UgiStock

Swiss Steel Group

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Stainless steel families

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Super stainless steel

Hollow rough parts

Specialty markets, grades under surveillance

Market	Brand name	Symbolic designation	Numerical designation	AISI / ASTM	Page
ABC Market	UGI® 4462 cold worked	X2CrNiMoN 22-5-3	1.4462	F51	63
ABC Market	UGIGRIP® 4362	X2CrNiN 23-4	1.4362		67
ABC Market	UGIGRIP® 4462	X2CrNiMoN 22-5-3	1.4462		68
Nuclear	UGI® 4006A	X12Cr13	1.4006	410	72
Nuclear	UGIPURE® 4542Q	X5CrNiCuNb16-4	1.4542	630	73
Nuclear	UGI® 4418Q / UGIPURE® 4418Q	X4CrNiMo16-5-1	1.4418		74
Nuclear	UGI® 4307Q / UGIPURE® 4307Q	X2CrNi18-9	1.4307	304/304L	75
Nuclear	UGI® 4550Q	X6CrNiNb18-10	1.4550	347	76
Nuclear	UGI® 4909 / UGIPURE® 4307Q	X2CrNiMo17-12-2	1.4909	316/316L	77
Nuclear	UGI® 4944	X6NiCrTiMoVB25-15-2	1.4944	660	78
Aerospace/Defence	UGI® 4028 AIR	X30Cr13	1.4028	420	82
Aerospace/Defence	UGI® 4057FG / UGI® 4057 / UGIPURE®4057 / UGI® 4057 AIR	X15CrNi17-03	1.4057	431	83
Aerospace/Defence	UGI® 4418Q / UGIPURE® 4418Q	X4CrNiMo16-5-1	1.4418		84
Aerospace/Defence	UGI®4542Q / UGIPURE®4542Q / UGIPURE® 4542-1 / UGIPURE® 4548 / UGI® 17-4PH AIR	X5CrNiCuNb16-4	1.4542	630	85
Aerospace/Defence	UGI® 4542Q / UGIPURE® 4542Q / UGIPURE® 4542-1 / UGIPURE® 4548 / UGI® 17-4PH AIR	X5CrNiCu17-4	1.4542/1.4548	630	86
Aerospace/Defence	UGIPURE® 15-5PH / UGIPUR® 4545 / UGI® 15-5PH AIR	X5CrNiCu15-5	1.4542/1.4545		87
Aerospace/Defence	UGI® 4307Q / UGIPURE® 4307Q	X2CrNi18-9	1.4307	304/304L	88
Aerospace/Defence	UGI® 4541Q	X6CrNiTi18-10	1.4541	321	89
Aerospace/Defence	UGI® 4550Q / UGI® 347H	X6CrNiNb18-10	1.4550	347	90
Aerospace/Defence	UGI® 4909HP / 4909	X2CrNiMo17-12-2	1.4909	316/316L	91
Aerospace/Defence	UGI® 4944	X6NiCrTiMoVB25-15-2	1.4944	660	92
Medical	UGIPURE® 4441 / UGIPURE® 316L	X2CrNiMo18-15-3	1.4441		96
Medical	UGIMA® 4542 / UGIMA® 4542LR	X5CrNiCuNb16-4	1.4542	630	97
Medical	UGI® 4057FG / UGI® 4057 / UGI® 4057LR	X17CrNi16-2	1.4057	431	98
Medical	UGIMA® 4028 / UGIMA® 4028 LR	X30Cr13	1.4028	420	Please consult us
Medical	UGI® 4021	X20Cr13	1.4021	420	Please consult us
Medical	UGI® 4418	X4CrNiMo16-5-1	1.4418		Please consult us
Watch industry	UGI® 4435 ICH	X2CrNiMo18-14-3	1.4435	316L	102
Oil and Gas	UGI® 4006/ UGI® 4006A	UNS S41000	1.4006	410	Please consult us
Oil and Gas	UGI® 4021	UNS S42000	1.4021	420	Please consult us
Oil and Gas	UGI® 4028	UNS S42020	1.4028	420	Please consult us
Oil and Gas	UGI® 4307	UNS S30403	1.4307	304L	Please consult us
Oil and Gas	UGI® 4404	UNS S31603	1.4404	316L	Please consult us
Oil and Gas	UGI® 4410	UNS S32750	1.4410	F53	Please consult us
Oil and Gas	UGI® 4418		1.4418		Please consult us
Oil and Gas	UGI® 4460	UNS S32900	1.4460	329	Please consult us
Oil and Gas	UGI® 4462	UNS S31803/S32205	1.4462	F51	Please consult us
Oil and Gas	UGI® 4507	UNS S32550	1.4507	F61	Please consult us
Oil and Gas	UGI® 4511	X3CrNb17	1.4511	430	Please consult us
Oil and Gas	UGI® 4539	UNS N08904	1.4539	904 L	Please consult us
Oil and Gas	UGI® 4542	UNS S17400	1.4542	630	Please consult us

Machinability technical support

Our experts are available to help you worldwide. They can provide you with information and help you optimize your cutting conditions and/or perform servicing on your machines.

Customer testimonials

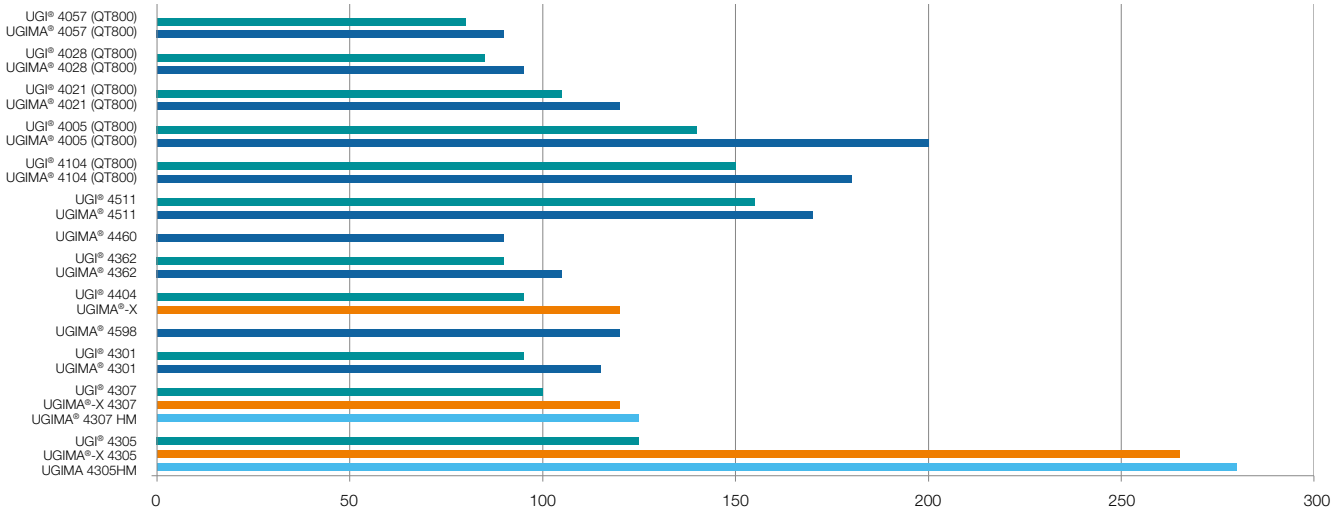
"UGIMA®: "turbo stainless steel', "the machinability champion"… Our engineers know this, our employees say so… and our customers testify to its efficiency in writing!", "Thanks to UGIMA® steels and their reproducibility, I no longer need to change my cutting parameters!"

"Not only has the latest-generation UGIMA® HM enabled those customers that have chosen it to further increase their productivity (even 10% to 20% better than UGIMA®), but it has also increased tool life (by two to five times, depending on the case)." Tornos

The UGIMA® solution and Ugitech's technical support are unmatched in the industry!

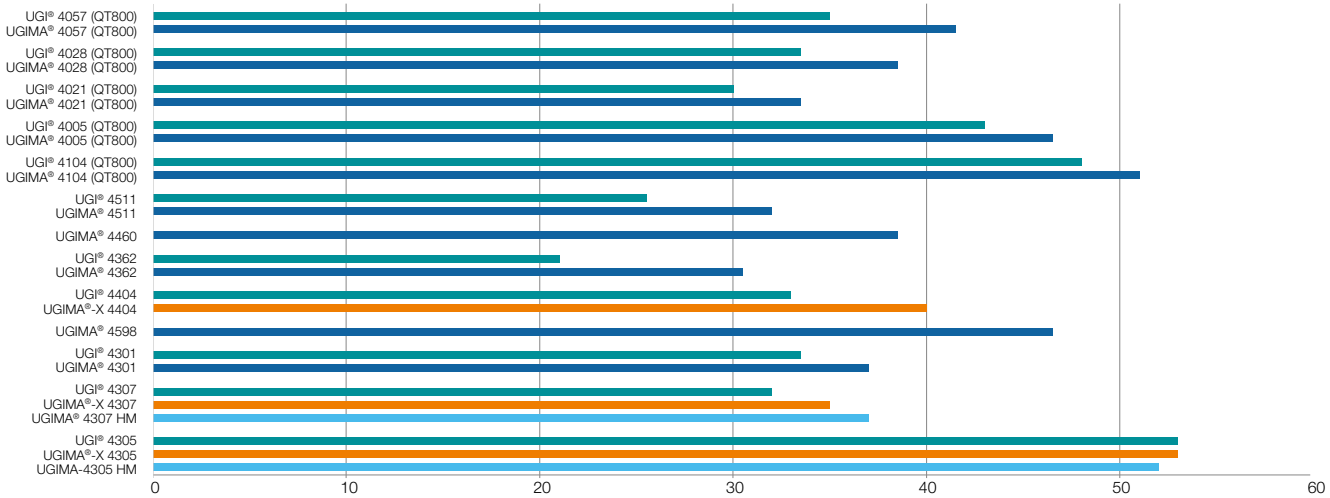
Contact us
machining.support@ugitech.com

Validated performance levels



Potential machining productivity in relation to cutting-tool wear
The productivity of UGI® 4307 is adopted as comparison basis (base 100)

Chip breakability



Number of chip breaking conditions out of 56 tested (a_p = 0.5 to 4 mm; f = 0.1 to 0.4 mm/rev.)

Depending on the grade, the product's performance can either optimize productivity in relation to cutting-tool wear or facilitate material processing by improving chip breakability.

A growing range of UGIMA® and UGIMA®-X grades

Ugitech grades		Equivalence		Designation			Chemical composition of Ugitech grades (standard composition as %)									
		AISI ASTM	UNS	N ° EN	EN name		C	Si	Mn	Ni	Cr	Mo	N	S	P	Autres
Martensitic stainless steels																
UGIMA® 4006	UGIMA® 410	410	S41000	1.4006	X12Cr13	min. max.	0.08 0.15	1.0	1.5	0.75	11.5 13.5	-	-	0.030	0.040	-
UGIMA® 4005A	UGIMA® 416A	416	S41600	1.4005	X12CrS13	min. max.	0.06 0.15	1.0	1.5	-	12.0 14.0	0.6	-	0.150 0.350	0.040	-
UGIMA® 4021	UGIMA® 420A	420	S42000	1.4021	X20Cr13	min. max.	0.16 0.25	1.0	1.5	-	12.0 14.0	-	-	0.030	0.040	-
UGIMA® 4028	UGIMA® 420B	420	S42000	1.4028	X30Cr13	min. max.	0.26 0.35	1.0	1.5	-	12.0 14.0	-	-	0.030	0.040	-
UGIMA® 4034	UGIMA® 420D	420	S42000	1.4034	X46Cr13	min. max.	0.43 0.50	1.0	1.0	-	12.5 14.5	-	-	0.030	0.040	-
UGIMA® 4057	UGIMA® 431	431	S43100	1.4057	X17CrNi16-2	min. max.	0.12 0.22	1.0	1.5	1.5 2.5	15.0 17.0	-	-	0.030	0.040	-
UGIMA® 4542	UGIMA® 630	630	S17400	1.4542	X5CrNiCuNb16-4	min. max.	0.07	0.7	1.5	3.0 5.0	15.0 17.0	0.6	-	0.030	0.040	Cu: 3.0 - 5.0 Nb: 5xC - 0.45
Ferritic stainless steels																
UGIMA® 4511	UGIMA® 430LNb	430LNb	-	1.4511	X3CrNb17	min. max.	0.05	1.0	1.0	-	16.0 18.0	-	-	0.030	0.040	Nb: 12xC – 1.0
UGIMA® 4509		441	S43940	1.4509	X2CrTiNb18	min. max.	0.03	1.0	1.0	-	17.5 18.5	-	-	0.015	0.040	Ti: 0.1 – 0.6
UGIMA® 4104		-	-	1.4104	X14CrMoS17	min. max.	0.10 0.17	1.0	1.5	-	15.5 17.5	0.2 0.6	-	0.150 0.350	0.040	Nb: 3xC+0.30-1.0
Austenitic stainless steels																
UGIMA® 4301 UGIMA® 4301FG	UGIMA® 304 UGIMA® 304FG	304	S30400	1.4301	X5CrNi18-10	min. max.	0.07	1.0	2.0	8.0 10.5	17.5 19.5	-	0.11	0.030	0.045	Cu: ≤ 1.0
UGIMA®-X 4307 UGIMA® 4307HM UGIMA® 4307FG	UGIMA®-X 304L UGIMA® 304LXL UGIMA® 304LFG	304L	S30403	1.4307	X2CrNi18-9	min. max.	0.03	1.0	2.0	8.0 10.5	17.5 19.5	-	0.11	0.030	0.045	-
UGIMA® 4306 UGIMA® 4306FG		304L	S30403	1.4306	X2CrNi19-11	min. max.	0.03	1.0	2.0	10.0 12.0	18.0 20.0	-	0.11	0.030	0.045	-
UGIMA® 4567	UGIMA® 304Cu	304Cu	S30430	1.4567	X3CrNiCu18-9-4	min. max.	0.04	1.0	2.0	8.5 10.5	17.0 19.0	-	0.11	0.030	0.045	Cu: 3.0 - 4.0
UGIMA®-X 4305 UGIMA® 4305HM	UGIMA®-X 303 UGIMA 303XL	303	S30300	1.4305	X8CrNiS18-9	min. max.	0.10	1.0	2.0	8.0 10.0	17.0 19.0	-	0.11	0.150 0.350	0.045	Cu: 0.4 - 0.7
UGIMA® 4570	UGIMA® 303UX	-	-	1.4570	X6CrNiCuS18-9-2	min. max.	0.08	1.0	2.0	8.0 10.0	17.0 19.0	0.6	0.11	0.150 0.350	0.045	Cu: 1.4 - 1.8
	UGIMA® 303Cu+	303Cu	S30330	-	X6CrNiCuS18-9-3	min. max.	0.06	1.0	2.0	8.0 10.0	17.0 19.0	0.6	-	0.150 0.350	0.040	Cu: 2.5 - 3.0
UGIMA® 4401 UGIMA® 4401FG	UGIMA® 316 UGIMA® 316FG	316	S31600	1.4401	X5CrNiMo17-12-2	min. max.	0.07	1.0	2.0	10.0 13.0	16.5 18.5	2.0 2.5	0.11	0.030	0.045	-
UGIMA®-X 4404 UGIMA® 4404FG	UGIMA®-X 316L UGIMA® 316LFG	316L	S31603	1.4404	X2CrNiMo17-12-2	min. max.	0.03	1.0	2.0	10.0 13.0	16.5 18.5	2.0 2.5	0.11	0.030	0.045	-
UGIMA® 4435 UGIMA® 4435FG UGIMA® 4435ICH	UGIMA® 316LMo	316L (316LMo)	S31603	1.4435	X2CrNiMo18-14-3	min. max.	0.03	1.0	2.0	12.5 15.0	17.0 19.0	2.5 3.0	0.11	0.030	0.045	-
UGIMA® 4541	UGIMA® 321	321	-	1.4541	X6CrNiTi18-10	min. max.	0.08	1.0	2.0	9.0 12.0	17.0 19.0	-	-	0.030	0.045	Ti: 5xC - 0.7
UGIMA® 4571	UGIMA® 316Ti	316Ti	S31635	1.4571	X6CrNiMoTi17-12-2	min. max.	0.08	1.0	2.0	10.5 13.5	16.5 18.5	2.0 2.5	-	0.030	0.045	Ti: 5xC - 0.7
UGIMA® 4598		-	-	1.4598	X3CrNiMoS17-11-2	min. max.	0.03	1.0	2.0	10.0 13.0	16.5 18.5	2.0 2.5	0.11	0.100 0.200	0.045	Cu: 1.3 - 1.8
Austenoferritic stainless steels / Duplex																
UGIMA® 4362		-	S32304	1.4362	X2CrNiN23-4	min. max.	0.03	1.0	2.0	3.5 5.5	22.0 24.0	0.1 0.6	0.05 0.20	0.015	0.035	Cu: 0.1 - 0.6
UGIMA® 4460	UGIMA® 329	329	S32900	1.4460	X3CrNiMoN27-5-2	min. max.	0.05	1.0	2.0	4.5 6.5	25.0 28.0	1.3 2.0	0.05 0.20	0.030	0.035	-

The FG grades are intended for hot forging and light cold working.

Machining made easy!

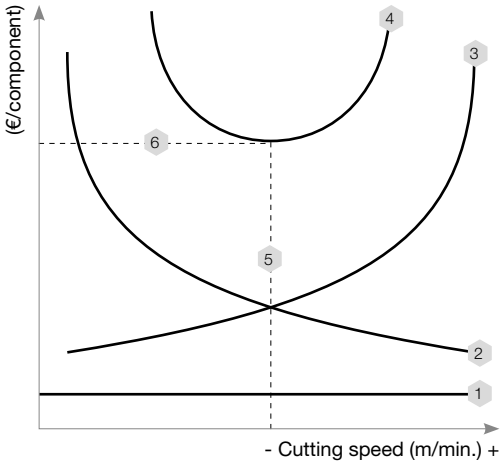
The UGIMA® and UGIMA®-X grades can:

- increase productivity by between 10% and 50%, depending on the grade[1];
- significantly increase tool service life[2];
- provide performance levels that can be repeated from one batch to another.

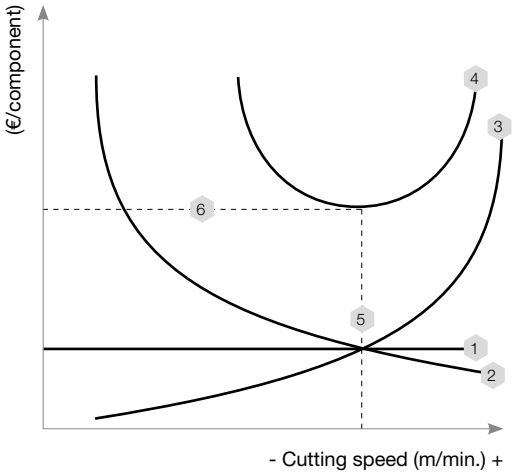
All this is achieved while improving chip breakability and the surface condition of parts.

With these grades, this real feat (level of performance) can be achieved on all types of machines and tools.

Cost of components with a standard grade



Cost of components with an UGIMA® grade

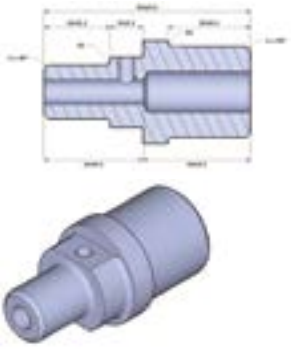


1 : with the same tool service life
2 : after optimization of cutting conditions

1: Material cost
2: Machine cost
3: Cutting-tool cost
4: Component cost = Cost of material + tools + machine
5: Selected speed
6: Final component cost

Usage value

	1.4404 Standard	UGIMA®-X 4404
Material cost (€/component)	€0.87	€0.91
Productivity (components/h)	51.4	64.3
Machining cost (€/component)	€0.93	€0.76
Total cost (€/component)	€1.80	€1.67
Savings (€/component)	-	€0.13
Savings on a production run of 10,000 components	-	€1,300.00



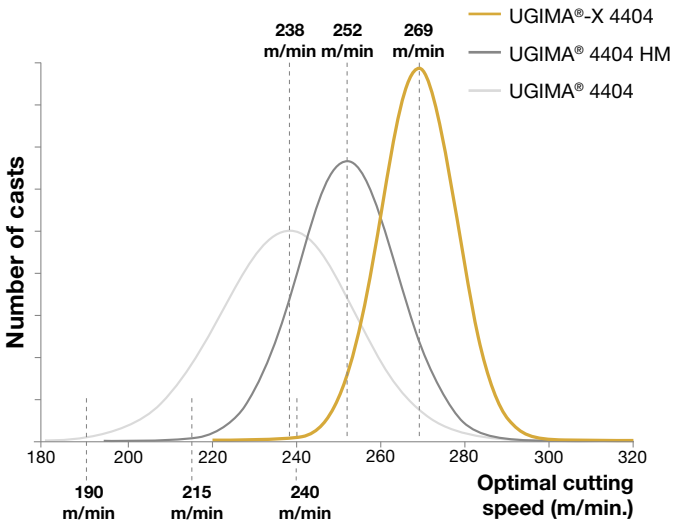
Reduction in dispersion of optimal cutting speeds

Each material batch has an optimal cutting speed. With UGIMA® grades:

- not only is the average optimal cutting speed increased,
- but the dispersion of optimal cutting speeds is reduced.

Machine-tool operators want to avoid machine stoppages, so they set their cutting speed to the lowest optimal speed for the material batches that they receive from their supplier.

With UGIMA® grades, the speed variation chosen by machine-tool operators is even greater than the observed variation in cutting-speed averages.



Speeds chosen by machine-tool operators

Properties of Ugitech long stainless steel products

	Drawn bars	Turned bars
Reference standard	EN 10088-3 2H	EN 10088-3 2B
Size range	1 to 28 mm	22 to 55 mm
Tolerances	Standard h9 On request, ground h9 to h6	Standard h9, h10 On request, ground h9 to h6
Lengths	Standard 3 m + 50 - 0 mm On request 1.5 m, 4 m or 6 m or other	Standard 3 m + 100 - 0 mm On request 1.5 m, 4 m or 6 m or other
Roundness	50% TI On request: 30% of TI	50% TI On request: 30% of TI
Straightness	0.5 mm/m On request 0.3 mm/m	Turned & polished bars h9, h10 ..... ≤ 1 mm/m Screw machining bars, h9..... ≤ 0.5 mm/m
Roughness	Maximum arithmetic roughness Ra < 0.6µm	Maximum arithmetic roughness Ra < 1.5µm
Mechanical properties	According to grade, size and hardening requirement	According to grade and size
Ends	1 chamfered/1 pointed; other finishes on request	2 chamfers; other finishes on request
Non-destructive tests	Eddy current on request Ultrasonic test up to FBH 0.7 mm for dia. ≥ 10 mm on request	Eddy current on request Ultrasonic test up to FBH 0.7 mm on request
Marking	On request	Laser on diameter > 35 mm
Surface defect Commitment	In accordance with EN 10088-3 Max. 0.2 mm for d ≤ 20 mm Max. 0.01 x d for d > 20 mm	In accordance with EN 10088-3 Max. 0.2 mm for d ≤ 20 mm Max. 0.01 xd for d > 20 mm
Customization	Cut-to-length, deep chamfered, cropping of non-checked ends	Cut-to-length, deep chamfered, cropping of non-checked ends
Straightness and roundness for long components and tailstocks	Possibility of special process for bars with improved roundness: long components with tight tolerances	-
Batch size	From stock: min. 50 kg From mill: min. 1 tonne	From stock: min. 50 kg From mill: min. 1 tonne

Packaging

Drawn wires

- Drums: pallet with cover,
  dia. 800 mm - H 600 mm - 250 kg
- Rings from 30 to 250 kg on pallet or basket
  Ring inner diameter:
  ID 1 to 1.50 mm = 350 mm
  ID > 1.50 mm = 500 mm
- Cable drums of 250 or 400 kg
  OD 760 mm - Bore dia. 40 mm

Bars

- Dia. > 9 mm: Akilux with 2 slings
- Dia. < 9 mm: in wooden crate

Profiles

- Cable drums of 250 to 1,000 kg
- Rings
- Bars in wooden crates (2 to 6 metres)

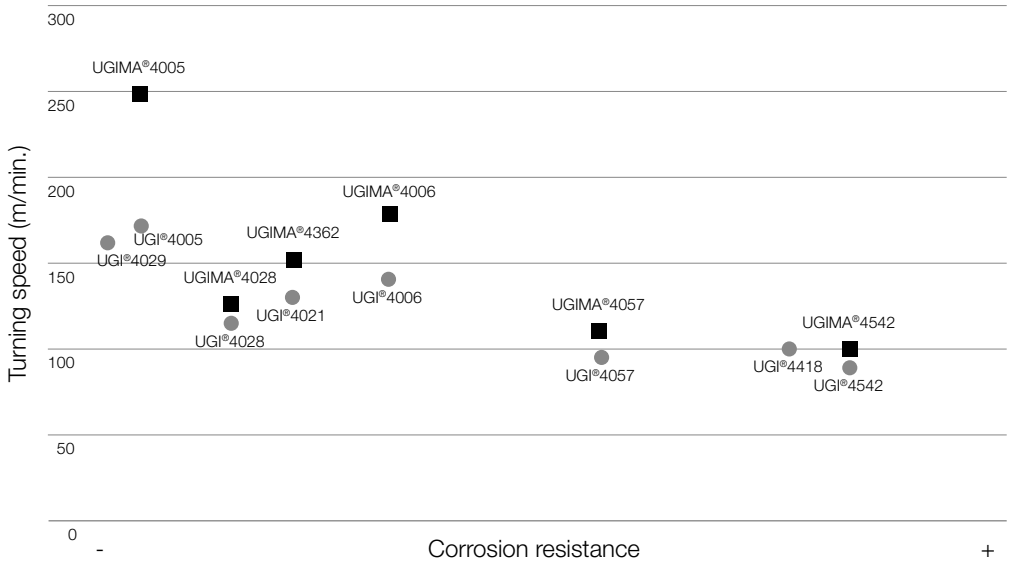
The indispensable solution for numerous cutting-edge applications

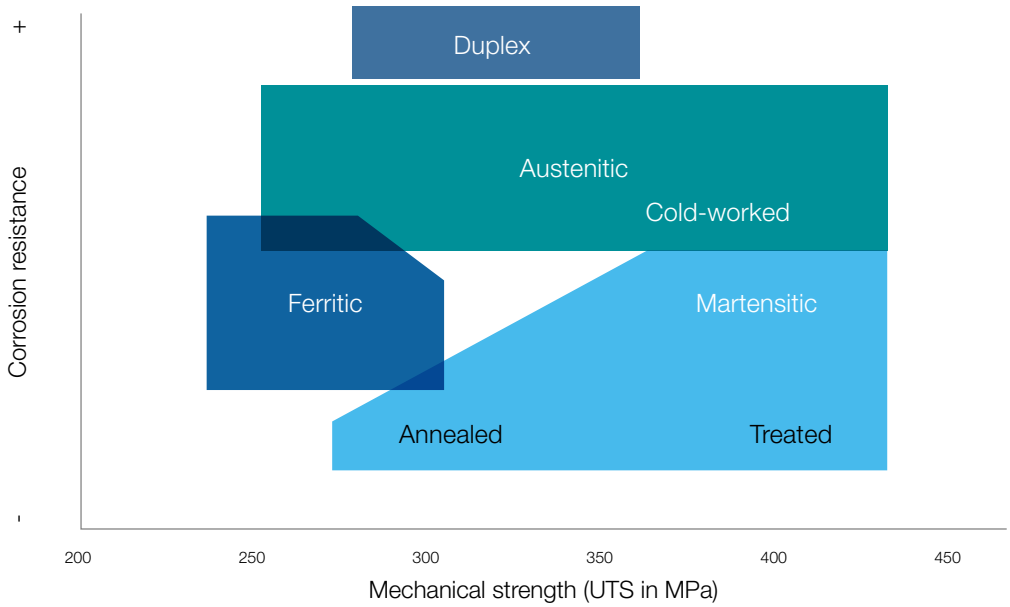
- Automotive industry
- Offshore
- Aerospace
- Nuclear
- Wind power: cylinders used for the axial rotation of wind-turbine blades.
- Road transport: truck tailboards, etc.
- Sanitation
- Watch industry
- Medical
- Boating: engine manoeuvring cylinders, etc.

