AGP: CP/249
Supersedes AGP: CP/57

FAO SPECIFICATIONS FOR PLANT PROTECTION PRODUCTS

CAPTAN

N-(trichloromethylthio)cyclohex-4-ene-1,2-dicarboximide

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, 1990

Group on Pesticide Specifications

FAO Panel of Experts on Pesticide Specifications, Registration Requirements and Application Standards

Technical Secretary: Dr. A.V. Adam
Plant Protection Service
Plant Production and Protection Division

FAO

Via delle Terme di Caracalla
00100 Rome, Italy - Telex: 610181 FAO I

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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. Classes of Specifications.

FAO (full) specifications (Code "S"). Specifications that have all necessary requirements together with CIPAC (full) methods, or other collaboratively studied (proven) methods. 2/ and 3/.

FAO Provisional specifications [Code (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 Tentative specifications (Code "ts") are those which have been recommended by FA0 as preliminary specifications 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.

Wherever possible, standards for apparatus and common names for pesticides are those approved by the International Standards Organization (IS0).

2. Expression of Active Ingredient Content

- 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 g/ kg expression of content;

- for all other liquids the active ingredient content of the product shall be declared in terms o£ g/kg or g/l at 20°C. 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.

3. Tolerance on Content.

A declared content o£ active ingredient must be included in all specifications, and one of the problems immediately arising is the level of tolerance acceptable above the nominal figures. The tolerance is influenced by (a) the reproducibility o£ 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 content of active ingredient. For examples of such permitted tolerances, see the table on page 20 of the Manual.

4. Containers/Packaging.

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

- Technical material, dustable powders and granules

  Containers shall be suitable, clean, dry and as specified, and shall not adversely affect, or be affected by, the product/material, but shall adequately protect it 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, 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 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 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 possible phytotoxicity of 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 1, p. 965 may be useful.

1/ Should national pesticide specifications developed from these approved FAO specifications deviate fend 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 or 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 t1983), 1C (1985) and ID (1988), 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 brackets in the specifications. A copy of a method 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 2PO, 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 Pesticides Control Officer, Plant Production and Protection Division, FAO, Via delle Terme di Caracalla, 00100, Rome, Italy.

FAO has published a *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.

INFORMATION

COMMON NAME:	CAPTAN (ISO)
EMPIRICAL FORMULA:	C9H8Cl3NO2S
RMM:	300.6
CAS REGISTRY NUMBER:	133-06-2
CIPAC CODE NUMBER:	40

CHEMICAL NAME:

N-(trichloromethylthio)cyclohex-4-ene-1,2-dicarboximide (IUPAC)
1,2,3,6-tetrahydro-N-(trichloromethylthio)phthalmide
3a,4,7,7a-tetrahydro-N-(trichloromethanesulphenyl)phthalimide
3a,4,7,7a-tetrahydro-2-[(trichloromethyl)]-1H-isoindole-1,3(2H)-dione (CA)

CAPTAN TECHNICAL
FAO Specification 40/TC/S (1990)

.1 DESCRIPTION

The material shall consist of captan together with related manufacturing impurities and shall be an off-white to tan coloured powder free from visible extraneous matter and added modifying agents.

.2 ACTIVE INGREDIENTS

.2.1 Identity test (CIPAC 1C, 40/TC/M.3/2 p. 2013 and 40/TC/M.4/2 p. 2015)

Where the identity of the active ingredient is in doubt, then it shall comply with at least one additional test.

.2.2 Captan (CIPAC 1C, 40/TC/M.3/3 p. 2013 (Referee method) or -/M.4/3 p. 2015)

The captan content shall be declared (not less than 910 g/kg) and, when determined, the content obtained shall not differ from that declared by more than ± 30 g.

.3 IMPURITIES

.3.1 Perchlormethylmercaptan *
Maximum: 10 g/kg

.3.2 Loss on drying (MT 17.4.1, CIPAC 1, p. 874)
Maximum: 15 g/kg

.4 PHYSICAL PROPERTIES

.4.1 pH of 1% aqueous dispersion (MT 75, CIPAC 1A, p. 1589)
Range: 7.0 to 8.5

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* The analytical method for determination of the relevant impurities is available from the Pesticide Management Group of the FAO Plant Protection Service or can be downloaded here.

CAPTAN WETTABLE POWDERS
FAO Specification 40/WP/S) (1990)

.1 DESCRIPTION

The material shall consist of a homogenous mixture of technical captan [complying with the requirements of FAO specification 40/TC/S (1990)] together with filler(s) and any other necessary formulants. It shall be in the form of a fine powder free from visible extraneous matter and hard lumps.

.2 ACTIVE INGREDIENTS

.2.1 Identity tests (CIPAC 1C, 40/WP/M.3/2 p. 2017 and 40/WP/M.4/2 p. 2017)

Where the identity of the active ingredient is in doubt, then the isolated active ingredient shall comply with at least on additional test.

.2.2 Captan (CIPAC 1C, 40/WP/M.3/3 p. 2017 (referee method) or -/M.4/3 p. 2017)

The captan content shall be declared (g/kg) and when determined the content obtained shall not differ from that declared by more than the following amounts:

Declared content	Permitted tolerance
up to 400 g/kg	+/- 5% of the declared content
above 400 g/kg	+/- 20 g

.3 IMPURITIES

.3.1 Perchlormethylmercaptan 1/

Maximum: 1% of the captan content found under .2.2

1/ The analytical method for determination of the relevant impurity is available from the Pesticide Management Group of the FAO Plant Protection Service, or can be downloaded here.

