

We master the fire in the era of steel



**ACCIAIERIE VALBRUNA**

High quality is our standard

HIGH QUALITY IS OUR STANDARD ... OUR PRODUCTS CHANGE WITH YOU

## We master the fire in the era of steel

Since the discovery of fire, man has radically changed his life; he discovers metals, learns how to melt them, and begins to progress.

The innate talent of human beings, continues to realise the great works of our day.

All this thanks to the discovery of the metal par excellence ... Steel

Valbruna ...  
The quintessential Steel Brand!



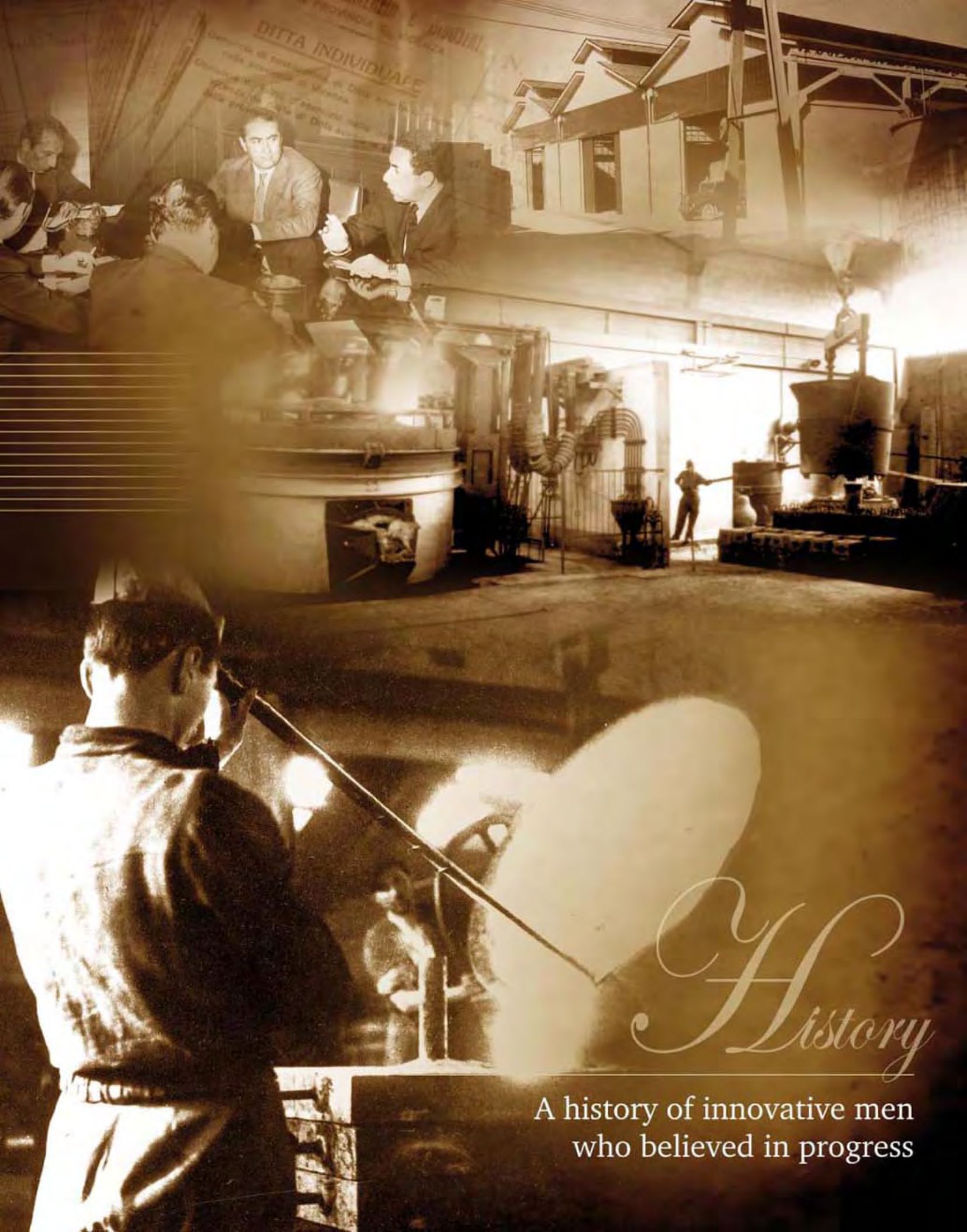
**ACCIAIERIE VALBRUNA**

High quality is our standard



# Stainless and Specialty Steels Long products

HIGH QUALITY IS OUR STANDARD ... OUR PRODUCTS CHANGE WITH YOU



# History

A history of innovative men  
who believed in progress

## How Valbruna began

Valbruna, was founded in 1925 when Ernesto Gresele decided to expand his metal trading activities by commencing the manufacture of new products from the recovery and reutilization of disused or discarded items.

At the end of the thirties, a steelworks and a rolling mill for bars came on stream alongside the ironworks.

After suffering a major setback in 1944, when the works was totally destroyed by aerial bombardment, production recommenced in the post-war period.

At the end of the 1950s, production of specialty low alloyed steels was superseded by the production of high alloy steels, stainless steels, high speed steels and specialty alloys.



A company rooted in its  
past history, making  
progressively further  
steps to the future



## A GLOBAL ORGANIZATION

Efficient in every  
department...  
in Italy and Worldwide

Acciaierie Valbruna





## THE COMPANY

Valbruna, with three production plants in Vicenza, Bolzano and Fort Wayne, IN (USA) and leader in the production of Stainless Steels, Nickel Alloys and Titanium long products, is underpinned by long experience and a highly qualified customer service.

## VALBRUNA....SUCH A GREAT REALITY!

Our extensive and strategic distribution network is our corner stone in a global market, granting not only a worldwide commercial presence but also a continuous feedback with our customers.



**Vicenza plant, Italy**  
(Total surface: 294.608 m<sup>2</sup>)



**Bolzano plant, Italy**  
(Total surface: 197.049 m<sup>2</sup>)



**Fort Wayne plant, IN-USA**  
(Total surface: 248.356 m<sup>2</sup>)

**ITALY:** **Mills**  
Vicenza  
Bolzano  
**USA:** Fort Wayne

**ITALY**  
Ancona  
Torino  
Milano  
Brescia  
Parma  
Bologna

**EUROPE**  
Germany  
France  
England  
Spain  
Ireland  
Denmark  
Switzerland  
Netherlands  
Poland  
Finland  
Sweden

**AMERICA**  
Canada  
United States  
Mexico

**ASIA - OCEANIA**  
Hong Kong  
Australia  
Malaysia  
UAE

# SCM

A strategic organization developed in the world

Supply Chain Management consists in a fully integrated approach to the strategic management of production, distribution and delivering processes, crossing borders within companies to pursue common goals.

Valbruna has developed substantial expertise in Supply Chain Management, being a proactive actor in building a strong partnership with customers to acquire global competitive edge.



Communicating and Interacting in the right way with our customers ... our priority!



A fully integrated communication process between company and customers focused on the corporate identity, a concept that encompasses all the different aspects of the organization: products, services, experience and history.

## CORPORATE IDENTITY

An investment in the company's future





Profitable communication



The secret of success



HIGH QUALITY IS OUR STANDARD ... OUR PRODUCTS CHANGE WITH YOU



## OPTIMIZED TECHNOLOGY FOR A WIDE PRODUCTION CAPACITY



- A whole production cycle from melting to distribution
- An extensive production range of grades.
- The availability of raw material, hence a steadfast supply on time.
- Products fitting the customers' needs by continuous feedback and versatility.
- The conformity of our products with the main international standards.

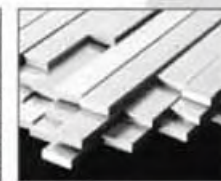
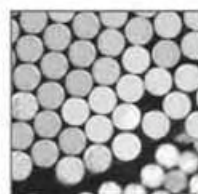
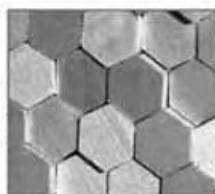
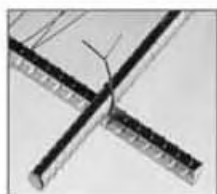


