Technical Data Sheet
UGIMA®-X 4307

Chemical analysis (%)

C	Si	Mn	Ni	Cr	Cu	Mo	N	P	S
≤ 0.03	≤ 0.75	0.5 – 1.5	8.0 – 9.5	18.0 – 19.0	≤ 0.75	≤ 0.5	≤ 0.10	≤ 0.040	0.020 – 0.030

19-04-2019 – REV 00

General presentation

UGIMA®-X 4307 is an improved-machinability stainless steel manufactured only by Ugitech.

Its properties are identical to those of other 1.4307s except for its machinability, which is even better than that of UGIMA® 4307, the 1.4307 grade from Ugitech with already improved machinability:

- UGIMA®-X 4307 is a stainless steel resulting from an improved production and control process in the inclusive UGIMA® population developed by Ugitech.
- UGIMA®-X 4307 represents a technological advance which has advantages whatever the machining conditions, the machinery or tools used; its machinability is optimal at high cutting conditions.
- Compared to UGIMA® 4307, the grade already improved in terms of machinability, the average machinability of UGIMA®-X 4307 is slightly improved (+ 4%); moreover, its industrial machinability dispersion (already good in UGIMA® 4307) has been significantly improved.

Classification

Improved Machinability Austenitic Stainless Steel.

Designation

Material No.

Europe – EN		USA – UNS	Japan – JIS	World – ISO
1.4301	X5CrNi18-10	S30400	SUS304	4301-304-00-I X5CrNi18-10
1.4307	X2CrNi18-9	S30403		4307-304-03-I X2CrNi18-09

Other material name

USA (AISI)	France (AFNOR)	Germany (DIN)	UK (BS)	Sweden (S.S)
304	Z7CN 18-10	W. Nr 1.4301		
304L	Z3CN 18-09	W. Nr 1.4307	304S11	2352

Standards

EN	EN 10088-3
ASTM	A276 / A276M, A479 / A479M

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Mechanical properties

Tensile data

	Yield stress	Tensile strength	Elongation	Reduction of Area
	Rp0,2% (MPa)	Rm (MPa)	A (%)	Z (%)
Solution annealed	≥ 200	500 – 680	≥ 48	≥ 68
Work-hardened by drawing	≥ 380	650 – 830	≥ 32	≥ 65

Limit values for information only; approximate ranges allowing for the different cold drawing rates it is possible to apply (cold drawing rate ↑ = hardness and strength↑)

Physical properties

Temperature	Density	Elastic modulus	Thermal conductivity	Expansion coefficient From 20 to 500°C	Electrical resistivity	Specific heat
(°C)	(kg/dm^3)	(GPa)	(W/m.K)	(K^{-1})	(µΩ.mm)	(J/kg.K)
20	7.90	200	15.0	-	730	500
100	-	194	-	16.0×10^{-6}	-	-
200	-	186	-	16.5×10^{-6}	-	-
300	-	179	-	17.0×10^{-6}	-	-
400	-	172	-	18.0×10^{-6}	-	-
500	-	165	-	18.0×10^{-6}	-	-

(Indicative values)

Magnetic properties

Like most austenitic stainless steels, UGIMA®-X 4307 is almost non-magnetic after a solution annealed heat treatment. However, after a cold drawing, mild ferromagnetic behavior may be observed due to the destabilization of the austenite.

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Corrosion resistance

UGIMA®-X 4307 has the same corrosion resistance as UGIMA® 4307. As such, it has a corrosion resistance similar to that of a standard 4307 / 304L in every respect, and therefore an excellent ability to withstand corrosion in many environments. However, UGIMA®-X 4307 is not recommended for use in marine environments and highly oxidizing chemical environments.

Environment	Behavior
Nitric acid	Good
Phosphoric acid	Average
Sulfuric acid	Average
Acetic acid	Average
Sodium carbonate	Average
NaCl (Saline mist)	Good
Humidity	Good
Sea water	Restricted use
Oil	Average

Special care must be taken when using UGIMA®-X 4307 in acid or chloride environments that are liable to pitting and crevice corrosion. It should not be used where components are shaped in such a way as to have areas where corrosive products might collect and corrode.

The use of UGIMA®-X 4307 is compatible with all fluids, lubricants, oils and greases applied in industry and machining. Optimum corrosion resistance is achieved on a surface free from residual machining oils or foreign particles (of iron for example).

UGIMA®-X 4307 is pickled in the same way as 1.4307/304L grades. This also applies to decontamination.

The corrosion resistance of a stainless steel depends on many factors related to the composition of the corrosive atmosphere (chloride concentration, presence or absence of oxidizing agents, temperature, pH, agitation or no agitation, and so on), as well as on the preparation of the material (surfaces free from metal particles, surface finish such as hardening, polishing, and so on). Precautionary measures should be taken for certain tests such as the saline mist test (ISO 9227): for example marking labels that might cause corrosion run-outs and reduce the test resistance time should not be used on the sample.

Hot transformation

The forging of UGIMA®-X 4307 poses no particular problems:

- Heating without special precautions up to 1170°-1250°C.
- Forging between 900°C and 1250°C (the best results being obtained between 1100 and 1250°C).
- Cooling in air or water, if no deformation is feared. Priority will be given to cooling in water for high charges (avoid cooling stacked forgings in air).

Heat treatment

The heat treatment of UGIMA®-X 4307 consists of quenching the metal in water or air after keeping it for a holding time of approximately half an hour at a high temperature of between 1000 and 1100°C. This solution annealing heat treatment enables all traces of cold drawing to be removed whilst providing the steel with its lowest level of mechanical properties.

