	0,30	-	-	-
RW 309LMO	min	-	1,00	0,30	-	-	21,0	11,0	2,00	-	-	-	-
	max	0,03	2,50	0,65	0,020	0,030	25,0	15,5	3,50	0,30	-	-	-
RW 309H	min	0,04	1,00	0,30	-	-	23,0	12,0	-	-	-	-	-
	max	0,15	2,50	0,65	0,030	0,030	24,0	14,0	0,50	0,30	-	-	-
RW 310	min	0,08	1,00	0,30	-	-	25,0	20,0	-	-	-	-	-
	max	0,15	2,50	0,65	0,020	0,030	27,0	22,0	0,30	0,30	-	-	-
RW 312	min	-	1,00	0,30	-	-	28,0	8,0	-	-	-	-	-
	max	0,15	2,50	0,65	0,020	0,030	32,0	10,5	0,30	0,30	-	-	-
RW 316L	min	-	1,00	-	-	-	18,0	11,0	2,50	-	-	-	-
	max	0,03	2,50	0,20	0,020	0,030	20,0	14,0	3,00	0,30	-	-	-
RW 316LAWS	min	-	1,00	0,30	-	-	18,0	11,0	2,50	-	-	-	-
	max	0,03	2,50	0,65	0,020	0,030	20,0	14,0	3,00	0,30	-	-	-
RW 316LSI	min	-	1,00	0,65	-	-	18,0	11,0	2,50	-	-	-	-
	max	0,03	2,50	1,00	0,020	0,030	20,0	14,0	3,00	0,30	-	-	-



CHEMICAL COMPOSITION (BATCH ANALYSIS) %

		C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N	Nb	Ti
RW 316H	min	0,04	1,00	0,30	-	-	18,0	11,0	2,00	-	-	-	-
	max	0,08	2,50	0,65	0,020	0,030	20,0	14,0	3,00	0,30	-	-	-
RW 317LAWS	min	-	1,00	0,30	-	-	18,5	13,0	3,00	-	-	-	-
	max	0,03	2,50	0,65	0,020	0,030	20,0	15,0	4,00	0,30	-	-	-
RW 318SI	min	-	1,00	0,65	-	-	18,0	11,0	2,50	-	-	10xC	-
	max	0,08	2,50	1,00	0,020	0,030	20,0	14,0	3,00	0,30	-	1,00	-
RW 347	min	-	1,00	0,30	-	-	19,0	9,0	-	-	-	10xC	-
	max	0,08	2,50	0,65	0,020	0,030	21,0	11,0	0,30	0,30	-	1,00	-
RW 347SI	min	-	1,00	0,65	-	-	19,0	9,0	-	-	-	10xC	-
	max	0,08	2,50	1,00	0,020	0,030	21,0	11,0	0,30	0,30	-	1,00	-
RW 385	min	-	1,00	-	-	-	19,5	24,0	4,20	1,20	-	-	-
	max	0,025	2,50	0,50	0,020	0,020	21,5	26,0	5,20	2,00	-	-	-
RW 2209	min	-	0,50	-	-	-	21,5	7,5	2,50	-	0,10	-	-
	max	0,03	2,00	0,90	0,020	0,030	23,5	9,5	3,50	0,30	0,20	-	-
RW 409CB	min	-	-	-	-	-	10,5	-	-	-	-	10xC	-
	max	0,08	0,80	1,00	0,020	0,030	13,50	0,6	0,50	0,75	-	0,75	-
RW 410	min	-	-	-	-	-	12,0	-	-	-	-	-	-
	max	0,12	0,60	0,50	0,020	0,030	13,5	0,5	0,50	0,40	-	-	-
RW 410NIMO	min	-	-	-	-	-	11,0	4,0	0,40	-	-	-	-
	max	0,05	0,60	0,50	0,020	0,030	12,5	5,0	0,70	0,30	-	-	-
RW 4122	min	0,33	-	-	-	-	15,5	-	0,90	-	-	-	-
	max	0,43	1,00	0,70	0,020	0,030	17,5	1,0	1,20	-	-	-	-
RW 420	min	0,30	-	-	-	-	12,0	-	-	-	-	-	-
	max	0,40	0,60	0,50	0,030	0,030	14,0	0,6	0,75	0,75	-	-	-
RW 420C	min	0,38	0,30	-	-	-	12,0	-	-	-	-	-	-
	max	0,43	0,60	0,50	0,030	0,030	14,0	0,6	0,75	0,75	-	-	-
RW 430	min	-	-	-	-	-	16,0	-	-	-	-	-	-
	max	0,10	0,60	0,50	0,030	0,030	17,0	0,6	0,75	0,75	-	-	-
RW 430LNB	min	-	-	-	-	-	17,8	-	-	-	-	0,05+ 7(C+N)	-
	max	0,02	0,80	0,50	0,020	0,030	18,8	0,5	0,30	0,30	0,02	0,5	-
RW 430LNBTI	min	-	-	-	-	-	17,5	-	-	-	-	8xC	10xC
	max	0,03	1,50	1,00	0,300	0,030	19,5	0,5	0,50	0,50	0,02	0,80	0,50
RW 2594	min	-	-	-	-	-	24,0	8,0	2,50		0,2	-	-
	max	0,03	2,50	1,00	0,020	0,030	27,0	10,5	4,50	1,5	0,3	-	-

