



Pesticide Reference Material for Food Testing

Food safety matters—contaminants, pesticides, residues and natural toxins in the food chain gain more and more attention. To ensure compliance with maximum residue of levels of pesticides and to assess the consumer exposure to pesticide residues in and on food of plant and animal origin, the European Union has established Multiannual Control Programmes for Pesticide Residues (MACP) run within the EU and EFTA. The MACP scope covers a period of three years, the current one running from 2022-2024.

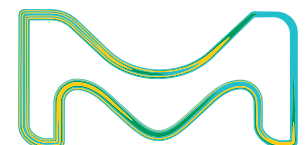
This control programme is applied to all food of plant and animal origin, being produced within the EU and EFTA or being imported from outside countries.

We understand the importance of determining food's nutritional value and quality to ensure safety. We offer a comprehensive range of high-quality and reliable pesticide reference materials, covering the current MACP scope.

Pesticides to be determined in products of plant origins

Product	Pestanal®	Ref Mat (ISO 17025)	TraceCERT® (CRM)
2,4-D	31518-250 mg		76514-100 mg
2-Phenylphenol	45529-250 mg		
Abamectin	31732-100 mg		CRM42377-100 mg
Acephate	45315-250 mg	56997-100 mg	
Aclonifen	36792-50 mg-R		
Acrinathrin	46415-100 mg-R		
Aldicarb	33386-100 mg		68417-50 mg
Aldrin	36666-25 mg		08573-50 mg
Ametoctradin	32461-50 mg		93683-25 mg
Azinphos-methyl	45333-250 mg		
Azoxystrobin	31697-100 mg		43854-50 mg
β-Cyfluthrin	46003-250 mg		93223-50 mg
Benomyl	45339-250 mg		
Benfuracarb	31544-100 mg		CRM06035-100 mg
Bifenthrin	34314-100 mg	43931-100 mg	
Biphenyl	35800-1g		96996-100 mg
Bitertanol	45349-250 mg		CRM68817-100 mg
Boscalid	33875-100 mg-R		74144-50 mg
Bromide ion			43147-100 mL (1000 mg/L bromide in water)
Bromopropylate	45357-250 mg		93744-50 mg

Product	Pestanal®	Ref Mat (ISO 17025)	TraceCERT® (CRM)
Bupirimate	31510-250 mg		
Buprofezin	37886-100 mg		CRM69368-100 mg
Captan	32054-250 mg		74047-50 mg
Carbaryl	32055-250 mg	55396-100 mg	
Carbendazim	45368-250 mg		79888-50 mg
Carbofuran	32056-250 mg	53859-100 mg	
Chlorantraniliprole	32510-25 mg	52823-25 mg	
Chlorfenapyr	37913-100 mg-R	52951-100 mg	
Chlormequat chloride	45387-250 mg		93757-50 mg
Chlorothalonil	36791-250 mg		
Chlorpropham	45393-250 mg		CRM43551-100 mg
Chlorpyrifos	45395-100 mg		94114-100 mg
Chlorpyrifos-methyl	45396-250 mg		18647-50 mg
Clofentezine	36763-50 mg		CRM55869-50 mg
Clothianidin	33589-100 mg		68965-50 mg
Cyantraniliprole	32372-25 mg		CRM01303-25mg



