UTILITIES

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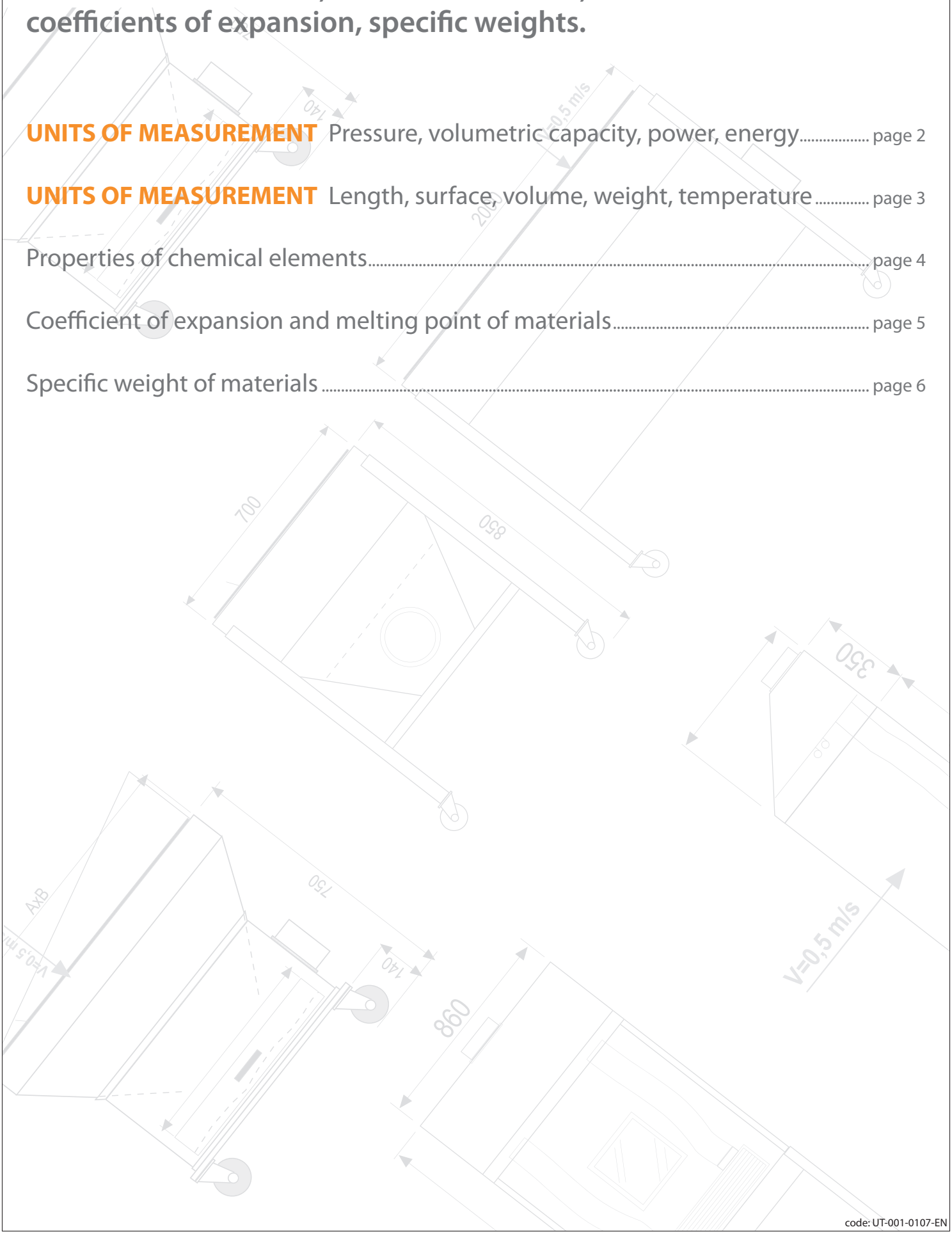

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Units of measurement and conversions

