



# Dry block Kjeldahl digestion apparatus organic nitrogen by Kjeldahl determination

..... Macro and Micro Models .....

THE EQUIPMENT FOR THE DIGESTION OF ORGANIC NITROGEN IS MADE OF TWO BASIC ELEMENTS:  
BLOCK DIGESTER (MINERALISATION) WITH TEMPERATURE CONTROL AND GLASSWARE (MACRO 250 ML AND MICRO 100ML).  
DISTILLATION UNIT "PRO-NITRO I" OR "PRO-NITRO II (SEMI-AUTOMATIC), PRO-NITRO III ( WITH TITRATION).

## Digestion block 'Bloc-digest' (Complete Systems )

### Features

- Minimum sample handling.
- Uniform heating.
- Automatic control of temperature and time of the digestion process.
- System of fume extraction.
- Complete system comes with:
  - 1 dry block heater.
  - 1 controller for temperature and time.
  - 1 rack for tubes and support rack.
  - 1 fume extractor.
- Digestion tubes.



Complete unit with:  
Dry-block connected to the control unit for time  
and temperature rack support for tubes and fume extractor.

MACRO	Part No	No. of places
Bloc Digest 6	4000629	6
Bloc Digest 12	4000630	12
Bloc Digest 20	4000631	20

MICRO	Part No	No. of places
Bloc Digest m 12	4001047	12
Bloc Digest m 24	4001048	24
Bloc Digest m 40	4001049	40

### SPARE AND REPLACEMENT PARTS

#### Dry blocks

Must not be used without a control unit "RAT" as without it there will be no temperature or time control.



Model	Part No.	No. Places	Ø Tube mm	Height/Width/Depth (external) cm	Temperature °C	Power W	Weight Kg
MACRO	4000507	6	42	18 33 28	45 to 450	1500	18
MACRO	4000508	12	42	18 39 33	45 to 450	2000	25
MACRO	4000509	20	42	18 44 39	45 to 450	2500	31
MICRO	4001050	12	26	18 33 28	45 to 450	1500	16
MICRO	4001051	24	26	18 39 33	45 to 450	2000	22
MICRO	4001052	40	26	18 44 39	45 to 450	2500	27



## Apparatus for Analytical Techniques

### EXTRACITION

Determination of organic nitrogen by the Kjeldahl: "BLOC-DIGEST"  
 Steam distillation of protein samples: "PRO-NITRO I"  
 Semiautomatic steam distillation of protein samples: "PRO-NITRO II"  
 Extraction for the determination of cellulose and fibres: "DOSI-FIBER"  
 Extractor by solvent recovery for the determination of fats and oils in foods and other substances: "DET-GRAS"  
 Distillation unit for alcohol "ALCO-DEST"

### WATER ANALYSIS

Determination of chemical oxygen demand, C.O.D., in residual waters "C.O.D"  
 Determination of biological oxygen demand B.O.D. "B.O.D."  
 Refrigerator incubators for B.O.D. "MEDILOW S, M, L and LG"  
 Laboratory Flocculators "FLOCUMATIC"  
 Water distillation "AQUASEL" and "L-3"