RODACCIAI'S DENOMINATIONS EQUIVALENT

	EN ISO 14343-A: 2017 Nominal Composition	EN ISO 14343-B: 2017 Alloy Type	AWS A5.9-2017 Alloy Designation	AWS A5.9-2017 Nominal Composition Designation	DIN Werkstoff Nr.
RW 307	18 8 Mn	-	-	18 8 Mn	1.4370
RW 307L	18 8 Mn	-	-	18 8 Mn	1.4370
RW 307SI	18 8 Mn	-	-	18 8 Mn	1.4370
RW 308L	19 9 L	-	-	19 9 L	-
RW 308LAWS	19 9 L	SS308L	ER308L	19 9 L	1.4316
RW 19-9-L	19 9 L	SS308L	ER308L	19 9 L	1.4316
RW 308LSI	19 9 L Si	SS308LSi	ER308LSi	19 9 L Si	1.4316
RW 308H	19 9 H	SS308H	ER308H	19 9 H	-
RW 309L	23 12 L	SS309L	ER309L	23 12 L	1.4332
RW 309SI	-	SS309Si	ER309Si	-	(1.4829)
RW 309LSI	23 12 L Si	SS309LSi	ER309LSi	23 12 L Si	1.4332
RW 309LMO	23 12 2 L	-	-	23 12 2 L	(1.4459)
RW309H	22 12 H	SS309	ER309	22 12 H	-
RW 310	25 20	SS310	ER310	25 20	(1.4842)
RW 312	29 9	SS312	ER312	29 9	1.4337
RW 316L	19 12 3 L	-	-	19 12 3 L	1.4430
RW 316LAWS	19 12 3 L	SS316L	ER316L	19 12 3 L	1.4430
RW 316LSI	19 12 3 L Si	SS316LSi	ER316LSi	19 12 3 L Si	1.4430
RW 316H	19 12 3 H	SS316H	ER316H	19 12 3 H	-
RW 317LAWS	18 15 3 L	SS317L	ER317L	18 15 3 L	-
RW 318SI	19 12 3 Nb Si	-	(ER318)	19 12 3 Nb Si	1.4576
RW 347	19 9 Nb	SS347	ER347	19 9 Nb	1.4551
RW 347SI	19 9 Nb Si	SS347Si	ER347Si	19 9 Nb Si	1.4551
RW 385	20 25 5 Cu L	SS385	ER385	20 25 5 Cu L	-
RW 2209	22 9 3 N L	SS2209	ER2209	22 9 3 N L	(1.4462)
RW 409CB	-	SS409Nb	ER409Nb	-	-
RW 410	13	SS410	ER410	13	-
RW 410NIMO	13 4	SS410NiMo	ER410NiMo	13 4	-
RW 4122	-	-	-	-	1.4122
RW 420	-	SS420	ER420	-	-
RW 420C	-	(SS420)	(ER420)	-	1.4031
RW 430	(17)	SS430	ER430	(17)	1.4016
RW 430LNB	18 LNb	(SS430LNb)	(ER430LNb)	18 L Nb	1.4511
RW 430LNBTI	18 L Nb Ti	-	-	18 L Nb Ti	-
RW 2594	25 9 4 N L	SS2594	ER2594	25 9 4 N L	-

NICKEL
ALLOY FAMILY

In the field of production of Stainless Steel welding wire from many years, Rodacciai have developed a new family of products in order to increase its range of products and meet its customers' demand.
After research, development and tests carried out at Rodacciai production sites and laboratories, the company has launched the new family on Nickel Alloys solid welding wire with the brand Roda Alloy .

The long experience and the work accomplished before the launch of the new products have allowed Rodacciai to collect positive feedbacks from customers - particularly appreciating the quality consistency that has been achieved.
According to customers' needs, Roda Alloy can supply MIG, TIG, core wire or Submerged Arc welding processes , in different sizes - from 0.8 mm to 4 mm.- and different packaging. Last but not least, Roda Alloy 625 has received the TÜV certification.

"THE COMPANY HAS LAUNCHED THE NEW FAMILY ON NICKEL ALLOYS SOLID WELDING WIRE."

Roda ALLOY 625e
Roda ALLOY 625
Roda ALLOY 825
Roda ALLOY 82
Roda ALLOY 276
Roda ALLOY 617
Roda ALLOY 622

DATASHEET RODA ALLOY 625 – MIG – TIG

VdTUV - Merkblatt 1153 Approved

DESCRIPTION AND APPLICATIONS

Roda Alloy 625 is developed for welding of Alloys 625 at working temperature from –269°C to above 1000°C. It's suitable for welding heat resisting alloys (as Incoloy 800/800H) with other alloys for power generation and petrochemical plants and furnace equipment. It's also suitable for overmatching corrosion-resistant welds in Alloy 825, 6%Mo superaustenitic stainless 254SMo, Alloy 28, 904L, and for overlays on valves, pumps and shafts in marine and offshore equipment where high pitting resistance (PRE>50) and tolerance to weld metal dilution is required. In addition to the above materials, Roda Alloy 625 can be used as filler metal for cladding and welding dissimilar base metals such as Ni-Cr-Mo alloys to stainless and carbon steels.