PRESSURE

Units of measurement	Symbol	Pa	bar	at	mm H_2O	mm Hg	kgf/m²	psi	lbf/ft²	in w.	in Hg	ft w.
pascal	Pa	1	10^{-5}	$1{,}0197\times10^{-5}$	9,80638	0,0075	0,10197	$0{,}145\times10^{-3}$	0,02088	0,00401	$0{,}295\times10^{-3}$	$0{,}335\times10^{-3}$
bar	bar	10^{5}	1	1,0197	$9{,}8064\times10^{-4}$	750,07	10197	14,505	2088	401,46	29,530	33,456
atmosfera = kgf/cm²	at	98070	0,9807	1	1×10^{-4}	735,56	10000	14,223	2048,16	393,71	28,960	32,808
mm di acqua	mm H_2O	0,10197	10-5	$1{,}0197\times10^{-5}$	1	0,0075	0,10197	$1{,}450\times10^{-3}$	0,0208	0,00401	0,000295	0,000334
mm di mercurio	mm Hg	133,32	$1{,}3332\times10^{-3}$	$1{,}3595\times10^{-3}$	0,07355	1	13,595	0,0193	1,392	0,5353	0,0394	0,0446
Kg per m²	kgf/m²	9,807	$9{,}807\times10^{-5}$	10^{-4}	1	0,0735	1	0,00142	0,205	0,0394	0,0029	0,0033
libbre per pollice²	psi	6894,14	0,06894	0,0703	0,001422	51,719	703,07	1	144	27,683	2,0362	2,3069
libbre per piede²	lbf/ft²	47,876	$4{,}7876\times10^{-4}$	$4{,}8824\times10^{-4}$	0,2048	0,7183	4,8824	0,00694	1	0,1922	0,01414	0,01602
pollici di acqua	in w.	249,09	0,00249	0,00254	0,03937	1,868	25,4	0,03614	5,203	1	0,07355	0,0833
pollici di mercurio	in Hg	3386,36	0,03386	0,03453	0,00289583	25,4	345,34	0,4912	70,731	13,595	1	1,1329
piedi di acqua	ft w.	2989	0,02989	0,03048	0,003280	22,42	304,8	0,4334	62,43	12	0,8827	1

VOLUMETRIC CAPACITY

Units of measurement	Symbol	m³/s	m³/h	L/s	cm³/s	cfm	cfh	gpm	gph	y³/min
metro cubo al secondo	m³/s	1	3600	10^{-3}	10^{-6}	2118,88	127133	15850	$951{,}02\times10^{-3}$	78,477
metro cubo all'ora	m³/h	$0{,}2778\times10^{-3}$	1	0,2778	277,778	0,5886	35,315	4,4029	264,17	0,0218
litro al secondo	L/s	10^{-3}	3,6	1	103	2,1189	127,134	15,850	951,02	0,0785
centimetro cubo al secondo	cm³/s	10^{-6}	0,0036	10^{-3}	1	0,0212	0,1271	0,0158	0,951	$0{,}785\times10^{-4}$
piede cubo al minuto	cfm	$0{,}4719\times10^{-3}$	1,6990	0,4719	471,95	1	60	7,480	448,83	0,0370
piede cubo all'ora	cfh	$0{,}7866\times10^{-5}$	0,02832	$0{,}7866\times10^{-2}$	7,866	0,01667	1	0,1247	7,480	$0{,}6173\times10^{-3}$
gallone al minuto	gpm	$0{,}6309\times10^{-4}$	0,2271	0,06309	63,090	0,1337	8,0208	1	60	$4{,}951\times10^{-3}$
gallone all'ora	gph	$0{,}1052\times10^{-5}$	$3{,}785\times10^{-3}$	$0{,}1052\times10^{-2}$	1,0515	$2{,}228\times10^{-3}$	0,1337	0,01667	1	$8{,}252\times10^{-4}$
iarda cubica al minuto	y³/min	0,01274	45,873	12,743	12742,6	27	1620	201,97	12118,44	1