TABLE OF METHODS AND RECOMMENDED APPARATUS PRO- NITRO, DOSI-FIBER, DET-GRAS, BLOC-DIGEST, ALCODEST AND C.O.D*					
	Method	Pro-Nitro	Dosi-Fiber	Det-Gras	Bloc-Digest
<b>ANALYSIS OF CEREAL AND DERIVATIVES</b>					
Determination of the cellulose index	Wladesco		Yes		
Insoluble fibre in food	Van Soest		Yes		
Crude Fibre	Weend & Wijkströn		Yes		
Proteins	Kjeldahl	Yes			Yes
Identification of fat by extraction	Soxhlet extraction			Yes	
Crude fat	Soxhlet extraction			Yes	
Arsenic	Determination by A.A.				Yes
Mercury	Determination by A.A.				Yes
<b>ANALYSIS OF MILK AND DAIRY PRODUCTS</b>					
	Method	Pro-Nitro	Dosi-Fiber	Det-Gras	Bloc-Digest
Crude fat	Soxhlet extraction			Yes	
Crude protein	Kjeldahl	Yes			Yes
Casein	Kjeldahl precipitation of casein	Yes			Yes
<b>ANALYSIS PF ALCOHOLIC BEVERAGES</b>					
	Method	Alcodest	Dosi-Fiber	Det-Gras	Bloc-Digest
Degree of alcohol	Volumetric	Yes			
Volatile acidity	Volumetric	Yes			
Iron	Photometric				Yes
<b>ANALYSIS OF FODDER AND RAW MATERIAL</b>					
	Method	Pro-Nitro	Dosi-Fiber	Det-Gras	Bloc-Digest
Crude cellulose	Weende & Wijkströn		Yes		
Crude protein	Kjeldahl	Yes			Yes
Crude fat	Soxhlet extraction			Yes	
Volatile nitrates bases	Distillation Kjeldahl	Yes			
Soluble crude fat in hydrochloric acid and pepsin	Kjeldahl	Yes			Yes
Total casein	Kjeldahl in casein precipitate	Yes			
Phosphates	Photometric				Yes
Cyanohydric acid	Distillation in silver nitrate	Yes			
Pure zolidene	Soxhlet extraction			Yes	
<b>ANALYSIS OF FRUIT JUICES AND DERIVATIVES</b>					
	Method	Pro-Nitro	Dosi-Fiber	Alcodest	Bloc-Digest
Total nitrogen	Kjeldahl	Yes			Yes
Volatile acid	Measurement by distillation			Yes	
Arsenic	Dichromate determination				Yes
<b>WATER ANALYSIS</b>					
	Method	Pro-Nitro	Dosi-Fiber	C.O.D.	Bloc-Digest
Total nitrogen	Kjeldahl	Yes			Yes
Total phosphate	Photometric method				Yes

\* Reference: Official published approved methods by the Ministry of agriculture for fisheries and food 1993.

### VISCOMETERS

Rotational "ST-DIGIT"  
 Approvals: ASTM, DIN ISO  
 Cannon-Fenske, Ubbelohde

### SPECTROPHOTOMETRY

Clinical "PHOTOMETER S-2000"  
 Biochemistry "PHOTOMETER M2000"  
 Single beam Non scanning "SPECTROPHOTOMETER VR-2000"  
 Digital colorimeter "CLORMIC"  
 Microtitre strip reader "READER M2000"  
 Microplate washer "S-1010"  
 Colony counter "DIGITAL-S"  
 pH meters "pH-500", "LD-pH" and "pH-2001"  
 Conductivity "CD-2002"



## Spare and Replacement Parts

### Features

Time and temperature display.  
 Temperature selection from 45 to 450 °C.  
 Digestion time period of 1 min. to 9 h. 59 min.  
 K type temperature probe monitors the temperature in the block once the set temperature has been reached. An acoustic and indicator lamp show when the unit has reached the end of the heating cycle. A safety alarm operates if the temperature probe fails. A selector switch at the back of the unit for Kjeldahl or C.O.D, controls the

heating ramp rate.  
 Control Panel  
 Mains switch On/OFF.  
 Digital display of temperature.  
 Push button temperature selection.  
 Push button increase value.  
 Push button decrease value.  
 Stop button.  
 Push button cancel entry.  
 Push button select time.  
 Digital display of time.

Electronic controller with digital display of time and temperature. RAT.  
 Part No 4000051



Electronic RAT controller.

### Rack and support for tubes

Made of specially treated chemical resistant dur-al sheet metal, with lifting handles on the side. A removable side panel to maintain an even distribution of heat and enables the samples to be examined while being digested.

Model	Part No.	No. of Places	Height/Width/Depth (external) cm
MACRO	4005071	6	15 17.5 12.5
MACRO	4005081	12	15 23 18
MACRO	4005091	20	15 28.5 23.5
MICRO	4001053	12	15 17.5 12.5
MICRO	4001054	24	15 23 18
MICRO	4001055	40	15 28.5 23.5



### Fume extraction

Unit for collecting fumes comes with a support rack. Made of borosilicate glass and stainless steel.

