

**PRODEC<sup>®</sup>**

RAISING  
THE BAR  
OF YOUR  
MACHINING

 **MARCEGAGLIA**



STAINLESS STEEL  
**RAISING THE BAR**  
OF YOUR MACHINING

Marcegaglia **PRODEC**<sup>®</sup>  
is stainless steel *reimagined* 

Marcegaglia **PRODEC**<sup>®</sup> is designed to **outperform the competition for all machining purposes** and is **trusted by professionals globally**.

Marcegaglia **PRODEC**<sup>®</sup> stainless steel bar sets **a new benchmark:**

- unlocks **superior machining efficiency** powered by outstanding material consistency
  - accelerates productivity with **higher cutting speeds**
  - achieves **longer-lasting, more dependable tool life**.
-

# BUILT TO OUTPERFORM



**SUPERIOR**  
TOOL LIFE



**FASTER**  
MACHINING



**PERFECT**  
**CONSISTENCY**  
IN QUALITY



**HIGHER**  
SPINDLE UTILIZATION



**MAXIMISE**  
YIELD



**EXCELLENT**  
SURFACE FINISH



**HIGH**  
PRODUCTIVITY

In a machining environment defined by precision and performance, productivity is a strategic mandate.

Every second of cycle time, every tool change, every deviation in stability and yield translates into tangible impact on profitability.

When performance is built into the material itself, results become predictable and competitive advantage becomes sustainable.

*Marcegaglia PRODEC®  
transforms stainless steel  
into a **measurable**  
**machining productivity** ”*

# VALIDATED PERFORMANCE. MEASURED RESULTS.

**+13%** CUTTING SPEED  
**ON 304L**  
vs top competitors

**+20%** CUTTING SPEED  
**ON 316L**  
vs top competitors

**+159%** LONGER  
**TOOL LIFE**  
compared to lowest  
European test result

Marcegaglia **PRODEC®** integrates metallurgical excellence, consistent quality and proven machining performance into one solution.

Engineered for demanding machining environments, it delivers **exceptional material consistency** and **stable cutting behaviour** throughout the production process.

Extensive **comparative V<sub>15</sub> machining trials** confirm **PRODEC®'s superior results**.

The V<sub>15</sub> machinability test demonstrates a materials workability by determining the supplier with the highest cutting speed with 15 minutes of tool life.

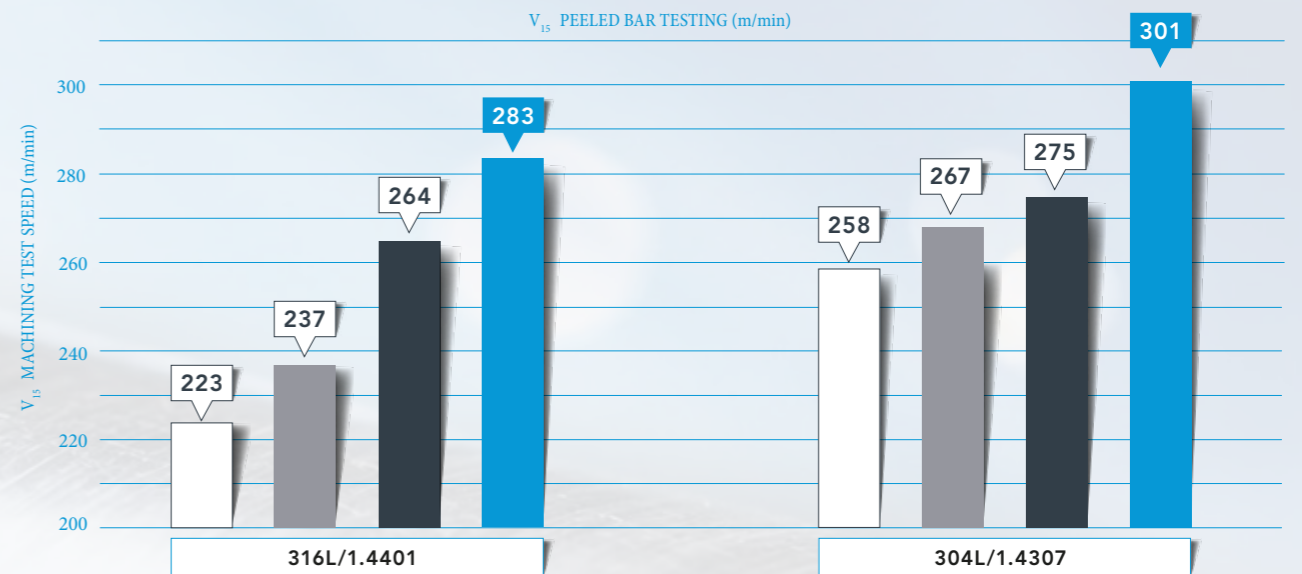
Tests demonstrate significant improvements in cutting speed and tool life compared to market competitors, translating directly into higher productivity and lower machining costs.

