

# Carmelo Iriondo, S.L.

*hornidura industrialak*

Casa fundada en 1931 (E. Iriondo Bernedo)

S. Bartolome kalea, 40 bajo - Apdo. 7 - 20870 Elgoibar - Gipuzkoa

Tel. 943 74 02 95 - Fax: 943 74 01 52

E-mail: ciriondo@ciriondo.com



## TABLAS DE CONVERSION SISTEMA INTERNACIONAL DE UNIDADES ( SI)

### LONGITUD

mm----pulgadas

1mm = 0.03937 pulgadas

Ejemplo: 683,7 mm = 26,9167

mm	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	pulgadas									
0	-	0.0039	0.0079	0.0118	0.0157	0.0197	0.0236	0.0276	0.0315	0.0354
1	0.0394	0.0433	0.0472	0.0512	0.0551	0.0591	0.0630	0.0669	0.0709	0.0748
2	0.0787	0.0827	0.0866	0.0906	0.0945	0.0984	0.1024	0.1068	0.1102	0.1142
3	0.1181	0.1220	0.1260	0.1299	0.1339	0.1378	0.1417	0.1457	0.1496	0.1535
4	0.1575	0.1614	0.1654	0.1693	0.1732	0.1772	0.1811	0.1850	0.1890	0.1929
5	0.1969	0.2008	0.2047	0.2087	0.2126	0.2165	0.2205	0.2244	0.2283	0.2323
6	0.2362	0.2402	0.2441	0.2480	0.2520	0.2559	0.2598	0.2630	0.2677	0.2717
7	0.2756	0.2795	0.2835	0.2874	0.2913	0.2953	0.2992	0.3031	0.3071	0.311
8	0.3151	0.3189	0.3228	0.3268	0.3307	0.3346	0.3386	0.3425	0.3465	0.3504
9	0.3543	0.3583	0.3622	0.3661	0.3701	0.3740	0.3780	0.3819	0.3858	0.3898

mm	0	10	20	30	40	50	60	70	80	90
	pulgadas									
0	-	0.394	0.787	1.181	1.575	1.969	2.362	2.756	3.151	3.543
100	3.940	4.334	4.727	5.121	5.515	5.909	6.302	6.696	7.091	7.483
200	7.870	8.264	8.657	9.051	9.445	9.839	10.232	10.626	11.021	11.413
300	11.810	12.204	12.597	12.991	13.385	13.779	14.172	14.566	14.961	15.353
400	15.750	16.144	16.537	16.931	17.325	17.719	18.112	18.506	18.901	19.293
500	1.690	20.084	20.477	20.871	21.265	21.659	22.052	22.446	22.841	23.233
600	23.620	24.014	24.407	24.801	25.195	25.589	25.982	26.376	26.771	27.163
700	27.560	27.954	28.347	28.741	29.135	29.529	29.922	30.316	30.711	31.103
800	31.500	31.894	32.287	32.681	33.075	33.469	33.862	34.256	34.651	35.043
900	35.430	35.824	36.217	36.611	37.005	37.399	37.792	38.186	38.581	38.973

# Carmelo Iriondo, S.L.

*hornidura industrialak*

Casa fundada en 1931 (E. Iriondo Bernedo)

S. Bartolome kalea, 40 bajo - Apdo. 7 - 20870 Elgoibar - Gipuzkoa

Tel. 943 74 02 95 - Fax: 943 74 01 52

E-mail: [ciriondo@ciriondo.com](mailto:ciriondo@ciriondo.com)



## PRESION

bar > Pa > psi(libras/pulgada cuadrada)