Model	Part No.	No. of Places	Height/Width/Depth (external) cm
MACRO	4005072	6	15 18 12
MACRO	4005082	12	15 23 18
MACRO	4005092	20	15 29 23
MICRO	4001056	12	15 18 12
MICRO	4001057	24	15 23 18
MICRO	4001058	40	15 29 23



Digestion and distillation tube  
 Series MACRO of 250 ml volume.  
 Graduated to 100 ml.  
 42 mm Ø x 300 mm high.  
 Part No. 4042300



Tube for digestion and distillation  
 Series MICRO of 100 ml volume.  
 26 mm Ø x 300 mm high.  
 Part No. 4001045



Water jet pump for vacuum extraction.  
 Made of PVC designed for the fume extraction of the 20 and 40 place models. Part No. 4000633



Water Jet pump for vacuum extraction.  
 Metallic suitable for the extraction of fumes for the 6, 12 and 24 around the condenser and place models. Part No. 7000293



Display of a selection of MICRO 12, 24 and 40 place dry blocks with fume extractor and RAT controller.



# Distillation unit 'Pro-nitro I' ( manual )

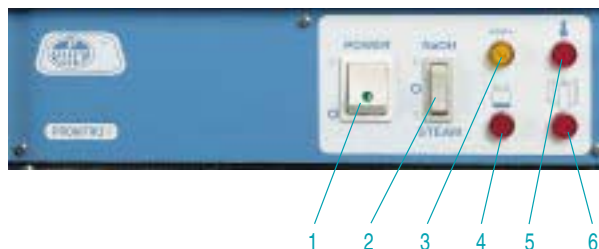
DETERMINATION OF ORGANIC (PROTEIN) NITROGEN (KJELDAHL METHOD).

## Features

Steam distillation system.  
 Determination Range: 1 to 140 mg of Nitrogen.  
 Distillation time, typically: 5 to 20 ml / minute.  
 Cooling water consumption: 80-100 litres/hour.  
 Closed system, distilled water consumption: 2 litres/hour.  
 Reservoir tank for distilled water: 10 litres.  
 Reservoir tank for NaOH: 10 litres.  
 The steam generator has an embedded heating element and over temperature safety thermostat  
 A safety protective screen around the condensers and sample glassware needs to be closed before the instrument will operate.  
 Universal adapter for sample tubes MACRO (Ø 42 mm) and MICRO (Ø 26 mm).

## Control Panel

1. Mains ON/OFF switch with a "ON" luminescent Indicator lamp.
2. NaOH vapour selector switch.
3. Steam generator luminescent lamp.
4. Low water level luminescent indicator lamp.
5. Over temperature due to low water level in the steam generator luminescent indicator lamp.
6. Safety door open luminescent indicator.



Part No.	Height/Width/Depth (external) cm	Power W	Weight Kg
4000627	75 - 30 - 30	1325	23

The apparatus comes complete with a tube of 42 mm Ø x 300 mm high (MACRO series).

## SPARES

Digestion and distillation tubes 250 ml MACRO.  
 Graduated to 100 ml. 42 Ø x 300 mm high.  
 Part No. 4042300



## ACCESSORY

Digestion and distillation tube 100ml MICRO.  
 Dimensions 26 Ø x 300mm high.  
 Part No. 4001045





# Distillation unit semi-automatic "Pro-nitro II"

DETERMINATION OF ORGANIC (PROTEIN) NITROGEN (KJELDAHL METHOD).

## Features

- Steam distillation system.
- Determination Range: 1 to 140 mg of Nitrogen.
- Dosing pump volume of water: 5 to 50 ml
- Dosing pump volume of NaOH: 5 to 50 ml
- Distillation time, typically: 2 to 60 minutes.
- Distilling out put: 5 to 20 ml per minute
- Cooling water consumption: 80-100 litres/hour.
- Closed system, distilled water consumption: 2 litres/hour.
- Reservoir tank for distilled water: 10 litres.
- Reservoir tank for NaOH: 10 litres.
- The steam generator has an embedded heating element and over temperature safety thermostat
- A safety protective screen around the condenser and sample glassware needs to be closed before the instrument will operate.
- Universal adapter for sample tubes MACRO (Ø 42 mm) and MICRO (Ø 26 mm).
- Automated features:
  - Water dosing pump.
  - NaOH dosing pump.
  - Distillation timer.
  - Audible notification of the end of the cycle.
  - Automatic cooling when the distillation process starts.

## Control Panel

- Mains ON/OFF switch.
- Water pump for the steam generator in operation indicator lamp.
- Heater for the steam generator in operation indicator lamp.
- Low water level indicator lamp.
- Over temperature or low water level in the steam generator indicator lamp.
- Function selector Manual /Automatic.
- Push button with indicator lamp for automatic dosing of water.
- Push button with indicator lamp for dosing NaOH.
- Push button with indicator lamp for the steam generator.
- Push button with indicator lamp to show the end of the cycle and stop the steam generator.
- Timer: 0 to 60 minutes.
- Audible end of cycle.



