

Tabla Materiales

Grupo Group Groupe	Subgrupo Subgroup S. Groupe	Materiales Materials Matériaux	Dureza Hardness Dureté (HRC)	Dureza Hardness Dureté (HB)	Tracción Tension Traction (N/mm ²)
P	P.1	Aceros Construcción - Aceros Cementación Structural Steels - Case Hardening Steels Aciers de construction - Aciers supérieurs	<24,5	<250	<850
		Aceros al Carbono No Aleados - Aceros Bonificados Unalloyed Carbon Steels - Heat-Treatable Steels Aciers au carbone sans alliage - Aciers supérieurs			
	P.2	Aceros Aleados Alloyed Steels Aciers alliés	<31,6	<300	<1000
	P.3	Aceros Aleados Tratados - Aceros Bonificados Heat-Treatable Alloyed Steels Aciers alliés supérieurs	31,6-42,8	300-400	1000-1300
	P.4	Materiales resistentes al desgaste Wear-Resistant Materials Matériaux résistant à l'usure	42,8-50,8	400-500	1300-1800
	P.5	INOX Ferríticos-Martensíticos Ferritic-Martensitic Stainless INOX ferritiques-martensitiques	<34	<320	<1100
M		INOX Austeníticos Austenitic Stainless INOX austénitiques	<24,5	<250	<850
K	K.1	Fundición Gris Grey Cast Iron Fonte grise		<200	<700
	K.2	Fundición Nodular Nodular Cast Iron Fonte nodulaire	<31,6	>200<300	>700<1000
S		Aleaciones Termorresistentes (Titanio, Inconel...) Heat-Resistant Alloys (Titanium, Inconel...) Alliages thermorésistants (Titane, Inconel...)			
N	N.1	Cobre - Bronce - Latón Viruta Corta Copper - Bronze - Brass (Short Chip) Cuivre - Bronze - Laiton (Copeaux courts)		<200	<700
	N.2	Cobre - Bronce - Latón Viruta Larga Copper - Bronze - Brass (Long Chip) Cuivre - Bronze - Laiton (Copeaux longs)		<200	<700
	N.3	Al - Mg No Aleado Unalloyed Al - Mg Al - Mg Sans alliage		<100	<350
	N.4	Aleaciones Al Si < 10% Al Alloys Si < 10% Alliages Al Si < 10%		<180	<600
	N.5	Aleaciones Al Si > 10% Al Alloys Si > 10% Alliages Al Si > 10%		<180	<600
	N.6	Termoplásticos Thermoplastics Thermoplastiques			
	N.7	Duroplásticos Hard Plastics Plastiques durs			
F		Composites de Fibras (Fibra de Carbono, Fibra de Vidrio...) Fiber Composites (CFRP, GFRP, Honeycomb...) Composites en fibre (CFRP, GFRP, Structure en nid d'abeilles...)			
H		Aceros Templados, Aceros Endurecidos Heat-Treated Alloys Aciers trempés, Aciers alliés supérieurs	45<70		