Notes

Martensitic stainless steels

Martensitic stainless steels





UGIMA® 4005/UGI® 4005

Description

– Stainless steel with 13% chromium

– EN 10088-3: 1.4005 – X12CrS13 – AISI 416 – ASTM A582 / A582M

Average composition (%)

C = 0.12; Cr = 13; S = 0.25

Properties

– Screw machining stainless steel with 13% chromium used in relatively unaggressive environments and which can be optimized by the UGIMA® process without impairing its mechanical and corrosion resistance properties.

– Increased productivity, longer service life of plates/drill bits and above all the uniformity of delivered batches making it possible to keep the same cutting parameters for each batch.

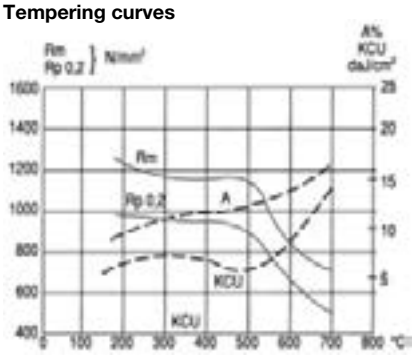
Fields of application

– Mechanical engineering, transport, electronic equipment.

– Machined parts, screw machining.

Heat treatment

Tempering curves



Tempering temperature

Indicative mechanical properties after quenching in oil at 950°C and tempering for 2 hours

Corrosion resistance

– Corrosion resistance is adversely affected by a high sulphur content compared with martensitic stainless steels with 13% Cr (such as 4021), particularly in environments conducive to pitting or crevice corrosion.

Mechanical properties (see GLOSSARY)

Grades	Metallurgical state	Processing	UTS (MPa)	YS (MPa)	HB	E (%)
UGIMA® 4005 UGI® 4005	Annealed	Drawn & polished Dia. 5 à 16 mm	≤ 880		≤ 280	
		Drawn & polished or turned Dia. 16.01 to 40 mm	≤ 800		≤ 250	
		Turned & polished Dia. 40.01 to 63 mm	≤ 760		≤ 230	
		Turned & polished Dia. > 63 mm	≤ 730		≤ 220	
	Treated QT 650	Drawn & polished Dia. 10.01 to 16 mm	700/1,000	≥ 500		≥ 8
		Drawn & polished or turned Dia. 16.01 to 40 mm	650/930	≥ 450		≥ 10
		Turned & polished Dia. 40.01 to 63 mm	650/880	≥ 450		≥ 10

Available size range

Grades	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGIMA® 4005 UGI® 4005	Annealed	Drawn & polished SMQ	Dia. 6 to 28 mm	h9	< 0.5 mm/m
		Turned & polished SMQ	Dia. 30 to 55 mm	h10	< 0.5 mm/m
		Turned & polished	Dia. 60 to 70 mm	h10	< 1.2 mm/m
	Treated QT650	Drawn & polished SMQ	Dia. 12 to 25 mm	h9	< 0.5 mm/m
		Turned & polished SMQ	Dia. 30 to 50 mm	h10	< 0.5 mm/m

SMQ = Screw Machining Quality

UGIMA® 4006/UGI® 4006

Description

- Martensitic stainless steel with 13% chromium
- 1.4006 – X12Cr13 – AISI 410 EN 10088-3 – EN 10088-5 – ASTM A182 / A182M – ASTM A276 (standards applicable according to the metallurgical state level)
- NACE MR0175/ISO 15156-3 (standard applicable only on “Double Tempering” state).

Average composition (%)

C = 0.12; Cr = 12.5; S ≤ 0.030

Properties

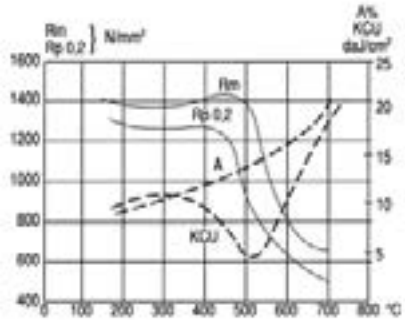
- Martensitic grade combining high mechanical properties with good corrosion resistance on suitably polished surfaces in moderately aggressive non-chlorinated environments (optimum in treated state)
- Good resistance in oxidizing atmosphere up to 600°C
- UGIMA® grade produced according to an Ugitech process to significantly improve its machinability (15% to 25% increase in productivity), up to diameter 115 mm

Fields of application

- Mechanical engineering, oil and petrochemicals industry. Food and food processing industry, decoration and household appliances, cutlery: shafts, pistons, liners, valves, nuts and bolts, etc.
- Pickling: please consult us first.

Heat treatment

Tempering curves



Tempering temperature

Indicative mechanical properties after quenching in oil at 950°C and tempering for 2 hours

Corrosion resistance

- Atmospheres, fresh waters (check water analysis). Oxidizing saline solutions free of chlorides, fluorides, iodides, bromides, etc.
- Cold diluted nitric solutions.
- Certain cold diluted organic acids: picric, tannic, lactic, etc.
- Non-corrosive products such as: alcohol, benzol, petroleum, oil, soap, etc.

Mechanical properties (see GLOSSARY)

Grades	Metallurgical state	UTS (MPa)	YS (MPa)	HB	E (%)	Z (%)
UGIMA® 4006 UGI® 4006	Treated QT 650 Class 2 ASTM A182	≥ 585	≥ 380	167/229	≥ 18	≥ 35
	Treated QT 760 Class 3 ASTAM 182	≥ 760	≥ 585	235/302	≥ 15	≥ 35
Grade	**Metallurgical state**	**UTS (MPa)**	**YS (MPa)**	**KV + 20 °C KV - 46 °C**	**E (%)**	**Z (%)**
UGI® 4006	Treated QT 650	650/800	≥ 450	≥ 25 J	≥ 18	≥ 45

Available size range

Grades	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGIMA® 4006 UGI® 4006	Treated QT 650 Class 2 ASTM A182	Rolled & descaled	Dia. 30 to 50 mm	k13	< 1 mm/m
			Dia. 60 to 90 mm	k13	< 1.5 mm/m
	Treated QT 760 Class 3 ASTAM 182	Rolled & descaled	Dia. 26 to 55 mm	k13	< 1 mm/m
			Dia. 60 to 115 mm	k13	< 1.5 mm/m
UGI® 4006	Treated QT 650 Class 2 ASTM A182	Rolled & descaled	Dia. 120 to 170 mm	k13	< 2 mm/m
	Treated QT 760 Class 3 ASTAM 182	Rolled & descaled	Dia. 120 to 140 mm	k13	< 2 mm/m
UGI® 4006/AISI 410 as per NACE MR0175/ ISO 15156-3 + NF EN 10088-3	Treated QT 650	Rolled & descaled	Dia. 30 to 50 mm	k13	< 1 mm/m
			Dia. 60 to 110 mm	k13	< 1.5 mm/m

SMQ = Screw Machining Quality

UGIMA® 4021/UGI® 4021

Description

– Martensitic stainless steel with 13% chromium

– EN 10088-3: 1.4021 – X20Cr13 – AISI 420 – EN 10088-5

Average composition (%)

C = 0.2; Cr = 13

Properties

– In the treated state, a martensitic grade combining excellent mechanical properties with good corrosion resistance on suitably polished surfaces in moderately aggressive non-chlorinated environments.

– Good resistance in oxidizing atmosphere up to 600°C.

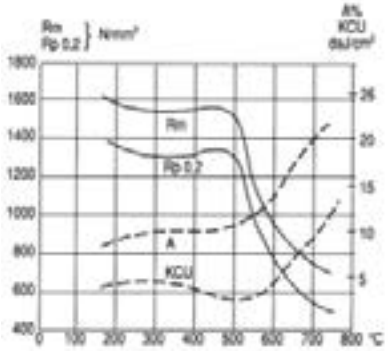
– UGIMA® grade produced according to an Ugitech process to significantly improve its machinability, up to diameter 115 mm.

Fields of application

– Mechanical engineering, oil and petrochemicals industry, food and food processing industry, decoration and household appliances, transport and cutlery: shafts, pistons, liners, valves, nuts and bolts, etc.

Heat treatment

Tempering curves



Tempering temperature

Indicative mechanical properties after quenching in oil at 950°C and tempering for 2 hours

Corrosion resistance

– Atmospheres, fresh waters (check water analysis). Oxidizing saline solutions free of chlorides, fluorides, iodides, bromides, etc. Cold diluted nitric solutions.

– Certain cold diluted organic acids: picric, tannic, lactic, etc.

– Non-corrosive products such as: alcohol, benzol, petroleum, oil, soap, etc.

Mechanical properties (see GLOSSARY)

Grades	Metallurgical state	Processing	UTS (MPa)	YS (MPa)	KV + 20 °C	E (%)
UGIMA®4021 UGI® 4021	Treated QT 700	Drawn & polished Dia. ≤ 10 mm	750/1,000	≥ 600		≥ 8
		Drawn & polished Dia. 10.01 to 16 mm	750/1,000	≥ 550		≥ 8
		Drawn & polished or turned Dia. 16.01 to 40 mm	700/950	≥ 500	≥ 25 J	≥ 10
		Turned Dia. 40.01 to 63 mm	700/900	≥ 500	≥ 25 J	≥ 12
	Treated QT 800	Rolled & descaled	800/950	≥ 600	≥ 12 J	≥ 20

Available size range

Grades	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGIMA®4021 UGI® 4021	Treated QT 700	Drawn & polished	Dia. 8 to 25 mm	h9	< 0.5 mm/m
		Turned & polished	Dia. 26 to 35 mm	h10	< 1 mm/m
	Treated QT 800	Rolled & descaled	Dia. 25 to 55 mm	k13	< 1 mm/m
		Rolled & descaled	Dia. 60 to 115 mm	k13	< 1.5 mm/m

UGIMA® 4028/UGI® 4028

Description

– Stainless steel for treatment with 13% chromium

– EN 10088-3: 1.4028 – X30Cr13 – AISI 420

Average composition (%)

C = 0.3; Cr = 13

Properties

– In the treated state, a martensitic grade combining excellent mechanical properties with good corrosion resistance on suitably polished surfaces in moderately aggressive non-chlorinated environments.

– UGIMA® grade produced according to an Ugitech process to significantly improve its machinability (15% to 25% increase in productivity), up to diameter 115 mm.

Fields of application

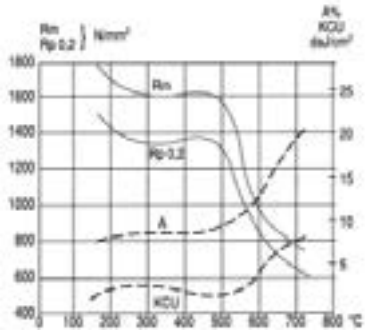
– Moulds for PVC products and glassware.

– Mechanical engineering, transport, electronic equipment, decoration and household appliances, cutlery: shafts, pistons, liners, valves, nuts and bolts, etc.

– Cutting tools.

Heat treatment

Tempering curves



Tempering temperature

Indicative mechanical properties after quenching in oil at 950°C and tempering for 2 hours

Corrosion resistance

– Atmospheres, fresh waters (check water analysis). Oxidizing saline solutions free of chlorides, fluorides, iodides, bromides, etc.

– Cold diluted nitric solutions.

– Certain cold diluted organic acids: picric, tannic, lactic, etc.

– Non-corrosive products such as: alcohol, benzol, petroleum, oil and soap.

Mechanical properties (see GLOSSARY)

Grades	Metallurgical state	Processing	UTS (MPa)	YS (MPa)	KV + 20 °C	E (%)
UGIMA®4028 UGI® 4028	Treated QT 850	Drawn & polished Dia. 5 to 10 mm	900/1,150	≥ 700		≥ 7
		Drawn & polished Dia. 10.01 to 16 mm	900/1,150	≥ 650		≥ 7
		Drawn & polished or turned Dia. 16.01 to 40 mm	850/1,100	≥ 650	≥ 15 J	≥ 9
		Rolled & descaled	850/1,000	≥ 650	≥ 15 J	≥ 10

Available size range

Grades	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGIMA®4028 UGI® 4028	Treated QT 850	Drawn & polished	Dia. 6 to 28 mm	h9	< 0.5 mm/m
		Turned & polished	Dia. 30 to 40 mm	h10	< 1 mm/m
		Rolled & descaled	Dia. 22 to 115 mm	k13	< 1 mm/m
UGI® 4028		Rolled & descaled	Dia. 120 to 300 mm	k13	< 1.5 mm/m

UGI® 4029

Description

– Stainless steel with 13% chromium

– EN 10088-3: 1.4029 – X 29CrS13 – AISI 420 F

Average composition (%)

C = 0.28; Cr = 12.8; S = 0.2

Properties

– A screw machining grade, UGI® 4029 is a martensitic steel whose machinability is improved by the addition of sulphur. Recommended for machined parts with high mechanical properties, it will be used in relatively unaggressive environments (oils, greases, cold detergents, etc.).

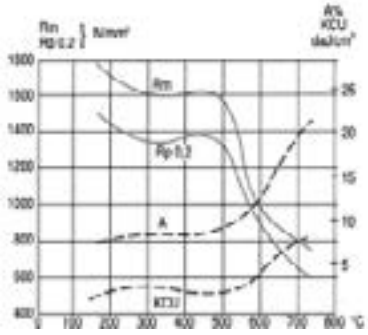
Fields of application

– Mechanical engineering, transport, food and food processing industry, defence, oil and petrochemicals industry, electronic equipment:

– Machined parts, screw machining.

Heat treatment

Tempering curves



Tempering temperature

Indicative mechanical properties after quenching in oil at 950°C and tempering for 2 hours

Corrosion resistance

– Corrosion resistance is adversely affected by a high sulphur content compared with martensitic stainless steels with 13% Cr (such as 4021), particularly in environments conducive to pitting or crevice corrosion.

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	Processing	UTS (MPa)	HB
UGI® 4029	Annealed	Drawn & polished Dia. 5 to 16 mm	≤ 950	≤ 305
		Drawn & polished or turned Dia. 16.01 to 40 mm	≤ 900	≤ 280

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGI® 4029	Annealed	Drawn & polished SMQ	Dia. 10 to 26 mm	h9	< 0.5 mm/m
		Turned & polished SMQ	Dia. 30 to 36 mm	h10	< 0.5 mm/m

SMQ = Screw Machining Quality

UGIMA® 4057/UGI® 4057

Description

- Martensitic stainless steel, chromium-nickel
- EN 10088-3: 1.4057 – X17CrNi16-2 – EN 10088-5 – AISI 431 – ASTM A479 / A479M – EN 10272 – PED 2014/68/EU

Average composition (%)

C = 0.17; Cr = 16; Ni = 2

Properties

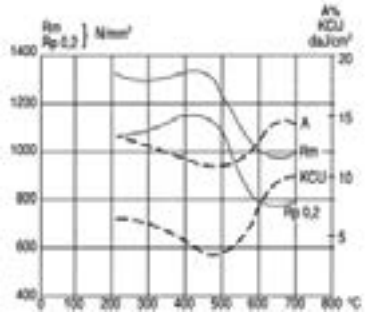
- Is required when chromium martensitic steels prove insufficient in terms of toughness or corrosion resistance.
- Good heat conduction. Low expansion. Suitable for polishing.
- Keeps a good hot surface condition. Mechanical strength up to 600°C. For descaling, please consult us.
- UGIMA® grade developed according to Ugitech process in order to significantly improve its machinability (15% to 25% increase in productivity), up to diameter 115 mm.

Fields of application

- Mechanical engineering, chemicals industry, oil and petrochemicals industry, transport, aerospace, defence, offshore.
- Moulds for glass bottles with appropriate heat treatment.
- For extrusion blow-moulded bottles in PVC with appropriate heat treatment.

Heat treatment

Tempering curves



Tempering temperature

Indicative mechanical properties after quenching in oil at 950°C and tempering for 2 hours

Corrosion resistance

- Corrosion resistance mid-way between that of type 1.4016 ferritic steels (AISI 430) and that of type 1.4301 austenitic steels (AISI 304).

Mechanical properties (see GLOSSARY)

Grades	Metallurgical state	Processing	UTS (MPa)	YS (MPa)	KV + 20 °C	E (%)
UGIMA®4057 UGI® 4057	Treated QT 800	Drawn & polished Dia. 5 to 10 mm	850/1,100	≥ 750		≥ 7
		Drawn & polished Dia. 10.01 to 16 mm	850/1,100	≥ 700		≥ 7
		Drawn & polished or turned Dia. 16.01 to 40 mm	800/1,050	≥ 700	≥ 25 J	≥ 9
UGIMA®4057 UGI® 4057	Treated QT 900	Rolled & descaled Dia. ≤ 60	900/1,050	≥ 700	≥ 20 J	≥ 12
		Rolled & descaled Dia. > 60	900/1,050	≥ 700	≥ 15 J	≥ 10

UGI® 4418

Description

– Martensitic stainless steel, chromium-nickel-molybdenum

– EN 10088-3: 1.4418 – X4CrNiMo16-5-1 – EN 10088-5 – EN 10272 – PED 2014/68/EU

Average composition (%)

C ≤ 0.06; Cr = 16; Ni = 5; Mo = 1.1

Properties

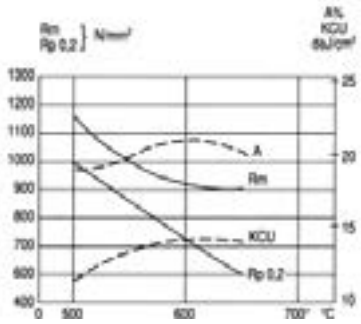
– Offers excellent corrosion resistance in aggressive environments together with high mechanical properties, especially impact strength. Recommended in cryogenics.

Fields of application

– Mechanical engineering, nuclear, offshore, transport, defence, chemicals industry, building, cable cars.

Heat treatment

Tempering curves



Tempering temperature

Indicative mechanical properties after quenching in oil at 950°C and tempering for 2 hours

Corrosion resistance

– Due to its high percentages of nickel, chromium and molybdenum and its low carbon content, the UGI® 4418 grade has good resistance to atmospheric corrosion. This grade has a resistance to marine atmospheres similar to that of 1.4542.

– UGI® 4418 is also far more resistant to pitting corrosion than a martensitic steel with 13% Cr (1.4006).

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	Processing	UTS (MPa)	YS (MPa)	KV + 20 °C	E (%)
UGI® 4418	Treated QT 900	Drawn & polished Dia. 5 to 16 mm	900/1,150	≥ 750		≥ 10
		Drawn & polished or turned Dia. 16.01 à 40 mm	900/1,100	≥ 700	≥ 80 J	≥ 12
		Drawn & polished or turned Dia. 40.01 à 63 mm	900/1,100	≥ 700	≥ 80 J	≥ 16
		Rolled & descaled Dia. ≤ 160	900/1,100	≥ 700	≥ 80 J	≥ 16
		Rolled & descaled Dia. > 160	900/1,100	≥ 700	≥ 60 J (transverse direction)	≥ 14

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGI® 4418	Treated QT 900	Drawn & polished SMQ	Dia. 10 to 20 mm	h9	< 0.5 mm/m
		Turned & polished SMQ	Dia. 22 to 55 mm	h10	< 0.5 mm/m
		Rolled & descaled	Dia. 60 to 120 mm	k13	< 1.5 mm/m
		Rolled & descaled	Dia. 130 to 200 mm	k13	< 2 mm/m

SMQ = Screw Machining Quality

UGIMA® 4542/UGI® 4542

Description

- Precipitation hardening martensitic stainless steel
- EN 10088-3: 1.4542 – X5CrNiCuNb16-4 – EN 10088-5 – ASTM A564 / A564M Grade 630 – UNS S17400 NACE MR0175 / ISO 15156-3 (applicable only on the “H1150D double tempering” state)

Average composition (%)

C ≤ 0.07; Cr = 16; Ni = 4; Cu = 4

Properties

- UGIMA® 4542 contributes a new technological breakthrough which provides major advantages compared with the 1.4542 grade.
- The productivity gains obtained are between 20% and 30%.
- Its properties according to its metallurgical state make it a response to both high mechanical strength requirements and applications requiring high impact strength.

Fields of application

- Food processing industry, petrochemicals, nuclear, surgery, mechanical engineering, offshore, ABC market, transport, chemicals, etc.

Corrosion resistance

- Excellent corrosion resistance similar to that of austenitic stainless steels of the 18Cr-8Ni type and even higher, in some cases, due to its high copper content.
- This steel structure makes it insensitive to intergranular corrosion and highly resistant to fatigue corrosion and stress corrosion.
- It also offers excellent resistance to erosion corrosion due to the combination of high mechanical properties and corrosion resistance.

Heat treatment and mechanical properties

Metallurgical state		UTS (MPa)	YS (MPa)	KV + 20 °C	KV - 50 °C	E (%)	Z (%)	HB
EN 10088-3	ASTM							
AT	A	≤ 1200						≤ 360
-	H1150D	≥ 860	725	≥ 41 J		≥ 16	≥ 50	255/311
P930	H1150	930-1100	725	≥ 41 J		≥ 16	≥ 50	277/311
P930		930-1100	725	≥ 41 J	≥ 27 J	≥ 16	≥ 50	277/311

Available size range

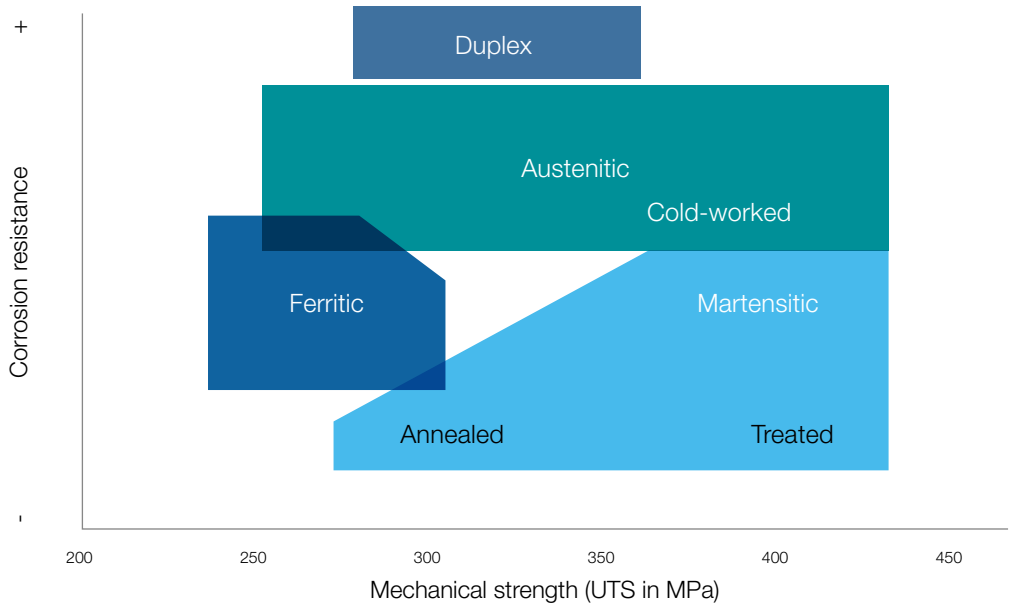
Grades	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGIMA®4542 UGI® 4542	Solution treated Condition A	Drawn & polished	Dia. 8 to 20 mm	h9	< 1 mm/m
		Rolled & descaled	Dia. 22 to 55 mm	k13	< 1 mm/m
		Rolled & descaled	Dia. 60 to 115 mm	k13	< 1.5 mm/m
	Age-hardened H1150 / P930	Drawn & polished	Dia. 10 to 20 mm	h9	< 1 mm/m
		Rolled & descaled	Dia. 25 to 55 mm	k13	< 1 mm/m
		Rolled & descaled	Dia. 60 to 110 mm	k13	< 1.5 mm/m
	Double aged H1150D, P930-capable	Turned & polished SMQ	Dia. 22 to 50 mm	h10	< 0.5 mm/m
		Turned & polished	Dia. 60 mm	h10	< 1 mm/m
		Rolled & descaled	Dia. 65 to 100 mm	k13	< 1.5 mm/m
UGI® 4542	Solution treated Condition A	Rolled & descaled	Dia. 120 to 250 mm	k13	< 2 mm/m
	Double aged H1150D, P930-capable	Rolled & descaled	Dia. 120 to 200 mm	k13	< 2 mm/m

SMQ = Screw Machining Quality

Notes

Ferritic stainless steels

Ferritic stainless steels



UGIMA® 4511

Description

– Ferritic stainless steel with 17% chromium

– EN 10088-3: 1.4511 – X3CrNb17 – AISI 430

Average composition (%)

C ≤ 0.03; Cr = 17; Nb = 0.2

Propriété :

– Ferritic steel with 17% chromium. In addition to good corrosion resistance, offers numerous possibilities for working: good cold forgeability, good weldability (presence of niobium) and satisfactory machinability. Steel whose machinability can be optimized by the UGIMA® process without impairing its mechanical and corrosion resistance properties.