# PRODUCT RANGE

| PROFILES                  | PROCESSING ROUTES                                                                                                                                     | TOLERANCES                                                                                                                                                                                                                                                                          | mm SIZES                                                                                    | inch SIZES                                                                                                                                              |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Blooms and Billets</b> | Hot rolled<br>Forged                                                                                                                                  | -<br>-                                                                                                                                                                                                                                                                              | 40 ÷ 200<br>100 ÷ 600                                                                       | 1.500" ÷ 8.000"<br>4.000" ÷ 23.500"                                                                                                                     |
| <b>Ingots</b>             | Square<br>8-sided<br>16-sided<br>Round                                                                                                                | -<br>-<br>-<br>-                                                                                                                                                                                                                                                                    | 2.000 ÷ 16.000 kg<br>3.000 ÷ 32.000 kg<br>47.000 kg<br>1.900 ÷ 24.000 kg                    | 4,400 ÷ 35,000 lbs<br>6,600 ÷ 70,000 lbs<br>100,000 lbs<br>4,000 ÷ 52,000 lbs                                                                           |
| <b>Rounds</b>             | Hot rolled<br>Cold drawn from coils<br>Cold drawn from bars<br>Peeled<br>Peeled reeled<br>Centerless ground<br>Forged + peeled<br>Forged rough turned | ASTM A484 - EN10060<br>ASTM A484 - EN10278 (h9 to h11)<br>ASTM A484 - EN10278 (h9 to h11)<br>ASTM A484 - EN20286 (k12 to h9)<br>ASTM A484 - EN20286 (k12 to h9)<br>ASTM A484-EN10278 (h6 to h9)<br>ASTM A484 - EN20286 (k12 to k13) - EN10031<br>ASTM A484-EN20286 (k13 ) - EN10031 | 5,5 ÷ 180<br>3 ÷ 32<br>32 ÷ 80<br>16 ÷ 180<br>16 ÷ 180<br>2 ÷ 200<br>180 ÷ 300<br>300 ÷ 600 | 0.217" ÷ 7.000"<br>0.118" ÷ 1.250"<br>1.260" ÷ 3.000"<br>0.625" ÷ 7.000"<br>0.625" ÷ 7.000"<br>0.125" ÷ 8.000"<br>7.000" ÷ 12.000"<br>12.000" ÷ 23.500" |
| <b>S.S. Rebars</b>        | Cold drawn<br>Hot rolled                                                                                                                              | -<br>-                                                                                                                                                                                                                                                                              | 3 ÷ 12<br>6 ÷ 50                                                                            | 0.118" ÷ 0.500"<br>0.250" ÷ 2.000"                                                                                                                      |
| <b>Hexagons</b>           | Hot rolled<br>Cold drawn                                                                                                                              | ASTM A484 - EN10061<br>ASTM A484 - EN10278 (h11)                                                                                                                                                                                                                                    | 8 ÷ 72<br>5 ÷ 70                                                                            | 0.315" ÷ 2.835"<br>0.156" ÷ 2.750"                                                                                                                      |
| <b>Flats</b>              | Cold drawn<br>Hot rolled<br>Forged                                                                                                                    | ASTM A484 - EN10278 (h11)<br>ASTM A484 - EN10058<br>ASTM A484-EN10031                                                                                                                                                                                                               | W. 10÷100 – Th. 3÷60<br>W. 15÷200 – Th. 3÷70<br>W. 60÷600 – Th. 30÷550                      | W. 0.375" ÷ 4.000" – Th. 0.125" ÷ 2.000"<br>W. 0.500" ÷ 8.000" – Th. 0.125" ÷ 2.500"<br>W. 2.500" ÷ 23.000" – Th. 1.250" ÷ 21.650"                      |
| <b>Squares</b>            | Cold drawn<br>Hot rolled<br>Forged                                                                                                                    | ASTM A484 - EN10278 (h11)<br>ASTM A484 - EN10059<br>ASTM A484 - EN10031                                                                                                                                                                                                             | 2,8 ÷ 70<br>7 ÷ 80<br>85 ÷ 300                                                              | 0.1875" ÷ 2.750"<br>0.3125" ÷ 3.125"<br>3.3125" ÷ 12.000"                                                                                               |
| <b>Angles</b>             | Hot rolled                                                                                                                                            | ASTM A484 - EN10056                                                                                                                                                                                                                                                                 | 20x20x3 ÷ 100x100x12                                                                        | 0.7500"x0.7500"x0.125" ÷ 4.000"x4.000"x0.500"                                                                                                           |
| <b>Wire Rod</b>           | Hot rolled<br>Coils from 1000 to 1300 Kg                                                                                                              | ASTM A555-EN10108                                                                                                                                                                                                                                                                   | 5 ÷ 38                                                                                      | 0.197" ÷ 1.500"                                                                                                                                         |
| <b>Wire</b>               | Cold drawn<br>Coils from 25 to 800 Kg                                                                                                                 | ASTM A484-EN10278 (h9 to h11)                                                                                                                                                                                                                                                       | 1 ÷ 23                                                                                      | 0.039" ÷ 0.8750"                                                                                                                                        |

We also offer:

|                                  |                                                                    |                                                                 |
|----------------------------------|--------------------------------------------------------------------|-----------------------------------------------------------------|
| <b>Chromium Plated S.S. Bars</b> | Dia from 8 to 200 mm<br>Lengths from 3 to 8,3 metres               | Dia from 0.3125" to 8.000"<br>Lengths from 9.5 to 27 ft         |
| <b>Threaded Rods</b>             | Type A2 and A4<br>Dia from M5 to M24<br>Lengths from 1 to 4 metres | Type A2 and A4<br>Dia from M5 to M24<br>Lengths from 3 to 13 ft |



## STAINLESS STEELS

AUSTENITIC  
STAINLESS STEELS

Steels with a Chromium content between 17% and 26%, Nickel between 7% and 35% and Carbon 0.15% max which cannot be stiffened by quench hardening but only through cold working (e.g cold drawing). Corrosion resistance is higher compared to other stainless steels and they are non magnetic unless cold worked.

| VALBRUNA<br>GRADE | EN NUMBER            | AISI<br>NUMBER | UNS<br>NUMBER | EN NAME                         | BS<br>NUMBER         |
|-------------------|----------------------|----------------|---------------|---------------------------------|----------------------|
| AIM/1             | -                    | 201            | S20100        | -                               | -                    |
| AIMR              | -                    | XM-28          | S24100        | -                               | -                    |
| AIP               | 1.4303               | 305            | S30500        | X4CRNI18-12/X5CRNI18-12         | -                    |
| AIP/DE            | -                    | -              | -             | -                               | 305S11               |
| AISC              | 1.4550/1.4546        | 347/347H       | S34700/S34709 | X6CRNINB18-10/X5CRNINB18-10     | 347S31/347S20        |
| AISH              | 1.4948               | 304H           | S30409        | X6CRNI18-10/X6CRNI18-11         | -                    |
| AISH1             | 1.4948               | 304H           | S30409        | X6CRNI18-10/X6CRNI18-11         | -                    |
| AISH2             | -                    | 304H           | S30409        | -                               | -                    |
| AISL              | 1.4301/1.4307/1.4304 | 304/304L       | S30400/S30403 | X5CRNI18-10/X2CRNI18-9          | 304S15/304S31        |
| AISL/DE           | 1.4306               | -              | -             | X2CRNI19-11                     | 304S11               |
| AISLN             | 1.4311               | 304LN          | S30453        | X2CRNIN18-10                    | -                    |
| AISN              | -                    | 304HN          | S30452        | -                               | -                    |
| AIST              | 1.4541               | 321            | S32100        | X6CRNIT18-10                    | 321S31               |
| AISTH             | 1.4878/1.4544        | 321H           | S32109        | X8CRNIT18-10                    | -                    |
| AMS               | -                    | 317            | S31700        | -                               | -                    |
| AMSL              | -                    | 317L           | S31703        | -                               | -                    |
| AMSL/DE           | 1.4438               | -              | -             | X2CRNIMO18-15-4                 | -                    |
| AMSL/DE2          | 1.4439               | -              | -             | X3CRNIMON17-13-5                | -                    |
| APFIS             | 1.4845               | 310/310S       | S31000/S31008 | X8CRNI25-21/X12CRNI25-21        | 310S31               |
| APFI/SI           | 1.4841               | 314            | S31400        | X15CRNISI25-21/X15CRNISI25-20   | 314S25               |
| APFR/SI           | 1.4828               | -              | -             | X15CRNISI20-12                  | -                    |
| APFR              | 1.4833               | 309            | S30900        | X12CRNI23-13/X7CRNI23-14        | -                    |
| APFRS             | -                    | 309S           | S30908        | -                               | 309S20               |
| APM/DE2           | 1.4432/1.4436        | -              | -             | X2CRNIMO17-12-3/X5CRNIMO17-13-3 | 316S33/316S14        |
| APM/UK2           | -                    | -              | -             | -                               | 316S19               |
| APMC              | -                    | 316CB          | S31640        | -                               | -                    |
| APMC/DE           | 1.4580               | -              | -             | X10CRNIMONB18-10                | -                    |
| APMH              | -                    | 316H           | S31609        | -                               | -                    |
| APML              | 1.4401/1.4404        | 316/316L       | S31600/S31603 | X5CRNIMO17-12-2/X2CRNI17-12-2   | 316S14               |
| APMLD2            | 1.4435/1.4437        | -              | -             | X2CRNIMO18-14-3/X6CRNIMO18-12   | 316S13/316S14/316S33 |
| APMLN             | 1.4429               | -              | -             | X2CRNIMON17-13-3                | -                    |
| APMLN/DE          | 1.4406               | 316N/316LN     | S31651/S31653 | X2CRNIMON17-11-2                | -                    |
| APML/FR           | -                    | -              | -             | -                               | 316S31/316S14        |
| APMT              | -                    | 316TI          | S31635        | -                               | -                    |
| APMT/DE           | 1.4571               | -              | -             | X6CRNIMOTI17-12-2               | -                    |
| APMZ/UK           | 1.4427               | -              | -             | X12CRNIMOS18-11                 | -                    |
| AU188ZU           | 1.4570               | -              | -             | X6CRNICUS18-9-2                 | -                    |
| AU188             | 1.4310/1.4300/1.4324 | 302            | S30200        | X10CRNI18-8/X12CRNI18-8         | 302S31/301S22        |
| AU188Z            | 1.4305               | 303            | S30300        | X8CRNIS18-9                     | 303S31               |
| AV203             | -                    | XM-1           | S20300        | -                               | -                    |
| NTR50             | -                    | XM-19          | S20910        | -                               | -                    |
| NTR60             | -                    | -              | S21800        | -                               | -                    |
| V2111N            | 1.4835               | F45            | S30815        | X9CRNISINCE21-11-2              | -                    |
| V2018MN           | 1.4547               | F44            | S31254        | X1CRNIMOCUN20-18-7              | -                    |

# WELDING

## WELDING

Special chemical balance for welding

| VALBRUNA GRADE | EN NUMBER | UNS NUMBER | EN NAME                  | AWS CLASSIFICATION |
|----------------|-----------|------------|--------------------------|--------------------|
| AISL/EL2       | 1.4316    | S30883     | X2CRNI19-9               | ER 308L            |
| AISL/EL        | 1.4316    | S30888     | X2CRNI19-9               | ER 308LSI          |
| APFRS          | 1.4833    | S30908     | X12CRNI23-13/X7CRNI23-14 | ER 309S            |
| APML/EL        | 1.4430    | S31683     | X2CRNIMO19-12            | ER 316L            |
| APML/EL2       | 1.4430    | S31688     | X2CRNIMO19-12            | ER 316LSI          |

# COLD HEADING

## COLD HEADING

Copper is added to improve the austenitic structure and make the steel less prone to cold work hardening.

| VALBRUNA GRADE | EN NUMBER | AISI NUMBER | UNS NUMBER | EN NAME             | BS NUMBER |
|----------------|-----------|-------------|------------|---------------------|-----------|
| AISRU/1        | 1.4567    | -           | -          | X3CRNICU18-9-4      | 394S17    |
| AISRU/2        | -         | 304CU       | S30430     | -                   | 394S17    |
| AISRU          | 1.4567    | 304CU       | S30430     | X3CRNICU18-9-4      | -         |
| AISRUH         | 1.4567    | 304CU       | S30430     | X3CRNICU18-9-4      | 394S17    |
| AISRUB         | 1.4560    | -           | -          | X3CRNICU19-9-2      | -         |
| APMRU          | 1.4578    | 316CU       | -          | X3CRNICUM017-11-3-2 | 396S17    |

