Characteristic Values of Sanalloy Grades

WC Grain Size	Characteristics: Corrosion Resistance	Wear-Resistance	Impact Resistance	Seizure Resistance	Chipping Resistance	High-Fracture Toughness	Hot Forging	Non Magnetic	Grades Classification Symbol	Grades	Specific Gravity	Hardness HRA	Hardness HV	Transverse Rupture Strength GPa	Compressive Strength GPa	Fracture Toughness MPa·m$^{1/2}$	Young's Modulus GPa	Poisson's Ratio	Coefficient of Thermal Expansion MK^{-1}	Coefficient of Thermal Conductivity W/m·k	Applications
Ultrafine Grain	○	○			○				VF-10	**RF06**	14.85	93.5	1820	3.2	6.0	11	620	0.21	5.1	79	Nozzles, Plugs, Drawing dies, Bushes, Plungers, Various gauge blocks, Cutting blades, Slitters, Progressive dies, Press-forming dies, Powder compacting dies, Dies for molding resins and glass, Blanking punches, Punches for deep drawing, Dies for deep drawing, Bending dies
	○	○			○				VF-30	**RF10**	14.55	91.5	1510	3.3	5.5	14	590	0.21	5.3	75	
	○	○			○				VF-40	**RF20**	14.00	90.0	1350	3.5	5.3	16	540	0.22	5.5	71	
	○	○			○				-	**RF30**	13.50	88.0	1160	3.5	5.1	17	490	0.23	5.7	68	
	○	○		○	○				VF-30	**PRF9N**	14.55	91.5	1510	3.0	5.5	13	590	0.21	5.3	75	Nozzles, Cutting blades, Progressive dies, Press-forming dies, Powder compacting dies, Blanking punches, Slitters, Drawing dies, Bushes, Dies for deep drawing, Bending dies
	○	○		○	○				VF-40	**PRF14N**	14.00	90.0	1350	3.5	5.3	15	540	0.22	5.5	71	
	○	○							VF-20	**FD25**	13.90	92.0	1570	3.9	5.9	11	550	0.22	5.5	71	Nozzles, Plugs, Drawing dies, Bushes, Plungers, Various gauge blocks, Cutting blades, Slitters, Progressive dies, Press-forming dies, Powder compacting dies, Dies for molding resins and glass, Blanking punches, Punches for deep drawing, Dies for deep drawing
		○							VF-30	**FD15**	14.25	91.0	1450	3.3	5.4	12	560	0.22	5.3	71	
	○	○							VF-40	**FRT15**	14.10	90.5	1400	3.3	5.2	14	550	0.22	5.5	71	
Microfine Grain		○							VF-20	**DA10**	15.00	92.5	1640	3.0	5.9	11	630	0.21	4.8	79	
		○					○		VF-20	**KA10**	14.85	92.5	1640	2.8	5.8	11	630	0.21	4.8	79	General cutting tools, Powder compacting dies
		○					○		VF-30	**KA20**	14.75	91.5	1510	2.5	5.4	12	620	0.21	5.0	75	
	○							○	NF-30	**NA20**	14.35	91.0	1450	3.3	4.9	12	570	0.22	5.1	71	Nozzles, Seal rings, Powder compacting dies, Corrosion-resistant molds, Nonmagnetic molds, Dies for molding resins and glass
	○							○	NF-40	**NA30**	13.90	89.5	1300	3.6	4.7	14	540	0.23	5.4	67	
Fine Grain	○	○							VM-30	**RD20**	14.75	91.5	1510	2.9	5.5	14	610	0.21	5.0	79	Nozzles, Plugs, Drawing dies, Bushes, Guides, Center tips, Various gauge blocks, Cutting blades, Slitters, Guide rolls, Progressive dies, Press-forming dies, Powder compacting dies, Punches, Blanking punches, Punches for deep drawing, Dies for deep drawing, Bending dies
	○	○							VM-30	**RD25**	14.55	91.0	1450	3.3	5.3	15	590	0.21	5.1	75	
	○	○							VM-40	**RD30**	14.30	90.0	1350	3.5	5.2	16	570	0.22	5.2	75	
	○	○							VM-40	**RD50**	14.00	89.0	1250	3.7	4.8	17	540	0.23	5.4	71	
	○	○							VM-50	**RD60**	13.70	88.0	1160	3.5	4.4	18	520	0.23	5.6	69	
