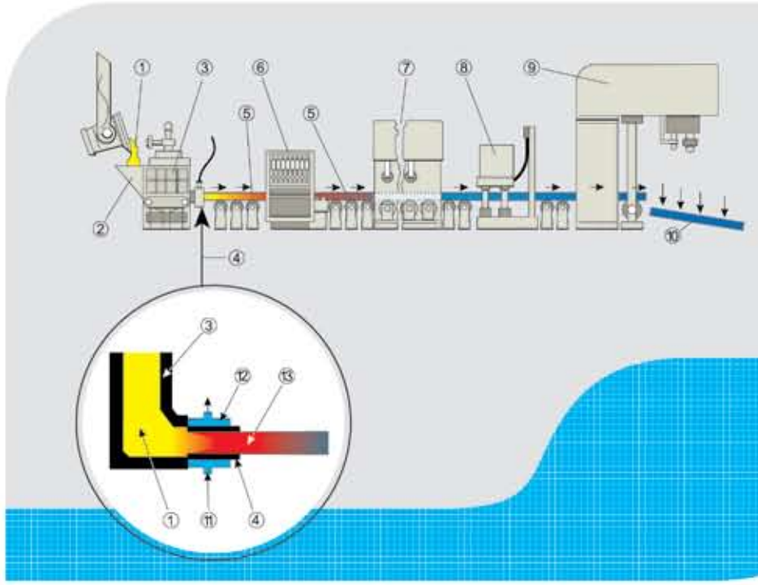
Versa-Bar® grades compared to other standards (*)

	Versa-Bar® Grade	ASTM		DIN		SAE	UNI
		A 48	A 159	1691	EN 1561	J 431	5007
Gray Iron	FC 100	20	G 1800	GG 10	EN-GJL-100	G 1800	G 10
	FC 200	30	G 2500	GG 20	EN-GJL-200	G 2500	G 20
	FC 250	35	G 3000	GG 25	EN-GJL-250	G 3000	G 25
	FC 300	40	G 3500	GG 30	EN-GJL-300	G 3500	G 35

	Versa-Bar® Grade	ASTM	DIN		SAE	UNI
		A 536	1693	EN 1563	J 434	4544
Ductile Iron	FE 40015	60-40-18	GGG 40	EN-GJS-400-15	D-4018	GS 370-17
	FE 45012	65-45-12	-	EN-GJS-450-10	D-4512	GS 400-12
	FE 50007	-	GGG 50	EN-GJS-500-7	-	GS 500-7
	FE 55006	80-55-06	-	-	D-5506	-
	FE 60003	-	GGG 60	EN-GJS-600-3	-	GS 600-2
	FE 70002	100-70-03	GGG 70	EN-GJS-700-2	D-7003	GS 700-2

(*) The information provided is only intended to be a general summary. It is important to say that materials are not equal, but similar.

Continuous Cast Process



1 - Molten Metal
2 - Filling Spout
3 - Feeding Furnace
4 - Water Cooled Graphite Die
5 - Roller Supports
6 - Control Panel
7 - Drawing Unit
8 - Cut-off machine
9 - Break-off Unit
10 - Stock Size
11 - Water inlet and outlet
12 - Water Cooling Jacket
13 - Cast Bar - VERSA-BAR®

