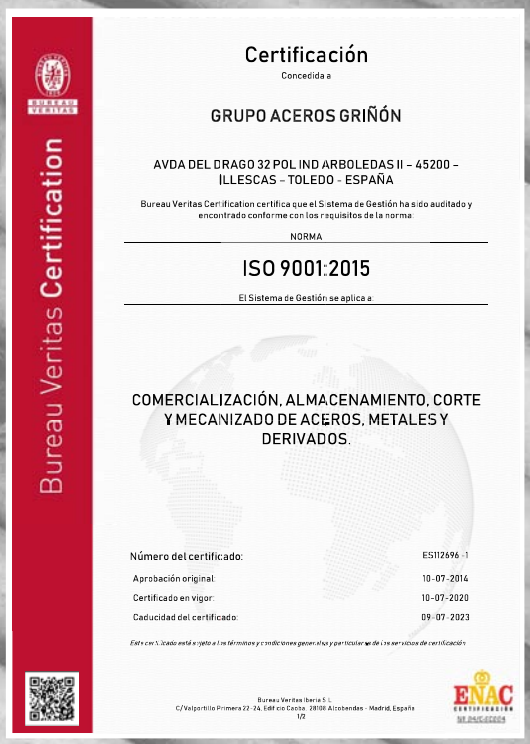
Aceros Griñón

Un mundo de acero a su disposición

PRESENTACIÓN

Ágil y dinámica, Aceros Griñón se constituye en 1992, con vocación de servicio, para satisfacer las necesidades de las empresas del centro de España integrándose rápidamente en el tejido industrial madrileño creciendo de forma constante y regular.

Aceros Griñón crece en número de clientes y va incrementando su área de influencia convirtiéndose en referente de calidad y servicio y adquiere, con el paso de los años, una nueva dimensión comercial. Para dotar a la empresa de las mejores capacidades, Aceros Griñón ha realizado inversiones sostenidas tanto en instalaciones, como en medidos productivos y logísticos que soportan su innata vocación de servicio al cliente.



Bureau Veritas Certification

Certificación

Concedida a

GRUPO ACEROS GRIÑÓN

AVDA DEL DRAGO 32 POL IND ARBOLEDAS II – 45200 – ILLESCAS – TOLEDO - ESPAÑA

Bureau Veritas Certification certifica que el Sistema de Gestión ha sido auditado y encontrado conforme con los requisitos de la norma:

NORMA

ISO 9001:2015

El Sistema de Gestión se aplica a:

COMERCIALIZACIÓN, ALMACENAMIENTO, CORTE Y MECANIZADO DE ACEROS, METALES Y DERIVADOS.

Número del certificado:	ES112696 -1
Aprobación original:	10-07-2014
Certificado en vigor:	10-07-2020
Caducidad del certificado:	09-07-2023

Este certificado está sujeto a los términos y condiciones generales y particulares de los servicios de certificación

Bureau Veritas Iberia S.L.
C/Valportillo Primera 22-24, Edificio Caoba, 28108 Alcobendas - Madrid, España
1/2

ENAC

Como respuesta a las necesidades de sus clientes, en 2014, El grupo Aceros Griñón obtiene la certificación en calidad ISO 9001:2008 lo que certifica los estándares de calidad que la empresa llevaba desarrollando durante años. Dentro de esta política de empresa se demuestra la filosofía de trabajo de Nuestro Grupo: orientación al cliente, atención personalizada, respuesta dinámica y ajustada a las necesidades del cliente, dentro de un marco de intercambio sin imposiciones, condicionantes ni mínimos. En este proceso de expansión nace en 2005 Aceros Griñón Sur. Delegación que surge para dar respuesta a las necesidades industriales de Andalucía y Extremadura, trasladando la misma idea de servicio y atención al cliente que ha llevado a Aceros Griñón a ser un referente en la zona centro peninsular. La expansión de Aceros Griñón Sur es paralela a la mejora de las infraestructuras en la delegación andaluza, donde se ha ampliado la flota de camiones y se construye en 2013 el nuevo almacén de 5000 m2, que sostendrá la mejora en la oferta y el servicio ofrecidos a sus clientes.

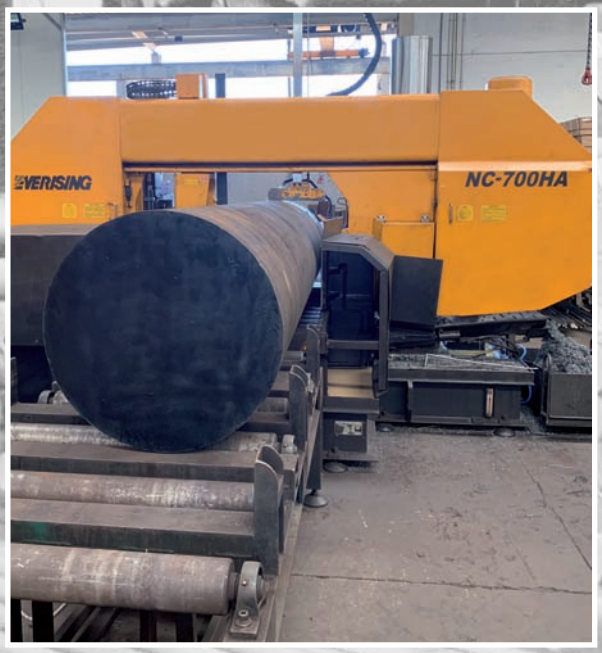
Dentro de la vocación de oferta a sus clientes, Aceros Griñón diversifica su cartera de productos apoyada en la incorporación de nuevos proveedores, tanto nacionales como internacionales, que garantizan poder dar una respuesta comercial a cualquier necesidad del mercado.

Hoy, Aceros Griñón y Aceros Griñón Sur, son una empresa líder en el sector, almacenes MULTIPRODUCTO modernos y capaces de dar respuesta especifica a las exigencias de sus clientes. Gracias a nuestra línea de trabajo, la amplia oferta de productos y la cercana colaboración con fabricantes de primer nivel en diversos sectores, podemos afrontar el futuro con total confianza en nuestras posibilidades para poder brindar a nuestros clientes.

Un mundo de acero a su disposición

MEDIOS PRODUCTIVOS Y LOGÍSTICOS

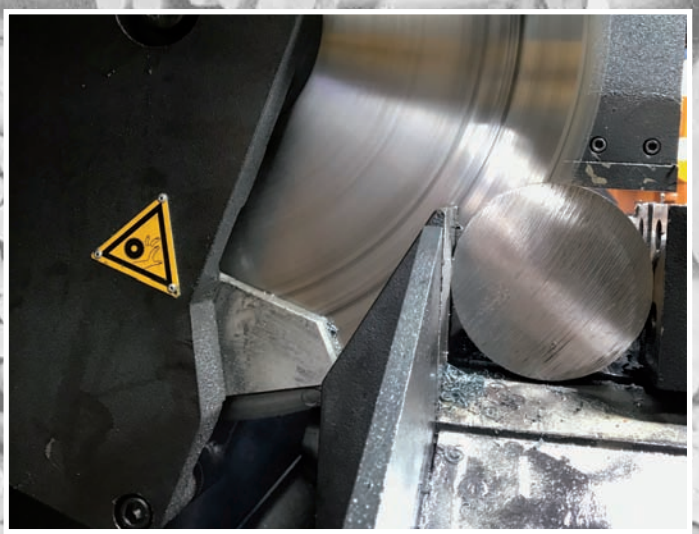
El grupo Aceros Griñón dispone de INFRAESTRUCTURAS distribuidas de reciente adquisición de muy alta calidad y gran eficiencia. Su capacidad se ve incrementada por la flota propia de camiones que hacen posible un reparto ágil que mejora la respuesta al cliente.



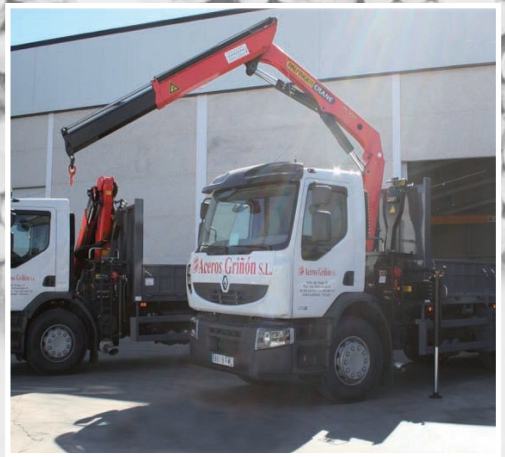
Aceros Griñón y Aceros Griñón Sur ponen al servicio de sus clientes capacidad propia de corte tanto de disco, hasta 150 mm en Illescas, como de sierra hasta 700 mm en Illescas y 460 mm en Sevilla.

Nuestro corte de sierra cuenta con los más modernos medios de control y optimización. Su CNC controla la velocidad del corte, el avance y la posible desviación, optimizando todos los recursos de la máquina para adecuarse a las condiciones del acero que se está manipulando.

Para diámetros de hasta 420 mm se dispone de sistema High Speed para corte de cinta de carburo de características especiales, que permite cortar series de alta velocidad reduciendo hasta 3 veces el tiempo necesario respecto a los equipamientos con cinta bimetálica.



Como servicio exclusivo en almacenes de acero, Aceros Griñón cuenta con tres máquinas de corte de disco de hasta 150 mm de diámetro. Este sistema mejora sustancialmente los resultados del corte con cinta. Se trata de un corte por placas parecido al utilizado en los tornos de control numérico, dando como resultado un acabado similar al de un refrentado de un torno. Esto permite ajustar el corte a la medida final del mecanizado en tolerancias mucho menores que las de una sierra de cinta. De este modo, para piezas en las que las caras de corte no tengan funcionalidad para el trabajo final de la pieza, se puede ajustar la medida final del mecanizado sin necesidad de refrentar la misma, con el consecuente ahorro en el precio para nuestros clientes. Adicionalmente, el menor tiempo de corte empleado, sumado al ahorro del empleo del cargador automático, permite la entrega de grandes series de corte en plazos más ajustados.



Aceros Griñón y Aceros Griñón Sur disponen actualmente de una amplia flota de camiones propia para atender las necesidades de nuestros clientes. Son capaces de gestionar con la misma eficacia pedidos de pequeño o gran tonelaje, dar soluciones para zonas de difícil acceso y facilitar la descarga del material mediante pluma, siendo el único almacén del sector que ofrece este servicio.

De igual modo, Aceros Griñón y Aceros Griñón Sur, cuentan con una amplia experiencia en la gestión de transporte a través de empresas especializadas con las que se da respuesta a la demanda de zonas donde no se realice reparto regular, tanto en España como fuera de nuestras fronteras.

NUESTROS PRODUCTOS

ACEROS LAMINADOS Y FORJADOS

CALIDAD	PERFIL	MEDIDAS	ESTADO	ACAB	ALM
S235/S275	RED	8 A 60 MM	+ AR	LAM	BD
	PL	20X3 A 300X30 MM	+ AR	LAM	BD
	CU	10 A 60 MM	+ AR	LAM	BD
C45	RED	20 A 350 MM	+ AR	LAM	ST
	RED	250 A 700 MM	+ N	FORJ	ST
	RED	710 A 1200 MM	+ N	FORJ	BD
	CU	20 A 200 MM	+ AR	LAM	ST
	CU	210 A 400 MM	+ N	FORJ	BD
	PL	20X10 A 200X30 MM	+ AR	LAM	ST
	PL	200X40 A 400X60 MM	+ AR	LAM	BD
	HEX	16 A 80 MM	+ AR	LAM	FB
S355J2	RED	16 A 350 MM	+ AR	LAM	ST
	RED	250 A 700 MM	+ N	FORJ	ST
	RED	710 A 1200 MM	+ N	FORJ	BD
	CU	20 A 200 MM	+ AR	LAM	ST
	CU	210 A 400MM	+ N	FORJ	BD
	PL	30X20 A 200X30 MM	+ AR	LAM	ST
	PL	200X40 A 400X60 MM	+ AR	LAM	BD
ASTM A105	RED	20 A 350 MM	+ AR	LAM	BD
	RED	310 A 1200 MM	+ AR	FORJ	BD
	CU	20 A 160 MM	+ AR	LAM	BD
ASTM A350 LF2	RED	20 A 350 MM	+ N	LAM	BD
	RED	310 A 1200 MM	+ N	FORJ	BD
C35	RED	20 A 300 MM	+ AR	LAM	BD
	RED	250 A 700 MM	+ N	FORJ	FB
C55/C60	RED	20 A 300 MM	+ AR	LAM	BD
	RED	250 A 700 MM	+ N	FORJ	FB
46Si7/55Si7	RED	16 A 80 MM	+ AR	LAM	FB
	PL	25X5 A 200X30 MM	+ AR	LAM	BD
	CU	16 A 100 MM	+ AR	LAM	FB
28MnCrB5	RED	16 A 80 MM	+ AR	LAM	FB
	PL	25X5 A 200X30 MM	+ AR	LAM	BD
	CU	16 A 100 MM	+ AR	LAM	FB
11SMn30/37	RED	25 A 100 MM	+ AR	LAM	BD
11SMnPb30/37	RED	25 A 100 MM	+ AR	LAM	ST
OTRAS CALIDADES: C25/41CR4/25CRM04/36NICRMO16/100CR6					

CALIDAD	PERFIL	MEDIDAS	ESTADO	ACAB	ALM
42CrMo4	RED	20 A 200 MM	+ AR	LAM	BD
	RED	20 A 250 MM	+ A	LAM	ST
	RED	16 A 310 MM	+ QT	LAM	ST
	RED	260 A 700 MM	+ QT	FORJ	ST
	RED	710 A 1200 MM	+ QT	FORJ	BD
	PL	40X30 A 200X30 MM	+ AR	LAM	FB
	HEX	16 A 80 MM	+ AR	LAM	FB
42CrMo4Pb	RED	20 A 200 MM	+ QT	LAM	BD
34CrNiMo6	RED	20 A 200 MM	+ AR	LAM	FB
	RED	20 A 250 MM	+ A	LAM	FB
	RED	20 A 310 MM	+ QT	LAM	ST
	RED	260 A 500 MM	+ QT	FORJ	ST
	RED	510 A 1200 MM	+ QT	FORJ	FB
	PL	40X30 A 200X30 MM	+ AR	LAM	FB
39NiCrMo5	RED	20 A 200 MM	+ AR	LAM	BD
	RED	16 A 310 MM	+ QT	LAM	ST
	RED	260 A 700 MM	+ QT	FORJ	BD
	RED	710 A 1200 MM	+ QT	FORJ	BD
	PL	40X30 A 200X30 MM	+ AR	LAM	FB
	HEX	16 A 80 MM	+ AR	LAM	FB
30CrNiMo8	RED	20 A 200 MM	+ AR	LAM	BD
	RED	16 A 310 MM	+ QT	LAM	ST
	RED	260 A 700 MM	+ QT	FORJ	BD
	RED	710 A 1200 MM	+ QT	FORJ	BD
16/20MnCr5	RED	20 A 200 MM	+ AR	LAM	ST
	RED	210 A 310 MM	+ AR	LAM	BD
	RED	300 A 620 MM	+ A	FORJ	BD
	RED	630 A 1200 MM	+ A	FORJ	FB
18CrMo4	RED	20 A 200 MM	+ AR	LAM	ST
20NiCrMo2-2	RED	20 A 150 MM	+ AR	LAM	BD
	RED	30 A 220 MM	+ FP	LAM	ST
17NiCrMo6-4	RED	20 A 310 MM	+ A	LAM	BD
	RED	300 A 1000 MM	+ A	FORJ	BD
18CrNiMo7-6	RED	20 A 310 MM	+ FP	LAM	BD
	RED	300 A 500 MM	+ FP	LAM	BD
51CrV4	RED	20 A 120 MM	+AR	LAM	ST
	RED	125 A 230 MM	+AR	LAM	FB
	RED	20 A 230 MM	+A	LAM	FB

