7.32 **SUSPENSION CONCENTRATES FOR SEED TREATMENT (FS)** (Flowable concentrates for seed treatment)

Note for preparation of draft specifications. Do not omit clauses or insert additional clauses, nor insert limits that are more lax than those than given in the guidelines, without referring to section 4. From the “Notes” provided at the end of this guideline, incorporate only those which are applicable to the particular specification.

The guidelines for seed treatment formulations do not apply to formulations intended for film-coating or pelleting of seeds. They include special clauses, related to their use pattern, although some of the corresponding test methods are not yet developed. The influence of treatment on germination is of major importance but it is not the subject of a specification clause because no test method is applicable to all types of seeds. To avoid adverse effects, users should apply the formulation strictly according to the recommendations of the manufacturer and should not treat seeds for which effect on germination is not known. Treated seeds should be stored in a suitable container and should be protected from excessive temperature and moisture.

**…… [ISO common name] SUSPENSION CONCENTRATE FOR SEED TREATMENT** (Note 1)

[CIPAC number]/FS (month & year of publication)

7.32.1 **Description**

The material shall consist of a suspension of fine particles of technical ...... [ISO common name], complying with the requirements of FAO specification ......, in the form of ...... (see Section 4.2), in an aqueous phase together with suitable formulants, including colouring matter (Note 1). After gentle stirring or shaking, the material shall be homogeneous (Note 2) and suitable for further dilution with water if necessary.

7.32.2 **Active ingredient**

7.32.2.1 **Identity tests** (Note 3)

 The active ingredient shall comply with an identity test and, where the identity remains in doubt, shall comply with at least one additional test.

7.32.2.2 **...... [ISO common name] content** (Note 3)

 The ...... [ISO common name] content shall be declared (g/kg or g/l at 20 ± 2ºC, Note 4) and, when determined, the average content measured shall not differ from that declared by more than the appropriate tolerance, given in the table of tolerances, Section 4.3.2.

7.32.3 **Relevant impurities**

7.32.3.1 **By-products of manufacture or storage** (Note 5), if required

 Maximum: ......% of the …… [ISO common name] content found under 7.32.2.2.

7.32.4 **Physical properties**

 7.32.4.1 **Acidity** and/or **Alkalinity** (MT 191) or **pH range** (MT 75.3) (Note 6), if required

 Maximum acidity: ...... g/kg calculated as H2SO4.

 Maximum alkalinity: ...... g/kg calculated as NaOH.

 pH range: ...... to ......

7.32.4.2 **Pourability** (MT 148.1)

 Maximum “residue”: ......%.

7.32.4.3 **Wet sieve test** (MT 185) (Note 7)

 Maximum: ......% retained on a ......µm test sieve.

7.32.4.4 **Persistent foam** (MT 47.3) (Note 8) if required

 Maximum: ...... ml after 1 min.

 7.32.4.5 **Suspensibility** (MT 184) (Note 9), if required

 A minimum of ......% of the ...... [ISO common name] content found under 7.32.2.2 shall be in suspension after 30 min in CIPAC Standard Water D at 30 ± 2 °C (Note 10).

 7.32.4.6 **Particle size distribution** (MT 187), if required

 …% of particles shall be in the range … to … (Note 11)

 7.32.4.7 **Adhesion to seeds** (MT 194)

 The manufacturer shall declare for a representative type of seeds for which the seed treatment formulation is recommended, the minimum percentage of the [ISO common name] remaining on the seeds after the test.

7.32.5 **Storage stability**

7.32.5.1 **Stability at 0 °C** (MT 39.3)

 After storage at 0 ± 2 °C for 7 days, the formulation shall continue to comply with the clause for: wet sieve test (7.32.4.3).