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	UNE	W.-nr.	DIN	AFNOR	B.S.	SS	UNI	AISI
GRUPO GROUP GROUPE P ACEROS - STEELS - ACIERS								
P.1	ACEROS DE CONSTRUCCIÓN / STRUCTURAL STEELS / ACIERS DE CONSTRUCTION (<850 N/mm² / <250 HB)							
	AE235B,FE360 B	1,0036	FE360 (ST 37-2)	E -42-2	FE 360 B	1311	FE 360 B FU	A 570 GR.33,36
	AE235B,FE360B	1,0037	FE 360 B(RST 37-2)	E 24-2	FE 360 B		FE 360 B,C,D	A 283 CR.C
	AE275B,FE430BFN	1,0044	FE 430 B (ST 44-2)	E 28-2	FE 430 B FN		FE 430 B	A 570 GR.40
	A490-2,FE490-2FN	1,0050	FE 490-2 (ST 50-2)	A 50-2	FE 490-2 FN		FE 490	A 570 GR.50
	A590-2,FE590-2FN	1,0060	FE 590-2 (ST 60-2)	A 60-2	FE 590-2 FN		FE 60-2	A 572 GR.65
	A690-2,FE690-2FN	1,0070	FE 690-2 (ST 70-2)	A 70-2	FE 690-2 FN		FE 70-2,FE 690	
	AE 235 D,FE360D1FF	1,0116	FE 360D1 (ST 37-3)	A 24-3	FE 360 D1 FF	1312	FE 360 C,D	A 284 GR.D
	ACEROS DE CEMENTACIÓN / CASE HARDENING STEELS / ACIERS DE CIMENTERIE							
	F.111	1,0401	C 15	AF 37 C 12	080 A 15	1350	C 15	M 1015
F.1510-C10K	1,1121	CK 10	XC 10	040 A 10	1265	C 10	1010	
F.1110-C15K	1,1141	C15	C18RR	080M15	1390	C15	GR.1016	
	1,7015	15 CR 3	12C8	523M15			5015	
F.1516-16MNCR5	1,7131	16MNCR5	16MC5	527M17		16MNCR5	NO.5115	
F.150 D	1,7147	20MNCR5	20MC5			20MNCR5	5120	
ACEROS DE FÁCIL MECANIZACIÓN / FREE-CUTTING STEELS / ACIERS D'USINAGE MECANIQUE FACILE								
F.2111-11SMN28	1,0712	9SMN28	S 250	230M07		CF 9 SMN 28	1213	
F.2112-11SMN PB28	1,0718	9 SMN PB 28	S 250 PB		1914	CF 9SMN PB28	12 L 13	
F.2121-10S20	1,0721	10S20	10F1	210M15		CF10S20	GR.1108	
F.210-G	1,0726	35S20	35 MF 6	212M36	1957	CF 35 SMN 10	1140	
	1,0727	45 S 20	45 MF 4		1973		1146	
F.2113-12SMN35	1,0736	9 SMN 36	S 300			CF 9 SMN 36	1215	
F.210-F	1,0723	15 S 20		210 A 15	1922			
ACEROS DE CONSTRUCCIÓN FUNDIDOS / CAST STEELS / ACIERS DE CONSTRUCTION FONTE								
	1,0416	GS-83,3	A 42C-M	AM 1		FEG38VR	GR. N1	
	1,0551	GS-52	E26-52-M	161GR400A		GC20	GR.N 2	
	1,0553	GS-60	30M6M	A 3			GR.80-40	
	1,0554	GS-62	E26-52-M	AW3			GR.105-85	
ACEROS AL CARBONO NO ALEADOS / UNALLOYED CARBON STEELS / ACIERS AU CARBONE SANS ALLIAGE								
ACEROS BONIFICADOS / HEAT-TREATABLE STEELS / ACIERS SUPÉRIEURS								
F. 112	1,0402	C 22	1 C 22	070 M 20	1450	C 25	M 1023	
F. 113	1,5010	C 35	C 35	40 HS		C 35	GR.1035	
F.114	1,0503	C 45	C 45	50 HS	1650	C 45	GR.1043	
F.115	1,0535	C 55	C 54	50	1655	C 55	GR.1055	
	1,0601	CK 60	C 60	60 HS,CS		C 60	1060	
F.1120-C25K	1,1151	CK 22	2 C 22	055 M 15		C 20, C 25	1020	
	1,1157	40 MN 4	35 M 5	150 M 36			1035	
F.1130-C35K	1,1181	CK 35	2 C 35	080 A 35	1572	C 35	1038	
F.1140-C45K	1,1191	CK 45	2 C 45	080 M 46	1660	C45	1045	
F.1150-C55K	1,1203	CK 55	2 C 55	060 A 57		C 55	1055	
	1,1221	CK 60	2 C 60	060 A 62	1770	C 60	1060	
ACEROS ALEADOS - ALLOYED STEELS - ACIERS ALLIÉS (<1000 N/mm² / <300 HB)								
ACEROS ALEADOS PARA HERRAMIENTAS / ALLOYED TOOL STEELS / ACIERS ALLIÉS POUR OUTILS								
F.5230-100 CR6	1,2067	100 CR 6	Y 100 C 6	BL 3			L 1, L 3	
F.5212-X210CR12	1,2080	X210 CR 12	Z 200 C 12	B D 3	2710	X 205CR12 KU	D 3	
F.5227-X100CRMO V5	1,2363	X 100 CRMO V5	Z 100	CDV 5	2260	X100CRMOV51KU	A 2	
	1,2379	X 155CRVMO 12	Z 160CDV12	BD2	2310	X155CRVMO121KU	D 2	
F.5220-95MNCRW5	1,2510	100 MNCRW 4	90 MWCV 5	BO 1	2140	95MNCRW5KU	O 1	
	1,2550	60 WCRV 7	55 W C20	BS 1		55 WCR V8 KU	S 1	
	1,2842	90MN CRV8	90 MNV8	B 02		90MNCVR8KU	O 2	
ACEROS RÁPIDOS / HIGH SPEED STEELS / ACIERS RAPIDES								
F.5563.12-1-5-5	1,3202	HS 12-1-4-5	HS 12-1-5-5	BT 15		HS12-1-5-5	T 15	
F.5553.10-4-3-10	1,3207	HS 10-4-3-10	Z130WKCVDV	BT 42		HS 10-4-3-10	T 42	
F.5613-6-5-2-5	1,3243	HS 6-5-2-5	Z85WDCV06	BM 35	2723	HS 6-5-2-5	M 35	
F.5617-2-10-1-8	1,3247	S 2 10 1 8	Z110DKCWW	BM 42		HS 6-5-2	M 42	
F.5603-6-5-2	1,3343	HS 6-5-2	Z85WDCV06	BM 2	2715	HS 6-5-2	M 2	
FUNDICIÓN ALEADA / ALLOYED CAST IRON / FONTE ALLIÉE								
F.8372-AM26CRMO4	1,7218	GS-25 CRMO 4	25 CD 4	70 8A 25	2225	25 CRM04	4130	
F.8331-AM34CRMO 4	1,7220	34 CRM 04	25 CD 4	708 A25	2234	30 CRM04	4130	
ACEROS BONIFICADOS / ALLOYED HEAT-TREATABLE STEELS / ACIERS SUPÉRIEURS								
F. 114	1,0503	C 45	C 45	50 HS	1650	C 45	GR.1043	
F.8331-AM34CRMO 4	1,7220	34 CRMO 4	25 CD4	708 A25		30 CRMO 4	4130	
F.8332-AM42CRMO 4	1,7225	41 CRMO 4	42 CD4	708M 40	2244	38CRMO 4KB	GR.4140	
	1,7228	50 CRMO 4	50 CR MO 4	708 A 47			4150	
ACEROS NITRURACIÓN / NITRIDING STEELS / ACIERS AVEC NITRATE								
	1,7779	20 CRM0V 1 3 5						
	1,8504	34 CR AL 6						
F.1741-34CRAIMO 5	1,8507	34 CRAIMO 5	30 CAD 6,12			34 CR Al MO 7	A 355 Cl.D	
F.1740-41 CRAIMO 7	1,8509	41 CRAIMO 7	40 CAD 6,12	905 M 39		41 CR Al MO 7	A 355 Cl.A	
F.1712-31 CRMO 12	1,8515	31 CRMO 12	30 CD 12	722 M 24	2240	30 CR MO 12		