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# STAINLESS STEELS

## MARTENSITIC STAINLESS STEELS

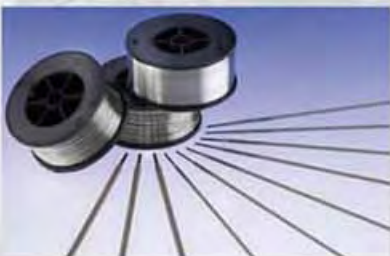
Steels with a Chromium content of 11% to 18% and a Carbon content of 2% maximum, with additional small quantities of other elements. In order to improve both mechanical properties and corrosion resistance, they are heated to an appropriate temperature, 950° - 1050° C, followed by suitable quenching and tempering.  
Martensitic steels are attracted to a magnet.

| VALBRUNA<br>GRADE | EN<br>NUMBER  | AISI<br>NUMBER | UNS<br>NUMBER | EN NAME                   | BS<br>NUMBER |
|-------------------|---------------|----------------|---------------|---------------------------|--------------|
| CMXA              | -             | 440A           | S44002        | -                         | -            |
| CMXB              | -             | 440B           | S44003        | -                         | -            |
| CMXBM             | 1.4112        | -              | -             | X90CRM0V18                | -            |
| CMXC              | 1.4125        | 440C           | S44004        | X105CRM017                | -            |
| CMXC/1            | -             | 440C           | S44004        | -                         | -            |
| CMX/DE            | 1.4037        | -              | -             | X65CR13                   | -            |
| VAL1              | 1.4006/1.4011 | 403/410        | S40300/S41000 | X12CR13/X12CR12           | 410S21       |
| VAL1A/2           | 1.4002        | 405            | S40500        | X6CRAL13                  | -            |
| VAL1B/DE          | 1.4024        | -              | -             | X15CR13                   | -            |
| VAL1HS            | 1.4005        | 416            | S41600        | X12CRS13                  | 416S21       |
| VAL1PT            | 1.4512        | 409            | S40900        | X2CRTI12                  | -            |
| VAL1Z             | 1.4005        | 416            | S41600        | X12CRS13                  | 416S21       |
| VAL2A             | 1.4021        | 420            | S42000        | X20CR13                   | -            |
| VAL2AM            | 1.4120        | -              | -             | X20CRM013                 | -            |
| VAL2A/UK          | -             | -              | -             | -                         | 420S29       |
| VAL2A/UK2         | -             | -              | -             | -                         | 420S37       |
| VAL2B             | 1.4028        | 420            | S42000        | X30CR13                   | 420S45       |
| VAL2C             | 1.4031        | 420            | S42000        | X39CR13                   | -            |
| VAL2CZ            | 1.4035        | -              | -             | X45CRS13                  | -            |
| VAL2D             | 1.4116        | -              | -             | X50CRM0V15                | -            |
| VAL2/DE           | 1.4034        | -              | -             | X46CR13                   | -            |
| VAL2/DS           | 1.4036        | -              | -             | X46CRS13                  | -            |
| VAL2BZ            | 1.4029        | 420F           | S42020        | X29CRS13                  | -            |
| VAL3              | 1.4122        | -              | -             | X39CRM017-1               | -            |
| VAL3S             | 1.4122        | -              | -             | X35CRM017                 | -            |
| VAL4              | 1.4057        | 431            | S43100        | X17CRNI16-2               | -            |
| VAL4/UK           | -             | -              | -             | -                         | 431S29       |
| X134M             | 1.4313        | -              | S41500        | X3CRNIMO13-4              | -            |
| X134M/1           | 1.4313/1.4413 | -              | S41500        | X3CRNIMO13-4/X4CRNIMO13-4 | -            |
| X134M/3           | -             | -              | S41500        | -                         | -            |
| X164M             | 1.4418        | -              | -             | X4CRNIMO16-5-1            | -            |

## WELDING

### WELDING

| VALBRUNA<br>GRADE | EN<br>NUMBER | AISI<br>NUMBER | UNS<br>NUMBER | EN NAME      | AWS<br>CLASSIFICATION |
|-------------------|--------------|----------------|---------------|--------------|-----------------------|
| X134/EL           | 1.4313       | -              | S41500        | X3CRNIMO13-4 | -                     |



# PRECIPITATION HARDENING

## PRECIPITATION HARDENING

These steels with a minimum of 10.5% Cr have exceptional strength due to heat treatment at various temperatures that induces precipitation hardening (also known as aging). This process allows a sub microscopic precipitation of phase rich in elements coherent with the matrix (for example Cu) that greatly increases the mechanical properties of the steel.

| VALBRUNA GRADE | EN NUMBER | AISI NUMBER | UNS NUMBER | EN NAME          |
|----------------|-----------|-------------|------------|------------------|
| AV177AL        | 1.4568    | 631         | S17700     | X7CRNiAl17-7     |
| V138           | -         | XM-13       | S13800     | -                |
| V157M          | 1.4574    | 632         | S15700     | -                |
| V145           | -         | XM-25       | S45000     | -                |
| V145/1         | 1.4594    | -           | -          | X5CRNiMoCuNb14-5 |
| V155           | 1.4545    | XM-12       | S15500     | X5CRNiCuNb15-5   |
| V174           | 1.4542    | 630         | S17400     | X5CRNiCuNb16-4   |
| V174/1         | 1.4548    | 630         | S17400     | X5CRNiCuNb17-4-4 |
| V174LC*        | 1.4542    | 630         | S17400     | X5CRNiCuNb16-4   |
| V176T          | -         | 635         | S17600     | -                |
| X154MU/2       | 1.4594    | -           | -          | X5CRNiMoCuNb14-5 |

\* For load cells or higher Rp0.2/Rm ratio



**ACCIAIERIE VALBRUNA**  
High quality is our standard

## FERRITIC STAINLESS STEELS

Steels with a chromium content higher than 10.5% and a Carbon of 0.15% maximum. Unlike martensitic steels these grades cannot be stiffened by quench hardening but only through cold working (e.g. cold drawing). Ferritic steels are attracted to a magnet.

| VALBRUNA GRADE | EN NUMBER | AISI NUMBER | UNS NUMBER | EN NAME               | BS NUMBER     |
|----------------|-----------|-------------|------------|-----------------------|---------------|
| VAL1LC         | -         | -           | S40940     | -                     | -             |
| VAL1LCNI       | -         | -           | S40976     | -                     | -             |
| VAL1NI         | -         | 414         | S41400     | -                     | -             |
| X7AL           | 1.4713    | -           | -          | X10CRALSi7            | -             |
| X11L           | 1.4003    | -           | S41003     | X2CRNi12/X2CR11       | -             |
| X17AL          | 1.4742    | -           | -          | X10CRALSi18/X10CRAL18 | -             |
| X17L           | 1.4016    | 430         | S43000     | X6CR17                | 430S11/430S18 |
| X17M           | 1.4113    | 434         | S43400     | X6CRM017-1            | 434S20        |
| X17MZ          | 1.4105    | 430F        | S43020     | X6CRMOS17             | -             |
| X17NBL         | 1.4511    | -           | -          | X3CRNb17              | -             |
| X17T           | 1.4510    | 430Ti       | S43036     | X3CRTi17              | -             |
| X17Z           | -         | 430F        | S43020     | -                     | -             |
| X17Z/DE        | 1.4104    | -           | -          | X14CRMOS17            | -             |
| X18DZ          | -         | XM-34       | S18200     | -                     | -             |
| X24AL          | 1.4762    | -           | -          | X10CRALSi25/X10CRAL24 | -             |
| X25R           | -         | 446         | S44600     | -                     | -             |
| X182N          | 1.4521    | 444         | S44400     | X2CRMOTi18-2          | -             |



# STAINLESS STEELS

## DUPLEX STAINLESS STEELS

These steels have a Cr content higher than 16% with Ni of 4-6% and Mo of 1.5-3%. Their dual austenitic and ferritic grain structure (hence the term duplex) means that they have the good mechanical properties of austenitic stainless steels but with a superior resistance to stress corrosion and pitting.

| VALBRUNA GRADE | EN NUMBER | AISI NUMBER | UNS NUMBER    | EN NAME         |
|----------------|-----------|-------------|---------------|-----------------|
| MV274MDE*      | 1.4460    | 329         | S32900        | X3CRNIMON27-5-2 |
| V225MN         | 1.4462    | F51/F60     | S31803/S32205 | X2CRNIMON22-5-3 |
| V234N          | 1.4362    | -           | S32304        | X2CRNIN23-4     |
| V257MNC        | 1.4582    | -           | -             | X4CRNIMONB25-7  |
| V2101MN        | 1.4162    | -           | S32101        | -               |
| **LDX2101®     | 1.4162    | -           | S32101        | -               |

\* Improved machinability steel

\*\* Outokumpu registered trademark

## SUPERDUPLEX STAINLESS STEELS

Characterised by higher contents of Cr, Mo, and N than standard duplex steels, resulting in increased corrosion resistance, these steels were developed for applications in aggressive chloride environments.

| VALBRUNA GRADE | EN NUMBER | AISI NUMBER | UNS NUMBER | EN NAME            |
|----------------|-----------|-------------|------------|--------------------|
| V257M          | 1.4410    | F53         | S32750     | X2CRNIMON25-7-4    |
| V257MWU        | 1.4501    | F55         | S32760     | X2CRNIMOCUWN25-7-4 |



## STAINLESS STEELS FOR HOT FORGING

| VALBRUNA GRADE | EN NUMBER            | AISI NUMBER | UNS NUMBER    | EN NAME                                            | BS NUMBER     |
|----------------|----------------------|-------------|---------------|----------------------------------------------------|---------------|
| AISLF          | 1.4301/1.4307/1.4314 | 304/304L    | S30400/S30403 | X5CRNI18-10/X2CRNI18-9                             | 304S15/304S31 |
| AISLF1*        | 1.4301/1.4307        | 304/304L    | S30400/S30403 | X5CRNI18-10/X2CRNI18-9                             | -             |
| AISTF          | 1.4541               | 321         | S32100        | X6CRNITI18-10                                      | -             |
| AISTF1*        | 1.4541/1.4544/1.4878 | 321/321H    | S32100/S32109 | X6CRNITI18-10/X8CRNITI18-10/X12CRNITI18-9          | -             |
| APMLF          | 1.4401/1.4404        | 316/316L    | S31600/S31603 | X5CRNIMO17-12-2/X2CRNIMO17-12-2<br>X2CRNIMO17-13-2 | -             |
| APMLF1*        | 1.4401/1.4404        | 316/316L    | S31600/S31603 | X5CRNIMO17-12-2/X2CRNIMO17-12-2<br>X2CRNIMO17-13-2 | -             |
| APMTF          | 1.4571               | -           | -             | X6CRNIMOTI17-12-2                                  | -             |
| V174F          | 1.4542               | 630         | S17400        | X5CRNICUNB16-4                                     | -             |
| V174F1*        | 1.4542               | 630         | S17400        | X5CRNICUNB16-4                                     | -             |
| VAL1F          | 1.4006               | 410         | S41000        | X12CR13                                            | -             |

\* For heavy forging parts

# NICKEL ALLOYS

## NICKEL ALLOYS

More and more requests coming from new technologies and industries for enhanced performance and resistance to aggressive environments has driven the development of Nickel Alloys. This encompasses iron base, nickel base and cobalt base alloys.

