Determination of degree of water saturation

Name:	**Date:**
Material description:	

Specific density

$$\rho_s = \frac{m_s}{V_s} \quad [\mathrm{Mg/m^3}]$$

$$\rho_s = \frac{m_2 - m_1}{m_4 - m_1 + m_2 - m_3} \cdot \rho_k \quad [\mathrm{Mg/m^3}]$$

	m_1 = ... g	m_1 = ... g
	m_2 = ... g	m_2 = ... g
	m_3 = ... g	m_3 = ... g
	m_4 = ... g	m_4 = ... g
ρ_k = ... Mg/m^3	ρ_s = ... Mg/m^3	ρ_s = ... Mg/m^3

m_1 – pycnometer weight
m_2 – weight of pycnometer and dried sample
m_3 – weight of pycnometer and sample with liquid
m_4 – weight of pycnometer with liquid
ρ_k – density of liquid (temperature dependent)

ρ_s = ... Mg/ m^3

Water content

$$w = \frac{m_w}{m_s} \cdot 100 \quad [\%]$$

$$m_w = m - m_s \quad [\mathrm{g}]$$

	m = ... g	m = ... g
	m_s = ... g	m_s = ... g
	m_w = ... g	m_w = ... g
	w = ... %	w = ... %

m – weight of the sample (natural moisture)
m_W – weight of the water in the sample
m_S – weight of the dried sample

w = ... %

Bulk (total) density REGULARLY SHAPED SAMPLE

$$\rho = \frac{m}{V} \quad [\mathrm{Mg/m^3}]$$

m = ... g

a = ... m
b = ... m
c = ... m

V = ... m^3

m – weight of the sample (natural moisture)
a – width of block
b – length of block
a – height of block

ρ = ... Mg/m^3

Bulk (total) density IRREGULARLY SHAPED SAMPLE

$$\rho = \frac{m}{V} \quad [\mathrm{Mg/m^3}]$$

$$V = \frac{m_1 - m_2}{\rho_w} - \frac{m_1 - m}{\rho_p} \quad [\mathrm{m^3}]$$

m = ... g m = ... g

m_1 = ... g m_1 = ... g

m_2 = ... g m_2 = ... g

$\rho_w = 1 \mathrm{Mg/m^3}$
$\rho_p = 0.9 \mathrm{Mg/m^3}$

V = ... m^3 V = ... m^3

ρ = ... Mg/m^3 ρ = ... Mg/m^3

m – weight of the sample (natural moisture)
m_1 – weight of the sample with paraffin
m_2 – weight of the sample with paraffin under water
ρ_w – density of water (temperature dependent)
ρ_p – density of paraffin

ρ = ... Mg/m^3

Degree of water saturation

$$S_r = \frac{V_w}{V_p} \cdot 100 \quad [\%]$$

$$S_r = \frac{w \cdot \rho \cdot \rho_s / \rho_w}{\rho_s \cdot (w + 1) - \rho} \quad [\%]$$

S_r = ... %