APPROXIMATE EQUIVALENT WITH OTHER STANDARDS

Rodacciai Denomination	Rodaalloy 625
EN ISO 18274:2010	Ni 6625 - NiCr22Mo9Nb
AWS A5.14/A5.14M: 2018	ERNiCrMo-3 - N06625
DIN Werkstoff Nr.	2.4831 - 2.4856

FILLER METAL PROPERTIES

Typical Chemical composition (nominal) in %

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Al	Ti	Fe	Nb+Ta
0,02	0,2	0,2	0,005	0,005	22	63	8,5	0,06	0,2	0,2	≤0,5	3,5

EXPECTED MINIMUM MECHANICAL PROPERTIES AS WELDED

TEMPERATURE		20°C	-196°C
Yield strength, Rp 0,2	MPa min	480	
Tensile strength, Rm	MPa min	750	
Elongation, A5	% min	35	
Impact energy, ISO – V	J min	110	65
PRE	min	50	

TYPICAL WELDING PARAMETERS

PROCESS	DIAMETER		VOLT	AMPERE	GAS
	mm	inches			
MIG	1,0	0.035	20 - 25	110 - 150	100% Ar
	1,2	1/16	24 - 26	180 - 220	100% Ar
	1,6				
TIG	1,6	1/16	11 - 14	125 - 185	100% Ar
	2,0	3/32	11 - 14	115 - 165	100% Ar
	2,4				
	3,2				

Welding positions down hand, horizontal/vertical, vertical upward, overhead. Highest operating temperature, in the short term range, as for base metal, but not higher than 1000 °C. Lowest operating temperature, as for base metal, but not lower than – 196°C

SIZES

diam. mm 0,80 – 0,90 – 1,00 – 1,14 – 1,20 – 1,60 – 2,00 – 2,40 – 3,20 – 4,00 diam. inches 0.030 – 0.035 – 0.045 – 1/16 – 3/32 – 1/8 – 5/32

PACKAGING FORMS

TIG:Carton boxes of 5 kg / 10 lb. Red, cardboard tubes of 5 kg / 10 lb. Wooden crates of 250 kg / 660 lb .
MIG: Metallic wire baskets BS300 of 15 kg / 33 lb. Plastic spools D300 of 12,5 kg / 25 lb for diam. 0,80 mm and of 15 kg / 33 lb for the other diameters.
Plastic spools D200 of 5 kg / 10 lb. Bulk spool on wood or steel up to 250 kg / 550 lb. Drum for robotic welding up to 400 kg / 880 lb.
Submerged Arc: Metallic wire basket K415 of 25 kg / 55 lb Drum for robotic welding up to 300 kg / 660 lb.
Core Wire: Core wires in cut lengths 250 - 450 mm (9 - 18 inches), or Core wires in coils weight up to kg 800 1750 lb.
Electrode: dry pack – range of Ø 2,50 – 5,00 in cut lengths from 300 to 450 mm

DATASHEET RODA ALLOY 825 – MIG – TIG

DESCRIPTION AND APPLICATIONS

Roda Alloy 825 is used in corrosive environments below 540°C (1000°F) because it's resistant to reducing acids, H_3PO_4, H_2SO_4, and also to chloride-ion stress-corrosion cracking, thanks to Nickel together with Molybdenum and Copper. As filler metal is used for welding Ni-Fe-Cr-Mo-Cu alloy to itself using TIG and MIG processes; a typical use is for pipes and tubes in UNS N08825 (ASTM B423) used in offshore oil platforms.
Roda Alloy 825 can also be used to overlay cladding where similar chemical composition is required or to protect carbon and low alloys steel.

APPROXIMATE EQUIVALENT WITH OTHER STANDARDS

Rodacciai Denomination	Rodaalloy 825
EN ISO 18274:2010	Ni 8065 - NiFe30Cr21Mo3
AWS A5.14/A5.14M: 2018	ERNiFeCr-1 - N08065
DIN Werkstoff Nr.	(2.4858)

FILLER METAL PROPERTIES Typical Chemical composition (nominal) in %

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Al	Ti	Fe
0,02	0,65	0,3	0,002	0,020	22,5	43,5	3,15	2,5	0,1	0,8	27

EXPECTED MINIMUM MECHANICAL PROPERTIES AS WELDED

Temperature		20°C
Yield strength, Rp 0,2	MPa min	240
Tensile strength, Rm	MPa min	560
Elongation, A5	% min	28

TYPICAL WELDING PARAMETERS

PROCESS	DIAMETER		VOLT	AMPERE	GAS
	mm	inches			
MIG	1,0	0.035	26-29	150-190	75% Ar + 25% He
	1,2	0.045	28-32	180-220	75% Ar + 25% He
	1,6	1/16	29-33	200-250	75% Ar + 25% He
TIG	1,6	1/16	14-18	90-130	100% Ar
	2,4	3/32	15-20	120-175	100% Ar
	3,2	1/8	15-20	150-220	100%Ar

Typically no preheat is required, interpass temperature is kept to 150°C maximum and no PWHT is required.

SIZES

diam. mm 0,80 – 0,90 – 1,00 – 1,14 – 1,20 – 1,60 – 2,00 – 2,40 – 3,20 – 4,00
diam. inches 0.030 – 0.035 – 0.045 – 1/16 – 3/32 – 1/8 – 5/32

PACKAGING FORMS

TIG:Carton boxes of 5 kg / 10 lb. Red, cardboard tubes of 5 kg / 10 lb. Wooden crates of 250 kg / 660 lb .
MIG: Metallic wire baskets BS300 of 15 kg / 33 lb. Plastic spools D300 of 12,5 kg / 25 lb for diam. 0,80 mm and of 15 kg / 33 lb for the other diameters.
Plastic spools D200 of 5 kg / 10 lb. Bulk spool on wood or steel up to 250 kg / 550 lb. Drum for robotic welding up to 400 kg / 880 lb.
Submerged Arc: Metallic wire basket K415 of 25 kg / 55 lb Drum for robotic welding up to 300 kg / 660 lb.
Core Wire: Core wires in cut lengths 250 - 450 mm (9 - 18 inches), or Core wires in coils weight up to kg 800 1750 lb.

