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FAO SPECIFICATIONS
FOR PLANT PROTECTION PRODUCTS

(MERCURIAL SEED TREATMENTS)

ETHOXYETHLYMERCURY CHLORIDE

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
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DISCLAIMER [1]

FAO specifications are developed with the basic objective of promoting, as far as practicable, the manufacture, distribution and use of pesticides that meet basic quality requirements.

Compliance with the specifications does not constitute an endorsement or warranty of the fitness of a particular pesticide for a particular purpose, including its suitability for the control of any given pest, or its suitability for use in a particular area. Owing to the complexity of the problems involved, the suitability of pesticides for a particular purpose and the content of the labelling instructions must be decided at the national or provincial level.

Furthermore, pesticides which are manufactured to comply with these specifications are not exempted from any safety regulation or other legal or administrative provision applicable to their manufacture, sale, transportation, storage, handling, preparation and/or use.

FAO disclaims any and all liability for any injury, death, loss, damage or other prejudice of any kind that may arise as a result of, or in connection with, the manufacture, sale, transportation, storage, handling, preparation and/or use of pesticides which are found, or are claimed, to have been manufactured to comply with these specifications.

Additionally, FAO wishes to alert users to the fact that improper storage, handling, preparation and/or use of pesticides can result in either a lowering or complete loss of safety and/or efficacy.

FAO is not responsible, and does not accept any liability, for the testing of pesticides for compliance with the specifications, nor for any methods recommended and/or used for testing compliance. As a result, FAO does not in any way warrant or represent that any pesticide claimed to comply with a FAO specification actually does so.

[1] This disclaimer applies to all specifications published by FAO.

INTRODUCTION TO FAO SPECIFICATIONS DEVELOPED UNDER THE OLD PROCEDURE

Between 1975 and 2000, FAO published booklets of specifications for technical materials and related formulations of plant protection products. Revisions of, and additions to, already published specifications will be issued when necessary. However, all changes and revisions of FAO specifications are now subject to the new procedure described in the *Manual on the development and use of FAO and WHO Specifications for Plant Protection Products*, FAO Plant Production and Protection Paper No. 173, Rome 2002 (*Revised First Edition* available only on the FAO home page of the Internet at: http://www.fao.org/ag/agp/agpp/pesticid/)

FAO specifications developed under the old procedure are based on the requirements defined in the Fourth Edition of the *Manual on the development and use of FAO specifications for plant protection products*, Plant Production and Protection Paper No. 128, Rome 1995.

This manual contained detailed definitions and other essential background information on basic procedures and technical principles adopted by the group on Pesticide Specifications of the FAO Panel of Experts on Pesticide Specifications, Registration Requirements, Application Standards and Prior Informed Consent, such as:

1. Categories of Specifications (Section 3.1 of the Manual)

   FAO Tentative Specifications (Code 'S/T', formerly 'TS') are those which have been recommended by FAO as preliminary specifications and which are based on minimum requirements. The methods of analysis cited are normally supplied by the manufacturer or may already have been published or be the subject of collaborative work.

   FAO Provisional Specifications [Code 'S/P', formerly ('S')] are those for which more evidence of the necessary parameters is available and where some collaborative study of the methods of analysis has been carried out.

   FAO (full) Specifications (Code 'S/F', formerly 'S').
   Specifications that have all necessary requirements together with CIPAC (full) methods, or other collaboratively studied (proven) methods.[2, 3]

   Wherever possible, standards for apparatus and common names for pesticides are those approved by the International Organization for Standardization (ISO).

2. Expression of active ingredient content (Section 4.2.5 of the Manual)

   - for solids, liquid technical materials, volatile liquids (of maximum boiling point 50°C) and viscous liquids (with minimum kinematic viscosity of 1×10^3 m^2/s at 20°C) the FAO Specification shall be based on expression of the content as g/kg;

- for all other liquids the active ingredient content of the product shall be declared in terms of g/kg *or* g/l at 20°C. If the customer requires both g/kg *and* g/l at 20°C, then in case of dispute the analytical results shall be calculated as g/kg.

3. Tolerance on content (Section 4.2.7 of the Manual)

A declared content of active ingredient must be included in all specifications, and one of the problems immediately arising is the level of tolerance acceptable about the nominal figure. The tolerance is influenced by (a) the reproducibility of the method of analysis, (b) the sampling error and (c) the manufacturing variance.