Comes complete with a distillation tube of 42 mm Ø x 300 mm high (MACRO series).

## SPARES

Digestion and distillation tubes 250 ml MACRO.  
 Graduated to 100 ml. 42 Ø x 300 mm high.  
**Part No. 4042300**



## Accessories

Digestion and distillation tube 100ml MICRO.  
 Dimensions 26 Ø x 300mm high  
**Part No. 4001045**



Part No.	Height/Width/Depth (external) cm	Power W	Weight Kg
4000851	80 - 35 - 40	1325	36



# Full Automatic Kjeldahl Analyser 'Pro Nitro III'

KJELDAHL ORGANIC NITROGEN DETERMINATION INCLUDES COLORIMETRIC AUTOMATIC TITRATION

## Specification:

- 1) Power: 2000W
- 2) Detection range: 0.1 ... 200 mg of nitrogen
- 3) Recovery: Better than 99.5%
- 4) Cycle time: 6 minutes (sample of 50mg de N)
- 5) Boric Acid dose: 0 ... 50 ml in steps of 5 ml
- 6) NaOH dose: 0 ... 200 ml in steps of 5 ml
- 7) Reagent addition: 0.05N up to 0.50N in steps of 0.05N
- 8) Flask NaOH: 2l
- 9) Flask Boric Acid: 2l
- 10) Flask HCl: 2l
- 11) Steam water tank: 10l
- 12) Water consumption during analysis: from 1 to 2 l/minute.



## Features

Better accuracy, Better results:  
 Auto-detection at the end of the distillation:  
 Optimal Nitrogen recovery assured.  
 Colorimetric automatic titration:  
 Avoids manual operating errors.  
 No calibration required.  
 Uses regulatory accepted titration method.

Boric acid dosage and titration reagent.  
 Compact design with internal reservoir tanks.  
 The unit includes:  
 Water tank for steam generator.  
 Flask for NaOH  
 Flask for Boric acid.  
 Flask for titration reagent (HCl or H<sub>2</sub> SO<sub>4</sub>)  
 Dosing:  
 Digital, high precision dosing of titration reagent.  
 Peristaltic pump dosing of NaOH and Boric acid,  
 with easy tube replacement,  
 Thermal-paper printer included.

Output report conforms to  
 GLP procedures, includes:  
 Unique Analysis Number (Unrepeated).  
 Date  
 Initial time and end time of analysis.  
 Nitrogen detected as (mg) of nitrogen  
 Volume (ml) of reagent (HCl), consumption  
 during titration.  
 Volume (ml) Boric acid used.  
 Volume de (ml) of NaOH used.  
 Concentration (Normality) of titration reagent.

## Safety

Safety alarms to protect the operator:  
 No sample tube: The operation remains static  
 until the sample tube is inserted.

Protective door open: The operation will not start  
 until the door is shut.

Sample safety alarms to protect the analysed  
 sample: (The analysis can continue once the  
 problem is solved)

Cooling water: The operation stops if the correct  
 water pressure is not achieved.

Steam generator water: The operation stops if  
 the water tank is empty, restarts once filled.

Safety thermostat: The operation stops if the  
 thermostat triggers, restarts once reset.  
 thermostat triggers, restarts once reset.

Additional functions compared to manual  
 systems:

Colorimetric titration.  
 Auto-detection at the end of the distillation.  
 Automatic emptying of the sample and distillate.  
 Designated waste outlet for further processing.  
 Stores standard dosing parameters for NaOH,

## Control panel:

- 1 Setting date, time and peristaltic dosing pump  
 calibration
- 2 Print analysis report
- 3 Reject selection and return to previous menu.
- 4 Up key, for menu option selection
- 5 Down key, for menu option selection
- 6 Accept selection.

Model	Part No.	H / W / D cm	Power W	Wt. Kg
Pronitro III	4001430	73 63 33	2000	25



# Extractor for the determination of cellulose and fibre 'Dosi-fiber'

## Applications

- Total Fibre (WEENDE, VAN SOEST or similar).
- Dietary fibre.
- Neutral detergent fibre.
- Acid detergent fibre.
- Other extraction processes which do not use acetic acid, acetic trichloric acid or nitric acid.
- Textile fibre.
- Wood and paper fibre.