DATASHEET RODA ALLOY 82 – MIG – TIG

DESCRIPTION AND APPLICATIONS

Roda Alloy 82 is a Ni-Cr alloy consumable with addition of Nb, used for GTAW, GMAW of Ni-Cr alloys (i.e. UNS N06075, UNS N07080, UNS N08330), of Ni-Cr-Fe alloys (i.e. UNS N06600, UNS N06601, UNS N06690) and of Ni-Fe-Cr alloys (i.e.UNS N08800, UNS N08811). It is also used for overlaying on steels and for dissimilar welding, joining stainless steels with carbon steel and stainless steels with nickel alloys.
It can also be used for cryogenic applications.

APPROXIMATE EQUIVALENT WITH OTHER STANDARDS

Rodacciai Denomination	Rodaalloy 82
EN ISO 18274:2010	Ni 6082 - NiCr20Mn3Nb
AWS A5.14/A5.14M: 2018	ERNiCr-3 - Ni6082
DIN Werkstoff Nr.	2.4806

FILLER METAL PROPERTIES Typical Chemical composition (nominal) in %

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Co	Ti	Fe
0,03	3	0,1	0,005	0,005	20	70	2,5	0,06	0,05	0,40	≤1,5

EXPECTED MINIMUM MECHANICAL PROPERTIES AS WELDED

TEMPERATURE		20°C	-196°C
Yield strength, Rp 0,2	MPa min	480	
Tensile strength, Rm	MPa min	750	
Elongation, A5	% min	35	

TYPICAL WELDING PARAMETERS

PROCESS	DIAMETER		VOLT	AMPERE	GAS
	mm	inches			
	1,0	0.035	26-32	160-280	75% Ar + 25% He
MIG	1,2	0.045	28-32	180-300	75% Ar + 25% He
	1,6	1/16	29-33	200-300	75% Ar + 25% He
	1,6	1/16	14-18	90-150	100% Ar
TIG	2,4	3/32	15-20	150-255	100% Ar
	3,2	1/8	15-20	200-370	100% Ar

Welding positions down hand, horizontal/vertical, vertical upward, overhead.
Highest operating temperature, in the short term range, as for base metal, but not higher than 1000 °C. Lowest operating temperature, as for base metal, but not lower than – 196°C

SIZES

diam. mm 0,80 – 0,90 – 1,00 – 1,14 – 1,20 – 1,60 – 2,00 – 2,40 – 3,20 – 4,00
diam. inches 0.030 – 0.035 – 0.045 – 1/16 – 3/32 – 1/8 – 5/32

PACKAGING FORMS

TIG:Carton boxes of 5 kg / 10 lb. Red, cardboard tubes of 5 kg / 10 lb. Wooden crates of 250 kg / 660 lb .
MIG: Metallic wire baskets BS300 of 15 kg / 33 lb. Plastic spools D300 of 12,5 kg / 25 lb for diam. 0,80 mm and of 15 kg / 33 lb for the other diameters.
Plastic spools D200 of 5 kg / 10 lb. Bulk spool on wood or steel up to 250 kg / 550 lb. Drum for robotic welding up to 400 kg / 880 lb.
Submerged Arc: Metallic wire basket K415 of 25 kg / 55 lb Drum for robotic welding up to 300 kg / 660 lb.
Core Wire: Core wires in cut lengths 250 - 450 mm (9 - 18 inches), or Core wires in coils weight up to kg 800 1750 lb.

DATASHEET RODA ALLOY 276 – MIG – TIG

DESCRIPTION AND APPLICATIONS

Roda Alloy 276 is a Ni-Cr-Mo alloy consumable, used for GTAW, GMAW of Ni-Cr-Mo alloys (especially UNS N10276). The presence of chromium, molybdenum and tungsten gives a good corrosion resistance to pitting and crevice. It can be also used for dissimilar welding, joining UNS N10276 to other nickel-base alloys, to stainless steels or to low alloy steels. It also suitable for steel surfacing.

APPROXIMATE EQUIVALENT WITH OTHER STANDARDS

Rodacciai Denomination	Rodaalloy 276
EN ISO 18274:2010	Ni 6276 - NiMo16Cr15Fe6W4
AWS A5.14/A5.14M: 2018	ERNiCrMo-4 - N10276
DIN Werkstoff Nr.	(2.4819)

FILLER METAL PROPERTIES

Typical Chemical composition (nominal) in %

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	W	V	Co	Fe
≤0,010	0,5	0,05	≤0,005	0,010	16	58	16	0,1	3,5	≤0,05	≤0,05	5,8

EXPECTED MINIMUM MECHANICAL PROPERTIES AS WELDED

TEMPERATURE		20°C	-196°C
Yield strength, Rp 0,2	MPa min	520	
Tensile strength, Rm	MPa min	720	
Elongation, A5	% min	40	

TYPICAL WELDING PARAMETERS

Process	Diameter mm	Diameter inches	Volt	Ampere	Gas
MIG	1,0	0.035	24-28	150-250	75% Ar + 25% He
	1,2	0.045	24-28	180-280	75% Ar + 25% He
	1,6	1/16	26-30	200-300	75% Ar + 25% He
TIG	1,6	1/16	12-15	100-150	100% Ar
	2,4	3/32	14-18	120-180	100% Ar
	3,2	1/8	14-18	140-200	100% Ar