POWER

Units of measurement	Symbol	KW	W	kcal/h	kgm/s	BTU/h	ft lb/s	BHP	CV
Kilowatt	KW	1	1000	860,5	102	3413	737,5	1,341	1,360
watt	W	0,001	1	0,8605	0,102	3,413	0,7375	$1{,}341\times10^{-3}$	$1{,}360\times10^{-3}$
chilocaloria/ora	kcal/h	$1{,}1628\times10^{-3}$	1,1628	1	0,1186	3,9683	0,8576	$1{,}559\times10^{-3}$	$1{,}581\times10^{-3}$
chilogrammetro/secondo	kgm/s	$9{,}807\times10^{-3}$	9,807	8,434	1	33,47	7,233	$1{,}315\times10^{-2}$	$1{,}333\times10^{-2}$
British thermal unit/hour	BTU/h	$0{,}2930\times10^{-3}$	0,2930	0,2520	0,02988	1	0,2161	$0{,}393\times10^{-3}$	$0{,}398\times10^{-3}$
libbra piede/secondo	ft ld/s	$1{,}356\times10^{-3}$	1,356	1,166	0,1383	4,627	1	$1{,}818\times10^{-3}$	$1{,}844\times10^{-3}$
cavallo vapore	BHP (UK)	0,7457	745,7	641,3	76,04	2547,0	550	1	1,0139
cavallo vapore (metrico)	CV	0,7355	735,5	632,53	75,0	2512,2	542,4	0,986	1

ENERGY

Units of measurement	Symbol	BTU	cal	joule	Hp hr	kw hr
British thermal unit	BTU	1	252	1055	0,000393	0,000293
caloria	cal	0,00397	1	4,186	0,00000156	0,00000116
joule	joule	0,000948	0,2389	1	0,000000373	0,000000278
cavalli vapore - ora	Hp hr	2545	641340	2684975	1	0,7457
kilowatt - ora	kw hr	3413	860076	3600715	1,341	1

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Units of measurement and conversions

LENGTH

Units of measurement	Symbol	m	cm	mm	in	hd	ft	yd
metro	m	1	10^{2}	10^{3}	39,3701	9,8425	3,2808	1,0936
centimetro	cm	10^{-2}	1	10	0,3937	0,0984	0,0328	0,0109
millimetro	mm	10^{-3}	10^{-1}	1	0,0394	$9,84x10^{-3}$	$3,28x10^{-3}$	$1,09x10^{-3}$
pollice	in	$2,54x10^{-2}$	2,54	25,4	1	0,25	0,0833	0,0278
mano	hd	0,1016	10,16	101,60	4	1	0,3333	0,1111
piede	ft	0,3048	30,48	304,80	12	3	1	0,3333
iarda	yd	0,9144	91,44	914,40	36	9	3	1

SURFACE

Units of measurement	Symbol	cm^2	m^2	km^2	in^2	ft^2
centimetri quadrati	cm^2	1	10^{-4}	10^{-10}	0,155	0,00108
metri quadrati	m^2	10^{4}	1	10^{-6}	1550	10,76
kilometri quadrati	km^2	10^{10}	10^{6}	1	1550000000	10800000
pollici quadrati	in^2	6,452	0,000645	0,00000000645	1	0,0694
piedi quadrati	ft^2	928	0,09280	0,0000000928	144	1

VOLUME

Units of measurement	Symbol	cm^3	l	in^3	ft^3	ft oz	pt	qt	gal
centimetri cubici	cm^3	1	0,001	0,061	0,0000353	0,03381	0,0021	0,00106	0,00264
litri	l	1000	1	61,02	0,03532	33,81	2,113	1,057	0,2642
pollici cubici	in^3	16,39	0,01639	1	0,000579	0,5541	0,03463	0,01732	0,00433
piedi cubici	ft^3	28316	28,32	1728	1	957,5	59,84	29,92	7,481
ft oz	ft oz	29,57	0,02957	1,805	0,001	1	0,0625	0,03125	0,0078
pt	pt	473,2	0,4732	28,88	0,01671	16	1	0,5	0,125
qt	qt	946,4	0,9463	57,75	0,03342	32	2	1	0,25
galloni	gal	3785	3,785	231	0,1337	128	8	4	1

WEIGHT

Units of measurement	Symbol	g	kg	oz	lb
grammo	g	1	0,001	0,03527	0,0022
kilogrammo	kg	1000	1	35,27	2,205
oncia	oz	28,35	0,02835	1	0,0625
libbra	lb	453,6	0,4536	16	1

