

Technical Data Sheet

技术数据表

UGIMA®-X 4305

Chemical composition 化学成分 (%)

C	Si	Mn	Ni	Cr	Cu	Mo	P	S
≤ 0.07	≤ 0.75	≤ 2.0	8.0 – 10.0	17.0 – 18.0	≤ 0.75	≤ 0.5	≤ 0.04	0.25 – 0.35

25-03-2019 – REV 00

General presentation

概述

UGIMA®-X 4305 is a stainless steel of highly improved machinability manufactured only by Ugitech.

UGIMA®-X 4305 是由 Ugitech 独家生产的高性能机加工不锈钢。

Its properties are identical to those of other 1.4305s except for its machinability, which is even better than that of UGIMA® 4305, the 1.4305 grade from Ugitech with already improved machinability.

UGIMA®-X 4305 与其他 1.4305 相比，尽管具有更加优异的切削性能，其他性能仍与 1.4305 保持一致。虽然 Ugitech 1.4305 的机加工性能已经经过提升，但 UGIMA®-X 4305 的机加工性能更加优异。

– UGIMA®-X 4305 is a stainless steel resulting from an improved production and control process in the UGIMA® population developed by Ugitech.

– UGIMA®-X 4305 是 Ugitech 通过改进生产和控制工艺开发的 UGIMA® 系列中的不锈钢产品。

- UGIMA®-X 4305 represents a technological advance which has advantages whatever the machining conditions, machinery or tools used; its machinability is optimal at high cutting conditions.

- 无论在任何加工条件下，使用任何机械装置或工具都能展现 UGIMA®-X 4305 优越的技术属性。在高速切割条件下能达到最理想的机加工性能

- Compared to UGIMA® 4305, increases of 15% have been achieved in turning. This ranks it slightly ahead of UGIMA® 4305 HM, with fewer detrimental effects such as the cold cracking phenomenon thanks to its lower sulfur content.

- 改良后的 UGIMA®-X 4305 的车削率比 UGIMA® 4305 提高了 15%。由于其含硫量较低，故较少发生诸如冷裂等不利情况

Classification

分类

Improved Machinability Austenitic Stainless Steel with a high sulfur content.

提高机加工性能的奥氏体高硫不锈钢

Designation

名称

Material No. 材料牌号

Europe – EN 欧洲 – EN	USA – UNS 美国 – UNS	Japan – JIS 日本 – JIS	World – ISO 国际 – ISO	
1.4305	X8CrNiS18-9	S30300	SUS303	4305-303-00-1 X10CrNiS18-9

Other material name

其他名称

USA 美国	France 法国	Germany 德国	UK 英国	Sweden 瑞典
AISI	AFNOR	DIN	BS	S.S
303	Z8CNF 18-09	1.4305	303S31	2346



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Standards 标准

EN	EN 10088-3
ASTM	ASTM A581/581M - ASTM A582/582M
AMS	AMS 5640 type 1 - AMS QQS 764 - SAE J405
JIS	JIS G 4303 - JIS G 4308

Mechanical properties

机械性能

Tensile data

抗拉数据

	Yield stress 屈服强度	Tensile strength 抗拉强度	Elongation 拉伸率	Reduction of Area 断面收缩率
	Rp0,2% (MPa)	Rm (MPa)	A (%)	Z (%)
Solution annealed 固溶退火	250 – 350	570 – 650	50 – 65	60 – 75
Work-hardened by drawing 拉拔硬化处理	360 – 670	685 – 850	26 – 47	37 – 56

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↑)

数据信息仅供参考。不同的冷压率允许有近似范围（冷压率↑=硬度和强度↑）。

Physical properties

物理性质

Temperature 温度	Density 密度	Elastic modulus 弹性模量	Thermal conductivity 热传导性	Expansion coefficient 膨胀系数 20°C - 200°C	Electrical resistivity 电阻率	Specific heat Capacity 比热容
(°C)	(kg/dm ³)	(GPa)	(W/m.K)	(K ⁻¹)	(μΩ.mm)	(J/kg.K)
20	7.90	196	15.3	-	730	500
200	-	-	-	16.8 x10 ⁻⁶	-	-

(Indicative values)



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Corrosion resistance

抗腐蚀性

UGIMA[®]-X 4305 has an excellent ability to withstand corrosion in many environments. Its corrosion resistance is typical of an austenitic steel and is similar to that of 4305 / 303 in every respect.

UGIMA[®]-X 4305 在许多环境中都具有出色的抗腐蚀能力。其耐腐蚀性是奥氏体不锈钢的特性，且与 4305/303 在各个方面都具有相似的特性。

However, UGIMA[®]-X 4305 is not recommended for use in marine environments and highly oxidizing chemical environments.

然而，我们不建议在海洋中或高氧化化学物质环境中使用 UGIMA[®]-X 4305。

In addition, as with all high sulfur content stainless steels, special care must be taken when using UGIMA[®]-X 4305 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 form areas where corrosive products might collect and corrode.

