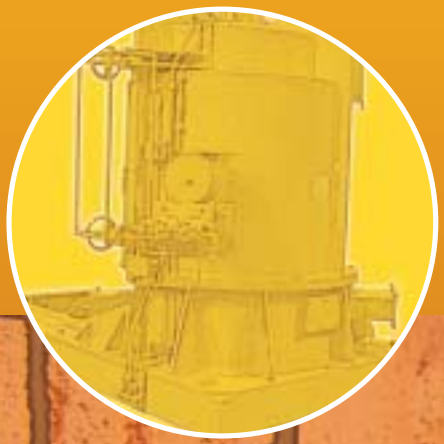
TECNICAS HIDRAULICAS, S.A.



Mafel Mills

Ball Mills

Pendular Mills

Attrition Mills

Classifying plants

Milling Division and Classification

TECNICAS HIDRAULICAS, S.A.

Mafel Micronising Mills

Mafel Micronising Mills

Mills with a vertical shaft by MAFEL are ideal for the micronisation of non-abrasive mineral products with a hardness of less than 4 on the Mohs scale, as well as for food, chemical, pharmaceutical and insecticide products etc.

Its design achieves the milling procedure in three phases:

1st Milling step

By the hammers knocking the product at a speed over 100 m/s.

2nd Milling step

MAFEL mill incorporates at top and bottom of shaft blowers that generate a rising air current to keep the particles suspended at the central milling area and produce turbulences that originate collisions and frictions between particles resulting in self-milling.

3rd Milling step

Top of shaft incorporates a variable set of Whizzers to classify the particles. Crossing of particles is difficulted by modifying the number of Whizzers; only selected particles are allowed to cross, and larger ones are knocked and fall to the central milling area where a new cycle starts.

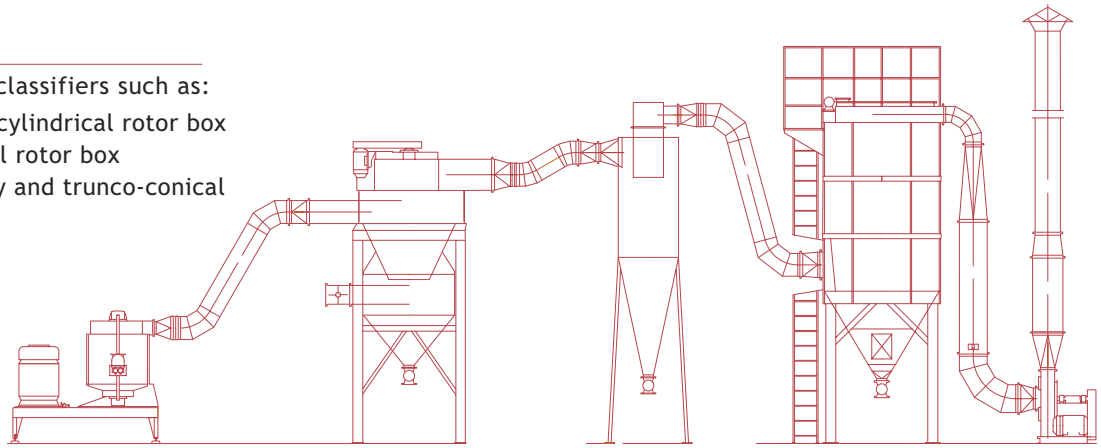
Complete Milling and Classification Plants

Técnicas Hidráulicas S.A. can supply equipment such as mills, classifiers, cyclones, filters, fans etc, or fully functioning "turnkey" installations.

Classifiers

We have an extensive range of classifiers such as:

- Tangential upper feeding with cylindrical rotor box
- Central feeding with cylindrical rotor box
- Lower feeding, cylindrical body and trunco-conical rotor box



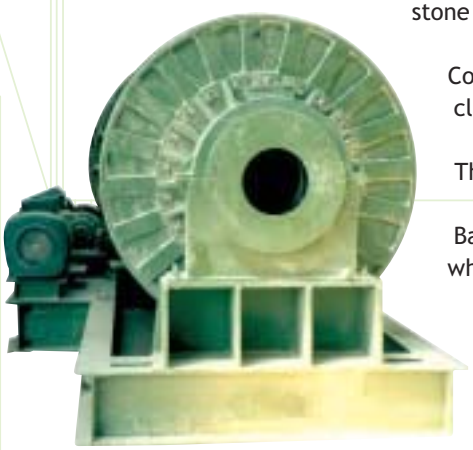
Mafel Mills

Motor and Fan Power

Mill	Motor power	Cyclone	Classifier	Motor power	Automatic chute filter	Centrifugal fan	Fan power
K-00	7.5 kW	C-100	JOY-0E	3 kW	FAM-10	VCA-10	5 kW
K-51	37 kW	C-500	JOY-1E	7.5 kW	FAM-36	VCA-45	15 kW
K-125	90 kW	C-750	JOY-3E	11 kW	FAM-85	VCA-60	30 kW
K-220	160 kW	C-1200	JOY-4E	18.5 kW	FAM-130	VCA-90	45 kW
K-270	200 kW	C-1500	JOY-5E	22 kW	FAM-150 FAM-200	VCA-110	35 kW

Freely-moving Ball Mills

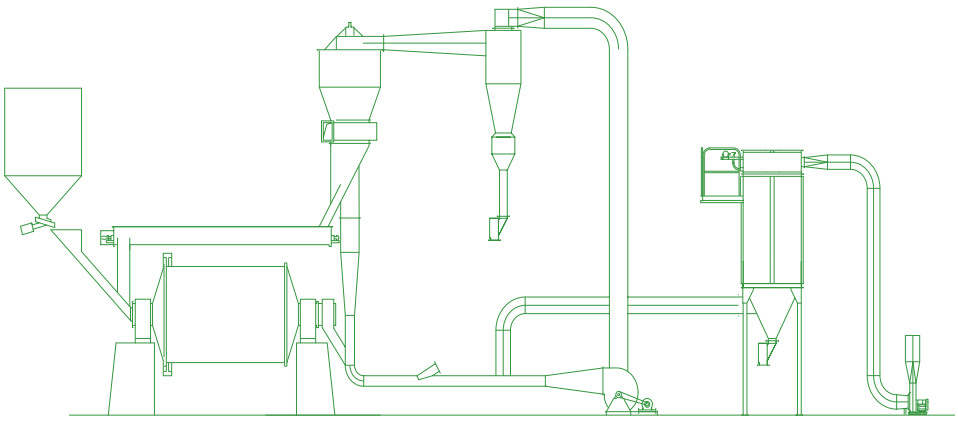
Ball mills are composed of a barrel with an inside layer of protective plates full of metal or stone bodies which grind down the supplied material when the barrel rotates.

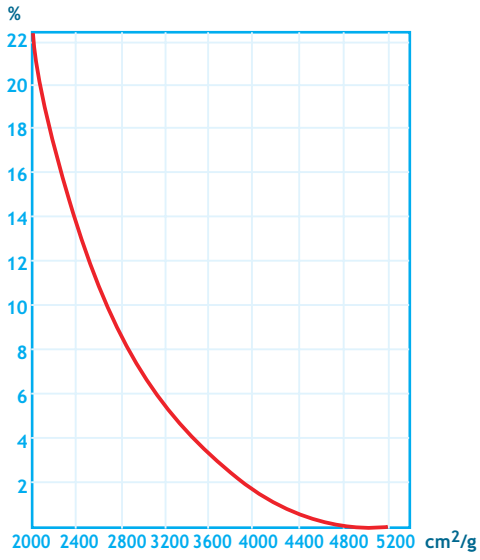


Complete milling plants in accordance with the enclosed diagram (closed circuit) with classifier, cyclone, chute filter, main fan and secondary bag filter fan.

The mentioned plants can micronise products to less than 15 microns.

Ball mills are able to micronise both hard and abrasive products as well as soft products which have to be extremely fine ground.





Specific surface area in wleins

Ball Mills

Interior Dimensions

Steel milling load

Mill diameter mm	Mill length mm	Ball load	HP
1,500	1,500	5.80	100
1,500	1,500	8.30	150
1,500	1,500	9.75	175
1,800	1,800	11.20	200
1,800	1,800	13.10	250
1,800	1,800	15.60	300
2,100	2,100	5.80	100
2,100	2,100	8.30	150
2,100	2,100	9.75	175
2,400	2,400	11.20	200
2,400	2,400	13.10	250
2,400	2,400	15.60	300

Ball Mills

Interior Dimensions

Flint milling load

Mill diameter mm	Mill length mm	Ball load	HP
2,000	4,800	5.80	100
2,200	5,700	8.30	150
2,200	6,700	9.75	175
2,200	7,700	11.20	200
2,400	7,300	13.10	250
2,400	8,550	15.60	300

TECNICAS HIDRAULICAS, S.A.

Attrition-Mill Atrimill

Attrition-Mill Atrimill

Vertical crushing mills, composed of a static body shell (casing) and a central shaft with a cylindrical body composed of four to five milling plates which include a variable number of blades which, when rotating, produce the exact turbulence required to crush the material into particles by rubbing and striking.

Ultra-Rotor Model	Installed power Kw	Weight t	Evaporation power kg H_2O/h	Crush factor	Dimensions length x width x height mm
A-75	45 55 75	3	200 - 230	1	200 - 230
A-160	110 132 160	7.5	800 - 1000	4	800 - 1000
A-300	200 240 300	12.5	1600 - 1800	8	1600 - 1800

Pendular Mill

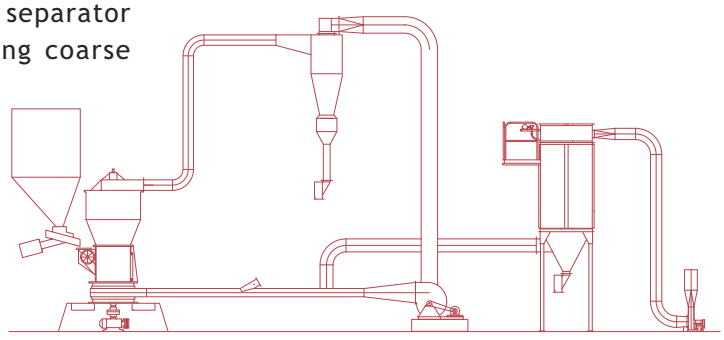
Pendular Mill

Milling in pendular mills is produced by a centrifugal force which pushes the pendulum rollers against the milling fixed grinding ring.

The material to be ground, whose granulometry can be as much as 25 mm, is introduced into the machine via an alveolar feeder, (regulated by the power consumed by the mill motor or by the fan's motor) reaches the bottom from where it is collected by gratings, which rotate together with the group of star pendulums, and is projected as a continuous stream between each roller and the ring where it is ground.

The air enters the base of the mill via a series of tangential blades which cause an upward vortex which drags the fine and medium particles.

The air current carrying particles reaches the separator which classifies the ground material, rejecting coarse particles to the milling chamber. The particles which have been milled to the desired size are then dragged towards the cyclone or bag filter from where they are collected.



Pendular Mills

Features

	MP.3	MP.5	MP.8	MP.12	MP.16
Ø Ring	940	1,066	1,270	1,460	1,670
Ø Rollers	380	425	460	510	550
Speed	156	138	116	101	88
Production	3 Tm/h	5 Tm/h	8 Tm/h	12 Tm/h	16 Tm/h
Airflow	12,000m³/h	16,000m³/h	24,000m³/h	35,000m³/h	52,000m³/h
Power absorption	30 HP	50 HP	100 HP	150 HP	180 HP
Fan Motor	50 HP	75 HP	125 HP	180 HP	220 HP

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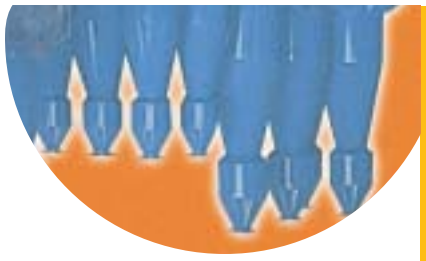
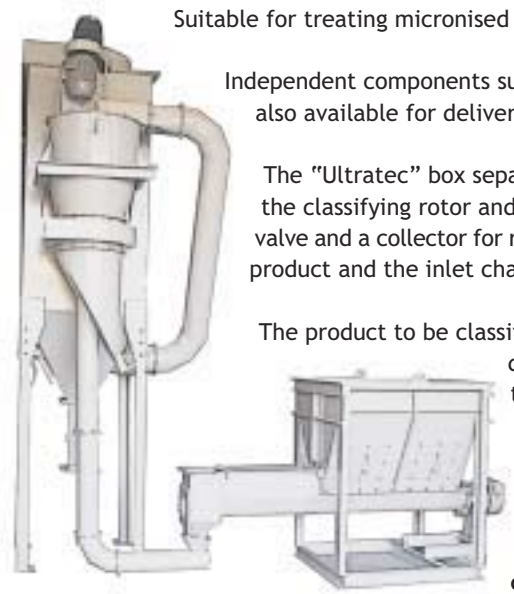


Separators and Classification Plants



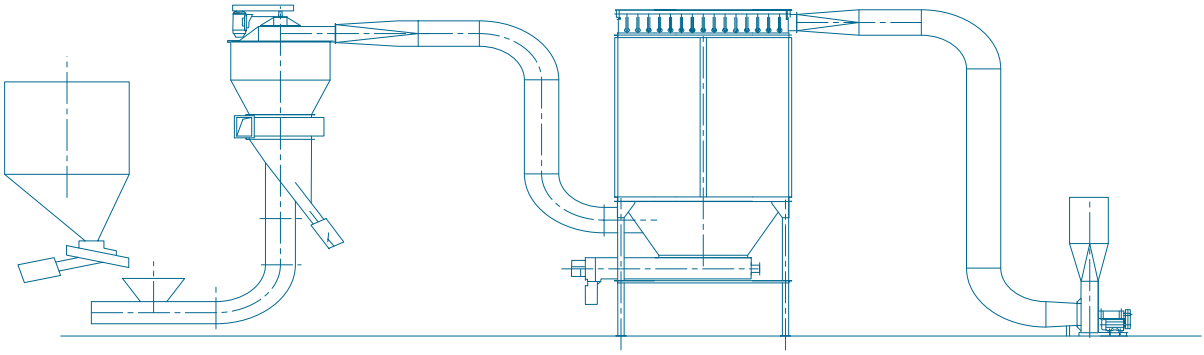
Suitable for treating micronised products in classification ranges of 5 to 100 microns.

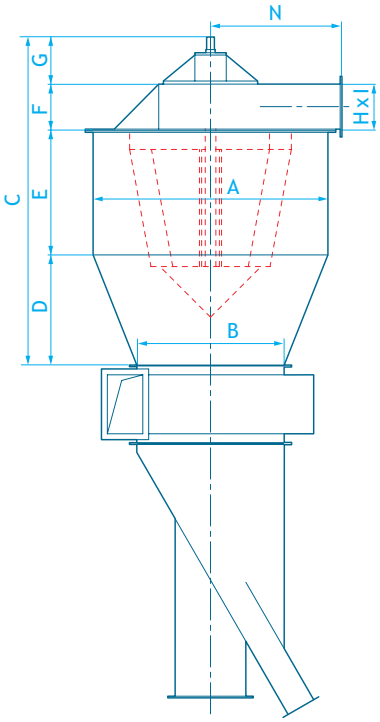
Independent components such as classifiers, cyclones etc. or turnkey classification plants are also available for delivery.

The "Ultratec" box separators are composed of an upper cylindrical body which houses the classifying rotor and the outlet for the classified products, a central body with a wash valve and a collector for rejects and a lower body with a shoe valve for removing the rejected product and the inlet channel for the product to be classified.

The product to be classified is introduced via the lower part in order to achieve improved distribution of the product in the expansion chamber thus aiding the separation of rougher particles which lose speed and fall. The classifying rotor has a trunco conical construction and is driven by an electric motor, pulleys and belts. The rotor speed is adjusted using a frequency variator.

The main features of our classification plants are their low consumption and speed which in turn provides the equipment with long endurance and high output.





Dynamic Separators
Dimensions and General Information

Size	A	B	C	D	E	F	G	H	I	N
100	1000	732	1500	508	572	204	216	204	357	600
120	1200	878	1810	608	678	253	271	241	428	700
150	1500	1100	2210	750	846	316	288	316	535	850
170	1700	1250	2492	860	970	350	312	360	620	950
200	2000	1464	3020	1010	1140	408	462	408	714	1,100

Applications

Materials appropriate for milling

Mining
Chemical industry
Food industry
Calcic carbonate
Sulphur
Wood carbo
Chlorinated insecticides
Lime sulphate
Ammonia nitrate
Iron oxide
Plaster
Barite
Clay
Chrome gree
Graphite
Red lead
Cocoa
Salt
Soya flour
Quarries
Insecticides
Dolomite
Lime arsenate
Oil coke
Blackening
Salicylic acid
Phenolic resi
Lithopone
Bentonite
Plastics
Steatite
Gypsum
White lead
DDT
Sugar
Wheat flour
Small oranges
Heat-resistant materials
Abrasive products
Quartz
Feldspar
Coal
China clay
Zirconium
Silica
Etc.

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