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AMENDMENT 1
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Soil quality — Determination of particle size distribution in mineral soil material — Method by sieving and sedimentation

AMENDMENT 1

Qualité du sol — Détermination de la répartition granulométrique de la matière minérale des sols — Méthode par tamisage et sédimentation

AMENDEMENT 1

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This document was prepared by Technical Committee ISO/TC 190, *Soil quality*, Subcommittee SC 3, *Chemical and physical characterization*.

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Soil quality — Determination of particle size distribution in mineral soil material — Method by sieving and sedimentation

AMENDMENT 1

8.2.5

Replace the text with the following:

Ultrasonic bath, able to provide an acoustic power P_{ac} (W) level in the range of 5 W to 20 W per litre of water (see Annex D), typically operating at a frequency between 37 kHz to 45 kHz.

Figure 2

Replace Figure 2 with the following:

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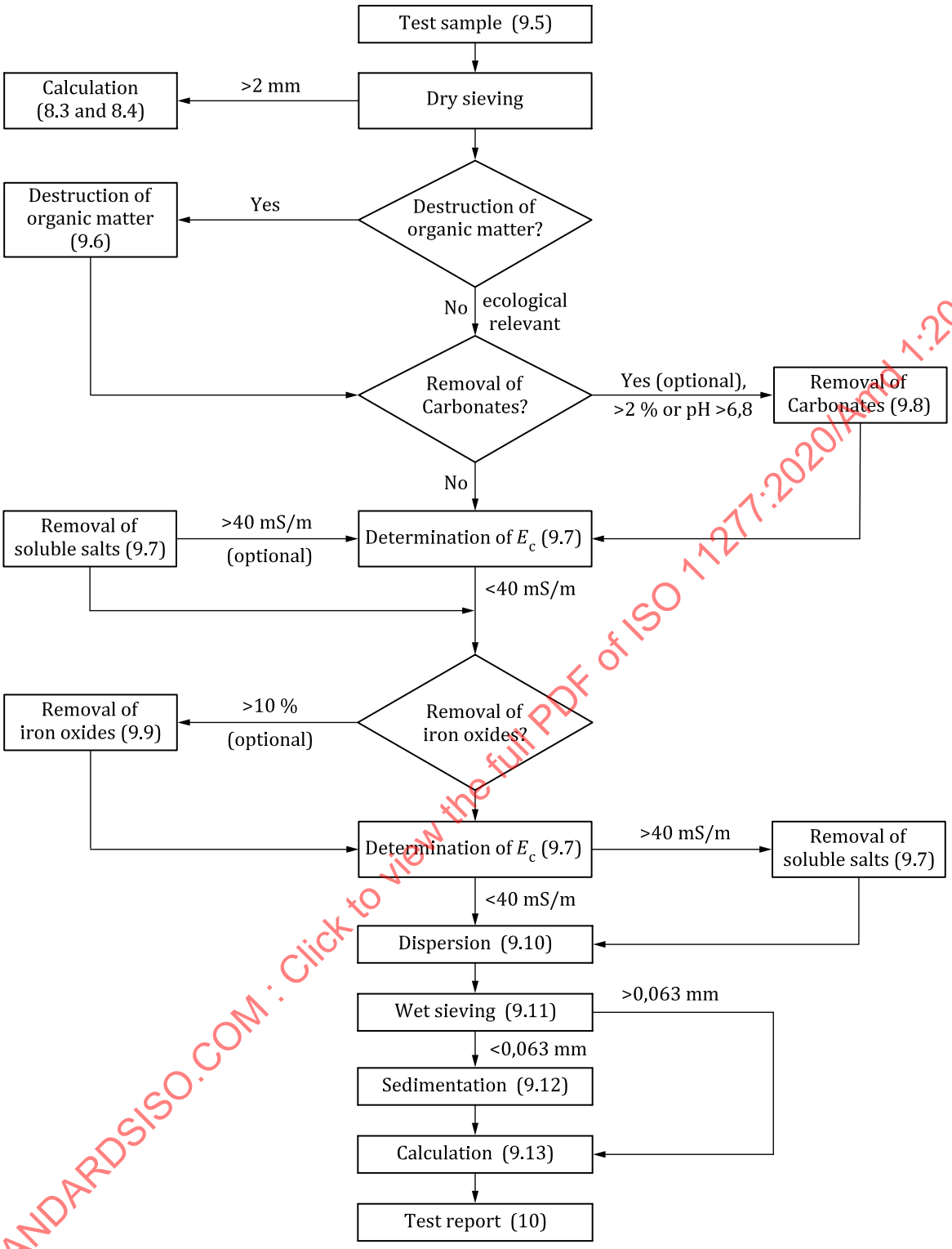

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Figure 3

Add the following to the key:

3 sideways opening

9.6.1, first paragraph

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Replace the paragraph with the following:

The organic substances shall be removed. Only for the determination of ecologically relevant particle size distribution the destruction of organic matter is not necessary (see NOTE).

