

# Mill Collection



*The Mill collection*

## Introduction

Good results starts with sample preparation.

Errors caused by analytical instruments are very small compared to the errors associated with sample preparation. Badly prepared samples will automatically result in large analytical errors.

The laboratory sample mill is an important but often overlooked link in the chain of analysis; so important that at FOSS Tecator we regard it as an integral part of the analytical system.

We have therefore developed mills of our own to assure the best analytical results. They are convenient and safe to use and they cover a broad range of grinding applications, including preparation for both traditional wet chemistry and NIR/NIT analyses, with assured high repeatability and reproducibility.

## General description

This Mill collection folder presents high quality products that can ensure reliability and reproducibility of the analysis.

The Cemotec™ is optimized for solid samples with a high moisture content, and the Cyclotec™

for dry samples that require a uniform particle size. The Knifetec™ is suitable for small (100 ml) samples of dry, moist or wet materials, and the robust Homogenizer for larger (0.2-2.5 kg) samples with a high fat or oil content.

Various accessories and consumables are available to make routine sample preparation simple. They include a range of sample bottles, grinding rings, blades and impellers.

Sample preparation is an important step in all analytical procedures. It is for example crucial to grind properly to obtain the highest quality of the analytical results.

Analytical errors are more easily reduced in the sample preparation step than in any of the subsequent steps of the analysis.

All samples should be prepared under the same conditions.

On the following pages we show how our Mill collection can crush, grind, mix and homogenize dry samples to a consistency suitable for chemical analysis.

# Cemotec™ 1090 Sample Mill

Sample grinding without moisture loss.

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*Cemotec™ Mill*

## Features:

- Reliable classic working principle
- Adjustable particle size
- Low noise level

## Benefits:

- No loss of moisture
- Officially approved by the Swedish National Board of Agriculture for sample preparation prior to moisture analysis
- Low maintenance demand

## Description:

The Cemotec™ Sample Mill is specially designed to grind grain and seed samples without losing any of the moisture content. It is however an excellent mill for all types of sample preparation where the requirements for fineness and uniformity of particle size are moderate.

The Cemotec works on the tried-and-true principle of grinding between two discs, one stationary and one turning. The sample is introduced at the centre of the stationary disc and is crushed between the discs. The distance between the discs is easily adjusted by a graduated knob to control the fineness of the grist.

The Cemotec works silently and effectively at relatively low speed. The rate of grinding is about 3 grams per second. Low speed means low noise, and dust is effectively contained by the seal between the outlet and the sample container.



*Cemotec™ Accessories*



# Cyclotec™ 1093 Sample Mill

Rapid sample preparation for general laboratory analysis.

## Features:

- High grinding speed, 4 grams per second
- Adjustable particle size
- Low noise level (75 dBA)

## Benefits:

- No thermal degradation of the sample
- Uniform particle size distribution
- Easy handling of samples
- High operator safety
- Low maintenance demand
- Recommended by the Canadian Grain Commission prior to NIR analysis
- Approved by AOAC prior to NIR analysis (4.2.10 16th Ed.)

## Description:

The Cyclotec™ Sample Mill is designed for rapid, uniform grinding of a wide variety of feeds, grains, leaves, etc. and also for grinding of chemicals, pharmaceuticals and similar products. Recovery of the sample is complete.

Through its unique design the Cyclotec grinds samples by a high speed action. This action rolls the sample against the inner circumference of a durable grinding surface and then passes it through a fine mesh screen.

The high volume air flow provides self cleaning action and minimum temperature rise; whole series of samples can be ground with minimal cross contamination and without cleanout between samples. Thermal degradation is minimized to provide more accurate results.

The Cyclotec offers a very rapid and convenient solution to accurate sample preparation for a variety of analytical techniques, e.g. Kjeldahl, Infrared Reflectance, Direct Distillation, Crude Fibre and Extraction.



*Cyclotec™ Mill*



*Cyclotec™ filled with holder for 500 ml sample bottle*



# 2094 and 2096 Homogenizers

Rapid maceration and homogenization of a variety of samples.