– This steel has better corrosion resistance than ferritic grades 1.4104 and 1.4105, and close to that of austenitic grade 1.4305. Accordingly, for certain applications, it can be economically substituted for 1.4305 and to some extent for 1.4307.

– Its ferritic structure provides it with excellent ferromagnetic properties, good resistance to oxidation (in particular to thermal cycles) and a coefficient of expansion similar to that of a carbon steel.

Fields of application

– Energy, solenoid valve production processes, automotive industry for various sensor mountings and components for injection, solenoid valves, food processing industry for valves and fluids and cosmetics control components.

– Steel often used to produce parts which are cold-formed, then machined or screw-machined to obtain machine dimensions and, finally, welded onto a mounting or with one another.

Mechanical properties (see GLOSSARY)

Grades	Metallurgical state	Dimensions	UTS (MPa)	YS (MPa)	E (%)	HB
UGIMA® 4511	Annealed	Dia. 22 to 76 mm	420/600	≥ 200	≥ 20	≤ 180
	Cold-worked by drawing	Dia. 5 to 16 mm	480/750	≥ 300	≥ 10	≤ 220
		Dia. 16 to 28 mm	450/700	≥ 240	≥ 15	≤ 210

Available size range

Grades	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGIMA® 4511	Cold-worked by drawing	Drawn & polished	Dia. 5 to 28 mm	h9	< 0.5 mm/m
	Annealed	Turned & polished SMQ	Dia. 22 to 55 mm	h10	< 0.5 mm/m
		Turned & polished	Dia. 55 to 76 mm	h10	< 1.2 mm/m

SMQ = Screw Machining Quality

UGIMA® 4104/UGI® 4104

Description

– Ferritic stainless steel with 17% chromium

– EN 10088 – 1.4104 – X14CrMoS17

Average composition (%)

C = 0.13; Cr = 16.5; Mo = 0.4; S = 0.25

Properties

– Screw machining stainless steel with 17% chromium used in relatively unaggressive environments and which can be optimized by the UGIMA® process without impairing its mechanical and corrosion resistance properties.

Fields of application

– Transport, electronic equipment, food and food processing industry, decoration, household appliances and office systems.

Corrosion resistance

– Approximately the same as for ferritic stainless steels with 17% chromium of the AISI 430 type, although its corrosion resistance is adversely affected by its high sulphur content, particularly in environments conducive to pitting or crevice corrosion.

Mechanical properties (see GLOSSARY)

Grades	Metallurgical state	Processing	UTS (MPa)	HB
UGIMA®4104 UGI® 4104	Annealed	Dia. 5 to 16 mm	≤ 880	≤ 280
		Dia. 16.01 to 40 mm	≤ 800	≤ 250
		Dia. 40.01 to 63 mm	≤ 760	≤ 230
		Dia. > 63 mm	≤ 730	≤ 220

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGIMA®4104	Annealed	Drawn & polished SMQ	Dia. 5 to 28 mm	h9	< 0.5 mm/m
		Polished ground*	Dia. 30 to 50 mm	h9	< 0.8 mm/m
		Turned & polished*	Dia. 55 to 80 mm	h10	< 1 mm/m

SMQ = Screw Machining Quality

* Stock available only in Germany

UGI® 4105

Description

– Ferritic stainless steel with 17% chromium

– EN 10088-3: 1.4105 – X6CrMoS17 – AISI 430F – ASTM A582/A582M – ASTM F899

Average composition (%)

C ≤ 0.08; Cr = 17; Mo = 0.4; S = 0.25

Properties

– Screw machining stainless steel with 17% chromium used in relatively unaggressive environments and which can be optimized by UGIMA® process without impairing its mechanical and corrosion resistance properties.

Fields of application

– Transport, electronic equipment, food and food processing industry, decoration, household appliances and office systems.

– Machined parts, screw machining.

Corrosion resistance

– Approximately the same as for ferritic stainless steels with 17% chromium of the AISI 430 type, although its corrosion resistance is adversely affected by its high sulphur content, particularly in environments conducive to pitting or crevice corrosion.

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	Dimensions	UTS (MPa)	YS (MPa)	E (%)	HB
UGI® 4105	Annealed	Dia. 5 to 10 mm	530/780	≥ 330	≥ 7	≤ 260
		Dia. 10.01 to 16 mm	500/780	≥ 310	≥ 7	≤ 260
		Dia. 16.01 to 63 mm	430/730	≥ 250	≥ 12	
		Dia. > 63 mm	430/630	≥ 250	≥ 20	

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGI® 4105	Annealed	Drawn & polished	Dia. 4 mm	h9	< 0.5 mm/m
		Drawn & polished SMQ	Dia. 5 to 28 mm	h9	< 0.5 mm/m
		Turned & polished SMQ	Dia. 30 to 55 mm	h10	< 0.5 mm/m
		Turned & polished	Dia. 60 to 65 mm	h10	< 1 mm/m

SMQ = Screw Machining Quality

UGI® 4114

Description

- Ferritic stainless steel
- 1.4114 – X6CrMoS19-2 – UGV 182 – ASTM A582/A582M – AISI 303

Average composition (%)

C ≤ 0.08; Cr = 18; Mo = 2; S = 0.25

Properties

- A screw machining grade, UGI® 4114 is similar to type 1.4305 stainless steel grades (AISI 303) with regard to corrosion resistance and machinability.
- UGI® 4114 is preferred when ferromagnetism is required.

Fields of application

- Transport, electronic equipment, mechanical engineering, food and food processing industry, decoration and household appliances.
- Machined parts, screw machining, whenever amagnetism is not required: nuts and bolts, screws, couplings, miscellaneous shafts; etc.

Corrosion resistance

- Fresh waters and natural atmospheres without chlorides.
- Food products.
- Cold diluted organic acid solutions. Cold alkaline solutions.
- Chloride-free saline solutions. Non-chlorinated soaps and detergents.
- Numerous organic products such as: phenol, petroleum, alcohol, etc.

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	Dimensions	UTS (MPa)	HB
UGI® 4114	Annealed	Dia. 8 to 28 mm	430/750	≤ 262
		Dia. 30 to 80 mm	430/630	≤ 262

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGI® 4114	Annealed	Drawn & polished	Dia. 8 to 28 mm	h9	< 0.5 mm/m
		Turned & polished	Dia. 30 to 80 mm	h10	< 1 mm/m

UGI® 4763

Description

– Ferritic stainless steel

Average composition (%)

C ≤ 0.05; Cr = 24; N = 0.05

Properties

– Ferritic steel with a high chromium content used in high-temperature applications from 800°C to 1100°C, offering good resistance to cyclic oxidation.

– Good ferromagnetic properties.

Fields of application

– Parts and accessories for heat treatment furnace and quenching baths. Solenoid valve components.

Standards

Grade	Reference standard	Name	Metallurgical state symbol
UGI® 4763	AISI	446	A
	ASTM A276 / A314	UNS S44600	A
	DIN Wr 1.4763	X8Cr24	A

Mechanical properties (see GLOSSARY)

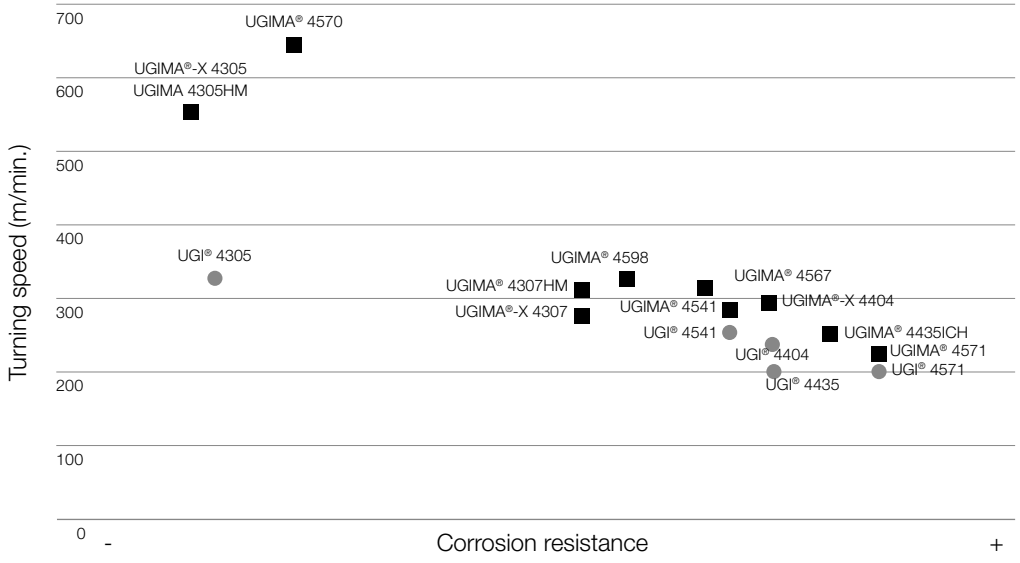
Grade	Metallurgical state	UTS (MPa)	YS (MPa)	E (%)	Z (%)	HB
UGI® 4763	MAX. annealed	≥ 450	≥ 275	≥ 20	≥ 45	≤ 219

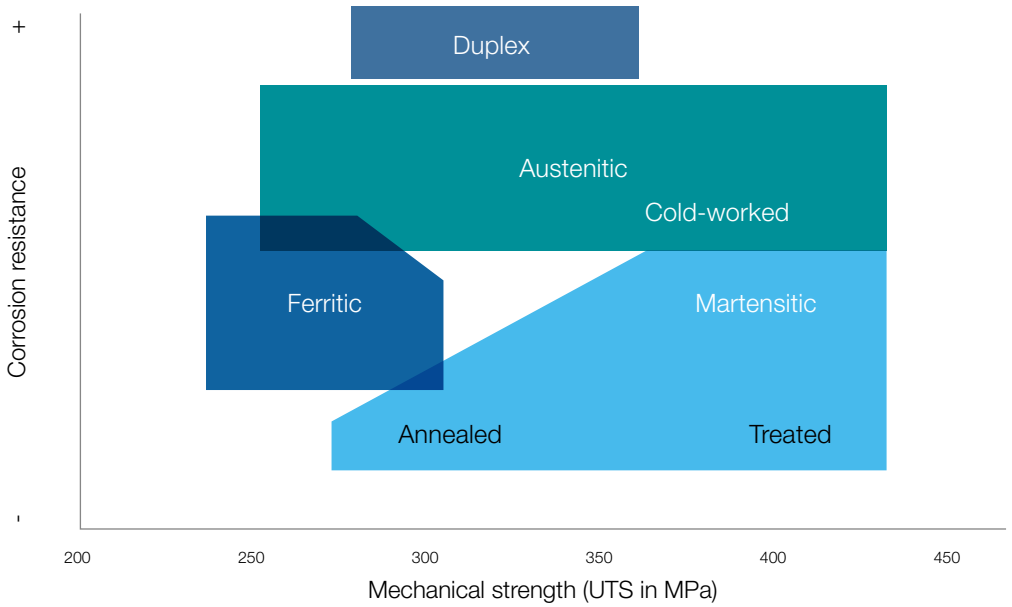
Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance
UGI® 4763	MAX. annealed	Single turned	Dia. 30 to 70 mm	k13

Austenitic stainless steels

Austenitic stainless steels





UGI® 4305

Description

– 18/8 austenitic stainless steel

– EN 10088-3: 1.4305 – X8CrNiS18-9 – EN 10088-5 – AISI 303 – ASTM A582/A582M

Average composition (%)

C ≤ 0.07; Cr = 18; Ni = 9; S = 0.25

Properties

– UGI® 4305 is a screw machining grade resulphurized to 0.30% sulphur to greatly improve its machinability.

Fields of application

– Transport, electronic equipment, mechanical engineering, decoration and household appliances.

– Machined parts, screw machining, nuts, couplings, etc.

Corrosion resistance

– Typical of an austenitic steel, offering good corrosion resistance in numerous environments.

– However, it is not recommended for use in marine and highly oxidizing chemical environments.

– Moreover, like all “resulphurized” steels, special precautions must be taken for use in acid or chlorinated environments conducive to attack by pitting or crevice corrosion.

Mechanical properties (see GLOSSARY)

Grades	Metallurgical state	Processing	UTS (MPa)	YS (MPa)	E (%)	HB
UGI® 4305	Solution treated	Drawn & polished or Polished ground Dia. 5 to 16 mm	600/950	≥ 400	≥ 15	≤ 262
		Drawn, Turned or Polished ground Dia. 16.01 to 63 mm	500/850	≥ 190	≥ 20	≤ 262
		Turned & polished Dia. > 63 mm	500/750	≥ 250	≥ 35	≤ 230
		Rolled & descaled	500/750	≥ 190	≥ 35	≤ 230

Available size range

Grades	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGI® 4305	Solution treated	Drawn & polished	Dia. 3 to 4.5 mm	h9	< 0.5 mm/m
		Drawn & polished SMQ	Dia. 5 to 28 mm	h9	< 0.5 mm/m
		Turned & polished SMQ	Dia. 29 to 55 mm	h10	< 0.5 mm/m
		Turned & polished	Dia. 60 to 80 mm	h10	< 1.2 mm/m
		Rolled & descaled	Dia. 40 to 55 mm	k13	< 1 mm/m
		Rolled & descaled	Dia. 60 to 130 mm	k13	< 1.5 mm/m
		Polished ground*	Dia. 8 to 18 mm	h8	< 0.8 mm/m
		Polished ground*	Dia. 27 to 50 mm	h9	< 0.8 mm/m
		Matt drawn	Hexagon, 12 to 46 mm	h11	< 1.5 mm/m

SMQ = Screw Machining Quality

* Stock available only in Germany

UGIMA®-X 4305

Description

- 18/8 austenitic stainless steel
- EN 10088-3: 1.4305 – X8CrNiS18-9 – EN 10088-5 – AISI 303 – ASTM A582/A582M

Average composition (%)

C ≤ 0.07; Cr = 18; Ni = 9; S = 0.25 – 0.35

Properties

- UGIMA®-X 4305 is the third generation of UGIMA® produced by Ugitech.
- Process optimization and thorough control of the inclusion population have contributed to further technological progress irrespective of the machining conditions, the machine or the tooling used.
- Productivity gains of 50% can be obtained by comparison with the standard 1.4305 grade.
- For parts working under high pressure with thin walls, Ugitech recommends using non-resulphurized grades.

Fields of application

- Mechanical engineering, complex machined parts, screw machining, nuts, couplings, etc.

Corrosion resistance

- UGIMA®-X 4305 has good corrosion resistance in numerous environments. Its corrosion resistance, typical of an austenitic steel, is in every way similar to that of type 4305 / 303.

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	Processing	UTS (MPa)	YS (MPa)	E (%)	HB
UGIMA®-X 4305	Solution treated	Drawn & polished or Polished ground Dia. 5 to 16 mm	600/950	≥ 400	≥ 15	≤ 262
		Drawn or Polished ground Dia. 16.01 to 28 mm	550/850	≥ 360	≥ 20	≤ 262
		Turned & polished or Polished ground Dia. 22 to 76 mm	500/650	≥ 250	≥ 40	≤ 262

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGIMA®-X 4305	Solution treated	Drawn & polished	Dia. 3 to 4.5 mm	h9	< 0.5 mm/m
		Drawn & polished SMQ	Dia. 5 to 28 mm	h9	< 0.5 mm/m
		Turned & polished SMQ*	Dia. 42 mm	h9	< 0.5 mm/m
		Polished ground*	Dia. 32 mm	h9	< 0.8 mm/m
		Matt drawn	Hexagon, 12 to 46 mm	h11	< 1.5 mm/m

SMQ = Screw Machining Quality
* Stock available only in Germany

UGIMA® 4305HM

Description

– 18/8 austenitic stainless steel, sulfur

– EN 10088-3: 1.4305 – X8CrNiS18-9 – EN 10088-5 – AISI 303 – ASTM A582/A582M

Average composition (%)

C ≤ 0.07; Cr = 18; Ni = 9; S = 0.25 – 0.35

Properties

– UGIMA®4305 HM is a version even more loaded with sulfur than UGIMA®-X 4305.

– The process optimization and the perfect control of the inclusion population bring a comfort of use whatever the machining conditions, the machine or the tool used.

– Productivity gains of up to 50 % can be achieved compared to the standard grade 1.4305.

– For small diameter parts or where cutting speeds cannot be very high, it is preferable to use UGIMA 4305HM compared to UGIMA®-X 4305. On the other hand, its sulfur content being higher than in UGIMA®-X 4305, the risks of cold taper are higher with this grade than with UGIMA® -X4305.

– For high pressure parts with thin walls, Ugitech recommends the use of non-resulfurized grades.

Fields of application

– Mechanical engineering, complex machined parts, screw cutting, nuts, couplings, etc.

Corrosion resistance

– UGIMA® 4305HM has good corrosion resistance in many environments. However, its corrosion resistance is slightly below that of UGIMA®-X 4305. Typical of an austenitic sulfur steel, its corrosion resistance is in all respects comparable to that of 4305 / 303.

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	Processing	UTS (MPa)	YS (MPa)	E (%)	HB
UGIMA® 4305HM		Drawn & polished Dia. 3 to 16 mm	550/850	≥ 400	≥ 15	≤ 262
		Drawn & polished Dia. 16 to 28 mm	550/850	≥ 360	≥ 20	≤ 262
		Turned & polished Dia. 22 to 76 mm	500/650	≥ 250	≥ 40	≤ 262

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGIMA® 4305HM	Annealed	Polished drawn	Dia. 5 to 6 mm	h9	< 0.5 mm/m
		Polished drawn SMQ*	Dia. 7 to 28 mm	h9	< 0.5 mm/m
		Matt drawn	Hexagons, 12 to 50 mm	h11	< 1.5 mm/m

SMQ = Screw Machining Quality

UGIMA® 4570

Description

- Austenitic stainless steel
- EN 10088-3: 1.4570 – X6CrNiCuS18-9-2 – AISI 303Cu

Average composition (%)

C ≤ 0.08; Cr = 18; Ni = 9; S = 0.25; Cu = 1.6

Properties

- This is currently the stainless steel offering the best machinability thanks to the remarkable synergy existing between the UGIMA® process and the sulphur and copper alloy additions: it enables productivity to be increased by approximately 50% by comparison with a standard 1.4305 steel.

Fields of application

- Transport, electronic equipment, decoration and household appliances.
- Screw machining. Excellent knurling and deep drilling behaviour.

Corrosion resistance

- Like for all resulphurized stainless steels, one should be reserved regarding its corrosion resistance in environments conducive to pitting and crevice corrosion (acid and chlorinated environments).
- Parts' design should take this into account, avoiding regions of corrosive product retention and stagnation. On the other hand, this screw machining grade is compatible with lubricants, oils and greases normally used in general and automotive mechanical engineering operations and applications.

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	Dimensions	UTS (MPa)	YS (MPa)	E (%)
UGIMA®4570	Solution treated	Dia. ≤ 16 mm	600/800	≥ 400	≥ 25
		Dia. > 16 mm	500/910	≥ 185	≥ 20

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGIMA®4570	Solution treated	Drawn & polished	Dia. 4 mm	h8	< 0.5 mm/m
		Drawn & polished SMQ	Dia. 5 to 26 mm	h9	< 0.5 mm/m

SMQ = Screw Machining Quality

UGIMA® 4567

Description

– Austenitic stainless steel

– EN 10088-3 : 1.4567 – X3CrNiCu18-9-4 – EN 10088-5 – AISI – 304Cu

Average composition (%)

C ≤ 0.04; Cr = 18; Ni = 9.5; Cu = 3.5

Properties

– Excellent resistance to cold forming due to the contribution of copper: very good behaviour for thread forming and tapping by rolling.

– Ideal grade for deep drilling.

– Slightly better corrosion resistance than UGIMA® 4307 due to its copper content.

Fields of application

– Mechanical engineering, chemicals industry, offshore, electronic equipment, food and food processing industry, decoration and household appliances

– Screw machining: motor shafts, inserts, rivets, screws and nuts, gas couplings, etc.

– Parts intended for crimping or deforming, etc.

– Suitable grade for the automotive market: direct injection, common rail, electro-injectors, etc.

Corrosion resistance

– Excellent corrosion resistance in natural environments: waters, rural and urban atmospheres where there are no major acid concentrations, and in food and food processing environments (with reservations in certain special cases: white wines, mustards, etc.) and in certain chemical environments: nitric acid, cold diluted organic acids, etc.

– Unlike type 1.4301 steels (AISI 304), UGIMA® 4307 can be used in diluted chlorinated environments.

– Resistant to intergranular corrosion, even after welding.

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	Dimensions	UTS (MPa)	YS (MPa)	E (%)
UGIMA® 4567	Solution treated	Dia. 10 to 16 mm	600/850	≥ 340	≥ 25
		Dia. > 16 mm	450/800	≥ 175	≥ 30

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGIMA® 4567	Solution treated	Drawn & polished SMQ	Dia. 10 to 18 mm	h9	< 0.5 mm/m

SMQ = Screw Machining Quality

UGIMA®-X 4307

Description

- 18/10 austenitic stainless steel
- EN 10088-3: 1.4307 – X2CrNi18-9 – EN 10088-5 – 304L – ADW2 – ADW10 – AISI – NACE MR0175 / ISO 15156-3 – ASTM A182/A182M – ASTM A276 – ASTM A479/A479M – ASTM F899 – EN 10272 – PED 2014/68/EU

Average composition (%)

C ≤ 0.03; Cr = 18.5; Ni = 8

Properties

- UGIMA®-X 4307: high corrosion resistance, insensitive to intergranular corrosion depending on the process to significantly improve its machinability (20% to 30% increase in productivity).

Fields of application

- A great variety of applications: shafts, valves, couplings, etc.
- Forging, stamping, machining of various mechanical parts for: chemicals industry, nitric acid and derivatives (explosives, fertilizers).
- Food industry: cheese plants, dairy plants, red wine, vinegar, jams.

Corrosion resistance

- Nitric acid up to 52% at all temperatures and 98% when cold.
- Cold diluted organic acids.
- Alkaline solutions (except when hot above 50%). Saline solutions other than chlorides, sulphites and sulphates. Fresh waters and natural atmospheres.
- Food products (except mustard and white wines).

Mechanical properties (see GLOSSARY)

Grades	Metallurgical state	Processing	UTS (MPa)	YS (MPa)	E (%)	Z (%)	HB
UGIMA®-X 4307	Solution treated	Drawn & polished or Polished ground Dia. 3 to 7 mm	620/880	≥ 400	≥ 30	≥ 50	≤ 315
		Drawn & polished or Polished ground Dia. 7.1 to 10 mm	620/800	≥ 400	≥ 30	≥ 50	≤ 315
		Drawn & polished or Polished ground Dia. 10.01 to 12.6 mm	620/800	≥ 380	≥ 30	≥ 50	≤ 315
		Drawn & polished or Polished ground Dia. 12.61 to 16 mm	600/800	≥ 380	≥ 30	≥ 50	≤ 315
		Drawn & polished or Polished ground Dia. 16.01 to 28 mm	520/800	≥ 205	≥ 30	≥ 50	≤ 315
		Turned & polished Dia. 30 to 60 mm	515/680	≥ 205	≥ 45	≥ 50	≤ 315
		Rolled & descaled Dia. ≤ 160 mm	500/700	≥ 175	≥ 45		≤ 215
		Rolled & descaled Dia. > 160 mm	500/700	≥ 175	≥ 35		≤ 215

Available size range

Grades	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGIMA®-X 4307	Solution treated	Drawn & polished	Dia. 3 to 28 mm	h9	< 0.5 mm/m
		Drawn & polished SMQ	Dia. 5 to 28 mm	h9	< 0.5 mm/m
		Turned & polished	Dia. 30 to 55 mm	h10	< 1 mm/m
		Turned & polished SMQ	Dia. 30 to 55 mm	h10	< 0.5 mm/m
		Turned & polished	Dia. 60 mm	h10	< 1.2 mm/m
		Rolled & descaled	Dia. 25 to 55 mm	k13	< 1 mm/m
		Rolled & descaled	Dia. 60 to 130 mm	k13	< 1.5 mm/m
		Matt drawn	Hexagon, 8 to 50 mm	h11	< 1.5 mm/m

SMQ = Screw Machining Quality

UGIMA® 4307 HM

Description

– 18/10 austenitic stainless steel

– EN 10088-3 : 1.4307 – X2CrNi18-9 – EN 10088-5 – 304 L – ADW2 – ADW10 – AISI – NACE MR0175 / ISO 15156-3 – ASTM A182/A182M – ASTM A276 – ASTM A479/ A479M – ASTM F899 – EN 10272 – PED 2014/68/EU

Average composition (%)

C ≤ 0.03; Cr = 18.5; Ni = 9

Fields of application

– Mechanical engineering, chemicals, oil, food and food processing. Decoration and household equipment, etc.

Corrosion resistance

– UGIMA® 4307 HM has good corrosion resistance in numerous environments.

– Its corrosion resistance, typical of an austenitic steel, is in every way similar to that of type 4307/304L.

Properties

– UGIMA® 4307 HM is a stainless steel having the same properties as UGIMA®-X 4307.

– It has 1% more nickel than UGIMA®-X 4307, thereby making its machining easier and more efficient.