9.6.1, first paragraph after the NOTE

Replace the paragraph with the following:

Destroy the organic matter with hydrogen peroxide solution as described below.

9.6.2

Add the following paragraph after the first paragraph:

Systems operating with an ultrasonic bath (8.2.5) may be used, provided that comparability to the procedure described above without the use of any kind of ultrasonic power is proven (see Annex D). Comparability shall be proven for all soils to be analysed in relation to their Reference Soil Groups according to WRB (2015)[14], as soils are from many different climate zones and parent materials which influences the comparability of particle size analyses depending on pre-treatment.

9.6.3

Delete the first paragraph, the second paragraph, the first sentence in the first paragraph after NOTE 1, and the second paragraph after NOTE 1.

9.6.3, third paragraph after the WARNING

Replace “100 mS/m” with “40 mS/m”.

9.6

Delete the subclause headings “9.6.1 General”, “9.6.2 Method A” and “9.6.3 Method B”.

9.8, *third paragraph*

Replace “100 mS/m” with “40 mS/m” in the 6th sentence.

9.9, *last but one paragraph*

Replace “100 mS/m” with “40 mS/m”.

9.10 “Dispersion”

Replace the first paragraph and the list with the following:

Add water to the centrifuge bottle so that the total volume is between 150 ml and 200 ml. Add 25,0 ml of dispersion agent with a pipet or dispenser.

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Shake the bottle overnight on the end-over-end shaker at 6 rpm. Ensure that, if soils are shaken over the weekend, the total shaking time does not exceed 18 h; alternatively increase the temperature of the solution to boiling temperature and keep it for (5 ± 0,5) min. Cool the solution to room temperature.

Provided that comparability to the procedure described above without the use of any kind of ultrasonic power is proven; apply ultrasonic power in the waterbath for 10 min at (70 ± 5) °C.

Annex D

Add the following annex after Annex C, before the Bibliography

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Annex D
(informative)

Ultrasonic bath assisted wet sieving and sedimentation

D.1 General

In order to ensure that primary particles, rather than loosely bonded aggregates, are measured, organic matter and salts are removed and a dispersing agent is added prior to the particle size distribution determination.

The use of an ultrasonic bath can be considered to enhance the soil pre-treatment procedure. The application of ultrasonic power can however influence the result of the particle size analyses. Ultrasonic bath assisted wet sieving and sedimentation can therefore only be used after the comparability has been proven for the type of soils to be analysed. Provided that comparability to the pre-treatment procedure described in 9.6 to 9.10 without the use of any kind of ultrasonic power is proven for the tested soil type, the use of a heated ultrasonic bath to assist in the wet sieving and sedimentation can be performed as described in this annex. For soil types commonly found in the Low Countries region of northwestern Europe, the ultrasonic bath assisted wet sieving and sedimentation as described in this annex has been assessed and proven comparable[15].

D.2 Apparatus

D.2.1 Ultrasonic bath, able to provide an acoustic power P_{ac} (W) level in the range of 5 W to 20 W per litre of water, typically operating at a frequency between 37 kHz to 45 kHz.

To determine the level of ultrasonic energy which an ultrasonic bath system can transfer into a liquid, the following experimental method can be applied[16]. The calibration method is based on the assumption that the acoustic energy absorbed by a liquid sample of known mass is converted into thermal energy and by monitoring the temporal increase in temperature during sonication it is possible to obtain a relative measure of the power output of the sonicator.

a) Fill the ultrasonic bath to the maximum water filling level mark (note M, the mass of the liquid in g).

b) Immerse a temperature probe connected to a temperature meter in the liquid.

c) Let the liquid temperature stabilize at room temperature and note the equilibrium temperature.

d) Select a sonicator output setting, operating in continuous mode and record the water temperature increase for at least 5 min with a minimum resolution of 30 s.

e) Using the recorded temperature values, create a temperature vs. time curve and obtain the best linear fit for the curve using least squares regression.

f) With the obtained slope ($\Delta T/\Delta t$), the delivered acoustic power P_{ac} (W) can be calculated from Formula (D.1):

$$P_{ac} = \frac{\Delta T}{\Delta t} M C_P \qquad \text{(D.1)}$$

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