

# Outokumpu Steel Grades

|                                   | Steel designations |                     | Outokumpu steel names | Typical chemical composition, % |                    |      |      |      |        | National steel designations for steel specifications similar to EN |             |                |              | Outokumpu products | Welding consumables Covered electrodes EN 1600 |                        |
|-----------------------------------|--------------------|---------------------|-----------------------|---------------------------------|--------------------|------|------|------|--------|--|-------------|----------------|--------------|--------------------|--|------------------------|
|                                   | EN                 | ASTM/UNS            |                       | C                               | N                  | Cr   | Ni   | Mo   | Others | JIS/Japan  | GB/PR China | KS/Korea       | GOST/Russia  |                    |  |                        |
| WET CORROSION AND GENERAL SERVICE | Ferritic           | 1.4003              | S40977                | 4003                            | 0.02               | –    | 11.5 | 0.5  | –      | –  | –           | –              | –            | P H C              | 13 or 19 9L                                    |                        |
|                                   |                    | 1.4000              | 410S                  | 4000                            | 0.03               | 0.01 | 12.5 | –    | –      | –  | SUS 403     | –              | –            | P                  | 13 or 19 9L                                    |                        |
|                                   |                    | 1.4016              | 430                   | 4016                            | 0.04               | –    | 16.5 | –    | –      | –  | SUS 430     | 1Cr17          | 08Kh13       | H C N B R          | 19 9L or 23 12L                                |                        |
|                                   |                    | 1.4521              | 444                   | 4521                            | 0.02               | 0.01 | 17.8 | –    | 2.1    | Ti   | SUS 404     | –              | 12Ch17       | P                  | 19 12 3L or 23 12 2L                           |                        |
|                                   | Martensitic        | 1.4006              | 410                   | 4006                            | 0.12               | 0.04 | 12   | –    | –      | –  | SUS 410     | 1Cr12          | STS 410      | P B R              | 13, 19 9 or 248 SV*                            |                        |
|                                   |                    | 1.4005              | 416                   | 4005                            | 0.10               | 0.04 | 13   | –    | –      | S  | SUS 416     | Y1Cr13         | STS 416      | B R                | 248 SV*  |                        |
|                                   |                    | 1.4021              | 420                   | 4021                            | 0.20               | –    | 13   | –    | –      | –  | SUS 420J1   | 2Cr13          | STS 420J1    | N B R              | 248 SV*  |                        |
|                                   |                    | 1.4028              | 420                   | 4028                            | 0.30               | –    | 12.5 | –    | –      | –  | SUS 420J2   | 3Cr13          | STS 420J2    | N R                | 248 SV*  |                        |
|                                   |                    | 1.4313              | S41500                | 4313                            | 0.03               | 0.04 | 12.5 | 4.1  | 0.6    | –  | SUS Ti6NM   | –              | –            | P                  | 248 SV*  |                        |
|                                   |                    | 1.4548 <sup>1</sup> | –                     | 4548                            | 0.05               | 0.07 | 15.5 | 4.2  | –      | Mn   | –           | –              | –            | R                  | 248 SV*  |                        |
|                                   | 1.4418             | –                   | 248 SV                | 0.03                            | –                  | 16   | 5    | 1    | –      | –  | –           | –              | (P) B        | 248 SV*            |  |                        |
|                                   | Duplex             | 1.4162 <sup>1</sup> | S32101                | LDX 2101 <sup>®</sup>           | 0.03               | 0.22 | 21.5 | 1.5  | 0.3    | 5Mn  | –           | –              | –            | –                  | P H C R T F D                                  | LDX 2101* or 22 9 3 NL |
|                                   |                    | 1.4362              | S32304                | 2304                            | 0.02               | 0.10 | 23   | 4.8  | 0.3    | –  | –           | –              | –            | P H C R T F D      | 2304* or 22 9 3 NL                             |                        |