Welding positions down hand, horizontal/vertical, vertical upward, overhead.
Highest operating temperature, in the short term range, as for base metal, but not higher than 1000 °C. Lowest operating temperature, as for base metal, but not lower than – 196°C

SIZES

diam. mm 0,80 – 0,90 – 1,00 – 1,14 – 1,20 – 1,60 – 2,00 – 2,40 – 3,20 – 4,00
diam. inches 0.030 – 0.035 – 0.045 – 1/16 – 3/32 – 1/8 – 5/32

PACKAGING FORMS

TIG:Carton boxes of 5 kg / 10 lb. Red, cardboard tubes of 5 kg / 10 lb. Wooden crates of 250 kg / 660 lb .
MIG: Metallic wire baskets BS300 of 15 kg / 33 lb. Plastic spools D300 of 12,5 kg / 25 lb for diam. 0,80 mm and of 15 kg / 33 lb for the other diameters.
Plastic spools D200 of 5 kg / 10 lb. Bulk spool on wood or steel up to 250 kg / 550 lb. Drum for robotic welding up to 400 kg / 880 lb.
Submerged Arc: Metallic wire basket K415 of 25 kg / 55 lb Drum for robotic welding up to 300 kg / 660 lb.
Core Wire: Core wires in cut lengths 250 - 450 mm (9 - 18 inches), or Core wires in coils weight up to kg 800 1750 lb.

DATASHEET RODA ALLOY 617 – MIG – TIG

DESCRIPTION AND APPLICATIONS

Roda Alloy 617 is a, Ni-Cr-Co-Mo alloy consumable, used for GTAW, GMAW of Ni-Cr-Co-Mo alloys (like UNS N06617), of Ni-Cr-Mo austenitic stainless steel and for cladding.
Due to its composition is suitable for joining dissimilar alloys where high temperature strength and oxidation resistance are required up to 1150°C (i.e UNS N08800, UNS N08811).

APPROXIMATE EQUIVALENT WITH OTHER STANDARDS

Rodacciai Denomination	Rodaalloy 617
EN ISO 18274:2010	Ni 6617 - NiCr22Co12Mo9
AWS A5.14/A5.14M: 2018	ERNiCrCoMo-1 - N06617
DIN Werkstoff Nr.	2.4627

FILLER METAL PROPERTIES

Typical Chemical composition (nominal) in %

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Al	Ti	Co	Fe
0,06	0,05	≤0,15	≤0,005	≤0,005	21,5	56	8,8	≤0,02	1,3	≤0,4	11	≤0,8

EXPECTED MINIMUM MECHANICAL PROPERTIES AS WELDED

TEMPERATURE		20°C	-196°C
Yield strength, Rp 0,2	MPa min	300	
Tensile strength, Rm	MPa min	700	
Elongation, A5	% min	50	

TYPICAL WELDING PARAMETERS

PROCESS	DIAMETER mm	DIAMETER inches	VOLT	AMPERE	GAS
	1,0	0.035	26-29	150-190	75% Ar + 25% He
MIG	1,2	0.045	28-32	180-220	75% Ar + 25% He
	1,6	1/16	29-33	200-250	75% Ar + 25% He
TIG	3,2	1/8	29-32	350-450	100% Ar

Welding positions down hand, horizontal/vertical, vertical upward, overhead.
Highest operating temperature, in the short term range, as for base metal, but not higher than 1000 °C. Lowest operating temperature, as for base metal, but not lower than – 196°C

SIZES

diam. mm 0,80 – 0,90 – 1,00 – 1,14 – 1,20 – 1,60 – 2,00 – 2,40 – 3,20 – 4,00
diam. inches 0.030 – 0.035 – 0.045 – 1/16 – 3/32 – 1/8 – 5/32

PACKAGING FORMS

TIG:Carton boxes of 5 kg / 10 lb. Red, cardboard tubes of 5 kg / 10 lb. Wooden crates of 250 kg / 660 lb .
MIG: Metallic wire baskets BS300 of 15 kg / 33 lb. Plastic spools D300 of 12,5 kg / 25 lb for diam. 0,80 mm and of 15 kg / 33 lb for the other diameters.
Plastic spools D200 of 5 kg / 10 lb. Bulk spool on wood or steel up to 250 kg / 550 lb. Drum for robotic welding up to 400 kg / 880 lb.
Submerged Arc: Metallic wire basket K415 of 25 kg / 55 lb Drum for robotic welding up to 300 kg / 660 lb.
Core Wire: Core wires in cut lengths 250 - 450 mm (9 - 18 inches), or Core wires in coils weight up to kg 800 1750 lb.

DATASHEET RODA ALLOY 622 – MIG – TIG

DESCRIPTION AND APPLICATIONS

Roda Alloy 622 is a Ni-Cr-Mo alloy consumable, used for GTAW, GMAW of Ni-Cr-Mo alloys (i.e. UNS N06022, UNS N08825, UNS N06625, UNS N10276). It is suitable for dissimilar welding of Ni-Cr-Mo alloys with Ni-Cr-Mo austenitic stainless steels. The presence of chromium, molybdenum and tungsten increases pitting and crevice corrosion resistance. It can be used also for surfacing of carbon and low alloy steels.

