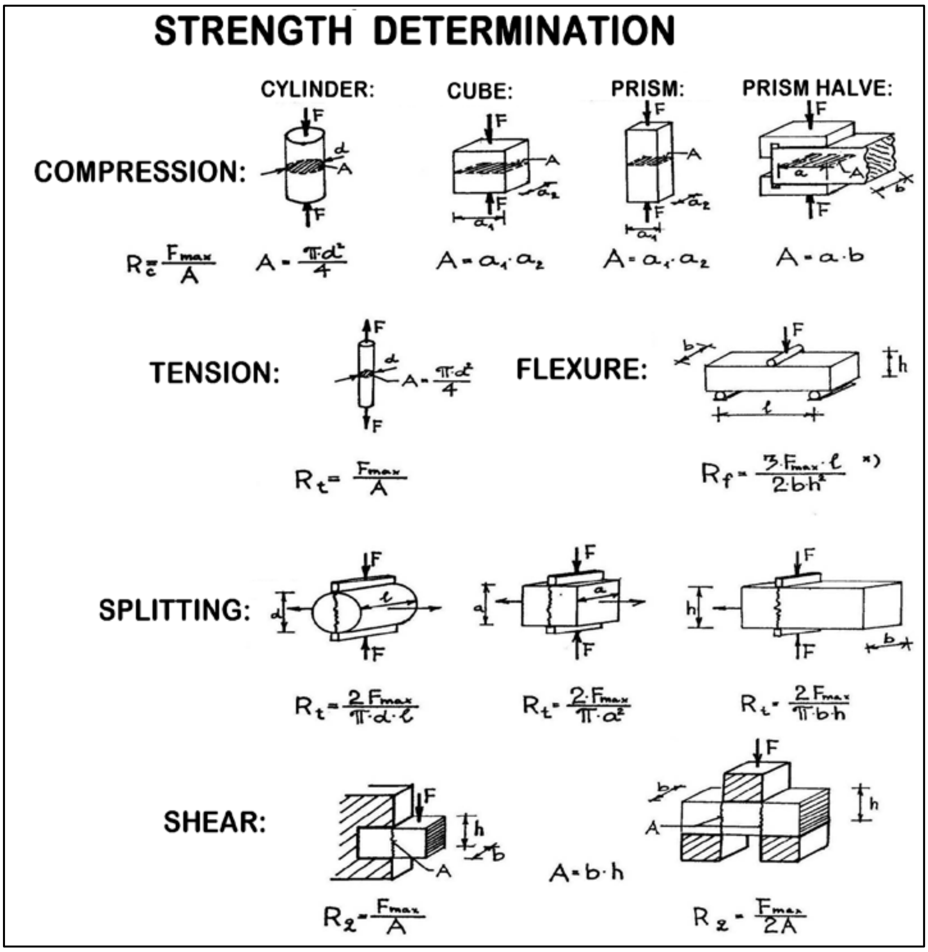
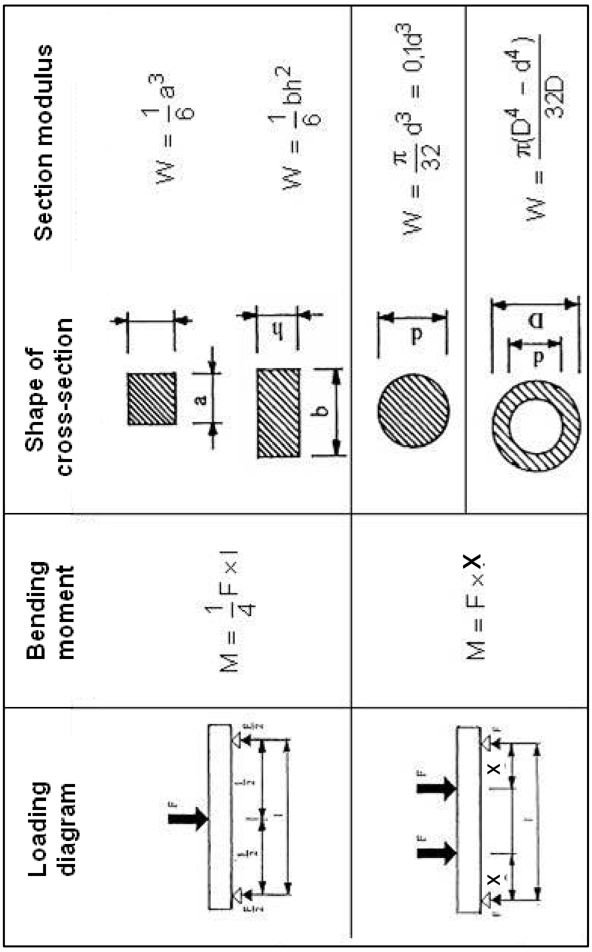
Properties		Wood	Steel	Aluminum and light alloys	Full burned bricks	Concrete	Aerated autoclaved concrete	PVC hard	Polyester, glass laminate	Foamed poly-styrene	Glass
Density	$kg.m^{-3}$	1500	7850	2650-2800	2600-2700	2500-2700	2400-2500	1360-1400	1400-1900	1060	2200-3600
Dry bulk density	$kg.m^{-3}$	400-700	7850	2650-2800	1600-2200	2000-2400	400-700	1360-1400	1400-1900	14-100	2200-3600
Gravimetric sorptivity	%	140-170	0	0	20-25	6,0-13	40-90	do 0,4	0,5-2,1	70-500	0
Volumetric sorptivity	%	55-70	0	0	35-55	13-30	35-40	do 0,55	0,8-4	do 7	0
Compressive strength	MPa	47-55[1)]	350-2000	70-700	6,0-25	6,0-60	2,0-3,0	70	100-250	0,12-0,5	700-1200
Tensile strength	MPa	80-135[1)]	250-2000	70-700	1,2-4	1,0-5,0	0,2-2	50	150-400	0,15-0,22	30-90
Modulus of elasticity	MPa	11000-16000[1)]	210000	65000-73000	8000-12000	15000-40000	800-2000	2500-3600	10000-30000	3,5-15	50-90
Coefficient of thermal conductivity	$W.m^{-1}.k^{-1}$	0,075[2] - 0,25[1)]	50-58	125-210	0,65-0,8	1,2-1,75	0,12-0,25	0.15	0,175-0,30	0,035-0,045	0,6-0,9
Specific heat capacity	$kJ.kg^{-1}.K^{-1}$	2,1-2,7	0.46	0,92-1	0,9-1,1	0,85-1,2	0.85	1-1,1	1.05	1.35	0.85-1
Coefficient of thermal expansion	K^{-1}	$3,0 - 5,0.10^{-6}$	$11\text{-}12.10^{-6}$	$20 - 24.10^{-6}$	5.10^{-6}	$9,0\text{-}12.10^{-6}$	$7,0 - 8.10^{-6}$	80.10^{-6}	$10,0 - 17.10^{-6}$	50.10^{-6}	$6\text{-}9.10^{-6}$