## Description

Integral extraction and filtration.  
 Due to there being no transfer of the sample, reduces the risk of sample loss, since the tubes, crucibles and filtrate are transferred with the samples in place.  
 Excellent results due to reproducible operating conditions.  
 Easy sample handling due to the special crucible support stand.  
 Versatile and precise test procedure that allows the samples to be weighed at various stages in the extraction process.

## Features

Rugged external case with a "RILSAN" protective coating.  
 All equipment components; condenser, valves, heater, compressed air valves and controls are all protected within the main case. Infrared heating elements.

## Technical data

Sample size: 0.5 to 3 g ( Normally 1 g).  
 Reproducibility: approximately  $\pm 1$  % for fibre level between 5-30%.  
 Measuring range: 0.1 to 100%.  
 Cooling water consumption: 1 litre/minute.

## Equipment

Comes complete with: crucible with a porosity P-2, Crucible support rack, heater lid and holder manipulator.  
 Not included: Double hotplate and beakers for reagents, supplied as an accessory.

### SPARES

- Support rack for 4 crucibles.  
**Part No.** 4000600
- Support rack for 6 crucibles.  
**Part No.** 4000624
- Crucibles with a P-2 porosity.  
**Part No.** 4000601



6 place extractor unit Part No 4000623

Part No.	No. of Places	Height/Width/Depth (external) cm	Power W	Weight Kg
4000599	4	56 43 32	1000	19
4000623	6	56 57 32	1500	25

## Accessories

- Double hotplate  
For reagents  
Power consumption 1750 W.  
**Part No.** 4000634
- Beaker  
For reagents  
**Part No.** 1000635





# Solvent recovery extractor for the determination of fats and oil 'Det-gras'

MAXIMUM SAFETY DURING THE SOLVENT EXTRACTION PHASE WITH SOLVENT HEATING BY LIQUID HEAT TRANSFER. INDEPENDENT HEATING AND TEMPERATURE CONTROL UNIT.  
 REPRODUCIBLE RESULTS:  $\pm 1$  %.  
 EXTRACTION TIME: 40 MINUTES.  
 70 % SOLVENT RECOVERY.



6 place extractor unit. Part No 4000842.

## Applications

Total fat in animal fodder. Total fat in meat products. Fat content in fish.  
 Soluble material in paper. Soluble material in textile fibres. Oil content in seeds and fruit.

## EXTRACTION UNIT

### Features

Metal case with lifting device for the sample thimbles from the hotplate to the cooling condensers.  
 These units include PTFE solvent recovery taps as well as magnetic height displacement guides for the sample thimbles.  
 The heated base plate is controlled by the separate heating unit that maintains a homogeneous temperature distribution across the plate surface. Connections are at the back of the unit for air and water for the refrigeration and drying system. The main case is coated with a "RILSAN polymer".

### Control Panel

Timer with acoustic notification of the end of cycle: 0-60 minutes.  
 Air inlet tap.

## HEATING AND CONTROL UNIT

### Features

Independent closed circuit, by pumping heated oil to the extraction unit through insulated and protected conductors.  
 The unit also incorporates an air pump that once the solvent extraction has been completed transmits a flow of air to the extraction unit to facilitate the drying of the sample thimbles in the distillation column.

### Control Panel

ON/OFF switch with indicator lamp for the heater elements.  
 Switch with indicator lamp for the air pump,  
 Digital electronic temperature controller from 20 °C to 200 °C.  
 Heater on indicator lamp.  
 Safety thermostat working indicator lamp.

Part No.	No. of Places	Height/Width/Depth (extractor exterior) cm			Height/Width/Depth (heating and cntrl. unit ext.) cm			Water Cons. litres/min.	Power W	Weight Kg
4001046	2	58	27	35	35	20	30	1	1060	32
4000842	6	58	58	35	35	20	30	2	1060	41

### Unit supplied with

	Model	
	2 Places	6 Places
Heater control unit for heated fluid transfer	Yes	Yes
Extraction unit	Yes	Yes
Heat conductors for the circulation heated oil	Yes	Yes
Tank for 5 litres of oil	Yes	Yes
Box of 25 sample thimbles	Yes	Yes
Thimble rack level	1	1
Support rack for thimble tubes	1	1
Beaker tongs	1	1
Magnetic support for thimble lever	1	1
Aluminium solvent beakers	6	18
Thimble supports	6	18
Aluminium tubes for thimble support	6	18
Extraction beaker rack	1	3
Thimble support rack	1	3



Equipment supplied with the 6 place model.