*The results speak for themselves* ””

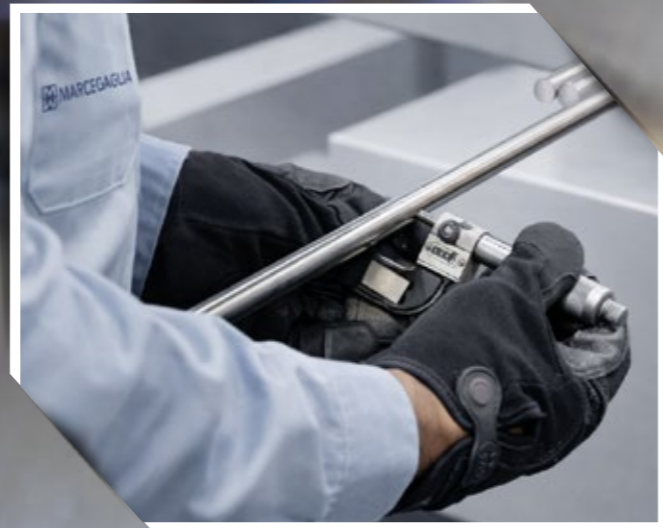
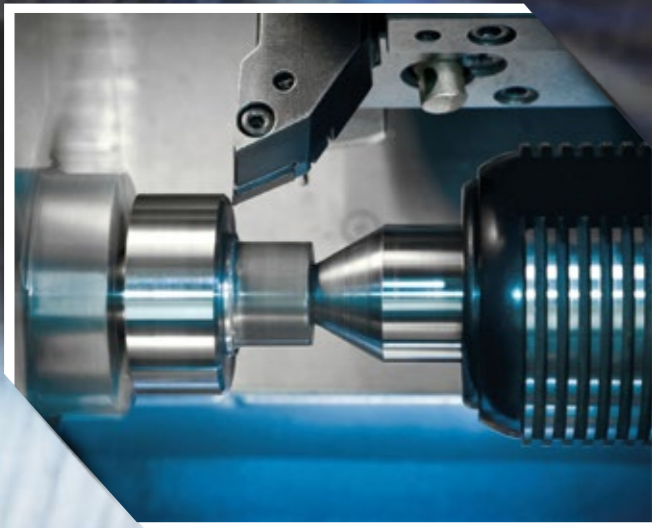
# TESTED. PROVEN. SUPERIOR.

## BAR – FASTER MACHINING WITH PRODEC®

■ PRODEC® ■ Closest European competitor ■ Average European competitor ■ Lowest European competitor



Testing was carried out in November 2025 with Marcegaglia PRODEC® and 6 other competing stainless steel bars. Chart includes exclusively European material, regarded as a global benchmark of excellence. The tool used for the testing was a CNMG cemented carbide insert.



### PRACTICAL EXAMPLE: RESULTS FROM A RING TO MACHINED FLANGE

	STANDARD 316L/4404	PRODEC® 316L/4404	IMPROVEMENT	
Turning	4:53 min	3:18 min	1:35 min	32%
Milling	13:39 min	9:24 min	4:15 min	31%
Drilling	3:12 min	2:36 min	0:36 min	19%
<b>Total</b>	<b>21:44 min</b>	<b>15:18 min</b>	<b>6:26 min</b>	<b>30%</b>

### PRACTICAL EXAMPLE: RING TO FLANGE ON A CNC TURNING MACHINE

	STANDARD 316L/4404	PRODEC® 316L/4404	IMPROVEMENT	
Cutting speed	110 m/min	160 m/min	50 m/min	46%
Feed	0.25 mm/rev	0.3 mm/rev	0.05 mm/rev	20%
Depth of cut	1.5 mm	2 mm	0.5 mm	33%
<b>Processing time</b>	<b>21.1 min</b>	<b>15.7 min</b>	<b>5.4 min</b>	<b>26%</b>
<b>Tool lifetime</b>	<b>3-6 pieces</b>	<b>9 pieces</b>	<b>3-6 pieces</b>	<b>150%-300%</b>

# DESIGNED FOR DEMANDING MACHINING SECTORS

Marcegaglia **PRODEC**® is developed for high machining productivity, complex components and tight tolerances that set high requirements for materials to **perform reliably** throughout the machining process.

From small precision parts to larger mechanical components, the material supports stable machining across a **wide range of applications**.

#### Typical applications include:

- FASTENERS
- FLANGES AND VALVES
- PRESSURE FITTINGS
- MACHINED COMPONENTS FOR PROCESS EQUIPMENT
- NUTS, BOLTS, AND SCREWS
- GEARS
- SHAFTS

*Marcegaglia **PRODEC**® provides a reliable foundation for efficient manufacturing* ””

# THE PRODUCT RANGE

A robust framework of specifications and standards supports the production, testing and supply of the Marcegaglia PRODEC® product range, ensuring outstanding quality and performance consistency.

Marcegaglia PRODEC®,  
where every need  
finds its perfect match

Comprehensive stock held in Sheffield, UK with short lead-times.