PERFILES
RED =REDONDO
CU =CUADRADO
PL =PLETINA
HEX =HEXÁGONO

ESTADOS
+ AR =NATURAL
+ A =RECOCIDO
+ N =NORMALIZADO
+ FP =RECOCIDO
+ QT =BONIFICADO

ACABADOS
LAM =LAMINADO EN CALIENTE
FORJ =FORJADO

ALMACEN
ST =STOCK
BD =PLAZO 7/10 DIAS
FB =FABRICACION

NUESTROS PRODUCTOS

ACEROS CALIBRADOS

CALIDAD	PERFIL	MEDIDAS	ESTADO	ACAB	ALM
S235JR	RED	2,50 A 130 MM	+ AR	+ C/+ SH	ST
	RED	130 A 250 MM	+ AR	+ SH	BD
	CU	4 A 100 MM	+ AR	+ C	ST
	CU	110 A 150 MM	+ AR	+ C	BD
	PL	6X3 A 400X60 MM	+ AR	+ C	ST
	HEX	10 A 100 MM	+ AR	+ C	BD
C45	RED	5 A 130 MM	+ AR	+ C/+ SH	ST
	RED	3 A 4 y 140 A 200 MM	+ AR	+ C/+ SH	BD
	CU	10 A 100 MM	+ AR	+ C	ST
	CU	4 A 9 y 110 A 150 MM	+ AR	+ C	BD
	PL	8X3 A 140X60 MM	+ AR	+ C	ST/BD
	RED	20 A 80 MM	+ AR	+ SL	ST
	RED	6 A 19 Y 80 A 120 MM	+ AR	+ SL	BD
	HEX	16 A 100 MM	+ AR	+ C	ST
	HEX	6 A 15 MM	+ AR	+ C	BD
S355J2	RED	10 A 80 MM	+ AR	+ C	ST
	RED	5 A 9 y 85 A 150 MM	+ AR	+ C	BD
	CU	8 A 100 MM	+ AR	+ C	BD
	HEX	10 A 100 MM	+ AR	+ C	BD
	PL	12X10 A 130X50 MM	+ AR	+ C	BD
C25	RED	6 A 80 MM	+ AR	+ C	BD
C35	RED	6 A 80 MM	+ AR	+ C	BD
C55	RED	6 A 80 MM	+ AR	+ C	BD
11SMn30/37	RED	3 A 80 MM	+ AR	+ C	ST
	RED	85 A 160 MM	+ AR	+ C	BD
	HEX	4 A 100 MM	+ AR	+ C	BD
	PL	10X5 A 120X50 MM	+ AR	+ C	BD
42CrMo4	RED	7 A 60 MM	+ A	+ C	ST
	RED	16 A 100 MM	+ QT	+ C/ +SH	BD
	RED	8 A 160 MM	+ QT	+ C/ +SH	FB

CALIDAD	PERFIL	MEDIDAS	ESTADO	ACAB	ALM
11SMnPbB30/37	RED	2,5 A 120 MM	+ AR	+ C	ST
	RED	125 A 200 MM	+ AR	+ C	BD
	CU	5 A 60 MM	+ AR	+ C	ST
	CU	70 A 130 MM	+ AR	+ C	BD
	HEX	5 A 70 MM	+ AR	+ C	ST
	HEX	80 A 100 MM	+ AR	+ C	BD
	PL	10X5 A 120X50 MM	+ AR	+ C	BD
	RED	10 A 120 MM	+ AR	+SL	FB
C45PB	RED	5 A 50 MM	+ AR	+ C	ST
	HEX	12 A 50 MM	+ AR	+ C	ST
36SMnPb14	RED	3 A 100 MM	+ AR	+ C	BD
	HEX	5 A 70 MM	+ AR	+ C	BD
	CU	20 A 80 MM	+ AR	+ C	BD
C15PB	RED	6 A 60 MM	+ AR	+ C	BD
44SMn28	RED	10 A 60 MM	+ AR	+ C	BD
45S20	RED	10 A 60 MM	+ AR	+ C	BD
39NiCrMo5	RED	8 A 5160 MM	+ QT	+ C/ +SH	BD
16/20MnCr5	RED	5 A 65 MM	+ AR	+ C	BD
17NiCrMo6-4PB	RED	8 A 80 MM	+ AR	+ C	BD
100Cr6	RED	20 A 60 MM	+ AR	+ C	BD
Laton	RED	5 A 100 MM	+ AR	+ C/ EXTR	ST
	HEX	6 A 70 MM	+ AR	+ C/ EXTR	ST
	CU	6 A 60 MM	+ AR	+ C/ EXTR	BD
	PL	20X10 A 100X20 MM	+ AR	+ C/ EXTR	BD

PERFILES
RED =REDONDO
CU =CUADRADO
PL =PLETINA
HEX =HEXÁGONO

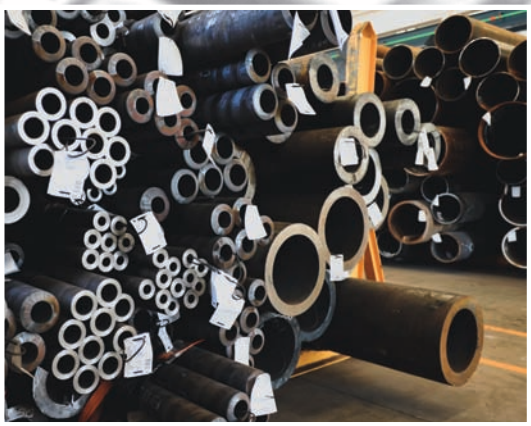
ESTADOS
+ AR =NATURAL
+ A =RECOCIDO
+ AC =RECOCIDO GLOBULAR
+ N =NORMALIZADO
+ FP =RECOCIDO ISOTÉRMICO
+ QT =BONIFICADO

ACABADOS
+C =ESTIRADO EN FRIO
+ SH =TORNEADO
+ SL =RECTIFICADO
EXTR =EXTRUIDO

ALMACEN
ST =STOCK
BD =PLAZO 7/10 DIAS
FB =FABRICACION

NUESTROS PRODUCTOS

PRODUCTOS VARIOS



TUBOS

Tubos mecánicos sin soldadura E355 (EN-10297) o E355J2H (EN-10210)

Tubos calibrados soldados (EN-10305-2) y sin soldadura (EN-10305-1)

Tubos de conducción soldados y sin soldadura Iso, Din, Api, Astm

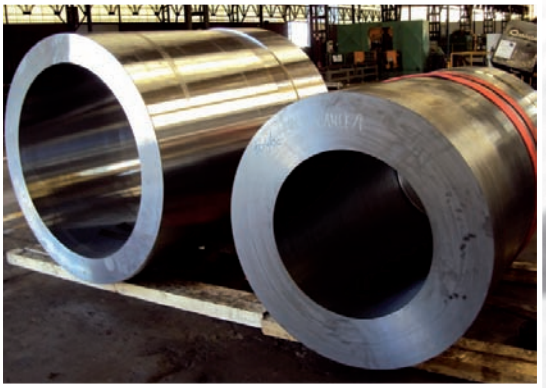
Tubos lapeados y Barras cromadas

TREPANADOS

Trepanados interiores desde diámetro 25 mm hasta 650 mm en longitudes desde 800 mm hasta 18000 mm.

Tolerancias hasta Iso h7 con Rugosidad Ra ≤0,20 desde diámetro 60 mm

Piezas de hasta peso de 40.000 kg



PIEZAS FORJADAS

Piezas forjadas de forma para diferentes sectores

Naval, Eólico, Siderurgia, Generadores y Turbinas eléctricas.

CHAPAS INDUSTRIALES

Chapas industriales calidades S235JR, S275JR, S355J2, C45,42CRMO4,28MNB5,55SI7, CORTEN A y B, Antidesgaste Hb 400 y Hb 500, Alto limite elástico S690QL.

Espesores hasta 600 mm, en formato comercial o en piezas cortadas por procesos de Oxicorte, Plasma, Agua, Lase.r

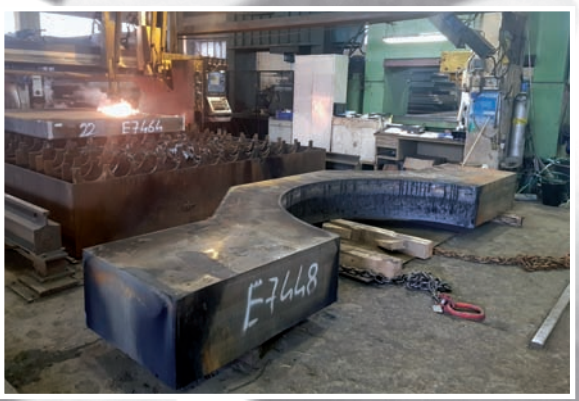


TABLA DE CONVERSION DE DUREZAS Y RESISTENCIA A LA TRACCION

DUREZA					RESISTENCIA A LA TRACCION			DUREZA					RESISTENCIA A LA TRACCION			DUREZA					RESISTENCIA A LA TRACCION			DUREZA					RESISTENCIA A LA TRACCION		
0 mm	HB	HV	HRC	HRB	N/mm2	Kgf/mm2	Psi/1000	0 mm	HB	HV	HRC	HRB	N/mm2	Kgf/mm2	Psi/1000	0 mm	HB	HV	HRC	HRB	N/mm2	Kgf/mm2	Psi/1000	0 mm	HB	HV	HRC	HRB	N/mm2	Kgf/mm2	Psi/1000
6.10	92	97	-	54	310	32	45	3.97	233	245	-	-	785	80	113.9	3.13	380	400	-	-	1290	132	187.1	2.67	(525)	553	-	-	1820	188	264.0
5.01	95	100	-	56	320	33	46.4	3.95	235	247	-	99	790	81	114.6	3.12	383	403	41	-	1300	133	188.5	-	(528)	556	-	-	1830	187	265.4
5.93	98	103	-	58	330	34	47.9	3.93	238	250	22	99.5	800	82	116.0	3.10	387	407	-	-	1310	134	190.0	2.66	(531)	559	-	-	1840	188	266.9
5.87	100	105	-	59	335	34	48.8	3.91	240	253	-	-	810	83	117.5	3.09	390	410	-	-	1320	135	191.4	-	(532)	560	53	-	1845	188	267.6
5.83	102	107	-	60	340	35	49.3	3.89	242	255	23	-	820	84	118.9	3.06	393	413	42	-	1330	136	192.9	2.65	(533)	561	-	-	1850	189	268.3
5.75	105	110	-	62	350	36	50.8	3.87	245	258	-	-	830	85	120.4	3.07	396	417	-	-	1340	137	194.4	-	(536)	564	-	-	1860	190	269.8
5.70	107	113	-	63.5	360	37	52.2	3.85	247	260	24	-	835	85	121.1	3.06	399	420	-	-	1350	138	195.8	2.64	(539)	567	-	-	1870	191	271.2
5.66	109	115	-	64.5	370	38	53.7	3.84	249	262	-	-	840	86	121.8	3.05	402	423	43	-	1360	139	197.3	-	(542)	570	-	-	1880	192	272.7
5.57	113	119	-	66	380	39	55.1	3.82	252	265	-	-	850	87	123.3	3.04	405	426	-	-	1370	140	198.7	2.63	(543)	572	-	-	1890	193	274.1
5.54	114	120	-	67	385	39	55.8	3.80	255	268	25	-	860	88	124.7	-	408	429	-	-	1380	141	200.2	2.62	(546)	575	-	-	1900	194	275.8
5.50	116	122	-	67.5	390	40	56.6	3.78	257	270	-	-	865	88	125.5	3.02	409	430	-	-	1385	141	200.9	-	(549)	578	54	-	1910	195	277.0
5.44	119	125	-	69	400	41	58.0	3.77	258	272	26	-	870	89	126.2	-	410	431	-	-	1390	142	201.5	2.61	(551)	580	-	-	1920	196	278.5
5.38	122	128	-	70	410	42	59.5	3.76	261	275	-	-	880	90	127.6	3.01	413	434	44	-	1400	143	203.1	2.80	(554)	583	-	-	1930	197	279.9
5.33	124	130	-	71	415	42	60.2	3.74	264	276	-	-	890	91	129.1	3.00	415	437	-	-	1410	144	204.6	-	(557)	586	-	-	1940	198	281.4
5.32	125	132	-	72	420	43	60.9	3.72	266	280	27	-	900	92	130.5	2.99	418	440	-	-	1420	145	206.0	2.59	(560)	589	-	-	1950	199	282.8
5.26	128	135	-	73	430	44	62.4	3.70	269	283	-	-	910	93	132.0	2.98	421	443	-	-	1430	146	207.4	-	(561)	590	-	-	1955	199	283.5
5.20	131	138	-	74	440	45	63.8	3.69	271	285	-	-	915	93	132.7	2.97	424	446	45	-	1440	147	208.9	-	(562)	591	-	-	1960	200	284.3
5.17	133	140	-	75	450	46	65.3	3.68	273	287	28	-	920	94	133.4	2.96	427	449	-	-	1450	148	210.3	2.58	(564)	594	-	-	1970	201	285.7
5.11	136	143	-	76.5	460	47	66.7	3.66	276	290	-	-	930	95	134.9	-	428	450	-	-	1455	148	211.0	-	(587)	596	55	-	1980	202	287.2
5.06	138	145	-	77	465	47	67.4	3.64	278	293	29	-	940	96	136.3	2.95	429	452	-	-	1460	149	211.8	2.57	(569)	599	-	-	1990	203	288.8
5.05	140	147	-	77.5	470	48	68.2	3.63	280	295	-	-	950	97	137.8	2.94	432	455	-	-	1470	150	213.2	-	(570)	600	-	-	1995	203	289.4
5.00	143	150	-	78.5	480	49	69.6	3.61	284	299	-	-	960	98	139.2	2.93	435	458	46	-	1480	151	214.7	2.58	(572)	602	-	-	2000	204	290.1
4.96	145	153	-	79.5	490	50	71.1	3.60	285	300	-	-	965	98	140.0	-	437	460	-	-	1485	151	215.4	-	(575)	605	-	-	2010	205	291.5
4.93	147	155	-	80	495	50	71.8	3.59	287	302	30	-	970	99	140.7	2.92	438	461	-	-	1490	152	216.1	2.55	(577)	607	-	-	2020	206	293.0
4.90	149	157	-	81	500	51	72.5	3.57	290	305	-	-	980	100	142.1	2.91	441	464	-	-	1500	153	217.6	-	(580)	610	-	-	2030	207	294.4
4.86	152	160	-	81.5	510	52	74.0	3.55	293	308	-	-	990	101	143.6	2.90	444	467	-	-	1510	154	219.0	2.54	(582)	613	-	-	2040	206	295.9
4.81	155	163	-	82.5	520	53	75.4	3.54	295	310	31	-	995	101	144.2	2.89	447	470	-	-	1520	155	220.5	-	(584)	615	56	-	2050	209	297.3
4.78	157	165	-	83	530	54	76.9	3.53	295	311	-	-	1000	102	145.0	-	449	473	47	-	1530	156	221.9	2.53	(587)	618	-	-	2060	210	298.8
4.74	160	168	-	84.5	540	55	78.3	3.52	299	314	-	-	1010	103	146.5	2.88	452	476	-	-	1540	157	223.4	-	(589)	620	-	-	2070	211	300.2
4.71	162	170	-	85	545	56	79.0	3.50	301	317	32	-	1020	104	147.9	2.87	455	479	-	-	1550	158	224.8	2.52	(592)	623	-	-	2080	212	301.7
4.70	163	172	-	88.5	550	56	79.8	3.49	304	320	-	-	1030	105	149.4	-	(456)	480	-	-	1555	159	225.5	-	(595)	626	-	-	2090	213	303.1
4.66	166	175	-	86	560	57	81.2	3.47	307	323	-	-	1040	106	150.6	2.86	(457)	481	-	-	1560	159	226.3	2.51	(598)	629	-	-	2100	214	304.6
4.62	169	178	-	86.5	570	58	82.7	3.45	311	327	33	-	1050	107	152.3	2.85	(460)	484	48	-	1570	160	227.7	-	(599)	630	-	-	2105	215	305.3
4.59	171	180	-	87	575	59	83.4	3.44	314	330	-	-	1060	108	153.7	-	(462)	488	-	-	1580	161	229.2	-	(600)	631	-	-	2110	215	306.0
4.58	172	181	-	-	580	59	84.1	3.43	316	333	-	-	1070	109	155.2	2.84	(465)	489	-	-	1590	162	230.6	2.50	(602)	634	-	-	2120	216	307.5
4.54	175	184	-	88	590	60	85.6	3.41	319	336	34	-	1080	110	156.6	2.83	(466)	490	-	-	1595	163	231.3	-	(604)	636	-	-	2130	217	308.9
4.53	176	185	-	-	595	61	86.3	3.40	322	339	-	-	1090	111	158.1	-	(467)	491	-	-	1600	163	232.1	2.49	(607)	639	57	-	2140	218	310.4
4.51	176	187	-	69	600	61	87.0	3.39	323	340	-	-	1095	112	158.8	2.82	(470)	494	-	-	1610	164	233.5	-	(608)	640	-	-	2145	219	311.1
4.47	181	190	-	89.5	610	62	88.5	3.38	325	342	-	-	1100	112	159.5	-	(472)	497	49	-	1620	165	235.0	-	(609)	641	-	-	2150	219	311.8
4.44	184	193	-	90	620	63	89.9	3.36	328	345	35	-	1110	113	161.0	-	(475)	500	-	-	1630	166	236.4	2.48	(612)	644	-	-	2160	220	313.3
4.43	185	195	-	-	625	64	90.6	3.35	332	349	-	-	1120	114	162.4	2.80	(478)	503	-	-	1640	167	237.9	2.47	(615)	647	-	-	2170	221	314.7
4.40	187	197	-	91	630	64	91.4	3.34	333	350	-	-	1125	115	163.2	2.79	(481)	506	-	-	1650	168	239.3	-	(618)	650	-	-	2180	222	316.2
4.37	190	200	-	91.5	640	65	92.8	3.33	334	352	-	-	1130	115	163.9	-	(483)	509	-	-	1660	169	240.8	-	(620)	653	-	-	2190	223	317.6
4.34	193	203	-	92	650	66	94.3	3.32	337	355	36	-	1140	116	165.3	2.78	(485)	510	-	-	1665	170	241.5	2.46	(622)	655	58	-	2200	224	319.1
4.32	195	205	-	92.5	660	67	95.7	3.31	340	358	-	-	1150	117	166.8	-	(486)	511	-	-	1670	170	242.2	-	-	675	59	-	-	-	-
4.29	196	208	-	93	670	68	97.2	3.30	342	360	-	-	1155	118	167.5	2.77	(488)	514	50	-	1680	171	243.7	-	-	698	60	-	-	-	-
4.27	199	210	-	93.5	675	69	97.9	3.29	343	361	-	-	1160	118	168.2	2.76	(491)	517	-	-	1690	172	245.1	-	-	720	61	-	-	-	-
4.25	201	212	-	-	680	69	98.6	3.28	346	364	37	-	1170	119	169.7	2.75	(494)	520	-	-	1700	173	246.6	-	-	745	62	-	-	-	-
4.22	204	215	-	94	690	70	100.1	3.26	349	367	-	-	1180	120	171.1	-	(496)	522	-	-	1710	174	248.0	-	-	773	63	-	-	-	-
4.19	206	219	-	-	700	71	101.5	3.25	352	370	-	-	1190	121	172.6	2.74	(499)	525	-	-	1720	175	249.5	-	-	800	64	-	-	-	-
4.18	209	220	-	95	705	72	102.3	3.24	354	373	38	-	1200	122	174.0	-	(501)	527	-	-	1730	176	250.9	-	-	829	65	-	-	-	-
4.16	211	222	-	95.5	710	72	103.0	3.23	357	376	-	-	1210	123	175.5	2.73	(504)	530	-	-	1740	177	252.4	-	-	864	86	-	-	-	-
4.13	214	225	-	96	720	73	104.4	3.21	361	380	-	-	1220	124	176.9	2.71	(506)	533	-	-	1750	178	253.8	-	-	900	67	-	-	-	-
4.11	216	228	-	-	730	74	105.9	3.20	363	382	39	-	1230	125	178.4	2.71	(509)	536	-	-	1760	179	255.3	-	-	940	68	-	-	-	-
4.08	219	230	-	96.5	740	75	107.3	3.19	366	385	-	-	1240	126	179.8	-	(512)	539	-	-	1770	180	256.7								
4.07	221	233	-	97	750	76	108.8	3..18	369	388	-	-	1250	127	181.3	2.7	(513)	540	-	-	1775	181	257.4								
4.05	223	235	-	-	755	77	109.5	3.17	371	390	-	-	1255	128	182.0	-	(514)	541	-	-	1780	182	258.2								
4.03	225	237	-	97.5	760	77	110.2	-	372	392	40	-	1260	128	182.7	2.69	(517)	544	52	-	1790	183	259.6								
4.01	228	240	-	98	770	79	111.7	3.16	374	394	-	-	1270	130	184.2	-	(520)	547	-	-	1800	184	261.1								
3.98	231	243	21	-	780	80	113.1	3.14	377	397	-	-	1280	131	185.6	2.68	(523)	550	-	-	1800	184	261.1								