APPROXIMATE EQUIVALENT WITH OTHER STANDARDS

Rodacciai Denomination	Rodaalloy 622
EN ISO 18274:2010	Ni 6022 - NiCr21Mo13Fe4W3
AWS A5.14/A5.14M: 2018	ERNiCrMo-10 - N06022
DIN Werkstoff Nr.	2.4635

FILLER METAL PROPERTIES Typical Chemical composition (nominal) in %

C	Mn	Si	S	P	Cr	Ni	Mo	Cu	W	V	Co	Fe
≤0,015	≤0,25	0,05	≤0,005	0,005	22	56	14	≤0,08	3	0,10	0,05	≤5

EXPECTED MINIMUM MECHANICAL PROPERTIES AS WELDED

TEMPERATURE		20°C	-196°C
Yield strength, Rp 0,2	MPa min	480	
Tensile strength, Rm	MPa min	750	
Elongation, A5	% min	35	

TYPICAL WELDING PARAMETERS

PROCESS	DIAMETER mm	DIAMETER inches	VOLT	AMPERE	GAS
	1,0	0.035	26-29	140-190	75% Ar + 25% He
MIG	1,2	0.045	28-32	160-200	75% Ar + 25% He
	1,6	1/16	29-33	200-250	75% Ar + 25% He
TIG	3,2	1/8	25-30	275-350	100% Ar

Welding positions down hand, horizontal/vertical, vertical upward, overhead.
Highest operating temperature, in the short term range, as for base metal, but not higher than 1000 °C. Lowest operating temperature, as for base metal, but not lower than – 196°C

SIZES

diam. mm 0,80 – 0,90 – 1,00 – 1,14 – 1,20 – 1,60 – 2,00 – 2,40 – 3,20 – 4,00
diam. inches 0.030 – 0.035 – 0.045 – 1/16 – 3/32 – 1/8 – 5/32

PACKAGING FORMS

TIG:Carton boxes of 5 kg / 10 lb. Red, cardboard tubes of 5 kg / 10 lb. Wooden crates of 250 kg / 660 lb .
MIG: Metallic wire baskets BS300 of 15 kg / 33 lb. Plastic spools D300 of 12,5 kg / 25 lb for diam. 0,80 mm and of 15 kg / 33 lb for the other diameters.
Plastic spools D200 of 5 kg / 10 lb. Bulk spool on wood or steel up to 250 kg / 550 lb. Drum for robotic welding up to 400 kg / 880 lb.
Submerged Arc: Metallic wire basket K415 of 25 kg / 55 lb Drum for robotic welding up to 300 kg / 660 lb.
Core Wire: Core wires in cut lengths 250 - 450 mm (9 - 18 inches), or Core wires in coils weight up to kg 800 1750 lb.

PRODUCTION RANGE AND FINISHING

<table>
<tr><th>WELDING PROCESSES</th><th></th><th>SIZE</th><th>PACKAGING</th></tr>
<tr><td rowspan="4">MIG</td><td rowspan="2">mm</td><td rowspan="2">0,80 - 0,90 - 1,00 - 1,14 - 1,20 - 1,60</td><td>Plastic spool D200
- size: width 55 mm
- outside diameter: 200 mm
- spindle hole diameter: 51,5 mm
- weight: 5 kg</td><td>Plastic spool D300
- size: width 100 mm
- outside diameter: 300 mm
- spindle hole diameter: 51,5 mm
- weight: 12,5 kg (for diameter ≤0,8 mm)
15 kg (for diameters >0,8 mm)</td></tr>
<tr><td colspan="2">Blue metallic wire basket BS300
- size: width 100 mm
- outside diameter: 300 mm
- inside diameter: 51,5 mm
- weight: 15 kg</td></tr>
<tr><td>inches</td><td>0.030 - 0.035 - 0.045 - 1/16</td><td colspan="2">Bulk spool / wooden / metallic
- size: width 285 mm
- outside diameter: 750 mm
- spindle hole diameter: 41 mm
- weight: 250 kg</td></tr>
<tr><td colspan="3"></td><td colspan="2">Drum for robotic welding
- wire diameter (mm): 0,8 | 0,9 1,0 1,2 | 1,6
- height of drum (mm): 670 | 790 | 790
- outside diameter (mm): 510 | 520 | 580
- weight (kg): 150 | 250-400 | 250-400</td></tr>
<tr><td rowspan="2">TIG</td><td>mm</td><td>0,80 - 0,90 - 1,00 - 1,14 - 1,20 - 1,60
2,00 - 2,40 - 3,20 - 4,00</td><td colspan="2" rowspan="2">Rods
- length 1000 mm (Ø in mm)/36 inches (Ø in inches)
- stamped with AWS and W.Nr. ref.
- packed boxes or cardboard tubes
- weight: 5 kg</td></tr>
<tr><td>inches</td><td>0.030 - 0.035 - 0.045 - 1/16
3/32 - 1/8 - 5/32</td></tr>
<tr><td rowspan="2">SUBMERGED ARC</td><td>mm</td><td>1,60 - 2,00 - 2,40 - 3,20 - 4,00</td><td>Metallic wire basket K415
- size: width 100 mm
- outside diameter: 415 mm
- inside diameter: 300 mm
- weight: 25 kg</td><td>Drum
- wire diameter: 2,0 - 4,0 mm
- height of drum: 850 mm
- outside diameter: 660 mm
- weight: 300 kg</td></tr>
<tr><td>inches</td><td>1/16 - 5/64 - 3/32 - 1/8 - 5/32</td><td colspan="2"></td></tr>
<tr><td rowspan="2">CORE WIRE IN CUT LENGTHS OR IN COILS</td><td>mm</td><td>1,60 - 2,00 - 2,50 - 3,25 - 4,00 - 5,00</td><td colspan="2" rowspan="2">Core wires in cut lengths
- length 250 - 450 mm (9 - 18 inches)
- packed in wooden crates
sizes:
- 800 - 1.000 kg, base 750x800 mm - height 500 mm
- 500 - 650 kg, base 820x570 mm - height 580 mm
Core wires in coils
- size: internal diameter: 380 mm
- weight: 500/800 kg</td></tr>
<tr><td>inches</td><td>1/16 - 5/64 - 3/32 - 1/8
5/32 - 3/16</td></tr>
</table>