## ROUND BAR

PRODUCT	DIMENSION	LENGTH	TOLERANCE
Cold drawn bar	6-26 mm	2.2-6 m	ISO h9 & ASTM A484*
Cold drawn & Centerless ground bar	6-26 mm	2.2-6 m	ISO h7, h8, h9*
Peeled bar	28-90 mm	3 m or 6 m*	ISO k11 & ASTM A484*
	95-190 mm	Random lengths 4.0-6.0m	ISO k13 & ASTM A484*
Peeled & polished bar	28-90 mm	3 m or 6 m*	ISO h9 & ASTM A484*

\*Other tolerances / lengths available on request

## HEXAGON BAR

PRODUCT	DIMENSION	LENGTH	TOLERANCE
Cold drawn bar	8-25.4 mm	2.2-6 m	ISO h11 & ASTM A484

## SQUARE BAR

PRODUCT	DIMENSION	LENGTH	TOLERANCE
Cold drawn bar	8-22.23 mm	2.2-6 m	ISO h11 & ASTM A484

**PRODEC® grades - stock availability:**  
303 (1.4305), 304/304L (1.4301/1.4307),  
316/316L (1.4401/1.4404)

**Non-PRODEC® grades - mill quantities:**  
17-4, 17-7, A240, 1.4547, 305, 310, 314,  
347, 320, 321, 304Cu, 316Cu, 2101,  
2304, welding grades

## MANUFACTURING STANDARD

PRODUCT	DIMENSION	TESTING METHOD	STANDARD
Round bar	All dimensions	Eddy current	EN 10277 Table 3 Class 3
Round bar	28-190 mm	Ultrasonic testing	EN 10308 Class 3*
Round bar	28-90 mm	Eddy current	EN 10277 Table 3 Class 2
Hexagon bar	17, 19, 22, 24 mm	Eddy current	EN 10277 Table 3 Class 2

\*Excluding 1.4305/303 grades

## PRODUCT DESIGNATION

Stainless steel for general purposes

## SUPPLY CONDITIONS

- Dimensional tolerances according to EN 10278 or ASTM A484
- Corrosion testing to ASTM A262 Method E & EN ISO 3651-2 Method A on PRODEC® 304, 316
- Upon request: certification according to AD 2000 W2/W10

## OPTIONAL PROCESSING

- Centerless grinding
- Polishing (grit 240)
- Chamfering

## STANDARD CHAMFERING EDGES

DIMENSION	DEPTH AT 45°
8-10 mm	1 mm
10-20 mm	1.2 mm
30-90 mm	1-3 mm

# PRODEC® DATASHEET

## STAINLESS STEEL BAR OPTIMIZED FOR IMPROVED MACHINABILITY

### PRODEC® 304L/4307

A version of 304L/4307 with improved machinability. Improves productivity with faster machining, longer tool life, better dimensional tolerances, superior machined surface quality, and improved yields compared to conventionally produced 304L/4307.

#### Typical applications:

- Fasteners
- Flanges and valves
- Pressure fittings
- Machined components

### PRODEC® 316L/4404

A version of 316L/4404 with improved machinability. Improves productivity with faster machining, longer tool life, better dimensional tolerances, superior machined surface quality, and improved yields compared to conventionally produced 316L/4404.

#### Typical applications:

- Fasteners
- Flanges and valves
- Pressure fittings
- Machined components

### PRODEC® 303/4305

For applications that use 303/1.4305. This product gives you faster machining, longer tool life, better tolerances, superior machined surface quality, and reduced scrap losses compared to conventionally produced 303/1.4305.

#### Typical applications:

- Nuts, bolts, and screws
- Gears
- Shafts
- Machined parts for process equipment

# GENERAL CHARACTERISTICS

## CHEMICAL COMPOSITION

GRADE FAMILY	MARCEGAGLIA NAME	EN	ASTM		PRE	TYPICAL CHEMICAL COMPOSITION, % BY MASS					
			TYPE	UNS		C	Cr	Ni	Mo	N	OTHERS
A	<b>PRODEC® 304L/4307</b>	1.4307	304L	S30403	18	0.02	18	8	–	–	–
A	<b>PRODEC® 316L/4404</b>	1.4404	316L	S31603	24	0.02	17	10	2	–	–
A	<b>PRODEC® 303/4305</b>	1.4305	303	S30300	17	0.05	17	8	–	–	0.3 S

Chemical compositions and PRE calculations are based on Marcegaglia typical values.

Pitting Resistance Equivalent is calculated using the following formula:

$$PRE = \%Cr + 3.3 \times \%Mo + 16 \times \%N$$

Surface finish and other factors determine the actual corrosion resistance of a particular product.

## CORROSION RESISTANCE

Although improvements in machinability have been associated with reduced corrosion resistance in the past, the Marcegaglia **PRODEC®** treated products have shown corrosion resistance within the range typically expected from comparable stainless steel products.