*Homogenizers*



*The cutters*



## Features:

- Powerful cutting action at one or two speeds: 1500 or 1500/3000 rpm
- Sample size from 0.2 to 2.5 kg
- A variety of angled knives for different sample types
- Knives and bowl in stainless steel
- Safety switch
- Sample preparation of meat products according to AOAC 983.18

## Benefits:

- Rapid and reproducible homogenization
- Easy to clean
- Robust construction

## Description:

The 2094 and 2096 Homogenizers are designed for macerating and homogenizing of a variety of high-moisture, high-fat and fibrous samples. Application examples include: size reduction of forage and dry food and chemical products; homogenization of meat, fish, fruit, vegetables, prepared foods (such as pizza, meat pies and frozen meals) and chemical and pharmaceutical formulations.

The Homogenizers allows frozen food samples to be homogenized in a short period of time, providing more accurate analyses of unstable constituents such as vitamins.

A reproducible degree of homogenization is achieved by the mixing action obtained by the angled knives. Homogenization is accomplished through the high speed combined with a powerful cutting action.

Angled knife blades produce a vertical flow within the batch and facilitate rapid and thorough homogenization. Complete homogenization is normally achieved in 20 to 60 seconds.

A magnetic safety switch prevents the 2094 and 2096 Homogenizers from being operated without the transparent cover in the locked position.

The 2094 and 2096 Homogenizers comes with a multipurpose micro-teeth cutter. For additional convenience extra stainless steel bowls and smooth blade cutters are available for both Homogenizers. For the 2096 Homogenizer a scalloped cutter is also available.



# 1095 Knifetec™ Sample Mill

Rapid sample preparation of high-fat, high-moisture and fibrous samples.

## Features:

- 20 000 rpm rotor blade for rapid grinding
- Timer controlled
- Sample size up to 100 ml initial volume
- Water cooled
- Safety switch stops rotor in less than 1 second

## Benefits:

- Integral tilting system, fully removable lid and rotor blade to facilitate cleaning
- Chamber cooling option reduces adhesion of sample to the wall of the grinder
- No heat generated, making samples suitable for moisture analysis

## Description:

The 1095 Knifetec™ Sample Mill is designed for the preparation of high fat, high moisture and fibrous samples prior to analysis. Oilseeds, prepared foods, meat products, fruit, vegetables, grains, seeds and feed samples are examples of suitable sample types.

The high speed rotor blade and timer control ensure very fast and reproducible sample preparation time after time. The normal time to prepare samples is from two to ten seconds.

A safety switch located in the lid prevents accidental operation of the mill with the lid removed.

The Knifetec is equipped with a grinding chamber cooling feature which enables it to be connected to a cold water tap or other laboratory chilling devices. Samples containing high levels of fat have a tendency to stick to the wall of the chamber as the fat softens during grinding, preventing adequate homogenisation. Fibrous samples may generate heat due to friction. Utilizing the cooling option overcomes both these problems, ensuring satisfactory sample preparation.

The fully removable lid, the stainless steel chamber and the removable rotor blade of the Knifetec simplify sample removal and cleaning between samples. This saves a considerable amount of time compared to other techniques. An integral tilting system also simplifies emptying and cleaning.

The design of the 1095 Knifetec ensures rapid, reproducible and safe preparation.



Knifetec™



The sample tray and rotor blades



**Ordering information:****Cemotec™ 1090 Sample Mill:**

- 1090-001 Cemotec 1090 Sample Mill complete with hardened Grinding Discs, disposable Sample Bottles (20), Allen Keys 4 and 5 mm, Hopper with cover, Users' Manual, 200-230 V, 50-60 Hz
- 1090-002 Same as above but for 115 V, 50-60 Hz

**Accessories**

- 10003923 Disposable Sample Bottles (150 ml) of polypropylene with snap-on lid 100/pkg
- 10003924 Disposable Sample Bottles (150 ml) of polypropylene with snap-on lid 500/pkg
- 10003965 Grinding Discs (1 pair)
- 10003922 Seal for Sample Bottle

**Cyclotec™ 1093 Sample Mill**

- 1093-001 Cyclotec 1093 Sample Mill complete with Sample Bottles (125 ml) with snap-on lid (2), screens 0.5 and 1.0 mm, Allen Keys 4 and 6 mm, Seal for Grinding Chamber, Paper Bag for Dust Collection, Seal for Sample Bottle, Users' Manual, 200-230 V, 50 Hz
- 1093-002 Same as above but for 115 V 60 Hz
- 1093-003 Same as above but for 200-230 V 60 Hz
- 1093-004 Same as above but for 115 V 50 Hz