1 bar = 100.00 Pa = 100 k Pa = 14,5 psi

1 Pa = 0,00001 bar = 0,000145 psi

1 psi = 0,069 bar = 6897,8 Pa

bar	Kpa*	psi
0.0005	0.05	0.0073
0.001	0.10	0.0145
0.005	0.5	0.0725
0.01	1	0.145
0.05	5	0.725
0.069	6.9	1.000
0.1	10	1.450
0.25	25	3.625
0.5	50	7.250
0.75	75	10.875
1.0	100	14.500
1.5	150	21.750
2.0	200	29.000
2.5	250	36.250
3.0	300	43.500
3.5	350	50.750
4.0	400	58.000
4.5	450	65.250
5.0	500	72.500
5.5	550	79.750
6.0	600	87.000
7.0	700	101.500
8.0	800	116.000
9.0	900	130.500
10.0	1000	145.000
12.0	1200	174.000
14.0	1400	203.000
16.0	1600	232.000
18.0	1800	261.000
20.0	2000	290.000

psi	Kpa*	bar
0.007	0.05	0.005
0.015	0.1	0.0010
0.070	0.48	0.0048
0.150	1.04	0.0104
0.700	4.83	0.0483
1.000	6.90	0.0690
1.500	10.35	0.1035
3.000	20.70	0.2070
7.000	48.30	0.4830
10.000	69.00	0.690
15.000	103.50	1.0350
20.000	138.00	1.380
25.000	172.50	1.725
30.000	207.00	2.070
35.000	241.50	2.415
40.000	276.00	2.760
50.000	345.00	3.450
60.000	414.00	4.140
70.000	483.00	4.830
80.000	552.00	5.520
90.000	621.00	6.210
100.000	690.00	6.900
110.000	759.00	.7590
125.000	862.50	8.625
150.000	1035	10.350
175.000	1207.5	12.075
200.000	1380	13.800
225.000	1552.5	15.525
250.000	1725	17.250
300.000	2070	20.700

\* Para obtener valores manejables, aplíquese 100.000 Pa = 100 kPa

# Carmelo Iriondo, S.L.

*hornidura industrialak*

Casa fundada en 1931 (E. Iriondo Bernedo)

S. Bartolome kalea, 40 bajo - Apdo. 7 - 20870 Elgoibar - Gipuzkoa

Tel. 943 74 02 95 - Fax: 943 74 01 52

E-mail: ciriondo@ciriondo.com



## PAR DE GIRO

kpm > Nm > libras pulgadas

1 kpm = 9,81 Nm = 87,11 libras pulgadas

Según SI, la magnitud kpm deberá sustituirse por Nm

Kp	Nm	libras pulgadas
0.010	0.0981	0.8711
0.050	0.4905	4.3550
0.1	0.981	8.7110
0.5	4.905	43.5550
1.0	9.810	87.1100
1.5	14.715	130.6650
2.0	19.620	174.2200
2.5	24.525	217.7750
3.0	29.430	261.3300
3.5	34.335	304.8850
4.0	39.240	348.4400
4.5	44.145	391.9950
5.0	49.050	435.5500
5.5	53.955	479.1050
6.0	58.860	522.6600
6.5	63.765	566.2150
7.0	68.670	609.7700
7.5	73.575	653.3250
8.0	78.480	696.8800
8.5	83.385	740.4350
9.0	88.290	783.9900
9.5	93.195	827.5450
10.0	98.100	871.1000
12.0	117.720	1045.3200
15.0	147.150	1306.6500
20.0	196.200	1742.2000

# Carmelo Iriondo, S.L.

*hornidura industrialak*

Casa fundada en 1931 (E. Iriondo Bernedo)

S. Bartolome kalea, 40 bajo - Apdo. 7 - 20870 Elgoibar - Gipuzkoa

Tel. 943 74 02 95 - Fax: 943 74 01 52

E-mail: [ciriondo@ciriondo.com](mailto:ciriondo@ciriondo.com)



## CAUDAL

$l/min > K_v > C_v$

QNn l/min	Kv	Cv
10	0.009	0.010
50	0.045	0.051
80	0.072	0.081
100	0.091	0.102
120	0.109	0.122
150	0.136	0.152
180	0.163	0.183
200	0.182	0.203
250	0.227	0.254
300	0.273	0.305
330	0.300	0.335
400	0.364	0.407
450	0.409	0.457
500	0.455	0.508
550	0.500	0.558
600	0.545	0.609
650	0.591	0.660
700	0.636	0.711
750	0.682	0.762
800	0.727	0.813
900	0.818	0.914
1000	0.909	1.016
1200	1.091	1.219
1500	1.364	1.524
1750	1.590	1.778
2000	1.818	2.032
2500	2.272	2.540
3000	2.727	3.048
3500	3.182	3.556
4000	3.636	4.065
4500	4.091	4.573
5000	4.545	5.081
5500	5.000	5.589
6000	5.454	6.097
6500	5.909	6.605
7000	6.364	7.113
7500	6.818	7.621
8000	7.272	8.130
8500	7.727	8.638
9000	8.182	9.146
9500	8.636	9.654
10000	9.091	10.162