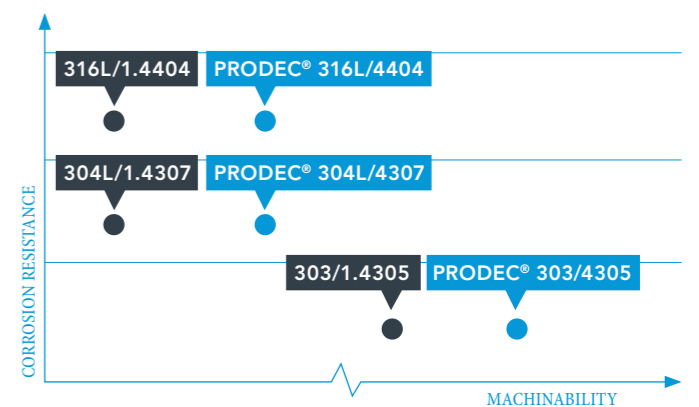
**PRODEC® 304L/4307** is a versatile, general-purpose stainless steel with good resistance to atmospheric corrosion, many organic and inorganic chemicals, as well as foods and beverages. It has also been used in vacuum-processing equipment and specialized instruments where high integrity is essential.

**PRODEC® 316L/4404** provides improved resistance to pitting and crevice corrosion in environments containing chlorides and other halides.

**PRODEC® 303/4305** is resistant to mildly corrosive environments. In order to achieve the best possible corrosion resistance, all **PRODEC® 303/4305** parts should be chemically treated to remove sulfides from the final surface.



CORROSION RESISTANCE VS MACHINABILITY



## MECHANICAL PROPERTIES

METRIC					
MARCEGAGLIA NAME	PRODUCT FORM	MIN. YIELD STRENGTH R <sub>yo.2</sub> (MPa)	TENSILE STRENGTH R <sub>m</sub> (MPa)	ELONGATION A <sub>5</sub> (%)	HARDNESS (HBW) MAX.
PRODEC® 304L/4307	Hot rolled bar	175	500-700	45/35	215
	Cold drawn bar	400/380/175	600-930/600-930/500-830	25/25/30	-
PRODEC® 316L/4404	Hot rolled bar	200	500-700	40/30	215
	Cold drawn bar	400/380/200	600-930/580-930/500-830	25/25/30	-
PRODEC® 303/4305	Hot rolled bar	190	500-750	35	230
	Cold drawn bar	400/400/190	600-950/600-950/500-850	15/15/20	-

Minimum values for Hot rolled bars and Cold drawn bars according to EN 10088-3.



## PHYSICAL PROPERTIES

METRIC						
MARCEGAGLIA NAME	DENSITY [kg/dm³]	MODULUS OF ELASTICITY AT 20 °C [GPa]	COEFFICIENT OF THERMAL EXPANSION 20-100 °C [10 <sup>-6</sup> /K]	THERMAL CONDUCTIVITY AT 20 °C [W/(m*K)]	THERMAL CAPACITY AT 20 °C [J/(kg*K)]	ELECTRICAL RESISTIVITY AT 20 °C [Ω*mm²/m]
PRODEC® 304L/4307	7.9	200	16.0	15	500	0.73
PRODEC® 316L/4404	8.0	200	16.0	15	500	0.75
PRODEC® 303/4305	7.9	200	16.0	15	500	0.73

Values according to EN 10088-1.

IMPERIAL						
MARCEGAGLIA NAME	DENSITY [lbm/in³]	MODULUS OF ELASTICITY [psi]	COEFFICIENT OF THERMAL EXPANSION 68-212 °F [μin/(in* °F)]	THERMAL CONDUCTIVITY [Btu/(hr*ft* °F)]	THERMAL CAPACITY [Btu/(lbm* °F)]	ELECTRICAL RESISTIVITY [μΩ*in]
PRODEC® 304L/4307	0.285	29 * 10 <sup>6</sup>	8.89	8.7	0.119	28.74
PRODEC® 316L/4404	0.289	29 * 10 <sup>6</sup>	8.89	8.7	0.119	29.53
PRODEC® 303/4305	0.285	29 * 10 <sup>6</sup>	8.89	8.7	0.119	28.74

Values according to EN 10088-1.