7.32.5.2 **Stability at elevated temperature** (MT 46.3)

 After storage at 54 ± 2 °C for 14 days (Note 12), the determined average active ingredient content must not be lower than ......% relative to the determined average content found before storage (Note 13) and the formulation shall continue to comply with the clauses for:

- by‑products of manufacture or storage (7.32.3.1),

- acidity, alkalinity or pH range (7.32.4.1),

- pourability (7.32.4.2),

- wet sieve test (7.32.4.3),

- suspensibility (7.32.4.5),

- adhesion to seeds (7.32.4.7),

as required.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Note 1 The influence of treatment on germination is of major importance but it is not the subject of a specification clause because no test method is applicable to all types of seeds. To avoid adverse effects, users should apply the formulation strictly according to the recommendations of the manufacturer and should not treat seeds for which effect on germination is not known. Treated seeds should be stored in a suitable container and should be protected from excessive temperature and moisture.

 The formulation is expected contain a dye or pigment that permanently colours the seed after treatment (red is recommended). For special purposes however, the dye/pigment can be added at a later stage. In some countries, there may be a legal requirement that a specific colour shall be used. The same colour must not be used for denaturing seeds intended for use as livestock feeding stuffs.

Note 2 Before sampling to verify the formulation quality, inspect the commercial container carefully. On standing, suspension concentrates usually develop a concentration gradient from the top to the bottom of the container. This may even result in the appearance of a clear liquid on the top and/or sediment on the bottom. Therefore, before sampling, homogenize the formulation according to the instructions given by the manufacturer or, in the absence of such instructions, gently shake the commercial container (for example by inverting the closed container several times, large containers must be opened and stirred adequately). After this procedure, the container should not contain a sticky layer of non-dispersed matter at the bottom. A suitable and simple method of checking for a non-dispersed sticky layer (“cake”) is by probing with a glass rod or similar device adapted to the size and shape of the container. All the physical and chemical tests must be carried out on a sample taken after the recommended homogenization procedure.

Note 3 Method(s) of analysis must be CIPAC, AOAC or equivalent. If the methods have not yet been published then full details, with appropriate method validation data, must be submitted to FAO/WHO by the proposer.

Note 4 Unless homogenization is carried out carefully, it is possible for the sample to become aerated. This can lead to errors in the determination of the mass per millilitre, and in calculation of the active ingredient content (in g/l) if methods other than OECD 109 or MT 3.3 are used. If the buyer requires both g/kg and g/l at 20 °C, then in case of dispute the analytical results shall be calculated as g/kg.

Note 5 This clause should include only relevant impurities and the title should be changed to reflect the name of the relevant impurity. Method(s) of analysis must be peer validated.

Note 6 The method to be used shall be stated. If several methods are available, a referee method shall be selected.

Note 7 This test should detect coarse particles (e.g. caused by crystal growth) or extraneous materials which could cause blockage of spray nozzles or filters of the application equipment.

Note 8 The mass of sample to be used in the test should correspond to the highest rate of use recommended by the supplier provided it is within the scope of the method. The test is to be conducted in CIPAC standard water D.

Note 9 Suspensibility is not applicable for FS which are used without dilution and the clause can be removed. In MT 184, chemical assay is the only fully reliable method to measure the mass of active ingredient still in suspension. However, simpler methods such as gravimetric and solvent extraction determination may be used on a routine basis provided that these methods have been shown to give equal results to those of the chemical assay method. In case of dispute, the chemical method shall be the referee method.

Note 10 Unless other temperatures and/or times are specified.

Note 11 Percentages may be specified in one or more ranges, as appropriate to the product. Laser diffraction is not always suitable to measure the particle size distribution of liquid formulations. This should be evaluated by 4.5.31 Wet sieve test and 4.5.43 Suspensibility or 4.5.44 Dispersion stability.

Note 12 Unless other temperatures and/or times are specified. Refer to Section 4.6.2 of this Manual for alternative storage conditions.

Note 13 Samples of the formulation taken before and after the storage stability test should be analyzed concurrently after the test in order to reduce the analytical error.