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	Processing	UTS (MPa)	YS (MPa)	E (%)	Z (%)	HB
UGIMA®4307HM	Solution treated	Drawn & polished or Polished ground Dia. 3 to 7 mm	620/880	≥ 400	≥ 30	≥ 50	≤ 315
		Drawn & polished or Polished ground Dia. 7.1 to 10 mm	620/800	≥ 400	≥ 30	≥ 50	≤ 315
		Drawn & polished or Polished ground Dia. 10.01 to 12.6 mm	620/800	≥ 380	≥ 30	≥ 50	≤ 315
		Drawn & polished or Polished ground Dia. 12.61 to 16 mm	600/800	≥ 380	≥ 30	≥ 50	≤ 315
		Drawn & polished or Polished ground Dia. 16.01 to 28 mm	520/800	≥ 205	≥ 30	≥ 50	≤ 315
		Turned & polished Dia. 30 to 55 mm	515/680	≥ 205	≥ 45	≥ 50	≤ 315

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGIMA®4307HM	Solution treated	Drawn & polished SMQ	Dia. 5 to 28 mm	h9	< 0.5 mm/m
		Turned & polished SMQ	Dia. 30 to 55 mm	h10	< 0.5 mm/m
		Matt drawn	Hexagon, 8 to 50 mm	h11	< 1.5 mm/m

SMQ = Screw Machining Quality

UGIMA® 4541/UGI® 4541

Description

- Titanium-stabilized 18/10 austenitic stainless steel
- EN 10088-3 : 1.4541 – X6CrNiTi18-10 – EN 10088-5 – ADW2 – ADW10 – ASTM A182/A182M – ASTM A276 – ASTM A479/A479M – EN 10272 – PED 2014/68/EU – NACE MR0175 / ISO 15156-3

Average composition (%)

C ≤ 0.08; Cr = 18; Ni = 10.5; Ti ≤ 0.7

Properties

- Its main property is intergranular corrosion resistance using titanium as a stabilizing element to prevent the formation of chromium carbide when using machined parts in high temperatures.
- UGIMA® 4541 is specially dedicated to machining and screw machining, providing a productivity gain during processing operations.
- UGI® 4541 is used both for its corrosion resistance and for its resistance to heat (can be used up to 800°C, significant creep resistance up to 700°C).

Fields of application

- Mechanical engineering, chemicals industry, food and food processing industry, aerospace, transport, defence:
- Bolts and nuts; flanges.
- Furnace and boiler components.

Welding

- No heat treatment is needed after welding.

Corrosion resistance

- Excellent corrosion resistance in natural environments: waters, rural and urban atmospheres where there are no major chloride or acid concentrations, and in food and food processing environments (with reservations in certain special cases: white wines, mustard, etc.) and in certain chemical environments: nitric acid, cold diluted organic acids, etc.
- Resistant to intergranular corrosion, even after welding.
- Chemical resistance at high temperature: limit temperatures for use in continuous service:
  - Oxidizing atmosphere: 850°C.
  - Sulphurous oxidizing atmosphere: 750°C
- The limit temperature for use must take into account the exact nature of the atmosphere, and the amplitude and frequency of mechanical and thermal stresses.

Mechanical properties (see GLOSSARY)

Grades	Metallurgical state	Processing	UTS (MPa)	YS (MPa)	E (%)	HB
UGIMA®4541 UGI® 4541	Solution treated	Drawn & polished Dia. ≤ 28 mm	500/800	≥ 190	≥ 30	
		Rolled & descaled Dia. ≤ 160	500/700	≥ 190	≥ 40	≤ 215

Available size range

Grades	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGIMA®4541 UGI® 4541	Solution treated	Drawn & polished	Dia. 12 to 28 mm	h9	< 0.5 mm/m
		Rolled & descaled	Dia. 30 to 130 mm	k13	< 1.5 mm/m

UGIMA®-X 4404

Description

– 18/12 austenitic stainless steel, low-carbon molybdenum

– EN 10088-3 : 1.4404 – X2CrNiMo17-12-2 – EN 10088-5 – ADW10 – ADW2 – AISI 316 L – ASTM A182/A182M – ASTM A276 – ASTM A479/A479M – ASTM F899 – NACE MR0175 / ISO 15156-3

Average composition (%)

C ≤ 0.03; Cr = 17.5; Ni = 12; Mo = 2.25; S = 0.020 – 0.030

Properties

– UGIMA®-X 4404 is a stainless steel resulting from optimization of the production method and control of the inclusion population of the third generation of UGIMA® developed by Ugitech.

– It is in every respect identical to the properties of UGIMA® 4404 except for its exceptional machinability. By comparison with the market standard 1.4404 grade, 40% productivity gains have been achieved in high-speed steel drilling and 15% in cutting.

Fields of application

– Water industry (valves), outdoor exposure in rural, urban and industrial atmospheres and even in the known presence of chloride ions (seaside).

– Chemical industry in certain temperature and concentration conditions. Food and food processing industry. Medicine, pharmaceuticals, decoration and household equipment.

Corrosion resistance

– UGIMA®-X 4404 has excellent corrosion resistance in natural environments: waters, rural and urban atmospheres, in industrial conditions even in the presence of moderate chloride and acid concentrations, in food and food processing environments and in numerous acid (sulphuric, phosphoric, organic) and chlorinated environments, in certain temperature and concentration conditions.

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	Processing	UTS (MPa)	YS (MPa)	E (%)	KV	HB
UGIMA®-X 4404	Solution treated	Drawn & polished or Polished ground Dia. 3 to 10 mm	600/800	≥ 400	≥ 25		
		Drawn & polished or Polished ground Dia. 10.01 to 16 mm	580/800	≥ 380	≥ 25		
		Drawn & polished or Polished ground Dia. 16.01 to 28 mm	515/800	≥ 205	≥ 30	≥ 100 J	
		Turned & polished Dia. 28,01 à 130	515/700	≥ 205	≥ 40	≥ 100 J	
		Rolled & descaled Dia. ≤ 160 mm	515/700	≥ 205	≥ 40	≥ 100 J	≤ 215

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGIMA®-X 4404	Solution treated	Drawn & polished	Dia. 3 to 28 mm	h9	< 0.5 mm/m
		Turned & polished	Dia. 30 to 50 mm	h10	< 1 mm/m
		Turned & polished	Dia. 60 mm	h10	< 1.2 mm/m
		Polished ground*	Dia. 25 to 50 mm	h9	< 0.8 mm/m
		Rolled & descaled	Dia. 25 to 55 mm	k13	< 1 mm/m
		Rolled & descaled	Dia. 60 to 130 mm	k13	< 1.5 mm/m
		Matt drawn	Hexagon, 8 to 50 mm	h11	< 1.5 mm/m

* Stock available only in Germany

UGIMA® 4435/UGIMA® 4435 ICH/ UGI® 4435

Description

- Molybdenum austenitic stainless steel
- EN 10088-3 : 1.4435 – X2CrNiMo18-14-3 (ex AFNOR Z 3 CND 18-14-03)
- AISI – ADW2 – ADW10 – ASTM A182/A182M – ASTM A276 – ASTM A479/A479M
- EN 10272 – PED 2014/68/EU – NACE MR0175 / ISO 15156-3 – BN2

Average composition (%)

C ≤ 0.03; Cr = 18; Ni = 13.7; Mo ≥ 2.5

Properties

- UGIMA® 4435 is an austenitic stainless steel with a high molybdenum content and a specific metallurgy for improved behaviour during machining.
- Its composition provides it with very good corrosion resistance and is perfectly suited for prolonged contact with the skin.

Fields of application

- Watch industry, pharmaceuticals, chemical industry, oil and petrochemicals industry, amagnetic properties, etc.

Corrosion resistance

- Excellent corrosion resistance in natural environments: waters, rural and urban atmospheres, and industrial atmospheres even in the presence of moderate chloride and acid concentrations, in food and food processing environments and in numerous acid (sulphuric, phosphoric, organic) and chlorinated chemical environments, in certain temperature and concentration conditions.
- PREN = 27
  (PREN = Pitting Resistance Equivalent Number = Cr + 3,3Mo + 16N)
- Resistant to intergranular corrosion, even after welding.

Mechanical properties (see GLOSSARY)

Grades	Metallurgical state	Processing	UTS (MPa)	YS (MPa)	E (%)	KV	HB
UGIMA®4435 UGIMA®4435 ICH UGI® 4435	Solution treated	Drawn & polished Dia. 3 to 16 mm	600/800	≥ 400	≥ 25		
		Drawn & polished Dia. 16.01 to 25 mm	500/800	≥ 235	≥ 30	≥ 100 J	
		Turned & polished Dia. 25.01 to 45 mm	500/700	≥ 200	≥ 40	≥ 100 J	
		Rolled & descaled Dia. ≤ 160	500/700	≥ 200	≥ 40	≥ 100 J	≤ 215

Available size range

Grades	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGIMA®4435 ICH UGI® 4435	Solution treated	Drawn & polished	Dia. 8 to 25 mm	h9	< 0.5 mm/m
		Turned & polished	Dia. 30 to 45 mm	h10	< 1 mm/m
UGIMA®4435 UGI® 4435		Rolled & descaled	Dia. 30 to 130 mm	k13	< 1 mm/m

* Stock available only in Germany

UGIMA® 4598

Description

– 18/12 austenitic stainless steel, molybdenum, Copper and Sulphur

– EN 10088-3: 1.4598 – X2CrNiMoCuS17-10-2 – no correspondence AISI

Average composition (%)

C ≤ 0.03 ; Cr = 17 ; Ni = 12 ; Mo = 2 ; Cu = 1.5 ; S = 0.15

Properties

– UGIMA® 4598 is a basic 1.4404 / 316L stainless steel in which sulfur and copper have been added to significantly improve its machinability. UGIMA® 4598 benefits from the UGIMA® process which allows an additional improvement in machinability.

– This steel presents excellent machinability compared to a basic 316L and can replace 316L in certain applications where corrosion is not severe.

– Having a better machinability both in turning and drilling than a 1.4307 type steel, it can replace it in all applications.

Fields of application

– This steel, with very good machinability, is used to manufacture precision turned parts: fasteners, sensor supports, instruments in fields of activity such as transport, watchmaking and food processing.

Corrosion resistance

– The corrosion resistance of UGIMA® 4598 is lower than that of a 1.4404 due to the presence of sulfur in 1.4598 steel.

– Nevertheless, the neutral salt spray test applied according to the standard ISO 9227 on bars with drawn and turned surfaces, shows that after 1000 hours of testing, the surfaces of bars in UGIMA® 4598 and UGIMA® 4404 grades are identical.

– The corrosion resistance of UGIMA® 4598 is superior to that of 1.4307 in all media.

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	Processing	UTS (MPa)	YS (MPa)	E (%)	Z (%)
UGIMA® 4598	Solution treated	Drawn & polished Dia. 6 to 15 mm	600/900	≥ 400	≥ 15	≤ 270
		Drawn & polished Dia. 6 to 15 mm	500/850	≥ 400	≥ 25	≤ 250

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGIMA® 4598	Solution treated	Drawn & polished	Dia. 5 to 25 mm	h9	< 0,5 mm/m

UGI® 4404FGX3

Description

- Molybdenum austenitic stainless steel
- EN 10088-3 : 1.4404 – X2CrNiMo17-12-2 – AISI 316L – ADW2 – ADW10 – ASTM A479/A479M – EN 10272 – PED 2014/68/EU – NACE MR0175 / ISO 15156-3

Average composition (%)

C ≤ 0.03; Cr = 17.5; Ni = 12; Mo = 2.25

Properties

- UGI® 4404FGX3 has satisfactory machinability and its low carbon content provides it with good corrosion resistance in weld areas.
- Practically amagnetic grade after solution annealing heat treatment. However, slight ferromagnetic behaviour can be observed due to the presence of residual cold-working ferrite and/or martensite after cold working of the metal.

Fields of application

- Water industry (valves), outdoor exposure in rural, urban and industrial atmospheres and even in the known presence of chloride ions (seaside).
- Chemical industry in certain temperature and concentration conditions. Food and food processing industry. Medicine, pharmaceuticals, decoration and household equipment.

Corrosion resistance

- Very good corrosion resistance like the whole 316 family. Has good intergranular corrosion resistance, even after welding.

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	Processing	UTS (MPa)	YS (MPa)	E (%)	Z (%)
UGI® 4404FGX3	Solution treated	Drawn & polished	550/800	≥ 350	≥ 30	≥ 60
		Turned & polished	500/700	≥ 200	≥ 40	≥ 40
		Rolled & descaled	500/700	≥ 200	≥ 40	≥ 40

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGI® 4404FGX3	Solution treated	Drawn & polished*	Dia. 24 mm	h9	< 0.5 mm/m
		Turned & polished*	Dia. 38 and 42 mm	h10	< 1 mm/m
		Rolled & descaled*	Dia. 30 to 90 mm	k13	< 1 mm/m

* Stock available only in Germany

UGIMA® 4571/UGI® 4571/ UGIMA® 316Ti/UGI® 316Ti

Description

– Titanium-stabilized molybdenum 18/12 austenitic stainless steel

– EN 10088-3 : 1.4571 – X6CrNiMoTi17-12-2 – EN 10088-5 – ADW2 – ADW10 – NACE MR0175 / ISO 15156-3 – EN 10272 – PED 2014/68/EU – JIS G4303 – ASTM A182/ A240 – AISI 316Ti

Average composition (%)

C ≤ 0.08; Cr = 17.5; Ni = 11.5; Mo = 2.25; Ti ≤ 0.7

Properties

– UGI® 4571 is used both for its corrosion resistance and for its resistance to heat (creep resistance up to 750°C).

– To improve corrosion resistance, instead of lowering the carbon content, it is stabilized with titanium via the formation of titanium carbides.

– UGIMA® 4571 is a stainless steel with improved machinability, produced exclusively by Ugitech.

Fields of application

– Chemical industries: nitro explosives, celluloid, rayon, cellulose (bisulphite processes), paper mills, dyeing plants, etc.

– Food industry: white wine, mustard, salted products, fruit preserves, yeasts, alcohols, etc.

– Mechanical engineering, transport, aerospace, medical industry.

Corrosion resistance

– Phosphoric acid, all concentrations up to 40°C. Sulphuric acid less than 10% and more than 80% at 20°C.

– Sulphonitric mixtures up to 70°C.

– Diluted organic acids, even boiling.

– Saline solutions, except chlorides. Alkaline solutions, all concentrations below 100°C.

– Fresh waters and natural atmospheres (marine in particular).

– Organic products, food and pharmaceutical.

Mechanical properties (see GLOSSARY)

Grades	Metallurgical state	Processing	UTS (MPa)	YS (MPa)	E (%)	KV	HB
UGIMA® 4571/ UGIMA® 316Ti UGI® 4571 / UGI® 316Ti	Solution treated	Drawn & polished Dia. 8 to 10 mm	600/800	≥ 400	≥ 25		
		Drawn & polished Dia. 10.01 to 16 mm	580/800	≥ 380	≥ 25		
		Drawn & polished Dia. 16.01 to 28 mm	500/800	≥ 200	≥ 30	≥ 100 J	
		Turned & polished or Polished ground Dia. 30 à 60	500/700	≥ 200	≥ 30	≥ 100 J	
		Rolled & descaled Dia. ≤ 160 mm	500/700	≥ 200	≥ 40	≥ 100 J	≤ 215

Available size range

Grades	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGIMA® 4571/ UGIMA® 316Ti UGI® 4571 / UGI® 316Ti	Solution treated	Drawn & polished	Dia. 8 to 28 mm	h9	< 0.5 mm/m
		Turned & polished	Dia. 30 mm	h10	< 1 mm/m
		Polished ground*	Dia. 30 to 60 mm	h9	< 0.8 mm/m
		Rolled & descaled	Dia. 22 to 55 mm	k13	< 1 mm/m
		Rolled & descaled	Dia. 60 to 130 mm	k13	< 1.5 mm/m
		Matt drawn	Hexagon, 14 to 55 mm	h11	< 1.5 mm/m
UGI® 4571		Rolled & descaled	Dia. 150 to 200 mm	k13	< 2 mm/m

* Stock available only in Germany

Super stainless steel

UGI® 4462

Description

- Austenoferritic stainless steel, chromium-nickel-molybdenum (Duplex)
- EN 10088-3: 1.4462 – X2CrNiMoN 22-5-3 – 45N – EN 10088-5 – UNS S31803 – UNS S32205 – ASTM A182/A182M (F51 - F60) – ASTM A276 – ASTM A479/A479M – EN 10272 – PED 2014/68/EU – NACE MR0175 / ISO 15156-3 – NACE MR0103
- Products in stock are certified Norsok M-650 M-630.

Average composition (%)

C ≤ 0.03; Cr = 22; Ni = 5.5; Mo = 3; N = 0.16

Corrosion resistance

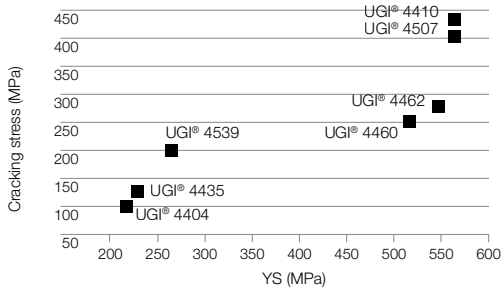
- UGI® 4462 has high corrosion resistance in acid and chlorinated environments.
- Insensitive to intergranular corrosion, its austenite + ferrite two-phase structure provides it with a stress corrosion resistance far superior to that of austenitic steels.
- Pitting Resistance Equivalent Number: (PREN = Pitting Resistance Equivalent Number = Cr + 3,3Mo + 16N) Pitting corrosion
- The critical pitting corrosion temperature in chlorinated neutral environments is significant of the surface blemishes which may appear in the event of an increase in the service temperature.
- Stress corrosion: influence of stress. The maximum stress leading to cracking of a material due to stress corrosion is related to its yield strength.

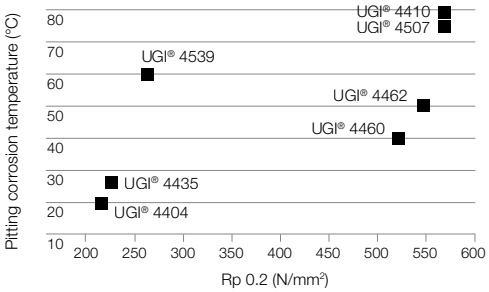
Properties

- A grade which is characterized by a corrosion resistance far superior to that of type 1.4404 austenitic steels (AISI 316L), and very high mechanical properties including a 150% higher yield strength.

Fields of application

- Oil and petrochemicals industry, chemical industry, mechanical engineering, food and food processing industry, offshore, defence, building.





Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	Processing	UTS (MPa)	YS (MPa)	E (%)	Z (%)	HB	KV
UGI® 4462	Solution treated	Drawn & polished Dia. 10 to 16 mm	850/1,100	≥ 650	≥ 25	≥ 45	≤ 290	
		Drawn & polished Dia. 20 mm	650/1,000	≥ 450	≥ 25	≥ 45	≤ 290	≥ 100 J
		Rolled & descaled	650/880	≥ 450	≥ 25	≥ 45	≤ 270	≥ 100 J

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGI® 4462	Solution treated	Drawn & polished	Dia. 8 to 20 mm	h9	< 1 mm/m
		Rolled & descaled	Dia. 25 to 55 mm	k13	< 1 mm/m
		Rolled & descaled	Dia. 60 to 120 mm	k13	< 1.5 mm/m
		Rolled & descaled	Dia. 130 to 250 mm	k13	< 2 mm/m
	Cold-worked*	Drawn or Turned	Dia. 20 to 40 mm	h9 - h11	< 1.2 mm/m

* Metallurgical state not conform to NACE MR0175

UGI® 4507

Description

– Austenoferritic stainless steel, chromium-nickel-molybdenum (Super Duplex)

– Products in stock are certified Norsok M-650 M-630.

Average composition (%)

C ≤ 0.03; Cr = 25; Ni = 6; Mo = 3.5; N = 0.2

Fields of application

– Oil and petrochemicals industry, chemical industry, mechanical engineering, food and food processing industry, offshore, defence, building.

– Pumps. Valves, flanges, screws and nuts, bolting, connectors, distribution blocks, etc.

Specific aspects

– PREN ≥ 40
(PREN = Pitting Resistance Equivalent Number = Cr + 3,3Mo + 16N). Pitting corrosion.

– Intergranular corrosion guarantee as per ISO 3651-2 Practice C.

– Detection of intermetallic phases as per ASTM 923 Method A.

– 35% to 65% ferrite content.

Standards

Grade	Standard or specification	Name	Metallurgical state symbol
UGI® 4507	ASTM A479/A479M - ASME SA479/SA479M	UNS S32550	A
	ASTM A182/A182M	F59 - F61	A
	NACE MR0175 / MR0103	UNS S32520 / S32550	A
	NF EN 10088.3	X2CrNiMoCuN25-6-3	AT
	ASTM A276	UNS S32550	A
	STF22-52/B028-1	X2CrNiMoCuN25-6-3	AT
	ASTM A182/A182M	F59 - F61	A

Mechanical properties at room temperature (see GLOSSARY)

Grade	Metallurgical state	UTS (MPa)	YS (MPa)	E (%)	HB
UGI® 4507	Solution treated	760/890	≥ 550	≥ 25	≤ 270

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance
UGI® 4507	Solution treated	Turned simple	Dia. 20 to 120 mm	k12
		Forged	Dia. 130 to 300 mm	k13

Other requirements and dimensions: please consult us.

UGI® 4410

Description

– Austenoferritic stainless steel, chromium-nickelmolybdenum (Super Duplex)

– EN 10088-3: 1.4410 – X2CrNiMoN 25-7-4 – ASTM A182/A182M – ASTM A276 – ASTM A479/A479M: UNS S32750 – F53 – EN 10272 – NACE MR0175 / ISO 15156-3

– Products in stock are certified Norsok M-650 M-630.

Average composition (%)

C ≤ 0.03; Cr = 25; Ni = 7; Mo = 4; N = 0.25

Corrosion resistance

– UGI® 4410 has a high corrosion resistance in acid and chloride environments.

– Insensitive to intergranular corrosion, its two-phase austenite + ferrite structure gives it a much higher resistance to stress corrosion than austenitic steels.

– Pitting Resistance Equivalent Number: PREN ≥ 41 (PREN = Pitting Resistance Equivalent Number = Cr + 3,3Mo + 16N) Pitting corrosion.

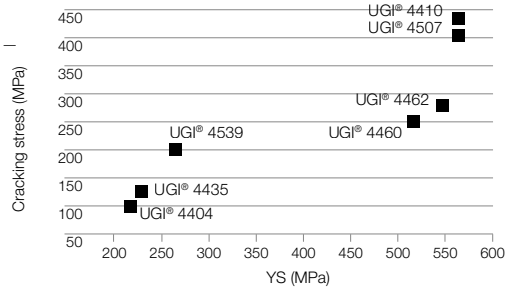
– The critical pitting corrosion temperature in chlorinated neutral environments is significant of the surface blemishes which may appear in the event of an increase in the service temperature.

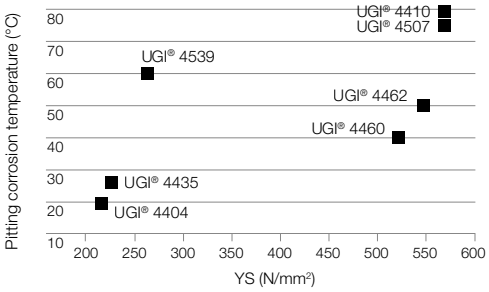
Properties

– A grade that is characterized by a corrosion resistance that is both much higher than that of austenitic steels of the 1.4539 (AISI 904L) type, and very high mechanical characteristics, including a very high yield strength (see the table of mechanical characteristics). A super duplex steel grade that outperforms grades 1.4362 and even 1.4462 in corrosion resistance and mechanical strength.

Fields of application

– Oil and petrochemicals industry, chemical industry, offshore.





Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	Processing	UTS (MPa)	YS (MPa)	E (%)	HB
UGI® 4410	Solution annealed	Turned & polished Dia. 25 to 100 mm	800/930	≥ 550	≥ 25	≤ 290

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGI® 4410	Solution annealed	Turned & polished	Dia. 25 to 100 mm	h10	< 1.2 mm/m

* Metallurgical state not conform to NACE MR0175

UGI® 4539

Description

– Super austenitic stainless steel

– EN 10088-3: 1.4539 – X1NiCrMoCu25-20-5 – EN 10088-5 – AISI 904 L – EN 10272 – PED 2014/68/EU – NACE MR0175 / ISO 15156-3 – UNS N08904

Average composition (%)

C ≤ 0.02; Cr = 20; Ni = 25; Mo = 4.5; Cu 1.6; S ≤ 0.01

Properties

– Grade which is characterized by excellent corrosion resistance in the most aggressive environments: this "super austenitic" grade appears as the ultimate solution to corrosion problems, before moving on to alloys with a nickel or cobalt base.

Fields of application

– Paper industry, chemical industry, phosphate industry, offshore, medical industry, decoration and household appliances, defence.

– Heat exchangers and condensers.

– Valves and couplings in corrosive liquid storage facilities.

– Flue pipe components.

– Thalassotherapy.

Corrosion resistance

– Due to its alloying element content, this steel has far superior corrosion resistance to that of chromium-nickel-molybdenum austenitic stainless steels.

Its use is especially recommended in:

– environments conducive to pitting corrosion and stress corrosion;

– chlorides, seawater up to 70°C, and sulphuric and phosphoric solutions.

For example, excellent resistance in sulphuric acid:

– at 20°C, all concentrations;

– at 50°C, concentrations lower than 60% or higher than 90%.

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	Processing	UTS (MPa)	YS (MPa)	E (%)	HB	KV
UGI® 4539	Solution treated	Drawn & polished Dia. 10 to 16 mm	630/900	≥ 400	≥ 35	≤ 330	
		Drawn & polished Dia. 20 mm	530/880	≥ 230	≥ 35	≤ 330	≥ 100 J
		Rolled & descaled	530/720	≥ 230	≥ 40	≤ 230	≥ 100 J

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGI® 4539	Solution treated	Drawn & polished	Dia. 10 to 20 mm	h9	< 1 mm/m
		Rolled & descaled	Dia. 25 to 30 mm	k13	< 1.5 mm/m

UGI® 4845

Description

- Refractory austenitic steel corrosion-resistant at high temperatures
- Material number: 1.4845 – X8CrNi25-21 (EN 10095)
- 1.4845 – AISI 310 – ASTM A182/A182M – ASTM A276 – ASTM A479/A479M – EN 10095 – NACE MR0175 / ISO 15156-3 – UNS S31000

Average composition (%)

C ≤ 0.10; Cr = 25; Ni = 20.5; Si ≤ 0.75

Properties

- "Refractory" grade, offering chemical resistance at temperatures as high as 1100°C (creep resistance up to 850°C).
- Avoid holding at temperatures between 650°C and 850°C (possible embrittlement due to sigma phase precipitation)

Fields of application

- Chemical industry, mechanical engineering:
- Tools for glass making.
- Furnace and boiler equipment components.
- Moulds for aluminium bronze.