# Alcohol distillation unit 'Alcodest'

DISTILLATION APPARATUS FOR THE DETERMINATION OF THE DEGREE OF ALCOHOL FOLLOWING THE APPROVED EEC AND AOAC METHODS FOR VOLATILE AND ABSORBIC ACIDS; NO.11047, 11075 -11078 AND THE EEC COLORIMETRIC METHOD.

### Features

- Steam distillation unit.
- Cooling water consumption: 80-100 litres/hour.
- Closed circuit distilled water consumption: 2 litres/hour.
- Distilled water reservoir tank: 10 litres.
- Steam generator equipped with an embedded heater and over temperature safety thermostat.

### Control Panel

1. Main ON/OFF switch with "ON" indicator lamp.
2. Steam generator "ON" switch.
3. Steam generator "ON" indicator lamp.
4. Low water level indicator lamp.
5. Over temperature or low water level in the steam generator indicator lamp.
6. Safety screen open indicator lamp.



### Model

Part No.	Height/Width/Depth (external) cm	Power W	Weight Kg
4000637	75 - 30 - 30	1325	23

Comes complete with a 80 and 42 mm Ø x 300 mm high tubes.

### Accessories

Tubes 80 Ø x 300 mm high tube.  
Part No. 1000646



Tubes 42 Ø x 300 mm high tube.  
Part No. 4042300



Support rack for 6 tubes.  
Part No. 4000647 80 mm Ø tube.  
Part No. 4000648 42 mm Ø tube.



Magnetic stirrer "Asincro".  
Part No. 7000379



Hotplate  
145 mm Ø with  
7 position  
heating control.  
Part No. 1000442



Tube extraction tongs. Part No. 7000532





# Hot Block for the determination of chemical oxygen demand C.O.D. in residual waters

IN ACCORDANCE WITH THE EEC. STANDARD UNE 77-004  
REFLUX METHOD.

## Features

Comprising of a Hot Block for 6, 12 or 20 samples, temperature controller, glassware and racks.

Uniform heating throughout the block to all samples. Automatic control of temperature and time during the process.

C.O.D. unit comprises of:

1 metallic hot block.

1 electronic digital controller for temperature and time. (RAT.)

1 Support rack for tubes.

1 Support rack for condensers.

C.O.D. tubes with an aperture of 29/32.

Condensers for C.O.D.



Models	Part No.	No. of places
C.O.D. - 6	4000638	6
C.O.D. - 12	4000639	12
C.O.D. - 20	4000640	20



Part No.	No. of Places	Tube Ø mm	Height/Width/Depth (external) cm	Temperature °C	Power W	Weight Kg
4000507	6	42	18 33 28	45 - 450	1500	18
4000508	12	42	18 39 33	45 - 450	2000	25
4000509	20	42	18 44 39	45 - 450	2500	31

Digital electronic temperature and time controller RAT. Part No. 4000051

## Features

Time and temperature display. Temperature selection from 45 to 450 °C. Heating time period of 1 min. to 9 h. 59 min. K type temperature probe monitors the temperature in the block once the set temperature has been reached. An acoustic and indicator lamp show when the unit has reached the end of the heating cycle. A safety alarm operates if the temperature probe fails. A selector switch at the back of the unit for C.O.D., controls the heating ramp rate.

## Control Panel

Mains switch On/OFF.  
Digital display of temperature.  
Push button temperature selection.  
Push button increase value.  
Push button decrease value.  
Stop button.  
Push button cancel entry.  
Push button select time.  
Digital display of time.

## Condenser tube support

### Part No.

4000643 6 places

4000643 12 places

4000643 20 places



## Tube support rack

Made of chemically treated dur-al sheet metal, with handles and removable panels that maintain the heat around the tubes and allow the user to examine the samples during the process.

### Part No.

4005071 for COD 6 (block of 6 4000507).

4005081 for COD 12 (block of 12 4000508).

4005091 for COD 20 (block of 20 4000509).



## Condenser tubes for COD process

### Part No. 1000642

## Tubes for C.O.D.

### Part No. 1000641