Product	Pestanal®	Ref Mat (ISO 17025)	TraceCERT® (CRM)
Cyazofamid	33874-100 mg-R		CRM69113-50 mg
Cyflufenamid	32403-25 mg		
Cyfluthrin (mixture of isomers)	33738-250 mg		
Cymoxanil	34326-100 mg		90024-50 mg
Cypermethrin	36128-100 mg		51991-50 mg
Cyproconazole	46068-100 mg		90622-50 mg
Cyprodinil	34389-100 mg	68162-100 mg	
Cyromazine	45414-50 mg	07346-25 mg	
Deltamethrin	45423-250 mg		05995-50 mg
Diazinon	45428-250 mg		68486-50 mg
Dichlorvos	45441-250 mg		
Dicloran	45435-250 mg		78336-50 mg
Dicofol	36677-100 mg-R		74046-50 mg
Dieldrin	33491-100 mg	44959-100 mg	
Diethofencarb	34087-100 mg	04342-50 mg	
Difenconazole	36531-250 mg		74177-50 mg
Diflubenzuron	45446-250 mg		77070-50 mg
Dimethoate	45449-100 mg	52994-100 mg	
Dimethomorph	46027-100 mg	56585-100 mg	
Diniconazole	46049-250 mg		93795-50 mg
Diphenylamine	45456-250 mg		CRM69121-100 mg
Dithianon	45462-250 mg		
Dodine	45466-250 mg		93845-50 mg
Emamectinbenzoate B1a		80996-10 mg	
Endosulfan (α+β ~2:1)	32015-250 mg		
Epoxiconazole	36848-100 mg		
Ethephon	45473-250 mg		
Ethion	45477-250 mg	89323-50 mg	
Ethirimol	45478-250 mg		93638-50 mg
Etofenprox	34094-100 mg		89929-50 mg
Etoazole	32506-50 mg	55951-50 mg	
Famoxadone solution	33495-2ml-R		
Fenamidone	33965-100 mg-R	05386-50 mg	
Fenamiphos	45483-250 mg	67114-100 mg	
Fenarimol	45484-250 mg		
Fenazaquin	31635-100 mg		CRM05394-50 mg
Fenbuconazole	31654-100 mg		
Fenbutatin oxide	34342-250 mg		
Fenhexamid	31713-100 mg	56366-100 mg	
Fenitrothion	45487-250 mg	64454-100 mg	
Fenoxycarb	34343-250 mg	53122-100 mg	
Fenpropathrin	31223-250 mg	80196-50 mg	
Fenpropidin	46017-50 mg		
Fenpropimorph	36772-100 mg-R		40713-100 mg
Fenpyroximate	31684-100 mg	51998-100 mg	
Fenthion	36552-250 mg		
Fenvalerate	45495-250 mg		90064-50 mg
Fipronil	46451-100 mg		16785-50 mg
Flonicamid	32509-25 mg	56522-25 mg	
Fluazifop-P	35372-25 mg		
Flubendiamide	32801-100 mg		
Fludioxonil	46102-100 mg-R		74123-50 mg
Flufenoxuron	31594-250 mg	40685-50 mg	
Fluopicolide	41132-100 mg		
Fluopyram	32462-50 mg		CRM01345-25 mg
Fluquinconazole	46301-100 mg		
Flusilazole	45753-100 mg	75834-50 mg	
Flutriafol	34344-100 mg		
Fluxapyroxad	37047-100 mg		
Folpet	32057-250 mg	66004-100 mg	
Formetanate hydrochloride	45514-250 mg		
Fosthiazate	34099-50 mg		
Furathiocarb	45517-50 mg		
Glufosinate-ammonium	45520-100 mg		49677-100 mg
Glyphosate	45521-250 mg		89432-100 mg
Haloxifop	45817-100 mg		
Haloxifop-P	35378-25 mg		36824-25 mg
Hexaconazole	34348-100 mg	90416-50 mg	
Hexythiazox	33365-100 mg	50902-100 mg	
Imazalil	32007-100 mg	53259-100 mg	
Imidacloprid	37894-100 mg		68694-25 mg