**Kv:** Caudal de agua, expresado en m<sup>3</sup>/h a temperaturas entre +5 y + 30°C, que atraviesa un elemento en una dirección determinada y experimentando una caída de presión de 1 bar (según VDI 2173).

Suponiendo que el elemento actúa como una tobera corta (lo que es cierto en la mayoría de los casos), puede calcularse el valor Kv de acuerdo a la siguiente fórmula

$$K_v = A_0 / 19.84 \quad K_v \text{ en m}^3/\text{h} \quad A_0 \text{ en mm}^2$$

En esta formula, la sección transversal equivalente es  $A_0 = 0,018 \times QNn$  de lo que resulta:

$$K_v = QNn / 1100 \quad QNn \text{ caudal normal nominal en l/min}$$

El coeficiente “flor” (magnitud empleada en Norteamérica para el caudal) se calcula con la siguiente ecuación:

$$C_v = QNn / 984$$

# Carmelo Iriondo, S.L.

*hornidura industrialak*

Casa fundada en 1931 (E. Iriondo Bernedo)

S. Bartolome kalea, 40 bajo - Apdo. 7 - 20870 Elgoibar - Gipuzkoa

Tel. 943 74 02 95 - Fax: 943 74 01 52

E-mail: [ciriondo@ciriondo.com](mailto:ciriondo@ciriondo.com)