EQUIVALENCIAS INTERNACIONALES

ACEROS AL CARBONO

EUROPA EN	ESPAÑA UNE	ALEMANIA DIN	ALEMANIA STAND Nº	FRANCIA AFNOR	ITALIA UNI	USA AISI/SAE	JAPON JIS
C15E	F1110	CK15	1.0401	XC15	C15	SAE 1015	C15C
C25E	F1120	CK25	1.1158	XC25	C25	SAE 1026	S25C
C30E	F1130	CK30	1.1178	XC32	C30	SAE 1030	S30C
C45E	F1140	CK45	1.1191	XC45	C45	SAE 1045	S45C
C55E	F1150	CK55	1.1203	XC55	C55	SAE 1055	S55C
C60E		CK60	1.0601	C60	C60	SAE 1060	S58C
S355J2	AE355	ST-52.3	1.0577	A52FP	FE510	ASTM A656	SS490YA
		C21	1.0432			ASTM A105	

ACEROS ALEADOS PARA TEMPLE Y REVENIDO

EUROPA EN	ESPAÑA UNE	ALEMANIA DIN	ALEMANIA STAND Nº	FRANCIA AFNOR	ITALIA UNI	USA AISI/SAE	JAPON JIS
28Mn6	28Mn6	28Mn6	1.1170	35Mn5	C28Mn	1527 Gr1330	SCMn2
38Cr2	F1200	38Cr2	1.7003	38C2	38Cr2		
46Cr2		42Cr2	1.7006	46C2	46CR2		
34Cr4		34Cr4	1.7033	32C4	34Cr4	SAE 5132	SCr430
37Cr4	F1201	37Cr4	1.7034	38C4	38Cr4	SAE 5135	SCr435
41Cr4	F1202	41Cr4	1.7035	42C4	41Cr4	SAE 5140	SCr440
25CrMo4	F222	25CrMo4	1.7218	25CD4	25CrMo4	SAE 4130	SCM420
34CrMo4	F1250	34CrMo4	1.7220	34CD4	35CrMo4	SAE 4135	SCM435
42CrMo4	F1252	42CrMo4	1.7225	42CD4	42CrMo4	SAE 4140	SCM440
39NiCrMo3	F1282		1.6510		39NiCrMo3		
34CrNiMo6	34CrNiMo6	34CrNiMo6	1.6582	35NCD6	35CrNiMo5	SAE 4340	SCM447
30CrNiMo8	30CrNiMo8	30CrNiMo8	1.6580	30CND8	30CrNiMo8		SCM431
40NiCrMo7	F1272	40NiCrMo8-4	1.6562		40NiCrMo7	SAE 4340	SNCM439
36NiCrMo16	F1260	36NiCrMo16	1.6773	35NCD16	35NiCrMo15		
51CrV4	F1430	50CrV4	1.8159	50CrV4	50CrV4	SAE 6150	SUP10
20MnB5	F1293	19MnB4	1.5530	20MB5	20MnB5	SAE 15B21H	SWRCHB620
30MnB5			1.5531		30MnB5	SAE 15B28H	
38MnB5		38MnB5	1.5532	38MB5		SAE 15B41H	SWRCHB737
27MnCrB5.2		27MnCrB5-2	1.7182				
39MnCrB6.2		39MnCrB6-2	1.7189				

ACEROS PARA MUELLES

EUROPA EN	ESPAÑA UNE	ALEMANIA DIN	ALEMANIA STAND Nº	FRANCIA AFNOR	ITALIA UNI	USA AISI/SAE	JAPON JIS
38Si7		38Si7	1.5023	40Si7			
41Si7	F1451	46Si7	1.5024	46S7	48Si7		
51Si7	F1450	51Si7	1.5025	51S7	50Si7	SAE 9250	
56Si7	F1440	55Si7	1.5026	55S7	55Si7	SAE 9255	
60Si7	F1441	60Si7	1.5027	60S7	60Si7	SAE 9260	SUP 16
54SiCr6		54SiCr6	1.7102	54SiCr6	54SiCr6	SAE 9254	SUP 12
55SiCr7		55SiCr7	1.7106	56SC7	55SiCR7	SAE 9261	
60SiCr7	F1442	60SiCr7	1.7108	61SC7	60SiCr8	SAE 9262	
46SiCrMo6		46SiCrMo6.3	1.8062	45SCD6	45SiCrMo6		
55Cr3	F1431	55Cr3	1.7176	55C3	55Cr3	SAE 5155	SUP 9
51CrV4	F1430	50CrV4	1.8159	50CrV4		SAE 6150	SUP10
51CrMoV4	F1460	51CrMoV4	1.7701	51CDV4	51CrMoV4		

ACEROS NITRURACION

EUROPA EN	ESPAÑA UNE	ALEMANIA DIN	ALEMANIA STAND Nº	FRANCIA AFNOR	ITALIA UNI	USA AISI/SAE	JAPON JIS
15CrMoV5-9		15CrMoV5 9	1.8521				
25CrMo12	F1711	25CrMo12					
31CrMo12	F1712	31CrMo12	1.8515	30CD12	31CrMo12		
31CrMoV9	F1721	31CrMoV9	1.8519		31CrMOV10		
34CrAlMo5-10	F1741	34CrAlMo5	1.8507				
34CrAlNi7-10		34CrAlNi7	1.8550				
41CrAlMo7-10	F1740	41CrAlMo7	1.8509	40CAD6.12	41CrAlMo7		SACM645

ACEROS PARA RODAMIENTOS

EUROPA EN	ESPAÑA UNE	ALEMANIA DIN	ALEMANIA STAND Nº	FRANCIA AFNOR	ITALIA UNI	USA AISI/SAE	JAPON JIS
102Cr6	F1310	100Cr6	1.3505	100Cr6	100Cr6	52100	SUJ2
100CrMn6	F1312	100CrMn6	1.3520	100CrMn6		A485(2)ASTM	
100CrMo7	F1313	100CrMo7	1.3537	100CrMo7.2	100CrMo7	A485(3)ASTM	SUJ4
100CrMo7.3	F1314	100CrMo7.3	1.3536	100CrMo8.3		A485(3)ASTM	

COMPOSICION QUIMICA %

ACEROS AL CARBONO

EUROPA EN	C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %	Otros %
C15E	0.12/0.18	<0.40	0.30/0.60	<0.045	<0.045				
C25E	0.22/0.29	<0.40	0.40/0.70	<0.045	<0.045	<0.40	<0.40	<0.10	Cr+Ni+Mo<0.63
C30E	0.27/0.34	<0.40	0.50/0.80	<0.045	<0.045	<0.40	<0.40	<0.10	Cr+Ni+Mo<0.63
C45E	0.42/0.50	<0.40	0.50/0.80	<0.045	<0.045	<0.40	<0.40	<0.10	Cr+Ni+Mo<0.63
C55E	0.52/0.60	<0.40	0.60/0.90	<0.045	<0.045	<0.40	<0.40	<0.10	Cr+Ni+Mo<0.63
C60E	0.57/0.65	<0.40	0.60/0.90	<0.045	<0.045	<0.40	<0.40	<0.10	Cr+Ni+Mo<0.63
S355J2	<0.22	<0.55	<1.60	<0.045	<0.045				Cu <0.55
A-105	0.18/0.23	0.15/0.35	0.60/1.05	<0.040	<0.050				

ACEROS ALEADOS PARA TEMPLE Y REVENIDO

EUROPA EN	C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %	Otros %
28Mn6	0.25/0.32	<0.40	1.30/1.65	<0.035	<0.035	<0.40	<0.10	<0.10	Cr+Ni+Mo<0.63
38Cr2	0.35/0.42	<0.40	0.50/0.80	<0.035	<0.035	0.40/0.60			
46Cr2	0.42/0.50	<0.40	0.50/0.80	<0.035	<0.035	0.40/0.60			
34Cr4	0.30/0.37	<0.40	0.60/0.90	<0.035	<0.035	0.90/1.20			
37Cr4	0.34/0.41	<0.40	0.60/0.90	<0.035	<0.035	0.90/1.20			
41Cr4	0.38/0.41	<0.40	0.60/0.90	<0.035	<0.035	0.90/1.20			
25CrMo4	0.22/0.29	<0.40	0.60/0.90	<0.035	<0.035	0.90/1.20		0.15/0.30	
34CrMo4	0.30/0.37	<0.40	0.60/0.90	<0.035	<0.035	0.90/1.20		0.15/0.30	
42CrMo4	0.38/0.45	<0.40	0.60/0.90	<0.035	<0.035	0.90/1.20		0.15/0.30	
39NiCrMo3	0.35/0.43	0.15/0.35	0.50/0.80	<0.035	<0.035	0.60/1.00	0.70/1.00	0.15/0.25	
34CrNiMo6	0.30/0.38	<0.40	0.50/0.80	<0.035	<0.035	1.30/1.70	1.30/1.70	0.15/0.30	
30CrNiMo8	0.26/0.34	<0.40	0.30/0.60	<0.035	<0.035	1.80/2.20	1.80/2.20	0.30/0.50	
40NiCrMo7	0.37/0.44	0.20/0.35	0.70/0.90	<0.020	<0.015	0.70/0.95	1.65/2.00	0.30/0.40	Al 0.005/0.050
36NiCrMo16	0.32/0.39	<0.40	0.30/0.60	<0.030	<0.025	1.60/2.00	3.60/4.10	0.24/0.45	
51CrV4	0.47/0.55	<0.40	0.70/1.10	<0.035	<0.035	0.90/1.20			V-0.10/0.25
20MnB5	0.17/0.23	0.15/0.35	1.10/1.40	<0.035	<0.035				B.- 0.0008/0.005
30MnB5	0.27/0.33	<0.40	1.15/1.45	<0.035	<0.040				B.- 0.0008/0.005
38MnB5	0.36/0.42	<0.40	1.15/1.45	<0.035	<0.040				B.- 0.0008/0.005
27MnCrB5.2	0.24/0.30	<0.40	1.10/1.40	<0.035	<0.040	0.30/0.60			B.- 0.0008/0.005
39MnCrB6.2	0.36/0.42	<0.40	1.40/1.70	<0.035	<0.040	0.30/0.60			B.- 0.0008/0.005

ACEROS PARA MUELLES

EUROPA EN	C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %	Otros %
38Si7	0.35/0.42	1.50/1.80	0.50/0.80	<0.030	<0.030				
41Si7	0.42/0.50	1.50/1.80	0.50/0.80	<0.050	<0.050				N.- <0.007
51Si7	0.47/0.55	1.50/1.80	0.50/0.80	<0.045	<0.045				N.- <0.007
56Si7	0.52/0.60	1.50/1.80	0.70/1.00	<0.045	<0.045				
60Si7	0.56/0.64	1.50/1.80	0.70/1.00	<0.045	<0.045				
54SiCr6	0.51/0.59	1.20/1.60	0.50/0.80	<0.030	<0.030	0.50/0.80			
55SiCr7	0.52/0.60	1.50/1.80	0.70/1.00	<0.050	<0.050	0.20/0.40			N.- <0.007
60SiCr7	0.57/0.65	1.50/1.80	0.70/1.00	<0.030	<0.030	0.20/0.40			
46SiCrMo6	0.42/0.50	1.30/1.70	0.50/0.80	<0.030	<0.025	0.50/0.75		0.15/0.30	
55Cr3	0.52/0.59	0.25/0.50	0.70/1.00	<0.030	<0.030	0.70			
51CrV4	F143	0.47/0.55	<0.40	0.70/1.10	<0.035	<0.035	0.90/1.20		
51CrMoV4	0.47/0.55	<0.40	0.70/1.10	<0.035	<0.035	0.90/1.20		0.15/0.30	V-0.10/0.25

ACEROS NITRURACION

EUROPA EN	C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %	Otros %
15CrMoV5-9	0.13/0.18	<0.40	0.80/1.10	<0.025	<0.025	1.20/1.50		0.80/1.10	V.-0.20/0.30
25CrMo12	0.22/0.29	0.15/0.40	0.40/0.70	<0.035	<0.035	2.75/3.25		0.40/0.60	
31CrMo12	0.28/0.35	0.15/0.40	0.40/0.70	<0.030	<0.035	2.80/3.30	<0.30	0.30/0.50	
31CrMoV9	0.26/0.34	<0.40	0.40/0.70	<0.025	<0.030	2.30/2.70		0.15/0.25	V.-0.10/0.20
34CrAlMo5-10	0.30/0.37	<0.40	0.50/0.80	<0.025	<0.030	1.00/1.30		0.15/0.25	Al.-0.80/1.20
34CrAlNi7-10	0.30/0.37	<0.40	0.40/0.70	<0.025	<0.030	1.50/1.80	0.85/1.15		Al.-0.80/1.20
41CrAlMo7-10	0.38/0.45	<0.40	0.50/0.80	<0.030	<0.035	1.50/1.80		0.25/0.40	Al.-0.80/1.20

