



Food and Agriculture Organization  
of the United Nations

FAO SPECIFICATIONS FOR PLANT PROTECTION PRODUCTS

**PROPACHLOR (AGP: CP/303)**

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Rome, 1992

## **DISCLAIMER<sup>1</sup>**

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.

---

<sup>1</sup> 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/pest-and-pesticide-management/en/>)

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.<sup>2, 3</sup>

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  $1 \times 10^3 \text{ m}^2/\text{s}$  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.

---

<sup>1</sup> *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.*

<sup>2</sup> *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.*

<sup>3</sup> *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/pest-and-pesticide-management/en/>).

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.

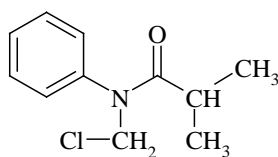
**PROPACHLOR**

2-chloro-*N*-isopropylacetanilide

## INFORMATION

COMMON NAME: propachlor (ISO)

STRUCTURAL FORMULA:



EMPIRICAL FORMULA: C<sub>11</sub>H<sub>14</sub>ClNO

RMM: 211.7

CAS REGISTRY NUMBER: 1918-16-7

CIPAC CODE NUMBER: 176

CHEMICAL NAMES: 2-chloro-*N*-isopropylacetanilide  
(IUPAC)

2-chloro-*N*-(1-methylethyl)-*N*-  
phenylacetamide (CA)



## PROPACHLOR TECHNICAL

FAO Specification 176/TC/S (1991)

### .1 DESCRIPTION

The material shall consist of propachlor together with related manufacturing impurities and a stabilizer. It shall be a beige to dark brown flake, free from visible extraneous matter and added modifying agents.

### .2 ACTIVE INGREDIENT

#### .2.1 Identity tests<sup>1</sup>

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

#### .2.2 Propachlor (176/TC/(M)/3, CIPAC D, p.151) (AOAC 986.05, 1990)

The propachlor content shall be declared (not less than 950 g/kg) and, when determined, the content obtained shall not differ from that declared by more than  $\pm 20$  g/kg.

### .3 IMPURITIES

#### .3.1 Acetone-insolubles (MT 27, CIPAC 1, p.894)

Maximum: 0.5 g/kg.

#### .3.2 Water (MT 30.1, CIPAC 1, p.897)

Maximum: 3 g/kg.

#### .3.3 N,N-di-isopropylaniline<sup>1</sup>

Maximum: 20 g/kg.

#### .3.4 2-chloroacetanilide (2-chloro-N-phenylacetamide)<sup>1</sup>

Maximum: 18 g/kg.

---

<sup>1</sup>Methods available from the Plant Protection Officer,  
FAO Plant Production and Protection Service

.3.5 2,2-dichloro-*N*-isopropylacetanilide (2,2-dichloro-*N*-phenylacetamide)<sup>1</sup> isopropyl-*N*-

Maximum: 12 g/kg.

#### .4 **PHYSICAL PROPERTIES**

.4.1 pH range (MT 75, CIPAC 1, p.1589) (concentration: 35 g sample in 65 g distilled water).

Minimum value: 5.5.

Maximum value: 7.0.

---

<sup>1</sup>Methods available from the Plant Protection Officer,  
FAO Plant Production and Protection Service

## PROPACHLOR WETTABLE POWDERS

FAO Specification 176/WP/S (1991)

### .1 DESCRIPTION

The material shall consist of an homogeneous mixture of technical propachlor complying with the requirements of FAO Specification 176/TC/S (1991), together with filler(s) and any necessary formulants. It shall be in the form of a fine powder, free from extraneous matter and hard lumps.

### .2 ACTIVE INGREDIENT

#### .2.1 Identity tests (Method 176/WP/(M)/2, CIPAC D, p.153)

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 Propachlor (Method 176/WP/(M)/3, CIPAC D, p.153) (AOAC 986.05, 1990)

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

<u>Declared content</u>	<u>Permitted tolerance</u>
up to 500 g/kg or g/l	± 5% of the declared value
above 500 g/kg or g/l	± 25 g/kg

### .3 IMPURITIES

### .4 PHYSICAL PROPERTIES

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

Maximum: 1.0% retained on a 75  $\mu$ m test sieve.

#### .4.2 Suspensibility (MT 15.1, CIPAC 1, p.861)

A minimum of 60% of the propachlor content found under .2.2 shall be in suspension after 30 minutes 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.

.4.3 Persistent foam (MT 47, CIPAC 1, p.954)

Amount of sample to be taken: 10 g  
Maximum: 15 ml after 1 minute

.4.4 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  $54 \pm 2^{\circ}\text{C}$  for 14 days, the product shall continue to comply with .2.2, .4.1 and .4.2.

---

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 Method MT 15.1, CIPAC 1, p.861.

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

## PROPACHLOR SUSPENSION CONCENTRATES

FAO Specification 176/SC/S (1991)

Note: this product is not to be used in hot countries.

### .1 DESCRIPTION

The material shall consist of a suspension of fine particles of technical propachlor, complying with the requirements of FAO specification 176/TC/S (1991), in an aqueous phase together with suitable formulants. After gentle agitation the material shall be homogeneous (Note 1) and suitable for further dilution in water.

### .2 ACTIVE INGREDIENT

#### .2.1 Identity tests (176/SC/(M)/2, CIPAC D, p.153)

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 Propachlor (176/SC/(M)/3, CIPAC D, p.153) (AOAC 986.05, 1990)

The propachlor content shall be declared (g/kg or g/l at 20°C, Note 2) and, when determined, the content obtained shall not differ from that declared by more than the following amounts:

<u>Declared content</u>	<u>Permitted tolerance</u>
250 to 500 g/kg or g/l	$\pm 5\%$ of the declared content
above 500 g/kg or g/l	$\pm 25$ g/kg

### .3 IMPURITIES

### .4 PHYSICAL PROPERTIES

#### .4.1 Mass per millilitre at 20°C (MT 3.3, CIPAC 1C, p.2247)

If required, the range of the mass per millilitre (g/ml) at 20°C shall be declared.