**Accessories**

- 10000893 Sample Bottles, dark glass for UV protection, 125 ml, case of 104
- 10003679 Sample Bottles, dark glass for UV protection, 125 ml, case of 52
- 15220023 Lid for Sample Bottles
- 10002485 Large Inlet/Forage Assembly Kit
- 10002488 Dust Collection with external connection
- 10002537 Paper Bags for Dust Collection, pack of 10
- 10002000 Dust Filter Pad
- 10014484 Screen 0.3 mm (use together with 1 or 2 mm Screen)
- 10000820 Screen 0.5 mm
- 10005864 Screen 0.8 mm
- 10001989 Screen 1.0 mm
- 10002715 Screen 2.0 mm
- 10001990 Seal for Sample Bottle
- 10001992 Seal for Grinding Chamber
- 10001993 Seal for Dust Filter Cover
- 10008180 Seal Kit
- 10001991 Impeller, Standard
- 10002666 Impeller, Nickel-plated for mineral analysis
- 10009833 Holder for 500 ml sample bottle
- 10013478 Sample bottle 500 ml with lid, 1 pcs
- 10004463 Grinding Ring, made of tungsten carbide - Standard
- 10013810 Grinding Ring for Hard sample
- 10006680 Grinding Ring Heavy Metals 3/set

**Homogenizer 2094**

- 2094-001 Homogenizer complete with stainless steel bowl (3.5 l), multipurpose cutter with microteeth blades, transparent lid and User's Manual, 1 500 rpm, 1 × 230 V, 50 Hz
- 2094-002 Same as above but for 1 × 115 V, 60 Hz

**Accessories**

- 19000660 Stainless steel bowl. 3,5 l
- 19000662 Transparent lid
- 19000654 Cutter with smooth blades
- 19000659 Cutter with microteeth blades
- 19000634 Grindstone for blades

**Homogenizer 2096**

- 2096-001 Homogenizer complete with stainless steel bowl (5.5 l), multipurpose cutter with microteeth blades, transparent lid with integrated scraper and Users's Manual, 1 500 / 3 000 rpm, 3 × 400 V, 50 Hz
- 2096-002 Same as above but only 1 500 rpm for 1-phase, 115 V, 60 Hz

**Accessories**

- 19000605 Stainless steel bowl. 5,5 l
- 19000655 Transparent lid with scraper
- 19000656 Cutter with smooth blades
- 19000657 Cutter with scalloped blades
- 19000658 Cutter with microteeth blades
- 19000634 Grindstone for blades

**Knifetec™ 1095 Sample Mill**

- 1095-001 Knifetec Sample Mill complete with rotor blade, PVC tubing 4m, tubing clamp, Users' Manual, 230 V, 50-60 Hz
- 1095-002 Same as above and also including Transformer for 115 V operation, 50-60 Hz

**Accessories**

- 10005980 Rotor blade standard, complete
- 10008651 Rotor blade with sharp knives complete
- 10013135 Rotor blade for small volume
- 10013136 Rotor blade for pellets
- 10005960 Distance for Rotor blade
- 10003923 Disposable Sample Bottles (150 ml) of polypropylene with snap-on lid 100/set
- 10003924 Disposable Sample Bottles (150 ml) of polypropylene with snap-on lid 500/set
- 10008467 Stainless steel tray

\*Ordering information: Use the above specified Cat. Nos. together with the text.