ACEROS PARA RODAMIENTOS

EUROPA EN	C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %	Otros %
102Cr6	0.90/1.05	0.15/0.35	0.25/0.45	<0.030	<0.025	1.35/1.65	<0.30		Cu.- <0.30
100CrMn6	0.90/1.05	0.50/0.70	1.00/1.20	<0.030	<0.025	1.40/1.65	<0.30		Cu.- <0.30
100CrMo7	0.90/1.05	0.20/0.40	0.25/0.45	<0.030	<0.025	1.65/1.95	<0.30	0.15/0.25	Cu.- <0.30
100CrMo7.3	0.90/1.05	0.20/0.40	0.60/0.80	<0.030	<0.025	1.65/1.95	<0.30	0.20/0.35	Cu.- <0.30

EQUIVALENCIAS INTERNACIONALES

ACEROS PARA CEMENTACION

EUROPA EN	ESPAÑA UNE	ALEMANIA DIN	ALEMANIA STAND Nº	FRANCIA AFNOR	ITALIA UNI	USA AISI/SAE	JAPON JIS
C10E	F1510	CK10	1.1121	XC10	C10	SAE 1010	S10C
C15E	F1511	CK15	1.1141	XC12	C15	SAE 1015	S15C
C16E		C16E	1.1148	XC18		SAE 1016	
20Mn5	F1515	20Mn5	1.1133	20M5	G22Mn3	SAE 1024	SMn420
17Cr3		17Cr3	1.7016	18C3		SAE 5117	
20Cr4		20Cr4	1.7027				SCr420
16MNCr5	F1516	16MnCr5	1.7131	16MC5	16MnCr5	SAE 5115	
20MnCr5	F150.D	20MNCr5	1.7147	20MC5	20MnCr5	SAE 5120	SMnC420H
15CrMo5	F1551	15CrMo5	1.7262	12CD4FF			SCM21
18CrMO4	F1550	18CrMO4	1.7242	18CD4	18CrMO4		SCM418
20MoCr3		20MoCr3	1.7320	20MoCr3			
20MoCr4	F1523	20MoCr4	1.7321	20MoCr4		4118	SCMV1
16NiCr4	F1581	16NiCr4	1.5714	16NiCr4	16CrNi4	3115	
18NiCr5-4	F1580	18NiCr5-4	1.5810	20NC6			
17CrNI6-6		15CrNi6	1.5919				
15NiCr13	F1540	14NiCr10	1.5732	14NC11	16NiCr11	SAE 3415	SNC21
20NiCrMo2KD	F1522	20NiCrMo2-2	1.6523	20NCD2	20NiCrMo2	SAE 8620	CNCM220
17NiCrMo6-4		17NiCrMo6-4	1.6566	18NCD5	18NiCrMo5		
18CrNiMo7-6		17CrNiMo6	1.6587	18NCD6			
14NiCrMo13-4	F1560	14NiCrMo13-4	1.6657		16NiCrMo12		9310RH

ACEROS DE FACIL MECANIZACION

EUROPA EN	ESPAÑA UNE	ALEMANIA DIN	ALEMANIA STAND Nº	FRANCIA AFNOR	ITALIA UNI	USA AISI/SAE	JAPON JIS
11SMn30	F2111	9SMn28	1.0715	S250	CF9SMn28	SAE 1213	SUM22
11SMnPB30	F2112	9SMnPb28	1.0718	S250Pb	CF9SMnPb28	SAE 12L13	SUM22L
11SMn37	F2113	9SMN36	1.0736	S300	CF9SMN36	SAE 1215	SUM25
11SMnPb37	F2114	9SMnPb36	1.0737	S300Pb	CF9SMnPb36	SAE 12L14	
15SMN13		15S10	1.0710	13MF4		SAE 1115	SUM31
10S20	F2121	10S20	1.0721	12MF4	CF10S20		
10SPb20	F2122	10SPb20	1.0722		CF10SPb20		
36SMN14	F2131		1.0764	35MF6	CF35SMn10		SUM41
36SMnPb14	F2132		1.0765	35MF6Pb	CF35SMnPb10	SAE 1137	
35S20		35S20	1.0726	35MF4			
35SPb20		35SPb20	1.0756				
46S20		45S20	1.0727	45MF4			
46SPb20		45SPb20	1.0757				
44SMn28	F2133	44SMn28	1.0762	45MF6.3	CF44SMn28	SAE 1144	SUM 43
44SMnPb28		44SMnPb28	1.0763	44SMnPb28	CF44SMnPb28	SAE 1144	SUM 43
		60S20	1.0728				
		60SPb20	1.0758				
C45Pb		C45Pb	1.0504				

ACEROS DE HERRAMIENTAS PARA TRABAJAR EN FRIO

EUROPA EN	ESPAÑA UNE	ALEMANIA DIN	ALEMANIA STAND Nº	FRANCIA AFNOR	ITALIA UNI	USA AISI/SAE	JAPON JIS
120W4	F5238	120W4	1.2516		U115W4KU	F1	
55WCrV8	F5242	60WCrV8	1.2550	45WCrV8	U55WCr8KU	S1	SKS-41
58SiMoCr8	F5247	58SiMoCr8	1.2103		U58SiMoKU+V	S5	
90MNCrV8	F5229	90MnCrV8	1.2842	90MnV8	U88MnV8KU	A681(02)ASTM	
95MnWCrV5	F5220	100MnWCrV5	1.2510	90MnWCrv5	U95MnWCr5KU	A681(01)ASTM	SKS-3
X210Cr12	F5212	X210Cr12	1.2080	X200Cr12	UX210Cr13KU	A681(D3)ASTM	SKD-1
X160CrMoV121	F5211	X155CrVMo12.1	1.2379	X160CrMoV12	UX155CrVMo12.1KU	A681(D2)ASTM	SKD-11

ACEROS DE HERRAM. PARA TRABAJAR EN CALIENTE

EUROPA EN	ESPAÑA UNE	ALEMANIA DIN	ALEMANIA STAND Nº	FRANCIA AFNOR	ITALIA UNI	USA AISI/SAE	JAPON JIS
35CrMo8	F5307	56NiCrMoV7	1.2714	55NiCrMoV7	55NiCrMoV7KU	L6	STK-4
40NiCrMoV16	F5305	X45NiCrMo4	1.2767	40NiCrMoV16	40NiCrMoV16KU	6437 E ASTM	
X38CrMoV5.1	F5317	X38CrMoV5.1	1.2343	X38CrMoV5	X37CrMoV51KU	6437E ASTM	SKD-6
X40CrMoV511	F5318	X40CrMoV5.1	1.2344	X40CrMoV5	X40CrMoV5.11KU	6408A ASTM	SKD-61
32CrMoV12-28	F5313	X32CrMoV3.3	1.2365	32CrMoV12-28	X30CrMoV1227KU	H10	SKD-7

ACEROS DE HERRAM. PARA TRABAJAR EN CALIENTE

EUROPA EN	ESPAÑA UNE	ALEMANIA DIN	ALEMANIA STAND Nº	FRANCIA AFNOR	ITALIA UNI	USA AISI/SAE	JAPON JIS
40CrMnMo7	F5303	40CrMnMo7	1.2311		35CrMo8KU		
40CrMnMoS8.6	F5302	40CrMnMoS8.6	1.2312				UDO-35
40CrMnNiMo8.6.4		40CrMnNiMo8.6.4	1.2738			4130-35i	
XC40Cr14	F3404	X42Cr13	1.2083	X40Cr14	740C14	A-420	

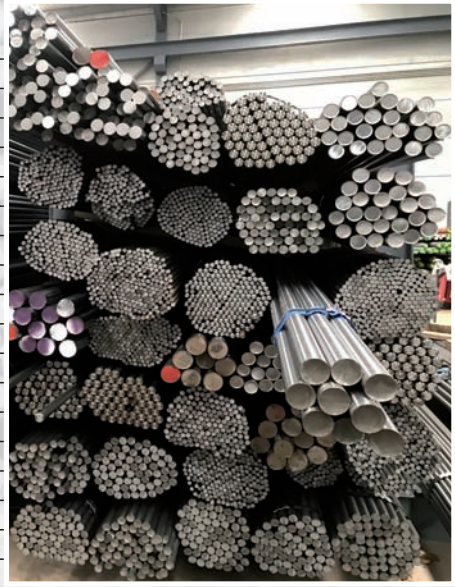
COMPOSICION QUIMICA %

ACEROS PARA CEMENTACION

EUROPA EN	C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %	Otros %
C10E	0.07/0.13	<0.40	0.30/0.60	<0.035	<0.035				
C15E	0.12/0.18	<0.40	0.30/0.60	<0.035	<0.035				
C16E	0.12/0.18	<0.40	0.60/0.90	<0.035	<0.035				
20Mn5	0.17/0.23	<0.60	1.00/1.50	<0.035	<0.030	<0.30			AL.- 0.015/0.050
17Cr3	0.14/0.20	<0.40	0.60/0.90	<0.035	<0.035	0.70/1.00			
20Cr4	0.17/0.23	<0.40	0.60/0.90	<0.035	<0.035	0.90/1.20			
16MNCr5	0.14/0.19	<0.40	1.00/1.30	<0.035	<0.035	0.80/1.10			
20MnCr5	0.17/0.22	<0.40	1.10/1.40	<0.035	<0.035	1.00/1.30			
15CrMo5	0.13/0.17	0.15/0.35	0.80/1.10	<0.035	<0.035	1.00/1.30		0.20/0.30	
18CrMO4	0.13/0.20	0.15/0.35	0.50/0.80	<0.035	<0.035	0.90/1.20	<0.40	0.20/0.30	
20MoCr3	0.17/0.23	<0.40	0.60/0.90	<0.035	<0.035	0.40/0.70		0.30/0.40	
20MoCr4	0.17/0.23	<0.40	0.70/1.00	<0.035	<0.035	0.30/0.60		0.40/0.50	
16NiCr4	0.13/0.19	<0.40	0.70/1.00	<0.035	<0.035	0.60/1.00	0.80/1.10		
18NiCr5-4	0.16/0.21	<0.40	0.60/0.90	<0.035	<0.035	0.90/1.20	1.20/1.50		
17CrNI6-6	0.14/0.19	<0.40	0.40/0.60	<0.035	<0.035	1.40/1.70	1.40/1.70		
15NiCr13	0.10/0.17	0.15/0.35	0.40/0.70	<0.035	<0.035	0.55/0.95	2.25/2.75		
20NiCrMo2KD	0.17/0.23	<0.40	0.65/0.95	<0.035	<0.035	0.35/0.70	0.40/0.70	0.15/0.25	
17NiCrMo6-4	0.14/0.20	<0.40	0.60/0.90	<0.035	<0.035	0.80/1.10	1.20/1.50	0.15/0.25	
18CrNiMo7-6	0.15/0.21	<0.40	0.50/0.90	<0.035	<0.035	1.50/1.80	1.40/1.70	0.25/0.35	
14NiCrMo13-4	0.12/0.17	0.15/0.40	0.30/0.60	<0.025	<0.020	0.80/1.10	3.00/3.50	0.20/0.30	

ACEROS DE FACIL MECANIZACION

EUROPA EN	C %	Si %	Mn %	P %	S %	Pb %
11SMn30	<0.14	<0.05	0.90/1.30	<0.11	0.27/0.33	
11SMnPB30	<0.14	<0.05	0.90/1.30	<0.11	0.27/0.33	0.15/0.35
11SMn37	<0.14	<0.05	1.10/1.50	<0.10	0.34/0.40	
11SMnPb37	<0.15	<0.05	1.10/1.50	<0.10	0.34/0.40	0.15/0.35
15SMN13	0.12/0.18	<0.40	0.90/1.30	<0.06	0.08/0.18	
10S20	0.07/0.13	<0.40	0.70/1.10	<0.06	0.15/0.25	
10SPb20	0.07/0.13	<0.40	0.70/1.10	<0.06	0.15/0.25	0.20/0.35
36SMN14	0.32/0.39	<0.04	1.30/1.70	<0.06	0.10/0.18	
36SMnPb14	0.32/0.39	<0.04	1.30/1.70	<0.06	0.10/0.18	0.15/0.35
35S20	0.32/0.39	<0.40	0.70/1.10	<0.06	0.15/0.25	
35SPb20	0.32/0.39	<0.40	0.70/1.10	<0.06	0.15/0.25	0.15/0.35
46S20	0.42/0.50	<0.40	0.70/1.10	<0.06	0.15/0.25	
46SPb20	0.42/0.50	<0.40	0.70/1.10	<0.06	0.15/0.25	0.15/0.35
44SMn28	0.40/0.48	<0.40	1.30/1.70	<0.06	0.24/0.33	
44SMnPb28	0.40/0.48	<0.40	1.30/1.70	<0.06	0.24/0.33	0.15/0.35
	0.57/0.65	0.10/0.30	0.70/1.10	<0.06	0.18/0.25	
	0.57/0.65	0.10/0.30	0.70/1.10	<0.06	0.18/0.25	0.15/0.35
C45Pb	0.42/0.50	<0.40	0.50/0.80	<0.045	<0.045	0.15/0.30



ACEROS DE HERRAMIENTAS PARA TRABAJAR EN FRIO

EUROPA EN	C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %	V	W	Otros %
120W4	1.15/1.25	0.15/0.30	0.20/0.35	<0.035	<0.035	0.15/0.25			0.07/0.12	0.90/1.10	
55WCrV8	0.55/0.65	0.50/0.70	0.15/0.45	<0.035	<0.035	0.90/1.20			0.10/0.20	1.80/2.10	
58SiMoCr8	0.55/0.63	1.70/2.00	0.60/0.90	<0.035	<0.035	0.35/0.45					
90MNCrV8	0.85/0.95	0.10/0.40	1.90/2.10	<0.030	<0.030	0.20/0.50			0.05/0.15		
95MnWCrV5	0.90/1.05	0.15/.035	1.00/1.20	<0.035	<0.035	0.50/0.70			0.05/0.15	0.50/0.70	
X210Cr12	1.90/2.20	0.10/0.40	0.15/0.45	<0.035	<0.035	11.0/13.0					
X160CrMoV121	1.50/1.60	0.10/0.40	0.15/0.45	<0.030	<0.030	11.0/13.0		0.60/0.80	0.90/1.10		

ACEROS DE HERRAM. PARA TRABAJAR EN CALIENTE

EUROPA EN	C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %	V
35CrMo8	0.50/0.60	0.10/0.40	0.65/0.95	<0.030	<0.030	1.00/1.20	1.50/1.80	0.45/0.55	0.07/0.12
40NiCrMoV16	0.40/0.50	0.10/0.40	0.15/0.45	<0.030	<0.030	1.20/1.50	3.80/4.30	0.15/0.35	
X38CrMoV5.1	0.36/0.42	0.90/1.20	0.30/0.50	<0.030	<0.030	4.80/5.50		1.10/1.40	0.25/0.50
X40CrMoV511	0.37/0.43	0.90/1.20	0.30/0.50	<0.030	<0.030	4.80/5.50		1.20/1.50	0.90/1.10
32CrMoV12-28	0.28/0.35	0.10/0.40	0.15/0.45	<0.030	<0.030	2.70/3.20		2.60/3.00	0.40/0.70

ACEROS DE HERRAM. PARA TRABAJAR EN CALIENTE

EUROPA EN	C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %
40CrMnMo7	0.35/0.45	0.20/0.40	1.30/1.60	<0.035	<0.035	1.80/2.10		0.15/0.25
40CrMnMoS8.6	0.35/0.45	0.30/0.50	1.40/1.60	<0.030	0.05/0.10	1.80/2.00		0.15/0.25
40CrMnNiMo8.6.4	0.35/0.45	0.20/0.40	1.30/1.60	<0.035	<0.035	1.80/2.10	0.90/1.20	0.15/0.25
XC40Cr14	0.38/0.45	<1.00	<1.00	<0.030	<0.030	12.5/13.5		