|                                   |                    | 1.4462              | S32205 <sup>2</sup>   | 2205                            | 0.02               | 0.17 | 22   | 5.7  | 3.1    | –  | SUS 329J3L  | 00Cr22Ni5Mo3N  | STS 329J3L   | P H C N B R T F D  | 22 9 3 NL                                      |                        |
|                                   |                    | 1.4501              | S32760                | 4501                            | 0.02               | 0.27 | 25.4 | 6.9  | 3.8    | W  | –           | –              | –            | P                  | 25 9 4 NL                                      |                        |
|                                   |                    | 1.4410              | S32750                | SAF 2507 <sup>®</sup>           | 0.02               | 0.27 | 25   | 7    | 4      | –  | –           | –              | STS 329J4L   | P C H T            | 25 9 4 NL                                      |                        |
|                                   | Austenitic         | 1.3805 <sup>1</sup> | –                     | 3805                            | 0.36               | 0.02 | –    | –    | –      | 20.7Mn   | –           | –              | –            | –                  | P  | 18 8 Mn                |
|                                   |                    | 1.4310              | 301                   | 4310                            | 0.10               | –    | 17   | 7    | –      | –  | SUS 301     | 1Cr17Ni7       | STS 301      | H C N B R          | 19 9L  |                        |
|                                   |                    | 1.4318              | 301LN                 | 4318                            | 0.02               | 0.14 | 17.7 | 6.5  | –      | –  | SUS 301L    | –              | STS 301L     | H C                | 19 9L  |                        |
|                                   |                    | 1.4372              | 201                   | 4372                            | 0.05               | 0.20 | 17   | 4    | –      | 7Mn  | SUS 201     | 1Cr17Mn6Ni5N   | STS 201      | H C N R            | 18 9 Mn Mo or 23 12L                           |                        |
|                                   |                    | 1.4568              | 631                   | 4568                            | 0.08               | 0.02 | 16.6 | 7.6  | –      | Mn   | SUS 631     | –              | –            | R                  | 19 9L  |                        |
|                                   |                    | 1.4301              | 304                   | 4301                            | 0.04               | –    | 18.1 | 8.1  | –      | –  | SUS 304     | 0Cr18Ni9       | STS 304      | P H C N B R T F    | 19 9L  |                        |
|                                   |                    | 1.4307              | 304L                  | 4307                            | 0.02               | –    | 18.1 | 8.1  | –      | –  | SUS 304L    | 00Cr19Ni10     | STS 304L     | P H C N B R T F    | 19 9L  |                        |
|                                   |                    | 1.4311              | 304LN                 | 4311                            | 0.02               | 0.14 | 18.5 | 10.5 | –      | –  | SUS 304LN   | 00Cr18Ni10N    | STS 304LN    | P H C N B R        | 19 9L  |                        |
|                                   |                    | 1.4541              | 321                   | 4541                            | 0.04               | –    | 17.3 | 9.1  | –      | Ti   | SUS 321     | 0Cr18Ni10Ti    | STS 321      | P H C N B R T F    | 19 9L  |                        |
|                                   |                    | 1.4550              | 347                   | 4550                            | 0.05               | 0.04 | 17.5 | 9.5  | –      | Nb   | SUS 347     | 0Cr18Ni11Nb    | STS 347      | P C R              | 19 9 Nb or 19 9L                               |                        |
|                                   |                    | 1.4305              | 303                   | 4305                            | 0.05               | –    | 17.3 | 8.2  | –      | S  | SUS 303     | Y1Cr18Ni9      | –            | P B R              | 19 9L  |                        |
|                                   |                    | 1.4303              | 305                   | 4303                            | 0.04               | –    | 17.7 | 12.5 | –      | –  | SUS 305J1   | 1Cr18Ni12      | STS 305      | P H C N B R        | 19 9L  |                        |
|                                   |                    | 1.4306              | 304L                  | 4306                            | 0.02               | –    | 18.2 | 10.1 | –      | –  | SUS 304L    | 00Cr19Ni10     | STS 304L     | P H C N B R T F    | 19 9L  |                        |
|                                   |                    | 1.4567              | S30430                | 4567                            | 0.01               | –    | 17.7 | 9.7  | –      | 3Cu  | SUS XM7     | 0Cr18Ni9Cu3    | –            | B R                | 19 9L  |                        |