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	UNE	W.-nr.	DIN	AFNOR	B.S.	SS	UNI	AISI
ACEROS ALEADOS BONIFICADOS - HEAT-TREATABLE ALLOYED STEEL - ACIERS ALLIÉS SUPÉRIEURS (1000-1300 N/mm² / 300-400 HB)								
ACEROS ALEADOS HERRAMIENTAS / ALLOYED TOOL STEELS / ACIERS ALLIÉS OUTILS								
		1,2311	40 CRMNMO 7					
		1,2312	40 CRMNMO 8 6					
F.5213-X210CRW 12		1,2436	X 210 CRW 12	Z 200 CW 12		2312	X 215 CRW 12 1 KU	
		1,2713	55 NICRMOV 6	55 NCDV	BH 224/5			L 6
		1,2714	56 NICRMOV 7	55 NCDV 7	BH 224/5		56 NICRMOV7KU	L 6
ACEROS ALEADOS HTAS. TRABAJO CALIENTE / TOOL STEELS WARM WORKING / ACIERS ALLIÉS OUTILS TRAVAIL EN CHAUD								
F.5317-X37CRMOV 5		1,2343	X38CRMOV5.1	Z 38CDV 5	BH 11		X37CRMOV51KU	H 11
F.5318-X40CRMOV 5		1,2344	X 40CRMOV 51	X 40CRMOV 5	BH 13	2242	X 40CRMOV511KU	H 13
F.5318-X40CRMOV 5								
F.5313-30CRMOV 12		1,2365	X 32CRMOV 3 3	32CDV12-28	BH 10		30CRMOV1227KU	H 10
F.5323-X30WCRV 9 3		1,2581	X30WCRV 9,3	Z30WCV 9	BH 21		X 30WCRV 93KU	H 21
		1,2550	60 WCRV 7	55 WC 20	BS 1		55 WCRV 8 KU	S 1
		1,2567	X 30 WCRV 5 3	Z 32 WCV 5			X 30 WCRV 53 KU	
ACEROS BONIFICADOS / HEAT-TREATABLE STEELS / ACIERS SUPÉRIEURS								
		1,5864	35 NICR 18					
		1,6580	30 NICRMO 8					
F-124 A		1,7361	32 CRMO 12	30 CD 12	722 M 24		32 CRMO 12	
		1,7707	30 CRMOV 9				31 CRMOV 10	
ACEROS NITRURACIÓN / NITRIDING STEELS / ACIERS AVEC NITRATE								
F.1712-31 CRMO 12		1,8515	31 CRMO 12	30 CD 12	722 M 24	2240	30 CRMO 12	
		1,8523	39 CRMOV 13 9		897 M 39			
P.4	Materiales resistentes al desgaste - Wear-Resistant Materials - Matériaux résistant a l'usure Por ejemplo / For instance / Par exemple HARDOX® 450 wear plate - XAR 450 - RAEX® - FORA - CREUSABRO							
ACEROS INOX MARTENSÍTICOS / MARTENSITIC STAINLESS STEEL / ACIERS INOX MARTENSITIQUES (<1100 N/mm² / <320 HB)								
F.3402-X20CR13		1,4021	X 20 CR 13	X 20 CR 13	420 S 37	2314	X 20 CR 13	420
F.3427-X19CRNI 17-2		1,4057	X 20 CRNI 17 2	Z 15 CN16,02	431 S29	2321	X 16 CRNI16	431
F.3220-X45CRSI09-03		1,4718	X 45 CRSI 9,3	Z 45 CS9	401 S45		X 45CR SI 8	HNV 3
ACEROS INOX FERRÍTICOS / FERRITIC STAINLESS STEELS / ACIERS INOX FERRITIQUES (<1100 N/mm² / <320 HB)								
F.3111-X6CRAI 13		1,4002	X 6 CRAI 13	Z 8CA 12	405 S17		X 6 CRAI 13	405
F.3401-X 10 CR 13		1,4006	X 10 CR13	Z 12 C 13	410 S2	2302	X 12 CR 13	410
F.3113-X6 CR17		1,4016	X 6 CR 17	Z 8 C 17	430 S18	2320	X 8 CR 17	430
F.3115-X5CRTI 17		1,4510	X 6 CRTI 17	Z 8C T 17			X 6 CRTI 17	430 TI
		1,4512	X 6 CRTI 12	Z 6CT 12	409 S19		X 6 CRTI 12	409
GRUPO GROUP GROUPE M ACEROS INOXIDABLES - STAINLESS STEELS - ACIERS INOX								
ACEROS INOX AUSTENÍTICOS / AUSTENITIC STAINLESS STEELS / ACIERS INOX AUSTÉNITIQUES (< 850 N/mm² / <250 HB)								
F.3507-X 10CRNI 18-8		1,4300	X 12 CRNI 18 8					302
F.3504-X5CRNI 18-10		1,4301	X5 CRNI 18-10	X5 CRNI 18-10	304 S31	2333	X5 CRNI 18-10	304
F.3541-X2CRNIN 18-10		1,4311	X 2 CRNIN 18-10	Z 3CN 18.07AZ	304 S 61	2371	X 2 CRNIN 18 11	304 LN
F.3542-X2CRNIMON17-12-2		1,4406	X 2 CRNIMON 17-12-2	Z 3 CND17.11.02	316 S 61	2375	X 2 CRNIMON 17 12	316 LN
F.3533-X2CRNIMO17-13-2		1,4435	X2CRNIMO 18-14-3	Z3CND 17-12-03	316 S14	2353	X2CRNIMO 1713	316 L
F.3523-X6CRNITI 18-10		1,4541	X 6CRNITI 18-10	Z 6CNT 18-10	321 S31	2337	X 6CRNITI 18 11	321
F.3535-X6CRNITI 17-12-2		1,4571	X 6 CRNIMOTI 17 12 2	Z 6CNDT 17,12	320 S18	2350	X 6 CRNIMOTI 17 12	316 TI
F.3535-X6CRNIMOTI17-12		1,4573	X 10 CRNIMOTI 18 12		320 S33		X 6 CRNIMOTI 17 13	316 TI
F.3312-X15CRNISI20-12		1,4828	X 15CRNISI 20 12	Z 17CNS 20 12	309 S24		X 16CRNI 23 14	309
GRUPO GROUP GROUPE K FUNDICIÓN - CAST IRON - FONTE								
FUNDICIÓN GRIS / GREY CAST IRON / FONTE GRISE (<700N/mm²/<200 HB)								
		0.7033	GGG 35-3	FGS 370-71	GR.350/22	0717-15	GS 370-17	
		0.7040	GGG 40	FGS 400-12	GR.420-12	0717-02	GS 400-12	GR.60-40-18
		0.7050	GGG 50	FGS 500-7	500/7	0727	GS 500-7	65-45-12
		0.7060	GGG 60	FGS 600-3	GR.600/3	0732-03	GS 600-3	GR.80-55-06
		0.8135	GTS 35-10	MN 35-10	B 35-12	0815	B 35-10	GR.32510
		0.8145	GTS 45-06	MN 450-6	P 45-06	0852-00	P 45-06	GR.45006
		0.8155	GTS 55-04	MN 550-4	P 55-04	0854-00	P 55-04	6004
K.2	FUNDICIÓN NODULAR / NODULAR CAST IRON / FONTE NODULAIRE (700-1000N/mm² /200-300 HB)							
		0.7070	GGG 70	FGS 700-2	GR.700/2	0737-01	GS 700-2	100-70-03
		0.8080	GGG 80	FGS 800-2	GR.800/2		GS 800-2	GR.120-90-02