TABLA DE PESOS DE PERFILES REDONDOS, CUADRADOS Y HEXAGONALES

TABLA DE PESOS REDONDOS, CUADRADOS, HEXAGONAL KG/METRO

mm	Redondo	Cuadrado	Hexágono	mm	Redondo	Cuadrado	Hexágono	mm	Redondo	Cuadrado
2	0.025	0.031	0.027	65	26.026	33.166	28.723	450	1247.400	1589.625
2.5	0.039	0.049	0.042	68	28.484	36.298	31.435	460	1303.456	
3	0.055	0.071	0.061	70	30.184	38.465	33.312	470	1360.744	
3.5	0.075	0.096	0.083	73	32.827	41.833	36.288	480	1419.264	
4	0.099	0.126	0.109	75	34.650	44.156	38.240	490	1479.016	
4.5	0.125	0.159	0.138	78	37.477	47.759	41.361	500	1540.000	1962.500
5	0.154	0.196	0.170	80	39.424	50.240	43.509	510	1602.216	
6	0.222	0.283	0.245	83	42.436	54.079	46.833	520	1665.664	
7	0.302	0.385	0.333	85	44.506	56.716	49.118	530	1730.344	
8	0.394	0.502	0.435	88	47.703	60.790	52.646	540	1796.256	
9	0.499	0.636	0.551	90	49.896	63.585	55.066	550	1863.400	2374.625
10	0.616	0.785	0.680	93	53.278	67.895	58.798	560	1931.776	
11	0.745	0.950	0.823	95	55.594	70.846	61.355	570	2001.384	
12	0.887	1.130	0.979	98	59.161	75.391	65.291	580	2072.224	
13	1.041	1.327	1.149	100	61.600	78.500	67.983	590	2144.296	
14	1.207	1.539	1.332	105	67.914	86.546		600	2217.600	2826.000
15	1.386	1.766	1.530	110	74.536	94.985	82.259	610	2292.136	
16	1.577	2.010	1.740	115	81.466	103.816		620	2367.904	
17	1.780	2.269	1.965	120	88.704	113.040	97.895	630	2444.904	
18	1.996	2.543	2.203	125	96.250	122.656		640	2523.136	
19	2.224	2.834	2.454	130	104.104	132.665	114.891	650	2602.600	3316.625
20	2.464	3.140	2.719	135	112.266	143.066		660	2683.296	
22	2.981	3.799	3.290	140	120.700	153.900	133.200	670	2765.224	
23	3.259	4.153	3.596	145	129.514	165.046		690	2932.776	
24	3.548	4.522	3.916	150	138.600	176.625	152.962	700	3018.400	3846.500
25	3.850	4.906	4.249	155	147.994	188.596		710	3105.256	
26	4.164	5.307	4.596	160	157.696	200.960		720	3193.344	
27	4.491	5.723	4.956	165	167.706	213.716		730	3282.664	
28	4.829	6.154	5.330	170	178.024	226.865		740	3373.216	
29	5.181	6.602	5.717	175	188.650	240.406		750	3465.000	4415.625
30	5.544	7.065	6.118	180	199.584	254.340		760	3558.016	
31	5.920	7.544	6.533	185	210.826	268.666		700	3652.264	
32	6.308	8.038	6.961	190	222.376	283.385		780	3747.744	
33	6.708	8.549	7.403	200	246.400	314.000		790	3844.456	
34	7.121	9.075	7.859	210	271.656	346.185		800	3942.400	5024.000
35	7.546	9.616	8.328	220	298.144	379.940		810	4041.576	
36	7.983	10.174	8.811	230	325.864	415.265		820	4141.984	
37	8.433	10.747	9.307	240	354.816	452.160		830	4243.624	
38	8.895	11.335	9.817	250	385.000	490.625		840	4346.496	
39	9.369	11.940	10.340	260	416.416	530.660		850	4450.600	
40	9.856	12.560	10.877	270	449.064	572.265		860	4555.936	
41	13.355	13.196	11.428	280	482.944	615.440		870	4662.504	
42	10.866	13.847	11.992	290	518.056	660.185		880	4770.304	
43	11.390	14.515	12.570	300	554.400	706.500		890	4879.336	
44	11.926	15.198	13.162	310	591.976			900	4989.600	
45	12.474	15.896	13.767	320	630.784			910	5101.096	
46	13.035	16.611	14.385	330	670.824			920	5213.824	
47	13.607	17.341	15.017	340	712.096			930	5327.784	
48	14.193	18.086	15.663	350	754.600	961.625		940	5442.976	
49	14.790	18.848	16.323	360	798.336			950	5559.400	
50	15.400	19.625	16.996	370	843.304			960	5677.056	
52	16.657	21.226	18.383	380	889.504			970	5795.944	
53	17.303	22.051	19.096	390	936.936			980	5916.064	
55	18.634	23.746	20.565	400	985.600	1256.000		990	6037.416	
57	20.014	25.505	22.088	410	1035.496			1000	6160.000	
58	20.722	26.407	22.869	420	1086.624					
60	22.176	28.260	24.474	430	1138.984					
63	24.449	31.157	26.982	440	1192.576					

FORMULAS PARA EL CÁLCULO DE PESOS

REDONDO	CUADRADO	HEXÁGONO
DxDx6.16/1000	LxLx7.85/1000	DxDx6.79/1000

TABLA DE PESOS DE PLETINAS

TABLA DE PESOS PLETINAS KG/METRO

KG/METRO	ESPESOR (mm)																						
ANCHO (mm)	2	3	4	5	6	7	8	10	12	14	15	16	18	20	22	25	30	35	40	50	60	70	80
6	0.094	0.141	0.188	0.236	0.283	0.330	0.377	0.471	0.565	0.659	0.707	0.754	0.848	0.942	1.036	1.178	1.413	1.649	1.884	2.355	2.826	3.297	3.768
8	0.126	0.188	0.251	0.314	0.377	0.440	0.502	0.628	0.754	0.879	0.942	1.005	1.130	1.256	1.382	1.570	1.884	2.198	2.512	3.140	3.768	4.396	5.024
10	0.157	0.236	0.314	0.393	0.471	0.550	0.628	0.785	0.942	1.099	1.178	1.256	1.416	1.570	1.727	1.963	2.355	2.748	3.140	3.925	4.710	5.495	6.280
12	0.188	0.283	0.377	0.471	0.565	0.659	0.754	0.942	1.130	1.319	1.413	1.507	1.696	1.884	2.072	2.355	2.826	3.297	3.768	4.710	5.652	6.594	7.536
14	0.220	0.330	0.440	0.550	0.659	0.769	0.879	1.099	1.319	1.539	1.649	1.758	1.978	2.198	2.418	2.748	3.297	3.847	4.396	5.495	6.594	7.693	8.792
16	0.251	0.377	0.502	0.628	0.754	0.879	1.005	1.256	1.507	1.758	1.884	2.010	2.261	2.512	2.763	3.140	3.768	4.396	5.024	6.280	7.536	8.792	10.048
18	0.283	0.424	0.565	0.707	0.848	0.989	1.130	1.413	1.696	1.978	2.120	2.261	2.543	2.826	3.109	3.533	4.239	4.946	5.652	7.065	8.478	9.891	11.304
20	0.314	0.471	0.628	0.785	0.942	1.099	1.256	1.570	1.884	2.198	2.355	2.512	2.826	3.140	3.454	3.925	4.710	5.495	6.280	7.850	9.420	10.990	12.560
22	0.345	0.518	0.691	0.864	1.036	1.209	1.382	1.727	2.072	2.418	2.591	2.763	3.109	3.454	3.799	4.318	5.181	6.045	6.908	8.635	10.362	12.089	13.816
25	0.393	0.589	0.785	0.981	1.178	1.374	1.570	1.963	2.355	2.748	2.944	3.140	3.533	3.925	4.318	4.906	5.888	6.869	7.850	9.813	11.775	13.738	15.700
30	0.471	0.707	0.942	1.178	1.413	1.649	1.884	2.355	2.826	3.297	3.533	3.768	4.239	4.710	5.181	5.888	7.065	8.243	9.420	11.775	14.130	16.485	18.840
35	0.550	0.824	1.099	1.374	1.649	1.923	2.198	2.748	3.297	3.847	4.121	4.396	4.946	5.495	6.045	6.869	8.243	9.616	10.990	13.738	16.485	19.233	21.980
40	0.628	0.942	1.256	1.570	1.884	2.198	2.512	3.140	3.768	4.396	4.710	5.024	5.652	6.280	6.908	7.850	9.420	10.990	12.560	15.700	18.840	21.980	25.120
45	0.707	1.060	1.413	1.766	2.120	2.473	2.826	3.533	4.239	4.946	5.299	5.652	6.359	7.065	7.772	8.831	10.598	12.364	14.130	17.663	21.195	24.728	28.260
50	0.785	1.178	1.570	1.963	2.355	2.748	3.140	3.925	4.710	5.495	5.888	6.280	7.065	7.850	8.635	9.813	11.775	13.738	15.700	19.625	23.550	27.475	31.400
55	0.864	1.295	1.727	2.159	2.591	3.022	3.454	4.318	5.181	6.045	6.476	6.908	7.772	8.635	9.499	10.794	12.953	15.111	17.270	21.588	25.905	30.223	34.540
60	0.942	1.413	1.884	2.355	2.826	3.297	3.768	4.710	5.652	6.594	7.065	7.538	8.478	9.420	10.362	11.775	14.130	16.485	18.840	23.550	28.260	32.970	37.680
65	1.021	1.531	2.041	2.551	3.062	3.572	4.082	5.103	6.123	7.144	7.654	8.164	9.185	10.205	11.226	12.756	15.308	17.859	20.410	25.513	30.615	35.718	40.820
70	1.099	1.649	2.198	2.748	3.297	3.847	4.396	5.495	6.594	7.693	8.243	8.792	9.891	10.990	12.089	13.738	16.485	19.233	21.980	27.475	32.970	38.465	43.960
75	1.178	1.766	2.355	2.944	3.533	4.121	4.710	5.888	7.065	8.243	8.831	9.420	10.598	11.775	12.953	14.719	17.663	20.606	23.550	29.438	35.325	41.213	47.100
80	1.256	1.884	2.512	3.140	3.768	4.396	5.024	6.280	7.536	8.792	9.420	10.048	11.304	12.560	13.816	15.700	18.840	21.980	25.120	31.400	37.680	43.960	50.240
90	1.413	2.120	2.826	3.533	4.239	4.946	5.652	7.065	8.478	9.891	10.598	11.304	12.717	14.130	15.543	17.663	21.195	24.728	28.260	35.325	42.390	49.455	56.520
100	1.570	2.355	3.140	3.925	4.710	5.495	6.280	7.850	9.420	10.990	11.775	12.560	14.130	15.700	17.270	19.625	23.550	27.475	31.400	39.250	47.100	54.950	62.800
110	1.727	2.591	3.454	4.318	5.181	6.045	6.908	8.635	10.632	12.089	12.953	13.816	15.543	17.270	18.997	21.588	25.905	30.223	34.540	43.175	51.810	60.445	69.080
120	1.884	2.826	3.768	4.710	5.652	6.594	7.536	9.420	11.304	13.188	14.130	15.072	16.956	18.840	20.724	23.550	28.260	32.970	37.680	47.100	56.520	65.940	75.360
130	2.041	3.062	4.082	5.103	6.123	7.144	8.164	10.205	12.246	14.287	15.308	16.328	18.369	20.410	22.451	25.513	30.615	35.718	40.820	51.025	61.230	71.435	81.640
140	2.198	3.297	4.396	5.495	6.594	7.693	8.792	10.990	13.188	15.386	16.485	17.584	19.782	21.980	24.178	27.475	32.970	38.465	43.960	54.950	65.940	76.930	87.920
150	2.355	3.533	4.710	5.888	7.065	8.243	9.420	11.775	14.130	16.485	17.663	18.840	21.195	23.550	25.905	29.438	35.325	41.213	47.100	58.875	70.650	82.425	94.200
160	2.512	3.768	5.024	6.280	7.536	8.792	10.048	12.560	15.072	17.584	18.840	20.096	22.608	25.120	27.632	31.400	37.680	43.980	50.240	62.800	75.360	87.920	100.480
170	2.669	4.004	5.338	6.673	8.007	9.342	10.676	13.345	16.014	18.683	20.018	21.352	24.021	26.690	29.359	33.363	40.035	46.708	53.380	66.725	70.070	93.415	106.760
180	2.826	4.239	5.652	7.065	8.478	9.891	11.304	14.130	16.956	19.782	21.195	22.608	25.434	28.260	31.086	35.325	42.390	19.455	56.520	70.650	84.780	98.910	113.040
200	3.140	4.710	6.280	7.850	9.420	10.990	12.560	15.700	18.840	21.980	23.550	25.120	28.260	31.400	34.540	39.250	47.100	54.950	62.800	78.500	94.200	109.900	125.600
250	3.925	5.888	7.850	9.813	11.775	13.738	15.700	19.625	23.550	27.475	29.438	31.400	35.325	39.250	43.175	49.063	58.875	68.688	78.500	98.125	117.750	137.375	157.000
300	4.710	7.065	9.420	11.775	14.130	16.485	18.840	23.550	28.260	32.970	35.325	37.680	42.390	47.100	51.810	58.875	70.650	82.425	94.200	117.750	141.300	164.850	188.400
350	5.495	8.243	10.990	13.738	16.485	19.233	21.980	27.475	32.970	38.465	41.213	43.960	49.455	54.950	60.445	68.688	82.425	96.163	109.900	137.375	164.850	192.325	219.800
400	6.280	9.420	12.560	15.700	18.840	21.980	25.120	31.400	37.680	43.960	47.100	50.240	56.520	62.080	69.800	78.500	94.200	109.900	125.600	157.000	188.400	219.800	251.200

FORMULA PARA EL CALCULO DE PESO PLANOS

(ANCHO X ESPESOR) X 7.85/1000

TABLAS DE PESOS TUBO MECÁNICO KG/METRO

DE mm	ESP mm	DI mm	PESO Kg/m
26.9	6.3	14.3	3.2
33.7	6.3	21.1	4.3
	7.1	19.5	4.7
	8.0	17.7	5.1
	8.8	16.1	5.4
	10.0	13.7	5.8
38	6.3	25.4	4.9
	7.1	23.8	5.4
	8.0	22.0	5.9
	8.8	20.4	6.3
	10.0	18.0	6.9
42.4	6.3	29.8	5.6
	7.1	28.2	6.2
	8.0	26.4	6.8
	8.8	24.8	7.3
	10.0	22.4	8.0
	11.0	20.4	8.5
	12.5	17.4	9.2
44.5	6.3	31.9	5.9
	7.1	30.3	6.5
	8.0	28.5	7.2
	8.8	26.9	7.7
	10.0	24.5	8.5
	11.0	22.5	9.1
	12.5	19.5	9.9
48.3	6.3	35.7	6.5
	7.1	34.1	7.2
	8.0	32.3	8.0
	8.8	30.7	8.6
	10.0	28.3	9.4
	11.0	26.3	10.1
	12.5	23.3	11.0
51	6.3	38.4	6.9
	7.1	36.8	7.7
	8.0	35.0	8.5
	8.8	33.4	9.2
	10.0	31.0	10.1
	11.0	29.0	10.9
	12.5	26.0	11.9
	14.2	22.6	12.9
54	6.3	41.4	7.4
	7.1	39.8	8.2
	8.0	38.0	9.1
	8.8	36.4	9.8
	10.0	34.0	10.9
	11.0	32.0	11.7
	12.5	29.0	12.8
	14.2	25.6	13.9
57	6.3	44.4	7.9
	7.1	42.8	8.7
	8.0	41.0	9.7
	8.8	39.4	10.5
	10.0	37.0	11.6
	11.0	35.0	12.5
	12.5	32.0	13.7
	14.2	28.6	15.0
	16.0	25.0	16.2
60.3	6.3	47.7	8.4
	7.1	46.1	9.3
	8.0	44.3	10.3
	8.8	42.7	11.2
	10.0	40.3	12.4
	11.0	38.3	13.4
	12.5	35.3	14.7
	14.2	31.9	16.1
	16.0	28.3	17.5
	17.5	25.3	18.5
63.5	6.3	50.9	8.9
	7.1	49.3	9.9
	8.0	47.5	10.9
	8.8	45.9	11.9
	10.0	43.5	13.2
	11.0	41.5	14.2
	12.5	38.5	15.7
	14.2	35.1	17.3
	16.0	31.5	18.7
	17.5	28.5	19.9
67	6.3	54.4	9.4
	7.1	52.8	10.5