Rodacciai
WELDING
WARNING
SINCE 1959 ALL OVER THE WORLD

SUSTAINABILITY
PRESERVING THE FUTURE

"SUSTAINABILITY', A STRATEGIC ELEMENT OF RODASTEEL

Based on the guidelines given by the United Nation Climate Conferences, Rodacciai coined its own three pillars: people, planet and performances.

PEOPLE

It is important for Rodasteel to create a work environment that attracts more and more talented individuals and retains those already present

PLANET

Rodasteel places environmental conservation as a fundamental aspect of its production activities and growth objectives

PERFORMANCE

Rodasteel pays particular attention to the efficiency and reduction of its energy consumption

2030

PEOPLE

Since people are the basis of our success, it is important for Rodasteel to create a work environment that attracts more and more talented individuals and retains those already present for as long as possible.

For this reason, Rodacciai invests in people trainings represented by two main projects: Rodacciai Academy and Rodajob.

Rodacciai Academy: inaugurated in 2015, it deals with the development and skills of the company's human resources in collaboration with stakeholders and the local area. The goal is the transmission and development of knowledge and professional experience, with specific programs dedicated to employees, school and university students and unemployed.

Roadjob: inaugurated in 2019, it is a non-profit foundation composed of 26 other companies and 11 training institutions. The main activity consists in the provision of professionalizing training courses, mainly dedicated to unemployed, precarious young people and high school students. Rodasteel offers and guarantees equal opportunities to all its employees regardless of gender, geographic origin, disability or any other difference. Respect for diversity and combating discrimination are also central to the Rodacciai Code of Ethics, alongside other social topics such as the promotion and support of human rights.

Moreover, Rodacciai supports its employees by investing in welfare services. Rodacciai Welfare is a platform aimed at promoting people health and safety.

This tool gives people the access to special services in order to improve their work-life balance and possibilities.

HIRING RATE

Hiring rate increase (expressed in percentage)

TRAINING RATE

Total training hours per employee (expressed in hours per capita)

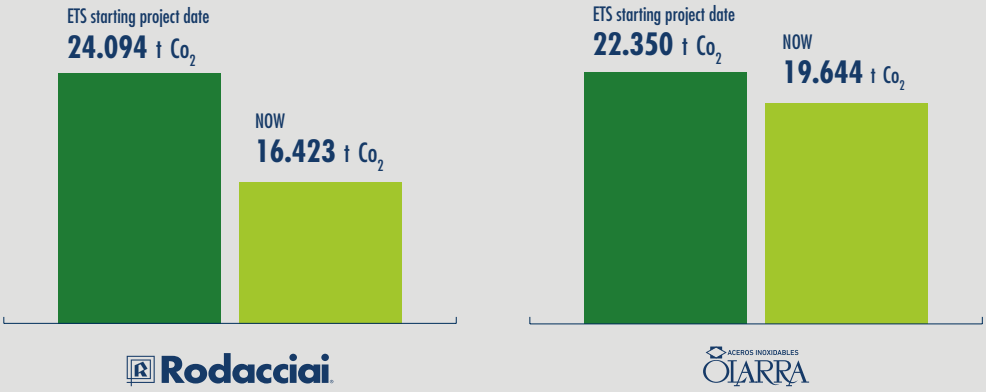
PLANET

Rodasteel places environmental conservation as a fundamental aspect of its production activities and growth objectives. The company is committed to continuously monitoring and evaluating its environmental impacts to identify winning strategies and innovative solutions to mitigate and reduce them. Responsible **management of raw materials** is a fundamental point for Rodacciai environmental strategy plan. Even though steel is originally created from virgin ferrous minerals, nowadays it can be considered both durable and permanent. In fact, the most used raw material is scrap metal that is 100% recyclable and capable of being remelted without ever losing any of its characteristic properties. For this reason, Rodasteel is gradually reducing the consumption of virgin raw materials and limiting the production of waste through recovery and reuse.

Waste management is extremely important for a company that aspires to monitor and consequently reduce its environmental impacts. According to that aspect, in line with the Group's principle of implementing circular economy initiatives, Olarra concluded in 2021 the project aimed at enhancing the waste produced and reducing the consumption of virgin materials: the Tarcinox project. The initiative aimed at recovering three of the main types of waste produced by Olarra: slag and dust in steelworks and sludge produced in rolling mills. The project is a continuation of an earlier industrial waste initiative (PIVASI) and the starting point of a new plan for the next period, focused on the recovery of the metals contained in the settling sludge as well as in the search for alternatives for the management and valorisation of steel slag. This path demonstrated the continuous improvements and developments put in place by the corporation.

GREENHOUSE GAS (GHG) EMISSIONS

Values of greenhouse gas emissions (expressed in Co_2 tonnage). The reference period is from the ETS (Emission Trading System) starting project date for the production plant to today.