#### .4.2 pH range (MT 75.1, CIPAC 1A, p.2282)

The pH of the material shall lie within the range 5 to 6.5.

.4.3 Pourability (MT 148, CIPAC 1C, p.2282)

Maximum residue: 2.5%  
Maximum rinsed residue: 0.2%

4.4 Spontaneity of dispersion (MT 160, CIPAC 1C, p.2291)

A minimum of 60% of the propachlor content found under .2.2 shall be in suspension after 30 minutes in CIPAC Standard Water C at 25°C.

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

.4.5 Suspensibility (MT 161, CIPAC 1C, p.2294) (Note 3)

A minimum of 60% of the propachlor content found under .2.2 shall be in suspension after 30 minutes in CIPAC Standard Water C at 25°C.

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

.4.6 Wet sieve test (MT 59.3, CIPAC 1, p.981) (Note 4)

Maximum: 1 g/kg of the product shall be retained on a 75  $\mu$ m test sieve.

.4.7 Persistent foam (MT 47.2, CIPAC 1C, p.2249)

Amount of sample to be taken: 5 g/95 ml water.  
Maximum: 30 ml after 1 minute.

.5 **STORAGE STABILITY**

.5.1 Stability at 0°C (MT 39.1, CIPAC 1, p.930)

After storage at  $0 \pm 1^\circ\text{C}$  for 7 days, the product shall continue to comply with .4.3, .4.4 .4.5 and .4.6.

.5.2 Stability at 40°C (Note 5)

After storage at  $40 \pm 2^\circ\text{C}$  for 2 months, the product shall continue to comply with .2.2, .4.2 (except that the minimum permitted pH shall be 4.5), .4.3 (except that the maximum permitted residue shall be 4%), .4.4, .4.5 and .4.6.

.6 **CONTAINERS**

They should be suitable, clean, dry and as specified in the order and should adequately protect the material from external influences. Metal containers should not be used unless lined with suitable material to resist the product.

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

---

Note 1 Before sampling to verify the product 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 of sediment on the bottom. Therefore before sampling, homogenize the product according to the instructions given by the manufacturer or, in the absence of such instructions, by gentle shaking of 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 product 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 any similar device adapted to the size and shape of the container. All the physical and chemical tests must be carried out on a laboratory sample taken after the recommended homogenization procedure.

Note 2 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 active ingredient content in g/l. It is preferable therefore to determine the content in g/kg and, if necessary, employ the density in g/ml ex clause .4.1 to calculate the active ingredient content in g/l.

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 3 This test will normally only be carried out after the heat stability test .5.2.

Note 4 This test detects coarse particles (e.g. caused by crystal growth) or agglomerates (crust formation) or extraneous materials which could cause blockage of spray nozzles or filters in the spray tank.

Note 5 Method MT 46.1.2 (CIPAC 1, p.952) may be used, but taking a sample weight of at least 500 g.

## **PROPACHLOR GRANULES**

FAO Specification 176/GR/S (1991)

(For machine application)

### **.1 DESCRIPTION**

The material shall consist of granules containing technical propachlor complying with the requirements of FAO Specification 176/TC/S (1991), together with suitable carriers and any other necessary formulants. It shall be dry, free-flowing, free from visible extraneous matter and hard lumps, essentially non-dusty, and intended for application by machine.

### **.2 ACTIVE INGREDIENT**

#### **.2.1 Identity test (176/GR/(M)/2, CIPAC D, p.154)**

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 Propachlor (176/GR/(M)/3, CIPAC D, p.154) (AOAC 986.05, 1990)**

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

<u>Declared content</u>	<u>Permitted tolerance</u>
up to 100 g/kg	±10% of the declared content
above 100 g/kg	± 6% of the declared content

### **.3 IMPURITIES**

### **.4 PHYSICAL PROPERTIES**

#### **.4.1 Apparent density range after compaction (MT 58.4, CIPAC 1, p.977)**

If appropriate, the apparent density range of the product after compaction shall be declared. Where required, the range shall be between 0.6 and 0.8 g/ml.



.4.2 Nominal size range (MT 58.3, CIPAC 1, p.974)

The nominal size range of the product shall be declared (e.g. 250  $\mu$ m to 500  $\mu$ m; 250  $\mu$ m to 850  $\mu$ m). The ratio of the lower to the upper declared limit shall not exceed 1:4 (Note 1). Not less than 900 g/kg of the product shall be within the declared nominal size range.

.4.3 Material retained on a 125  $\mu$ m test sieve (MT 58.3, CIPAC 1, p.974) (Note 2)

A minimum of 990 g/kg shall be retained on a 125  $\mu$ m test sieve. The propachlor content of the material retained on the 125  $\mu$ m sieve shall comply with .2.2.

**.5 STORAGE STABILITY**

.5.1 Stability at 54°C (Note 3)

After storage at 54  $\pm$  2°C for 14 days, the product shall continue to comply with .2.2, .4.2 and .4.3.

---

Note 1 Higher ratios increase the risk of segregation, which may adversely affect the flow rate. This should be checked with the machine to be used.

Note 2 This requirement is valid only for granules having a lower limit of the size range of at least 300  $\mu$ m.

For microgranules having a lower limit of less than 300  $\mu$ m the amount of material passing a 63  $\mu$ m test sieve shall be declared.

Note 3 MT 46.1.7 is under consideration, but MT 46.1.1, CIPAC 1, p.951, may be used as an interim test.