Resistance to oxidation at high temperatures

Maximum temperatures for use in continuous service

- Oxidizing atmosphere ..... 1,100°C
- Sulphurous oxidizing atmosphere ..... 1,000°C
- Carburizing reduction ..... 1,000°C
- Sulphurous reduction ..... 750°C

UGI® 4845 forms an oxide film more adhesive and more compact than UGI® 4833. It therefore withstands cyclical temperature variations better, but in no case exceed 1,100°C.

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	Processing	UTS (MPa)	YS (MPa)	E (%)	HB
UGI® 4845	Solution treated	Drawn & polished Dia. 6 mm	500/900	≥ 210	≥ 20	≤ 292
		Drawn & polished Dia. > 6 mm	500/800	≥ 210	≥ 20	≤ 292
		Rolled & descaled	500/700	≥ 210	≥ 35	≤ 192

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGI® 4845	Solution treated	Drawn & polished	Dia. 6 to 25 mm	h9	< 1 mm/m
		Rolled & descaled	Dia. 30 to 50 mm	k13	< 1 mm/m
		Rolled & descaled	Dia. 60 to 100 mm	k13	< 1.5 mm/m

Notes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Special offers

Tailors solutions to your requirements

Bespoke finishing
- End finishing: chamfered, pointed, shoulders, face-grinding
- Slug cutting to tight tolerances: dia. 10 to 400 mm, lengths 10 mm to 12 m
- Improved straightness: up to < 0.1 mm/m

Non-destructive tests (NDT)
- Visual, ultrasound, liquid penetrant, eddy current, etc.
- Magnetic particle examination on parts
- Hardness measurement by ball test
- Spectrometry
- Anti-mixing inspection

Custom processing
- Heat treatments: quenching, tempering, stress relief, capability on Nadcap-certified furnaces
- Hardening treatments by cold working and strain hardening
- Surface treatments: micro-fissured chromium plating, dia. 10 to 120 mm, thickness 10 to 100 microns

Metallurgical inspections
- Chemical composition
- Tensile tests, impact strength, etc.
- Grain dimensioning, cleanliness
- Macrography, micrography

Machining by
- Peeling, turning up to 12 metres
- Grinding up to 12 metres
- Boring up to 6 metres

Finishing
- Individual packaging: net, cardboard tube, plastic ring
- Cargo packaging: cardboard box, cardboard box on pallet, strengthened wooden crate, etc.
- Special markings: continuous laser/ink, dia. 10 to 120 mm, lengths 2 to 6 m, specific bar ends
- Coloured marking of bar ends

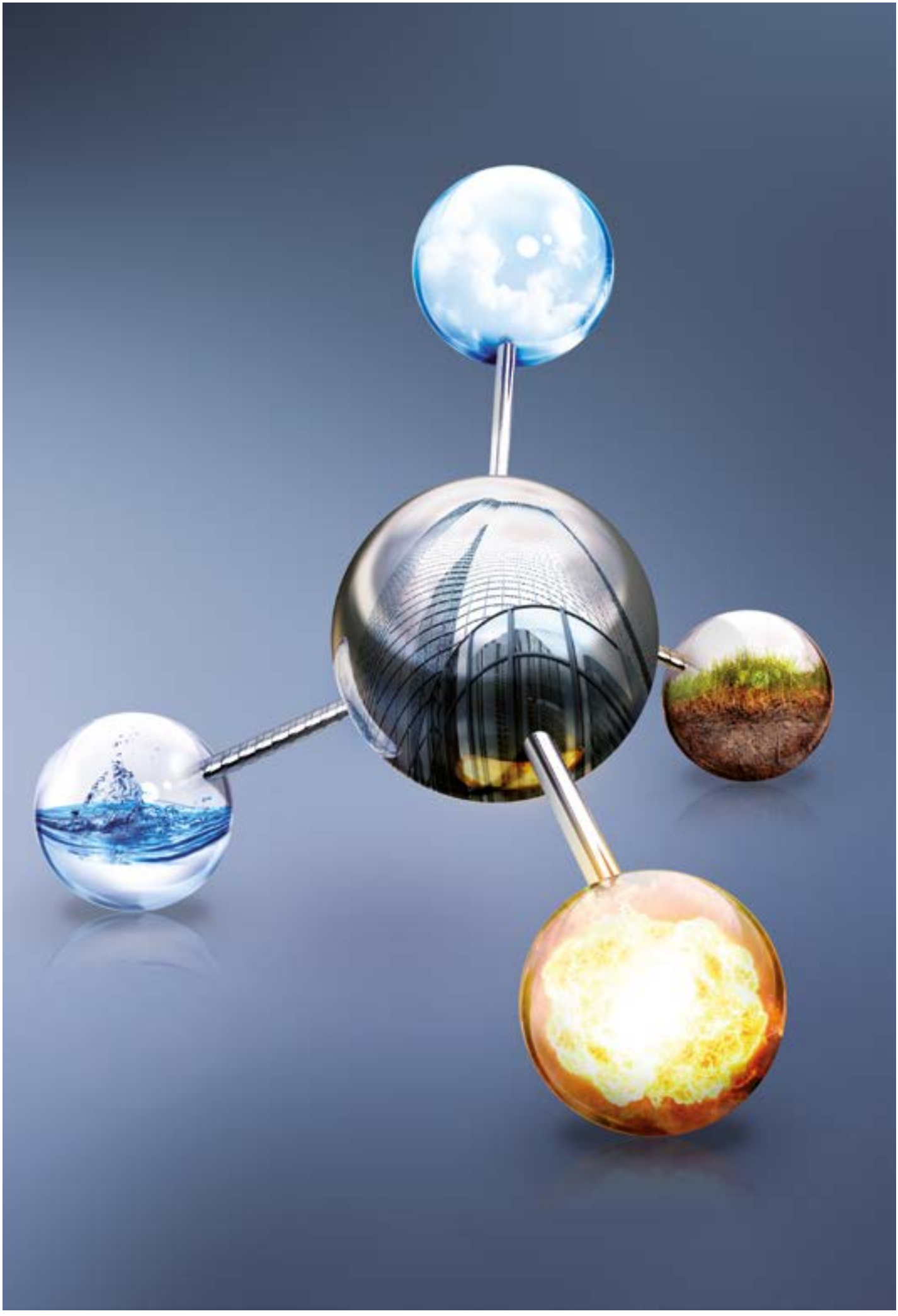
Additional products

Bars
- Round or square sections from 10 to 500 mm
- Shapes as per drawing
- Hexagons, 15 to 120 mm
- Flats (width 15 to 40 mm, thickness 5 to 300 mm)

Components
- Rollers, counter-forged blocks, forged rings, hollow as-forged components

Special certification documents
- With or without organizations (Lloyds, Bureau Véritas, EDF, etc.) and compilation of dossiers complying with the requirements of your purchase specifications.

Contact: consultation.DPSM@ugitech.com



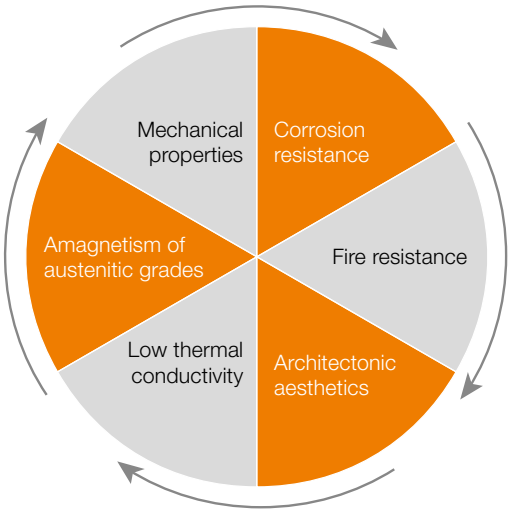
ABC Market

ABC Market and stainless steel: Ugitech… the fifth element

Four elements and a single common denominator for restored harmony.

Man innovates every day to control the four elements, water, earth, air and fire. A leader in innovation in long stainless steel products, Ugitech has asserted itself as the fifth element.

In numerous applications, stainless steels demonstrate their capacity for meeting varied needs in the areas of construction, civil engineering and architecture.



Water

Water is the major element on the surface of our planet, exposing our buildings, directly or indirectly, to corrosion risks, resulting in aesthetic or structural damage. Whatever the environment in contact, our products ensure long service life, security and aesthetics for all structures. They are also a significant source of savings on maintenance and repair.

Air

Air's alchemy with water and seawater spray makes it a corrosion vector feared by the constructors of engineering structures. It is also the subject of in-depth studies to combat heat losses.

Due to their low thermal conductivity, stainless steels are an effective response for energy improvement in low-consumption buildings.

Earth

Due to their structure, stainless steels have a great capacity for absorbing energy in the event of significant deformation, while retaining substantial strength. They are highly suitable for the construction of structures in seismic zones, and the amagnetic properties of certain grades will also be appreciated in many applications.

Fire

Stainless steel components are capable of easily achieving fire resistance times exceeding 30 minutes without any additional protection. At temperatures exceeding 500°C, stainless steels show lower stiffness losses than conventional carbon steels, thereby enhancing building safety.

UGI® 4462 cold-worked

Description

- Cold-worked smooth bars
- Austenoferritic stainless steel, chromium-nickel-molybdenum (Duplex)
- EN 10088-3: 1.4462 – X2CrNiMoN 22-5-3
- EN 10088-5: 1.4462 – X2CrNiMoN 22-5-3

Average composition (%)

C ≤ 0.03; Cr = 22; Ni = 5.5; Mo = 3; N = 0.16

Properties

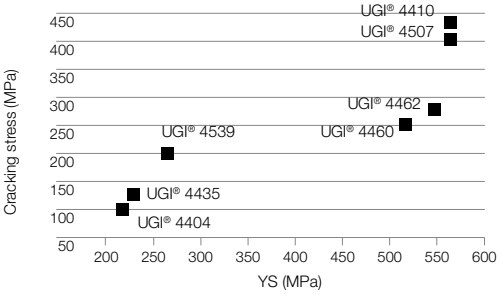
- High strength low alloy grade characterized by a corrosion resistance far superior to that of type 1.4404 austenitic steels (AISI 316L), combined with a 150% higher yield strength.

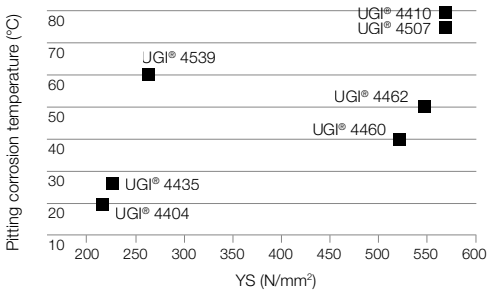
Fields of application

- Building: various structural members, cutting force absorption, tension members, fasteners.
- Civil engineering: tension members and prestressed bars and rebar couplers

Corrosion resistance

- UGI® 4462 has high corrosion resistance in acid and chlorinated environments.
- Insensitive to intergranular corrosion, its austenite + ferrite two-phase structure provides it with a stress corrosion resistance far superior to that of austenitic steels.
- Pitting Resistance Equivalent Number: PREN = 33 (PREN = Pitting Resistance Equivalent Number = Cr + 3,3Mo + 16N) Pitting corrosion.





Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	UTS (MPa)	YS (MPa)	E (%)
UGI® 4462 Cold-worked	Cold-worked	≥ 900	≥ 800	≥ 15

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGI® 4462 Cold-worked	Cold-worked	Drawn & polished	Dia. 20 to 25 mm	h9	< 1 mm/m
			Dia. 25 to 40 mm	h11	< 1.5 mm/m

UGIGRIP® Stainless steel concrete reinforcing bar

Mechanical properties

Sustainable management of the heritage is an ethical and ecological necessity. It is also an economic necessity, which requires achieving the lowest possible life-cycle cost over the structure's service life.

In the most exposed parts of the structure, stainless steel reinforcing bars are the most efficient solution to ensure the durability of concrete. Stainless steel rebars are used for repairs and for new works, partially or completely replacing carbon steels, both in precast products and for the execution of cast-in-situ structures.

General properties

In addition to their excellent corrosion resistance which ensures a long service life for structures over several decades, UGIGRIP® range provides a guarantee of:

- Higher mechanical properties than with conventional steel, which allows the use of smaller cross sections or a reduction in reinforcement (meaning weight and labour savings)
- Mechanical properties – yield strength and elongation – meeting the requirements of Eurocode 8, class M for earthquake-resistant construction;
- A selection of non-magnetic stainless steels for buildings where this property is required: hospitals, banks, airports, meteorological stations, etc.
- Mechanical properties at high temperature – tensile and creep – exceeding those of conventional steels, giving improved fire resistance;
- A very low thermal conductivity which gives this product exceptional properties for treating thermal bridges.

Recommended grades:

Only by choosing the appropriate grade for the operating environment can the durability of structures be increased depending on the areas of exposure. European standard EN 206-1 defines the five main exposure classes of concrete structures.

Depending on the environment to which the part of the structure is exposed, Ugitech recommends using the following stainless steel grades.

NB: this recommendation is made without taking into account the quality (porosity and permeability) of the concrete used.

Recommendations according to exposure classes

Exposure classes		Grade type recommendations	
		Duplex	Conventional grades AISI/EN
Class XC (carbonation)	XC	1.4062	304/4301
Class XD (chlorides other than marine chlorides, including road salt)	XD1 and XD2	1.4062	304/4301
	XD3	1.4362	316/4401
Classes XS (marine chlorides)	XS1	1.4362	316/4401
	XS2 and XS3	1.4462	*
Class XF (freezing/thawing with deicing agent)	XF1 and XF2	1.4362	316/4401
	XF3 and XF4	1.4462	*

UGIGRIP® Stainless steel concrete reinforcing bar

Mechanical properties

- Stainless steels have very interesting mechanical properties by comparison with conventional steel.
- Depending on the dimensions and grades, UGIGRIP® products can be delivered with various yield strength levels.
- Min. yield strengths (YS) expressed in N/mm²

Stainless steel families	Common grade names	Proof stress at 0.2% in MPA, cold notching			Proof stress at 0.2% in MPA, hot notching		
		INE 500	INE 650	INE 750	INE 500	INE 650	INE 750
Austenitic	304	•			•		
Austenitic	316	•			•		
Duplex	4062	•	•		•		
Duplex	4362	•	•		•		
Duplex	4462	•	•	•	•	•	

The elongation values comply with the various reference standards, including EN 1992.

The type 304 and 316 austenitic grades show higher elongation values; their ductility is especially suitable for seismic applications.

Ductility: min. values: total elongation under maximum force as a % (Agt) and UTS/YS ratio

	Duplex			Austenitic	
Grades	4062	4362	4462	Type 304	Type 316
Agt % Min	5	5	5	15	15
Rm/Rp0,2 Min	1.10	1.10	1.10	1.15	1.15

Physical properties

Stainless steels have very interesting mechanical properties by comparison with conventional steel.

Structures	Carbon steel	Austenitic stainless steels Type 304 – 316 (4301-4401)	Duplex stainless steel 1.4062 – 1.4362 – 1.4462
Coefficient of linear expansion between 20°C and 100°C ($10^{-6}.K^{-1}$)	10	16	13
Thermal conductivity at 20°C ($W.m^{-1}.K^{-1}$)	40	15	15
Resistivity ($\Omega.mm^2.m^{-1}$)	18-20	73-75	80
Modulus of elasticity at 20°C (GPa)	206	193-196	200
Magnetic	Yes	No	Yes

Contact: consultation.ugigrip@ugitech.com

UGIGRIP® 4362

Description

- Duplex concrete reinforcing bar
- Austenoferritic stainless steel, chromium-nickel (Duplex)
- EN 10088-3: 1.4362 – X2CrNiN 23-4 – EN 10088-5 – XP A35 014 – BS 6744 – SIA 262

Average composition (%)

C ≤ 0.03; Cr = 23; Ni = 4; N = 0.16

Properties

- Duplex grade which is characterized by a corrosion resistance equivalent to that of type 1.4404 austenitic steels (AISI 316L), together with a 150% higher yield strength.

Fields of application

- Repairs or new works. Exposure class – XS1 – XF1 – XF2 – XA1.
- Can be used for more severe exposure classes than those defined if the quality of the concretes and their application on site are guaranteed and secured.

Corrosion resistance

- Generalized corrosion: The UGIGRIP® 4362 grade can substitute in most currently known applications for 1.4404 or 316L; especially in maritime or urban atmospheres.
- Stress corrosion: Stress corrosion tests in a chlorinated aqueous environment (8ppm O2) at pH = 7 with the application of stresses exceeding the yield strength during periods exceeding 1000h show that the UGIGRIP® 4362 grade has better resistance than 316L.
- PREN = 33 (PREN = Pitting Resistance Equivalent Number = Cr + 3,3Mo + 16N)

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	UTS (MPa)	YS (MPa)	E (%)	Agt %
UGIGRIP® 4362	Cold-worked	≥ 850	≥ 650	≥ 14	≥ 5
	Solution treated	≥ 600	≥ 500	≥ 14	≥ 5

Available size range

Grade	Metallurgical state	Processing	Product type	Size range
UGIGRIP® 4362	Cold-worked	Cold notching	Rings*	Dia. 6 to 14 mm
			Bars	Dia. > 6 to 25 mm
	Solution treated	Hot notching	Bars	Dia. 32 and 40 mm

*ID 600 mm + /-20% - counter-clockwise unwinding direction

UGIGRIP® 4462

Description

- Duplex concrete reinforcing bar
- Austenoferritic stainless steel, chromium-nickel (Duplex)
- EN 10088-3: 1.4462 – X2CrNiMoN 22-5-3 – EN 10088-5 - XP A35 014 – BS 6744 – SIA 262

Average composition (%)

C ≤ 0.03; Cr = 22; Ni = 5.5; Mo = 3; N = 0.16

Properties

- Duplex grade which is characterized by a corrosion resistance far superior to that of type 1.4404 austenitic steels (AISI 316L), together with a 150% higher yield strength.

Fields of application

- Repairs or new works. Exposure class XF3 – XF4 – XA2 – XA3

Corrosion resistance

- UGIGRIP® 4462 has high corrosion resistance in acid and chlorinated environments.
- Insensitive to intergranular corrosion, its austenite + ferrite two-phase structure provides it with a stress corrosion resistance far superior to that of austenitic steels.
- Pitting Resistance Equivalent Number: PREN = 33 (PREN = Pitting Resistance Equivalent Number = Cr + 3,3Mo + 16N) Pitting corrosion.

Mechanical properties (see GLOSSARY)

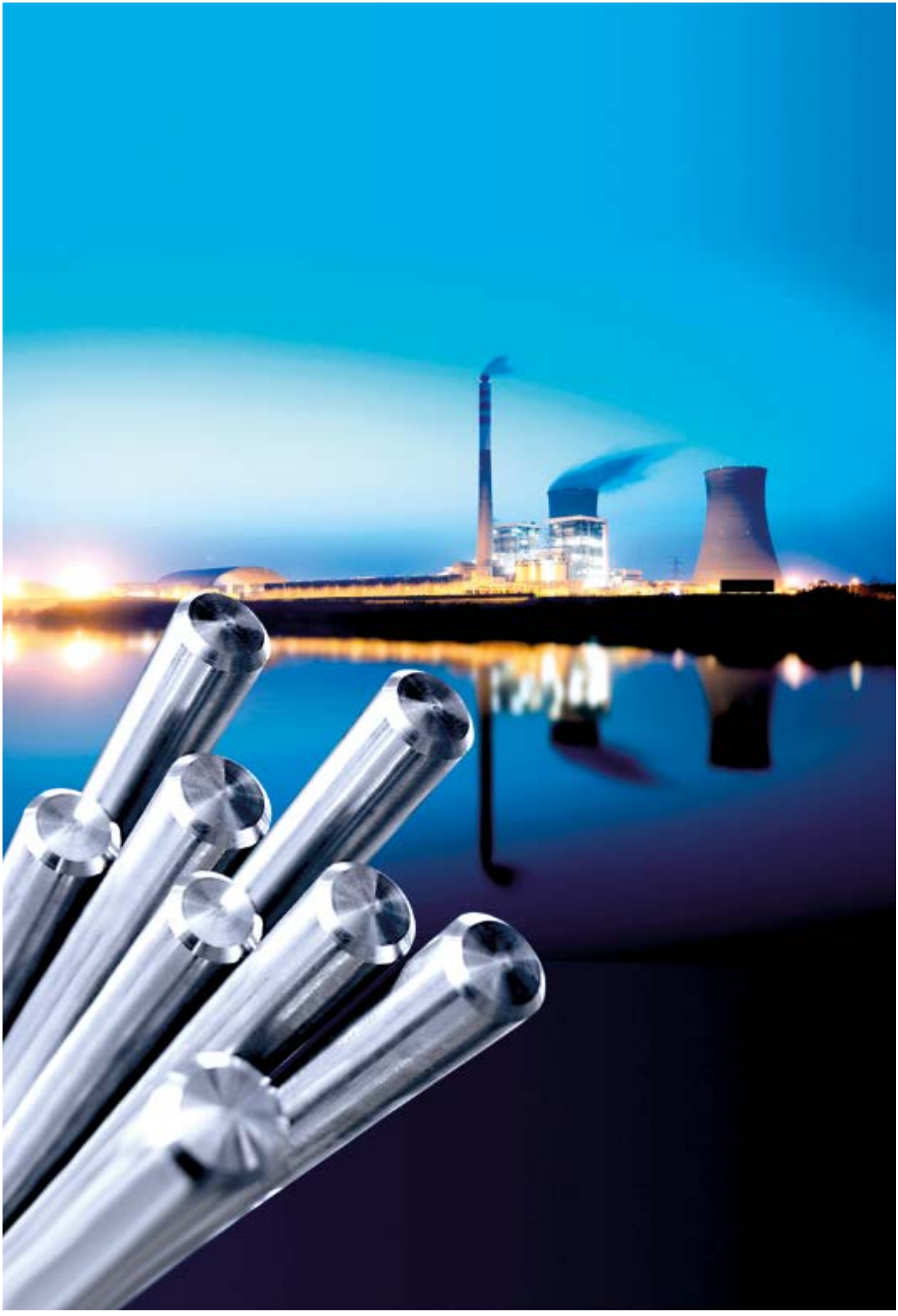
Grade	Metallurgical state	UTS (MPa)	YS (MPa)	E (%)	Agt %
UGIGRIP® 4462	Cold-worked	≥ 850	≥ 650	≥ 14	≥ 5
	Solution treated	≥ 600	≥ 500	≥ 14	≥ 5

Available size range

Grade	Metallurgical state	Processing	Product type	Size range
UGIGRIP® 4462	Cold-worked	Cold notching	Rings*	Dia. 6 to 14 mm
			Bars	Dia. 6 and 25 mm

*Inside diameter 600 mm +/- 20 mm - counter-clockwise

Notes



Nuclear

UGI® 4006A

Description

– Martensitic stainless steel with 13% chromium

Average composition (%)

C = 0.12; Cr = 12.5; Co ≤ 0.06; B as an indication, Nb as an indication

Fields of application

– Mechanical engineering, nuclear industry

– Valves and fittings, pumps, control rods, cluster control mechanisms, steam-generator tie rods and screws, nuts and bolts.

Standards

Grade	Standard or specification	Name	Metallurgical state symbol
UGI® 4006A	RCCM M5110 Levels 1, 2 and 3	X12Cr13	Quenched and tempered

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	UTS (MPa)	YS (MPa)	HB	E (%)	KV 0 °C J	YS at 350 °C (MPa)
UGI® 4006A	Treated	760/960	≥ 590	228/285	≥ 15	≥ 40	≥ 490

Other possible treatments: please consult us

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance
UGI® 4006A	Treated	Turned simple	Dia. 20 to 100 mm	k12

US inspection as per MC2300, liquid penetrant inspection as perMC4000, visual inspection as per MC7000
Stock under EDF DI supervision

Other requirements and dimensions: please consult us

UGIPURE® 4542Q

Description

– Precipitation-hardened martensitic stainless steel Recast ESR

Fields of application

– Nuclear industry, mechanical engineering, chemicals

– Control rods, shafts, fasteners, nuts and bolts, etc.

Average composition (%)

C ≤ 0.07; Cr = 16.25; Ni = 4; Cu = 4; Co ≤ 0.06; Nb + Ta: indicative; B: indicative

Standards

Grades	Standard or specification	Name	Metallurgical state symbol
UGIPURE® 4542Q	RCCM M5110 Levels 1-2-3	X6CrNiCu17-04	Age-hardened

Mechanical properties (see GLOSSARY)

Grades	Metallurgical state	UTS (MPa)	YS (MPa)	YS at 350 °C (MPa)	KV 0 °C J	E (%)	Z (%)
UGIPURE® 4542Q	Age-hardened	960/1,160	≥ 790	≥ 630	≥ 60	≥ 16	≥ 45

Available size range

Grades	Metallurgical state	Processing	Size range	Tolerance
UGIPURE® 4542Q	Age-hardened	Turned simple	Dia. 20 to 115 mm	k12

US inspection as per MC2300, liquid penetrant inspection as per MC4000, visual inspection as per MC7000
Stock under EDF DI supervision

Other requirements and dimensions: please consult us

UGI® 4418Q / UGIPURE® 4418Q

Description

– Martensitic stainless steel, chromium-nickel-molybdenum

Average composition (%)

C ≤ 0.7; Cr = 16; Ni = 4.5; Mo = 1.1; Co ≤ 0.2; Nb + Ta ≤ 0.15;
B: indicative

Fields of application

– Nuclear industry, mechanical engineering

– Valves and fittings, pumps, piping, control rods, shafts, fasteners, nuts and bolts, etc.