## TEMPERATURA

Formula de °C a °F = °C = (°F-32) x 0.556

Formula de °F a °C = °F = (°C x 1.8) + 32

°F	°C	°F	°C	°F	°C	°C	°F	°C	°F	°C	°C	°F
-100	-73.3	+100	+37.8	+305	+151.7	-100	-148	+100	+212	+305	+581	
-95	-70.6	+105	+40.6	+310	+154.4	-95	-139	+105	+221	+310	+590	
-90	-67.8	+110	+43.3	+315	+157.2	-90	-130	+110	+230	315	+599	
-85	-65.0	+115	+46.1	+320	+160.0	-85	-121	+115	+239	+320	+608	
-80	-62.2	+120	+48.9	+325	+162.8	-80	-112	+120	+248	+325	+617	
-75	-59.4	+125	+51.7	+330	+165.6	-75	-103	+125	+257	+330	+628	
-70	-56.7	+130	+54.4	+335	+168.3	-70	-94	+130	+266	+335	+635	
-65	-53.9	+135	+57.2	+340	+171.1	-65	-85	+135	+275	+340	+644	
-60	-51.1	+140	+60.0	+345	+173.9	-60	-76	+140	+284	+345	+653	
-55	-48.3	+145	+62.8	+350	+176.7	-55	-67	+145	+293	+350	+662	
-50	-45.6	+150	+65.6	+355	+179.4	-50	-58	+150	+302	+355	+671	
-45	-42.8	+155	+68.3	+360	+182.2	-45	-49	+155	+311	+360	+680	
-40	-40.0	+160	+71.1	+365	+185.0	-40	-40	+160	+320	+365	+689	
-35	-37.2	+165	+73.9	+370	+187.8	-35	-31	+165	+329	+370	+698	
-30	-34.4	+170	+76.7	+375	+190.6	-30	-22	+170	+338	+375	+707	
-25	-31.7	+175	+79.4	+380	+193.3	-25	-13	+175	+347	+380	+716	
-20	-28.9	+180	+82.2	+385	+196.1	-20	-4	+180	+356	+385	+725	
-15	-26.1	+185	+85.0	+390	+198.9	-17.8	0	+185	+365	+390	+734	
-10	-23.3	+190	+87.8	+395	+201.7	-15	+5	+190	+374	+395	+743	
-5	-20.6	+195	+90.6	+400	+204.4	-10	+14	+195	+383	+400	+752	
0	-17.8	+200	+93.3	+405	+207.2	-5	+23	+200	+392	+405	+761	
+5	-15.01	+205	+96.0	+410	+210.0	0	+32	+205	+401	+410	+770	
+10	-12.2	+210	+98.9	+415	+212.8	+5	+41	+210	+410	+415	+779	
+15	-9.4	+215	+101.7	+420	+215.6	+10	+50	+215	+419	+420	+788	
+20	-6.7	+220	+104.4	+425	+218.3	+15	+59	+220	+428	+425	+797	
+25	-3.9	+225	+107.2	+430	+221.1	+20	+68	+225	+437	+430	+806	
+30	-1.1	+230	+110.0	+435	+223.9	+25	+77	+230	+446	+435	+815	
+32	0.0	+235	+112.8	+440	+226.7	+30	+86	+235	+455	+440	+824	
+35	+1.07	+240	+115.6	+445	+229.4	+35	+95	+240	+464	+445	+833	
+40	+4.4	+245	+118.3	+450	+232.2	+40	+104	+245	+473	+450	+842	
+45	+7.2	+250	+121.1	+455	+235.0	+45	+113	+250	+482	+455	+851	
+50	+10.0	+255	+123.9	+460	+237.8	+50	+122	+255	+491	+460	+860	
+55	+12.8	+260	+126.7	+465	+240.6	+55	+131	+260	+500	+465	+869	
+60	+15.6	+265	+129.4	+470	+243.3	+60	+140	+265	+509	+470	+878	
+65	+18.3	+270	+132.2	+475	+246.1	+65	+149	+270	+518	+475	+887	
+70	+21.1	+275	+135.0	+480	+248.9	+70	+158	+275	+527	+480	+896	
+75	+23.9	+280	+137.8	+485	+251.7	+75	+167	+280	+536	+485	+905	
+80	+26.7	+285	+140.6	+490	+254.4	+80	+176	+285	+545	+490	+914	
+85	+29.4	+290	+143.3	+495	+257.2	+85	+185	+290	+554	+495	+923	
+90	+32.2	295	+146.1	+500	+260.0	+90	+194	+295	+563	+500	+932	
+95	+35.0	300	+148.9			+95	+203	+300	+572			



## UNIDADES, TABLAS DE CONVERSION Y FORMULAS SISTEMA INTERNACIONAL DE UNIDADES ( SI)

### PRESION

DE	A	MULTIPLICAR POR	EJEMPLO
MPa (Megapascal)	bar	10	10 Mpa x 10 = 100 bar
MPa	kp/cm2	10.197	10 Mpa x 10197 = 101.97 kp/cm2
MPa	PSI	145.0	10 Mpa x 145.0 = 1450 PSI
bar (bar)	kp/cm2	1.020	10 bar x 1.020 = 10.2 kp/cm2
bar	MPa	0.1	10 bar x 0.1 = 1.0 MPa
bar	PSI	14.504	10 bar x 14.504 = 145 PSI
kp/cm2 (kilopindio / cm2)	bar	0.981	10 kp/cm2 x 0.981 = 9.81 bar
kp/cm2	MPa	0.0981	10 kp/cm2 x 0.0981 = 0.981 MPa
kp/cm2	PSI	14.223	10 kp/cm2 x 14.223 = 142.2 PSI
PSI (Libra/pulgada2)	bar	0.0689	100 PSI x 0.0689 = 6.89 bar
PSI	kp/cm2	0.0703	100 PSI x 0.0703 = 7.03 kp/cm2
PSI	MPa	0.00689	100PSI x 0.00689 = 0.689 MPa
atm (atmosfera)	bar	1.01325	1.1 atm x 1.01325 = 1.115 bar
atm	kp/cm2	1.0332	1.1 atm x 1.0322 = 1.137 kp/cm2
atm	PSI	14.696	1.1 atm x 14.695 = 16.166 PSI
atm	MPa	0.10132	1.1 atm x 0.10132 = 0.111 MPa