此外，与所有高硫含量不锈钢一样，在酸性或含氯腐蚀环境中使用 UGIMA[®]-X 4305 时容易出现点蚀和缝隙腐蚀，必须特别小心。当部件的形状易聚集腐蚀物质时，不应使用 UGIMA[®]-X 4305。该部件可能会被聚集的腐蚀物质腐蚀。

Environment 环境	Behavior 表现
Nitric acid 硝酸	Good 良好
Phosphoric acid 磷酸	Average 一般
Sulfuric acid 硫酸	Average 一般
Acetic acid 乙酸	Average 一般
Sodium carbonate 碳酸钠	Average 一般
NaCl (Saline mist) 氯化钠 (盐雾)	Average 一般
Humidity 潮湿	Good 良好
Sea water 海水	Restricted use 限制使用

The use of UGIMA[®]-X 4305 is compatible with all the fluids, lubricants, oils and greases used in the machining industry. Optimum corrosion resistance is obtained where a surface is free from all residual machining oil or foreign particles (iron for example).

UGIMA[®]-X 4305 能适应工业和机械加工中使用的所有润滑油、润滑剂、润滑油和润滑脂。在没有残留加工油或杂质颗粒（例如铁屑）的表面可获得最佳耐腐蚀性能。

UGIMA[®]-X 4305 is pickled in the same way as 304 grade steel. UGIMA[®]-X 4305 与 304 钢种采用相同的酸洗工艺。



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The decontamination of steels with a high sulfur content is not recommended owing to the complexity and cost of this operation; however, if this is necessary, the recommended decontamination / passivation process is as follows:

由于操作的复杂性和出于对成本的考虑，不建议对钢材进行去污；但是，如果有必要，建议去污/钝化处理如下：

- 1 volume 52% nitric acid (36° Baumé)
- 52% (36° Baumé) 的硝酸
- 1 volume water
- 与硝酸溶液等量的水
- at room temperature
- 室温
- short duration
- 短时间处理
- wash carefully when the process is completed
- 处理后彻底清洗

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 to 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.

不锈钢的耐腐蚀性取决于多种因素。既取决于腐蚀性环境中的成分（氯化物浓度、是否存在氧化剂、温度、pH、搅拌与否等），也取决于材料因素（表面无金属颗粒，成品表面的硬化和抛光处理等）。对于某些试验，如盐雾试验（ISO 9227），需要注意一些事项。例如，不应在样品上使用标记物（将导致腐蚀失效的或缩短样品的抗腐试验时间）。

Heat treatment

热处理

The heat treatment of UGIMA[®]-X 4305 consists of quenching the metal in water or air after keeping it for an extended period (at least 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.

UGIMA[®]-X 4305 的热处理：在 1000°C 至 1100°C 的高温下保持至少半小时后，将金属在水中或空气中冷却。这种固溶退火热处理可去除所有冷拉痕迹，同时保持钢的机械性能达到最低水平。

Machinability

机加工性能

Due to the specific optimization of the entire oxide population in the grade, UGIMA[®]-X 4305 guarantees exceptional machinability performances, even for a 1.4305 grade. 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.

由于对氧化物进行了特殊优化，UGIMA[®]-X 4305 保证了 1.4305 卓越的机加工性能。尤其在严苛的切割条件下，更凸显优势。良好的断屑性能，高质量的加工表面以及刀具使用寿命的延长，均体现了材料卓越的机加工性能。

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

为最大程度地获得本材料在机加工性能上带来的优势，请联系我们的技术支持部门对部件与工作环境进行咨询。



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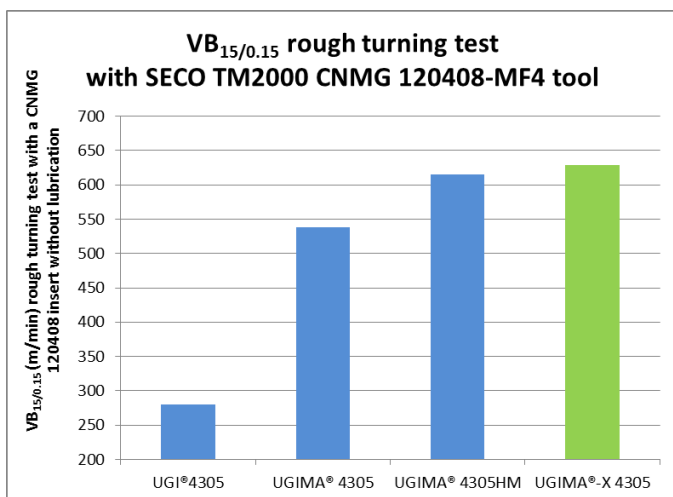
Turning

车削

VB15/0.15

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 4305 increase by nearly 15% compared with the already improved UGIMA® 4305; this therefore ranks it slightly higher than UGIMA® 4305HM but with less sulfur so fewer detrimental effects like the cold cracking phenomenon. The VB_{15/0.15} test results obtained with SECO TM2000 CNMG 120408-MF4 inserts are shown in the chart below.