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GRUPO GROUP GROUPE S							
ALEACIONES TERMORRESISTENTES - HEAT-RESISTANT ALLOYS - ALLIAGES THERMORÉSISTANTS							
TITANIO PURO / UNALLOYED TITANIUM / TITANE PUR (<700 N/mm² / <200 HB)							
	3,7024	TI 99,5 GRADO 1	T 35				
	3,7034	TI 99,7 GRADO 2	T 40				
	3,7055	TI 99,4 GRADO 3	T 50				
	3,7065	TI 4	T 60				
TITANIO ALEADO / ALLOYED TITANIUM / ALLIAGES TITANE (< 900 N/mm² / <270 HB)							
	3,7114	TIAL 5 SN 2					
	3,7124	TICU 2,5	TU 2				
	3,7164	TIAL 6 V 4	T-AGV	2 TA 10			
ALEACIONES NICKEL / NICKEL ALLOYS / ALLIAGES NICKEL: Inconel, Nimonic, Hastelloy... (<1300 N/mm² / <380 HB)							

GRUPO GROUP GROUPE N							
COBRE - LATÓN - BRONCE - COPPER - BRASS - BRONZE - CUIVRE - LAITON - BRONZE (< 700 N/mm² / <200-300 HB)							
BRONCES / BRONZE / BRONZES							
	2,1020	CU SN 6					
C 7150	2,1030	CU SN 8					
ALEACIONES COBRE VIRUTA CORTA / SHORT CHIPPING COPPER / ALLIAGE CUIVRE COPEAUX COURTS							
	2,0360	CU ZN 40	CU ZN 40	CZ 109		P-CU ZN 40	C 28000
	2,0402	CU ZN 40 PB2	CU ZN 39 PB2	CZ 122			C 38000
LATONES / BRASS / LAITONS (< 700 N/mm² / < 200-300 HB)							
	2,0250	CU ZN 20	CU ZN 20	CZ 103			C 24000
	2,0265	CU ZN 30	CU ZN 30	CZ 106		P-CU ZN 30	C 26000
	2,0321	CU ZN 37	CU ZN 37	CZ 108			C 27400
ALEACIÓN Cu VIRUTA LARGA / LONG CHIPS ALLOYED Cu / ALLIAGE Cu COPEAUX LONGS (< 700 N/mm² / <200-300 HB)							
	2,1245	CUBE 1,7	CU BE 1,7	CB101			C 17000
	2,1247	CUBE 2	CU BE 1,9				C 17200