Allowable variations in analytical results (i.e. tolerances in content of active ingredient) with respect to specific pesticide consignments are intended to cover reasonable variations in the contents of active ingredients. For examples of such tolerances, see the table in Section 4.2.7 of the Manual.

4. Containers/packaging

FAO guidelines are in preparation.

Containers shall comply with pertinent national and international transport and safety regulations.

Technical materials, dustable powders and granules

Containers shall be suitable, clean, dry and as specified, and shall not adversely affect, or be affected by, the contents, but shall adequately protect them against external conditions.

Wettable powders

The product shall be packed in suitable, clean, dry containers as specified in the order. The container shall provide all necessary protection against compaction, atmospheric moisture, loss by vaporization and/or contamination to ensure that the product suffers no deterioration under normal transit and storage conditions.

The product shall be protected by an adequate moisture barrier. This may be a suitable bag of polyethylene or alternative means of giving equal or better protection.

Solutions and emulsifiable concentrates

Containers shall be lined, where necessary, with a suitable material, or the interior surfaces shall be treated to prevent corrosion and/or deterioration of the contents.

Additional information should be given in all specifications where particular pesticides present problems in packaging.

5. Biological information

Phytotoxicity

No test can be specified to cover the possible phytotoxicity of a formulation to all crops. When a crop is not mentioned in the instructions for use, purchasers should check with the supplier that the material is suitable, always provided that such a use is not restricted or legally forbidden.

Wetting of crops

The dilute spray should satisfactorily wet the leaves of the specified crops when used in accordance with the instructions. Test method MT 53.2, CIPAC F, p.162, may be useful.

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[1] *Should national pesticide specifications developed from these approved FAO specifications deviate from them, the National Authority responsible for making such changes is requested to inform the FAO Plant Protection Service of the nature of, and the reasons for, the modifications.*

[2] *Methods of analysis and miscellaneous techniques referred to in these specifications have been developed and adopted by CIPAC (Collaborative International Pesticides Analytical Council Ltd.). See CIPAC Handbooks 1 (1970), 1A (1980), 1B (1983), 1C (1985), D (1988), E (1993), F (1995), G (1995), CIPAC Proceedings 1980 and 1981, obtainable from Black Bear Press Limited, King's Hedges Road, Cambridge CB4 2PQ, England. The page numbers of specific methods are given in parentheses in the specifications. Copies of methods not yet published can be obtained from the FAO Plant Protection Service.*

[3] *Information on standard waters for laboratory evaluation of pesticidal formulations will be found in CIPAC Monograph 1*, Standard Waters and an FAO Survey on Naturally Occurring Waters *(1972), Black Bear Press Limited, King's Hedges Road, Cambridge CB4 2PQ, England.*

SUBMISSION OF DRAFT SPECIFICATIONS TO FAO

Any organization, commercial firm or interested individual is encouraged to submit relevant specifications, or proposals for revision of existing specifications, for pesticide products for consideration and possible adoption by FAO. Correspondence should be addressed to the Pesticide Management Group, Plant Production and Protection Division, FAO, Viale delle Terme di Caracalla, 00153 Rome, Italy.

General guidelines on preparing draft specifications are given in the *Manual on the development and use of FAO and WHO Specifications for Plant Protection Products*, FAO Plant Production and Protection Paper No. 173, Rome 2002 (Revised First Edition available only on the FAO home page of the Internet at: http://www.fao.org/ag/agp/agpp/pesticid/).

Specifications which are considered suitable for further processing are assigned priorities and circulated to appropriate organizations and specialists to comment. Comments, together with other relevant information, are then reviewed in detail by the Group on Specifications of the FAO Panel of Experts on Pesticide Specifications, Registration Requirements, Application Standards and Prior Informed Consent. The drafts are converted into FAO Provisional Specifications, or full FAO Specifications.

ETHOXYETHLYMERCURY CHLORIDE TECHNICAL

FAO Tentative Specification 71E.2ch/1/ts/14

.1 DESCRIPTION

The material shall consist, essentially, of ethoxyethylmercury chloride, together with related manufacturing impurities, as dry, white powder, free from extraneous impurities and added modifying agents.

.2 ACTIVE INGREDIENT

.2.1 Identity Test

The identity shall be confirmed by the following tests:

.2.1.1. Melting Point [71E.2ch/1/M/10.8]+

About: 78º C.