## FABRICATION

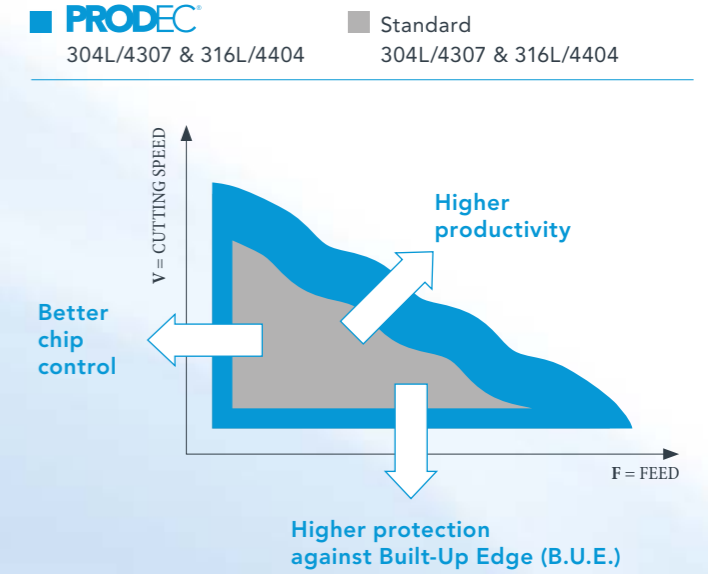
### MACHINING

PRODEC® products enable higher machining speeds, longer tool life, and superior part quality with reduced total cost for finished parts.

PRODEC® 304L/4307 and PRODEC® 316L/4404 are special variants of standard Types 304 (UNS S30400) / 304L (UNS S30403) and 316 (UNS S31600) / 316L (UNS S31603) respectively with enhanced metallurgy for better machinability. The general rules for machining stainless steel also apply to the PRODEC® grades. The difference is that PRODEC® grades enable a longer tool life and/or tougher machining conditions. The machining window illustrated on the right gives a demonstration of this.

### Machining guidelines

The cutting parameters in this guideline will work under normal cutting conditions. It is suggested to begin with cutting parameters in the ranges indicated in the tables and then to improve parameters by moving to higher or lower speed, feed or depth of cut until best performance is reached. It is possible to end up in a range somewhat outside the values indicated in the tables depending on the actual machine set-up.



### Turning

- The machine and setup must be rigid
- Use shortest possible tool length
- Use coolant
- Use smallest possible nose radius to avoid vibrations

TURNING	CARBIDE TOOLING				HSS TOOLING		
	DEPTH OF CUT OR WIDTH (mm)	SPEED (m/min)	FEED (mm/rev)	TOOL GRADE	SPEED (m/min)	FEED (mm/rev)	TOOL GRADE
Finishing	-2	260-280	0.10	M10-15	50 <sup>1)</sup>	0.10	T15
Medium	2-5	200-260	0.25	M10-25	35	0.25	T15
Roughing	5-10	50-220	0.40	M25-35	20	0.40	T15

1) Coated tools

### Milling

- Avoid cutting through holes/cavities
- Ensure good chip evacuation, recutting of chips may cause tool damage

MILLING	CARBIDE TOOLING			HSS TOOLING		
	SPEED (m/min)	FEED (mm/rev)	TOOL GRADE	SPEED (m/min)	FEED (mm/rev)	TOOL GRADE
Face milling	150-250	0.08-0.30	M10-30	24-40	0.08-0.20	T15
Side milling	180-240	0.08-0.30	M10-30	24-40	0.08-0.20	T15
End milling	150-220	0.05-0.20	M10-30	24-40	0.025-0.15	T15
End milling <sup>2)</sup>	50-100	0.05-0.20	M35	-	-	-

2) Solid cemented carbide

### Drilling

#### high speed steel twist drills

- Use coolant
- If possible use internal coolant through drill
- Use of cobalt high alloyed drills is preferred
- With PVD-coated HSS drills the cutting speed can be increased by 10%
- Use as short drill as possible

DRILLING <sup>3)</sup>	DIAMETER (mm)	HSS TOOLING (SPEED 17-20 m/min)	CARBIDE TOOLING (SPEED 45-80 m/min)
		FEED (mm/rev)	
	1	0.05	0.06-0.11
	3	0.10	0.07-0.14
	5	0.12	0.09-0.18
	10	0.15	0.14-0.26
	15	0.20	0.18-0.34
	20	0.30	0.20-0.40
	30	0.30	0.30-0.60

3) HSS-5%Co

### FORMING

#### Cold forming

PRODEC® products can be readily formed and fabricated with the full range of cold forming operations. They can be used in heading, drawing, bending, and upsetting. Cold forming operations will increase the strength and hardness of the material, and may leave it slightly magnetic.

#### Hot forming

PRODEC® 303/4305, PRODEC® 304L/4307, and PRODEC® 316L/4404 can be forged in the 925–1200 °C/1700–2200 °F range. For maximum corrosion resistance, forgings should be annealed at a minimum temperature of 1030°C/1900 °F and then water quenched or rapidly cooled by other means after hot forming operations.

#### Welding

PRODEC® 304L/4307 is readily weldable with the full range of conventional welding methods with the exception of oxyacetylene. AWS E308/ER308 or E308L/ER308L filler metals should be used, but molybdenum-containing austenitic stainless steel filler metals may also be considered. After welding, it may be necessary to fully anneal to restore the corrosion resistance lost by sensitization to intergranular corrosion when chromium carbides were precipitated in the grain boundaries in the weld heat-affected zone (HAZ).