GRUPO GROUP GROUPE N							
ALUMINIO - MAGNESIO - ALUMINIUM - MAGNESIUM							
Al - Mg SIN ALEAR / UNALLOYED ALUMINIUM - MAGNESIUM / ALUMINIUM - MAGNESIUM SANS ALLIAGE (<350 N/mm² / <100 HB)							
	3,0250	Al 99,5 H					
	3,0280	Al 99,8 H					
ALEACIONES ALUMINIO / ALUMINIUM ALLOYS / ALLIAGES ALUMINIUM Si<10% (< 600 N/mm² / <180 HB)							
	L-3811	3,0515	AIMN 1	3103	3103	P-ALMN 1,2 CU	A 93003
	L-3120-38-312	3,1325	AICUMG 1	2017 A		P-AICU4MGMNSI	A 92017
	L-3140-38-314	3,1355	AICUMG 2	2024	2024	P-AICU4-4MGMN	2024
	L-3710-38-371	3,4365	AIZNMGCU-1,5	7075	7075	P-AIZNMGCU-1,5	A 9775
FUNDICIÓN ALUMINIO / CAST ALUMINIUM / FONTE ALUMINIUM							
		3,3292	GD-AIMG 9	A-G10SY 4	LM 10		A 05200
ALEACIONES ALUMINIO / ALUMINIUM ALLOYS / ALLIAGES ALUMINIUM Si>10% (<600 N/mm² / <180 HB)							
	L-2560-61	3,2381	G-AISI 10 MG	A-S10G		G-AISI9MG	A-0359.0
	L-2530	3,2583	G-AISI 11	A-S12U	LM 20	G-AISI13CUMN	A-04130

GRUPO GROUP GROUPE N							
MATERIALES SINTÉTICOS - SYNTHETIC MATERIALS - MATÉRIELS SYNTHÉTIQUES							
TERMOPLÁSTICOS / THERMOPLASTICS / THERMOPLASTIQUES							
		POLIPROPILENO			PP		
		POLISTIROL		PS			
		POLIVILNICLORITO			PVC		
		POLICARBONATO		MACRALON	PC		
ULTRAMID		POLIAMIDA		PA			
		POLIMETILMETACRILATO		PLEXIGLAS	PMMA		
DUROPLÁSTICOS / HARD PLASTICS / PLASTIQUES DURS							
		BAQUELITA					
		PERTINAX					
		MOLTOPREN					
RESOPAL		GRAFITO					

GRUPO GROUP GROUPE F							
COMPOSITOS DE FIBRAS (FIBRA DE CARBONO, FIBRA DE VIDRIO, ESTRUCTURAS TIPO PANAL DE ABEJA...) FIBER COMPOSITES (CFRP, GFRP, HONEYCOMB...) COMPOSITES EN FIBRE (CFRP, GFRP, STRUCTURE EN NID D'ABEILLES...)							

GRUPO GROUP GROUPE H							
ACEROS TEMPLADOS, ACEROS ENDURECIDOS HEAT-TREATED ALLOYS - ACIERS TREMPÉS, ACIERS ALLIÉS SUPÉRIEURS							



Símbolos Características Herramienta - Tool Characteristics Symbols - Symboles caractéristiques outils