By varying the combination of different chemical elements a wide range of useful properties can be achieved. These include: exceptional mechanical properties, high corrosion resistance, high rupture strength, toughness, metallurgical stability, good fabricability, creep strength, thermal shock & cavitation resistance, and good fatigue life.

### Corrosion Resistance Alloys

| VALBRUNA GRADE | Commercial name        | UNS              | W.N.     | BS           | International designation       | ASTM                         | ASME           | AMS                          | EN               | DIN                | BS                       | Other                |
|----------------|------------------------|------------------|----------|--------------|---------------------------------|------------------------------|----------------|------------------------------|------------------|--------------------|--------------------------|----------------------|
| SG1            | Alloy 200<br>Alloy 201 | N02200<br>N02201 | 2.4068   | NA11<br>NA12 | LC-Ni99.0                       | B160<br>B564                 | SB160<br>SB564 | -                            | -                | 17740              | 3076-NA 11<br>3076-NA 12 | -                    |
| AN2            | Alloy 825<br>Alloy 65  | N08825<br>N08065 | 2.4858   | NA16         | NiFe30Cr21Mo3                   | B425<br>B564<br>F45          | SB425<br>SB564 | -                            | -                | 17744<br>1736      | 3076-NA 16<br>2901-NA 41 | A5.14 ERNiFeCr-1     |
| AV925          | Alloy 925              | N09925           | -        | -            | -                               | -                            | -              | -                            | -                | -                  | -                        | NACE MR0175          |
| AN4            | Alloy 904L             | N08904           | 1.4539   | 904S14       | X1NiCrMoCu25-20-5               | A182                         | SB649          | -                            | 10088-3<br>10272 | -                  | (1554-904S14)            | -                    |
| VAL4529        | Alloy 926              | N08926           | 1.4529   | -            | X1NiCrMoCuN25-20-7              | B472<br>B649                 | SB649          | -                            | 10088-3          | -                  | -                        | SEW 400              |
|                | Alloy 367              | N08367           | -        | -            | -                               | A182<br>B472<br>B564<br>B691 | SB564          | -                            | -                | -                  | -                        | -                    |
| AN5            | Alloy A286             | S66286           | 1.4980   | 286S31       | X6NiCrMoVB25-15-2               | A638<br>A453                 | -              | 5731<br>5732<br>5734<br>5737 | 10269<br>10302   | -                  | -                        | -                    |
| AV20           | Alloy 20               | N08020           | 2.4660   | -            | NiCr20CuMo                      | B473<br>B472                 | SB473          | -                            | -                | -                  | -                        | -                    |
| EG1            | Alloy 400              | N04400           | (2.4360) | NA13         | NiCu30Fe                        | B164<br>B564                 | SB164<br>SB564 | 4674                         | -                | (17743)<br>(17752) | 3076-NA 13               | QQ-N-281 D/2         |
| EG405          | Alloy 405              | N04405           | -        | (NA13)       | -                               | B164<br>B564                 | SB164<br>SB564 | 4674                         | -                | -                  | -                        | QQ-N-281 D/2         |
| EG2            | Alloy K-500            | N05500           | (2.4375) | NA18         | NiCu30Al                        | B865                         | -              | 4676                         | -                | (17743)<br>(17752) | 3076-NA 18               | QQ-N-286 E/2         |
| EG5            | CuNi30                 | C71500           | 2.0882   | CN107        | CuNi30Mn1Fe                     | B151                         | -              | -                            | 17664            | -                  | -                        | AFNOR<br>CuNi30Mn1Fe |
| GL3            | Alloy 625              | N06625           | 2.4856   | NA21         | NiCr22Mo9Nb                     | B446<br>B564                 | SB446<br>SB564 | 5666                         | 17744            | -                  | 3076-NA 21               | -                    |
| AVC276         | Alloy C276             | N10276           | 2.4819   | -            | NiMo16Cr15W                     | B564<br>B574                 | SB564          | -                            | -                | -                  | -                        | -                    |
| AV718          | Alloy 718              | N07718           | 2.4668   | NA51         | NiCr19Fe19Nb5Mo3;<br>NiCr19NbMo | B637                         | SB637          | 5662<br>5663<br>5664         | -                | -                  | -                        | -                    |

## NICKEL ALLOYS

| VALBRUNA GRADE | Commercial name                        | UNS                        | W.N.     | BS            | International designation             | ASTM         | ASME           | AMS  | EN                      | DIN                     | BS          | Other   |
|----------------|----------------------------------------|----------------------------|----------|---------------|---------------------------------------|--------------|----------------|------|-------------------------|-------------------------|-------------|---------|
| AN1            | Alloy 800<br>Alloy 800H<br>Alloy 800HT | N08800<br>N08810<br>N08811 | 1.4876   | NA15<br>NA15H | X10NiCrAlTi32-21;<br>X10NiCrAlTi32-20 | B408<br>B564 | SB408<br>SB564 | 5766 | 10095                   | -                       | 3076-NA 15  | SEW 470 |
| AN3            | Alloy DS                               | -                          | 1.4862   | NA17          | X8NiCrSi38-18                         | -            | -              | -    | 10095                   | -                       | 3076-NA 17  | -       |
| AN3US          | Alloy 330                              | N08330                     | (1.4864) | -             | -                                     | B511         | -              | 5716 | -                       | -                       | -           | -       |
| AN3CB          | Alloy 330CB                            | -                          | -        | -             | -                                     | -            | -              | -    | -                       | -                       | -           | -       |
| AN3K           | Alloy 42/25                            | -                          | -        | -             | -                                     | -            | -              | -    | -                       | -                       | -           | -       |
| GL1            | Alloy 600                              | N06600                     | 2.4816   | NA14          | NiCr15Fe                              | B166<br>B564 | SB166<br>SB564 | 5665 | 10095                   | 17742<br>17752          | 3076-NA 14  | -       |
| GL2            | Alloy 80A                              | N07080                     | 2.4952   | NA20          | NiCr20TiAl                            | B637         | -              | -    | 10302<br>10269<br>10090 | 17480<br>17240<br>17742 | 3076-NA 20  | -       |
| GL5            | Alloy 601                              | N06601                     | 2.4851   | -             | NiCr23Fe                              | B166<br>B564 | SB166<br>SB564 | 5715 | 10095                   | 17742<br>17752<br>1736  | 2901-5 NA49 | -       |

## Welding Alloys

| VALBRUNA<br>GRADE | Commercial<br>name    | UNS              | W.N.     | BS   | International<br>designation       | ASTM | ASME | AMS | EN   | DIN  | BS           | Other                               |
|-------------------|-----------------------|------------------|----------|------|------------------------------------|------|------|-----|------|------|--------------|-------------------------------------|
| GL3/EL            | Alloy 625             | N06625           | 2.4831   | NA43 | SG-NiCr21Mo9Nb<br>UP-NiCr21Mo9Nb   | B446 | -    | -   | 1736 | -    | 2901-NA 43   | A5.14 ERNiCrMo-3                    |
| AN2               | Alloy 825<br>Alloy 65 | N08825<br>N08065 | 2.4655   | NA41 | SG-NiCr27Mo                        | F45  | -    | -   | -    | -    | 2901-NA 41   | A5.14 ERNiFeCr-1                    |
| GL4               | Alloy 82              | N06082           | 2.4806   | NA35 | SG-NiCr20Nb<br>UP-NiCr20Nb         | -    | -    | -   | 1736 | -    | 2901-NA 35   | A5.14 ERNiCr-3                      |
| GL5               | Alloy 601             | N06601           | 2.4826   | NA49 | -                                  | B166 | -    | -   | -    | 1736 | 2901-5 NA 49 | -                                   |
| EG3               | Alloy 60              | N04060           | 2.4377   | NA33 | SG-NiCu 30 MnTi<br>UP-NiCu 30 MnTi | -    | -    | -   | 1736 | -    | 2901-NA 33   | A5.14 ERNiCu-7                      |
| SG2               | Alloy 55              | W82002           | (2.4560) | NA47 | S-NiFe 40                          | -    | -    | -   | 1736 | -    | 2901-5 NA 47 | A 5.15 ErNiFe-CL<br>A 5.15 ENiFe-CL |
| SG3               | Alloy 55 Ti           | -                | -        | -    | -                                  | -    | -    | -   | -    | -    | -            | -                                   |
| SG6               | Alloy 61              | N02061           | 2.4155   | NA32 | SG-NiTi 4                          | -    | -    | -   | 1736 | -    | 2901-NA 32   | A5.14 ERNi-1                        |

## Electrical resistance and Electronic Instrument Alloys

[illegible]

## TITANIUM

## TITANIUM

The unique and interesting chemical, mechanical and physical properties of titanium and related alloys leads to its use in a wide range of applications, such as Aerospace, Chemical processing, Oil & Gas, Electrochemical industry, Medical & surgical devices, Automotive industry, marine industry, desalination and desulphurization plants, food and pharmaceutical industry.

