



**M/s: SEVEN EIGHT CO.**

**SPECIFICATION MATERIAL 440C**

**HAIRDRESSER SCISSORS STAINLESS STEEL**

Grade 440C is capable of attaining, after heat treatment, the highest strength, hardness and wear resistance of all the stainless alloys. It's very high carbon content is responsible for these characteristics, which make 440C particularly suited to such applications as ball bearings and valve parts.

Grades 440A and 440B are identical except for slightly lower carbon contents (0.60 - 0.75% and 0.75 - 0.95% respectively); these have lower attainable harnesses but slightly higher corrosion resistances. Although all three versions of this grade are standard grades, in practice 440C is more available than the A or B variants.

A free-machining variant 440F (UNS S44020) also exists, with the same high carbon content as 440C. Again this grade is not readily available in Australia.

Martensitic stainless steels are optimized for high hardness and other properties are to some degree compromised. Fabrication must be by methods that allow for poor weld ability and usually also allow for a final harden and temper heat treatment. Corrosion resistance is lower than the common austenitic grades, and their useful operating temperature range is limited by their loss of ductility at sub-zero temperatures and loss of strength by over-tempering at elevated temperatures.

**Key Properties**

These properties are specified for bar product in ASTM A276. Similar but not necessarily identical properties are specified for other products such as plate and forgings in their respective specifications.

**Composition**

**Table 1.** Composition ranges for 440 grade stainless steels.

440A	min.	0.65	-	-	-	-	16.00	-	-	-
	max.	0.75	1.00	1.00	0.040	0.030	18.00	0.75	-	-
440B	min.	0.75	-	-	-	-	16.00	-	-	-
	max.	0.95	1.00	1.00	0.040	0.030	18.00	0.75	-	-

440C	min.	0.95	-	-	-	-	16.00	-	-
	max.	1.20	1.00	1.00	0.040	0.030	18.00	0.75	-

### Mechanical Properties

**Table 2.** Mechanical properties of 440C grade stainless steels.

Annealed*	758	448	14	269HB max#	-
204	2030	1900	4	59	9
260	1960	1830	4	57	9
316	1860	1740	4	56	9
371	1790	1660	4	56	9
* Annealed properties are typical for Condition A of ASTM A276					
# Brinell Hardness is ASTM A276 specified maximum for annealed 440A, B and C.					

### Physical Properties

**Table 3.** Typical physical properties for 440 grade stainless steels.

440A/B/C	7650	200	10.1	10.3	11.7	24.2	-	460	600
----------	------	-----	------	------	------	------	---	-----	-----

### Grade Specification Comparison

**Table 4.** Grade specifications for 440 grade stainless steels.

440A	S44002	-	-	SUS 440A	
440B	S44003	1.4112	X90CrMoV18	SUS 440B	
440C	S44004	-	1.4125	X105CrMo17	SUS 440C
These comparisons are approximate only. The list is intended as a comparison of functionally similar materials <b>not</b> as a schedule of contractual equivalents. If exact equivalents are needed original specifications must be consulted.					

### Possible Alternative Grades

**Table 5.** Possible alternative grades to 440 stainless steel.

440A/B	Slightly softer and more corrosion resistant grade needed
440F	High machinability required, with same hardness and hardenability as 440C
420	Lower strength and hardness needed than any of the 440 grades
416	Higher machinability required, and the much lower hardness and strength is still adequate

### Corrosion Resistance

Good resistance to the atmosphere, fresh water, foods, alkalies and mild acids. Best resistance in the hardened and tempered and passivated condition. A smooth polished surface also assists.

The corrosion resistance of grade 440C approximates that of grade 304 in many environments.

#### **Heat Resistance**

Not recommended for use in temperatures above the relevant tempering temperature, because of reduction in mechanical properties by over-tempering.

#### **Heat Treatment**

Annealing - Full anneal - 850-900°C, slow furnace cool to about 600°C and then air cool.  
Sub-critical Annealing - 735-785°C and slow furnace cool.

Hardening - Heat to 1010-1065°C, followed by quenching in warm oil or air. Oil quenching is necessary for heavy sections. Immediately temper at 150-370°C to obtain a wide variety of hardness values and mechanical properties as indicated in the accompanying table.

Tempering in the range 425-565°C is to be avoided because of reduced impact resistance and corrosion resistance. Tempering in the range 590-675°C results in lower hardness (the product become machinable) and high impact resistance.

#### **Welding**

If welding is necessary pre-heat at 250°C and follow welding with a full anneal. Grade 420 filler will give a high hardness weld (although not as high as the 440C), but 309 or 310 will produce soft welds with higher ductility.

#### **Machining**

In the annealed condition this grade is relatively easily machined; approximately the same as for high speed steel. Chips are tough and stringy so chip breakers are important. If these grades are hardened machining becomes more difficult and probably impossible.

#### **Applications**

Typical applications include:

- Rolling element bearings
- Valve seats
- High quality knife blades

- Surgical instruments
- Chisels.