PRODEC® 316L/4404 is readily welded with the full range of conventional welding methods with the exception of oxyacetylene. AWS E316L/ER316L and other low-carbon filler metals with a molybdenum content higher than that of the base metal should be used.

PRODEC® 303/4305 stainless steel is not recommended for applications requiring welding. When welding is necessary, AWS E312 filler metal may be considered. An alternative product for parts requiring welding is PRODEC® 304L/4307.

### STANDARDS AND APPROVALS

The most commonly used international product standards are given in the table below.

#### Standards

- EN 10088-3
- EN 10088-5
- EN 10272
- ASME SA479
- ASTM A479/479M
- ASTM A276
- ASTM A555
- ASTM A493

#### Certificates and approvals

Marcegaglia Stainless Sheffield meets the most common certifications and approvals:

- AD 2000 Merkblatt
- Approval of Material Manufacturers
- Factory Production Control Certificate
- ISO 9001
- ISO 14001
- ISO 50001
- ISO 45001
- Pressure Equipment Directive (PED)



# MACHINING GUIDELINE FOR PRODEC® 304L/4307 AND PRODEC® 316L/4404

PRODEC® 304L/4307 and PRODEC® 316L/4404 are special variants of standard Types 304 (UNS S30400) / 304L (UNS S30403) and 316 (UNS S31600) / 316L (UNS S31603) respectively with enhanced metallurgy for better machinability. The general rules for machining stainless steel also apply to the PRODEC® grades.

The difference is that PRODEC® grades enable a **longer tool life and/or tougher machining conditions**. The machining window illustrated on the right gives a demonstration of this.

Other fabrication operations such as welding, hot working and cold working can be performed in the same way as for standard 304L/4307 and 316L/4404.

## Turning

- The machine and setup must be rigid
- Use shortest possible tool length
- Use coolant
- Use smallest possible nose radius to avoid vibrations

## Milling

- Avoid cutting through holes/cavities
- Ensure good chip evacuation, recutting of chips may cause tool damage

## Drilling

### high speed steel twist drills

- Use coolant
- If possible use internal coolant through drill
- Use of cobalt high alloyed drills is preferred
- With PVD-coated HSS drills the cutting speed can be increased by 10%
- Use as short drill as possible

TURNING	CARBIDE TOOLING				HSS TOOLING		
	DEPTH OF CUT OR WIDTH (mm)	SPEED (m/min)	FEED (mm/rev)	TOOL GRADE	SPEED (m/min)	FEED (mm/rev)	TOOL GRADE
Finishing	-2	260-280	0.10	M10-15	50 <sup>1)</sup>	0.10	T15
Medium	2-5	200-260	0.25	M10-25	35	0.25	T15
Roughing	5-10	50-220	0.40	M25-35	20	0.40	T15

1) Coated tools

MILLING	CARBIDE TOOLING			HSS TOOLING		
	SPEED (m/min)	FEED (mm/rev)	TOOL GRADE	SPEED (m/min)	FEED (mm/rev)	TOOL GRADE
Face milling	150-250	0.08-0.30	M10-30	24-40	0.08-0.20	T15
Side milling	180-240	0.08-0.30	M10-30	24-40	0.08-0.20	T15
End milling	150-220	0.05-0.20	M10-30	24-40	0.025-0.15	T15
End milling <sup>2)</sup>	50-100	0.05-0.20	M35	-	-	-

2) Solid cemented carbide

DRILLING <sup>3)</sup>	DIAMETER (mm)	HSS TOOLING (SPEED 17-20 m/min)	CARBIDE TOOLING (SPEED 45-80 m/min)
		FEED (mm/rev)	
	1	0.05	0.06-0.11
	3	0.10	0.07-0.14
	5	0.12	0.09-0.18
	10	0.15	0.14-0.26
	15	0.20	0.18-0.34
	20	0.30	0.20-0.40
	30	0.30	0.30-0.60

3) HSS-5%Co

OTHER MACHINING OPERATIONS	CARBIDE TOOLING			HSS TOOLING		
	SPEED (m/min)	FEED (mm/rev)	TOOL GRADE	SPEED (m/min)	FEED (mm/rev)	TOOL GRADE
Cut-off	100-150	0.05-0.15	M30	24	0.05	T15
Reaming	50	0.10-0.40	M10-M30	10-15	0.10-0.40	T15
Tapping	-	-	-	5-13	-	-
Threading singel insert	90-130	-	M10-M30	15-20	-	T15
Drilling indexable insert	200-250	0.06-0.12	Center M30 Periferi M10	-	-	-

## OTHER MACHINING OPERATIONS

### Cut-off

- Reduce feed by 50% approximately 6mm from the center

### Reaming

- Type of coolant: emulsion or cutting oil

### Tapping

- For blind holes use spiral flute grinding for good chip evacuation
- For through holes use spiral point grinding with gun nose to push the chips forward

### Threading single insert

- Full profile insert for high quality thread forms
- V-profile insert – threading with minimum tool inventory
- Multipoint insert for economic threading in mass production