## THE WITNESS OF TIME...

Valbruna specialises in the production of the following grades:

## Commercial pure grades:

**Ti-Gr. 1:** the very low content of oxygen creates a reduced tensile strength and high ductility as well as excellent corrosion resistance in bland reducing to strongly oxidizing environments.

■ Availability upon minimum production lot quantity

**Ti-Gr. 2:** This grade is considered the most commonly used in industrial service, offering a good combination of high corrosion and erosion resistance, good cold formability and excellent weldability. Compared to Ti-Gr.1 it shows a higher oxygen content and tensile strength.

**Ti-Gr. 4:** Among the commercial pure grades, this one shows the highest tensile, while ductility and cold formability are slightly reduced.

It is used for draft gears and components operating in marine environments.

■ Availability upon minimum production lot quantity

 $\alpha - \beta$  Alloys: Titanium with other elements added

**Ti-Gr. 5:** Recommended for high mechanical resistance applications up to 350° - 400°C, it combines an ideal set of properties: high tensile strength, low density, toughness and ductility, weldability and machinability comparable to austenitic stainless steel.

Suitable to solution and precipitation heat treatments.

**Ti-Gr. 5 eli:** Ti6Al4V with extra low interstitial elements content, with enhanced ductility, typically used in the non aged condition for maximum toughness. Widely used for cryogenic devices as well as medical applications.

| Ti-Gr. 2   | Ti-Gr. 4   | Ti-Gr. 5  | Ti-Gr. 5 eli |
|------------|------------|-----------|--------------|
| ASTM B348  | ASTM B348  | ASTM B348 | ASTM F136    |
| ASTM F67   | ASTM F67   | AMS 4928  | ISO 5832 - 3 |
| ISO 5832-2 | ISO 5832-2 |           | AMS 4930     |



## VALVE STEELS

## VALVE STEELS

Valbruna can supply steels and special alloys for engine valves in rough ground, ground, or ground and polished bars depending on the production process of the customer. Rough ground or ground bars are offered for engine valves obtained by extrusion, while the ground and polished bars are proposed for upsetting.

## Alloy Steels

| VALBRUNA GRADE | EN NUMBER | AISI NUMBER | UNS NUMBER | EN NAME       |
|----------------|-----------|-------------|------------|---------------|
| VAL5           | 1.4718    | -           | -          | X45CRS19-3    |
| VAL5M          | 1.4731    | -           | -          | X40CRSIM010-2 |



## Austenitic Steels

| VALBRUNA GRADE | EN NUMBER | AISI NUMBER | UNS NUMBER | EN NAME           | BS NUMBER |
|----------------|-----------|-------------|------------|-------------------|-----------|
| 21MN           | 1.4881    | -           | -          | X70CRMNNIN21-6    | -         |
| 212MN          | 1.4875    | EV12        | S63012     | X55CRMNNIN20-8    | -         |
| 214MN          | 1.4871    | EV8         | S63008     | X53CRMNNIN21-9    | 349S52    |
| 214MNC         | 1.4870    | -           | -          | X53CRMNNINBN21-9  | 352S52    |
| 214MNCW        | 1.4882    | XEV-F       | S63019     | X50CRMNNINBN21-9  | -         |
| ACMV           | 1.4748    | -           | -          | X85CRM0V18-2      | -         |
| ACNW           | -         | -           | -          | -                 | 331S40    |
| APFR/2         | -         | EV4         | S63017     | -                 | 381S34    |
| AVW            | 1.4873    | -           | -          | X45CRNIW18-9      | -         |
| AVS            | 1.4747    | -           | -          | X80CRNIS120       | -         |
| AVS/DE         | 1.4732    | -           | -          | X80CRSIMOW15-2    | -         |
| NTR20          | 1.4866    | -           | -          | X33CRNIMNN23-8    | -         |
| S5220          | 1.4785    | -           | -          | X60CRMNMOVBN21-10 | -         |

## Nickel Alloys

| VALBRUNA GRADE | EN NUMBER | AISI NUMBER | UNS NUMBER | EN NAME    |
|----------------|-----------|-------------|------------|------------|
| GL2            | 2.4952    | -           | N07080     | NICR20TIAL |

MAXIVAL®

MAXIVAL®



Cutting data in the web-site  
WWW.MAXIVAL-STAINLESS-STEEL.COM



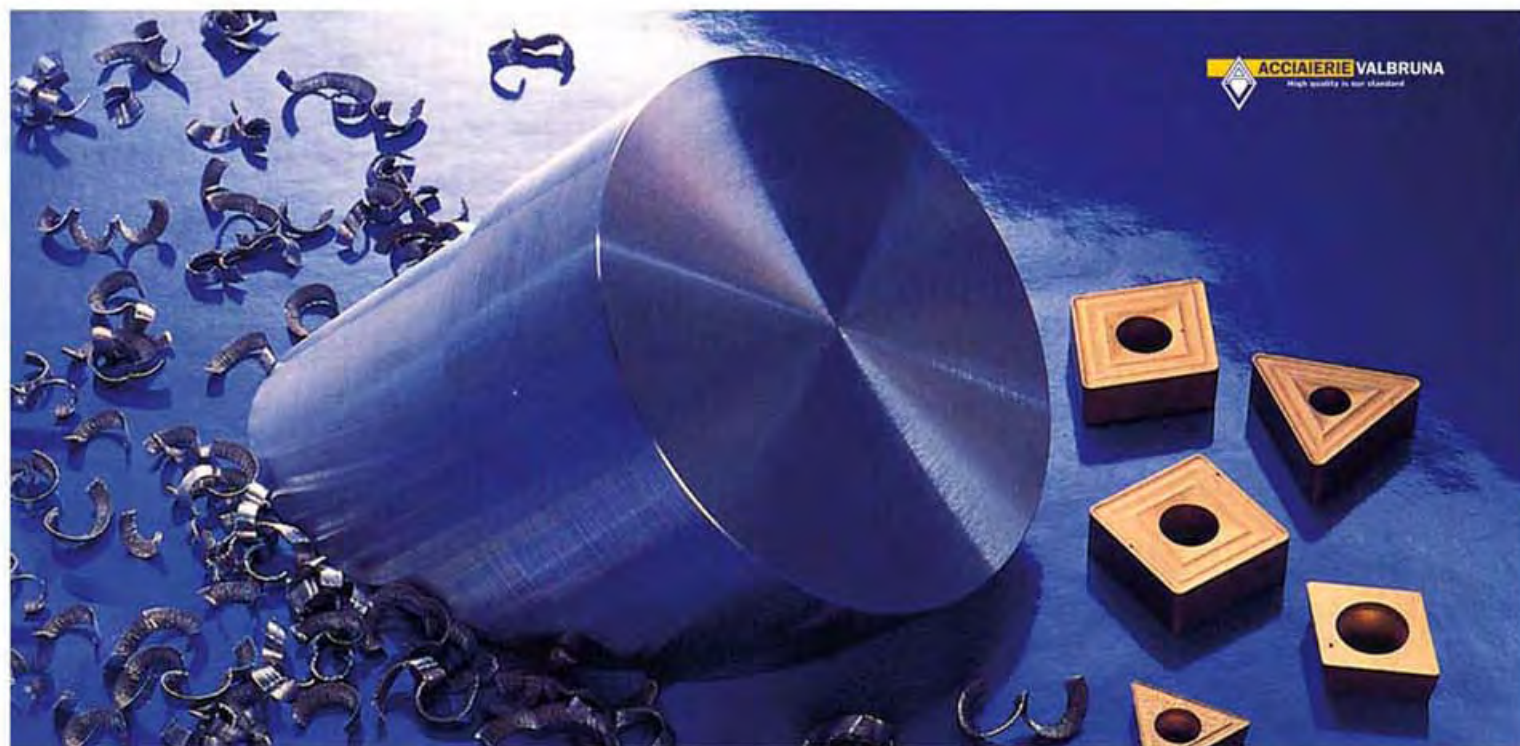
Maxival® is a technologically advanced process carried out on conventional stainless steels such as Type 304 and 316 that greatly improves machinability without jeopardize mechanical properties or resistance to corrosion.

The advantages offered to a machine shop when working with Maxival® process treated grades are:

- a greater number of machined pieces
- less tool wear
- a reduction of down times for tool replacement.

| VALBRUNA GRADE | EN NUMBER     | AISI NUMBER | UNS NUMBER    | EN NAME                         | BS NUMBER                    |
|----------------|---------------|-------------|---------------|---------------------------------|------------------------------|
| MVAISL         | 1.4301/1.4307 | 304/304L    | S30400/S30403 | X5CRNI18-10/X2CRNI18-9          | 304S15                       |
| MVAISLDE       | 1.4306        | -           | -             | X2CRNI19-11                     | 304S11                       |
| MVAISLFR       | 1.4301        | 304/304L    | S30400/S30403 | X5CRNI18-10                     | 304S15                       |
| MVAISRU        | 1.4567        | 304CU       | S30430        | X3CRNICU18-9-4                  | -                            |
| MVAIST         | 1.4541        | 321         | S32100        | X6CRNIT18-10                    | -                            |
| MVAPMDE2       | 1.4432/1.4436 | -           | -             | X2CRNIMO17-12-3/X5CRNIMO17-13-3 | 316S14/316S19/316S33         |
| MVAPML         | 1.4401/1.4404 | 316/316L    | S31600/S31603 | X5CRNIMO17-12-2/X2CRNIMO17-12-2 | 316S14/316S19                |
| MVAPMLD2       | 1.4435/1.4437 | -           | -             | X2CRNIMO18-14-3/X6CRNIMO18-12   | 316S13/316S33/316S14/316S19  |
| MVAPMLDE       | -             | -           | -             | -                               | 316S11/ 316S31/316S14/316S19 |
| MV188HS        | 1.4305        | 303         | S30300        | X8CRNIS18-9                     | -                            |
| MV274MDE       | 1.4460        | 329         | S32900        | X3CRNIMON27-5-2                 | -                            |
| VPAU188Z       | 1.4305        | 303         | S30300        | X8CRNIS18-9                     | -                            |
| VAL2A          | 1.4021        | 420         | S42000        | X20CR13                         | -                            |