	○	○		○					VM-30	**PRD9N**	14.55	91.0	1450	3.0	5.3	15	590	0.21	5.1	75	Nozzles, Drawing dies, Bushes, Guide rolls, Progressive dies, Press-forming dies, Powder compacting dies, Punches, Blanking punches, Punches for deep drawing, Dies for deep drawing, Bending dies, End-surface reforming dies
	○	○		○					VM-40	**PRD14N**	14.00	89.0	1250	3.5	4.8	17	540	0.23	5.4	71	
	○	○		○					VM-50	**PRD20N**	13.40	87.0	1070	3.2	4.0	19	490	0.24	5.8	67	
Medium Grain	○	○	○						-	**REA25**	14.95	91.0	1450	2.6	5.1	15	620	0.21	4.8	79	Drawing dies, Bushes, Slitters, Crushing tools, Reforming rolls, Guide rolls, Press-forming dies, Powder compacting dies, Punches, Dies for deep drawing, Header dies, Former dies
	○	○	○						VC-40	**REA35**	14.50	89.0	1250	3.3	4.7	17	580	0.22	5.2	75	
	○	○	○						VC-50	**REA65**	13.90	87.0	1070	3.4	4.2	21	530	0.23	5.6	71	
	○	○	○						VC-60	**REA75**	13.40	85.5	970	3.2	3.6	25	490	0.24	6.1	67	
	○	○	○						VC-70	**REA85**	13.00	83.5	860	3.0	3.4	28	440	0.24	6.5	63	
		○	○				○		VC-50	**KEA45**	14.40	88.0	1160	3.0	4.2	16	550	0.22	5.5	71	Dies for warm/hot forging, Valve molds, Crushing dies, Sizing dies
Coarse Grain	○		○						VU-50	**RV46**	14.55	88.0	1160	3.1	4.3	21	580	0.22	5.2	75	Crushing tools, Milling rolls, Reforming rolls, Dies for hot forging, Punches, Header dies, Former dies
	○		○						VU-60	**RV56**	14.15	86.5	1040	2.8	4.1	23	550	0.22	5.5	71	
	○		○						VU-60	**RV66**	13.95	86.0	1000	2.8	3.9	25	530	0.23	5.6	71	
	○		○						VU-70	**RV76**	13.55	84.5	910	2.7	3.6	27	490	0.23	6.1	67	
	○		○						VU-70	**RV86**	13.25	83.5	860	2.7	3.4	28	460	0.24	6.3	67	
	○		○						VU-70	**RL89**	13.50	83.0	840	2.5	3.4	30	480	0.24	6.2	67	
	○		○			○			VU-40	**RX71**	14.85	90.0	1350	2.2	4.8	18	610	0.21	4.8	79	Blanking punches, Backward punches, Deformed punches, Deformed dies such as spiders and bevel gears, Various forging dies such as diff-pinion and pinion-gears
	○		○			○			VU-50	**RX92**	14.45	87.5	1110	2.8	4.5	24	570	0.22	5.3	74	
	○		○			○			VU-60	**RX73**	14.25	86.5	1040	2.5	4.2	25	550	0.22	5.4	73	
	○		○			○			VU-70	**RX75**	13.70	84.5	910	2.4	3.8	28	500	0.24	6.0	68	
	○		○			○			VU-70	**RX94**	13.10	82.5	810	2.4	3.4	32	450	0.24	6.5	63	
	○		○			○			VU-80	**RX95**	12.80	81.0	770	2.2	3.2	35	410	0.25	6.6	61	
	○		○	○		○			VU-40	**PRV6N**	14.85	90.0	1350	2.4	4.8	18	610	0.21	4.8	79	Crushing tools, Progressive dies, Deformed punches, Deformed dies
	○		○	○		○			VU-60	**PRV12N**	14.25	86.5	1040	2.5	4.2	25	550	0.22	5.4	73	
	○		○	○		○			VU-70	**PRV18N**	13.70	84.5	910	2.4	3.8	28	500	0.24	6.0	68	
	○		○	○		○			VU-70	**PRV24N**	13.10	82.5	810	2.3	3.4	32	450	0.24	6.5	63	
	○		○			○	○		RU-60	**WM7**	14.40	85.0	940	2.1	3.9	23	570	0.22	5.6	71	Hot milling rolls, Dies for warm/hot forging, Blanking punches, Crushing dies, Sizing dies
	○		○			○	○		RU-70	**WX80**	13.70	83.0	840	2.4	3.5	26	510	0.24	6.1	66	

※ All data shown above are typical values, not guaranteed ones. We will not compensate any losses and damages caused by using any or entire part of the data. We reserve the right to modify the data without previous notice.

※ Grade Classification Symbol is quoted from JIS (Japanese Industrial Standards) B 4054：2020