### Drilling indexable insert

- Cutting data is very dependent on the drill design. Hence, the manufacturers recommendations must be considered

Master every machining operation with confidence

### Product forms

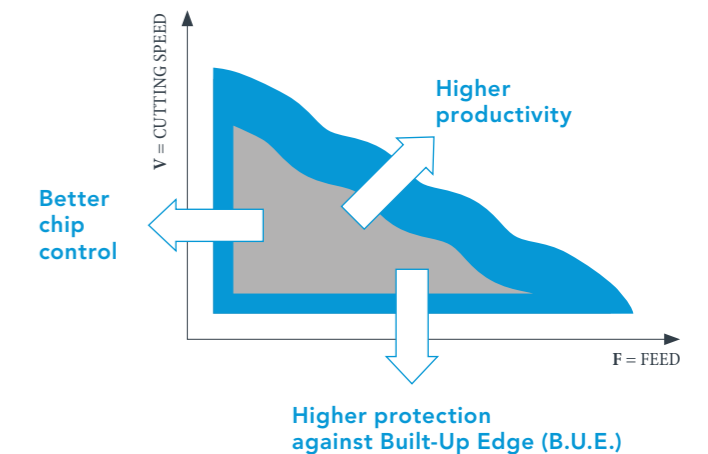
PRODEC® 304L/4307 and PRODEC® 316L/4404 are available as **round**, **hexagon** and **square bars**.

### Machining guidelines

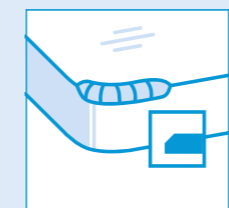
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It is possible to end up in a range somewhat outside the values indicated in the tables depending on the actual machine set-up.

<b>PRODEC®</b>	Standard
304L/4307 & 316L/4404	304L/4307 & 316L/4404

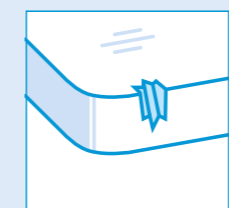


## TROUBLESHOOTING



### FLANK WEAR

For longer tool life – reduce cutting speed or use a harder insert.



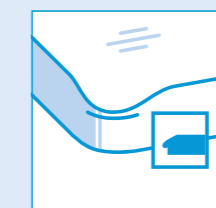
### NOTCH WEAR

Notch wear is a common wear mechanism when machining stainless steel. Increased cutting speed will reduce notch but increase flank wear. If possible, use an insert with smaller entering angle 60-80 degrees or variable cutting depth or softer insert grade.



### BUILT-UP EDGE (B.U.E.)

Built-up edge occurs when the cutting speed is too low and the stainless steel tends to stick to the tool (in milling the chips stick to the tool). To avoid – increase cutting speed or use another coating.



### PLASTIC DEFORMATION

To avoid – reduce either cutting speed, feed or use a harder insert.



### LONG CHIPS

To avoid – increase feed or use an insert with smaller chip breaker.

# MACHINING GUIDELINE FOR PRODEC® 303/4305

PRODEC® 303/4305 is a fully resulfurized free-machining austenitic stainless steel.

The PRODEC® brand name means this steel has been specially melted and treated by Marcegaglia's proprietary ladle metallurgy techniques to maximize machinability while retaining good mechanical properties, corrosion resistance, and forming characteristics.

This free cutting stainless steel gives you **faster machining, longer tool life, better tolerances, superior machined surface quality, and reduced scrap** losses compared to conventionally produced EN 1.4305.

## Turning

- The machine and setup must be rigid
- Use shortest possible tool length
- Use coolant
- Use smallest possible nose radius to avoid vibrations

TURNING	CARBIDE TOOLING				HSS TOOLING		
	DEPTH OF CUT OR WIDTH (mm)	SPEED (m/min)	FEED (mm/rev)	TOOL GRADE	SPEED (m/min)	FEED (mm/rev)	TOOL GRADE
Finishing	-2	260-280	0.10	M10-15	50 <sup>1)</sup>	0.10	T15
Medium	2-5	200-260	0.25	M10-25	35	0.25	T15
Roughing	5-10	50-220	0.40	M25-35	20	0.40	T15

1) Coated tools

## Milling

- Avoid cutting through holes/cavities
- Ensure good chip evacuation, recutting of chips may cause tool damage

MILLING	CARBIDE TOOLING			HSS TOOLING		
	SPEED (m/min)	FEED (mm/rev)	TOOL GRADE	SPEED (m/min)	FEED (mm/rev)	TOOL GRADE
Face milling	150-250	0.08-0.30	M10-30	24-40	0.08-0.20	T15
Side milling	180-240	0.08-0.30	M10-30	24-40	0.08-0.20	T15
End milling	150-220	0.05-0.20	M10-30	24-40	0.025-0.15	T15
End milling <sup>2)</sup>	50-100	0.05-0.20	M35	-	-	-