DE mm	ESP mm	DI mm	PESO Kg/m
67	8.0	51.0	11.6
	8.8	49.4	12.6
	10.0	47.0	14.1
	11.0	45.0	15.2
	12.5	42.0	16.8
	14.2	38.6	18.5
	16	35.0	20.1
	17.5	32.0	21.4
70	6.3	57.4	9.9
	7.1	55.8	11.0
	8.0	54.0	12.2
	8.8	52.4	13.3
	10.0	50.0	14.8
	11.0	48.0	16.0
	12.5	45.0	17.7
	14.2	41.6	19.5
	16.0	38.0	21.3
	17.5	35.0	22.7
	20.0	30.0	24.7
73	6.3	60.4	10.4
	7.1	58.8	11.5
	8.0	57.0	12.8
	8.8	55.4	13.9
	10.0	53.0	15.5
	11.0	51.0	16.8
	12.5	48.0	18.7
	14.2	44.6	20.6
	16.0	41.0	22.5
	17.5	38.0	24.0
	20.0	33.0	26.1
76.1	6..3	63.5	10.8
	7.1	61.9	12.1
	8.0	60.1	13.4
	8.8	58.5	14.6
	10.0	56.1	16.3
	11.0	54.1	17.7
	12.5	51.1	19.6
	14.2	47.7	21.7
	16.0	44.1	23.7
	17.5	41.1	25.3
	20.0	36.1	27.7
82.5	6.3	69.9	11.8
	7.1	68.3	13.2
	8.0	66.5	14.7
	8.8	64.9	16.0
	10.0	62.5	17.9
	11.0	60.5	19.4
	12.5	57.5	21.6
	14.2	54.1	23.9
	16.0	50.5	26.2
	17.5	47.5	28.1
	20.0	42.5	30.8
	22.2	38.1	33.0
	25.0	32.5	35.5
88.9	6.3	76.3	12.8
	7.1	74.7	14.3
	8.0	72.9	16.0
	8.8	71.3	17.4
	10.0	68.9	19.5
	11.0	66.9	21.1
	12.5	63.9	23.6
	14.2	60.5	26.2
	16.0	56.9	28.8
	17.5	53.9	30.8
	20.0	48.9	34.0
	22.2	44.5	36.5
	25.0	38.9	39.4
95	6.3	82.4	13.8
	7.1	80.8	15.4
	8.0	79.0	17.2
	8.8	77.4	18.7
	10.0	75.0	21.0
	11.0	73.0	22.8
	12.5	70.0	25.4
	14.2	66.6	28.3
	16.0	63.0	31.2
	17.5	60.0	33.4
	20.0	55.0	37.0
	22.2	50.6	39.9

DE mm	ESP mm	DI mm	PESO Kg/m
95	25.0	45.0	43.2
	28.0	39.0	46.3
101.6	6..3	89.0	14.8
	7.1	87.4	16.5
	8.0	85.6	18.5
	8.8	84.0	20.1
	10.0	81.6	22.6
	11.0	79.6	24.6
	12.5	76.6	27.5
	14.2	73.2	30.3
	16.0	69.6	33.8
	17.5	66.6	36.3
	20.0	61.6	40.2
	22.2	57.2	43.5
	25.0	51.6	47.2
	28.0	45.6	50.8
	30.0	41.6	53.0
108	6.3	95.4	15.8
	7.1	93.8	17.7
	8.0	92.0	19.7
	8.8	90.4	21.5
	10.0	88.0	24.2
	11.0	86.0	26.3
	12.5	83.0	29.4
	14.2	79.6	32.8
	16.0	76.0	36.3
	17.5	73.0	39.1
	20.0	68.0	43.4
	22.2	63.6	47.0
	25.0	58.0	51.2
	28.0	52.0	55.2
	30.0	48.0	57.7
114.3	6.3	107.7	16.8
	7.1	100.1	18.8
	8.0	98.3	21.0
	8.8	96.7	22.9
	10.0	94.3	25.7
	11.0	92.3	28.0
	12.5	89.3	31.4
	14.2	85.9	35.1
	16.0	82.3	38.8
	17.5	79.3	41.8
	20.0	74.3	46.5
	22.2	69.9	50.4
	25.0	64.3	55.1
	28.0	58.3	59.6
	30.0	54.3	62.4
	35.0	44.3	68.4
	40.0	34.3	73.3
121	6.3	108.4	17.8
	7.1	106.8	19.9
	8.0	105.0	22.3
	8.8	103.4	24.3
	10.0	101.0	27.4
	11.0	99.0	29.8
	12.5	96.0	33.4
	14.2	92.6	37.4
	16.0	89.0	41.4
	17.5	86.0	44.7
	20.0	81.0	49.8
	22.2	76.6	54.1
	25.0	71.0	59.2
	28.0	65.0	64.2
	30.0	61.0	67.3
	35.0	51.0	74.2
	40.0	41.0	79.9
127	6.3	114.4	18.8
	7.1	112.8	21.0
	8.0	111.0	23.5
	8.8	109.4	25.7
	10.0	107.0	28.9
	11.0	105.0	31.5
	12.5	102.0	35.3
	14.2	98.6	39.5
	16.0	95.0	43.8
	17.5	92.0	47.3
	20.0	87.0	52.8
	22.2	82.6	57.4
	25.0	77.0	62.9

DE mm	ESP mm	DI mm	PESO Kg/m
127	28.0	71.0	68.4
	30.0	67.0	71.8
	35.0	57.0	79.4
	40.0	47.0	85.8
	45.0	37.0	91.0
133	6.3	120.4	19.7
	7.1	118.8	22
	8.0	117.0	24.7
	8.8	115.4	27.0
	10.0	113.0	30.3
	11.0	111.0	33.1
	12.5	108.0	37.1
	14.2	104.6	41.6
	16.0	101.0	46.2
	17.5	98.0	49.8
	20.0	93.0	55.7
	22.2	88.6	60.7
	25.0	83.0	66.6
	28.0	77.0	72.5
	30.0	73.0	76.2
	35.0	63.0	84.6
	40.0	53.0	91.7
	45.0	43.0	97.7
139.7	6.3	127.1	20.7
	7.1	125.5	23.2
	8.0	123.7	26.0
	8.8	122.1	28.4
	10.0	119.7	32.0
	11.0	117.7	34.9
	12.5	114.7	39.2
	14.2	111.3	43.9
	16.0	107.7	48.8
	17.5	104.7	52.7
	20.0	99.7	59.0
	22.2	95.3	64.3
	25.0	89.7	70.7
	28.0	83.7	77.1
	30.0	79.7	81.2
	35.0	69.7	90.4
	40.0	59.7	98.4
	45.0	49.7	105.1
	50.0	39.7	110.6
146	6.3	133.4	21.7
	7.1	131.8	24.3
	8.0	130.0	27.2
	8.8	128.4	29.8
	10.0	126.0	33.5
	11.0	124.0	36.6
	12.5	121.0	41.2
	14.2	117.6	46.2
	16.0	114.0	51.3
	17.5	111.0	55.5
	20.0	106.0	62.1
	22.2	101.6	67.8
	25.0	96.0	74.6
	28.0	90.0	81.5
	30.0	86.0	85.8
	35.0	76.0	95.8
	40.0	66.0	104.6
	45.0	56.0	112.1
	50.0	46.0	118.4
152.4	6.3	139.8	22.7
	7.1	138.2	25.4
	8.0	136.4	28.5
	8.8	134.8	31.2
	10.0	132.4	35.1
	11.0	130.4	38.4
	12.5	127.4	43.1
	14.2	124.0	48.4
	16.0	120.4	53.8
	17.5	117.4	58.2
	20.0	112.4	65.3
	22.2	108.0	71.3
	25.0	102.4	78.5
	28.0	96.4	85.9
	30.0	92.4	90.6
	35.0	82.4	101.3
	40.0	72.4	110.9
	45.0	62.4	119.2

FORMULAS PARA EL CÁLCULO DE PESOS

$$\frac{\text{Diam. EXTERIOR - ESPESOR x ESPESOR}}{40} =$$

TABLAS DE PESOS TUBO MECÁNICO KG/METRO

DE mm	ESP mm	DI mm	PESO Kg/m
	50.0	52.4	126.3
159	6.3	146.4	23.7
	7.1	144.8	26.6
	8.0	143.0	29.8
	8.8	141.4	32.6
	10.0	139.0	36.7
	11.0	137.0	40.1
	125.5	134.0	45.2
	14.2	130.6	50.7
	16.0	127.0	56.4
	17.5	124.0	61.1
	20.0	119.0	68.6
	22.2	114.6	74.9
	25.0	109.0	82.6
	28.0	103.0	90.5
	30.0	99.0	95.4
	35.0	89.0	107.0
	40.0	79.0	117.4
	45	69.0	126.5
	50.0	59.0	134.4
	55.0	49.0	141.1
	60.0	39.0	146.5
165.1	6.3	152.5	24.7
	7.1	150.9	27.7
	8.0	149.1	31.0
	8.8	147.5	33.9
	10.0	145.1	38.2
	11.0	143.1	41.8
	12.5	140.1	47.0
	14.2	136.7	52.8
	16.0	133.1	58.8
	17.5	130.1	63.7
	20.0	125.1	71.6
	22.2	120.7	78.2
	25.0	115.1	86.4
	28.0	109.1	94.7
	30.0	105.1	100.0
	35.0	95.1	112.3
	40.0	85.1	123.4
	45.0	75.1	133.3
	50.0	65.1	141.9
	55.0	55.1	149.3
	60.0	45.1	155.5
168.3	6.3	155.7	25.2
	7.1	154.1	28.2
	8.0	152.3	31.6
	8.8	150.7	34.6
	10.0	148.3	39.0
	11.0	146.3	42.7
	12.5	143.3	48.0
	14.2	139.9	54.0
	16.0	136.3	60.1
	17.5	133.3	65.1
	20.0	128.3	73.1
	22.2	123.9	80.0
	25.0	118.3	88.3
	28.0	112.3	96.9
	30.0	108.3	102.3
	35.0	98.3	115.1
	40.0	88.3	126.6
	45.0	78.3	136.8
	50.0	68.3	145.9
	55.0	58.3	153.7
	60.0	48.3	160.3
171	6..3	158.4	25.6
	7.1	156.8	28.7
	8.0	155.0	32.2
	8.8	153.4	35.2
	10.0	151.0	39.7
	11.0	149.0	43.4
	12.5	146.0	48.9
	14.1	142.6	54.9
	16.0	139.0	61.2
	17.5	136.0	66.2
	20.0	131.0	74.5
	22.2	126.6	81.5
	25.0	121.0	90.0
	28.0	115.0	98.7
	30.0	111.0	104.3
	35.0	101.0	117.4
	40.0	91.0	129.2

DE mm	ESP mm	DI mm	PESO Kg/m
171	45.0	81.0	139.8
	50.0	71.0	149.2
	55.0	61.0	157.3
	60.0	51.0	164.2
177.8	6.3	165.2	26.6
	7.1	163.6	29.9
	8.0	161.8	33.5
	8.8	160.2	36.7
	10.0	157.8	41.4
	11.0	155.8	45.2
	12.5	152.8	51.0
	14.2	149.4	57.3
	16.0	145.8	63.8
	17.5	142.8	69.2
	20.0	137.8	77.8
	22.2	133.4	85.2
	25.0	127.8	94.2
	28.0	121.8	103.4
	30.0	117.8	109.3
	35.0	107.8	123.3
	40.0	97.8	135.9
	45.0	87.8	147.4
	50.0	77.8	157.6
	55.0	67.8	166.6
	60.0	57.8	174.3
191	6.3	178.4	28.7
	7.1	176.8	32.2
	8.0	175.0	36.1
	8.8	173.4	39.5
	10.0	171.0	44.6
	11.0	169.0	48.8
	12.5	166.0	55.0
	14.2	162.6	61.9
	16.0	159.0	69.1
	17.5	156.0	74.9
	20.0	151.0	84.3
	22.2	146.6	92.4
	25.0	141.0	102.3
	28.0	135.0	112.6
	30.0	131.0	119.1
	35.0	121.0	134.7
	40.0	111.0	149.0
	45.0	101.0	162.0
	50.0	91.0	173.9
	55.0	81.0	184.5
	60.0	71.0	193.8
193.7	6.3	181.1	29.1
	7.1	179.5	32.7
	8	177.7	36.6
	8.8	176.1	40.1
	10.0	173.7	45.3
	11.0	171.7	49.6
	12.5	168.7	55.9
	14.2	165.3	62.9
	16.0	161.7	70.1
	17.5	158.7	76.0
	20.0	153.7	85.7
	22.2	149.3	93.9
	25.0	143.7	104.0
	28.0	137.7	114.4
	30.0	133.7	121.1
	35.0	123.7	137.0
	40.0	113.7	151.6
	45.0	103.7	165.0
	50.0	93.7	177.2
	55.0	83.7	188.1
	60.0	73.7	197.8
203	6.3	190.4	30.6
	7.1	188.8	34.3
	8.0	187.0	38.5
	8.8	185.4	42.1
	10.0	183.0	47.6
	11.0	181.0	52.1
	12.5	178.0	58.7
	14.2	174.6	66.1
	16.0	171.0	73.8
	17.5	168.0	80.
	20.0	163.0	90.3
	22.2	158.6	99.0
	25.0	153.0	109.7
	28.0	147.0	120.8

DE mm	ESP mm	DI mm	PESO Kg/m
203	30.0	143.0	128.0
	35.0	133.0	145.0
	40.0	123.0	160.8
	45.0	113.0	175.3
	50.0	103.0	188.7
	55.0	93.0	200.7
	60.0	83.0	211.6
219.1	6.3	206.5	33.1
	7.1	204.9	37.1
	8.0	203.1	41.6
	8.8	201.5	45.6
	10.0	199.1	51.6
	11.0	197.1	56.5
	12.5	194.1	63.7
	14.2	190.7	71.8
	16.0	187.1	80.1
	17.5	184.1	87.0
	20.0	179.1	98.2
	22.2	174.7	107.8
	25.0	169.1	119.7
	28.0	163.1	132.0
	30.0	159.1	139.9
	35.0	149.1	158.9
	40.0	139.1	176.7
	45.0	129.1	193.2
	50.0	119.1	208.5
	55.0	109.1	222.6
	60.0	99.1	235.4
	65.0	89.1	247.0
	70.0	79.1	257.4
229	6.3	216.4	34.6
	7.1	214.8	38.9
	8.0	213.0	43.6
	8.8	211.4	47.8
	10.0	209.0	54.0
	11.0	207.0	59.1
	12.5	204.0	66.7
	14.2	200.6	75.2
	16.0	197.0	84.0
	17.5	194.0	91.3
	20.0	189.0	103.1
	22.2	184.6	113.2
	25.0	179.0	125.8
	28.0	173.0	138.8
	30.0	168.0	147.2
	35.0	159.0	167.5
	40.0	149.0	186.4
	45.0	139.0	204.2
	50.0	129.0	220.7
	55.0	119.0	236.0
	60.0	109.0	250.1
	65.0	99.0	262.9
	70.0	89.0	274.5
244.5	6.3	231.9	37.0
	7.1	230.3	41.6
	8.0	228.5	46.7
	8.8	226.9	51.2
	10.0	224.5	57.8
	11.0	222.5	63.3
	12.5	219.5	71.5
	14.2	216.1	80.6
	16.0	212.5	90.2
	17.5	209.5	98.0
	20.0	204.5	110.7
	22.2	200.1	121.7
	25.0	194.5	135.3
	28.0	188.5	149.5
	30.0	184.5	158.7
	35.0	174.5	180.8
	40.0	164.5	201.7
	45.0	154.5	221.4
	50.0	144.5	239.8
	55.0	134.5	257.0
	60.0	124.5	273.0
	65.0	114.5	287.7
	70.0	104.5	301.2
254	6.3	241.4	38.5
	7.1	239.8	43.2
	8.0	238.0	48.5
	8.8	236.4	53.2
	10.0	234.0	60.2