Machinability

Due to the specific optimization of the entire oxide population in the grade, UGIMA®-X 4307 guarantees exceptional machinability performances for a 1.4307. Such performances are provided especially in very high or severe cutting conditions. Its performance is based on very good chip breaking, increased tool service lives and very good surface finish after machining.

To obtain the maximum benefit from the potential of this grade, in terms of parts and working environment, contact our Technical Support Department.

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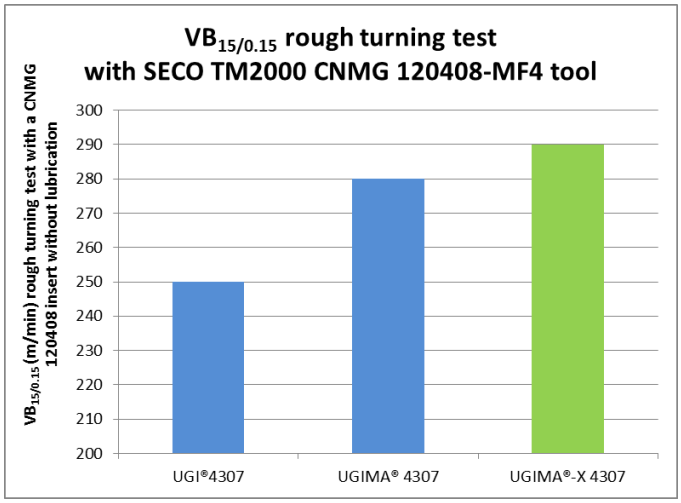
Turning

$VB_{15/0.15}$

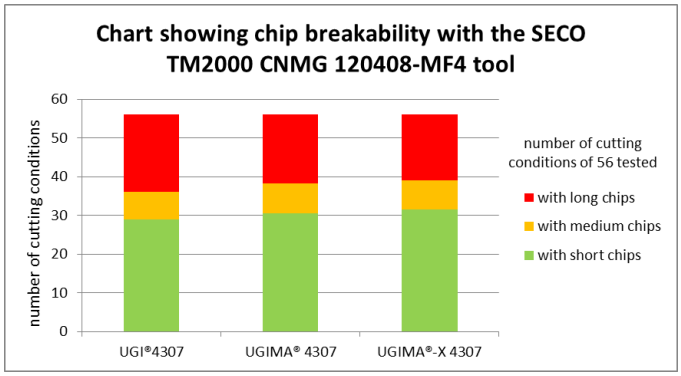
In terms of tool insert wear ($VB_{15/0.15}$ tests, representative of the potential rough turning productivity), the accessible cutting conditions of UGIMA®-X 4307 increase by 4% compared with the already improved UGIMA® 4307, and industrial machinability dispersion, already good in UGIMA® 4307, is significantly improved.

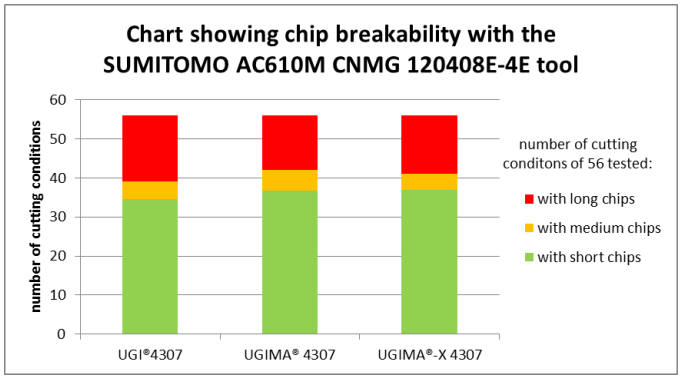
The $VB_{15/0.15}$ tests obtained with the SECO TM2000 CNMG 120408-MF4 inserts are shown in the chart below.



Chip Breaking Zones (CBZ)

In terms of chip breakability (CBZ tests, representative of the ability of the metal to limit machine downtime due to chips becoming entangled around the tools), the number of short chip cutting conditions for UGIMA®-X 4307 is slightly increased compared to those obtained with the already improved UGIMA® 4307. This is shown in the following charts, which indicate the number of machining conditions producing short, medium and long chips (among those tested*) for two reference turning inserts and for each stainless steel grade tested.





* the conditions tested are as follows: at a constant cutting speed (200 m/min), the feed rate "f" is varied from 0.1 mm to 0.4 mm/rev, in increments of 0.05 mm/rev, and the cutting depth "a_p" is varied from 0.5 mm to 4 mm, in increments of 0.5 mm; fifty-six conditions were tested using this method.

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Welding

UGIMA®-X 4307 can be welded without undue difficulty, with or without welding filler wire. If a welding filler wire is required, use grades E304L (coated electrodes), ER304L (GTAW), ER304LSi (GMAW).

In GMAW or GTAW welding, to avoid any risks of hot cracking, welding heat input should be limited (to avoid sulfur segregation responsible for the hot cracking phenomena occurring during the weld pool cooling). However, for laser welding, welding heat input must be maximized (to avoid too rapid cooling rates which bring about hot cracking of the welds by austenitic solidification). No heat treatment is required after welding.

Available products

Product	Shape	Surface finish	Tolerance	Dimension	
Bar	Round	Rolled and descaled	12 to 13	22 to 130	mm
	Round	Turned and polished	9 to 11	22 to 130	mm
	Round	Drawn	8 to 9	1.8 to 55	mm
	Round	Ground	7 to 9	1.8 to 80	mm
	Hexagonal	Drawn	11	3 to 55	mm
Drawn wire	Round	Mat		1 to 14	mm

Other formats: contact us

Applications

- General component production
- Chemical industry
- Oil, petrochemical and nuclear industries
- Food-processing and agricultural industries
- Decorating and household equipment
- Building and construction, transport
- Electronic equipment