|                                   |                    | –                   | S30464                | 4696                            | 0.02               | 0.05 | 19   | 13.5 | –      | B  | –           | –              | –            | P                  | 19 9 L   |                        |
|                                   |                    | 1.4401              | 316                   | 4401                            | 0.04               | –    | 17.2 | 10.1 | 2.1    | –  | SUS 316     | 0Cr17Ni12Mo2   | STS 316      | P H C N B R T F    | 19 12 3L                                       |                        |
|                                   |                    | 1.4404              | 316L                  | 4404                            | 0.02               | –    | 17.2 | 10.1 | 2.1    | –  | SUS 316L    | 00Cr17Ni14Mo2  | STS 316L     | P H C N B R T F    | 19 12 3L                                       |                        |
|                                   |                    | 1.4427 <sup>1</sup> | 316F                  | 4427                            | 0.02               | 0.05 | 16.9 | 10.7 | 2.6    | S  | –           | –              | –            | P                  | 19 12 3L                                       |                        |
|                                   |                    | 1.4436              | 316                   | 4436                            | 0.04               | –    | 16.9 | 10.7 | 2.6    | –  | SUS 316     | 0Cr17Ni12Mo2   | STS 316      | P H C N B R T F    | 19 12 3L                                       |                        |
|                                   |                    | 1.4432              | 316L                  | 4432                            | 0.02               | –    | 16.9 | 10.7 | 2.6    | –  | SUS 316L    | 00Cr17Ni14Mo2  | STS316L      | P H C N B R T F    | 19 12 3L                                       |                        |
|                                   |                    | 1.4406              | 316LN                 | 4406                            | 0.02               | 0.14 | 17.2 | 10.3 | 2.1    | –  | SUS 316LN   | 00Cr17Ni12Mo2N | STS 316LN    | P H C N B R        | 19 12 3L                                       |                        |
|                                   |                    | 1.4429              | S31653                | 4429                            | 0.02               | 0.14 | 17.3 | 12.5 | 2.6    | –  | SUS 316LN   | 00Cr17Ni13Mo2N | STS 316LN    | P R                | 19 12 3L                                       |                        |
|                                   |                    | 1.4571              | 316Ti                 | 4571                            | 0.04               | –    | 16.8 | 10.9 | 2.1    | Ti   | SUS 316Ti   | 0Cr18Ni12Mo2Ti | STS 316Ti    | P H C N B R T F    | 19 12 3 Nb or 19 12 3L                         |                        |
|                                   |                    | 1.4435              | 316L                  | 4435                            | 0.02               | –    | 17.3 | 12.6 | 2.6    | –  | SUS 316L    | 00Cr17Ni14Mo2  | STS 316L     | P H C N B R T F    | 19 12 3L                                       |                        |
|                                   |                    | 1.3952 <sup>1</sup> | –                     | 3952                            | 0.02               | 0.18 | 16.9 | 13.2 | 2.7    | Mn   | –           | –              | –            | P                  | 20 16 3 Mn L                                   |                        |
|                                   |                    | 1.4438              | 317L                  | 4438                            | 0.02               | –    | 18.2 | 13.7 | 3.1    | –  | SUS 317L    | 00Cr19Ni13Mo3  | STS 317L     | P C N B R          | 317L/SNR*                                      |                        |
|                                   |                    | 1.4439              | 317LMN                | 4439                            | 0.02               | 0.14 | 17.8 | 12.7 | 4.1    | –  | –           | –              | –            | P                  | 20 25 5 Cu L                                   |                        |
|                                   |                    | 1.4466              | S31050                | 725LN                           | 0.01               | 0.12 | 25   | 22.3 | 2.1    | –  | –           | –              | –            | P                  | 25 22 2 N L                                    |                        |
|                                   |                    | 1.3964 <sup>1</sup> | –                     | 3964                            | 0.01               | 0.27 | 20.5 | 15.4 | 3.2    | Mn, Nb   | –           | –              | –            | P                  | 20 16 3 Mn L                                   |                        |