OTHER GRADES AVAILABLE ON REQUEST



# SOFT MAGNETIC STEELS

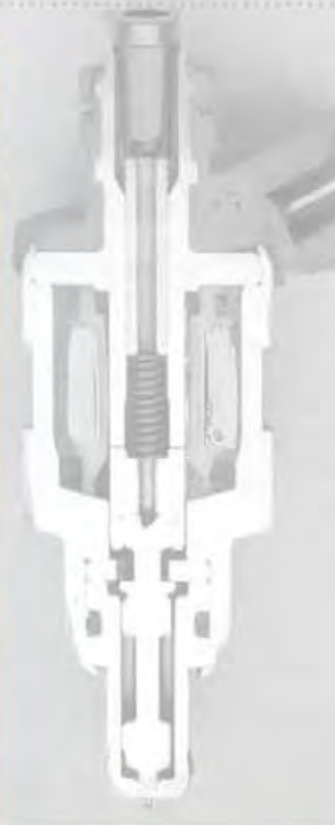
## MAGIVAL®

Magival® is a range of ferritic stainless steels, with a high degree of machinability, designed for magnetic applications where there are requirements for:

- high permeability
- low coercive force
- high machinability

Carefully controlled chemical analysis and sophisticated working processes create a ferritic structure which is highly sensitive to variations in a magnetic field. This avoids the need for expensive heat treatment by the user after machining. Due to their extreme ease of magnetization and demagnetization, the Magival® grades can be used to advantage in the manufacture of:

- magnetic cores
- solenoid valves
- electromagnetic devices
- flow regulators
- injector components



| MG1                     | MG2                | MG3                 | MG4                                                                                     | MG7               |
|-------------------------|--------------------|---------------------|-----------------------------------------------------------------------------------------|-------------------|
| AFNOR Z 8 CF 17         | ASTM A 838 ALLOY 2 | AFNOR Z 8 CDF 19 02 | Steel similar to<br>ASTM A 838 – ALLOY 2<br>with Molybdenum 1,5 ÷ 2,2 %<br>W.Nr. 1.4106 | ASTM A 582 S18235 |
| ASTM A 838 ALLOY 1      |                    | ASTM A 582 XM 34    |                                                                                         | W.Nr. 1.4523      |
| ASTM A 582 430 F        |                    |                     |                                                                                         |                   |
| DIN 17440 W. Nr. 1.4105 |                    |                     |                                                                                         |                   |

The best-known type, finding wide use in the automobile industries and for household electrical apparatus and appliances.

Used in components of magnetic devices where high values of magnetic permeability and low values of coercive force are required.

Its field of application is as for MG1. It is used where a greater resistance to corrosion is required, thanks to its molybdenum content.

Its composition has been developed for applications requiring better magnetic characteristics and high corrosion resistance. These properties are obtained thanks to a low content of interstitial elements and a high molybdenum content.

Ferritic Stainless Steel with Mo and Ti characterized by an improved machinability and with a better corrosion resistance than 430F series.

OTHER GRADES AVAILABLE ON REQUEST

## SILICON IRON ALLOYS

Silicon Iron alloys are generally used in applications requiring higher electrical resistivity, higher permeability, lower coercive force and residual magnetism than provided by either carbon steels or soft magnetic stainless steels such as the Magival® series.

Valbruna grades of Silicon Iron alloys are classified according to the Silicon content in the chemical composition according to the standard classification of ASTM A 867.

Each single grade has got its enhanced machinability option where required.

Silicon Iron alloys are normally supplied in the annealed condition since the best magnetic properties can be reached through a soft magnetic annealing carried out after part machining.

Silicon Iron alloys rust easily under ordinary atmospheric conditions and therefore a protective coating should be applied to the heat treated parts if exposed during their life cycle.

Due to their high magnetic properties, Silicon Iron alloys are mainly used in the manufacture of relays, solenoids and injectors parts.

| VALBRUNA GRADE | ASTM                 |
|----------------|----------------------|
| FeSi1P         | ASTM A 867 - TYPE 1F |
| FeSi3          | ASTM A 867 - TYPE 2  |
| FeSi3P         | ASTM A 867 - TYPE 2F |
| FeSi4          | ASTM A 867 - TYPE 3  |

MARINOX® - AQUASHAFT®



MARINOX® - AQUASHAFT®

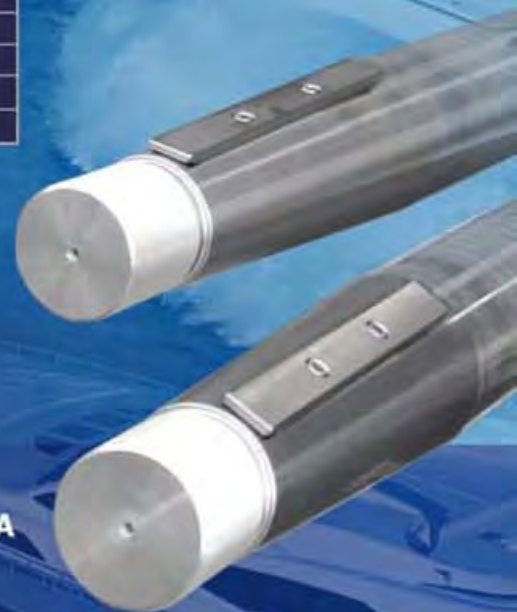
Marinox® and Aquashaft® identify a series of austenitic stainless steels, precipitation hardening grades and duplex steels intended for the manufacture of propeller shafts in the shipbuilding industry.

Utilising these types of steel, the designer can reduce the shaft dimensions and hence use smaller supports and seals.

The simultaneous reduction of weight and hydrodynamic resistance, permits better performances and greater efficiency.



| VALBRUNA GRADE | EN NUMBER     | AISI NUMBER | UNS NUMBER    | EN NAME                         |
|----------------|---------------|-------------|---------------|---------------------------------|
| MARINOX16      | 1.4401/1.4404 | 316L        | S31600/S31603 | X5CRNIMO17-12-2/X2CRNIMO17-12-2 |
| MARINOX17      | 1.4542        | 630         | S17400        | X5CRNICUNB16-4                  |
| MARINOX18      | 1.4418        | -           | -             | X4CRNIMO16-5-1                  |
| MARINOX19      | -             | 304HN/XM-21 | S30452        | -                               |
| MARINOX22/22HS | -             | XM-19       | S20910        | -                               |
| MARINOX25      | 1.4462        | 2205        | S31803/S32205 | X2CRNIMON22-5-3                 |
| MARINOX EG2    | (2.4375)      | -           | N05500        | NICU30AL                        |



|                   | MARINOX 16 | MARINOX 17 | MARINOX 18 | MARINOX 19 | MARINOX 22 | MARINOX 22HS | MARINOX 25 | MARINOX EG2 |
|-------------------|------------|------------|------------|------------|------------|--------------|------------|-------------|
| STRENGTH          | *          | *****      | *****      | ***        | *****      | *****        | **         | *****       |
| TOUGHNESS         | ***        | *          | **         | ***        | ***        | ***          | ****       | ***         |
| CORROSION RESIST. | ****       | *          | **         | **         | *****      | *****        | ****       | *****       |

REVAL®

REVAL®

HIGH QUALITY IS OUR STANDARD ... OUR PRODUCTS CHANGE WITH YOU

## Stainless Steel Reinforcement

A permanent solution to concrete decay, structure safety and continuous maintenance.

The benefits of using Reval® in roads, bridges and buildings:

- Excellent corrosion resistance to chlorides
- More than 100 years of expected service life in concrete
- Higher strength levels
- Better self healing to handling damage and abrasion when compared to galvanized or epoxy coated steel
- Low life cycle cost
- High ductility and strength
- Longer storage and service life
- Better resistance to localized corrosion mechanisms.
- Low magnetic permeability
- Better fire and heat resistance comparable to black bar
- Resistant to seismic loading
- Easy use with black steel by lapping or coupling



WWW.REVAL-STAINLESS-STEEL.COM



| AUSTENITIC    |               | DUPLEX    | SUPERAUSTENITIC |
|---------------|---------------|-----------|-----------------|
| 304/304L      | 316/316L      | 318       | 1.4529          |
| 304LN         | 316LN         | 318S13    |                 |
| 304S31        | 1.4571        | 1.4462    |                 |
| 1.4307        | 316S33        | S31803    |                 |
| 1.4301        | 1.4404        | 1.4362    |                 |
| 1.4541        | 1.4436        | 1.4162    |                 |
| S30400/S30403 | 1.4429        | *LDX2101® |                 |
| S30453        | S31600/S31603 |           |                 |
| S24100        | S31653        |           |                 |

\*Outokumpu registered trademark

|              |                     |                  |
|--------------|---------------------|------------------|
| <b>COILS</b> | Dia from 3 to 20 mm | 700 Kg - 1500 Kg |
| <b>BARS</b>  | Dia from 3 to 50 mm | 12 metres max    |



BIOVAL®

BIOVAL®

Complementary selection of Steels and Titanium Alloys  
for medical devices & surgical instruments



| MATERIAL DESIGNATION     | UNS NUMBER | VALBRUNA GRADE | ASTM STANDARDS | ISO STANDARDS |
|--------------------------|------------|----------------|----------------|---------------|
| Fe-18Cr-14Ni-2.5Mo       | S31673     | APML/IMP       | ASTM F138      | ISO 5832 - 1  |
| Fe-21Cr-10Ni-3Mn-2.5Mo   | S31675     | NTR50IMP       | ASTM F1586     | ISO 5832 - 9  |
| Fe-22Cr-12.5Ni-5Mn-2.5Mo | S20910     | NTR50          | ASTM F1314     | -             |
| X5CrNiCuNb16-4           | S17400     | V174           | ASTM F899      | -             |
| Ti-CP                    | UNS R50400 | TiGR2          | ASTM F67       | ISO 5832 - 2  |
| Ti6Al4V                  | UNS R56400 | TiGR5          | -              | ISO 5832 - 3  |
| Ti6Al4VELI               | UNS R56401 | TiGR5ELI       | ASTM F136      | ISO 5832 - 3  |
| X17CrNi16-2              | S43100     | VAL4UK         | ASTM F899      | -             |

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AEROSPACE SPECIAL GRADES



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**AleniaAeronautica**  
A Finmeccanica Company

**B1 Qualification for the production  
of Stainless Steels and Titanium bars**

**AEROVAL®**  
Aerospace special grades

## **AEROVAL® V155**

is a martensitic Stainless Steel which can be strengthened by precipitation treatment leading to a Cu-containing phase to precipitate in the alloy. It is typically used for parts requiring corrosion resistance and high mechanical properties up to 315°C.

