3. Soil classification

The main goal of soil classification is to obtain the most important properties of a tested soil sample, right after classification, using experience collected about each group. To reach this goal, soil classification must be based on these most important and most typical properties and parameters. The new soil classification system (realized in 2006 and based on the new European Standards of soil classification) will be introduced next. Old soil classification methods will also be mentioned briefly.

Naming and indentification of soils

The naming of soils refers to and is based on the particle composition and the importance of the particle-water relations. The name of soils is their fixed parameter, which can change only because of specific influences (e.g. great forces causing particle beaking, or weathering because of the chemical environment).

Granular soils are named based on their particle size distribution, because their behaviour is determined by particle composition. Cohesive soils are classified based on their plasticity index, as their behaviour is determined mainly by particle-water relations.

Soil names must be determined based on the new MSZ 14043-2 Hungarian Standard as follows:

- Based on particle size distribution, if $F_{0.063} < 40\%$ and $I_p < 10\%$;

- Based on plasticity index, if $F_{0.063} \geq 40\%$ and $I_p \geq 10\%$;

- Based on classification of adjacent layers and geological origin, if criteria on both particle size distribution ($F_{0.063}$) and on plasticity index (I_p) lead to a contradiction.

Soils must be named based on particle size distribution as shown in Figure 1.11. The parameters of soils (depicted on the axes of this ternary diagram) must be determined and plotted, and these parameters mark one point - characteristic of the soil. The soil is named from the region of the ternary diagram where this characteristic point lies. The lower part of the ternary diagram helps to separate silt and clay fractions, and silty or clayey attributives can be chosen.

(The soil example shown in this figure should be named silty clay based on this diagram, but these kinds of soils must be named based on plasticity index.)
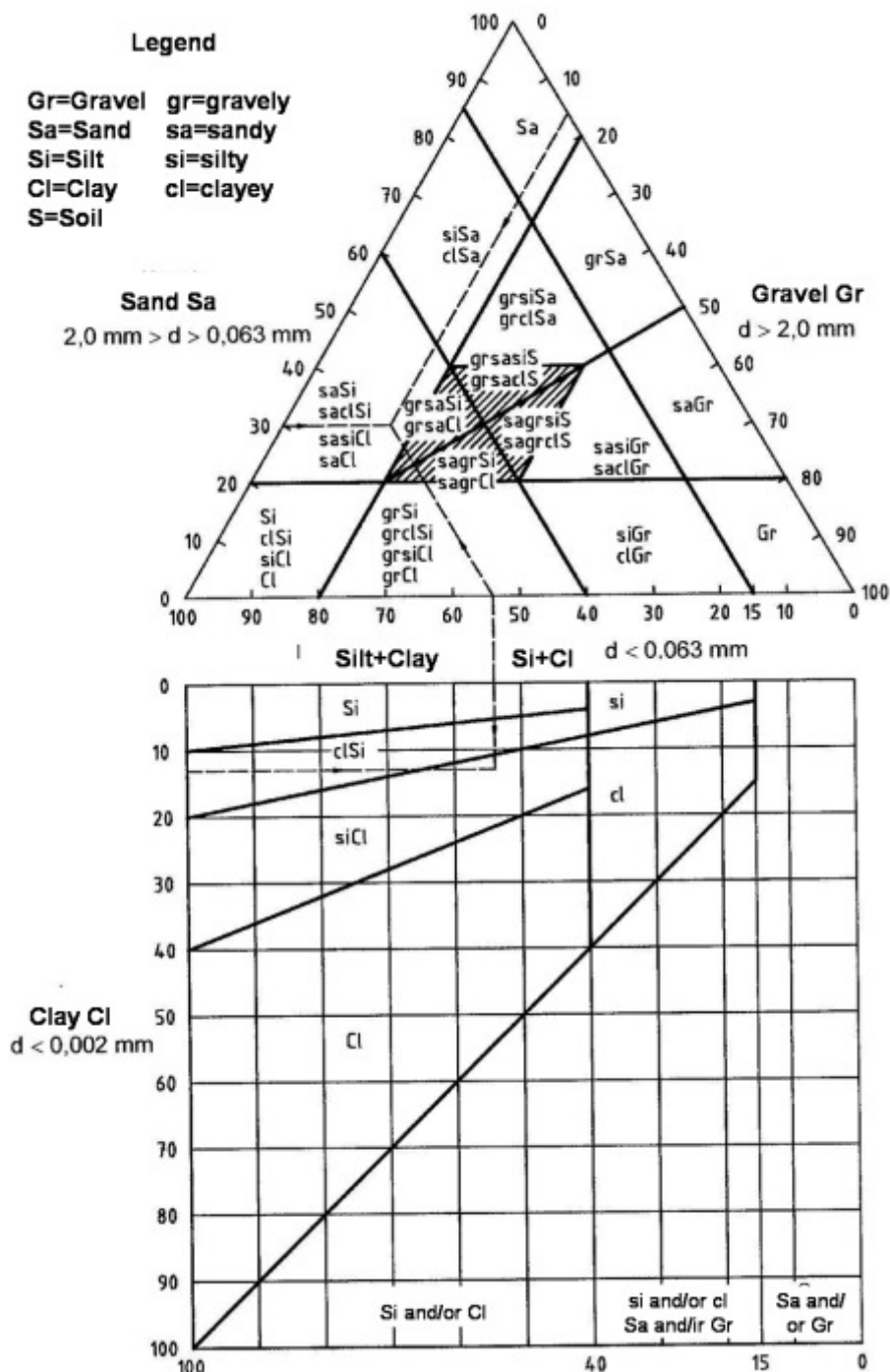
Figure 1.11: Classification of granular soils based on MSZ 14043-2

The larger fraction gives the name of granular soils according to former Hungarian soil classification. The following fraction(s) (containing "enough" of it) gave the attributive. The sufficient amount was 20% for gravel, sand, and sandflour, and 10% for silt and clay.

Classification of cohesive soils is based on the **plasticity index**, see Table 1.1.

The European Standards recommend the attributives shown in the middle column, but allow fixing the limits in the first column for every nation. The additional Hungarian Standard made this change, and attached the old (Hungarian) names to these new limits.

Plasticity index I_p %	Group name based on MSZ EN ISO 14688-2:2005	Name based on MSZ 14043-2:2006
≤ 10	Non-plastic	Based on particle size distribution

$10 - 15$	Low plasticity	Silt
$15 - 20$	Medium plasticity	Lean clay
$20 - 30$		Medium clay
$30 \leq$	High plasticity	Fat clay

Table 1.1.: Classification of cohesive soils

Organic nature must appear in the appellation of soils. Soils with an organic content between $2 - 6\,\%$ are slightly organic, between $6 - 20\,\%$ are moderately organic, and above $20\,\%$ are highly organic. Classification was more rigorous before: cohesive soils with an organic content above 5% and granular soils with an organic compound above 3% were called organic.

The new European-Hungarian Standard categorizes organic soils separately and classifies them based on appearance and components (different kinds of peats, marsh sediments, humus).

Colours of soils must be also mentioned, because this helps soil identification on site and gives other information. Besides, it could be of service to refer to geological origin and characteristics, and to all other important properties, e.g. artificial origin, possible pollution, local names, etc.