Standards

Grade	Standard or specification	Name	Metallurgical state symbol
UGI® 4418Q UGIPURE® 4418Q	RCCM M5110 Levels 1, 2 and 3	X6CrNiMo16-04	Quenched and tempered
	RCCM M3202 Levels 2 and 3	Z5CND16.04	Quenched, tempered, stress-relieved
	NFEN 10272	X4CrNiMo16-5-1	Quenched and tempered

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	UTS (MPa)	YS (MPa)	YS at 350 °C (MPa)	KV at 0 °C (J)	E (%)	Z (%)
UGI® 4418Q UGIPURE® 4418Q	Quenched and tempered	900/1,050	≥ 700	≥ 585	≥ 60	≥ 16	≥ 45
	Quenched, tempered, stress-relieved	820/1,020	≥ 685		≥ 72	≥ 14	Indicative

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance
UGI® 4418Q UGIPURE® 4418Q	Quenched and tempered	Turned simple	Dia. 20 to 110 mm	k12
	Quenched, tempered, stress-relieved	Single turned	Dia. 70 to 111 mm	k12

US inspection as per MC2300, liquid penetrant inspection as per MC4000, visual inspection as per MC7000
Stock under EDF DI supervision

Other requirements and dimensions: please consult us

UGI® 4307Q / UGIPURE® 4307Q

Description

– 18/10 austenitic stainless steel

Average composition (%)

C ≤ 0.03; Cr = 19; Ni = 9.5; Co ≤ 0.04; Nb + Ta ≤ 0.15; B ≤ 0.0018

Fields of application

– Nuclear industry

– Mechanical parts, valves and fittings, pumps, valve bodies, control rods, fasteners, nuts and bolts, instrumentation, steam-generator components, assembly accessories and couplings, flanges, collars, rounds for tube manufacturers, etc.

Standards

Grades	Standard or specification	Name	Metallurgical state symbol
UGI® 4307Q UGIPURE® 4307Q	RCCM M3306 Levels 1, 2 and 3	Z2CN19.10N2 Z2CN18.10	Solution treated
		Z6CN18.10 Z5CN18.10	
	RCCM M5110 Levels 1, 2 and 3	Z6CN18.10 Z5CN18.10	
	NF EN 10272	X2CrNi18-9	

Mechanical properties (see GLOSSARY)

Grades	Metallurgical state	UTS (MPa)	YS (MPa)	UTS at 350 °C (MPa)	YS at 350 °C (MPa)	E (%)	Z (%)
UGI® 4307Q UGIPURE® 4307Q	Single turned and Rolled or Forged peeled, dia. ≤ 150	520/700	≥ 210	≥ 394	≥ 125	≥ 45	≥ 50
UGI® 4307Q	Forged peeled dia. > 150	500/700	≥ 210	≥ 368	≥ 125	≥ 45	≥ 50

Available size range

Grades	Metallurgical state	Processing	Size range	Tolerance
UGI® 4307Q UGIPURE® 4307Q	Solution treated	Single turned	Dia. 20 to 124 mm	k12
		Forged peeled	Dia. 140 to 350 mm	Depending on the diameter

US inspection as per MC2300, liquid penetrant inspection as per MC4000, visual inspection as per MC7000
Stock under EDF DI supervision

Other requirements and dimensions: please consult us

UGI® 4550Q

Description

– Niobium-stabilized 18/10 austenitic stainless steel

Average composition (%)

C ≤ 0.04; Cr = 18.5; Ni = 10; Co ≤ 0.04; Nb ≤ 0.40; Nb + Ta ≤ 0.65; B ≤ 0.0018

Fields of application

– Nuclear industry

– Mechanical parts, valves and fittings, pumps, valve bodies, control rods, fasteners, nuts and bolts, instrumentation, steam-generator components, etc.

Standards

Grade	Standard or specification	Name	Metallurgical state symbol
UGI® 4550Q	RCCM M3306 Levels 1, 2 and 3	Z6CNNb18.11	Solution treated

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	UTS (MPa)	YS (MPa)	E (%)	Z (%)	UTS at 350 °C (MPa)	YS at 350 °C (MPa)
UGI® 4550Q	Single turned Dia. ≤ 100 mm	540/740	≥ 220	≥ 45	≥ 50	≥ 365	≥ 140

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance
UGI® 4550Q	Solution treated	Single turned	Dia. 20 to 120 mm	k12

US inspection as per MC2300, liquid penetrant inspection as per MC4000, visual inspection as per MC7000
Stock under EDF DI supervision

Other requirements and dimensions: please consult us

UGI® 4909 / UGIPURE® 4909

Description

– Remelted nickel-chromium-molybdenum austenitic stainless steel

Average composition (%)

C ≤ 0.03; Cr = 17.5; Ni = 12; Mo = 2.5; N = 0.06; Co ≤ 0.04; Nb + Ta < 0.15; B ≤ 0.0018

Fields of application

– Nuclear industry

– Mechanical parts, valves and fittings, pumps, valve bodies, control rods, fasteners, nuts and bolts, instrumentation, steam-generator components, thermocouple conduits, assembly accessories and couplings, flanges, collars, etc.

Standards

Grades	Standard or specification	Name	Metallurgical state symbol
UGI® 4909 UGIPURE® 4909	RCCM M3306 Levels 1, 2 and 3	Z2CND18.12 + N² Z2CND17.12 Z6CND17.12 Z5CND17.12	Solution treated
	RCCM M5110 Levels 1, 2 and 3	Z6CND17.12 Z5CND17.12	
	NF EN 10272	X2CrNiMo17-12-2	
	RCCM M3308 Levels 1, 2 and 3	Z2CND18.12 + N² Z2CND17.12	Cold-worked

Mechanical properties (see GLOSSARY)

Grades	Metallurgical state	UTS (MPa)	YS (MPa)	E (%)	Z (%)	UTS at 350 °C (MPa)	YS at 350 °C (MPa)
UGI® 4909 UGIPURE® 4909	Single turned and Rolled, dia. ≤ 150 mm	520/700	≥ 220	≥ 45	≥ 50	≥ 445	≥ 130
	Cold-worked, dia. 20 to 30 mm	≥ 655	450/620	≥ 30	≥ 60		
	Cold-worked, dia. 30 to 50 mm	≥ 590	450/620	≥ 30	≥ 60		
UGI® 4909	Forged dia. > 150 mm	500/660	≥ 220	≥ 45	≥ 50	≥ 416	≥ 130

Available size range

Grades	Metallurgical state	Processing	Size range	Tolerance
UGIPURE® 4909	Solution treated	Single turned	Dia. 20 to 120 mm	k12
	Cold-worked	Turned & polished	Dia. 20 to 50 mm	k12
UGI® 4909	Solution treated	Forged peeled	Dia. 140 to 30 mm	

US inspection as per MC2300, liquid penetrant inspection as per MC4000, visual inspection as per MC7000
Stock under EDF DI supervision

Other requirements and dimensions: please consult us

UGI® 4944

Description

– Precipitation-hardened austenitic stainless steel

Average composition (%)

C ≤ 0.08; Ni = 25; Cr = 15; Ti = 2; Mo = 1.2; V = 0.3; Co ≤ 0.2; B: 0.003-0.008

Fields of application

– Nuclear industry

– Mechanical parts, fasteners, nuts and bolts, control rods, valves and fittings, thermocouple conduits, etc.

Standards

Grade	Standard or specification	Name	Metallurgical state symbol
UGI® 4944	RCCM M5110 Levels 1, 2 and 3	X6NiCrTiMoVB25-15-2	Age-hardened

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	UTS (MPa)	YS (MPa)	E (%)	Z (%)	YS at 350 °C (MPa)
UGI® 4944	Age-hardened	900/1150	≥ 600	≥ 16	≥ 35	≥ 555

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance
UGI® 4944	Age-hardened	Rolled & descaled	Dia. 16 to 150 mm	k12

US inspection as per MC2300, liquid penetrant inspection as per MC4000, visual inspection as per MC7000
Stock under EDF DI supervision

Other requirements and dimensions: please consult us

Notes

Aeronautics / defence / aerospace

UGI® 4028 AIR

Description

– Martensitic stainless steel with 13% chromium

Average composition (%)

C = 0.3; Cr = 13

Fields of application

– Mechanical engineering, aerospace industry.

– Structural parts and components.

Standards

Grade	Standard or specification	Name	Metallurgical state symbol
UGI® 4028 AIR	AIR 9160C	Z30C13	T880
	CCT211	Z30C13	2A3B
	DMD 216-20	Z30C13	TR
	NCT 15-147-02	X30Cr13	U

*subject to batch conformity.

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	UTS (MPa)	YS (MPa)	E (%)	Z (%)	KU at 20°C (J)	KV at 20°C (J)
UGI® 4028 AIR	Treated	930/1080	≥ 730	≥ 10		15	15

Other possible treatments: please consult us

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance
UGI® 4028 AIR	Treated	Single polished	Dia. 25 to 40 mm	h10

Miscellaneous inspections: cleanliness, macrographs, non-destructive tests.

Other requirements and dimensions: please consult us

UGI® 4057FG / UGI® 4057 / UGIPURE® 4057 / UGI® 4057 AIR

Description

– Martensitic stainless steel, chromium-nickel

Average composition (%)

C = 0.17; Cr = 16; Ni = 2

Fields of application

– Mechanical engineering, aerospace industry.

– Structural parts and components, rotating parts, parts subjected to heavy mechanical loading.

Standards

Grades	Standard or specification	Name	Metallurgical state symbol
UGI® 4057FG UGI® 4057 UGIPURE® 4057 UGI® 4057 AIR	AIR 9160C	Z15CN17-03	T880
	ASNA 3138 / ASNA 3299	Z15CN17-03	T900
	CCT314	Z15CN17-03	1X
	CCT314	Z15CN17-03	2A3A
	DMD 280-20	X15CrNi17-03	T1R1R3
	NCT 10-140-01MD	Z15CN17-03	880/1080
	NCT 15-142-03	X15CrNi17.3	U
	NF EN 3490	X15CrNi17-3	U
	WL	1.4044.2	Annealed
	WL	1.4044.5	800/950*
	WL	1.4044.6	900/1000

*subject to batch conformity

Mechanical properties (see GLOSSARY)

Grades	Metallurgical state	UTS (MPa)	YS (MPa)	E (%)	Z (%)	KU (J)	KV at 20 °C (J)	HB
UGI® 4057FG UGI® 4057 UGIPURE® 4057 UGI® 4057 AIR	Treated	900/1050	≥ 700	≥ 15**	≥ 45	≥ 20	≥ 20	269/321
UGIPURE® 4057 UGI® 4057	Treated	800/1080	≥ 690	≥ 12	≥ 35	≥ 20	≥ 16	277/326
	Annealed*							

*on production

**A% ≥ 12 for dia<20

Other possible treatments: please consult us

Available size range

Grades	Metallurgical state	Processing	Size range	Tolerance
UGI® 4057FG UGIPURE® 4057 UGI® 4057 UGI® 4057 AIR	Treated	Drawn & polished or ground	Dia. 5 to 20 mm	h9
		Turned and polished or rolled & descaled	Dia. 22 to 180 mm	k13 or k12
UGIPURE® 4057	Treated	Drawn	Dia. 10 to 20 mm	h9
		Turned polished	Dia. 30 to 70 mm	h10

Miscellaneous inspections: cleanliness, macrographs, non-destructive tests.

Other requirements and dimensions: please consult us

UGI® 4418Q / UGIPURE® 4418Q

Description

– Martensitic stainless steel, chromium-nickel-molybdenum

Average composition (%)

C ≤ 0.06; Cr = 16; Ni = 5; Mo = 1.1

Fields of application

– Mechanical engineering, aerospace industry.

– Rotating parts, parts subjected to heavy mechanical loading, fasteners, screws, nuts and bolts. Pump shafts and valves, pistons and cylinders.

Standards

Grade	Standard or specification	Name	Metallurgical state symbol
UGI® 4418Q UGIPURE® 4418Q	AIR 9160C	Z8CND17-04	T900 / T1100
	ASNA 6095	Z6CND16-05-01	T1150*
	CCT 244	Z8CND17-04	2A 3A
	NCT 10-140-01MD	Z8CND17-04	Rm 900-1050Mpa Rm 1100-1250Mpa
	NCT 15-142-12	X5CrNiMo16-5	U
	NCT 15-142-14	X5CrNiMo16-5	U
	NF EN 10272	X4CrNiMo16-5-1	QT900
	NF EN 4628 / NF EN 4631	X4CrNiMo16-5-1	U
	E/DA/T N° 999815	X4CrNiMo16-5-1	T1150*

*subject to batch conformity.

Mechanical properties (see GLOSSARY)

Grades	Metallurgical state	Ø (mm)	Direction	Temperature (°C)	UTS (MPa)	YS (MPa)	E (%)	Impact strength KV at 20°C (J)	HB
UGI® 4418Q UGIPURE® 4418Q	QT900	≤ 75	L	20	900 to 1,050	≥ 700	≥ 16	≥ 120	269 to 331
			L	-40				≥ 70	
		> 75	T	20	900 to 1,050	≥ 700	≥ 12	≥ 80	269 to 331
			T	-40				≥ 35	
	QT1100	≤ 75	L	20	1,100 to 1,250	≥ 900	≥ 14	≥ 100	337 to 380
		> 75	T	20	1,100 to 1,250	≥ 900	≥ 8	≥ 50	337 to 380

Other possible treatments: please consult us

Available size range

Grades	Metallurgical state	Processing	Size range	Tolerance
UGI® 4418Q UGIPURE® 4418Q	Treated 900/1,050	Polished ground	Dia. 10 to 18 mm	k9 or h9
		Turned polished or Rolled & descaled	Dia. 22 to 115 mm	k12, k13 or h10
		Rolled & descaled	Dia. 135 to 180 mm	k13
	Treated 1,100/1,250	Rolled & descaled	Dia. 30 to 120 mm	k12

Miscellaneous inspections: cleanliness, macrographs, non-destructive tests.

Other requirements and dimensions: please consult us

UGI® 4542Q / UGIPURE® 4542Q / UGIPURE® 4542-1 / UGIPURE® 4548 / UGI® 17-4PH AIR Age-hardened H1150/P930/P960

Description

Precipitation-hardened martensitic stainless steel

Average composition (%)

C ≤ 0.07; Cr = 16; Ni = 4; Cu = 4; Nb = 0.3

Fields of application

- Mechanical engineering, aerospace industry.
- Rotating parts, parts subjected to heavy mechanical loading, turbine blades, fasteners, screws, nuts and bolts. Pump shafts and valves.

Standards: age-hardened state

Grade	Standard or specification	Names	Metallurgical state symbol
UGI® 4542Q UGIPURE® 4542Q UGIPURE® 4542-1 UGIPURE® 4548 UGI® 17-4PH AIR	AMS 5643	UNS S17400	H1150
	ASTM A564/A564M	GR 630 / UNS S17400	H1150
	HMDM0090	Z5CNU17	H1150
	DMD 229-20	X5CrNiCu17-4	T1R5
	BLFF 219101	X5CrNiCu17-4	H1150
	NF EN 10088.3	X5CrNiCuNb16-4	P930 - P960*
	NF EN 3161	X5CrNiCu17-4	U
	WL	1.4548.3	UTS ≥ 960*

* subject to the conformity of the batches.

Mechanical properties at room temperature (see GLOSSARY)

Grade	Metallurgical state	UTS (MPa)	YS (MPa)	E (%)	Z (%)
UGI® 4542Q UGIPURE® 4542Q UGIPURE® 4542-1 UGIPURE® 4548 UGI® 17-4PH AIR	Age-hardened	930 / 1172	≥ 724	≥ 16	≥ 50

Other possible treatments: please consult us

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance
UGI® 4542Q UGIPURE® 4542Q UGIPURE® 4542-1 UGIPURE® 4548 UGI® 17-4PH AIR	Age-hardened	Drawn & polished/turned	Dia. 20 to 110 mm	h9/h10/h11/k12
		Rolled & descaled	Dia. 140	k13

Miscellaneous inspections: cleanliness, macrographs, non-destructive tests.

Other requirements, metallurgical states and dimensions: please consult us

UGI® 4542Q / UGIPURE® 4542Q / UGIPURE® 4542-1 / UGIPURE® 4548 / UGI® 17-4PH AIR (cond A / H1025)

Description

– Precipitation-hardened martensitic stainless steel

Average composition (%)

C ≤ 0.07; Cr = 16; Ni = 4; Cu = 4; Nb = 0.3

Fields of application

– Mechanical engineering, aerospace industry.

– Rotating parts, parts subjected to heavy mechanical loading, turbine blades, fasteners, screws, nuts and bolts. Pump shafts and valves.

Standards: solution treated and/or age-hardened state

Grade	Standard or specification	Name	Metallurgical state symbol
UGI® 4542Q UGIPURE® 4542Q UGIPURE® 4542-1 UGIPURE® 4548 UGI® 17-4PH AIR	AMS 5622	UNS S17400	Cond A / H1025
	AMS 5643	UNS S17400	Cond A / H1025
	ASTM A564/A564M	UNS S17400 GR 630	Cond A / H1025
	NCT 17-144-10	X5CrNiCu17-4	W
	NCT 17-144-13	X5CrNiCu17-4	W / U
	NF EN 3161	X5CrNiCu17-4	W
	NFEN3160	X5CrNiCu17-4	W
	WL	1.4548.4	UTS > 1,070 MPa
	WL	1.4548.9	Cond A
	NF EN 10088.3	X5CrNiCuNb16-4	P1070 / AT
	HMDM 0063	Z5CNU17	H1025

Mechanical properties (see GLOSSARY)

Grade	Processing	UTS (MPa)	YS (MPa)	E (%)	Z (%)	HB	KV at 20°C (J)
UGI® 4542Q UGIPURE® 4542Q UGIPURE® 4542-1 UGIPURE® 4548 UGI® 17-4PH AIR	Solution treated	≤ 1,200				≤ 360	
	Age-hardened dia. ≤ 115 mm	1,070/1,200	≥ 1,000	≥ 12	≥ 45	331/401	≥ 30
	Age-hardened dia. > 115 mm	1,070/1,200	≥ 1,000	≥ 12	≥ 45	331/401	≥ 20

Other possible treatments: please consult us

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance
UGI® 4542Q UGIPURE® 4542Q UGIPURE® 4542-1 UGIPURE® 4548 UGI® 17-4PH AIR	Cond A	Turned & ground polished	Dia. 20 to 200 mm	h11 ou h9
	H 1025	Drawn & polished and ground	Dia. 12 to 23 mm	h9
		Turned	Dia. 25 to 200 mm	h11/k13

Miscellaneous inspections: cleanliness, macrographs, non-destructive tests.

Other requirements and dimensions: please consult us

UGI® 15-5PH AIR / UGIPURE® 15-5PH / UGIPURE® 4545 (cond A / H1025)

Description

– Precipitation-hardened martensitic stainless steel

Average composition (%)

C ≤ 0.05; Cr = 15; Ni = 4.5; Cu = 3.5; Nb = 0.3

Fields of application

– Mechanical engineering, aerospace industry.

– Rotating parts, parts subjected to heavy mechanical loading, turbine blades, fasteners, screws, nuts and bolts. Pump shafts and valves.

Standards: solution treated and age-hardened state

Grade	Standard or specification	Name	Metallurgical state symbol
UGI® 15-5PH AIR UGIPURE® 15-5PH UGIPURE® 4545	AMS 5659	UNS S15500	Cond A / H1025
	ASTM A564M	UNS S15500 / XM12	Cond A / H1025
	NCT 15-144-03	X5CrNiCu15-5	W* / U
	NCT 10 140 01MD	E-Z6CNU15-05	H1025
	DMD 261-20	E-Z5CNU15	T1
	HMDM0060	X5CrNiCu15-5	H1025
	NF EN 2821	X5CrNiCu15-5	W
	WL	1.4545.4	UTS > 1,070 MPa
	WL	1.4545.9	Cond A

* subject to the conformity of the batches.

Mechanical properties at room temperature (see GLOSSARY)

Grade	Processing	UTS (MPa)	YS (MPa)	E (%)	Z (%)	HB	KV à 20°C (J)
UGI® 15-5PH AIR UGIPURE® 15-5PH UGIPURE® 4545	Solution treated	≤ 1,200				≤ 360	
	Age-hardened dia. ≤ 75 mm	1,070/1,200	≥ 1,000	≥ 12	≥ 45	331/401	≥ 80
	Age-hardened dia. > 75 mm	1,070/1,200	≥ 1,000	≥ 12	≥ 45	331/401	≥ 20

Other possible treatments: please consult us

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance
UGI® 15-5PH AIR UGIPURE® 15-5PH UGIPURE® 4545	Cond A	Polished ground/turned	Dia. 20 to 70 mm	h11/h9
		Turned	Dia. 130 to 200 mm	h11
	H 1025	Polished ground	Dia. 12 to 22 mm	h9
		Turned & polished	Dia. 25 to 200 mm	h11/k13/h10

Miscellaneous inspections: cleanliness, macrographs, non-destructive tests.

Other requirements, metallurgical states and dimensions: please consult us

UGI® 4307Q/UGIPURE® 4307Q

Description

– 18/10 austenitic stainless steel

Average composition (%)

C ≤ 0.03; Cr = 18.5; Ni = 9

Fields of application

– Aerospace industry

– Mechanical parts, structural parts, connector parts, screws and nuts.

Standards

Grades	Standard or specification	Name	Metallurgical state symbol
UGI® 4307Q UGIPURE® 4307Q	AIR 9160C	Z2CN18-10	A
	AMS 5639	UNS S30400	SHT
	AMS 5647	UNS S30403	SHT
	AMS-QQ-S-763	304 / 304L	A
	ASNA 3366	Z2CN18-10	HY
	ASTM A276 ASTM A479/A479M	304 / 304L	A
	DGQT1.3.0.0005 (CR1.3.05)	Z2CN18-10	HY
	CCT 312	Z2CN18-10	A
	DMD 200-22*	X1CrNi18-10	T
	NCT15-143-03 / NCT 17-143-03	X2CrNi19-11	A
	NF EN 2465	X2CrNi18-9	U
	NF EN 10272 / NF EN 10088.3	X2CrNi18-9	AT

* subject to the conformity of the batches.

Mechanical properties (see GLOSSARY)

Grades	Metallurgical state	UTS (MPa)	YS (MPa)	E (%)	Z (%)	HB
UGI® 4307Q UGIPURE® 4307Q	Solution treated	517/640	≥ 207	≥ 45	≥ 50	140/187*

Available size range

Grades	Metallurgical state	Processing	Size range	Tolerance
UGIPURE® 4307Q	Solution treated	Polished ground	Dia. 8 to 18 mm	h9
		Polished & turned	Dia. 20 to 124 mm	k12
UGI® 4307Q		Forged peeled	Dia. 140 to 250 mm	k13

Other requirements and dimensions: please consult us

UGI® 4541Q

Description

– Titanium-stabilized 18/10 austenitic stainless steel

Average composition (%)

C ≤ 0.08; Cr = 18; Ni = 10.5; Ti ≤ 0.6

Fields of application

– Aerospace industry, offshore, defence

– Mechanical parts, structural parts, connector parts, screws and nuts, hydraulic parts and accessories.

Standards

Grade	Standard or specification	Name	Metallurgical state symbol
	AIR 9160C	Z10CNT18-11	A
	AMS 5645	UNS S32100	SHT
	AMS-QQ-S-763	321	A
	ASNA 3139	Z6CNT18-10	HY
	ASNA 3202	Z6CNT18-10	HY
	ASTM A479/A479M	UNS S32100	A
	BLFF248101	X6CrNiTi18	A
UGI® 4541Q	CCT 297	Z10CNT18-11	SHT
	DGQT1.3.0.0005 (CR1.3.05)	Z10CNT18-11	A
	DMD 276-22	X6CrNiTi18	T
	HMDM0065	Z10CNT18-10	HY
	NCT15-143-43	X10CrNiTi18-11	HY
	NF EN 10272 / NF EN 10088.3	X6CrNiTi18-10	AT
	NF EN 3487	X6CrNiTi18-10	U
	WL	1.4544.9	

Mechanical properties (see GLOSSARY)

Grade	Processing	UTS (MPa)	YS (MPa)	E (%)	Z (%)	HB
UGI® 4541Q	Solution treated	530/690	≥ 220	≥ 40	≥ 50	143/207

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance
UGI® 4541Q	Solution treated	Drawn & polished or ground	Dia. 5 to 20 mm	h9
		Turned & polished	Dia. 22 to 100 mm	h10/k12
		Rolled or forged peeled	Dia. 120 to 220 mm	k13

Other requirements and dimensions: please consult us

UGI® 4550Q / UGI® 347H

Description

– Niobium-stabilized 18/10 austenitic stainless steel

Average composition (%)

C ≤ 0.04; Cr = 18.5; Ni = 10; Nb = 0.6

Fields of application

– Aerospace industry, mechanical parts

– Structural parts, connector parts, screws and nuts, hydraulic parts and accessories.

Standards: solution treated and/or age-hardened state

Grade	Standard or specification	Name	Metallurgical state symbol
UGI® 4550Q UGI® 347H	AMS 5646	UNS S34700	SHT
	AMS QQ-S 763	347	A
	NF EN 10088.3	X6CrNiNb18-10	
	WL	1.4546.9	

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	UTS (MPa)	YS (MPa)	E (%)	Z (%)	HB
UGI® 4550Q UGI® 347H	Solution treated	540/740	≥ 215	≥ 40	≥ 40	140-223

On production only.

Other requirements and dimensions: please consult us

UGI® 4909 / UGIPURE® 4909

Description

– Nickel-chromium-molybdenum austenitic stainless steel

Average composition (%)

C ≤ 0.03; Cr = 17.5; Ni = 12; Mo = 2.5; N = 0.06

Fields of application

– Aerospace industry

– Mechanical parts, structural parts, connector parts, screws and nuts, hydraulic parts and accessories.

Standards

Grades	Standard or specification	Name	Metallurgical state symbol
UGI® 4909 UGIPURE® 4909	AMS 5648	UNS S31600	SHT
	AMS 5653	UNS S31603	SHT
	AMS-QQ-S-763	316 / 316L	A
	NF EN 10272 / NF EN 10088.3	X2CrNiMo17-12-2	AT

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	UTS (MPa)	YS (MPa)	E (%)	Z (%)	HB
UGIPURE® 4909	Solution treated	520/700	≥ 220	≥ 45	≥ 50	126-192

Available size range

Grades	Metallurgical state	Processing	Size range	Tolerance
UGIPURE® 4909	Solution treated	Single turned	Dia. 20 to 124 mm	k12
UGI® 4909		Forged peeled	Dia. 140 to 300 mm	

Other requirements and dimensions: please consult us

UGI® 4944

Description

– Precipitation-hardened austenitic stainless steel

Average composition (%)

C ≤ 0.08; Ni = 25; Cr = 15; Ti = 2; Mo = 1.2; V = 0.3; B = 0.005

Fields of application

– Aerospace industry

– Mechanical parts, parts working at high temperatures, fasteners, nuts and bolts.