The proper chemical composition and the manufacturing process promote improved toughness in the transverse direction and good ductility; these features are obtained by balanced chemistry capable to limit the content of  $\delta$ -ferrite and by consumable electrode remelting practice capable to control a tight inclusion content.

This grade could be multiple melted using AOD practice followed by either vacuum or electroslag consumable electrode remelting.

### DESIGNATIONS

| UNS    | AECMA             | AFNOR       | ASTM  | EN                    |
|--------|-------------------|-------------|-------|-----------------------|
| S15500 | FE-PM64/FE-PM1802 | EZ5CNU15-04 | XM-12 | 1.4545/X5CrNiCuNb15-5 |

### SPECIFICATIONS

| ASTM  | AMS  |
|-------|------|
| A 564 | 5659 |

## AEROVAL® AISC

Austenitic stainless steel stabilized by the addition of Columbium. Mechanical properties can be increased by cold working only. AISC exhibits good intergranular corrosion resistance.

### DESIGNATIONS

| UNS    | AISI | AECMA                | AFNOR         | EN                          |
|--------|------|----------------------|---------------|-----------------------------|
| S34700 | 347  | FE-PA 14/ FE-PA 3701 | Z6CNNb18 - 10 | X6CrNiNb18-10/1.4550/1.4546 |

### SPECIFICATIONS

| ASTM                   | AMS  | EN               | FEDERAL STANDARDS |
|------------------------|------|------------------|-------------------|
| A182, A276, A479, A580 | 5646 | 10088 - 3; 10272 | QQ-S-763          |

## AEROVAL® AIST

Austenitic Stainless Steel stabilized by the addition of Titanium. Since this grade is an austenitic one, it can not be precipitation hardened; mechanical properties can be increased by cold working only. AIST exhibits good intergranular corrosion resistance.

### DESIGNATIONS

| UNS    | AISI | AECMA               | AFNOR      | EN                          |
|--------|------|---------------------|------------|-----------------------------|
| S32100 | 321  | FE-PA 13/FE-PA 3601 | Z6CNT18-10 | X6CrNiTi18-10/1.4541/1.4544 |

### SPECIFICATIONS

| ASTM             | AMS  | EN        | FEDERAL STANDARDS |
|------------------|------|-----------|-------------------|
| A276; A182; A479 | 5645 | 10088 - 3 | QQ - S - 763      |

## AEROVAL® GL3

is a solid solution nickel-base alloy. This alloy shows high mechanical properties at temperatures up to 450°C and above 600°C, good corrosion resistance in different environments ( mineral and organic acids ), as well as good resistance to crevice corrosion, pitting, erosion, intergranular attack, stress corrosion cracking.

This performances are achieved by the combination of Nickel, Chromium, Molybdenum and Columbium.

This grade can be subjected to two different heat treatments to achieve appropriate mechanical properties for different applications: annealing ( grade 1 ) and solution annealing ( grade 2 ).

This grade could be multiple melted using AOD practice followed by either vacuum or electroslag consumable electrode remelting.

### DESIGNATIONS

| UNS    | AECMA              | AFNOR   | EN                 |
|--------|--------------------|---------|--------------------|
| N06625 | Ni-P97HT/Ni-PH3601 | NC22DNb | 2.4856/NiCr22Mo9Nb |

### SPECIFICATIONS

| ASTM       | AMS  | DIN          | EN    | BS        |
|------------|------|--------------|-------|-----------|
| B446, B564 | 5666 | 17744, 17752 | 10095 | 3076-NA21 |

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## AEROVAL® AN5

is an iron-nickel-chromium alloy. The elements Al and Ti in an austenitic structure make it aged-hardenable by appropriate heat treatment with increases in strength and hardness. The addition of Molybdenum provides high-temperature stability and reduces high-temperature creep. This alloy has greater resistance to high temperature than low-alloy steel and stainless steel and shows good mechanical properties at temperatures up to 700°C.

This grade could be multiple melted using AOD practice followed by either vacuum or electroslag consumable electrode remelting.

### DESIGNATIONS

| UNS    | AECMA                 | AFNOR    | ASTM | EN                                |
|--------|-----------------------|----------|------|-----------------------------------|
| S66286 | FE-PA 92HT/FE-PA 2601 | EZ6NCT25 | 660  | 1.4980/1.4944/X6NiCrTiMoVB25-15-2 |

### SPECIFICATIONS

| ASTM       | AMS                    | EN           | BS   |
|------------|------------------------|--------------|------|
| A453, A638 | 5731, 5732, 5734, 5737 | 10269, 10302 | HR51 |

## AEROVAL® X122MV

Hardenable martensitic grade with high tensile properties, good ductility and good creep rupture strength.

This grade could be multiple melted using AOD practice followed by either vacuum or electroslag consumable electrode remelting.

### DESIGNATIONS

| UNS    | AECMA             | AFNOR     | AISI/SAE | EN                  |
|--------|-------------------|-----------|----------|---------------------|
| S64152 | FE-PM37/FE-PM1502 | Z12CNDV12 | XM-32    | 1.4939/X12CrNiMoN12 |

### SPECIFICATIONS

| ASTM         | AMS  | EN            | BS         |
|--------------|------|---------------|------------|
| A 565, XM-32 | 5719 | 10269, 1.4939 | S151, S159 |

## AEROVAL® TI-GR5

is the most frequently used Ti-alloy because of its excellent strength-to-weight ratio which makes it particularly suitable for aerospace applications where a good combination of mechanical properties up to approximately 400°C, formability, weldability and toughness is a mandatory engineering requirement.

### DESIGNATIONS

| Commercial trade-name | ASTM    | UNS    | AECMA     | DIN    |
|-----------------------|---------|--------|-----------|--------|
| Ti6Al4V               | Grade 5 | R56400 | TI-P64001 | 3.7164 |

### SPECIFICATIONS

| ASTM         | AMS          | AMS                       | Military Specification | Werkstoff-Leistungsblatt |
|--------------|--------------|---------------------------|------------------------|--------------------------|
| B348         | 4928         | 4967                      | MIL-T-9047 [Withdrawn] | WL 3.7164.1; Teil 2      |
| (Bars; Ann.) | (Bars; Ann.) | (Bars; Ann., Heat-treat.) | (Bars; Ann.)           | (Bars; Ann.)             |

## STAINLESS AND SPECIALTY STEELS FOR POWER GENERATION

Stainless Steels and other corrosion resistant alloys are extensively used in the power generation industry to prevent corrosion, particularly at elevated temperatures.



### STAINLESS STEELS

| Valbruna | Name             | USA           |            |               | EUROPE        |                      |                                                               | JAPAN       | BS          |
|----------|------------------|---------------|------------|---------------|---------------|----------------------|---------------------------------------------------------------|-------------|-------------|
|          |                  | Standard Norm | Grade AISI | Symbol        | Standard Norm | EN Number            | EN Name                                                       | Designation | Designation |
| V145     | XM-25            | A564          | XM-25      | S45000        | -             | -                    | -                                                             | -           | -           |
| X154MU/2 | X5CrNiMoCuNb14-5 | -             | -          | -             | EN 10088-3    | 1.4594               | X5CrNiMoCuNb14-5                                              | -           | -           |
| VAL1B/1  | 403/410          | ASTM A182     | 403/410    | S40300/S41000 | EN 10088-3    | 1.4006/1.4011        | X12Cr13/X12Cr12                                               | SUS 410     | -           |
| VAL1C    | 403CB            | -             | 403CB      | -             | -             | -                    | -                                                             | -           | -           |
| VAL1MP   | 403/410          | -             | 403/410    | S41025        | EN 10088-3    | 1.4006               | -                                                             | -           | -           |
| VAL2A/1  | 420              | -             | 420        | -             | EN 10088-3    | 1.4021/1.4014/1.4027 | X20Cr13/X20Cr14                                               | SUS 420J1   | -           |
| VAL2MCV  | 422CB            | -             | 422CB      | -             | EN 10269      | 1.4913               | X19CrMoNbVN11-1                                               | -           | -           |
| VAL2MV   | X22CrMoV12-1     | -             | -          | -             | EN 10269      | 1.4923/1.4921/1.4922 | X20CrMoV11-1<br>X19CrMo12-1<br>X22CrMoV12-1<br>X21CrMoNiV12-1 | -           | -           |
| VAL2W    | 422              | A565          | 616/422    | S42200/B4B    | -             | -                    | -                                                             | -           | -           |
| X134M    | F6NM             | ASTM A276     | F6NM       | S41500        | EN 10088-3    | 1.4313               | X3CrNiMo13-4                                                  | -           | -           |
| X164M    | X4CrNiMo16-5-1   | -             | -          | -             | EN 10088-3    | 1.4418               | X4CrNiMo16-5-1                                                | -           | -           |
| X122MV   | XM-32            | ASTM A565     | XM-32      | -             | EN 10269      | 1.4938/1.4939/1.4933 | X12CrNiMoV12-3<br>X12CrNiMoN12                                | -           | -           |

### NICKEL ALLOYS

| Valbruna | Name           | USA           |                          | EUROPE        |               |                     | JAPAN       | BS          |
|----------|----------------|---------------|--------------------------|---------------|---------------|---------------------|-------------|-------------|
|          |                | Standard Norm | Symbol                   | Standard Norm | EN Number     | EN Name             | Designation | Designation |
| GL1      | Alloy 600      | ASTM B166     | N06600                   | -             | 2.4816        | -                   | -           | NA 14       |
| GL2      | Alloy 80A      | ASTM B637     | N07080                   | -             | 2.4952        | -                   | -           | NA 20       |
| GL3      | Alloy 625      | ASTM B446     | N06625                   | -             | 2.4856        | -                   | NCF 625     | NA 21       |
| AV718    | Alloy 718      | ASTM B637     | -                        | -             | 2.4668        | -                   | -           | -           |
| AN1      | 800/800H/800HT | ASTM B408     | N08800/N08810/<br>N08811 | -             | 1.4876/1.4958 | -                   | NCF 800     | NA15/NA15H  |
| AN2      | Alloy 825      | ASTM B564     | N08825                   | -             | 2.4858        | -                   | NCF 825     | NA41/NA16   |
| AN5      | Alloy A286/660 | ASTM A453     | 660/S66286               | EN 10269      | 1.4980        | X6NiCrTiMoVB25-15-2 | -           | -           |

### TITANIUM ALLOY

| Valbruna | Name    | USA           |        | EUROPE        |           |
|----------|---------|---------------|--------|---------------|-----------|
|          |         | Standard Norm | Symbol | Standard Norm | EN Number |
| Ti-Gr.5. | Ti6Al4V | AMS 4928      | R56400 | WL 3.7164.1   | 3.7164    |

Industrial markets:

## OIL & GAS

### STAINLESS AND SPECIALTY STEELS FOR OIL AND GAS

Many grades of Stainless Steels and High Nickel Alloys are extensively used in oil and gas applications thanks to their unique combination of high strength and excellent resistance to corrosion, in chloride containing environments and environments where induced cracking is a problem.