TEMPERATURE

Units of measurement	Symbol	°C	K	°F
Grado centigrado	°C	1	T_K - 273,15	5/9 (T_F - 32)
Grado Kelvin	K	T_C + 273,15	1	5/9 (T_F - +255,37)
Grado Farenheit	°F	9/5 (T_C + 32)	9/5 (T_K - 459,67)	1

Properties of chemical elements

Chemical element	Symbol	Atomic weight	Specific weight (g/cm³)	Melting point (°C)	Boiling point (°C)
Actinium	**Ac**	227	-	-	-
Aluminium	**Al**	26,98	2,7	660,1	1800
Americium	**Am**	243	-	-	-
Antimony	**Sb**	121,76	6,618-6,22	630,5	1380
Argon	**Ar**	39,948	-	-189,2	-185,7
Arsenic	**As**	74,92	5,73	-	615
Astatine	**At**	210	-	-	-
Barium	**Ba**	137,36	3,78	850	1140
Beryllium	**Be**	9,013	1,85	1350	1500
Berkelium	**Bk**	249	-	-	-
Bismuth	**Bi**	208,99	9,781	271,3	1450
Boron	**B**	10,82	2,45	2300	2550
Bromine	**Br**	79,916	3,12	-7,2	58,8
Cadmium	**Cd**	112,41	8,648	320,9	766
Calcium	**Ca**	40,08	1,54	810	1170
Californium	**Cf**	251	-	-	-
Carbon	**C**	12,011	3,52-2,25	>3500	4200
Cerium	**Ce**	140,13	7,02	640	1400
Cesium	**Cs**	132,91	1,873	28	670
Chlorine	**Cl**	35,453	-	-101,6	-34,7
Chromium	**Cr**	52,01	6,93	1615	2200
Cobalt	**Co**	58,94	8,71	1492	3000
Copper	**Cu**	63,54	8,93	1083	2310
Curium	**Cm**	247	-	-	-
Dysprosium	**Dy**	162,51	-	-	-
Einsteinium	**Es**	254	-	-	-
Erbium	**Er**	167,27	4,77	-	-
Europium	**Eu**	152	-	-	-
Fermium	**Fm**	253	-	-	-
Fluorine	**F**	19	-	-223	-187
Francium	**Fr**	223	-	-	-
Gadolinium	**Gd**	157,26	-	-	-
Gallium	**Ga**	69,72	5,93	29,7	>1600
Germanium	**Ge**	72,6	5,46	958,5	2700
Gold	**Au**	197	19,3	1063	2600
Hafnium	**Hf**	178,5	13,3	-	-
Helium	**He**	4,003	-	-272	-268,94
Holmium	**Ho**	164,94	-	-	-
Hydrogen	**H**	1,008	-	-259,14	-252,8
Indium	**In**	114,82	7,28	155	>1450
Iodine	**I**	126,9	4,94	113,5	184,5
Iridium	**Ir**	192,2	22,42	2443	>4800
Iron	**Fe**	55,85	7,86	1533	3000
Krypton	**Kr**	83,8	-	-169	-151,8
Lanthanum	**La**	138,92	6,15	826	1800
Lead	**Pb**	207,21	11,342	327,4	1620
Lithium	**Li**	6,94	0,534	186	>1200