Standards

Grade	Standard or specification	Name	Metallurgical state symbol
UGI® 4944	AMS 5732	UNS S66286	
	ASTM A453/A453M	GRADE 660	CLASS B
	ASTM A638/A638M	GRADE 660	TYPE 2
	DMD 274-22	E-Z6NCT25	TR
	NF EN 10269 / 10302	X6NiCrTiMoVB25-15-2	+ AT + P
	NF EN 4315	X6NiCrTiMoV26-15	U

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	UTS (MPa)	YS (MPa)	E (%)	Z (%)	HB
UGI® 4944	Age-hardened	960/1,150	≥ 660	≥ 16	≥ 35	262/341

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance
UGI® 4944	Age-hardened	Rolled & descaled	Dia. 16 to 150 mm	k12/h11/h10

Other requirements and dimensions: please consult us

Notes

Medical

UGIPURE® 4441 / UGIPURE® 316L

Description

– Nickel-chromium-molybdenum implantable austenitic stainless steel

Fields of application

– Surgical implants, screws and accessories. Orthopaedic reconstruction, vascular stents, etc.

Average composition (%)

C ≤ 0.03; Cr = 17.5; Ni = 14; Mo = 3; N = 0.08

Standards

Grade	Standard or specification	Name	Metallurgical state symbol
UGIPURE® 4441 UGIPURE® 316L	ASTM F138	UNS S31673	A
	ISO 5832-1	1.4441 / UNS S31673	Annealed / Cold-worked

Mechanical properties (see GLOSSARY)

Grade	Processing	UTS (MPa)	YS (MPa)	E (%)
UGIPURE® 4441 UGIPURE® 316L	Drawn, ground, polished & cold-worked, ≤ dia. 18 mm	860/1,100	≥ 690	≥ 12
	Ground and polished, dia. 20 to 76 mm	490/690	≥ 190	≥ 40
	Turned, polished and finished, dia. 30 to 100 mm	490/690	≥ 190	≥ 40

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance
UGIPURE® 4441 UGIPURE® 316L	Cold-worked	Drawn, ground & polished	Please consult us	h7/h8/h9
	Solution treated	Polished ground	Please consult us	h9
	Solution treated	Turned, polished and finished	Please consult us	h10/h11

Other requirements and dimensions: please consult us

UGIMA® 4542 / UGIMA® 4542LR (cond A)

Description

– Precipitation-hardened martensitic stainless steel

Fields of application

– Ancillaries, surgical instruments, screwdrivers, rasps.

Average composition (%)

C ≤ 0.07; Cr = 16; Ni = 4; Cu = 4

Standards

Grade	Standard or specification	Name	Metallurgical state symbol
UGIMA® 4542 UGIMA® 4542LR	ASTM F899	UNS S17400	A
	NF S 94-090	X5CrNiCuNb16-4	AT

Mechanical properties (see GLOSSARY)

Grade	Metallurgical state	UTS (MPa)	HB
UGIMA® 4542 UGIMA® 4542LR	Solution treated	≤ 1,200	≤ 360

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance
UGIMA® 4542 UGIMA® 4542LR	Solution treated - Cond. A	Drawn & polished	Dia. 8 to 20 mm	h9
		Turned & polished	Dia. 22 to 115 mm	h11
		Rolled & descaled	Dia. 22 to 115 mm	k13

Other requirements and dimensions: please consult us

UGI® 4057FG / UGI® 4057 / UGI®4057 LR

Description

– Chromium-nickel stainless steel

Fields of application

– Ancillaries, surgical instruments, etc.

Average composition (%)

C = 0.17; Cr = 16; Ni = 2

Standards

Grades	Standard or specification	Name	Metallurgical state symbol
UGI® 4057FG UGI® 4057 UGI® 4057 LR	ASTM F899	UNS S43100	Treated
	NF S 94-090 (except KV)	X17CrNi16-2	QT 880

Mechanical properties (see GLOSSARY)

Grade	UTS (MPa)	YS (MPa)	E (%)	KV at 20°C (J)
UGI® 4057FG Treated UGI® 4057 UGI® 4057 LR	900/1,080	≥ 700	≥ 12	≥ 20

Available size range

Grades	Processing	Size range	Tolerance
UGI® 4057FG UGI® 4057 UGI® 4057 LR	Polished ground	Dia. 5 to 20 mm	h9
	Turned	Dia. 22 to 110 mm	k12/k13

Other requirements and dimensions: please consult us

Notes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Watch industry

UGIMA® 4435 ICH

Description

- Molybdenum austenitic stainless steel
- EN 10088-3 : 1.4435 – X2CrNiMo18-14-3
- AISI – ADW2 – ADW10 – ASTM A182/A182M – ASTM A276 – ASTM A479/A479M – EN 10272 – PED 2014/68/EU – NACE MR0175 / ISO 15156-3 – BN2

Average composition (%)

C : ≤ 0.03; Cr = 18; Ni = 13.7; Mo ≥ 2.5

Properties

UGIMA® 4435 ICH is an austenitic stainless steel with a high molybdenum content and a specific metallurgy for improved behaviour during machining.

Its composition also provides it with very good corrosion resistance, and this makes it non-allergenic in prolonged contact with the skin. This stainless steel grade meets the requirements of nickel release chemical tests.

Its excellent machinability makes it possible to achieve significant productivity gains in processing.

Fields of application

Watch industry: this stainless steel corresponds perfectly to the needs of the watch industry and jewellery market, combining excellent corrosion resistance, compliance with the European directive concerning nickel release rates, and high machinability.

Mechanical properties (see GLOSSARY)

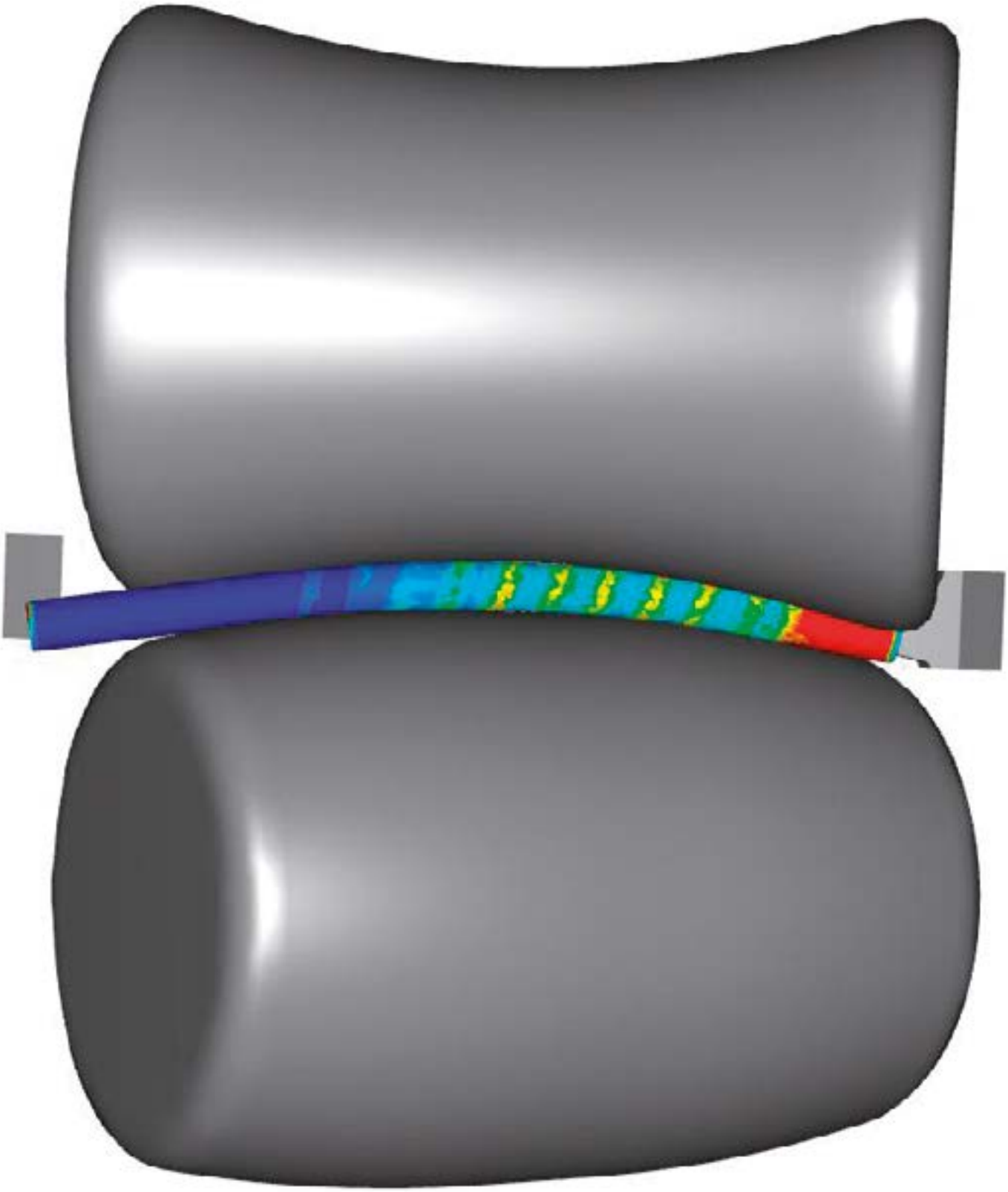
Grade	Metallurgical state	Processing	UTS (MPa)	YS (MPa)	E (%)	KV
UGIMA®4435 ICH	Solution treated	Drawn & polished Dia. 3 to 16 mm	600/800	≥ 400	≥ 25	
		Drawn & polished Dia. 16.01 to 25 mm	500/800	≥ 235	≥ 30	≥ 100 J
		Turned & polished Dia. 25.01 to 45 mm	500/700	≥ 200	≥ 40	≥ 100 J

Available size range

Grade	Metallurgical state	Processing	Size range	Tolerance	Straightness
UGIMA®4435 ICH	Solution treated	Drawn & polished	Dia. 8 to 25 mm	h9	< 0.5 mm/m
		Turned & polished	Dia. 30 to 45 mm	h9	< 1 mm/m

Other requirements and dimensions: please consult us

Notes



Technical appendices

Ugitech Service Centre – Orders from STOCK

Ugitech Service Centre, located in Grigny, south of Lyon, offers you capabilities for cutting and marking on bars and slugs.

These services are performed industrially based on a fleet of saws and a marking bench forming an integral part of our European stock. This stock consists of a modern storage/stacker crane of capacity 4,000 tonnes, to which can be added islands for receiving and preparing orders online.

Ugitech offers you a standard cutting capacity from diameter 22 to 450 mm. On request, with our partners, we will offer you cutting from diameter 5 mm.

The marking bench enables both continuous longitudinal ink and longitudinal laser marking at start of bar on a diameter range from 8 to 120 mm for drawn, polished-turned and rolled and descaled bars. Other possibilities: hexagonal and square bars from 10 to 60 mm.

All these services are proposed for orders from stock.

Cutting and end finishing services – Mill orders

In addition to the Service Centre offering services for orders from stock and common end finishing operations, Ugitech has established a capacity for cutting and performance of end finishing operations on products made to order (mill orders). These services include:

Sawing station – Coiled sheet cutting

- Cutting to length: diameters 10 to 130 mm – lengths 500 to 3000 mm – tolerances +/- 10 mm minimum – all presentations
- Face-grinding without deburring (as-sawn) in black rods only – diameters 30 to 130 mm – lengths 3000 to 6000 mm – tolerances +/- 10 mm minimum
- Cutting of one or two ends to ensure 100% US inspection on the trimmed part – diameters 10 to 90 mm – lengths > 500 mm

Chamfering

- 30° or 45° chamfers
- Round bars of length 500 to 6000 mm
- 20 ≤ dia. ≤ 40 mm: Depths of 1 to 10 mm (in mm steps) +/- 0.5 mm
- dia. < 20 mm: Depths of 1 to 4 mm (in mm steps) +/- 0.5 mm

Together, let's differentiate ourselves!

Glossary

UGIMA®

Ugitech production process considerably improving the grades' machinability without impairing other properties (corrosion, mechanical properties). These properties remain thoroughly in compliance with the standards.

Annealed

Metallurgical state of products that have undergone a careful heat treatment allowing more sophisticated processing operations such as certain machining or forming methods.

In the case of austenitic and austenoferritic steels, this state corresponds to the solution treated state.

Treated

Metallurgical state obtained by quenching + tempering.

Quenched or treated solution

Metallurgical state obtained by quenching and reserved for precipitation-hardened grades (UGI® 4542 - ex F16 PH).

The material must mandatorily undergo tempering before its end use.

Age-hardened or precipitation-hardened

Metallurgical state obtained by quenching and tempering on precipitation-hardened grades.

Screw machining bars

Products specially developed and manufactured to meet increasingly stringent screw machining requirements. See definition in chapter on "Factory manufacturing capabilities".

Material number

Material number: steel No. registered with the European Steel Registration Office. The number appears in STAHLEISENLISTE No. 9.

Mechanical properties

– 1 MPa = 1 N/mm^2.

– For profiles and bars of thickness ≤ 35 mm having undergone a final pass at low temperature, the maximum HB hardness values or the maximum tensile strength values can be increased by, respectively:

- 60 units and 150 MPa and minimum elongation value, possibly reduced to 10%, for ferritic and martensitic steels:

- 100 units and 200 MPa, and the minimum elongation value, possibly reduced to 20%, for austenitics.

EN 10088-3 (case of our drawn products)

Turned & polished bars

Cold-worked bars obtained by turning and burnishing: 2D finish as per EN 10088-3

Drawn & polished bars

Cold-worked bars obtained by drawing (cold working): 2H finish as per EN 10088-3

Ground bars

Cold-worked bars obtained by grinding; 2B and 2G finishes as per EN 10088-3 for tolerances h9 and ≤ h8 respectively.

Descaled rolled bars

Peeled hot-worked bars: 1X finish as per EN 10088-3 (1C for non-peeled black rods).

Factory manufacturing capabilities

Equipped with a steel mill, rolling mills, finishing workshops and wire drawing mills, Ugitech can meet your needs in most cases.

Main grades (as per EN 10088-3)

- Martensitic: 1.4000, 1.4005, 1.4006, 1.4021, 1.4028, 1.4029, 1.4031, 1.4034, 1.4035, 1.4057, 1.4109, 1.4118, 1.4121, 1.4125, 1.4122, 1.4313, 1.4116, 1.4418, 1.4922
- Ferritic: 1.4016, 1.4104, 1.4105, 1.4106, 1.4113, 1.4114
- Austenoferritic: 1.4362, 1.4460, 1.4462, 1.4507
- Austenitic: 1.4301, 1.4305, 1.4306, 1.4307, 1.4311, 1.4567, 1.4570
- Molybdenum austenitic: 1.4401, 1.4404, 1.4432, 1.4435, 1.4436, 1.4429, 1.4578
- Precipitation-hardened grades: 1.4542, 1.4944
- Titanium-stabilized austenitics: 1.4541, 1.4571
- Refractory grades: 1.4539, 1.4841, 1.4845
- Capability for special grades in complete casts: please consult us.
- For remelt grades the minimum weight, whatever the product presentation, is 800 kg.

Main presentations

Semi-finished rolled products

- Billets . . . . . from 50 to 140 mm, every 10 mm
  In presentation . . . . non-annealed or annealed
  . . . . . non-descaled or completely ground
  In lengths of 3 to 6.200 m and by 2 to 4 tonnes depending on dimensions.

Rolled, descaled or non-descaled bars

- Size range . . . . . from diameter 22 to 134 mm
- These products have an out-of-roundness less than or equal to half the tolerance on the diameter.

Possible presentations

- Rolled non-descaled or descaled with variants: non-annealed, annealed for cold cutting, annealed, max. annealed, treated, treated and stabilized, quenched, age-hardened (depending on grade).

Wire rod

- Size range: . . . . . from 5 to 13.5 mm, every 0.5 mm
  . . . . . from 14 to 32 mm, every 1 mm
- These products have an out-of-roundness less than or equal to half the tolerance on the diameter.

Possible presentations

- In 1,000 kg rings or multiples by size.

Hexagonal wire rod

- Grades: all.
- Dimensions . . . . . 12.4 - 13.2 - 14 mm then in mm steps up to 28
- Out-of-roundness . . . . . 0.5 mm (measured in 3 points)

Turned bars (cold-worked product)

Its surface may be

- Turned: roughness is less than 12.5 µm and turning marks are visible.
- Turned & polished: roughness is less than 1.5 µm treated and the surface is smooth and bright.
- Fine-Turned & polished: roughness is less than 0.5 µm treated and the surface is perfectly polished.
- Grades: all permanent grades.
- Size range from diameter 22 to 130 mm.

Possible presentations

- Annealed for cold cutting, annealed, max. annealed, treated, quenched, age-hardened.
- These products have an out-of-roundness less than or equal to half the tolerance on the diameter.
- Standard tolerances.
- For lengths optimized according to dia., ranging between 3 and 6.200 m, please consult us.

Drawn & polished bars (product cold-worked by die working without removing metal)

– Dia. 1.8 to 30 mm, tolerance h 9 - h 10 with possibility of j or k tolerances on request.

– These products have an out-of-roundness less than or equal to half the tolerance on the diameter.

Possible presentations

– Annealed, max. annealed, treated cold-worked, for high-speed machining, for pump shafts, quenched, age-hardened.

– Length from 3,0 to 6,1 m and standard tolerance +50/-0 mm

Screw machining bars

– Diameters ..... 7 to 55 mm (every mm)

– Tolerance on diameter h9 mm

– Tight length tolerance

– End finishes: adapted to screw machining machines

– Improved straightness: max. 0.5 mm/m

– Guaranteed surface condition

– Precise inspections in terms of geometry, surface defects, out-of-roundness, etc.

Drawn hexagons

– Grades: all permanent grades.

– Size range ..... 2 to 57 mm

– Min. dimensions and tonnages:

- In millimetric units:
  6 - 8 - 10 - 12 - 13 - 14 - 17 - 19 - 22 - 24 - 27 - 30 - 32 - 36 - 41 - 46 - 50 ..... min. 950 kg
- Other dimensions
  between 2.00 and 11.79 ..... min. 1000 kg
  between 11.80 and 57.00 min. 5 tonnes + multiple of 1 tonne.
- In imperial units:
  6.35 - 7.937 - 9.53 - 12.7 - 14.29 - 19.05 - 22.225 - 23.81 - 25.4 - 26.99 - 31.75 - 41.27 ..... min. 1000 kg
- Other dimensions between
  ..... 2.00 and 11.79: min. 1000 kg
  ..... 11.80 and 57.15: Min. 5 tonnes

– Tolerances on flats ..... standard = h 11

– Length and standard tolerance ..... 3 m +50/-0 mm

Ground bars (product cold-worked by removing metal)

– Diameter 1.8 to 120 mm, tolerance h 8 - h 9 with j or k tolerances possible on request

– These products have an out-of-roundness less than or equal to half the tolerance on the diameter.

– In 900 kg orders or multiples by size.

– Possible presentations: Annealed, max. annealed, treated, cold-worked, quenched, age-hardened, for pump shafts

– Standard length and tolerance

– Lengths optimized according to dia., ranging between 3 and 6.200 m

Special presentations

– Polished ground bars, h 7 and h 6 (for special applications) for diameter 1.8 to 22 mm.

Drawn wires (stainless steel and alloys)

– Wires: diameters from 13 microns to 18 mm (rings, coils, baskets)

– Profiles: sections from 1 to 60 mm^2 (rings, cable drums, straightened products)

Factory manufacturing capabilities

Alloy steels

Drawn, ground nickel alloy bars in diameters 4 to 20 mm (smaller sizes on request).

Principales Grades

	Material No.	C	Ni	Cr	Si	Mn	Cu	Mo	Miscellaneous
HT 330Nb	1.4887	0.1	35	22	1	1.5			Nb 1.2
HT 811	1.4876	0.08	32	20	1	1.5			
HT 825	2.4858	0.025	39	21	0.5	1	2	3	Ti 1.0
HT 845	2.4655	0.1	42	23	1	1			
920 S-LR		0.01	32	20	0.1	1.8	3.5	2.5	
901		0.04	42	13	0.2	0.2	0.2	6	Ti 3.0
HT 926	1.4529	0.02	24	19	0.5	1	1	6.5	
HT 601	2.4851	0.1	60	22	0.5	1	0.5		Al 1.5
HT 600	2.4816	0.1	72	15	0.1	0.5	0.5		
HT NA 6		0.014	43	16	0.06	0.1	0.05	0.1	Ti 1.7 Nb 3.0
A 286	1.4944/80	0.04	25	15		1.75		1.25	Ti 2.2 Al 0.15
HT 750	2.4669	0.08	70	15	0.5	0.5	0.5		Ti 2.7 Al 0.7 Nb 0.8
HT 718	2.4668	0.08	53	18				3	Ti 1.0 Al 0.5 Nb 5
HQ 80A	2.4952/2.4631	0.06	65	18-21					Al 1.6 Ti 2.4 Nb 0.3
HT 90	2.4632	0.095	56	19					Co 18.5 Al 1.35 Ti 2.5 Zr,05
Phyw 690		0.03	58	30	0.2	0.3			Al 0.7 Ti 0.3
Phynox		0.07	15	20	1	1.8		7	Co 40
HT 35 N		0.025	34	20				10	Co 30 Fe 1max
HT 218		0.06	8.2	17	3.9	8			N 0.16 VIM+VAR
HT 617	2.4663	0.065	51	23	0.3	0.3		8.8	Co 11 Al 1.2 Ti 0.4
HT X	2.4831	0.07	49	21				8.4	Co 1.25 Ti 0.1 Al 0.08 W 0.6
HT 276	2.4819	0.01	53	16		0.5		16	W 3.7 Fe 5.7
HT 625	2.4831	0.02	63	22				9	Nb 3.6
INVAR	1.3912	0.03	36	0.15	0.25	0.5	0.1		
N 42	1.3917	0.05	42	0.1	0.2	1	0.15	0.15	
N 47	1.3920	0.03	47	0.15	0.2	0.5	0.1		
SUPRA 50		0.01	48	0.2	0.2	0.6	0.1		
N 52	2.4478	0.01	50	0.1	0.15	1	0.15		
N 485	2.4486	0.01	48	6	0.25	0.25		0.1	
Dilver O	1.4773	0.05	0.5	30	1	1			
Dilver P	1.3981	0.01	29	0.1	0.1	0.25	0.1	0.1	Co 17
Gilphy 80	2.4869	0.05	76	20	1.3				Al 0.2
Gilphy 60	2.4867	0.05	60	16	1.2	0.3			Al 0.2
Gilphal 135	1.4765	0.03		22	0.3	0.2			Al 4.5
AFK584	1.3784	0.01	0.5	3.6	0.3		0.6	0.1	Co 52 V 8.7
Durinval C		0.03	42	5	0.6	0.05			Ti 2.5
Durimphy		0.01	18	0.25	0.1	0.1	0.2	5	Co 9 Ti 0.8
Permimphy		0.01	80	0.1	0.1	0.5	0.1	5	
Mumetal		0.005	80		0.05	0.5		5	

Conversion table

Mechanical properties - Annealed state

UTS	HB	HRB	HRC	HV	UTS	HB	HRB	HRC	HV	UTS	HB	HRB	HRC	HV
295	84				630	180	89		184	960	275			276
305	87				640	183	89.5		187	970	278		29	279
315	90				645	186	90.5		189	980	282			282
325	93				655	188	91		192	990	285			285
335	96	53			665	191	91.5		194	1000	287		30	287
345	98	56			675	194	92		197	1010	290			290
355	101	58			685	197	93		200	1020	293		31	293
365	104	61			695	200	93.5		203	1030	295			295
375	107	63			705	203	94		206	1040	298			298
385	110	64.5			715	206			208	1050	300		32	300
390	113	66			725	208	95		210	1060	304			303
400	115	67.5			735	211	96		213	1070	307			307
410	118	69			745	214			216	1080	309		33	309
420	121	70.5			755	217	97		220	1090	313			312
430	124	75.5			765	220			222	1100	315			314
440	127	73			775	223			225	1110	319		34	318
450	129	73.5			785	225			227	1120	321			320
460	132	74.5			795	228	99	20	230	1130	324			323
470	135	75.5			805	231			233	1140	327		35	325
480	138	76.5			815	234			236	1150	329			327
490	141	77.5			825	236	100	21	238	1160	333			331
500	144	78.5			835	239			240	1170	335		36	333
510	146	79.5			845	241		23	243	1180	339			337
520	149	80			855	245			247	1190	341			339
530	152	81			865	248		24	249	1200	343			341
540	155	82			875	251			252	1205	345		37	343
550	158	83			885	253		25	254	1215	350			348
560	161	84			895	256			257	1225	352			350
570	163	84.5			905	259		26	260	1235	354		38	352
580	166	85			910	262			263	1245	356			354
590	169	86		173	920	265			265	1255	361			356
600	172	87		176	930	268		27	268	1265	363			361
610	174	87.5		178	940	271			271	1275	366		39	363
620	177	88		181	950	274		28	274					

(valeurs indicatives)

Conversion table

Mechanical properties - Treated state

UTS	HB	HRB	HRC	HV	UTS	HB	HRB	HRC	HV	UTS	HB	HRB	HRC	HV
590	176	87.5		190	920	282			298	1245	378			396
600	179	89		194	930	285		30	302	1255	380			399
610	182	90		197	940	288			305	1265	383			401
620	186			200	950	292		31	308	1275	385			404
630	189	91		204	960	295			312	1285	388		41	407
640	192	92		207	970	297			314	1295	390			410
645	195			209	980	300		32	317	1305	395			415
655	198	93		212	990	304			321	1315	398		42	418
665	202	94		216	1000	307			325	1325	401			421
675	205	95		219	1010	309		33	327	1335	404			424
685	208			223	1020	313			330	1345	406			427
695	211	96		226	1030	317		34	334	1355	407			429
705	214	97		229	1040	319			336	1365	409		43	431
715	216			231	1050	323			340	1375	412			434
725	220			235	1060	325		35	342	1385	415			437
735	223	98		238	1070	329			346	1395	418			440
745	226		20	242	1080	331			348	1405	420		44	443
755	229	99		244	1090	333			350	1415	423			446
765	232		21	248	1100	337		36	354	1420	426			450
775	233	100		251	1110	339			357	1430	429			453
785	239		22	254	1120	341			359	1440	430			455
795	241		23	257	1130	345		37	363	1450	432		45	457
805	245			261	1140	347			365	1460	435			460
815	248		24	264	1150	350			368	1470	438			463
825	251			266	1160	352			370	1480	441			467
835	253		25	269	1165	356		38	374	1490	444		46	470
845	257			273	1175	359			377	1500	446			472
855	260		26	276	1185	361			379	1510	448			474
865	263			279	1195	363			382	1520	451			478
875	266		27	282	1205	366		39	384	1530	454			482
885	269			285	1215	370			389	1540	455		47	484
895	272		28	289	1225	373			391	1550	457			486
905	275			292	1235	375		40	394	1560	461			490
910	278		29	295										