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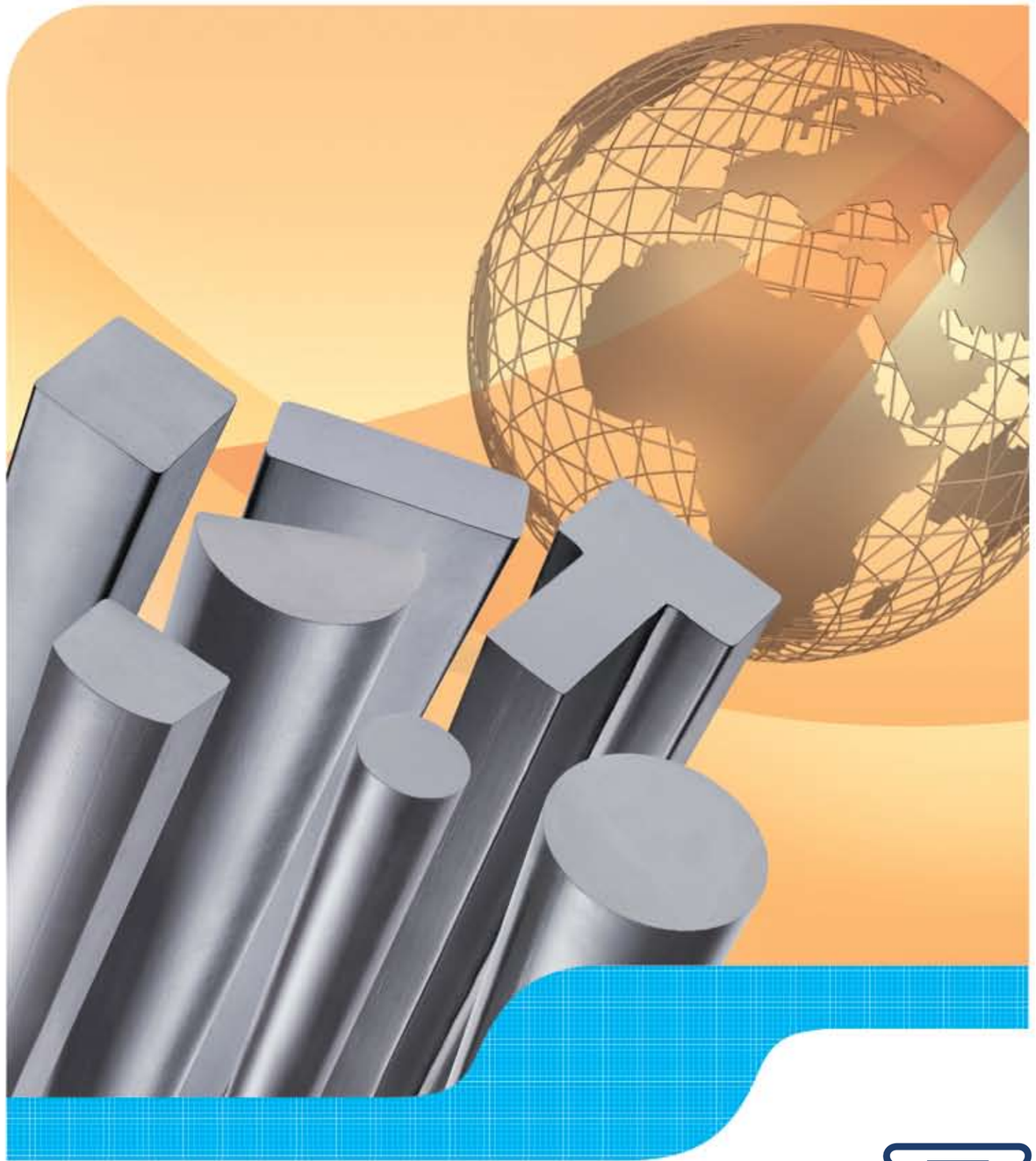
VERSA BAR®
Continuous Cast Iron Bar Stock



VERSA BAR®
Continuous Cast Iron Bar Stock

TUPY

Sizes and Shapes

Inches

Shape	Nominal Diameter	Increments	Weight Calculation (lb/in)
Round	0.625 – 4.000	0.125	d^2 x 0.20430
	4.250 – 11.000	0.250	
	11.500 – 15.000	0.500	
	16.000 – 22.875	1.000	
Square	1.125 – 4.000	0.250	w^2 x 0.26011
	4.250 – 9.000	0.500	
	9.500 – 18.500	1.000	
Rectangle	0.750 – 16.000 (height)	-	w x h x 0.26011
	1.125 – 24.000 (width)	-	

Standard length = 72″ (-1″ / + 2″)
Special sizes and shapes quoted under request.

Millimeters

Shape	Nominal Diameter	Increments	Weight Calculation (kg/m)
Round	30 – 150	5	d^2 x 0,005655
	160 – 430	10	
	450 – 600	20	
Square	30 – 100	5	w^2 x 0,0072
	110 – 300	10	
	330 – 470	30	
Rectangle	20 – 410 (height)	-	w x h x 0.0072
	30 – 610 (width)	-	

Standard length = 2.000mm and 3000mm (-0 / + 100 mm)
Special sizes and shapes quoted under request.