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## STAINLESS STEELS

| VALBRUNA GRADE | AISI NUMBER | EN NAME                     | EN NUMBER     | UNS NUMBER    | ASTM      | BS NUMBER     |
|----------------|-------------|-----------------------------|---------------|---------------|-----------|---------------|
| V2018MN        | F44         | X1CrNiMoCuN20-18-7          | 1.4547        | S31254        | A479+A276 | -             |
| NTR50          | XM-19       | -                           | -             | S20910        | A479+A276 | -             |
| NTR60          | -           | -                           | -             | S21800        | A479+A276 | -             |
| AIST           | 321         | X6CrNiTi18-10               | 1.4541        | S32100        | A479+A276 | 321S31        |
| AISC           | 347/347H    | X6CrNiNb18-10/X5CrNiNb18-10 | 1.4550/1.4546 | S34700/S34709 | A479+A276 | 347S31/347S20 |
| AMSL           | 317/317L    | -                           | -             | S31700/03     | A479      | -             |
| V174           | 630         | X5CrNiCuNb16-4              | 1.4542        | S17400        | A564      | -             |
| V174/1         | 630         | X5CrNiCuNb17-4-4            | 1.4548        | S17400        | -         | -             |
| V155           | XM-12       | X5CrNiCuNb15-5              | 1.4545        | S15500        | A564      | -             |
| X154MU/2       | -           | X5CrNiMoCuNb14-5            | 1.4594        | -             | -         | -             |
| VAL1           | 410         | X12Cr13                     | 1.4006        | S41000        | A479+A276 | -             |
| X134M          | F6NM        | X3CrNiMo13-4                | 1.4313        | S41500        | A479+A276 | -             |
| X164M          | -           | X4CrNiMo16-5-1              | 1.4418        | -             | -         | -             |
| VAL1BC         | 410CB       | -                           | -             | S41040        | -         | -             |
| VAL2AH         | 420MOD      | -                           | -             | S42000        | -         | -             |
| X135M          | -           | -                           | -             | S41426        | -         | -             |
| VCD7/1*        | 504         | 9Cr1Mo                      | -             | S50400        | -         | -             |
| V225MN         | F51/F60     | X2CrNiMoN22-5-3             | 1.4462        | S31803/S32205 | A276+A479 | -             |
| V257M          | F53         | X2CrNiMoN25-7-4             | 1.4410        | S32750        | A276+A479 | -             |
| V257MWU        | F55         | X2CrNiMoCuWN25-7-4          | 1.4501        | S32760        | A276+A479 | -             |

\* Alloy steel

## HIGH NICKEL GRADES

| Valbruna Grade | Commercial name                        | UNS                        | W.N.     | BS            | International Designation             | ASTM                         | ASME           | AMS                          | EN             | DIN                    | BS                       | OTHER               |
|----------------|----------------------------------------|----------------------------|----------|---------------|---------------------------------------|------------------------------|----------------|------------------------------|----------------|------------------------|--------------------------|---------------------|
| EG1            | Alloy 400                              | N04400                     | (2.4360) | NA13          | NiCu30Fe                              | B164<br>B564                 | SB164<br>SB564 | 4674                         | -              | (17743)<br>(17752)     | 3076-NA 13               | QQ-N-281 D/2        |
| EG2            | Alloy K-500                            | N05500                     | (2.4375) | NA18          | NiCu30Al                              | B865                         | -              | 4676                         | -              | (17743)<br>(17752)     | 3076-NA 18               | QQ-N-286 E/2        |
| GL3            | Alloy 625                              | N06625                     | 2.4856   | NA21          | NiCr22Mo9Nb                           | B446<br>B564                 | SB446<br>SB564 | 5666                         | 17744          | -                      | 3076-NA 21               | -                   |
| GL5            | Alloy 601                              | N06601                     | 2.4851   | -             | NiCr23Fe                              | B166<br>B564                 | SB166<br>SB564 | 5715                         | 10095          | 17742<br>17752<br>1736 | 2901-5 NA<br>49          | -                   |
| AV718          | Alloy 718                              | N07718                     | 2.4668   | NA51          | NiCr19Fe19Nb5Mo3;<br>NiCr19NbMo       | B637                         | SB637          | 5662<br>5663<br>5664         | -              | -                      | -                        | -                   |
| AVC276         | Alloy C276                             | N10276                     | 2.4819   | -             | NiMo16Cr15W                           | B564<br>B574                 | SB564          | -                            | -              | -                      | -                        | -                   |
| VAL4529        | Alloy 926                              | N08926                     | 1.4529   | -             | X1NiCr-MoCuN25-20-7                   | B472<br>B649                 | SB649          | -                            | 10088-3        | -                      | -                        | SEW 400             |
|                | Alloy 367                              | N08367                     | -        | -             | -                                     | A182<br>B472<br>B564<br>B691 | SB564          | -                            | -              | -                      | -                        | -                   |
| AN1            | Alloy 800<br>Alloy 800H<br>Alloy 800HT | N08800<br>N08810<br>N08811 | 1.4876   | NA15<br>NA15H | X10NiCrAlTi32-21;<br>X10NiCrAlTi32-20 | B408<br>B564                 | SB408<br>SB564 | 5766                         | 10095          | -                      | 3076-NA 15               | SEW 470             |
| AN2            | Alloy 825<br>Alloy 65                  | N08825<br>N08065           | 2.4858   | NA16          | NiFe30Cr21Mo3                         | B425<br>B564<br>F45          | SB425<br>SB564 | -                            | -              | 17744<br>1736          | 3076-NA 16<br>2901-NA 41 | A5.14<br>ERNiFeCr-1 |
| AV925          | Alloy 925                              | N09925                     | -        | -             | -                                     | -                            | -              | -                            | -              | -                      | -                        | NACE<br>MR0175      |
| AN5            | Alloy A286                             | S66286                     | 1.4980   | 286S31        | X6NiCrMoVB25-15-2                     | A638<br>A453                 | -              | 5731<br>5732<br>5734<br>5737 | 10269<br>10302 | -                      | -                        | -                   |
| SG5            | Alloy 36                               | K93601                     | 1.3912   | -             | Ni36                                  | B753<br>F30                  | -              | -                            | -              | 17745                  | -                        | SEW 385             |
| AV20           | Alloy 20                               | N08020                     | 2.4660   | -             | NiCr20CuMo                            | B473<br>B472                 | SB473          | -                            | -              | -                      | -                        | -                   |



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constant for a superior quality



# CONTROLS AND QUALITY CERTIFICATED

The company's quality assurance system is certified to UNI EN ISO 9001, and product quality is assured by full conformity with a range of European Standards for special steels (eg. UNI - EN 10088), and with the strictest international standards certified by TÜV, Lloyd's Register and Det Norske Veritas. Checks are continuous throughout the whole production cycle, including for Mercury and radioactive contamination, starting from the scrap to be melted, during the various process steps, through the monitoring of the process parameters. Non destructive testings are carried out by UT, ET, MT, VT methods and the personnel is qualified and certified according to EN473 - ISO 9712 and EN4179 - NAS410.

Laboratory facilities are available for chemical analysis using an Optical Emission spectrometer or wet analysis; metallographic evaluation by optical and Scanning Electron Microscopes; mechanical properties with hot and cold tensile tests, creep tests, and magnetic properties by a permeameter.

## CERTIFICATES OF QUALITY MANAGEMENT SYSTEM



ISO 9001:2008



AS9100, REVISION B  
( Aerospace standard )



ISO/TS 16949:2009  
( Automotive standard )

## CERTIFICATES OF PRODUCT



Care for  
the Environment,  
Health and Safety





## ENVIRONMENTAL POLICY

Relevant investments plans for air emission reduction and water treatment, as for regeneration of pickling baths and waste recovering and management in order to reduce the impact for the environment. Continuous updating to the recent EU legislation like REACH, GHS, Emission Trading.

## HEALTH & SAFETY POLICY

Safety Management Scheme as required by Seveso Law, yearly improvement projects including continuous training of the workers, preventive maintenance programs, NDT ( non destructive tests ) for the crucial components of the production facilities, work accidents reduction objectives, updating of the facilities to the best available techniques.



Project leader  
[www.global-links.it](http://www.global-links.it)



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Viale della Scienza, 25 36100 Vicenza - ITALY  
Tel. +39 0444 968211 Fax +39 0444 963836  
[www.valbruna-stainless-steel.com](http://www.valbruna-stainless-steel.com)  
e-mail: [info@valbruna.it](mailto:info@valbruna.it)

**ACCIAIERIE VALBRUNA**

Via Volta, 4 39100 Bolzano - ITALY  
Tel. +39 0471 924111 Fax +39 0471 924497

**VALBRUNA SLATER STAINLESS INC.**

2400 Taylor Street West 46801 Fort Wayne, IN - USA  
Tel. +1 260 434 2800 Fax +1 260 434 2801  
[www.valbrunastainless.com](http://www.valbrunastainless.com)  
e-mail: [info@valbruna.us](mailto:info@valbruna.us)