General



Herramienta de Mano
 Hand Tool
 Outil à main



Acero
 Steel
 Aciers



Plástico
 Plastic
 Plastique



Metacrilatos
 Methacrylates
 Méthacrylates

Taladrado - Drilling - Perçage



Especial Taladro Batería
 Power Tool Special
 Spécial perceuse à main

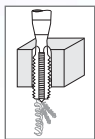


Asiento Allen
 Allen Seat
 Logement Allen

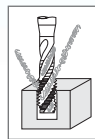


Asiento Cónico
 Taper Seat
 Logement conique

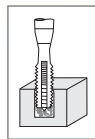
Roscado - Threading - Taraudage



Agujero Pasante
 Through Hole
 Trou débouchant



Agujero Ciego
 Blind Hole
 Trou borgne



Agujero Ciego
 Blind Hole
 Trou borgne



Bujía
 Spark Plug
 Bougie

Fresado - Milling - Fraisage



Desbaste Fino
 Fine Pitch Roughing
 Ébauche pas fin



Desbaste Grueso
 Coarse Roughing
 Ébauche



Desbaste Medio
 Roughing & Finishing
 Semi-Finition



Ranuras en "T"
 T Slots
 Rainures en T



Ranuras Woodruff
 Woodruff Slots
 Rainures Woodruff



Perfiles
 Profiles
 Profils



Taladrado - Drilling - Perçage

	Punta Cónica con Afilado Universal Universal Relieved Cone Point Pointe conique universel		Afilado en Cruz Tipo DIN 1412 "C" Split Point DIN 1412 "C" type Affûtage en croix type DIN 1412 "C"		Filo Corregido tipo "U" "U" type Corrected Edge Lèvre corrigée type "U"		Punta Centrar Tipo DIN 1412 "E" Center Point DIN 1412 "E" type Pointe à centrer type DIN 1412 "E"		Afilado Tipo DIN 1412 "A" Split Point DIN 1412 "A" type Affûtage pointe type DIN 1412 "A"
	Afilado Tipo "Convex" Split Point "Convex" Type Affûtage pointe type "Convex"		Punta Metal Duro Carbide Tipped Pointe carbure		Ángulo Punta Point Angle Angle de pointe 135°		Hélice Izquierda Left Hand Helix Hélice à gauche		Hélice Derecha Right Hand Helix Hélice à droite
	Ángulo de Hélice Helix Angle Angle d'hélice 40°		Perfil Parabólico "S" S Parabolic Profile Profil parabolique S		Mango Rebajado Reduced Shank Queue réduite $\varnothing=1/2$		Mango Cilíndrico Straight Shank Queue cylíndrica		Mango Cónico Morse Taper Shank Queue conique
	Puntos Soldadura Welding Point Points soudure		Mango 3 Planos 3-Flat Shank Attachement 3 plans ≥ 0.4		Radial Avellanado Radial Radial Countersinking Fraisage radiale		Ángulo Broca Escalonada Step Drill Angle Angle de foret etagé 45°		Conicidad Taper Conicité 20-30°
	Pulido Espejo Mirror Polished Polyglass		Refrigeración Interior Internal Cooling Lubrification interne						

Escariado-Avellanado - Reaming-Countersinking-Counterboring - Alesaje-Fraisage

			Ángulo Avellanado Countersinking-Counterboring Angle Angle de fraisage $\alpha 90^\circ$
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Roscado - Threading - Taraudage

	Tipo Entrada Macho Tap Point Type Type d'entrée de taraud C 2-3h		Entrada GUN GUN Chamfer Entrée GUN		Ranuras Rectas Straight Slots Denture droite
	Ángulo de Hélice Helix Angle Angle d'hélice 35°		Ranuras Exteriores Refrigeración External Cooling Slots Rainures extérieurs refroidissement		
	Rosca Standard Standard Thread Filetage standard 60°		Rosca de tubo cilíndrica Straight Pipe Thread Filetage tubes cylíndriques 55°		Rosca Whitworth cilíndrica Straight Whitworth Thread Filetage Whitworth cylíndrica 55°

Fresado - Milling - Fraisage



Dentado Alterno
 Staggered Teeth
 Denture alternée



Dentado Recto
 Straight Teeth
 Denture droite



Chavetero Longitudinal
 Longitudinal Keyway
 Rainure longitudinale



Chavetero Longitudinal y Transversal
 Drive Slot & Keyway
 Rainure longitudinale et transversale



Mecanizado piezas 3D
 For 3D-printed metal parts
 Fabrication additive de métaux 3D



Dentado Fresado
 Milled Teeth
 Denture fraisée



Dentado Destalonado
 Formed Teeth
 Denture détalonnée



Engranaje
 Gear
 Engrenage



Engranajes Cilíndricos
 Straight Gears
 Engrenages cylindriques



Engranajes Helicoidales
 Helical Gears
 Engrenages hélicoïdaux



1Z= 1 Diente
 1Z= 1 Flute
 1Z= 1 Dent



2Z= 2 Dientes
 2Z= 2 Flutes
 2Z= 2 Dents



3Z= 3 Dientes
 3Z= 3 Flutes
 3Z= 3 Dents



4-5 Z= 4-5 Dientes. Corte al Centro
 4-5 Z= 4-5 Flutes. Center Cutting
 4-5 Z= 4-5 Dents. Coupe au centre



6-8 Z= 6 Dientes. Super-Acabado
 6-8 Z= 6 Flutes. Super-Finishing
 6-8 Z= 6 Dents. Super-finition



3Z sin Corte al Centro
 3Z Non-Center-Cutting
 3Z sans coupe au centre



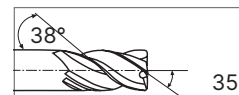
Varios Dientes Sin Corte al Centro
 Non-Center-Cutting Several Flutes
 Plusieurs dents sans coupe au centre



Desplazamiento desigual
 Uneven displacement
 Déplacement irrégulier



1Z= 1 Diente. Fresa Grabado
 1 Z= 1 Flute. Engraving End Mill
 1 Z= 1 Dent. Fraise gravure



Hélice alterna
 Unequal Helix
 Hélice alternée



Fresa Frontal Radial
 Radial Head End Mill
 Fraise frontal hémisphérique



Fresa Frontal Recta
 Straight Head End Mill
 Fraise frontal droite



Fresa Tórica
 Radius End Mill
 Fraise torique



Fresa Frontal Recta con Chafilán 45°
 Straight Head End Mill with 45° Chamfer
 Fraise frontal droite avec chamfrein 45°



Pulido Espejo
 Mirror Polished
 Polyglass



Mango Liso MD
 HM Plain Shank
 Queue plane carbure



Mango Weldon MD
 HM Weldon Shank
 Queue Weldon carbure



Mango Liso PMX-HSSE-HSS
 PMX-HSSE-HSS Plain Shank
 Queue plane PMX-HSSE-HSS



Mango Weldon PMX-HSSE-HSS
 PMX-HSSE-HSS Weldon Shank
 Queue Weldon PMX-HSSE-HSS



Mango WHISTLE NOTCH MD
 HM WHISTLE NOTCH Shank
 Queue WHISTLE NOTCH carbure



Mango WHISTLE NOTCH PMX-HSSE-HSS
 PMX-HSSE-HSS WHISTLE NOTCH Shank
 Queue WHISTLE NOTCH PMX-HSSE-HSS



Dentado Fino
 Fine Teeth
 Denture fine



Dentado Grueso
 Coarse Teeth
 Denture grosse



Fresado trocoidal
 Trochoidal milling
 Fraisage trochoïdal



1/4 radio
 1/4 radius
 1/4 rayon



Planchas de Aluminio
 Aluminium plates
 Plaques d'aluminium



Identif. Internacional	Comp. Química
International Identif.	Chemical Comp.
Identif. Internationale	Comp. Chimique