Typical Applications

Class 35 GJL 250	Its main characteristic is its excellent machinability, allowing high cutting speed and reduction of premature tooling wear. It is suitable for applications that require medium mechanical properties as bushings, pulleys, rings, sheaves, pattern plates, flanges, plugs, structures for machines, bearings, couplings.
Class 40 GJL 300	It presents good surface finish and leaking strength. It is suitable in applications subjected to wear such as pistons, hydraulic valves, dies, pattern plates, couplings, spacers.
60-40-18 GJS 400-15 65-45-12	The main characteristics of these materials are good machinability, excellent surface finish and very good leakage strength. They also show ultimate tensile strength and yield strength similar to steel SAE 1020/1030. They are suitable for machine components subjected to impact and resistant to cracking. They are also an excellent choice for hydraulic components that operate in high pressure such as manifolds, pistons, guides, cylinder heads, injector jackets, hydraulic pumps and dies.
GJS 500-7 80-55-06 GJS 600-3 100-70-03 GJS 700-2	These materials offer good hardenability and high mechanical properties. The ultimate tensile strength and yield strength of these materials are similar of that found on steel SAE 1040/1045. They are an excellent choice for machine components that require wear resistance and surface heat treatment response. Some examples are gears, axles, tie rod nuts, chuck bodies, piston glands, spindle housings, camshafts, valve seats, etc.

Material Properties

Properties	Diam/Height (inches) **(millimeters)**	Gray Iron		Ductile Iron					
		Class 35 GJL 250	Class 40 GJL 300	60-40-18 GJS 400-15	65-45-12	GJS 500-7	80-55-06	GJS 600-3	100-70-03 GJS 700-2
Tensile Strength (MPa)	≤ 3.000 **≤ 80**	210	250	400	450	500	550	600	700
	>3.000 ≤ 6.250 **>80 ≤ 160**	190	220	390	440	480	540	590	690
	>6.250 ≤ 11.875 **>160 ≤ 300**	170	210	380	430	470	530	580	680
	>11.875 ≤ 23.625 **>300 ≤ 600**	160	190	370	420	450	520	550	660
Yield Strength (MPa)	≤ 3.000 **≤ 80**	*	*	250	290	320	340	370	420
	>3.000 ≤ 6.250 **>80 ≤ 160**	*	*	250	280	310	330	360	400
	>6.250 ≤ 11.875 **>160 ≤ 300**	*	*	240	270	300	320	350	390
	>11.875 ≤ 23.625 **>300 ≤ 600**	*	*	240	260	290	310	340	380
Elongation (%)	≤ 3.000 **≤ 80**	*	*	15	12	7	6	3	2
	>3.000 ≤ 6.250 **>80 ≤ 160**	*	*	14	12	7	6	2	2
	>6.250 ≤ 11.875 **>160 ≤ 300**	*	*	11	10	5	5	1	1
	>11.875 ≤ 23.625 **>300 ≤ 600**	*	*	11	10	5	5	1	1
Hardness (HB)		170 - 240	200 - 290	131 - 207	131 - 217	170 - 240	187 - 269	200 - 290	235 - 310
Shear Strength (MPa)		1,5 x Tensile Strength (TS)		0,9 x Tensile Strength (TS)					
Torsion Strength (MPa)		1,5 x Tensile Strength (TS)		0,9 x Tensile Strength (TS)					
Fatigue Strength (MPa)		0,4 x Tensile Strength (TS)		0,5 x TS	0,45 x TS	0,4 x TS	0,4 x TS	0,4 x TS	0,4 x TS
Compressive Strength (MPa)		TS (140 to 175 MPa) x 4,02		1,7 x TS	1,65 x TS	1,6 x TS	1,5 x TS	1,45 x TS	1,4 x TS
		TS (176 to 210 MPa) x 3,68							
		TS (211 to 245 MPa) x 3,61							
		TS (246 to 280 MPa) x 3,39							
Impact Strength - V notched (j)		*	*	13 - 15	5 - 10	5 - 10	2 - 5	2 - 5	1 - 4
Thermal Condutivity at 300°C - (W/k.m)		46 - 49	44 - 47	36 - 37	36 - 37	35 - 36	33 - 34	32 - 33	31
Linear Expansion Coefficient - 20°C to 400°C (microns/m.k)		10 - 12,5		10 - 12,5					
Poisson's ratio		0,26		0,275					
Max. Magnetic Permeability (microhoms/m)		310 - 380		2140	2140	1600	1100	870	500
Hysteresis los (B= 1T) - (J/m³)		2500 a 3000		600	600	1300	1600	2200	2700
Heat Treat Responde (HRC)		45 - 55		45 - 55					