Product	Pestanal®	Ref Mat (ISO 17025)	TraceCERT® (CRM)
Indoxacarb	33969-25 mg-R		CRM67344-25 mg
Iprodione	36132-100 mg		89977-50 mg
Iprovalicarb	33431-100 mg-R		91451-50 mg
Isocarbophos	37901-100 mg-R		36831-50 mg
Isoprothiolane	76547-50 mg		
Kresoxim-methyl	37899-500 mg		90053-50 mg
γ-Cyhalothrin	31058-100 mg		72765-50 mg
Linuron	36141-100 mg		90524-50 mg
Lufenuron	31662-100 mg		76088-50 mg
Malathion	36143-100 mg		91481-50 mg
Mancozeb (Dithiocarbamate ligand)	45553-100 mg		
Mandipropamid	32805-100 mg		77043-50 mg
Maneb (Dithiocarbamate ligand)	45554-250 mg		
Mepanipyrim	33970-50 mg		
Mepiquat chloride	36151-100 mg		38117-50 mg
Metaflumizone	32966-100 mg		77344-50 mg
Metalaxyl	32012-100 mg		89979-50 mg
Metalaxyl-M	32808-100 mg		CRM67566-100 mg
Methamidophos	33395-100 mg		89933-50 mg
Methidathion	36158-100 mg		74189-50 mg
Methiocarb	36152-100 mg		CRM43234-100 mg
Methomyl	36159-100 mg		74088-50 mg
Methoxyfenozide	32507-50 mg		79327-50 mg
Metrafenone	32964-100 mg		18996-50 mg
Monocrotophos	36173-100 mg		90521-50 mg
Myclobutanil	34360-100 mg	50639-100 mg	
N-(6-Chloro-3-pyridylmethyl)-N-cyano-N-methylacetimidine (Acetamiprid)	33674-100 mg		51625-50 mg
Omethoate	36181-100 mg	49589-100 mg	
Oxadixyl	34365-100 mg	67427-100 mg	
Oxamyl	36184-100 mg	50404-100 mg	
Paclbutrazol	46046-250 mg		43900-50 mg
Parathion-methyl	36187-100 mg		43648-50 mg
Penconazole	36189-100 mg		90067-50 mg
Pencycuron	31118-100 mg	36225-50 mg	
Pendimethalin	36191-100 mg		89931-50 mg
Permethrin	45614-250 mg		68216-100 mg
Phosmet	36195-100 mg	61371-100 mg	
Pirimicarb	45627-250 mg	44719-100 mg	
Pirimiphos-methyl	32058-250 mg		
Prochloraz	45631-250 mg		64947-50 mg
Procyimidone	36640-250 mg-R		75120-50 mg
Profenofos	45632-250 mg		44394-100 mg
Propamocarb	45638-250 mg		
Propargite	32051-100 mg	40596-100 mg	
Propiconazole	45642-250 mg		
Propineb (Dithiocarbamate ligand)	45643-250 mg		
Propyzamide	45645-250 mg		95700-50 mg
Proquinazid	32508-50 mg		
Prosulfocarb	31141-250 mg	36431-100 mg	
Prothioconazole	34232-250 mg		
Pymetrozine	46119-250 mg-R	44184-100 mg	
Pyraclostrobin	33696-100 mg-R	01346-50 mg	
Pyridaben	46047-25 mg-R	50836-25 mg	
Pyridalyl	32393-25 mg		
Pyrimethanil	31577-250 mg		40947-50 mg
Pyripoxifen	34174-100 mg		92597-50 mg
Quinoxifen	46439-100 mg		
Spinetoram solution			43065-1 mL
Spinosad	33706-50 mg	51599-50 mg	
Spirodiclofen	33564-100 mg-R		CRM03908-50 mg
Spiromesifen	33599-100 mg	55998-50 mg	
Spirotetramat	32713-100 mg	51095-100 mg	
Spiroxamine	46443-100 mg		CRM52554-100 mg
Tebuconazole	32013-250 mg		43897-50 mg
Tebufozide	31652-100 mg		CRM01373-50 mg
Tebufenpyrad	46438-100 mg		36372-50 mg
Teflubenzuron	45756-250 mg-R		CRM01399-100 mg

Product	Pestanal®	Ref Mat (ISO 17025)	TraceCERT® (CRM)
Tefluthrin	35548-100 mg		
Terbuthylazine	45678-250 mg-R		74124-50 mg
Tetraconazole	37087-100 mg		74239-50 mg
Tetradifon	45680-250 mg		
T-Fluvalinate	46294-100 mg	90043-100 mg	
Thiabendazole	45684-250 mg		67554-50 mg
Thiacloprid	37905-100 mg-R		14783-50 mg
Thiamethoxam	37924-100 mg-R		68901-50 mg
Thiodicarb	34375-250 mg	68124-100 mg	
Thiophanate-methyl	45688-250 mg		