Lutetium	**Lu**	174,99	-	-	-
Magnesium	**Mg**	24,32	1,741	651	1100
Manganese	**Mn**	54,94	7,3	1260	1900
Mendelevium	**Md**	256	-	-	-
Mercury	**Hg**	200,61	13,546	-38,87	356,9
Molybdenum	**Mo**	95,94	9,01	2620	3700
Neodymium	**Nd**	144,27	7	840	-
Neon	**Ne**	20,183	-	-248,67	-245,9
Neptunium	**Np**	237	-	-	-
Nickel	**Ni**	58,71	8,8	1453	2900
Niobium	**Nb**	92,91	8,4	2500	3200
Nitrogen	**N**	14,008	-	-209,86	-195,81
Nobelium	**No**	253	-	-	-
Osmium	**Os**	190,2	22,5	2700	>5300
Oxygen	**O**	16	-	-218,4	-183
Palladium	**Pd**	106,4	12,16	1552	2200
Phosphorus	**P**	30,975	2,2	44,1	280
Platinum	**Pt**	195,09	21,37	1769	4300
Plutonium	**Pu**	242	-	-	-
Polonium	**Po**	210	-	-	-
Potassium	**K**	39,1	6,48	62,3	760
Praseodymium	**Pr**	140,91	0,87	940	-
Promethium	**Pm**	147	-	-	-
Protactinium	**Pa**	231	-	-	-
Radium	**Ra**	226	-	960	1140
Radon	**Rn**	222	-	-110	-
Rhenium	**Re**	186,22	-	-	-
Rhodium	**Rh**	102,91	12,44	1960	>2500
Rubidium	**Rb**	85,48	1,532	38,5	700
Ruthenium	**Ru**	101,1	12,1	2500	>2700
Samarium	**Sm**	150,35	7,7	>1300	-
Scandium	**Sc**	44,96	-	1200	2400
Selenium	**Se**	78,96	4,82	220	688
Silicon	**Si**	28,09	2,42	1420	2600
Silver	**Ag**	107,88	10,492	960,8	1960
Sodium	**Na**	22,991	0,9712	97,5	880
Strontium	**Sr**	87,63	2,6	800	1150
Sulphur	**S**	32,066	2-2,1	113-119	444,6
Tantalum	**Ta**	180,95	16,6	3005	>4100
Technetium	**Tc**	99	-	-	-
Tellurium	**Te**	127,61	6,02	452	1390
Terbium	**Tb**	158,93	-	327	-
Thallium	**Tl**	204,39	11,86	303,5	1650
Thorium	**Th**	232	11	1845	>3000
Thulium	**Tm**	168,94	-	-	-
Tin	**Sn**	118,7	7,29	231,89	2260
Titanium	**Ti**	47,9	4,5	1820	>3000
Tungsten (Wolfram)	**W (Tu)** -	183,86 -	19,3 -	3380 -	5900 -
Uranium	**U**	238	18,7	3600	-
Vanadium	**V**	50,95	5,6	17354	3000
Xenon	**Xe**	131,3	-	-140	-109,1
Ytterbium	**Yb**	173,04	-	-	-
Yttrium	**Y**	88,91	3,8	1490	2500
Zinc	**Zn**	65,38	6,92-7,16	419,47	907
Zirconium	**Zr**	91,22	6,44	1750	>2900