**Installation requirements:****Cemotec™ 1090 Sample Mill**

Power supply: 200-230 V, 50-60 Hz  
115 V, 50-60 Hz  
Power consumption: 600 W  
Net weight: 18 kg  
Dimensions, L × D × H: 220 × 400 × 400 mm  
Rotor speed, grinding disc 3 000 rpm

**Cyclotec™ 1093 Sample Mill**

Power supply: 200-230 V 50 Hz  
115 V 60 Hz  
200-230 V 60 Hz  
115 V 50 Hz  
Power consumption: 600 W  
Net weight: 18 kg  
Dimensions, L × D × H: 220 × 300 × 400 mm  
Rotor speed, impeller 10 000 rpm

**Homogenizer 2094**

Power supply: 230 V 50 Hz 1-phase  
115 V 60 Hz 1-phase  
Power consumption: 500 W  
Net weight: 15 kg  
Capacity: 3,5 l bowl. Do not exceed  
1,5 l liquid content  
Rotor speed: 1 500 rpm  
Dimensions, L × D × H: 250 × 410 × 300 mm

**Homogenizer 2096**

Power supply: 400 V 50 Hz 3-phase  
115 V 60 Hz 1-phase  
Power consumption: 750 W 1-phase /  
1400 W 3-phase  
Net weight: 25,5 kg  
Capacity: 5,5 l bowl. Do not exceed  
2,5 l liquid content  
Rotor speed: 1 500 rpm (1-phase) /  
1 500 & 3 000 rpm  
(3-phase)  
Dimensions, L × D × H: 270 × 460 × 400 mm

**Knifetec™ 1095 Sample Mill**

Power supply: 230 V 50-60 Hz  
incl Transformer 115/230V  
Power consumption: 120 W  
Net weight: 7,5 kg  
Dimensions, L × D × H: 190 × 290 × 250 mm  
Rotor speed: 20 000 rpm  
Water supply: 2 l/min, 8-10°C

**Performance data:**

Feature	Cemotec™	Cyclotec™	Homogenizer	Knifetec™
Sample Type	Dry samples prior to moisture analysis, up to 20 % moisture and/or 20% fat	Dry samples prior to wet chemistry or IR analysis, up to 15% moisture and/or fat content up to 20%	High-moisture, high-fat and fibrous samples	High-moisture, high-fat and fibrous samples
Applications	Grains, seeds, feed, beans, dry granular foods, fertilizer, tablets	Grains, seeds, cereals, forage, feed, leaves, tablets, tobacco, lime, coal	Forage, dry food, meat, fish, vegetables, prepared foods, chemical and pharmaceutical formulations	Oilseeds, prepared foods, meat products, fruit, vegetables, grains, seeds, and feed
Sample Size	Up to 14 mm Ø	Up to 10 mm, large inlet up to 40 mm	0.2 - 2.5 kg	Maximum 100 ml (50 - 150 g)
Grinding Principle	Two discs, one rotating one stationary	Turbine and sieve	Rotor knives	Rotor blade
Grinding Rate/Time	Appr. 3 g/s	Appr. 4 g/s	20 to 60 s	2 to 10 seconds
Grinding Speed	Grinding disc 3 000 rpm	Impeller 10 000 rpm	Blade 1 500 or 1 500 / 3 000 rpm	Blade 20 000 rpm
Particle Size	Coarse grist	Fine and uniform grist with 0.5 mm screen: max 0.45 mm with 1.0 mm screen: max 0.75 mm	Depending on sample	Depending on sample
Timer	No	No	No	Yes
Safety	Microswitch	Microswitch	Magnetic switch	Microswitch
Cleaning	Low cross contamination	Low cross contamination	Manual	Manual

<b>Application overview</b>				
<b>Application</b>	<b>Cemotec™</b>	<b>Cyclotec™</b>	<b>Homogenizer</b>	<b>Knifetec™</b>
Grains of wheat, oats, barley, rye	+++	+++	+	+++
Soya beans	+	+	+	+++
Rapeseed	+	+	+	+++
Feed pellets	+++	+++	+	++
Hay/Straw		++	+	
Vegetables/Fruit			+++	+
Meat			++	
Meat products			+++	+
Mixed food			+++	+

<b>Subsequent analysis</b>				
<b>Application</b>	<b>Cemotec™</b>	<b>Cyclotec™</b>	<b>Homogenizer</b>	<b>Knifetec™</b>
Reference methods				
Protein	+++	+++	+++	+++
Fat low	+++	+++	++	+++
Fat high			+++	+++
Fibre crude	+++	+++	+	++
Fibre dietary				
Moisture low & low fat	+++	+++		++
Moisture low & high fat			++	+++
Moisture high & low fat	++		+++	+++
Moisture hig & high fat			+++	+++
NIR/NIT	+	+++	+++	+++

+++ excellent    ++ very good    + good

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