Product	Pestanal®	Ref Mat (ISO 17025)	TraceCERT® (CRM)
Tolclofos-methyl	31209-50 mg		38461-50 mg
Triadimefon	45693-250 mg		38803-50 mg
Triadimenol	46138-250 mg		38878-50 mg
Triazophos	45696-50 mg		CRM74120-50 mg
Tricyclazole	45808-10 mg		39116-10 mg
Trifloxystrobin	46447-100 mg	52273-100 mg	
Triflumuron	35029-100 mg		74022-50 mg
Vinclozolin	45705-250 mg		90413-50 mg
Zineb (Dithiocarbamate ligand)	45707-250 mg		

Pesticides to be determined in products of animal origin

Product	Pestanal®	RM	TraceCERT® (CRM)
2,4'-DDT	49018-250mg		
4,4'-DDT	31041-100mg		80076-100mg
Aldrin	36666-25mg		08573-50mg
Bifenthrin	34314-10mg	43931-100mg	
α-Chlordane	442449-10mg		
γ-Chlordane	442599-50mg		
Chlordane (mix of isomers)			53797-20mg
Chlorpyrifos	45395-100mg		94114-100mg
Chlorpyrifos-methyl	45396-250mg		18647-50mg
Cypermethrin	36128-100mg		51991-50mg
Deltamethrin	45423-250mg		05995-50mg
Diazinon	45428-250mg		68486-50mg
Dieldrin	33491-100mg-R	44959-100mg	
Endosulfan (mix of isomers)	32015-250mg		
a-Endosulfan	45468-100mg		74119-50mg
b-Endosulfan	33385-100mg		40828-50mg
Famoxadone solution	33485-2ml-R		

Product	Pestanal®	RM	TraceCERT® (CRM)
Fenvalerate	45495-250mg		90064-50mg
Fipronil	46451-100mg		16785-50mg
Glufosinate-ammonium	45520-200mg		49677-100mg
Glyphosate	45521-250mg		89432-100mg
HCH, α-isomer	33856-50mg		74142-50mg
HCH, β-isomer	33376-100mg		
HCH, δ-isomer	33377-50mg		
HCH, mix of isomers	36756-250mg		
Heptachlor	32349-100mg		90426-50mg
Hexachlorobenzene	45522-250mg		
Indoxacarb	33969-25mg-R		CRM67344-100mg
Lindane	45548-250mg		
Methoxychlor	36161-100mg		CRM64156-100mg
Parathion	45607-100mg	49412-100mg	
Pendimethalin	36191-100mg		89931-50mg
Permethrin	45614-250mg		68216-100mg
Pirimiphos-methyl	32058-250mg		

Pestanal® (analytical standard grade)


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Certificate of Analysis

Product Name: Fipronil
PESTANAL™, analytical standard

Product Number: 46451

Batch Number: BCCG7159

CAS Number: 120068-37-3

Formula: C₁₂H₈Cl₂F₄N₂OS

Formula Weight: 437.15

Expiration Date: SEP 2025

Quality Release Date: 16 NOV 2021

TEST	SPECIFICATION	RESULT
APPEARANCE (COLOR)	WHITE TO FAINT YELLOW AND FAINT BEIGE	WHITE
APPEARANCE (FORM)	POWDER OR CRYSTALS	POWDER
PURITY (HPLC AREA %)	≥ 95.0 %	98.8 %
MELTING POINT	194 - 199 C	198 C
WATER	≤ 2.0 %	0.1 %
PROTON NMR SPECTRUM	CONFORMS TO STRUCTURE	CONFORMS



Dr. Reinhold Schweninger
Quality Assurance
Buchs, Switzerland

Sigma-Aldrich warrants that at the time of the quality release or subsequent retest date this product conformed to the information contained in this publication. The current specification sheet may be available at Sigma-Aldrich.com. For further inquiries, please contact Technical Service. Purchaser must determine the suitability of the product for its particular use. See reverse side of invoice or packing slip for additional terms and conditions of sale.

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The life science business of Merck KGaA, Darmstadt, Germany operates as MilliporeSigma in the US and Canada.