DE mm	ESP mm	DI mm	PESO Kg/m
254	11.0	232.0	65.9
	12.5	229.0	74.4
	14.2	225.6	84.0
	16.0	222.0	93.9
	17.5	219.0	102.1
	20.0	214.0	115.4
	22.2	209.6	126.9
	25.0	204.0	141.2
	28.0	198.0	156.1
	30.0	194.0	165.7
	35.0	184.0	189.0
	40.0	174.0	211.1
	45.0	164.0	231.9
	50.0	154.0	251.5
	55.0	144.0	269.9
	60.0	134.0	287.1
	65.0	124.0	303.0
	70.0	114.0	317.6
267	6.3	254.4	40.5
	7.1	252.8	45.5
	8.0	251.0	51.1
	8.8	249.4	56.0
	10.0	247.0	63.4
	11.0	245.0	69.4
	12.5	242.0	78.5
	14.2	238.6	88.5
	16.0	235.0	99.0
	17.5	232.0	107.7
	20.0	227.0	121.8
	22.2	222.6	134.0
	25.0	217.0	149.2
	28.0	211.0	165.0
	30.0	207.0	175.3
	35.0	197.0	200.3
	40.0	187.0	223.9
	45.0	177.0	246.4
	50.0	167.0	267.6
	55.0	157.0	287.6
	60.0	147.0	306.3
	65.0	137.0	323.8
	70.0	127.0	340.1
	75.0	117.0	355.1
273	6.3	260.4	41.4
	7.1	258.8	46.6
	8.0	257.0	52.3
	8.8	255.4	57.3
	10.0	253.0	64.9
	11.0	251.0	71.1
	12.5	248.0	80.3
	14.2	244.6	90.6
	16.0	241.0	101.4
	17.5	238.0	110.3
	20.0	233.0	124.8
	22.2	228.6	137.3
	25.0	223.0	152.9
	28.0	217.0	169.2
	30.0	213.0	179.8
	35.0	203.0	205.4
	40.0	193.0	229.8
	45.0	183.0	253.0
	50.0	173.0	275.0
	55.0	163.0	295.7
	60.0	153.0	315.2
	65.0	143.0	333.4
	70.0	133.0	350.4
	75.0	123.0	366.2
	80.0	113.0	380.8
	85.0	103..0	394.1
298.5	7.1	284.3	51.0
	8.0	282.5	57.3
	8.8	280.9	62.9
	10.0	278.5	71.1
	11.0	276.5	78.0
	12.5	273.5	88.2
	14.2	270.1	99.6
	16.0	266.5	111.5
	17.5	263.5	121.3
	20.0	258.5	137.4
	22.2	254.1	151.3
	25.0	248.5	168.6
	28.0	242.5	186.8

FORMULAS PARA EL CÁLCULO DE PESOS

$$\frac{\text{Diam. EXTERIOR - ESPESOR x ESPESOR}}{40} =$$

TABLAS DE PESOS TUBO MECÁNICO KG/METRO

DE mm	ESP mm	DI mm	PESO Kg/m
298.5	30.0	238.5	198.6
	35.0	228.5	227.4
	40.0	218.5	255.0
	45.0	208.5	281.3
	50.0	198.5	306.4
	55.0	188.5	330.3
	60.0	178.5	352.9
	65.0	168.5	374.3
	70.0	158.5	394.5
	75.0	148.5	413.4
	80.0	138.5	431.1
	85.0	128.5	447.5
305	7.1	290.8	52.2
	8.0	289.0	58.6
	8.8	287.4	64.3
	10.0	285.0	72.8
	11.0	283.0	79.8
	12.5	280.0	90.2
	14.2	276.6	101.8
	16.0	273.0	114.0
	17.5	270.0	124.1
	20.0	265.0	140.6
	22.2	260.6	154.8
	25.0	255.0	172.6
	28.0	249.0	191.3
	30.0	245.0	203.5
	35.0	235.0	233.1
	40.0	225.0	261.4
	45.0	215.0	288.5
	50.0	205.0	314.4
	55.0	195.0	339.1
	60.0	185.0	362.5
	65.0	175.0	384.7
	70.0	165.0	405.7
	75.0	155.0	425.4
	80.0	145.0	443.9
	85.0	135.0	461.2
	90.0	125.0	477.2
323.9	7.1	309.7	55.5
	8.0	307.9	62.3
	8.8	306.3	68.4
	10.0	303.9	77.4
	11.0	301.9	84.9
	12.5	298.9	96.0
	14.2	295.5	108.5
	16.0	291.9	121.5
	17.5	288.9	132.2
	20.0	283.9	149.9
	22.2	279.5	165.2
	25.0	273.9	184.3
	28.0	267.9	204.3
	30.0	263.9	217.4
	35.0	253.9	249.4
	40.0	243.9	280.1
	45.0	233.9	309.5
	50.0	223.9	337.7
	55.0	213.9	364.7
	60.0	203.9	390.5
	65.0	193.9	415.0
	70.0	183.9	438.3
	75.0	173.9	460.4
	80.0	163.9	481.2
	85.0	153.9	500.8
	90.0	143.9	519.1
	100.0	123.9	552.2
330	8.8	312.4	69.7
	10.0	310.0	78.9
	11.0	308.0	86.5
	12.5	305.0	97.9
	14.2	301.6	110.6
	16.0	298.0	123.9
	17.5	295.0	134.9
	20.0	290.0	152.9
	22.2	285.6	168.5
	25.0	280.0	188.0
	28.0	274.0	208.5
	30.0	270.0	222.0
	35.0	260.0	254.6
	40.0	250.0	286.1
	45.0	240.0	316.3
	50.0	230.0	345.3

DE mm	ESP mm	DI mm	PESO Kg/m
330	55.0	220.0	373.0
	60.0	210.0	399.5
	65.0	200.0	424.8
	70.0	190.0	448.8
	75.0	180.0	471.7
	80.0	170.0	493.2
	85.0	160.0	513.6
	90.0	150.0	532.7
	100.0	130.0	567.2
343	8.8	325.4	72.5
	10.0	323.0	82.1
	11.0	321.0	90.1
	12.5	318.0	101.9
	14.2	314.6	115.1
	16.0	311.0	129.0
	17.5	308.0	140.5
	20.0	303.0	159.3
	22.2	298.6	175.6
	25.0	293.0	196.1
	28.0	287.0	217.5
	30.0	283.0	231.6
	35.0	273.0	265.9
	40.0	263.0	298.9
	45.0	253.0	330.7
	50.0	243.0	361.3
	55.0	233.0	390.6
	60.0	223.0	418.8
	65.0	213.0	445.6
	70.0	203.0	471.3
	75.0	193.0	495.7
	80.0	183.0	518.9
	85.0	173.0	540.8
	90.0	163.0	561.5
	100.0	143.0	599.3
355.6	8.8	338.0	75.3
	10.0	335.6	85.2
	11.0	333.6	93.5
	12.5	330.6	105.8
	14.2	327.2	119.6
	16.0	323.6	134.0
	17.5	320.6	145.9
	20.0	315.6	165.5
	22.2	311.2	182.5
	25.0	305.6	203.8
	28.0	299.6	226.2
	30.0	295.6	240.9
	35.0	285.6	276.7
	40.0	275.6	311.3
	45.0	265.6	344.7
	50.0	255.6	376.8
	55.0	245.6	407.7
	60.0	235.6	437.4
	65.0	225.6	465.8
	70.0	215.6	493.0
	75.0	205.6	519.0
	80.0	195.6	543.7
	85.0	185.6	567.2
	90.0	175.6	589.5
	100.0	155.6	630.3
368	8.8	350.4	78.0
	10.0	348.0	88.3
	11.0	346.0	96.8
	12.5	343.0	109.6
	14.2	339.6	123.9
	16.0	336.0	138.9
	17.5	333.0	151.3
	20.0	328.0	171.6
	22.2	323.6	189.3
	25.0	318.0	211.5
	28.0	312.0	234.8
	30.0	308.0	250.1
	35.0	298.0	287.4
	40.0	288.0	323.6
	45.0	278.0	358.5
	50.0	268.0	392.1
	55.0	258.0	424.5
	60.0	248.0	455.7
	65.0	238.0	485.7
	70.0	228.0	514.4
	75.0	218.0	541.9
	80.0	208.0	568.2

DE mm	ESP mm	DI mm	PESO Kg/m
368	85.0	198.0	593.2
	90.0	188.0	617.0
	100.0	168.0	660.9
381	8.8	363.4	80.8
	10.0	361.0	91.5
	11.0	359.0	100.4
	12.5	356.0	113.6
	14.2	352.6	128.5
	16.0	349.0	144.0
	17.5	346.0	156.9
	20.0	341.0	178.1
	22.2	336.6	196.4
	25.0	331.0	219.5
	28.0	325.0	243.8
	30.0	321.0	259.7
	35.0	311.0	298.7
	40.0	301.0	336.4
	45.0	291.0	372.9
	50.0	281.0	408.1
	55.0	271.0	442.2
	60.0	261.0	475.0
	65.0	251.0	506.5
	70.0	241.0	536.9
	75.0	231.0	566.0
	80.0	221.0	593.8
	85.0	211.0	620.5
	90.0	201.0	645.9
	100.0	181.0	693.0
394	8.8	376.4	83.6
	10.0	374.0	94.7
	11.0	372.0	103.9
	12.5	369.0	117.6
	14.2	365.6	133.0
	16.0	362.0	149.2
	17.5	359.0	162.5
	20.0	354.0	184.5
	22.2	349.6	203.6
	25.0	344.0	227.5
	28.0	338.0	252.7
	30.0	334.0	269.3
	35.0	324.0	309.9
	40.0	314.0	349.2
	45.0	304.0	387.3
	50.0	294.0	424.2
	55.0	284.0	459.8
	60.0	274.0	494.2
	65.0	264.0	527.4
	70.0	254.0	559.3
	75.0	244.0	590.0
	80.0	234.0	619.5
	85.0	224.0	647.7
	90.0	214.0	674.7
	100.0	194.0	725.0
406.4	8.0	390.4	78.6
	8.8	388.8	86.3
	10.0	386.4	97.8
	11.0	384.4	107.3
	12.5	381.4	121.4
	14.2	378.0	137.3
	16.0	374.4	154.0
	17.5	371.4	168.8
	20.0	366.4	190.6
	22.2	362.0	210.3
	25.0	356.4	235.1
	28.0	350.4	261.3
	30.0	346.4	278.5
	35.0	336.4	320.6
	40.0	326.4	361.4
	45.0	316.4	401.1
	50.0	306.4	439.5
	55.0	296.4	476.6
	60.0	286.4	512.6
	65.0	276.4	547.3
	70.0	266.4	580.7
	75.0	256.4	613.0
	80.0	24.4	644.0
	85.0	236.4	673.7
	90.0	226.4	702.3
	100.0	206.4	755.6
419	8.0	403.0	81.1
	8.8	401.4	89.0

DE mm	ESP mm	DI mm	PESO Kg/m
419	10.0	399.0	100.9
	11.0	397.0	110.7
	12.5	394.0	125.3
	14.2	390.6	141.8
	16.0	387.0	159.0
	17.5	384	173.3
	20.0	379.0	196.8
	22.2	374.6	217.2
	25.0	369.0	242.9
	28.0	363.0	270.0
	30.0	359.0	287.8
	35.0	349.0	331.5
	40.0	339.0	373.9
	45.0	329.0	415.1
	50.0	319.0	455.0
	55.0	309.0	493.7
	60.0	299.0	531.2
	65.0	289.0	567.5
	70.0	279.0	602.5
	75.0	269.0	636.3
	80.0	259.0	668.8
	95.0	249.0	700.1
	90.0	239.0	730.2
	100.0	219.0	786.7
431.8	10.0	411.8	104.0
	11.0	409.8	114.2
	12.5	406.8	129.3
	14.2	403.4	146.2
	16.0	399.8	164.1
	17.5	396.8	178.8
	20.0	391.8	203.1
	22.2	387.4	224.2
	25.0	381.8	250.8
	28.0	375.8	278.8
	30.0	371.8	297.3
	35.0	361.8	342.5
	40.0	351.8	386.5
	45.0	341.8	429.3
	50.0	331.8	470.8
	55.0	321.8	511.1
	60.0	311.8	550.1
	65.0	301.8	588.0
	70.0	291.8	624.6
	75.0	281.8	659.9
	80.0	271.8	694.1
	85.0	261.8	727.0
	90.0	251.8	758.6
	100.0	231.8	818.3
445	10.0	425.0	107.3
	11.0	423.0	117.7
	12.5	420.0	133.0
	14.2	416.6	150.9
	16.0	413.0	169.3
	17.5	410.0	184.5
	20.0	405.0	209.6
	22.2	400.6	231.5
	25.0	395.0	258.9
	28.0	389.0	287.9
	30.0	385.0	307.0
	35.0	375.0	353.9
	40.0	365.0	399.5
	45.0	355.0	443.9
	50.0	345.0	487.1
	55.0	335.0	529.0
	60.0	325.0	569.7
	65.0	315.0	609.1
	70.0	305.0	647.4
	75.0	295.0	684.4
	80.0	285.0	720.1
	85.0	275.0	754.6
	90.0	265.0	787.9
	100.0	245.0	850.8
457	8.0	441.2	88.6
	8.8	439.6	97.3
	10.0	437.2	110.3
	11.0	435.2	121.0
	12.5	432.2	137.1
	14.2	428.8	155.1
	16.0	425.2	174.1
	17.5	422.2	189.8
	20.0	417.2	215.6

FORMULAS PARA EL CÁLCULO DE PESOS

$$\frac{\text{Diam. EXTERIOR - ESPESOR x ESPESOR}}{40} =$$

TABLAS DE PESOS TUBO MECÁNICO KG/METRO

DE mm	ESP mm	DI mm	PESO Kg/m
457.2	22.2	412.8	238.2
	25.0	407.2	266.5
	28.0	401.2	296.4
	30.0	397.2	316.1
	35.0	387.2	364.4
	40.0	377.2	411.6
	45.0	367.2	457.4
	50.0	357.2	502.1
	55.0	347.2	545.5
	60.0	337.2	587.7
	65.0	327.2	628.7
	70.0	317.2	668.4
	75.0	307.2	706.9
	80.0	297.2	744.2
	85.0	287.2	780.2
	90.0	277.2	815.0
	100.0	257.2	880.9
470	8.0	454.0	91.1
	8.8	452.4	100.1
	10.0	450.0	113.4
	11.0	448.0	124.5
	12.5	445.0	141.0
	14.2	441.6	159.6
	16.0	438.0	179.1
	17.5	435.0	195.3
	20.0	430.0	222.0
	22.2	425.6	245.2
	25.0	420.0	274.4
	28.0	414.0	305.2
	30.0	410.0	325.5
	35.0	400.0	375.5
	40.0	390.0	424.2
	45.0	380.0	471.7
	50.0	370.0	517.9
	55.0	360.0	562.9
	60.0	350.0	606.7
	65.0	340.0	649.2
	70.0	330.0	690.5
	75.0	320.0	730.6
	80.0	310.0	769.4
	85.0	300.0	807.0
	90.0	290.0	843.4
	100.0	270.0	912.5
482.6	11.0	460.6	127.9
	12.5	457.6	144.9
	14.2	454.2	164.0
	16.0	450.6	184.1
	17.5	447.6	200.7
	20.0	442.6	228.2
	22.2	438.2	252.1
	25.0	432.6	282.1
	28.0	426.6	313.9
	30.0	422.6	334.9
	35.0	412.6	386.3
	40.0	402.6	436.6
	45.0	392.6	485.6
	50.0	382.6	533.4
	55.0	372.6	580.0
	60.0	362.6	625.3
	65.0	352.6	669.4
	70.0	342.6	712.3
	75.0	332.6	753.9
	80.0	322.6	794.3
	85.0	312.6	833.5
	90	302.6	871.4
	100.0	282.6	943.5
508	8.8	490.4	108.3
	10.0	488.0	122.8
	11.0	486.0	134.8
	12.5	483.0	152.7
	14.2	479.6	172.9
	16.0	476.0	194.1
	17.5	473.0	211.7
	20.0	468.0	240.7
	22.2	463.6	266.6
	25.0	458.0	297.8
	28.0	452.0	331.5
	30.0	448.0	353.6
	35.0	438.0	408.3
	40.0	428.0	461.7
	45.0	418.0	513.8