.2.1.2 Other Tests [-/M/9.2]

Shall comply

.2.2 Total Mercury [-/M/10.3]

Minimum: 63.0%

Maximum: 66.0%, calculated on the basis of the dried material (Note 1).

.2.3 Chloride [-/M/10.4]

Minimum: 10.0%

Maximum: 12.0%, calculated on the basis of the dried material (Note 1).

.3 IMPURITIES

.3.1 Mercury Content of Sodium Hydrogen Carbonate Insolubles [-/M/10.5]

Maximum: 5% of the total mercury content found under .2.2.

.3.2 Other Organomercurials [-/M/10.6]

Maximum: 10%, calculated as ethoxyethylmercury chloride.

.3.3 Loss on Vacuum Drying at Ambient Temperature [-/M/10.7; MT 17.4]

Maximum: 1.0%.

.3.4 Sulphated Ash [-/M/10.9; MT 29.2]

Maximum: 1.5%.

.4 PHYSICAL PROPERTIES

.4.1 Dry Sieve Test [-/M/10.10; MT 59.1]

All material shall pass through a 500 µm test sieve and not more than 10% shall be retained on a 150 µm test sieve.

.5 CONTAINERS

Containers shall be suitable, clean, dry and as specified in the order, and shall not adversely affect, or be affected by, the product, but shall adequately protect it from external conditions. The material should not be allowed to come into direct contact with metal.

They shall comply with pertinent national and international transport and safety regulations.

Note 1: Equivalent to 97.1 to 101.7% of ethoxyethylmercury chloride.

+ Methods in CIPAC 1B

ETHOXYETHYLMERCURY CHLORIDE POWDERS FOR SEED TREATMENT

FAO Tentative Specification 71E.2ch/9/ts/1

.1 DESCRIPTION

The product shall consist of a homogeneous fine powder containing ethoxyethylmercury chloride, (complying with 7IE.2ch/1/ts/14) as the active ingredient, together with suitable fillers and necessary formulants (including colouring matter; Note 1) and free from visible extraneous materials and hard lumps. It shall be suitable for use either dry and/or as slurry treatment as recommended.

.2 ACTIVE INGREDIENT

.2.1 Mercury Compound

The mercury compound used in the formulation shall be declared.

.2.2 Identity Test [71E.2ch/9/M/4.2]$^{+}$

Where the identity is in question the material shall comply with the test.

.2.3 Mercury [-/M/4.3]

The total mercury content shall be declared and, when determined, the percentage obtained shall not differ from that declared by more than ± 10% of the declared content.

.3 IMPURITIES

.3.1 Pesticidally Inactive Mercury [-/M/4.4]

Maximum: $^{xy}/_{100}$ % where x% is the mean content of pesticidally inactive mercury (i.e. Mercury content of Sodium Hydrogen Carbonate Insolubles) permitted in the specification for the technical material and y% is the content of mercury declared under 2.3 (Note 2).

.3.2 pH Range of Aqueous Dispersion [/M/4.5;MT 75.1]

6.0 to 7.5.

.4 PHYSICAL PROPERTIES

.4.1 Dry Sieve Test [/M/4.6;MT 59.1]

Maximum: 5% retained on a 75µm test sieve.

Not more than 0.10 x% of the residues on the sieves shall be mercury where x is the percentage of total mercury found under .2.3 (Note 3).

*4.2 Adhesion to Seeds [-(M)/4.7]

Not less than 60% of the mercury used shall be present on the seeds after treatment. (Note 4).

.5 STORAGE STABILITY

.5.1 Stability at 54ºC [/M/4.8; MT 46.1]

After storage at 54 ± 2ºC for 14 days the product shall continue to comply with .2.3, .3.1, .4.1 and .4.2.*

.6 CONTAINERS

The products shall be packed in suitable, clean, dry containers as specified in the order. The product should not be allowed to come into direct contact with metal.

The container shall provide all necessary protection against compaction, atmospheric moisture, oxidation, loss by vaporization, and/or contamination to ensure that the product suffers no deterioration under normal transit and storage conditions. The product shall be protected by an adequate moisture barrier. This may be an inner bag of polyethylene (Note 5) or alternative means of giving equal or better protection.

Containers shall comply with pertinent national and international transport and safety regulations.

.7 BIOLOGICAL PROPERTIES

.7.1 Germination [/M/3.9]

The product shall show no effects on germination, within the specified limits of the test (Note 6) on the named seeds.

