6.14 **WATER DISPERSIBLE GRANULES**

**Introduction**

Water dispersible granules (WG) are intended for application after disintegration and dispersion in water by conventional spraying equipment.

WGs are formulated in many different ways depending on the physico-chemical properties of the active ingredient and the manufacturing equipment available. This can lead to products of differing appearances and differing particle size ranges. Products with a wide particle size range may give rise to some segregation in the containers. However, since the mixture from which WGs are formed is homogeneous, it is possible to allow a wider particle size range than typically used for GRs.

In order to check the properties of a WG according to a given specification, it is essential that the sample taken is representative. A method of sample preparation of WG is available (CIPAC MT 166: “Sample preparation for analytical determination of WG”) which should be applied.

The properties specified in this guideline are considered to be essential for good field performance. In addition to the properties usually considered for WP, these are dispersibility in water, dustiness, and flow properties.

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

**...... [ISO common name] WATER DISPERSIBLE GRANULES**

(CIPAC No ......)/WG (month & year of publication)

6.14.1 **Description**

The material shall consist of an homogeneous mixture of technical ...... [ISO common name], complying with the requirements of the FAO/WHO specification ...... , in the form of ....... (see Section 4.2), together with carriers and any other necessary formulants. It shall be in the form of granules (Note 1) for application after disintegration and dispersion in water. The formulation shall be dry, free-flowing, nearly dust free or essentially non-dusty, and free from visible extraneous matter and hard lumps.

6.14.2 **Active ingredient**

6.14.2.1 **Identity tests** (Note 2)

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

6.14.2.2 **...... [ISO common name] content** (Note 2)

 The ...... [ISO common name] content shall be declared (g/kg) 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.

6.14.3 **Relevant impurities**

6.14.3.1 **By-products of manufacture or storage** (Note 3), if required

 Maximum: ......% of the …… [ISO common name] content found under 6.14.2.2.

6.14.3.2 **Water** (MT 30.6) (Note 4), if required

 Maximum: ...... g/kg.

6.14.4 **Physical properties**

6.14.4.1 **Acidity** and/or **alkalinity** (MT 191) or **pH range** (MT 75.3) (Note 5), if required

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

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

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

6.14.4.2 **Wettability** (MT 53.3) (Note 6)

 The formulation shall be completely wetted in ...... min.

6.14.4.3 **Wet sieve test** (MT 185.1)

 Maximum: ......% retained on a 75 µm test sieve.

6.14.4.4 **Dispersibility** (MT 174)

 Dispersibility: minimum ......% after 1 min of stirring.

6.14.4.5 **Suspensibility** (MT 184.1) (Notes 7 & 8)

 Suspensibility: minimum ......% after 30 min in CIPAC Standard Water D at 25 ± 2 °C (Note 9).

6.14.4.6 **Persistent foam** (MT 47.3) (Note 10)

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

6.14.4.7 **Dustiness** (MT 171.1) (Note 11)

 The formulation shall have a maximum collected dust of 30 mg by the gravimetric method or a maximum dust factor of 25 by the optical method of MT 171.1.

6.14.4.8 **Flowability** (MT172.2)

 At least ......% of the formulation shall pass through a 5 mm test sieve after 20 drops of the sieve (Note12).

 6.14.4.9 **Attrition resistance** (MT 178.3)

 Minimum: ......% attrition resistance.

6.14.5 **Storage stability**

6.14.5.1 **Stability at elevated temperature** (MT 46.4)

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

- by-products of manufacture or storage (6.14.3.1),

- acidity/alkalinity/pH range (6.14.4.1),

- wet sieve test (6.14.4.3),

- dispersibility (6.14.4.4),

- suspensibility (6.14.4.5),

- dustiness (6.14.4.7),

 - attrition resistance (6.14.4.9),

as required.

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

Note 1 Depending on the manufacturing conditions, WGs may have different forms and particle size ranges. To describe specific formulations, it is recommended that information about the form (e.g. irregular shape, nearly spherical, cylindrical) is added and the nominal size range stated.

Note 2 Method(s) of analysis must be CIPAC, AOAC or equivalent. Where methods have not yet been published, full details and appropriate method validation data, must be submitted to FAO/WHO by the proposer.

Note 3 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 4 There may be cases where a minimum water content has to be specified.

Note 5 The method to be used shall be stated. If several methods are available, a referee method shall be selected.

Note 6 The method to be used shall be stated, either with or without swirling.

Note 7 The formulation should be tested at the highest and lowest rates of use recommended by the supplier, provided this does not exceed the conditions given in method MT 184.1.

Note 8 Chemical assay is the only fully reliable method to measure the mass of active ingredient still in suspension. However, the simpler gravimetric method may be used on a routine basis provided that it has been shown to give equal results to those of chemical assay. In case of dispute, chemical assay shall be the referee method.

Note 9 Unless another temperature is specified.

Note 10 The mass of sample to be used in the test should be at the highest rate of use recommended by the supplier. The test is to be conducted in CIPAC standard water D at 25 ± 5 oC.

Note 11 Measurement of dustiness must be carried out on the sample “as received” and, where practicable, the sample should be taken from a newly opened container, because changes in the water content of samples may influence dustiness significantly. The optical method of MT 171.1, usually shows good correlation with the gravimetric method, and can, therefore, be used as an alternative where the equipment is available. Where the correlation is in doubt, it must be checked with the formulation to be tested. In case of dispute the gravimetric method shall be used.

Note 12 The flowability test (MT 172. 2). includes the accelerated storage conditions to be used.

Note 13 Unless other temperatures and/or times are specified. Refer to Section 4.6.2 of this Manual for alternative storage conditions.

Note 14 Samples of the formulation taken before and after the storage stability test may be analysed concurrently after the test in order to reduce the analytical error.