|                                   |                    | 1.4539              | 904L                  | 904L                            | 0.01               | –    | 20   | 25   | 4.3    | 1.5Cu  | –           | –              | STS 317J5L   | P H C N B R T F    | 20 25 5 Cu L or P12*                           |                        |
|                                   |                    | 1.4529              | N08926                | 4529                            | 0.01               | 0.20 | 20.5 | 24.8 | 6.5    | Cu   | –           | –              | –            | P                  | P12* or P16*                                   |                        |
|                                   |                    | 1.4547              | S31254                | 254 SMO <sup>®</sup>            | 0.01               | 0.20 | 20   | 18   | 6.1    | Cu   | –           | –              | –            | P H C N B R T F    | P12* or P16*                                   |                        |
|                                   | 1.4565             | S34565              | 4565                  | 0.02                            | 0.45               | 24   | 17   | 4.5  | 5.5Mn  | –  | –           | –              | P            | P16* or P54*       |  |                        |
|                                   | HEAT AND CREEP     | Ferritic            | 1.4713                | –                               | 4713               | 0.07 | 0.02 | 6.5  | –      | 0.7Al  | –           | –              | –            | P                  | 18 9 Mn Mo or 23 12                            |                        |
|                                   |                    |                     | 1.4724                | –                               | 4724               | 0.08 | 0.02 | 12.3 | –      | 0.8Al  | –           | –              | 10Kh13SYu    | P                  | 23 12  |                        |
|                                   |                    |                     | 1.4742                | –                               | 4742               | 0.08 | 0.02 | 17.5 | –      | 1Al  | –           | –              | –            | P                  | 23 12 or 253 MA*                               |                        |
|                                   |                    |                     | 1.4762                | S44600                          | 4762               | 0.08 | 0.02 | 23.4 | –      | 1.4Al  | –           | –              | –            | P                  | 25 20 or 23 12                                 |                        |
|                                   |                    | Austenitic          | 1.4948                | 304H                            | 4948               | 0.05 | –    | 18.1 | 8.3    | –  | –           | SUS 304        | 1Cr18Ni9     | STS 304            | P H C B R                                      | 19 9                   |
|                                   |                    |                     | 1.4878                | 321                             | 4878               | 0.05 | –    | 17.3 | 9.1    | –  | Ti          | SUS 321        | 1Cr18Ni9Ti   | STS 321            | P H C N B R                                    | 19 9 Nb                |
|                                   |                    |                     | 1.4818                | S30415                          | 153MA <sup>™</sup> | 0.05 | 0.15 | 18.5 | 9.5    | –  | 1.3Si, Ce   | –              | –            | –                  | P C N B R T                                    | 253 MA* or 253 MA-NF*  |
|                                   |                    |                     | 1.4833                | 309S                            | 4833               | 0.06 | –    | 22.3 | 12.6   | –  | –           | SUS 309        | 0Cr23Ni13    | STS 309S           | P H C N B R                                    | 23 12 or 253 MA-NF*    |
|                                   |                    |                     | 1.4828                | S30900                          | 4828               | 0.04 | –    | 20   | 12     | –  | 2Si         | SUH 309        | 1Cr20Ni14Si2 | –                  | P H C N B R                                    | 253 MA* or 253 MA-NF*  |
|                                   |                    |                     | 1.4835                | S30815                          | 253MA <sup>®</sup> | 0.09 | 0.17 | 21   | 11     | –  | 1.6Si, Ce   | –              | –            | –                  | P H C N B R T                                  | 253 MA* or 253 MA-NF*  |
|                                   |                    |                     | 1.4845                | 310S                            | 4845               | 0.05 | –    | 25   | 20     | –  | –           | SUS 310S       | 0Cr25Ni20    | STS 310S           | P H C N B R                                    | 25 20                  |
|                                   |                    |                     | 1.4841                | 314                             | 4841               | 0.07 | 0.05 | 24.5 | 19.5   | –  | 2Si         | –              | –            | 20Kh25N2052        | P  | 25 20                  |