Note 1 The product shall contain a water insoluble dye that permanently colours the seed on application (red is recommended). In some countries there is a legal requirement that a specific colour be used. The inclusion of a water insoluble bitter principle, to make the treated seed unpalatable, is strongly recommended.

Note 2 e.g. If the mercury content of the formulation is 1.5% the permitted amount of inactive mercury would be 0.075% of the product.

Note 3 If the product contains 1% of mercury and 20 g of sample is used in the test, then the amount of mercury in the residue should not exceed 0.02 g, i.e.

$$\frac{(0.10 \times x) \times \text{weight of sample}}{100} \text{ g}$$

Note 4 Interim recommendation

Note 5 Because of the variation in the nature and size of the container, its destination and other factors, it is not possible to specify the thickness of the polyethylene but, as a guideline, for a container with 50 kg of product, the inner liner should be at least 0.075 mm thick.

Note 6 i.e., the tolerance given in the ISTA (International Seed Testing Association) International Rules for Seed Testing (Obtainable from ISTA Secretariat, Reckenholz, P.O. Box 412, CH-8046, Zurich Switzerland).

+ Methods in CIPAC 1B
* For information

ETHOXYETHYLMERCURY CHLORIDE SOLUTIONS
FOR SEED TREATMENT

FAO Tentative Specification 71E.2ch/10/ts/1

.1 DESCRIPTION

The product shall consist of a solution containing ethoxyethylmercury chloride, (complying with 7IE.2ch/1/ts/14) as the active ingredient, together with suitable solvents and necessary formulants, (including colouring matter; Note 1). It shall be free from visible suspended matter and sediment.

.2 ACTIVE INGREDIENT

.2.1 Mercury Compound

The mercury compound used in the formulation shall be declared.

.2.2 Identity Tests [1E.2ch/10/M/1.2]$^{+}$

Where the identity is in question the material shall comply with the test.

.2.3 Mercury [-/M/1.4]

The total mercury content (g/1 at 20ºC, or % w/w: Note 2) shall be declared and, when determined, the content shall not differ from that declared by more than ± 7.5% of the declared content.

.3 IMPURITIES

.3.1 Pesticidally Inactive Mercury [-/M/1.5]

Maximum: $^{xy}/_{100}$ % where x% is the maximum content of pesticidally inactive mercury permitted in the specification for the technical material and y% is the Content of mercury declared under 2.3 (Note 3).

.3.2 Water (-/M/1.6:MT 30.1)

Maximum: 0.5%

.4 PHYSICAL PROPERTIES

*.4.1 *Flash Point [-/M/1.7; MT 12]

Where appropriate, the minimum flash point of the product should be declared. The Method used shall be stated (e.g. Abel Method) (Note 4).

.5 STORAGE STABILITY

.5.1 Stability at 0ºC [-/M/1.8; MT 39]

After storage at 0º C ± 1ºC for 7 days no separation of solid and/or oily matter shall occur.

.5.2 Stability at 54ºC [-/M/1.9; MT 46]

After storage at 54 ± 2º C for 14 days the product shall continue to comply with .2.3, .3.1 and .5.1.

.6 CONTAINERS

They shall be lined, where necessary, with a suitable material, or the interior surface treated to prevent corrosion and/or deterioration of the contents. The product should not be allowed to come into direct contact with metal.

They shall comply with pertinent national and international transport and safety regulations (note 4).

.7 BIOLOGICAL PROPERTIES

.7.1 Germination [-/M/89]

The product shall show no effects on germination, within the specified limits of the test, on the specified seeds (Note 5).

Note 1 The product shall contain a water insoluble dye that permanently colours the seed on application (red is recommended). In some countries there is a legal requirement that a specific colour be used. The inclusion of a water insoluble bitter principle, to make the treated seed unpalatable, is strongly recommended.

Note 2 If the customer requires both g/1 at 20ºC and % w/w then, in case of dispute, the analytical results shall be calculated as % w/w.

Note 3 e.g. If the mercury content of the formulation is 1.5% then the maximum permitted content of pesticidally inactive mercury would be 0.075% of the product.

Note 4 Attention is drawn to the international and national regulations regarding transport and handling of flammable materials

Note 5 i.e. the tolerance given in the ISTA (International Seed Testing Association) International Rules for Seed Testing. (Obtainable from ISTA Secretariat, Reckenholz, P.O. Box 412, CH-8046, Zurich, Switzerland).

\+ Methods in CIPAC 1B
* For information