.4 PHYSICAL PROPERTIES

.4.1 pH of 1% aqueous dispersion (MT 75, CIPAC 1A, p.1589)

Minimum: 6.5

.4.2 Wet sieve test (MT 59.3, CIPAC 1, p. 981)

Maximum: 2% retained on a 75 µm test sieve

.4.3 Suspensibility (see Appendix 1)

A minimum of 60% of the captan content found under .2.2 shall be in suspension after 30 min. in CIPAC Standard Water C. (Notes 1 and 2)

Alternatively, if the buyer, requires other CIPAC Standard Waters to be used, then this shall be specified when ordering.

.4.4 Persistent foam (MT 47, CIPAC 1, p. 954) (Note 3)

Maximum: 25 ml after 1 minute

.4.5 Wetting of the product (MT 53.3.1, CIPAC 1, p. 967)

The product shall be completely wetted in 1 minute without swirling.

.5 STORAGE STABILITY

.5.1 Stability at 54 C (MT 46.1.1, CIPAC 1, p.951)

After storage at 54 +/- 2 C for 14 days, the product shall continue to comply with .2.2, .3.1, .4.1, .4.2, .4.3 and .4.5.

Note 1 The product should be tested at the highest and lowest rates of use recommended by the supplier, provided this does not exceed the conditions given in the method.

Note 2 This test will normally only be carried out after the heat stability test 5.1.

Note 3 The amount of sample to be used in the test should be specified.

CAPTAN DUSTABLE POWDERS
FAO Specification 40/DP/S) (1990)

.1 DESCRIPTION

The material shall consist of a homogenous mixture of technical captan [complying with the requirements of FAO specification 40/TC/S (1990)] together with carriers and any other necessary formulants. It shall be in the form of a fine, free-flowing powder free from visible extraneous matter and hard lumps.

.2 ACTIVE INGREDIENTS

.2.1 Identity tests (CIPAC 1C, 40/DP/M.3/2 p. 2018 and 40/DP/M.4/2 p. 2018)

Where the identity of the active ingredient is in doubt, then the isolated active ingredient shall comply with at least one additional test.

.2.2 Captan (CIPAC 1C, 40/DP/M.3/3 p. 2018 (Referee method) or -/M.4/3 p. 2018)

The captan content shall be declared (g/kg) and, when determined, the content obtained shall not differ from that declared by more than +/- 10%.

.3 IMPURITIES

.3.1 Perchlormethylmercaptan 1/

Maximum: 1% of the captan content found under .2.2

.4 PHYSICAL PROPERTIES

.4.1 pH of 1% aqueous dispersion (MT 75, CIPAC 1A, p.1589)

Minimum: 6.5

.4.2 Dry sieve test (CIPAC 1, 40/2/M.1/1.4, p. 178)

Maximum: 5% retained on a 75 µm test sieve. Not more than (0.005 x X) % of the amount of sample used for the determination shall be present as captan in the residue on the sieve, where X is the captan content (g/kg) found under .2.2 (Note 1)

.4.3 Flowability (MT 44, CIPAC 1A, p. 1567)

If required, maximum flow number: 12

In the absence of proven methodology, this clause is for information only.

.5 STORAGE STABILITY

.5.1 Stability at 54 C (MT 46.1.1, CIPAC 1, p.953)

After storage at 54 +/- 2 C for 14 days, the product shall continue to comply with .2.2, .3.1, .4.1, and .4.2.

Note 1 If the product has a found content of 50 g/kg of captan and 20 g of sample is used in the test, then the amount of captan in the residue on the sieve should not exceed 0.05 g, i.e.,

$$\frac{(0.005 \times 50) \times 20}{100} \quad \text{g}$$

1/ The analytical method for determination of the relevant impurity is available from the Pesticide Management Group of the FAO Plant Protection Service, or can be downloaded here.

APPENDIX 1

DETERMINATION OF SUSPENSIBILITY

Determine the suspensibility by MT 15.1 (CIPAC 1, p.861), using the appropriate CIPAC Standard Water.

Use amounts of sample sufficient to give concentrations in the 250 ml suspensions equivalent to the highest and lowest rates of use recommended for the product (Note 1). Carry out the determination on the suspension at a temperature of 30 +/- 2 C.

Determine the captan content in the bottom 25 ml of suspension as follows:

Transfer the bottom 25 ml of suspension quantitatively into a 250 ml separating funnel using 25 ml of distilled water. Add 50 ml of chloroform, shake for 2 minutes to dissolve the captan. Allow the two layers to separate and run off the bottom chloroform layer through a filter paper into a 250 ml round bottom flask. Repeat with two further 50 ml portions of chloroform. Evaporate the solvent using a rotary evaporator and eliminate the traces of solvent using a light current of dry air.

Determine the captan content of the residue either by method 40/WP/M.3/3, CIPAC 1C, p.2017 or method 40/WP/M.4/3, p.2017.

Note 1 The method is not suitable for high concentrations as recommended for aerial or low volume applications, i.e., above 1% captan in the diluted spray.