[1)] parallel to grains [2)] perpendicular to grains





Bulk density and density (specific gravity):

Bulk density: $\rho_V = \frac{m}{V}$ [kg.m^{-3}] m is mass of material [kg] , V is volume of material with voids (pores) [m^3] $V = V_h + V_p$	**Density** : $\rho = \frac{m}{V_h}$ [kg.m^{-3}] V_h is volume of solid material (solid phase) without voids and pores [m^3]	**Loose bulk density:** $\rho_s = \frac{m}{V_C}$ [kg.m^{-3}] V_c is volume of solid material, pores and space between particles (V_m) : $V_c = V_h + V_p + V_m$

Porosity

Total porosity p - ratio of the volume of the pores to the total volume of the material $\boldsymbol{p = 1 - \frac{V_h}{V} = 1 - \frac{\rho_V}{\rho}}$ [−], ev. [%]

Open porosty p_o - only pores which are open to the exterior and fluids can flow through them

Closed porosity p_c - only pores, which are not connected to the exterior $p = p_o + p_c$

Water (moisture) **content**

Quantity of water contained in a material. Water content is expressed as a ratio, which can range from 0 (completely dry) to the value of the materials' porosity at saturation. It can be given on a volumetric or mass (gravimetric) basis.

Volumetric water content : $\boldsymbol{w_V = \frac{V_w}{V}.100 = \frac{(m_w - m_d)}{\rho_w \, . \, V}.100}$ [%] V_w is volume of water in material [m^3], V is volume of material [m^3], ρ_W is water density at the test temperature	**Gravimetric water content** : $\boldsymbol{w_m = \frac{(m_w - m_d)}{m_d}.100}$ [%] m_w is mass of wet material [kg], m_d is mass of dry material [kg].

Sorptivity

Maximal amount of water, absorbed by a material when immersed in water. Sorptivity by volume (volumetric s.) is the ratio of water volume to material volume, so it calculated in the same way as the volumetric water content. Sorptivity by mass (gravimetric s.) is calculated in the same way as the gravimetric water content.

Volumetric sorptivity is equal to open porosity, because only open pores can be filled by water.

Density by pycnometry:

Specific density : $\boldsymbol{\rho = \frac{m.\rho_k}{m + m_4 - m_3}}$ $[kg.m^{-3}]$,

where m is mass of the sample of the tested material ($m=m_2-m_1$), m_1 mass of dry empty pycnometer including stopper, m_2 mass of dry pycnometer with sample and stopper, m_3 mass of closed pycnometer with sample and measuring liquid, m_4 mass of the closed pycnometer with measuring liquid, ρ_k density of measuring liquid at testing temperature

Bulk density by graduated cylinder (porous material, lighter than water): $\boldsymbol{\rho_V = \frac{m}{B - A + \frac{(m_1 - m)}{\rho_W} - C}}$ $[kg.m^{-3}]$,

where m is mass of dry material, m_1 mass of the wet material , dryed on the surface , A is volume of water without the material and weight, B is volume of water with the material and weight , C is volume of weight, ρ_W water density at the test temperature

Bulk density by wire basket method : $\boldsymbol{\rho_V = \rho_W \frac{M_4}{M_1 - (M_2 - M_3)}}$ $[kg.m^{-3}]$,

where M_1 is mass of the wet sample, dryed on the surface , M_2 mass of the sample in the basket under water , M_3 mass of the empty basket under water , M_4 mass of dry sample, ρ_w water density at test temperature

Young's modulus (modulus of elasticity)

Statical: from Hook´s law $\boldsymbol{\sigma = E.\varepsilon}$ $[MPa]$, where σ is acting stress (compressive, tensile, bending) [MPa], E is modulus of elasticity [MPa,] ε is strain (relative change of length [-].

Strain ε : $\boldsymbol{\varepsilon = \frac{\Delta l}{l_0}} = \frac{l_1 - l_0}{l_0}$ [−], where Δl is change of the length [mm], l_1 is length after elongation [mm], l_0 is original (initial) length [mm]

Particle size distribution curve is a graph of percent cumulative passing versus the sieve size.

Cumulative passing is sum of the mass or percentage passing the sieve (e.g. sum of the retained on all finer sieves and pan).

Cumulative percentage passing for the blended aggregate from aggregates A, B, C : $S_i = \frac{a.A_i + b.B_i + c.C_i}{(a+b+c)}$,

where S_i is cumulative percentage passing of the mixture for i- sieve, A_i, B_i, C_i are cumulative percentage passings i- sieve for the individual aggregates A, B, C and ***a, b, c*** are the mixing proportions.

Fineness Modulus is defined as the sum of the cumulative percentages retained on specified sieves divided by 100.

$$FM = \frac{\sum \{(\rangle 4) + (\rangle 2) + (\rangle 1) + (\rangle 0{,}5) + (\rangle 0{,}25) + (\rangle 0{,}125)\}}{100}$$