### CAUDAL

DE	A	MULTIPLICAR POR	EJEMPLO
l/s (Litro / segundo)	l/min	60	10 l/s x 60 = 60 l/min
l/s	CFM	2.119	10 l/s x 2.119 = 21.2 CFM
l/min (Litro/minuto)	l/s	0.0167	100 l/min x 0.0167 = 1.7 l/s
l/min	CFM	0.0353	100 l/min x 0.0353 = 3.5 CFM
CFM (Pie3 / minuto)	l/min	28.32	100 CFM x 25.32 = 2532 l/min
CFM	l/s	0.472	100 CFM x 0.472 = 47.2 l/s
m3/h (metro3 / hora)	l/min	16.667	100 m3h x 16.667 = 1666.7 l/min



# Carmelo Iriondo, S.L.

*hornidura industrialak*

Casa fundada en 1931 (E. Iriondo Bernedo)

S. Bartolome kalea, 40 bajo - Apdo. 7 - 20870 Elgoibar - Gipuzkoa

Tel. 943 74 02 95 - Fax: 943 74 01 52

E-mail: ciriondo@ciriondo.com



## VOLUMEN

DE	A	MULTIPLICAR POR	EJEMPLO
m3(metro)	Litro	1000	10 m3 x 1000 = 10.000 Litro
m3	ft3	35.3	10 m3 x 35.3 = 353 ft3
Litro	m3	0.001	100 Litro x 0.001 = 0.1 m3
Litro	ft3	0.0353	100 Litro x 0.0353 = 3.53 ft3
Litro	Galon (us)	0.264	100 Litro x 0.264 = 26.4 Galon (us)
Litro	Galon (imperial)	0.220	100 Litro x 0.220 = 22.0 Galon (imperial)
ft3(pie)	m3	0.0283	10 ft3 x 0.0283 m3 = 0.283 m3
ft3	Litro	28.32	10 ft3 x 28.32 = 283.2 Litro
Galon (us)	Litro	3.785	100 Galon (us) x 3.785 = 37.85 Litro
Galon (imperial)	Litro	4.546	10 Galon (imperial) x 4.546 = 45.46 Litro
in3	cm3	16.387	10 in3 x 16.387 = 163.87 cm3
cm3	in3	0.0610	10 cm3 x 0.0610 = 0.610 in3

## LONGITUD

DE	A	MULTIPLICAR POR	EJEMPLO
m (Metro)	ft	3.28083	10 m x 3.28083 = 32.8083 feet
ft (pies)	m	0.3048	10 feet x 0.3048 = 3.048 m
mm (milimetro)	Pulgada	0.0393	10 mm x 0.0393 = 0.393 Pulgada
Pulgada	mm	25.4	10 inch x 25.4 = 254 mm

## FUERZA

DE	A	MULTIPLICAR POR	EJEMPLO
N (Newton)	kp	0.1020	10 N x 0.1020 = 1.02 kp
N	lbf	0.2248	10 N x 0.2248 = 2.25 lbf
kp (kilopondio)	N	9.806	10 kp x 9.806 = 98.06 N
kp	lbg	2.205	10 kp x 2.204 = 22.05 lbg
lbf (Libra de fuerza)	kp	0.454	10 lbf x 0.454 = 4.54 kp
lbf	N	4.448	10 lbf x 4.448 = 44.48 N

## MASA

DE	A	MULTIPLICAR POR	EJEMPLO
kg (Kilogramo)	lb	2.205	10 kg x 2.205 = 22.05 lb
lb (libra)	kg	0.454	10 lb x 0.454 = 4.54 kg

## TORSION

DE	A	MULTIPLICAR POR	EJEMPLO
Nm(newton Metro)	kpm	0.1020	10 Nm x 0.1020 = 1.02 kpm
Nm	lbfft	0.7376	10 Nm x 0.7376 = 7.38 lbfft
kpm (kilopondio Metro)	Nm	9.81	10 kpm x 9.81 = 98.1 Nm
kpm	lbfft	7.233	10 kpm x 7.233 = 72.33 lbfft
lbfft (Libra de fuerza Pie)	Nm	1.356	10 lbfft x 1.356 = 13.56 Nm
lbfft	kpm	0.1383	10 lbfft x 0.1383 = 1.38 kpm