(valeurs indicatives)

Conversion table

Degree Fahrenheit F = 9°C/5 + 32
Degree Celsius C = 5/9 (F°-32)

From		To change to	Multiply by
Length	in	mm	25.4
	in	cm	2.54
	ft	cm	30.48
Weight	lb	kg	0.45359
	oz	g	28.35
Density	lb/in^3	g/cm^3	27.68
	lb/ft^3	g/cm^3	0.01602
Modulus of elasticity	lbs/in^2	MPa	0.006895
Flexibility F (ASTM)	1/°F	Specific deflection a (DIN) 1/K	0.954
Flexibility F (ASTM)	1/°F	Specific curvature k (DIN) 1/K	1.8
Electrical resistivity	Ω.cmil/ft	μΩ.m	0.001662
	Ω.cmi^2/ft	μΩ.m	0.002116
Length	mm	in	0.03939
	cm	in	0.3937
	cm	f	0.03281
Weight	kg	lb	2.205
	g	oz	0.03527
Density	g/cm^3	lb/in^3	0.03613
	g/cm^3	lb/ft^3	62.428
Modulus of elasticity	MPa	lbs/in^2	145.04
Specific deflection a (DIN)	1/K	Flexibility F(ASTM) 1/°F	1.048
Specific curvature k (DIN)	1/K	Flexibility F(ASTM) 1/°F	0.555
Electrical resistivity	μΩ.m	Ω.cmil/ft	601.68
	μΩ.m	Ω.cmi^2/ft	472.56

Conversion of physical and dimensional units

Length

m	mm	in	ft
1	103	39.37	3.281
10^{-3}	1	3.937 x 10^{-2}	3.281 x 10^{-2}
2.540 x 10^{-2}	25.40	1	8.333 x 10^{-2}
0.3048	304.8	12	1

Density

kg/m^3	g/cm^3	lb/in^3	lb/ft^3
1	10^{-3}	3.613 x 10^{-5}	6.243 x 10^{-2}
10^{-3}	1	3.613 x 10^{-2}	62.43
2.768 x 104	27.68	1	1.728 x 10^3
16.02	1.602 x 10^{-2}	5.787 x 10^{-4}	1

Conversion table

Degree Fahrenheit F = 9°C/5 + 32
Degree Celsius C = 5/9 (F°-32)

Conversion of physical and dimensional units

Electrical

Ω m	μ Ω m	Ω cir. Mil/ft	Ω mil²/ft
1	10^{8}	6.015×10^{8}	4.724×10^{8}
10^{-8}	1	6.015	4.724
1.662×10^{-9}	0.1662	1	0.7853
2.117×10^{-9}	0.2117	1.273	1

Mass

kg	g	oz	lb
1	10^{-3}	35.27	2.205
10^{-3}	1	3.527×10^{-2}	2.205×10^{-3}
2.835×10^{-2}	28.35	1	6.205×10^{-2}
0.4536	4.536×10^{2}	16	1

Mechanical strength

Pa	MPa	kgf/mm²	lbf/in²
1	10^{-6}	1.020×10^{-7}	1.450×10^{-4}
10^{6}	1	0.1020	1 450.0
9.807×10^{6}	9.807	1	1.422×10^{3}
6.895×10^{3}	6.895×10^{-3}	7.031×10^{-4}	1

Temperature

t°c = (t + 273.15) K
t°F = 5/9 x (t - 32) °C
t°C = (5/9 t + 32) °F

Mechanical properties

Family	Designation EN	AISI/ ASTM	Density Kg/dm^3	Modulus of elasticity (kN/mm^2)	Coefficient of thermal expansion 20 °C - 200 °C	Coefficient of thermal expansion 20 °C - 400 °C	Thermal conductivity W.m^{-1}.K^{-1}	Specific heat J.Kg^{-1}.K^{-1}	Electrical resistivity Ω.mm^2.m^{-1}
A	1.4372	201	7.8	200	15.7	17.5	15	500	0.7
A	1.4373	202	7.8	200	17.5	18.4	15	503	0.7
A	1.4310	301	7.9	200	17	18	15	500	0.73
A	1.4318		7.9	200	16.5	17.5	15	500	0.73
A	1.4305	303	7.9	200	16.5	17.5	15	500	0.73
A	1.4301	304	7.9	200	16.5	17.5	15	500	0.73
A	1.4311	304LN	7.9	200	16.5	17.5	15	500	0.73
A	1.4307	304L	7.9	200	16.5	18	15	500	0.73
A	1.4306	304L	7.9	200	16.5	17.5	15	500	0.73
A	1.4303	305	7.9	200	16.5	17.5	15	500	0.73
A	1.4567	302Cu	7.9	200	17.2	18.1	11.3	503	0.72
A	1.4845	3105	7.9	200	15.5	17	15	500	0.85
A	1.4841	314	7.9	200	15.5	17	15	500	0.9
A	1.4401	316	8	200	16.5	17.5	15	500	0.75
A	1.4436	316	8	200	16.5	17.5	15	500	0.75
A	1.4404	316L	8	200	16.5	17.5	15	500	0.75
A	1.4435	316L	8	200	16.5	17.5	15	500	0.75
A	1.4432	316L	8	200	16.5	17.5	15	500	0.75
A	1.4406	316LN	8	200	16.5	17.5	15	500	0.75
A	1.4429	316LN	8	200	16.5	17.5	15	500	0.75
A	1.4571	316Ti	8	200	17.5	18.5	15	500	0.75
A	1.4580	316Cb	8	200	17.5	18.5	15	500	0.75
A	1.4541	321	7.9	200	16.5	17.5	15	500	0.73
A	1.4439		8	200	16.5	17.5	14	500	0.85
A	1.4570		7.9	200	16.5	17.5	15	500	0.7
A	1.4578		8	200	(n.r.)	(n.r.)	(n.r.)	(n.r.)	(n.r.)
DX	1.4460	329	7.8	200	13.5	(n.r.)	15	500	0.8
DX	1.4462		7.8	200	13.5	14	15	500	0.8
DX	1.4507		7.8	200	12.5	13.5	15	500	0.8
F	1.4002	405	7.7	220	11.0	12	30	460	0.6
F	1.4003		7.7	220	10.8	11.6	25	430	0.6
F	1.4512	409	7.7	220	11'0	12	25	460	0.6
F		429 (h)	7.78	200	10.3	(n.r.)	25.7	460	0.59
F	1.4016 (1)	430	7.7	220	10	10.5	25	460	0.6
F	1.4105 (1)	430 F	7.7	220	10.5	10.5	25	460	0.7
F	1.4520 (1)		7.7	220	10.8	11.6	20	430	0.7
F	1.4511 (1)		7.7	220	10	10.5	25	460	0.6
F	1.4017 (1)		7.7	220	10.2	10.8	30	460	0.7

Mecanical properties

Family	Designation EN	AISI/ ASTM	Density Kg/dm³	Modulus of elasticity (kN/mm²)	Coefficient of thermal expansion 20 °C - 200 °C	Coefficient of thermal expansion 20 °C - 400 °C	Thermal conductivity $W.m^{-1}.K^{-1}$	Specific heat $J.Kg^{-1}.K^{-1}$	Electrical resistivity $\Omega.mm^2.m^{-1}$
F	1.4113 (1)	434	7.7	220	10.5	10.5	25	460	0.7
F	1.4510 (1)	439	7.7	220	10	10.5	25	460	0.6
F		442	7.78	200	10.2	(n.r.)	21.7	460	0.64
F	1.4516		7.7	220	10.5	11.5	30	460	0.6
F	1.4513		7.7	220	10.5	10.5	25	460	0.7
F	1.4521	444	7.7	220	10.8	11.6	23	430	0.8
F	1.4526		7.7	220	11.7	12.1	30	440	0.7
F	1.4509		7.7	220	10	10.5	25	460	0.6
M	1.4724		7.7		10.5	11.5	21	500	0.75
M	1.4762		7.7	(n.r.)	10.5	11.5	17	500	1.1
M	1.4006 (1)	410/403	7.7	215	11	12	30	460	0.6
M	1.4005 (1)	416	7.7	215	11	12	30	460	0.6
M	1.4029 (1)	416	7.7	215	9.9	11	30	460	0.55
M	1.4021 (1)	420	7.7	215	11	12	30	460	0.6
M	1.4028 (1)	420	7.7	215	11	12	30	460	0.65
M	1.4031 (1)	420	7.7	215	11	12	30	460	0.55
M	1.4034 (1)	420	7.7	215	11	12	30	460	0.55
M	1.4104 (1)		7.7	215	10.5	10.5	25	460	0.7
M	1.4057 (1)	431	7.7	215	10.5	10.5	25	460	0.7
M	1.4122 (1)		7.7	215	10.8	11.6	15	430	0.8
M	1.4313 (1)		7.7	200	10.9	11.6	25	430	0.6
M	1.4418 (1)		7.7	200	10.8	11.6	15	430	0.8
PH	1.4542 (1)	630	7.8	200	10.8	11.6	16	500	0.71
PH	1.4568 (1)	631	7.8	200	11	11.6	16	500	0.8

Table of tolerances

Table of tolerances, ISO h-j-k
h: deficit tolerance, e.g. dia. dia. 45 mm h9 = +0/-0,062 mm
j: distributed tolerance, e.g. dia. 45 j9 = +0,031/-0,031 mm
k: excess tolerance, e.g. dia. 45 k9 = -0,062/+0 mm

Diameters (in mm)	Tol 7	Tol 8	Tol 9	Tol 10	Tol 11	Tol 12	Tol 13
> 1 to 3 inclusive	0.009	0.014	0.025	0.040	0.06	0.09	0.14
> 3 to 6 inclusive	0.012	0.018	0.030	0.048	0.07	0.12	0.18
> 6 to 10 inclusive	0.015	0.022	0.036	0.058	0.09	0.15	0.22
> 10 to 18 inclusive	0.018	0.027	0.043	0.070	0.11	0.18	0.27
> 18 to 30 inclusive	0.021	0.033	0.052	0.084	0.13	0.21	0.33
> 30 to 50 inclusive	0.025	0.039	0.062	0.100	0.16	0.25	0.39
> 50 to 80 inclusive	0.030	0.046	0.074	0.120	0.19	0.30	0.46
> 80 to 120 inclusive	0.035	0.054	0.087	0.140	0.22	0.35	0.54
> 120 to 180 inclusive	-	0.063	0.100	0.160	0.25	0.40	0.63
> 180 to 250 inclusive	-	-	-	0.185	0.29	0.46	0.72
> 250 to 315	-	-	-	-	0.32	0.52	0.81
> 315 to 400	-	-	-	-	0.36	0.57	0.89
> 400 to 500	-	-	-	-	0.40	0.63	0.97
> 500	-	-	-	-	0.44	0.70	1.10

Other commonly used tolerances

Tolerances: Other commonly used standards

NFA 45001	DIN 1013	DIN 176 Hex (h11)	DIN 668 (h11)	DIN 669 DIN 671 (h9)	DIN 670 (h8)	ASTM A484 Table 6
Dia. 5.5 - 15 ±0.4	Dia. 8 - 15 ±0.4	h2 to 3 +0/ -0.060	Dia. 5 - 6 +0/ -0.075	Dia. 5 - 6 +0/ -0.030	Dia. 2 to 3 +0/ -0.014	Dia. 1.5 to 7.99 ±0.03
Dia. 16 - 25 ±0.5	Dia. 15 - 25 ±0.5	h3.2 to 6 +0/ -0.075	Dia. 6.5 -10 +0/ -0.090	Dia. 6.5 - 10 +0/ -0.036	Dia. 3.5 to 6 +0/ -0.018	Dia. 8 to 12.99 ±0.04
Dia. 26 - 35 ±0.6	Dia. 26 -35 ±0.6	h7 to 10 +0/ -0.090	Dia. 11 -18 +0/ -0.043	Dia. 11 - 18 +0/ -0.043	Dia. 6.5 to 10 +0/ -0.022	Dia. 13 to 24.99 ±0.05
Dia. 36 - 50 ±0.8	Dia. 36 -50 ±0.8	h11 to 17 +0/ -0.110	Dia. 19 -30 +0/ -0.130	Dia. 19 - 30 +0/ -0.052	Dia. 11 to 18 +0/ -0.027	Dia. 25 to 37.99 ±0.06
Dia. 51 - 80 ±1.0	Dia. 51 - 80 ±1.0	h19 to 30 +0/ -0.130	Dia. 32 -50 +0/ -0.160	Dia. 32 -50 +0/ -0.062	Dia. 19 to 30 +0/ -0.033	Dia. 38 to 100.0 ±0.08
Dia. 81 - 100 ±1.3	Dia. 81 - 100 ±1.3	h32 to 50 +0/ -0.160	Dia. 52 - 80 +0/ -0.190	Dia. 52 - 80 +0/ -0.074	Dia. 32 to 50 +0/ -0.039	
Dia. 101 - 120 ±1.5	Dia. 101 - 120 ±1.5	h55 to 65 +0/ -0.190	Dia. 85 - 120 +0/ -0.220	Dia. 85 - 120 +0/ -0.087	Dia. 52 to 80 +0/ -0.046	
Dia. 121 - 160 ±2.0	Dia. 121 - 160 ±2.0		Dia. 125 - 180 +0/ -0.250	Dia. 125 - 180 +0/ -0.100	Dia. 85 to 120 +0/ -0.054	
Dia. 161 - 200 ±2.5	Dia. 161 - 200 ±2.5		Dia. 200+ +0/ -0.290	Dia. 200+ +0/ -0.115		

Equivalence between standards

Material No.	Designation	AISI	UNS
1.4000	X6Cr13	403	S40300
1.4005	X12CrS13	416	S41600
1.4006	X12Cr13	410	S41000
1.4016	X6Cr17	430	S43000
1.4021	X20Cr13	420	S42000
1.4028	X30Cr13	420	S42000
1.4029	X29CrS13	420F	S42020
1.4031	X39Cr13	420	S42000
1.4034	X46Cr13	420	S42000
1.4057	X17CrNi16-2	431	S43100
1.4104	X14CrMoS17		
1.4105	X6CrMoS17	430F	S43020
1.4106	X2CrMoSiS18-2-1		
1.4114	X6CrMoS19-2	XM34	S18200
1.4118	X40CrMo15		
1.4121	X22CrMoNiS13-1		
1.4122	X39CrMo17-1		
1.4301	X5CrNi18-10	304	S30400
1.4303	X4CrNi18-12	305	S30500
1.4305	X8CrNiS18-9	303	S30300
1.4306	X2CrNi19-11		
1.4307	X2CrNi18-9	304L	S30403
1.4310	X10CrNi18-8	301	S30100
1.4401	X5CrNiMo17-12-2	316	S31600
1.4404	X2CrNiMo17-12-2	316L	S31603
1.4418	X4CrNiMo16-5-1		
1.4435	X2CrNiMo18-14-3	316L	S31603
1.4436	X3CrNiMo17-13-3		
1.4460	X3CrNiMoN22-5-2	329	S32900
1.4462	X2CrNiMoN22-5-3	F51	S31803
1.4507	X2CrNiMoCuN25-6-3		S32550
1.4539	X1NiCrMoCu25-20-5	904L	S08904
1.4541	X6CrNiTi18-10	321	S32100
1.4542	X5CrNiCuNb16-4	630	S17400
1.4567	X3CrNiCu18-9-4	304CU	S30430
1.4570	X6CrNiCuS18-9-2		
1.4571	X6CrNiMoTi17-12-2		S31635
1.4604	X2CrTi20		
1.4763	X8Cr24	446	S44600
1.4828	X18CrNiSi20-12		
1.4833	X12CrNi23-14	309	S30900
1.4841	X16CrNiSi25-21	314	S31400
1.4845	X8CrNi25-21	310	S31000
1.4909	X2CrNiMo17-12-3		

European standards

Most common European standards

EN 10088-1	**Stainless steels – Part 1:** List of stainless steels.
EN 10088-2	**Stainless steels – Part 2:** Technical delivery conditions for stainless steel sheet, plate and strip for general purposes.
EN 10088-3	**Stainless steels – Part 3:** Technical delivery conditions for semi-finished products, bars, rods and sections for general purposes.
EN 10088-5	**Stainless steels – Part 5:** Technical delivery conditions for bars, rods, wire, sections and bright products of corrosion resisting steels for construction purposes
EN 10027-1	**Designation systems for steels – Part 1:** Symbolic designation, main symbols.
EN 10027-2	**Designation systems for steels – Part 2:** Numbering system.
EN 10021	Steels and steel products. General technical delivery conditions.
EN 10029	Hot rolled steel plates 3 mm thick or above. Tolerances on dimensions, shape and mass.
EN 10204	Metallic products. Types of inspection documents.
EN 10048	Hot rolled narrow steel strip. Tolerances on dimensions and shape.
EN 10051	Continuously hot-rolled strip and plate/sheet cut from wide strip of non-alloy and alloy steels. Tolerances on dimensions, shape and mass.
EN 10258	Cold-rolled stainless steel narrow strip and cut lengths. Tolerances on dimensions and shape.
EN 10259	Cold-rolled stainless steel wide strip and plate/sheet. Tolerances on dimensions and shape.
EN 10028-7	**Flat products made of steels for pressure purposes – Part 7:** Stainless steels
EN 10272	Stainless steel bars for pressure purposes
EN 10222-5	**Steel forgings for pressure purposes – Part 5:** Martensitic, austenitic and austenoferritic stainless steels.

Other rules

DINNormen	17440/17441/17455/17457/17458
AD-Merkblätter (Arbeitsgemeinschaft Druckbehälter)	AD-W2/WO/TRD 100
SEW (STAHL-EISEN-Werkstoffblätter des Veriens Deutscher Eisenhüttenleute)	SEW 400
TÜV-Werkstoffblätter	
Merkblätter (Verein der Technischen Überwachungensvereine)	

Also see “types of certificates” sheet

The most common certificates as per EN 10204

– "Type 3.1" inspection certificate (former name 3.1B)
The inspections concern the delivered batch (or an inspection unit of which the batch forms part).
The signatory is the mill's authorised inspection representative who is independent of the manufacturing department.

– "Type 3.2" inspection certificate (former name 3.1A)
The signatory is an expert from an official organization (e.g. TÜV).

– "Type 3.2" inspection certificate (former name 3.1C)
The signatory is an expert tasked by the customer.

Translation of certificates according to EN 10204 and DIN 50049

Allemand	Français	Italien	Anglais
Werkbescheinigung	Attestation de conformité à la commande	Attesto di conformità all'ordinazione	Certificate of compliance with the order
Werkszeugnis	Relevé de contrôle	Attesto di controllo	Test report
Werksprüfzeugnis	Certificat d'attestation d'usine	Certificato d'attestazione di stabilimento	Manufacturer's test certificate
Abnahmeprüfzeugnis	Certificat de réception	Certificato di collaudo	Inspection certificate
Abnahmeprüfprotokoll	Procès-verbal de réception	Verbale di collaudo	Inspection report

Our certificates

All our certificates are online on our website www.ugitech.com

IATF 16949
Ugitech SA Ugine

IATF 16949
Ugitech ITALIA Srl

EN 9120
Ugitech SA Ugine Grigny

ISO 9001
Ugitech SA
Main locations

ISO 9001
Ugitech ITALIA Srl

ISO 13485
Ugitech SA

ISO/CEI 17025
COFRAC accreditation
of Ugine laboratories

TÜV AD2000
W0_Ugitech SA

TÜV PED 2014/68/
EU-AD 2000 W0
Ugitech ITALIA Srl

TÜV PED 2014/68/
EU Ugitech Ugine

EDF CEIDRE
Qualification Stock
RCC-M Barres

Marine Lloyd's Register

Marine Offshore
Bureau Veritas

Marine the DNV GL

NORSOK M650
UNS 32750
F53 MDS-D57
1.4410 bars

NORSOK M650
UNS 32750
F53 MDS-D57
1.4410 bars

NORSOK M650
UNS 31803/32205
F51 F60 MDS-D47
NORSOK M650
UNS 32550 F61
MDS-D57
1.4507 bars

Linear weight (kg/m)

Round, hexagonal and square steel bars (for smaller or intermediate sizes, take sub-multiples or multiples of the dimensions)

Dimensions (mm)	Round	Hexagon	Square
2	0.02	0.03	0.03
2.5	0.04	0.04	0.05
3	0.06	0.06	0.07
3.5	0.08	0.08	0.10
4	0.10	0.11	0.13
4.5	0.12	0.14	0.16
5	0.15	0.17	0.20
6	0.22	0.24	0.28
7	0.30	0.33	0.38
8	0.39	0.43	0.50
9	0.50	0.55	0.64
10	0.62	0.68	0.79
11	0.75	0.82	0.95
12	0.89	0.98	1.13
13	1.04	1.15	1.33
14	1.21	1.33	1.54
15	1.39	1.53	1.77
16	1.58	1.74	2.01
17	1.78	1.96	2.27
18	2.00	2.20	2.54
19	2.22	2.45	2.83
20	2.46	2.72	3.14
21	2.72	2.99	3.46
22	2.98	3.29	3.80
23	3.26	3.59	4.15
24	3.55	3.91	4.52
25	3.85	4.24	4.91
26	4.17	4.59	5.31
27	4.49	4.95	5.72
28	4.83	5.32	6.15
29	5.18	5.71	6.60
30	5.55	6.11	7.07
31	5.92	6.52	7.54
32	6.31	6.95	8.04
33	6.71	7.39	8.55
34	7.12	7.85	9.07
35	7.55	8.32	9.62
36	7.99	8.80	10.17
37	8.44	9.29	10.75

Dimensions (mm)	Round	Hexagon	Square
38	8.90	9.80	11.34
39	9.37	10.32	11.94
40	9.86	10.86	12.56
41	10.36	11.41	13.20
42	10.87	11.97	13.85
43	11.39	12.55	14.51
44	11.93	13.14	15.20
45	12.48	13.75	15.90
46	13.04	14.36	16.61
47	13.61	15.00	17.34
48	14.20	15.64	18.09
49	14.80	16.30	18.85
50	15.41	16.97	19.63
51	16.03	17.66	20.42
52	16.66	18.36	21.23
53	17.31	19.07	22.05
54	17.97	19.79	22.89
55	18.64	20.53	23.75
56	19.32	21.29	24.62
57	20.02	22.06	25.50
58	20.73	22.84	26.41
59	21.45	23.63	27.33
60	22.18	24.44	28.26
61	22.93	25.26	29.21
62	23.69	26.09	30.18
63	24.46	26.94	31.16
64	25.24	27.80	32.15
65	26.04	28.68	33.17
66	26.84	29.57	34.19
67	27.66	30.47	35.24
68	28.49	31.39	36.30
69	29.34	32.32	37.37
70	30.20	33.26	38.47
71	31.06	34.22	39.57
72	31.95	35.19	40.69
73	32.84	36.17	41.83
74	33.74	37.17	42.99
75	34.66	38.18	44.16
76	35.59	39.21	45.34

Linear weight (kg/m)

Round, hexagonal and square steel bars (for smaller or intermediate sizes, take sub-multiples or multiples of the dimensions)

Dimensions (mm)	Round	Hexagon	Square
77	36.54	40.25	46.54
78	37.49	41.30	47.76
79	38.46	42.37	48.99
80	39.44	43.45	50.24
85	44.52	49.05	56.72
90	49.91	54.99	63.59
95	55.61	61.26	70.85
100	61.62	67.88	78.50
105	67.94	74.84	86.55
110	74.56	82.14	94.99
115	81.50	89.78	103.82
120	88.74	97.75	113.04
125	96.29	106.07	122.66
130	104.14	114.72	132.67
135	112.31	123.72	143.07
140	120.78	133.05	153.86
145	129.56	142.72	165.05
150	138.65	152.74	176.53
155	148.05	163.09	188.60
160	157.75	173.78	200.96
165	167.77	184.81	213.72
170	178.09	196.18	226.87
175	188.72	207.89	240.41

Dimensions (mm)	Round	Hexagon	Square
180	199.66	219.94	254.34
190	222.66	245.06	283.39
200	246.49	271.53	314.00
210	271.76	299.36	346.19
220	298.25	328.55	379.94
230	325.98	359.10	415.27
240	354.95	391.01	452.16
250	385.14	424.27	490.63
260	416.57	458.89	530.66
270	449.23	494.87	572.27
280	483.12	532.20	615.44
290	518.25	570.89	660.19
300	554.60	610.95	706.50
310	592.19	652.35	754.39
320	631.01	695.12	803.84
330	671.07	739.24	854.87
340	712.36	784.73	907.46
350	754.88	831.57	961.63
360	798.63	879.76	1017.36
370	843.61	929.32	1074.67
380	889.83	980.23	1133.54
390	937.28	1032.50	1193.99
400	985.96	1086.13	1256.00

Environment/Energy

Ugitech combines the sustainable development of steel with Corporate Social Responsibility.

To support the company's long-term development, an HSE policy (Health, Safety, Environment) has been established. It is deployed notably via an environmental policy specific to each plant.

This Environmental Management System has ISO 14001 certification, for Ugitech Ugine, Bourg-en-Bresse, Imphy and Brionne plants and also at SMEZ in Reichshof and Ugitech Italia in Milan.

This standard concerns environmental management. It is based on the principle of continual improvement of environmental performance by managing the impacts related to the company's activity. Ugitech Italia also has EMAS certification.

The EMAS certification explicitly and fully includes the requirements of the ISO 14001 standard, but nevertheless differs from it through its principle of mandatory transparency regarding communication (objectives set and results obtained).

This Ugitech Ugine Energy Management System has ISO 50001 certification. This standard aims at improving energy performance. Its introduction is therefore a potential source of energy savings to cope with the scarcity of energy and constantly rising energy prices, while helping to reduce greenhouse gas emissions. Our policy is to communicate transparently with our authorities, our customers and all our interested stakeholders. That is why we provide you with a variety of information concerning our atmospheric emissions, water discharges, energy consumption, etc.

Notes

Notes

Swiss Steel Group

Production sites: Ugitech SA

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