# The Ultimate Soil Texture Flow Chart (USTF)



11 January 2022

This flow chart only provides an estimation of the texture. Especially around the limits between the classes, the results might be not absolutely reliable. Beginners should ask experienced soil scientists for help.

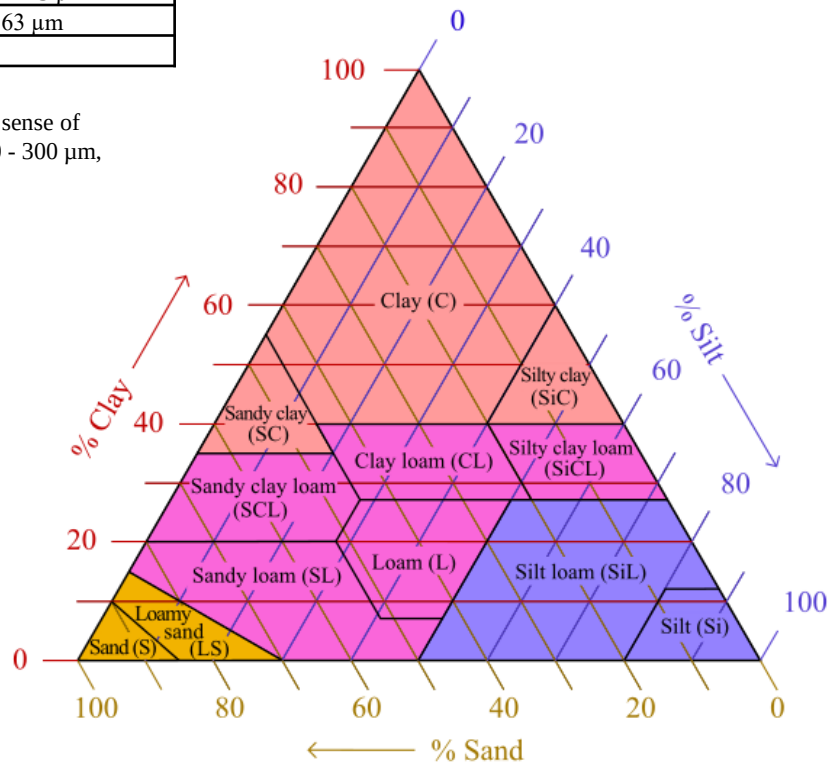
*Particle-size classes, according to ISO 11277:2009*

| Particle-size class | Diameter of particles |
|---|---|
| Fine earth | all particles ≤ 2 mm |
| Sand | > 63 µm - ≤ 2 mm |
| Very coarse sand | > 1250 µm - ≤ 2 mm |
| Coarse sand | > 630 µm - ≤ 1250 µm |
| Medium sand | > 200 µm - ≤ 630 µm |
| Fine sand | > 125 µm - ≤ 200 µm |
| Very fine sand | > 63 µm - < 125 µm |
| Silt | > 2 µm - ≤ 63 µm |
| Clay | ≤ 2 µm |

Note: The human eye and the tactile sense of the fingers can detect particles > 150 - 300 µm, depending on individual sensitivity.

WRB qualifiers:

- Arenic
- Siltic
- Clayic
- Loamic




*Texture classes triangle, from Blum et al. (2018), Figure 28, modified*

*Texture classes, according to NRCS Soil Survey Manual (2017)*

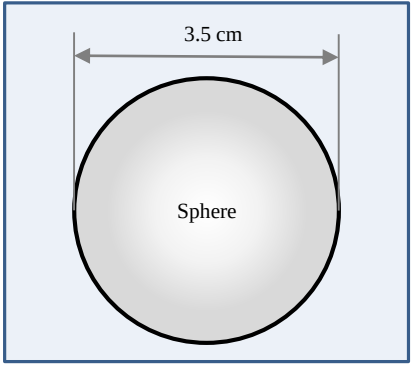
| Texture class | % sand | % silt | % clay | Additional criteria |
|---|---|---|---|---|
| **Sand (S)** | > 85 | < 15 | < 10 | (%silt + 1.5×%clay) < 15 |
| **Loamy sand (LS)** | > 70 to ≤ 90 | < 30 | < 15 | (%silt + 1.5×%clay) ≥ 15 and (%silt + 2×%clay) < 30 |
| **Silt (Si)** | ≤ 20 | ≥ 80 | < 12 | |
| **Silt loam (SiL)** | ≤ 50 | ≥ 50 to < 80 | < 27 | |
| | ≤ 8 | ≥ 80 to ≤ 88 | ≥ 12 to ≤ 20 | |
| **Sandy loam (SL)** | > 52 to ≤ 85 | ≤ 48 | < 20 | (%silt + 2×%clay) ≥ 30 |
| | > 43 to ≤ 52 | ≥ 41 to < 50 | < 7 | |
| **Loam (L)** | > 23 to ≤ 52 | ≥ 28 to < 50 | ≥ 7 to < 27 | |
| **Sandy clay loam (SCL)** | > 45 to ≤ 80 | < 28 | ≥ 20 to < 35 | |
| **Silty clay loam (SiCL)** | ≤ 20 | > 40 to ≤ 73 | ≥ 27 to < 40 | |
| **Clay loam (CL)** | > 20 to ≤ 45 | > 15 to < 53 | ≥ 27 to < 40 | |
| **Sandy clay (SC)** | > 45 to ≤ 65 | < 20 | ≥ 35 to < 55 | |
| **Silty clay (SiC)** | ≤ 20 | ≥ 40 to ≤ 60 | ≥ 40 to ≤ 60 | |
| **Clay (C)** | ≤ 45 | < 40 | ≥ 40 | |

Prepare a soil sample:
1. Take a sample of approx. 25 g of bulk soil.
2. Remove all coarse fragments (> 2 mm) and roots.
3. Add water slowly and destroy all aggregates thoroughly. For kaolinitic soils, take extra care to destroy pseudosand structure by prolonged squeezing.
4. Sample (except if very sandy) is at the proper consistency when moldable.
5. Form a sphere with a diameter of approx. 3.5 cm by rolling soil between both palms.

Yes

No

Add dry soil for optimum consistency.




Can you easily roll a sphere?

Is soil too dry?

Is soil too wet?

Does soil stain fingers and/or remain in finger rills?

SAND (S)

Squeeze the sphere between thumb and forefinger. Is it deformable with very low forces?

Place a piece of soil in your palm and drag the thumb of your other hand across it. Does soil form flakes and/or feel floury?

LOAMY SAND (LS)

Does soil feel very gritty?

Squeeze the sphere between thumb and forefinger. Is soil shapeable and/or adheres to the fingers and/or has grains to feel?

Pronounced flakes

SANDY LOAM (SL)

LOAM (L)

SILT LOAM (SiL)

SILT (Si)

Note: The 'floury' feeling of silt may also be described as 'soapy' or 'silky'.

Is both of the following fulfilled?
1. Squeeze the sphere with stronger forces until your fingers meet. Does soil cohere strongly and feel very plastic like plasticine or moist putty?
AND
2. Place a piece of soil in your palm and drag the thumb of your other hand across it. Does soil take a polish and/or feel smooth?

Does soil feel very gritty?

Does soil form flakes and/or feel floury and/or remain well in finger rills?

None of the former predominates.

SANDY CLAY LOAM (SCL)

SILTY CLAY LOAM (SiCL)

CLAY LOAM (CL)

Silt remains in finger rills

Does soil feel very gritty?

Does soil form flakes and/or feel floury and/or remain well in finger rills?

None of the former predominates.

SANDY CLAY (SC)

SILTY CLAY (SiC)

CLAY (C)

WRB qualifiers:

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- Clayic
- Loamic

*Flow Chart, ideas adapted from*
*- Natural England Technical Information Note TIN037 (2008)*
*- S.J. Thien, A flow diagram for teaching texture by feel analysis, Journal of Agronomic Education, 8:54-55 (1979), downloaded from NRCS*