HSS	AISI: M-2*	C
	DIN: 1.3343*	Cr
	AFNOR: Z85WDCV*	W
	EN: HS 6-5-2*	V
	UNE: F-5603*	Mo
*(o similares / or similar / où similaires)		

HSS-XT	Aleación especial Special alloy Alliage spécial
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HSSE 5%Co	AISI: M-35*	C
	DIN: 1.3243	Cr
	AFNOR: Z85WDKCV	W
	EN: HS 6-5-2-5	V
	UNE: F-5613	Mo
	Co	
*(o similares / or similar / où similaires)		

HSSE 8%Co	AISI: M-42*	C
	DIN: 1.3247	Cr
	AFNOR: Z110DKCWY	W
	EN: HS 2-9-1-8	V
	UNE: F-5617	Mo
	Co	
*(o similares / or similar / où similaires)		

PMX	AISI: ASP*
	This is a brandname belonging to Erasteel
	C: 1,60% / Cr: 4,80% / W: 10,50% V: 5,00% / Mo: 2,00% / Co: 8,00%
*(ó equivalentes)	
*(or equivalents) *(Où Similaires)	

MD/HM Carbure Micrograno	
Mat: Micrograno	
Comp.	WC 89,3, Co 10%, 0,7 (Nb-Ti-Ta)
Grano/Grain/Grain	Muy Fino Very Fine Très fine
Dureza/Hardness/Dureté	1700 HV
Resist. Rotura Breaking Resist. Résistance ruptures	3.800 N/mm2

MD/HM Carbure Micrograno+	
Mat: Micrograno +	
Comp.	WC 89,3, Co 6%, 0,7 (Nb-Ti-Ta)
Grano/Grain/Grain	Muy Fino Very Fine Très fine
Dureza/Hardness/Dureté	1820 HV
Resist. Rotura Breaking Resist. Résistance ruptures	3.600 N/mm2

MD/HM Carbure Grano UF	
Mat: Grano UF	
Comp.	WC 85,6, Ti/Ta (Ni) C 0,9, Co 12%
Grano/Grain/Grain	Ultrafino / Ultrafine/ Ultrafin
Dureza/Hardness/Dureté	1750 HV
Resist. Rotura Breaking Resist. Résistance ruptures	4.200 N/mm2

AL TIN	Nitruro de Aluminio-Titanio Aluminium-Titanium Nitride Nitrure de Aluminium-Titanium	
	Dureza / Hardness / Dureté HV(0,05)	3.300±300
	Oxidación Oxidation / Oxidation	800°C
	Coefficiente Fricción Rubbing Coefficient Coefficient friction	0,70
	Color / Colour / Couleur: Antracita / Anthracite / Anthracite	

BORA	Base TiAlN TiAlN Base Base TiAlN	
	Dureza / Hardness / Dureté HV(0,05)	4.200±200
	Oxidación Oxidation / Oxidation	1.100°C
	Coefficiente Fricción Rubbing Coefficient Coefficient friction	0,25
	Color / Colour / Couleur: Bronce / Bronze / Bronze	

BORDEAUX	Base TiAlCrN TiAlCrN base Base TiAlCrN	
	Dureza / Hardness / Dureté HV(0,05)	2.850
	Oxidación Oxidation / Oxidation	800°C
	Coefficiente Fricción Rubbing Coefficient Coefficient friction	0,25
	Color / Colour / Couleur: Rosado cobrizo / Copper Pink / Rose cuivré	

CARBEX	Base Carbono Carbon Base Base Carbone	
	Dureza / Hardness / Dureté HV(0,05)	5.000
	Oxidación Oxidation / Oxidation	500°C
	Coefficiente Fricción Rubbing Coefficient Coefficient friction	< 0,15
	Color / Colour / Couleur: Gris Oscuro / Dark Grey / Gris foncé	

CROMAX	Base AlCrN AlCrN Base Base AlCrN	
	Dureza / Hardness / Dureté HV(0,05)	4.400
	Oxidación Oxidation / Oxidation	1.100°C
	Coefficiente Fricción Rubbing Coefficient Coefficient friction	0,35
	Color / Colour / Couleur: Gris Brillante / Shinning Grey / Gris clair	

DIAMAX	Diamante Nanocristalino Nanocrystalline Diamond Diamant nanocristallin	
	Dureza / Hardness / Dureté HV(0,05)	10.000
	Oxidación Oxidation / Oxidation	800-850°C
	Coefficiente Fricción Rubbing Coefficient Coefficient friction	-
	Color / Colour / Couleur: Negro / Black / Noir	

HARD	Hard - TiAlN + WC/C Hard - TiAlN + WC/C Hard - TiAlN + WC/C	
	Dureza / Hardness / Dureté HV(0,05)	3.000
	Oxidación Oxidation / Oxidation	800°C
	Coefficiente Fricción Rubbing Coefficient Coefficient friction	0,15-0,20
	Color / Colour / Couleur: Gris oscuro / Dark Grey / Gris foncé	