DE mm	ESP mm	DI mm	PESO Kg/m
508	50.0	408.0	564.7
	55.0	398.0	614.4
	60.0	388.0	662.9
	65.0	378.0	710.1
	70.0	368.0	756.1
	75.0	358.0	800.9
	80.0	348.0	844.4
	85.0	338.0	886.7
	90.0	328.0	927.8
	100.0	308.0	1.006
521	8.8	503.4	111.2
	10.0	501.0	126.0
	11.0	499.0	138.4
	12.5	496.0	156.8
	14.2	492.6	177.5
	16.0	489.0	199.3
	17.5	486.0	217.3
	20.0	481.0	247.1
	22.2	476.6	273.1
	25.0	471.0	305.8
	28.0	465.0	340.4
	30.0	461.0	363.3
	35.0	451.0	419.5
	40.0	441.0	474.5
	45.0	431.0	528.2
	50.0	421.0	580.8
	55.0	411.0	632.1
	60.0	401.0	682.1
	65.0	391.0	731.0
	70.0	381.0	778.6
	75.0	371.0	824.9
	80.0	361.0	870.1
	85.0	351.0	914.0
	90.0	341.0	956.6
	100.0	321.0	1.038
530	11.0	508.0	140.8
	12.5	505.0	159.5
	14.2	501.6	180.6
	16.0	498.0	202.8
	17.5	495.0	221.2
	20.0	490.0	251.5
	22.2	485.6	278.0
	25.0	480.0	311.4
	28.0	474.0	346.6
	30.0	470.0	369.9
	35.0	460.0	427.3
	40.0	450.0	483.4
	45.0	440.0	538.2
	50.0	430.0	591.9
	55.0	420.0	644.3
	60.0	410.0	695.5
	65.0	400.0	745.4
	70.0	390.0	794.1
	75.0	380.0	841.6
	80.0	370.0	887.8
	85.0	360.0	932.8
	90.0	350.0	976.6
	100.0	330.0	1.060
558.8	10.0	538.8	135.3
	11.0	536.8	148.6
	12.5	533.8	168.4
	14.2	530.4	190.7
	16.0	526.8	214.2
	17.5	523.8	233.6
	20.0	518.8	265.8
	22.2	514.4	293.8
	25.0	508.8	329.1
	28.0	502.8	366.5
	30.0	498.8	391.2
	35.0	488.8	452.1
	40.0	478.8	511.8
	45.0	468.8	570.2
	50.0	458.8	627.4
	55.0	448.8	683.3
	60.0	438.8	738.1
	65.0	428.8	791.6
	70.0	418.8	843.8
	75.0	408.8	894.8
	80.0	398.8	944.6
	85.0	388.8	993.2
	90.0	378.8	1.041

DE mm	ESP mm	DI mm	PESO Kg/m
558.8	100.0	358.8	1131
570	14.2	541.6	194.6
	16.0	538.0	218.6
	17.5	535.0	238.4
	20.0	530.0	271.3
	22.2	525.6	299.9
	25.0	520.0	336.0
	28.0	514.0	374.3
	30.0	510.0	399.5
	35.0	500.0	461.8
	40.0	490.0	522.8
	45.0	480.0	582.6
	50.0	470.0	641.2
	55.0	460.0	698.5
	60.0	450.0	754.6
	65.0	440.0	809.5
	70.0	430.0	863.2
	75.0	420.0	915.6
	80.0	410.0	966.7
	85.0	400.0	1.017
	90.0	390.0	1.065
	100.0	370.0	1.159
584.2	12.5	559.2	176.2
	14.2	555.8	199.6
	16.0	552.2	224.2
	17.5	549.2	244.6
	20.0	544.2	278.3
	22.2	539.8	307.7
	25.0	534.2	344.8
	28.0	528.2	384.1
	30.0	524.2	410.0
	35.0	514.2	474.0
	40.0	504.2	536.8
	45.0	494.2	598.4
	50.0	484.2	658.7
	55.0	474.2	717.8
	60.0	464.2	775.7
	65.0	454.2	832.3
	70.0	444.2	887.7
	75.0	434.2	941.8
	80.0	424.2	994.7
	85.0	414.2	1.046
	90.0	404.2	1.097
	100.0	384.2	1.194
	10.0	589.6	147.9
	11.0	587.6	162.4
	12.5	584.6	184.1
	14.2	581.2	208.5
	16.0	577.6	234.2
	17.5	574.6	255.5
	20.0	569.6	290.8
	22.2	565.2	321.6
	25.0	559.6	360.4
	28.0	553.6	401.6
	30.0	549.6	428.8
	35.0	539.6	496.0
	40.0	529.6	561.9
	45.0	519.6	626.6
	50.0	509.6	690.0
	55.0	499.6	752.2
	60.0	489.6	813.2
	65.0	479.6	873.0
	70.0	469.6	931.5
	75.0	459.6	988.9
	80.0	449.6	1.045
	85.0	439.6	1.100
	90.0	429.6	1153
	100.0	409.6	1.257
622	14.2	593.6	212.8
	16.0	590.0	239.1
	17.5	587.0	260.9
	20.0	582.0	296.9
	22.2	577.6	328.4
	25.0	572.0	368.1
	28.0	566.0	410.2
	30.0	562.0	438.0
	35.0	552.0	506.7
	40.0	542.0	574.1
	45.0	532.0	640.3
	50.0	522.0	705.3
	55.0	512.0	769.1

DE mm	ESP mm	DI mm	PESO Kg/m
622	60.0	502.0	831.6
	65.0	492.0	892.9
	70.0	482.0	952.9
	75.0	472.0	1.012
	80.0	462.0	1.069
	85.0	452.0	1.126
	90.0	442.0	1.181
	100.0	422.0	1287
635	12.5	610.0	191.9
	14.2	606.6	217.4
	16.0	603.0	244.2
	17.5	600.0	266.5
	20.0	595.0	303.3
	22.2	590.6	335.5
	25.0	585.0	376.1
	28.0	579.0	419.1
	30.0	575.0	447.6
	35.0	565.0	517.9
	40.0	555.0	586.9
	45.0	545.0	654.8
	50.0	535.0	721.3
	55.0	525.0	786.7
	60.0	515.0	850.8
	65.0	505.0	913.7
	70.0	495.0	975.4
	75.0	485.0	1.036
	80.0	475.0	1.095
	85.0	465.0	1.153
	90.0	455.0	1.210
	100.0	435.0	1.319
660.4	10.0	640.4	160.4
	11.0	638.4	176.2
	12.5	635.4	199.7
	14.2	632.0	226.3
	16.0	628.4	254.3
	17.5	625.4	277.5
	20.0	620.4	315.9
	22.2	616.0	349.4
	25.0	610.4	391.7
	28.0	604.4	436.7
	30.0	600.4	466.4
	35.0	590.4	539.8
	40.0	580.4	612.0
	45.0	570.4	683.0
	50.0	560.4	752.7
	55.0	550.4	821.2
	60.0	540.4	888.4
	65.0	530.4	954.4
	70.0	520.4	1.019
	75.0	510.4	1.083
	80.0	500.4	1.145
	85.0	490.4	1.206
	90.0	480.4	1.266
	100.0	460.4	1.382
711.2	11.0	689.2	189.9
	12.5	686.2	215.4
	14.2	682.8	244.1
	16.0	679.2	274.3
	17.5	676.2	299.4
	20.0	671.2	340.9
	22.2	666.8	377.2
	25.0	661.2	423.1
	28.0	655.2	471.8
	30.0	651.2	504.0
	35.0	641.2	583.7
	40.0	631.2	662.1
	45.0	521.2	739.3
	50.0	611.2	815.3
	55.0	601.2	890.1
	60.0	591.2	963.6
	65.0	581.2	1.036
	70.0	571.2	1.107
	75.0	561.2	1.177
	80.0	551.2	1.245
	85.0	541.2	1.313
	90.0	531.2	1.379
	100.0	511.2	1.507

FORMULAS PARA EL CÁLCULO DE PESOS

$$\frac{\text{Diam. EXTERIOR - ESPESOR x ESPESOR}}{40} =$$

TABLA TOLERANCIAS PRODUCTOS CALIBRADOS

TOLERANCIAS ISO

Diametro mm		1 – 3	3 – 6	6 -10	10 – 18	18 – 30	30 – 50	50 – 80	80 - 120
5	g	-2 -6	-4 -9	-5 -11	-6 -14	-7 -16	-9 -20	-10 -23	-12 -27
	h	0 -4	0 -5	0 -6	0 -8	0 -9	0 -11	0 -13	0 -15
	j	+2 -2	+3 -2	+4 -2	+5 -3	+5 -4	+6 -5	+6 -7	+6 -9
	k	+4 0	+6 +1	+7 +1	+9 +1	+11 +2	+13 +2	+15 +2	+18 +3
	m	+6 +2	+9 +4	+12 +6	+15 +7	+17 +8	+20 +9	+24 +11	+28 +13
	n	+8 +4	+13 +8	+16 +10	+20 +12	+24 +15	+28 +17	+33 +20	+38 +23
6	f	-6 -12	-10 -18	-13 -22	-16 -27	-20 -33	-25 -41	-30 -49	-36 -58
	g	-2 -8	-4 -12	-5 -14	-6 -17	-7 -20	-9 -25	-10 -29	-12 -34
	h	0 -6	0 -8	0 -9	0 -11	0 -13	0 -16	0 -19	0 -22
	j	+4 -2	+6 -2	+7 -2	+8 -3	+9 -4	+11 -5	+12 -7	+13 -9
	k	+6 0	+9 +1	+10 +1	+12 +1	+15 +2	+18 +2	+21 +2	+25 +3
	m	+8 +2	+12 +4	+15 +6	+18 +7	+21 +8	+25 +9	+30 +11	+35 +13
	n	+10 +4	+16 +8	+19 +10	+23 +12	+28 +15	+33 +17	+39 +20	+45 +23
	p	+12 +6	+20 +12	+24 +15	+29 +18	+35 +22	+42 +26	+51 +32	+59 +37
7	f	-6 -16	-10 -22	-13 -28	-16 -34	-20 -41	-25 -50	-30 -60	-36 -71
	g	-2 -12	-4 -16	-5 -20	-6 -24	-7 -28	-9 -34	-10 -40	-12 -47
	h	0 -10	0 -12	0 -15	0 -18	0 -21	0 -25	0 -30	0 -35
	j	+6 -4	+8 -4	+10 -5	+12 -6	+13 -8	+15 -10	+18 -12	+20 -15
	k	+10 0	+13 +1	+16 +1	+19 +1	+23 +2	+27 +2	+32 +2	+38 +2
	m	+12 +2	+16 +4	+21 +6	+25 +7	+29 +8	+34 +9	+41 +11	+48 +13
	n	+14 +4	+20 +8	+25 +10	+30 +12	+36 +15	+42 +17	+50 +20	+58 +23
8	d	-20 -34	-30 -48	-40 -62	-50 -77	-65 -98	-80 -119	-100 -146	-120 -174
	e	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73	-50 -89	-60 -106	-72 -126
	f	-6 -20	-10 -28	-13 -35	-16 -43	-20 -53	-25 -64	-30 -76	-36 -90
	h	0 -14	0 -18	0 -22	0 -27	0 -33	0 -39	0 -46	0 -54
	k	+14 0	+18 0	+22 0	+27 0	+33 0	+39 0	+46 0	+54 0
9	d	-20 -45	-30 -60	-40 -76	-50 -93	-65 -117	-80 -142	-100 -174	-120 -207
	e	-14 -39	-20 -50	-25 -61	-32 -75	-40 -92	-50 -112	-60 -134	-72 -159
	h	0 -25	0 -30	0 -36	0 -43	0 -52	0 -62	0 -74	0 -87
	k	+25 0	+30 0	+36 0	+43 0	+52 0	+62 0	+74 0	+87 0
10	d	-20 -60	-30 -78	-40 -98	-50 -120	-65 -149	-80 +180	100 -120	-120 -260
	h	0 -40	0 -48	0 -58	0 -70	0 -84	0 -100	0 -120	0 -140
	k	+40 0	+48 0	+58 0	+70 0	+84 0	+100 0	+120 0	+140 0
11	d	-20 -80	-30 -105	-40 -130	-50 -160	-65 -195	-80 -240	-100 -290	-120 -340
	h	0 -60	0 -75	0 -90	0 -110	0 -130	0 -160	0 -190	0 -220
	k	+60 0	+75 0	+90 0	+110 0	+130 0	+160 0	+190 0	+220 0
12	h	0 -100	0 -120	0 -150	0 -180	0 -210	0 -250	0 -300	0 -350
13	h	0 -140	0 -180	0 -220	0 -270	0 -330	0 -390	0 -460	0 -540
Valor en m.m. multiplicar por 0.001									

TABLAS TOLERANCIAS PRODUCTOS LAMINADOS

REDONDOS LAMINADOS EN 10060:2003

Diámetro en mm	Desde	5	16	26	36	51	81	101	121	161	201	221	251
	Hasta	15	25	35	50	80	100	120	160	200	220	250	370
Tolerancia en mm		+/- 0.4	+/- 0.5	+/-0.6	+/- 0.8	+/- 1.0	+/- 1.3	+/- 1.5	+/- 2.0	+/- 2.5	+/- 3.0	+/-4.0	+/- 6.0

CUADRADOS LAMINADOS EN 10059:2003

Diámetro en mm	Desde	5	15	26	36	51	91	101	121
	Hasta	14	25	35	50	90	100	120	150
Tolerancia en mm		+/- 0.4	+/- 0.5	+/-0.6	+/- 0.8	+/- 1.0	+/- 1.3	+/- 1.5	+/- 1.8

AFNOR 45001

120	160	>200
160	200	
+/- 2	+/- 2.5	+/- 3

HEXAGONAL LAMINADOS EN 10060:2003

Diámetro en mm	Desde	5	16	25.5	35.5	52	83	103
	Hasta	15	25	35	51	82	102	
Tolerancia en mm		+/- 0.4	+/- 0.5	+/-0.6	+/- 0.8	+/- 1.0	+/- 1.3	+/- 1.5

REDONDOS FORJADOS BRUTOS DIN 7527

Medidas de acabado en mm		Longitud de fabricación inferior o igual a 3500 mm				Longitud de fabricación de 3500 mm a 6000 mm inclusive			
		Sección		Longitud		Sección		Longitud	
Desde	Hasta	Creces mm	Toler. mm	Creces mm	Toler. mm	Creces mm	Toler. mm	Creces mm	Toler. mm
100	125	10	+/- 2	16	+14/-11	13	+/- 4	21	+18/-12
126	160	12	+/- 2.3	18	+14/-11	15	+/- 4.6	22	+20/-13
161	200	14	+/- 2.8	20	+14/-14	18	+/- 5.2	25	+22/-14
201	250	17	+/- 3.4	23	+16/-16	21	+/- 6	27	-24/-16
251	315	21	+/- 4.2	26	+18/-18	24	+/- 7	30	+27/-18
316	400	26	+/- 5.1	30	+21/-21	29	+/- 8.4	35	+31/-20
401	500	32	+/- 6.3	36	+25/-25	35	+/- 10	40	+35/-24
501	630	39	+/- 7.8	42	+29/-29	42	+/- 12	47	+42/-28
631	800	49	+/- 9.8	52	+35/-35	52	+/- 14.9	55	+49/-33
801	1000	61	+/- 12.1	63	+42/-42	64	+/-18.1	66	+59/-40

PLETINAS LAMINADAS

TOLERANCIA EN LA ANCHURA HASTA ANCHO 150 MM EN 10058

Ancho en mm	Desde	10	41	81	101	121
	Hasta	40	80	100	120	150
Tolerancia en mm			+/- 0.75	+/- 1	+/- 1.5	+/- 2

+/- 2.5

TOL. EN EL ESPESOR EN10058

	21	41
</= 20	40	80
	+/- 0.5	+/- 1

TOLERANCIA EN LA ANCHURA DESDE ANCHO 150 MM DIN 59200

LA TOLERANCIA ADMISIBLE ES DE +/- 2% HASTA UN MAXIMO DE +/- 10 MM

TOLERANCIA EN EL ESPESOR DIN 59200

Ancho en mm	Desde	4	11	21	26	31	41	51	61	81
	Hasta	10	20	25	30	40	50	60	80	
Tolerancia en mm		-0.4/+0.6	-0.4/0.8	-0.5/+0.9	-0.6/+1.0	-0.7/+1.1	-0.9/+1.1	-1.0/+1.2	-1.0/+1.6	-1.0/+3.0

TOLERANCIAS TUBO MECANICO

Normas	EN – 10297-1			
Tolerancia del Diámetro Exterior en mm	D ≤ 219.1	+/- 1% con mínimo de +/-0.5 mm		
	D≥ 219.1	+/- 1 %		
Tolerancia del espesor en mm	Espesor/Diámetro (ratio)			
		<0.025	>0.025 ≤0.050	< 0.050
	D>219.1	+/- 20 %	+/- 15 %	+/- 12.5 %
	D≤ 219.1	+/- 12.5% con un mínimo de +/- 0.4 mm		

LOCALIZACIÓN Y CONTACTO

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V/2021