

Product information

Soft Stainless Damascene Steel, 95x.x

958.0

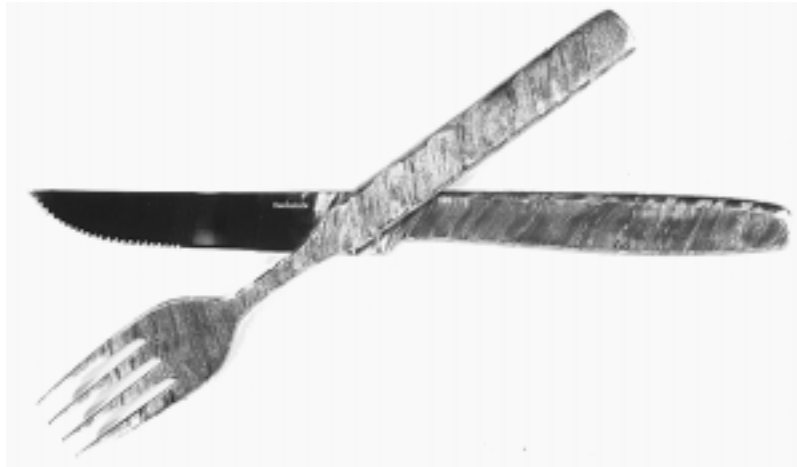
A soft Stainless Damascus Steel for soft applications



For Jewelry, Table cutlery, Fittings, Wrist watches etc.

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AUSTENITIC STAINLESS DAMASCENE STEEL

GRADES

	C	Si	Mn	Cr	Ni	Mo	%
I. 316L Bright colour	<.03	.50	.50	17	12	2.5	
II. 304L Dark etching	<.03	.50	.50	18	9	-	

FORGING

Temperature 1160 - 950 Deg C (2120 - 1800 Deg F)

Compared to normal low alloy carbon steels, stainless steel has higher, almost doubled deformation stresses. Hand forging must therefore be performed on relatively small dimensions. A good control of the heating temperature is needed. Electric or gas fired furnace is recommended.

Long heating times at temperature above 850 Deg C (1580 Deg F) leads to scale formation.

After the last forging step, a rapid cooling in air or water will prevent reduced corrosion resistance in the grain boundaries. Otherwise, a quench-annealing is recommended.

QUENCH ANNEALING

If the material has been cooled too slowly after a hot forming or a welding operation, quench annealing should be performed. Undesirable precipitations will then be dissolved and because of the rapid cooling they will not precipitate again.

Annealing temperature 1060 Deg C (1920 Deg F). Rapid cooling in water or air.

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MATERIAL PROPERTIES

The bar material delivered from DAMASTEEL has the following approximate properties.

Rp 0,2 MPa	Rm MPa	A5 %	Hardness HV
280	585	45	165



COLD WORKING

Like the conventional austenitic stainless steels the cold working ductility is good.

This has the advantage that a patterning step by ex. forging can sometimes be performed in the cold condition.



WELDING

The austenitic stainless steels possess very good weldability. Welding electrodes and wire of the 316 type should be used. Example Avesta 316L/SKR electrode and Avesta 316L-Si/SKR-Si wire.

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MACHINING

Like the conventional austenitic stainless steels, the austenitic damascene steel has some specific machinability properties.

- * Low tensile strength but a strong work hardening.
- * Tendencies for build up on the tool edge.
- * Tough and stringy chips, can be prevented by using chip curler tools.

Heavier feeds and slower speeds are used for machining the austenitic materials than are used for carbon steels. This reduces the work hardening and the tool edge build-up.

Turning

	High Speed Steel		Cemented carbide				
	Rough	Fine	Rough	M20	Fine	M01	M10
	M10	M20	M30	M01	M10		
Cutting speed m/min	10 - 15	15 - 20	80 - 90	65 - 75	50 - 60	90 - 150	90 - 105

Milling

	Rough		Fine	
	Speed m/min	Feed mm/rev	Speed m/min	Feed mm/rev
Face milling				
HSS tool	28	.15	36	.25
Carbide tool	98	.15	131	.20
End milling				
HSS tool Dia 6	25	.025	25	.012
12	25	.05	25	.025
19	25	.075	25	.05
25 - 50	25	.10	25	.075
Carbide tool				
Dia 6	82	.025	107	.012
12	82	.05	107	.025
19	82	.075	107	.05
25 - 50	82	.10	107	.10

Drilling.

High Speed Steel Drills. Cutting speed 6 - 12 m/min.

Hole diameter mm	1 - 5	5 - 10	10 - 20	20 - 40	40 - 60
Feed mm/rev.	.01 - .06	.06 - .12	.12 - .20	.20 - .26	.26 - .30

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GRINDING AND POLISHING

Normal grinding and polishing procedures for austenitic stainless can be used also for the damascene steel.

Grinding wheel recommendation: Silicon Carbide, 46 mesh, soft, open density, ceramic bonded. (C46J6V)

Speed: 35 m/sec

Feed: .01 - .05 mm/stroke

Speed of the work piece may be 1/60 of the grinding speed.

Abrasive belt grinding:

Application	Belt type	Mesh	Speed m/sec	Lubrication
Bar or coil				
Rough grinding	Al2O3	60 - 80	20 - 27	Grease
Fine grinding	"	80 - 100	19 - 22	"
Polishing	"	100 - 320	20 - 27	"
Forks knives spoons				
Fine grinding	"	80	28	"
Polishing	"	150 - 220	28	"



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ETCHING

Etching is done to develop the patterns on the finished piece.

The best conditions for etching are good polished surfaces carefully degreased.

The work piece is preferably dipped into the etching acid.

After etching the piece must be carefully cleaned in water.

A final cleaning with brush and soap eliminates the risk for acid rests.

	Etching Acid		Approx. time minutes	Etching colour	
				316L	304L
I	Water	60 %	5 - 10	Bright	Dark Grey
	H ₂ SO ₄	40 %			
	Soap	0,1 %			
II	Water	63 %	4 - 5	Bright	Black
	H ₂ SO ₄	30 %			
	HClO ₄	7 %			
III	Water	60 %	3 - 10	Bright	Deep relief Grey
	HCl	30 %			
	HNO ₃	10 %			
IV	Water	75 %	5 - 10	Bright	Black
	HCl	14 %			
	alcohol	11 %			
	Addition Fe(III)Cl 10 g/l				
	Cu(II)Cl 10 g/l				

Alternative I and IV react slowly, and an increased temperature may be needed.

The second II and the third III alternatives give a heavier attack and deeper relief, but unhealthy gases are formed.

If the surfaces still have oxides from the heat treatment, pit corrosion may occur.

The acids must be handled with care.