UTILITIES

Coefficient of expansion and melting point of materials

Material	Coefficient of expansion		Melting point (°C)
AD polyethylene	0,0002	20×10^{-5}	-
Aluminium	0,000024	$2,4 \times 10^{-5}$	658,7
Aluminium alloys	0,000023	$2,3 \times 10^{-5}$	550-650
Antimony	0,000011	$1,1 \times 10^{-5}$	630
BD polyethylene	0,0002	20×10^{-5}	-
Bismuth	0,000013	$1,3 \times 10^{-5}$	271
Brass	0,000019	$1,9 \times 10^{-5}$	900
Bricks	0,000006	$0,6 \times 10^{-5}$	-
Bronze (7,9%)	0,000018	$1,8 \times 10^{-5}$	900
Bronze (14%)	0,000018	$1,8 \times 10^{-5}$	900
Cadmium	0,000031	$3,1 \times 10^{-5}$	231
Carbon-steel	0,000012	$1,2 \times 10^{-5}$	1450-1530
Chromium	0,000008	$0,8 \times 10^{-5}$	1510
Cobalt	0,000018	$1,8 \times 10^{-5}$	1490
Concrete	0,000012	$1,2 \times 10^{-5}$	-
Copper	0,000017	$1,7 \times 10^{-5}$	1083
Glass	0,000008	$0,8 \times 10^{-5}$	-
Gold	0,000015	$1,5 \times 10^{-5}$	1064
Gray pig iron	0,000011	$1,1 \times 10^{-5}$	1160-1300
Granite	0,000009	$0,9 \times 10^{-5}$	-
Hard wood	0,000058	$5,8 \times 10^{-5}$	-
Iron	0,000012	$1,2 \times 10^{-5}$	1450-1530
Lead	0,000029	$2,9 \times 10^{-5}$	327,4
Magnesium	0,000022	$2,2 \times 10^{-5}$	650
Marbles	0,000007	$0,7 \times 10^{-5}$	-
Mercury	0,000181	$18,1 \times 10^{-5}$	-38,9
Molybdenum	0,000005	$0,5 \times 10^{-5}$	2500
Nickel	0,000013	$1,3 \times 10^{-5}$	1452
Phosphor bronze	0,000018	$1,8 \times 10^{-5}$	900
Pyrex glass	0,000003	$0,3 \times 10^{-5}$	-
Platinum	0,000009	$0,9 \times 10^{-5}$	1755
Polypropylene	0,00012	12×10^{-5}	-
PVC	0,00007	7×10^{-5}	-
Silicon	0,000008	$0,8 \times 10^{-5}$	1460
Silver	0,000019	$1,9 \times 10^{-5}$	960,5
Soft fiber wood	0,000004	$0,4 \times 10^{-5}$	-
Stainless steel	0,000017	$1,7 \times 10^{-5}$	-
Tempered glass	0,000009	$0,9 \times 10^{-5}$	-
Tin	0,000027	$2,7 \times 10^{-5}$	232
Tungsten	0,000005	$0,5 \times 10^{-5}$	-
Wolfram	0,000005	$0,5 \times 10^{-5}$	3000
Zinc	0,000031	$3,1 \times 10^{-5}$	419,4

The lengthening (meters) is calculated by multiplying the length (meters) by the coefficient of expansion and by the increase in temperature (°C).

UTILITIES

Specific weight of materials

Material	Specific weight (kg/dm³)
AD polyethylene	0,94 - 0,96
Aluminium	2,60
Antimony	6,70
Ash	0,90
Asphalt	1,10 - 1,50
BD polyethylene	0,92 - 0,93
Borax	1,75
Brass	8,40 - 8,70
Bronze (7,9%)	7,40
Bronze (14%)	8,90
Calcium	1,58
Celluloid	1,40
Cellulose	1,50
Cement	1,40
Chalk	1,80 - 2,70
Chromium	6,60
Clay	2,00 - 2,20
Coal - mass	1,20 - 1,50
Coal - pieces	0,80 - 0,95
Coking coal - pieces	0,30 - 0,48
Concrete	2,00 - 2,50
Copper	8,89 - 8,93
Cork	0,20 - 0,35
Diamond	3,55
Dry sand	1,40 - 1,60
Expanded clay	0,30 - 0,50
Fresh snow	0,10 - 0,20
Gas oil	0,80 - 0,85
Glass	2,40 - 2,70
Gold	19,3
Granite	2,50 - 3,00
Gravel	1,50 - 1,80
Gray pig iron	7,10
Humus	1,70 - 1,80
Ice	0,90

Material	Specific weight (kg/dm³)
Iron	7,85
Kaolin	2,20
Lead	11,34
Lime mortar	1,60 - 1,80
Lubricating grease	0,92 - 0,94
Lubricating oil	0,85 - 0,95
Magnesium	1,75
Marble	2,50 - 2,80
Masonry in full bricks	1,50 - 1,65
Masonry in hollow bricks	1,05 - 1,10
Mercury	13,59
Nickel	8,60
Paper	0,70 - 1,15
Petrol	0,70 - 0,75
Phosphor bronze	8,80
Phosphorus	1,83 - 2,19
Polypropylene	0,90 - 0,96
Porcelain	2,40
PVC	1,37 - 1,45
Quartz	2,50
Rubber	1,70 - 2,20
Sandstone	2,30
Sawn wood	0,60 - 1,10
Silicon	1,80 - 2,00
Silver	10,50
Sodium chloride	2,16
Steel	7,85
Stone masonry	2,25 - 2,45
Stump wood	0,30 - 0,40
Tar	1,20
Tin	7,28
Tungsten	19,10
Wax	0,95
Wet sand	1,90 - 2,10
Zinc	7,10

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