



TABLE 1: Standard Cobalt & Nickel base alloys - Nominal Compositions, weight %.

	Co	Cr	C	W	Mo	Ni	Si	B	Fe	Mn	Others
STELLITE 1	BAL	33	2.45	13	-	2.5*	1	-	2.5*	1	-
STELLITE 3	BAL	31	2.5	13	-	2.5*	1	-	2.5*	1	-
STELLITE 4	BAL	31.5	1	14	-	2.0*	1	-	2.0*	1	-
STELLITE 6	BAL	28	1.20	5	-	3.0*	1	-	2.5*	1	-
STELLITE 12	BAL	29	1.85	9	-	2.5*	1	-	2.5*	1	-
STELLITE 20	BAL	33	2.45	17.5	-	2.5*	1	-	2.5*	1	-
STELLITE 21	BAL	27	0.25	-	5.5	2.5*	1	-	3.0*	1	-
STELLITE 31	BAL	26	0.5	7.5	-	10.5	1	-	2.0*	1	-
STELLITE 190	BAL	26	3.30	14	-	1.0	1	-	8.0	0.5	-
STELLITE 238	BAL	26	0.1	-	3	-	1	-	20.0	1	-
STELLITE 306	BAL	25	0.4	2	-	6.0	1	-	4.0*	1	Nb=5
STELLITE 694	BAL	28	1	19	-	5.0	1	-	2.5*	1	V=1
STELLITE F	BAL	25.5	1.75	12.25	-	22.5	1	-	1.5*	-	-
STELLITE SF1	BAL	19	1.3	13	-	13	3	2.5	3*	0.5	Cu=0.5
STELLITE SF6	BAL	19	0.7	7	-	13	2.5	1.7	3*	0.5	Cu=0.5
STELLITE SF12	BAL	19	1	9	-	13	3	2	3*	0.5	Cu=0.5
STELLITE SF20	BAL	19	1.5	15	-	13	3	3	2*	0.5	Cu=0.5
TRIBALLOY T400	BAL	8	0.1*	-	28	3*	2.4	-	3*	-	-
TRIBALLOY T800	BAL	17	0.1*	-	28	3*	3.2	-	3*	-	-
DELORO 15	-	-	0.06*	-	-	BAL	2.0	1.05	1.5*	-	Cu=20
DELORO 22	-	0.70	0.10	-	-	BAL	2.3	1.75	-	-	-
DELORO 40	-	07.0	0.10	-	-	BAL	3.5	2.25	-	-	-
DELORO 50	-	10.25	0.45	-	-	BAL	4.0	1.85	4.0	-	-
DELORO 60	-	14.25	0.6	-	-	BAL	2.0	3.5	4.0	-	-
DELORO 625	-	22	0.1	-	9	BAL	-	-	5	-	-
NISTELLE C	-	16.5	0.12*	4.5	17	BAL	0.7	-	6.0	-	-
TRIBALLOY T700	-	15	0.10*	-	32	BAL	3.25	-	-	-	-

* Indicates maximum permitted.



PROPERTIES AND TYPICAL APPLICATIONS OF ALLOYS

Each family in the **DELORO STELLITE** range of surfacing alloys is formulated from a range of elemental compositions. Each having specific properties, allowing the optimum characteristics to be selected for any given application.

The **STELLITE** Family - **Cobalt base** alloys.

There are more than twenty **STELLITE** alloys in regular production.

Cobalt base alloys are resistant to corrosion, erosion, abrasion and galling, retaining these properties at high temperatures. They exhibit a high degree of hardness up to 800°C. The most widely used alloys, and some of their typical applications are:

STELLITE 1

Excellent resistance to abrasion, good corrosion resistance; used for pump sleeves and expeller screws.

STELLITE 4

Resistance to severe abrasion and corrosion; and in the manufacture of dry cell batteries.

STELLITE 6

Excellent resistance to cavitation and erosion, outstanding self-mating, anti galling characteristics; used for valve seats, plugs, pumps, bearings, shafts, erosion shields, rotors, etc.

STELLITE 12

High bulk hardness and resistance to abrasion; used for cutting edges in the carpet, timber and plastic industries.

STELLITE F

High corrosion resistance and wear resistant properties; used for valve seat facings in internal combustion engines.

STELLITE 21

Excellent high temperature strength, combines resistance to galling, cavitation, erosion and corrosion with toughness and work hardening properties; used extensively in the forging industry.

STELLITE 31

Microstructural stability at elevated temperatures; used for gas turbine components, mating faces of steam valves.

STELLITE 190

Extremely high anti-abrasive properties; used for journals of tri-cone rock bits.

STELLITE 238

Good hot hardness and excellent resistance to thermal and mechanical shock; ideal forging die material.

STELLITE 306

Similar wide range of properties to **STELLITE 6**, together with improved ductility for surfacing large areas, such as bearings and shafts.

STELLITE 694

High matrix strength and stability at elevated temperatures, such as in gas turbines; used for turbine blade interlocking surfaces.

Stellite®

SURFACING TECHNIQUES

Comparative Average Hardness, Room Temperature

	Average Hardness, Rockwell C		
	Tungsten Inert	Oxy-acetylene*	Manual Metal
	Gas**		Arc**
STELLITE 1	54	53	52
STELLITE 4	48	47	-
STELLITE 6	40	42	39
STELLITE 12	47	48	40
STELLITE 20	53	55	-
STELLITE 190	52	52	-
STELLITE 21	27 (45+)	-	26 (45+)
STELLITE 238	-	-	23
STELLITE 306	36	-	-
STELLITE 694	50	-	-
NISTELLE C	20	-	15
DELORO 40	41	-	-
DELORO 50	51	48	-
DELORO 60	57	56	-
STELLITE F	38	39	-

* One layer deposit ** Two layer deposit + Work hardened

Comparative Average Hot Hardness, DPH (kg/mm²)*

	Surfacing Process	Test Temperature, Deg. C (Deg F)				
		RT+	800 (427)	1000 (538)	1200 (649)	1400 (760)
STELLITE 1	Oxy-acetylene	620	475	440	380	260
STELLITE 1	Tungsten Inert Gas	620	510	465	390	230
STELLITE 4	Tungsten Inert Gas	530	475	430	370	290
STELLITE 6	Oxy-acetylene	450	350	295	265	180
STELLITE 6	Tungsten Inert Gas	390	300	275	260	185
STELLITE 12	Tungsten Inert Gas	535	345	325	285	245
STELLITE 20	Tungsten Inert Gas	745	525	435	355	245
STELLITE 190	Tungsten Inert Gas	595	355	305	295	255
STELLITE 21	Tungsten Inert Gas	300	200	185	140	110
STELLITE 238	Manual Metal Arc	210	185	180	175	75
STELLITE 306	Tungsten Inert Gas	330	190	180	165	140
STELLITE 694	Tungsten Inert Gas	440	355	320	310	220
NISTELLE C	Tungsten Inert Gas	195	190	185	170	145
DELORO 40	Tungsten Inert Gas	425	340	255	215	90
DELORO 50	Tungsten Inert Gas	530	440	575	375	-
DELORO 60	Tungsten Inert Gas	585	-	-	-	-
STELLITE F	Tungsten Inert Gas	380	275	265	250	195

+ Tested in vacuum furnace, hot-hardness unit, 1590 g load with sapphire indenter.

* Measured with Kentron unit 1590 g load with diamond indenter.