<sup>1</sup> designation according to Stahl Eisen Liste (Register of European Steels)

<sup>2</sup> also available as S31803

\*Avesta Welding designation

## EN Material Standards

|            |   |
|------------|---|
| EN 10088-1 | Stainless steel grades general, not for ordering                |
| EN 10088-2 | Stainless steel flat products for general purposes              |
| EN 10088-3 | Stainless steel long products for general purposes              |
| EN 10095   | Heat resisting steels and Ni alloys                             |
| EN 10302   | Creep resisting steels and Ni/Co alloys                         |
| EN 10028-7 | Stainless flat products for pressure purposes                   |
| EN 10272   | Stainless rolled bar for pressure purposes                      |
| EN 10263-5 | Stainless rod, bar and wire for cold heading and cold extrusion |
| EN 10151   | Stainless Steel Strip for Springs                               |
| EN 10217-7 | Welded tubes for pressure purposes                              |
| EN 10296-2 | Welded tubes for mechanical and general engineering             |
| EN 10253-3 | Butt-welding pipe fittings, without specific requirements       |
| EN 10253-4 | Butt-welding pipe fittings, with specific requirements          |

## EN Product Conditions

|    |  |
|----|--|
| 1D | Hot rolled, heat treated, pickled                                  |
| 1G | Hot rolled, ground   |
| 1Q | Hot rolled, quenched and tempered, pickled                         |
| 2H | Work hardened  |
| 2E | Cold rolled, heat treated, mech. desc. pickled                     |
| 2D | Cold rolled, heat treated, pickled                                 |
| 2B | Cold rolled, heat treated, pickled, skin passed                    |
| 2F | Cold rolled, heat treated, pickled, skin passed on roughened rolls |
| 2R | Cold rolled, bright annealed                                       |
| 2G | Ground   |
| 2J | Brushed or dull polished   |
| 2K | Satin polished   |
| 2M | Patterned  |
| 2W | Profile rolled   |
| 2L | Coloured   |

## Outokumpu Products

|  |   |
|--|---|
| P  | Hot rolled plate Quarto   |
| H  | Hot rolled strip/sheet CPP                                      |
| C  | Cold rolled strip/sheet   |
| N  | Cold rolled narrow strip  |
| B  | Bar   |
| R  | Rod   |
| T  | Tube/pipe   |
| F  | Fittings  |
| D  | DUPROF <sup>™</sup> , Profiles in high strength stainless steel |
| LDX 2101 <sup>®</sup> , 254 SMO <sup>®</sup> , 153 MA <sup>™</sup> and 253 MA <sup>®</sup> are trademarks owned by Outokumpu |   |
| SAF 2507 <sup>®</sup> is trademark owned by SANDVIK AB   |   |

## Outokumpu Special Steel Conditions

|   |   |
|---|---|
| LIC   | for improved steel cleanliness                                |
| PRODEC <sup>®</sup>   | for improved machinability                                    |
| HyTens <sup>®</sup>   | for improved mechanical properties                            |
| CCS <sup>®</sup>  | for improved mechanical properties                            |
| VKS <sup>®</sup>  | for improved thickness tolerances                             |
| RAP <sup>™</sup> 2E   | for improved thickness tolerances and improved surface finish |
| Multicertification is made on request to EN/ASTM/ASME as well as to superseded national standards |   |