IKRA	Base AlTiN AlTiN Base Base AlTiN	
	Dureza / Hardness / Dureté HV(0,05)	3.500±300
	Oxidación Oxidation / Oxidation	1000°C
	Coefficiente Fricción Rubbing Coefficient Coefficient friction	0,35
	Color / Colour / Couleur: Gris / Grey / Gris	

IRIS	Base Carbono ta-C Carbon ta-C Base Base Carbone ta-C	
	Dureza / Hardness / Dureté HV(0,05)	> 6.500
	Oxidación Oxidation / Oxidation	> 500°C
	Coefficiente Fricción Rubbing Coefficient Coefficient friction	0,30-1,50
	Color / Colour / Couleur: Arco Iris / Rainbow / Arc-en-ciel	

NITREX	Nitruro de Aluminio-Titanio Aluminium-Titanium Nitride Nitrure d'Aluminium-Titanium	
	Dureza / Hardness / Dureté HV(0,05)	3.300±300
	Oxidación Oxidation / Oxidation	800°C
	Coefficiente Fricción Rubbing Coefficient Coefficient friction	0,70
	Color / Colour / Couleur: Antracita / Anthracite / Anthracite	

SUA	Nitruro de Titanio Silicio Titanium Silicon Nitride Nitrure de Silicium-Titanium	
	Dureza / Hardness / Dureté HV(0,05)	3.500±300
	Oxidación Oxidation / Oxidation	1000-1100°C
	Coefficiente Fricción Rubbing Coefficient Coefficient friction	0,45
	Color / Colour / Couleur: Cobre / Copper / Cuivre	

TIALCN	Carbonitruro de Titanio-Aluminio Titanium Aluminium Carbonitride Carbo Nitrure d'Aluminium-Titanium	
	Dureza / Hardness / Dureté HV(0,05)	3.200
	Oxidación Oxidation / Oxidation	900°C
	Coefficiente Fricción Rubbing Coefficient Coefficient friction	0.4
	Color / Colour / Couleur: Oro rosa / Pink gold / Or rose	



TIALN

Nitruro de Titanio-Aluminio Titanium Aluminium Nitride Nitrure de d'Aluminium-Titanium	
Dureza/Hardness/Dureté HV(0,05)	3.000±500
Oxidación Oxidation / Oxidation	800-900°C
Coefficiente Fricción Rubbing Coefficient Coéfficient friction	0,45
Adecuado para Uso en Seco Appropriate for Dry Use Parfait usinage sans refroidir	
Color / Colour / Couleur: Violeta-Gris / Violet-Grey / Violet-Gris	

TIALN-
TOP

Carbo-Nitruro de Aluminio-Titanio Titanium-Aluminium Carbo-Nitride Carbo-Nitrure d'Aluminium-Titanium	
Dureza / Hardness / Dureté HV(0,05)	3.300
Oxidación Oxidation / Oxidation	900°C
Coefficiente Fricción Rubbing Coefficient Coéfficient friction	0,30-0,35
Color / Colour / Couleur: Violeta-Gris / Violet-Grey / Violet-Gris	

TIALSIN

Nitruro de Titanio-Aluminio-Silicio Titanium-Aluminium-Silicon Nitride Nitrure de Titanium-Aluminium-Silicium	
Dureza/Hardness/Dureté HV(0,05)	3.500±500
Oxidación / Oxidation / Oxidation	900°C
Coefficiente Fricción Rubbing Coefficient Coéfficient friction	0,45
Adecuado para Uso en Seco Appropriate for Dry Use Parfait usinage sans refroidir	
Color / Colour / Couleur: Antracita / Anthracite / Anthracite	

TICN

Carbo-Nitruro de Titanio Titanium Carbo-Nitride Carbonitride de Titanium	
Dureza / Hardness / Dureté HV(0,05)	3.500±500
Oxidación Oxidation / Oxidation	400°C
Coefficiente Fricción Rubbing Coefficient Coéfficient friction	0,20
Color / Colour / Couleur: Gris Azulado-Antracita Bluish-Anthracite Grey / Gris bleu anthracite	

TIN

Nitruro de Titanio Titanium Nitride Nitrure de Titanium	
Dureza / Hardness / Dureté HV(0,05)	2.300
Oxidación Oxidation / Oxidation	600°C
Coefficiente Fricción Rubbing Coefficient Coéfficient friction	0,40
Color / Colour / Couleur: Oro / Gold / Or	

TINKO

Base ALTIN ALTIN Base Base ALTIN	
Dureza / Hardness / Dureté HV(0,05)	3.800±500
Oxidación Oxidation / Oxidation	1.100°C
Coefficiente Fricción Rubbing Coefficient Coéfficient friction	0,45
Color / Colour / Couleur: Bronce / Bronze / Bronze	

X-AICr

Base ALCR Multicapa Multi-layered AlCr Base Base AlCr Multicouche	
Dureza / Hardness / Dureté HV(0,05)	3.000
Oxidación Oxidation / Oxidation	1.100°C
Coefficiente Fricción Rubbing Coefficient Coéfficient friction	0,25
Color / Colour / Couleur: Cobre / Copper / Cuivre	

ZIRKONIO

Nitruro de Zirconio Zirconium Nitride Nitrure de Zirkonium	
Dureza / Hardness / Dureté HV(0,05)	2.300±200
Oxidación Oxidation / Oxidation	660- 1.100°C
Coefficiente Fricción Rubbing Coefficient Coéfficient friction	0,50
Color / Colour / Couleur: Amarillo pálido / Pale Yellow / Jaune pâle	