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Our Certificate of Analysis contains:

- Purity and identity data
- Chromatogram
- Expiry date
- Additional information if applicable, e.g. water content

Reference material (ISO/IEC 17025)


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Certificate of Analysis

Product name: Dinocap
Product no.: 68074
Reference Material

Lot no.: BCCD1960
Expiry Date: JUN 2022
Storage: -20°C ± 5°C; storage under Argon

Chemical formula: C₁₄H₂₁N₃O₄
Molecular mass: 364.39 g/mol
CAS No.: 39300-45-3
Metrolgical traceability (certified value): NIST PS1 (Benzoic acid)
Date of testing (certified value): 22 APR 2020

Sample
 Certified value ± Expanded uncertainty (k=2)
 Mass fraction (g/g) by quantitative NMR spectroscopy
 (sum of isomers)



Dinocap **95.3 % ± 4.5 %**


Indicative values (not within scope of ISO/IEC 17025 accreditation)		
Test	Specification	Result
Appearance (Color)	Light Yellow to Dark Yellow to Dark Brown	Very Dark Yellow
Appearance (Form)	Liquid or Viscous Liquid	Viscous Liquid
Purity (GC Area %)	≥ 90.0 %	95.8 %


Measurement method and uncertainty: The certified value is assessed by quantitative NMR measurements (qNMR) within the scope of ISO/IEC 17025 accreditation. The uncertainty includes contributions from the primary reference material, the ambient conditions, weighing process, the measuring system, and any possible contributions from homogeneity and stability. It is calculated according to Eurachem/CITAC Guide "Quantifying uncertainty in analytical measurement" with a probability of 95%. The sole measurement uncertainty is calculated as $U_{95} = 0.8\% (g/g) (k=2)$.

Minimum sample size: 5 mg
Instructions for handling: The Reference Material should be stored in the original bottle. Warm to room temperature before opening. After each use the bottle should be tightly closed and protected from excessive moisture and light. Measure the dissolved sample immediately.


Certificate issue date: 25 MAR 2021


 Dr. A. Rück – CRM Operations



 Dr. P. Zell – Approving Officer

Sigma-Aldrich Production GmbH, Industriestrasse 25, 9471 Buchs, Switzerland;
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Certificate Page 1 of 2 Certificate version 01

TraceCERT® (certified reference material)

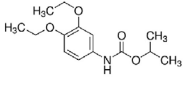

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Certified Reference Material Reference material certificate

Diethiofencarb **TraceCERT®**

Product no.: CRM04342
Lot no.: BCCG0699
Description of CRM: Solid neat material
Expiry date: NOV 2025
Storage: 15-25°C; storage under Argon

Chemical formula: C₁₄H₂₁N₃O₄
Molecular mass: 287.32 g/mol
CAS No.: 87130-20-9



Sample
 Certified value ± Expanded uncertainty,
 $U = k \cdot u (k=2.8)^{[1][2]}$
 as mass fraction (g/g)

Diethiofencarb **98.6 % ± 0.8 %**

Metrolgical traceability: NIST PS1 (Benzoic acid)^[8]
 Details see "Certification process details" on page 2.

Measurement method: The certified value is established by high-resolution quantitative NMR measurements (qNMR) in accordance with ISO/IEC 17025.^[4]


Intended use: Use this certified reference material (CRM) as calibrant for chromatography or any other analytical technique.


Minimum sample size: The sample is solid at room-temperature. 5 mg is recommended as the minimum sample size. If less material is used, it is recommended to increase the certified uncertainty by a factor of two for half of sample and a factor of four for a quarter of sample.


Instructions for handling and correct use: This material does not require drying before use. The CRM should be stored in the original bottle. Warm to room temperature before opening. After use the bottle should be tightly closed and protected from excessive moisture and light.

Accreditation: Sigma-Aldrich Production GmbH is accredited by the Swiss Accreditation Service SAS as reference material producer under no. SRMS 0001 in accordance with international standard ISO 17034.^[4]


Certificate issue date: 16 DEC 2021




 Dr. A. Rück – CRM Operations


 Dr. P. Zell – Approving Officer

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The Certificate of Analysis for our Reference Material pesticides include:

- Certified value established by quantitative NMR (qNMR) in accordance with IO/IEC 17025
- Stated uncertainty, including contributions from:
 - the primary reference material
 - the ambient conditions
 - the weighing process
 - homogeneity and stability studies
- Traceability to a SI unit via NIST SRM
- indicative values

Accuracy and precision made simple

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