在刀具磨损方面（VB_{15/0.15} 测试：代表潜在粗车生产能力），与 UGIMA® 4305（UGIMA® 4305 的工业机加工性能分布已属优良）相比，UGIMA®-X 4305 的切削效率增加了近 15%。因此车削率比 UGIMA® 4305HM 还略有提升。且含硫量较少，不易产生冷裂等不利情况。以下图表显示 SECO TM2000 CNMG 120408-MF4 镶块/刀刃的 VB_{15/0.15} 测试结果。

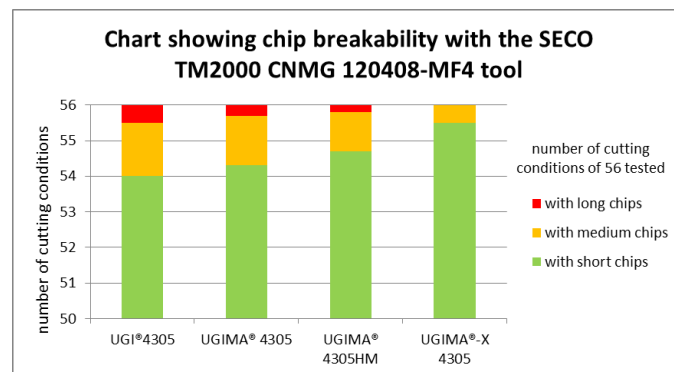


Chip Breaking Zones (CBZ)

断屑区 (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 4305 is slightly increased compared to those obtained with the already improved UGIMA® 4305 and UGIMA® 4305HM. This is shown in the following chart, which indicates the number of machining conditions (average values from several tests) producing short, medium and long chips (among those tested*) for the SECO TM2000 CNMG 120408-MF4 turning insert for each stainless steel grade tested.

在断屑性能（CBZ 测试：代表减少因金属断屑缠绕刀具导致机器停机时间的能力）方面，UGIMA®-X 4305 的短条断屑数量比已改良过的 UGIMA® 4305 和 UGIMA® 4305HM 还略有增量，以下图表可表明这一特点。该图表显示了 SECO TM2000 CNMG 120408-MF4 车削刀具和被测试的不锈钢钢种在切削测试中所产生的短条断屑、中条断屑和长条断屑的平均比例。



* the conditions tested are as follows: at a constant cutting speed (300 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.

*测试条件如下：恒定切削速度（200 米/分钟），进给量“f”在 0.1 毫米/转至 0.4 毫米/转之间变化，增量为以 0.05 毫米/转的增量进行不同的进给量测试。切削深度“a_p”在 0.5 毫米至 4 毫米之间变化，增量为以 0.5 毫米/转的增量进行不同的切削深度测试。使用此方法共测试了 56 个不同的切削状态。



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Welding

焊接

Like all austenitic stainless steels with a high sulfur content, UGIMA[®]-X 4305 must be welded with care to avoid hot cracking phenomena occurring in the HAZ as well as in the WM (especially when no filler wire is used).

和所有高硫含量的奥氏体不锈钢一样，对 UGIMA[®]-X 4305 的焊接应避免热影响区和焊缝金属中的热裂情况。（尤其在不用焊接填充丝时。）

In arc welding (GMAW, GTAW, etc.), reducing the heat input can be very helpful in avoiding hot cracking phenomena by enabling faster cooling, which limits the sulfur segregation in the HAZ/WM responsible for hot cracking. If a welding filler wire is required, ER312 filler wire can be a good solution to lower the risk of hot cracking in the WZ.

使用电弧焊时（例如熔化极气体保护焊、钨极气体保护焊 TIG 等），通过减少焊接时热量的输入可以缩短冷却时间、限制热影响区和焊缝金属中硫偏析的产生，从而有效帮助避免产生焊接热裂纹。如果要求使用填充焊丝，ER312 是可以降低焊接区产生热裂纹风险的理想填充丝。

Laser welding of UGIMA[®]-X 4305 is very difficult, as is the case for all the high-sulfur austenitic stainless steel grades like 1.4305. Laser welding should therefore be avoided if possible.

激光焊接很难应用于 UGIMA[®]-X 4305。这是所有高硫奥氏体不锈钢 1.4305 的共性。应避免对其使用激光焊接。

No heat treatment is required after welding.

焊接后无需热处理。

Available products

产品信息

Product 产品	Shape 横截面形状	Surface finish 成品表面	Tolerance 公差	Dimensions 尺寸
Bar 棒材	Round 圆形	Rolled and descaled 轧制和剥皮	12 -13	22 - 130 mm
	Round 圆形	Turned and polished 车削和抛光	9 -11	22 - 130 mm
	Round 圆形	Drawn 拉拔	8 -9	1.8 - 55 mm
	Round 圆形	Ground 磨光	7 -9	1.8 - 80 mm
Drawn wire 拉拔线材	Hexagonal 六角形	Drawn 拉拔	11	3 - 55 mm
	Round 圆形	Mat 哑光		1 - 14 mm

Other sizes: contact us
如需其他信息请联系我们。



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Applications

应用

- General component production
– 组件生产
- Food-processing and agricultural industries
– 食品加工和农业
- Decorating and household equipment
– 装饰和家用设备
- Building and construction, transport
– 建筑、施工和运输
- Electronic equipment
– 电器



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