Rodasteel pays particular attention to the efficiency and reduction of its **energy consumption**. With this purpose, Rodacciai carried out maintenance activities on the heating system of the furnace used for billet processing. In addition, the upgrade of lighting systems with LED lamps was promoted. For the Group it is also important the monitoring of **pollutants emissions** into the atmosphere. In order to obtain an annual estimate of air emissions for each pollutant the Group first carried out sampling at each site and then multiplied the average concentrations measured at each chimney by the average flows recorded at the time of sampling and by the yearly operating hours of the systems.

Moreover, in order to reduce its **greenhouse gas (GHG) emissions** and to improve the environmental impact the Group made the following investments:

- Burners were revamped (Sirone Plant);
- Construction of a regasifier for the use of biogas (Sirone plant);
- Improvement of two heat treatment furnaces (Olarra plant);
- The purchase and installation of a new bell furnace for roll treatment (Olarra plant);

With an on going perspective, Rodasteel Group, as a member of ETS is defining its road map with the aim of reducing atmospheric emissions and using resources increasingly from renewable sources, in accordance to the goal defined by the European community.

As for **electricity consumption**, the installation of solar panels in all production halls and the office building continues.

Responsible management of **water resources** is another important objective for environmental sustainability within the steel industry.

Therefore, Rodasteel Group adopted a global strategy with specific projects for all its production sites. For instance, about 346 thousand cubic meters of water were withdrawn in 2022, a 16% decrease from the previous year (-7% from 2020).

PERFORMANCES

The environmental sustainability of production processes is a priority for the industrial world and Rodacciai's mission is to accompany its customers in the sustainable steel supply chain.

With this purpose, the Group has planned a path based on some key points:

- Definition of a Sustainability and Decarbonisation Committee
- Increasing the energy efficiency of production processes
- Conservation of water resources
- Sourcing from renewable or more sustainable sources
- Optimisation of waste management
- Development of an automatic performance monitoring system
- Development of the fifth sustainability report for 2023
- Launch of a decarbonisation plan to 2030
- Maintaining the ISO 14001 standard

REDUCTION PROJECT

SCOPE 1

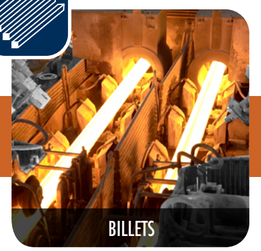
- Rolling Mill Furnace fuel supply: a new regasifier for BioGNL
  It will supplement the energy needs of the billet heating furnace reducing the consumption of natural gas.
- Forklift fuel supply: turning from Diesel to Biodiesel.
  Thanks to this project, implemented in the first two months of 2024, it is possible to use Biodiesel fuel for forklifts.
- GOs: Green Energy Procurements.
  The group favors the supply of natural gas, which guarantees the lowest possible carbon footprint.
- Efficiency improvement.
  Continous upgrading of productions facilities.

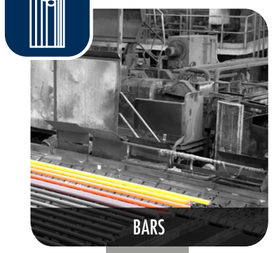
SCOPE 2

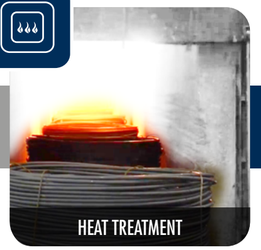
- Renewable power generation and self-consumption: Solar Power plants
  Since 2013 the company has been accommodating solar power plants that produce renewable power for the national grid. Moreover, it is planned to install other solar power plants for the self-consumption.
- PPA e GO: green power procurement.
  The group is planning to gradually increase the consumption of renewable electrical energy trough PPA contracts or equipped with Guarantees of Origin guaranteeing the lowest possible carbon footprint.
- Efficiency improvement.
  Continous upgrading of productions facilities.

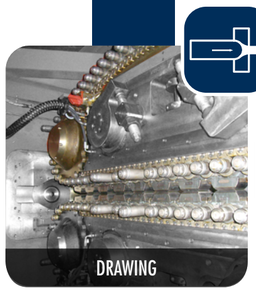
SCOPE 3

- Multimodal goods transport : Road – Rail – Sea
  The company selects the transport service providers verifying that they adopt multi-modal solutions that guarantee excellent performance in terms of Co_2- equivalent reduction.
- Truck fuel supply: turning from Diesel to Biodiesel
  The group has engaged one of main road transport service partners to ensure the use of Biodiesel to power the vehicles used to transport our goods.









STEEL MILL
ROLLING MILL
COLD FINISHING

Rodasteel Corporation has always distinguished itself through a unique production philosophy and the choice to have a complete vertical cycle for stainless steel products.

The ALL IN HOUSE strategy, from the scrap to the finished product, can guarantee constant monitoring of each step of the production cycle and provides a unique production flexibility and responsiveness. This aspect is always accompanied by a continuous focus on quality and the certification of products and processes.

Rodacciai, Bosisio Parini *(steel mill)*
Rodacciai, Sirone *(rolling mill)*

ACEROS INOXIDABLES OLARRA **Olarra, Bilbao** *(cold finishing plant)*

STEEL MILL
ROLLING MILL
COLD FINISHING
FURTHER PRODUCTION PROCESSES (IF NECESSARY)

STAINLESS STEEL SOLUTIONS **ALL IN HOUSE** FROM THE SCRAP TO THE FINISHED PRODUCT

www.rodacciai.com

Rodacciai®

Rodacciai S.p.a. - Headquarter
Bosisio Parini (LC) Via Giuseppe Roda 1, 23842
Tel. +39 031878111
rodawelding@rodacciai.com
www.rodasteel.ch

RA1101 12F