2) Solid cemented carbide

## Drilling

### high speed steel twist drills

- Use coolant
- If possible use internal coolant through drill
- Use of cobalt high alloyed drills is preferred
- With PVD-coated HSS drills the cutting speed can be increased by 10%
- Use as short drill as possible

DRILLING <sup>3)</sup>	DIAMETER (mm)	HSS TOOLING (SPEED 17-20 m/min)	CARBIDE TOOLING (SPEED 45-80 m/min)
		FEED (mm/rev)	
	1	0.05	0.06-0.11
	3	0.10	0.07-0.14
	5	0.12	0.09-0.18
	10	0.15	0.14-0.26
	15	0.20	0.18-0.34
	20	0.30	0.20-0.40
	30	0.30	0.30-0.60

3) HSS-5%Co

OTHER MACHINING OPERATIONS	CARBIDE TOOLING				HSS TOOLING		
	DEPTH OF CUT OR WIDTH (mm)	SPEED (m/min)	FEED EX. (mm/rev)	TOOL GRADE	SPEED (m/min)	FEED (mm/rev)	TOOL GRADE
Cut-off	1.5-7.0	80-200	0.040-0.15	M30	20-40	0.030-0.080	T15
Tapping	-	-	-	-	3-35	-	-
Threading singel insert	-	90-130	-	M10-M30	3-35	-	T15
Forming	7-50	40-130	0.040-0.12	M10-M30	20-40	0.040-0.40	T15

## OTHER MACHINING OPERATIONS

### Cut-off

- Reduce feed by 50% approximately 6mm from the center

### Reaming

- Type of coolant: emulsion or cutting oil

### Tapping

- For blind holes use spiral flute grinding for good chip evacuation
- For through holes use spiral point grinding with gun nose to push the chips forward

### Threading single insert

- Full profile insert for high quality thread forms
- V-profile insert – threading with minimum tool inventory
- Multipoint insert for economic threading in mass production

### Forming

- Use coolant
- The machine and setup must be rigid
- Use shortest possible tool length

*Precision engineered  
for every step of the process* ””

### Product forms

PRODEC® 303/4305 is available as **round**, **hexagon** and **square bars**.

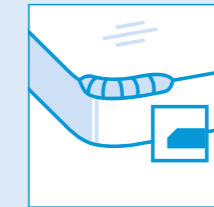
### Machining guidelines

The cutting parameters in this guideline will work under normal cutting conditions. It is suggested to begin with cutting parameters in the ranges indicated in the tables and then to improve parameters by moving to higher or lower speed, feed or depth of cut until best performance is reached.

It is possible to end up in a range somewhat outside the values indicated in the tables depending on the actual machine set-up.

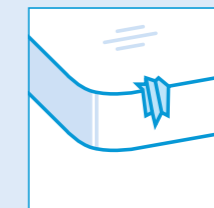


## TROUBLESHOOTING



### FLANK WEAR

For longer tool life – reduce cutting speed or use a harder insert.



### NOTCH WEAR

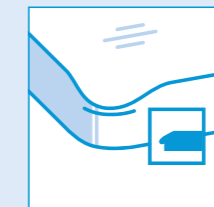
Notch wear is a common wear mechanism when machining stainless steel.

Increased cutting speed will reduce notch but increase flank wear. If possible, use an insert with smaller entering angle 60-80 degrees or variable cutting depth or softer insert grade.



### BUILT-UP EDGE (B.U.E.)

Built-up edge occurs when the cutting speed is too low and the stainless steel tends to stick to the tool (in milling the chips stick to the tool).  
To avoid – increase cutting speed or use another coating.



### PLASTIC DEFORMATION

To avoid – reduce either cutting speed, feed or use a harder insert.



### LONG CHIPS

To avoid – increase feed or use an insert with smaller chip breaker.

# BACKED BY INDUSTRIAL LEADERSHIP

Since 1959, Marcegaglia has transformed steel into competitive advantage. Today, the Group is a **leading global player in steel processing**, with 36 plants across 4 continents, 7,800 employees and 15,000 customers globally.

Marcegaglia **PRODEC®** is melted in **Sheffield (UK)**, the historic home of stainless steel since 1913, ensuring **fully European steel origin**. It is then rolled and finished into bars at plants in **Sheffield** and **Richburg**, South Carolina (USA).

With direct control over primary steel production and through entire value chain, Marcegaglia combines metallurgical expertise, industrial scale and technological leadership, optimizing machinability across every step of the production process.

This is the industrial power behind Marcegaglia **PRODEC®**, so that you can raise the bar of your machining performance.



Marcegaglia Stainless Sheffield, UK

*An ecosystem built  
for reliability  
and long-term partnership* ””

*Availability that supports  
your production planning* ””



In advanced manufacturing environments, every variable matters: from material selection to tool wear progression, spindle stability and surface integrity.

For manufacturers operating at the highest standards, Marcegaglia **PRODEC®** delivers measurable advantages where it matters most: speed, consistency and reliability.

*raising the bar  
of your machining* ””



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