### About SE&C

Our scissors feature two different stainless steel alloys in order to meet the high Japanese quality demands for sharpness and material. The combination of different hardness grades means that every pair of scissors is perfectly balanced and guarantees that the cutting edge is exceptionally durable. The unique "Ultimate Edge" SE&C scissor blades guarantee that they are a pleasure to work with and cut accurately.

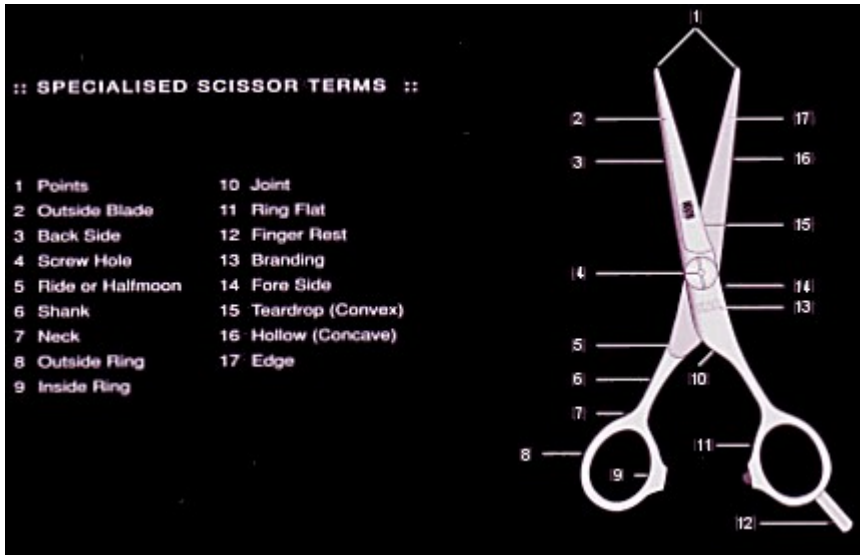


The unique manufacturing process ensures the necessary precision of the concave inner surfaces (hollow ground) and convex outer surfaces of the scissor blades. The convex-edged scissor blades are characterized by their exceptionally durable cutting edge. These blades are honed to an extremely sharp state with the inner side hollowed to such a point that the blades only touch at the point of intersection. This refined technology ensures superb cutting edge durability, while at the same time reducing cutting edge resistance to a minimum and thus considerably limiting hand fatigue.

Every pair of SE&C scissors is supplied with optimal tension settings: these do, however, occasionally need to be checked and readjusted as required, to ensure the durability of the cutting edge and to guarantee healthy ease of use. Most SE&C scissors are therefore fitted with a tension adjustable screw to ease readjustment. The patented Disc Operation Systems ensures that the SE&C Millennium and XP Series are always perfectly tensioned.



Comparison of SE&C Convex Blade and SE&C Semi-Convex Blade with conventional blade.



**:: ERGONOMIC DESIGN ::**

The SE&C Hair Styling Scissors are made in three handle configurations - offset, semi-offset and straight. With the offset handle, you can work with your shoulders straight and elbow down, using minimal wrist movements. The semi-offset is a comfortable compromise between the offset and straight models.

When working with the semi-offset or offset models, the shoulders remain straight and the elbows are not raised, putting far less strain on the wrist.



[1] straight handle



[2] semi-offset handle



[3] offset handle



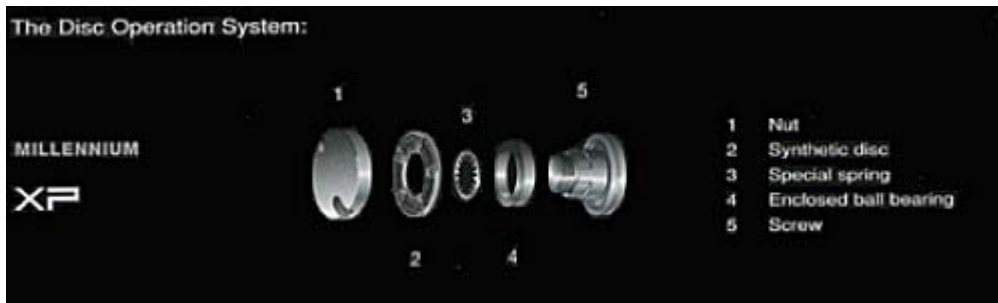
**:: THE DISC OPERATION SYSTEM ::**

The outstanding features of the SE&C Millennium and the SE&C XP-Series are their exceptional quality and their unique Disc Operation System.

This sophisticated screw system consists of an enclosed ball bearing unit, a special spring and a synthetic disc that ensures uniform pressure and incredibly smooth operation.

The enclosed ball bearing is free from collecting hair, dust and other substances from outside so that nothing may affect the precise movement of the scissors, whilst the synthetic disc between the upper and lower blades minimises friction and wear of the blades.

Thanks to this complex Disc Operation System with a replaceable synthetic disc the Millennium and the XP-Series have a considerably long life span than any conventional models.



SE&C - THE SYMBOL OF CRAFTSMANSHIP: