



MOARĂ PLANETARĂ CU BILE PM 300

The Planetary Ball Mill PM 300 is a powerful and ergonomic benchtop model with two grinding stations for grinding jar volumes up to 500 ml. This setup allows for processing up to 2 x 220 ml sample material per batch. Thanks to the high maximum speed of 800 rpm, extremely high centrifugal forces result in very high pulverization energy and consequently in short processing times.

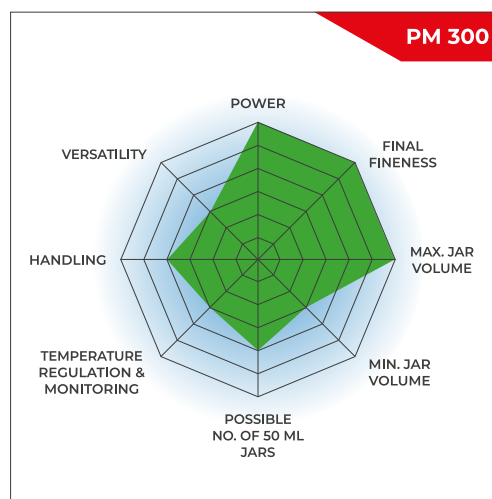
The PM 300 is ideally suited for virtually all industries where the quality control process places the highest demands on purity, speed, fineness and reproducibility. Thanks to its enormous energy input of up to 64.4 times the acceleration of gravity, this mill is the perfect choice for tasks in research like mechanochemistry (co-crystal screening, mechanosynthesis, mechanical alloying and mechano-catalysis), or for ultrafine colloidal grinding on a nanometer scale.



[Click pentru video](#)

THE POWERFUL, ERGONOMIC PLANETARY BALL MILL

- | Max. speed 800 rpm, large sun wheel
- | Up to 10 mm feed size and 0.1 μm final fineness
- | 2 grinding stations for jars of min. 12 ml and max. 500 ml, jars of 12 – 80 ml can be stacked (two jars each)
- | GrindControl to measure temperature and pressure inside the jar.
- | Aeration lids to control the atmosphere inside the jar
- | Bench top model, touch screen, storable SOPs and cycle programs, 5 different jar materials for dry and wet grinding



FAST & POWERFUL

- | Măcinare până în domeniul submicronilor fără pierderi
- | Măcinarea umedă permite obținerea unor particule cu dimensiuni de ordinul nanometric (<100 nm)
- | Variable speed from 50 to 800 rpm, speed ratio 1:-2
- | Milling with up to 64.4 x acceleration of gravity
- | Batch-wise processing with max. 2 x 220 ml sample
- | Possibility to stack jars enables simultaneous processing of 4 samples



SAFE AND EASY HANDLING

- | Easy and safe clamping of the grinding jars thanks to lockable sun wheel
- | Sistemul de siguranță Safety Slider împiedică pornirea mașinii fără ca incintele să fie bine fixate
- | Perfect stability on the lab bench thanks to FFCS -technology
- | Comfortable parameter setting via Touch display
- | Automatic grinding chamber ventilation with directed air stream for perfect jar cooling
- | Programmable starting time
- | Both grinding jars are freely accessible
- | Ergonomic clamping unit with smooth surfaces



SETTINGS & OPTIONS

- | Dry and wet milling possible
- | Potrivit pentru măcinări de lungă durată 99:59:59 h max.
- | Programmable breaks e.g. for cooling
- | Automatic calculation of the total process time
- | Inversarea sensului de rotație ajută la minimizarea efectelor de colmatare
- | Smart service interval notification based on usage



REPRODUCIBILITY

- | Reproducible results due to speed control
- | Indication of load-defined speed, independent of set speed
- | 12 SOPs and 4 cycle programs can be stored
- | Backup-ul în caz de pană de curent asigură memorarea timpului de măcinare rămas



THE BEST ALTERNATIVE TO A RETSCH PLANETARY BALL MILL? A RETSCH MIXER MILL.



Benefit from particularly ergonomic handling while achieving the same finenesses down to the nanometer range.

MOARA PLANETARĂ CU BILE PM300

SAFETY FIRST: AUTOMATED NOTIFICATION OF CLAMPING FORCE

Operation of the RETSCH planetary ball mills is particularly safe. They feature a robust Safety Slider which ensures that the mill can only be started after the grinding jar has been securely fixed with a clamping device. The self-acting lock ensures that the jar is seated correctly and securely. This proven solid mechanical system is less failure-prone than electronic solutions - the user has full access to the sample at any time. When the electronic system fails, it is not possible to unlock the jars, for example. A unique safety feature of the PM 300 is an acoustic signal and notification in the display when the clamping unit has been fixed with the required force of 25 Nm. RETSCH offers a convenient clamping aid to facilitate the process. This is particularly helpful when the machine is operated in the upper speed range between 600 and 800 rpm.



MOARA PLANETARĂ CU BILE PM300

WET AND NANO-SCALE GRINDING WITH THE PM 300

Măcinarea umedă este utilizată pentru a obține dimensiuni de particule sub 5 μm , deoarece particulele mici tind să se încarce pe suprafețele lor și să se aglomereze, ceea ce face dificilă măcinarea ulterioară în regim uscat. Prin adăugarea unui lichid sau a unui dispersant, particulele pot fi dispersate.

Pentru a produce particule foarte fine de 100 nm sau mai puțin (măcinare la scară nanometrică) prin măcinare umedă, sunt necesare mai degrabă forțe de frecare decât de impact. Acest lucru se realizează prin utilizarea unui număr mare de bile de măcinare mici, care au o suprafață mare și multe puncte de frecare. Nivelul ideal de umplere al incintei ar trebui să fie format din 60% bile mici de măcinare.

Pentru mai multe detalii despre umplerea incintei, măcinarea umedă și recuperarea probei măcinate, urmăriți videoclipul.

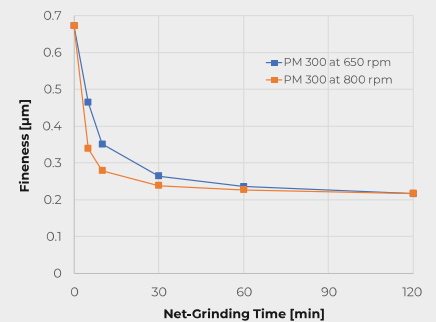


[Click pentru video](#)

În acest material video este prezentată măcinarea umedă în Moara Planetară cu Bile PM 100.

TITANIUM DIOXIDE IN 125 ML JAR

The graphic shows the result of pulverizing titanium dioxide (TiO₂) at 650 rpm and 800 rpm in the PM 300 and the net processing time. With the higher energy input at 800 rpm, the particle size decreases faster. However, the increased warming effects at 800 rpm should also be considered, as they might make longer breaks necessary.



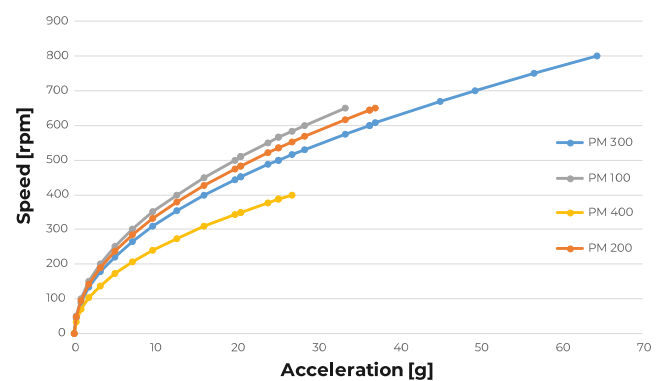
Net processing time of titanium dioxide with 0.1 mm grinding balls in sodium phosphate solution

MOARA PLANETARĂ CU BILE PM300

APPLICATIONS IN MECHANOCHEMISTRY

RETSCH Planetary Ball Mills are perfectly suited for processes like mechanical alloying or mechanosynthesis. For most reactions, the 1:2 speed ratio of jar to sun wheel of the models PM 100 and PM 200 is fully adequate, as the ball charge produces enough impact energy. However, greater energy is required for some reactions. Here the PM 400 MA can be used with the increased speed ratio of 1:-2.5 or 1:-3.0.

The PM 300 works with a speed ratio of 1:-2, but in contrast to other models, it reaches up to 64.4 x acceleration of gravity thanks to the maximum speed of 800 rpm and the large sun wheel. Together with the option to use four small, stackable grinding jars sized 12 to 80 ml for small scale operations, or two jars sized up to 500 ml for upscaling purposes, this planetary ball mill is highly suitable for research applications in mechanochemistry.



Achievable acceleration in different planetary ball mills dependent on speed setting

MOARA PLANETARĂ CU BILE PM300

EASYFIT GRINDING JARS FOR EXCELLENT RESULTS

The performance and the result of sample preparation are also determined by the choice of the grinding jar and its ball charge. The EasyFit range of jars has been specially designed for extreme working conditions such as long-term trials, even at maximum speed of 800 rpm, wet grinding, high mechanical loads and maximum speeds as well as for mechanical alloying. This line of jars is suitable for all RETSCH planetary ball mills.

The new EasyFit grinding jar series features a structure on the bottom of the 50-500 ml jars called Advanced Anti-Twist (AAT). This ensures that the jars are tightly fixed without the risk of twisting, even at high speed, and that wear and tear is drastically reduced. Secure clamping of the jars is made much easier: to find the correct clamping position, a maximum twist of 60° is required.

The geometry of the EasyFit jars in the 50 ml and 250 ml sizes has been enlarged in diameter and reduced in height compared to the previous "comfort" models. This offers two advantages: better grinding results and interchangeable lids, as there are only three diameter dimensions for the entire grinding jar range.

Diameter categories

- | Diameter 1: 12 ml and 25 ml grinding jars
- | Diameter 2: 50 ml, 80 ml and 125 ml grinding jars
- | Diameter 3: 250 ml and 500 ml grinding jars

- | Available jar sizes: 12 ml / 25 ml / 50 ml / 80 ml / 125 ml / 250 ml / 500 ml
- | Innovative Advanced Anti-Twist (AAT) function ensures secure fit of grinding jars
- | High flexibility thanks to suitability of three lid sizes for all seven jar sizes
- | Pressure-tight and dust-proof O-ring sealing prevents material spillage
- | Jars and balls available in 5 materials: hardened stainless steel, tungsten carbide, agate, sintered aluminium oxide, zirconium oxide
- | Stainless steel protective jacket for agate, sintered aluminum oxide, zirconium oxide and tungsten carbide grinding jars
- | O fantă între incintă și capac permite deschiderea ușoară a capacului, exp. cu ajutorul unei spatule în cazul unor efecte de subpresiune în interiorul incintei.



ADAPTER FOR SPECIAL APPLICATIONS

With a special adapter, co-crystal screening can be carried out in a planetary ball mill, using disposable vials such as 1.5 ml GC glass vials. The adapter features 24 positions arranged in an outer ring with 16 positions and an inner ring with 8 positions. The outer ring accepts up to 16 vials, allowing for screening up to 64 samples simultaneously when using the Planetary Ball Mill PM 400. The 8 positions of the inner ring are suitable to perform trials with different energy input, e.g. for mechanosynthesis research.



[Click pentru video](#)

JARS & LIDS FOR SPECIAL APPLICATIONS

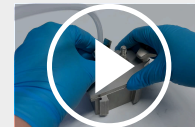
- For colloidal or wet grinding, the use of a grinding jar with a special closure device is recommended
- The special closure device is designed for ergonomic handling
- Capacele cu supape de gaz sunt concepute pentru lucrul în atmosferă inertă, de exemplu, atunci când oxigenul poate influența procesul de măcinare. Capacele permit introducerea unor gaze precum argon sau azot în incinta de măcinare.
- Sistem opțional de măsurare a presiunii și temperaturii PM GrindControl



GrindControl



Aeriation lid



[Click pentru video](#)

Video:
Aeriation lid

Both the aeriation lid and GrindControl can now be equipped with inlays of different materials. Thus, the lid can be used for, e. g. a steel and a zirconium oxide jar by simply exchanging the inlay.

MOARA PLANETARĂ CU BILE PM300

RECOMANDARE PENTRU UMLEREA INCINTELOR

Pentru a obține rezultate optime de măcinare, dimensiunea incintei trebuie adaptată la cantitatea de probă care urmează să fie prelucrată. Dimensiunea ideală a bilelor de măcinare trebuie să fie de 3 ori mai mare decât cea mai mare particulă din probă. Respectând această regulă empirică, numărul bilelor de măcinare pentru fiecare dimensiune a bilelor și volum al incintei este indicat în tabelul de mai jos. De exemplu, pentru a măcina 200 ml probă formată din particule de 7 mm, se recomandă o incintă de 500 ml și bile de 20 mm diametru sau mai mari. Conform tabelului sunt necesare 25 de bile de măcinare.

Volum nominal incintă de măcinare	Volum probă	Dimensiune max. probă	Încărcătura de bile recomandată (bucăți)					
			Ø 5 mm	Ø 7 mm	Ø 10 mm	Ø 15 mm	Ø 20 mm	Ø 30 mm
12 ml	până la ≤5 ml	<1 mm	50	15	5	-	-	-

25 ml	până la ≤10 ml	<1 mm	95 – 100	25 – 30	10	-	-	-
50 ml	5 – 20 ml	<3 mm	200	50 – 70	20	7	3 – 4	-
80 ml	10 – 35 ml	<4 mm	250 – 330	70 – 120	30 - 40	12	5	-
125 ml	15 – 50 ml	<4 mm	500	110 – 180	50 – 60	18	7	-
250 ml	25 – 120 ml	<6 mm	1100 – 1200	220 – 350	100 – 120	35 – 45	15	5
500 ml	75 – 220 ml	<10 mm	2000	440 – 700	200 – 230	70	25	8

If a pulverization process in a planetary ball mill is successful depends on the machine settings but also on the filling level of the grinding jar. The usable volume of the jars depends on the type of sample material. The number of grinding balls given in the table reflect the minimum amount per jar. A better result is obtained with a larger number of suitable balls, if indicated. In exceptional cases, the number of balls can be reduced by not more than 15%; however, that will result in increased wear of the grinding tools.

MOARA PLANETARĂ CU BILE PM300

PROBE TIPICE

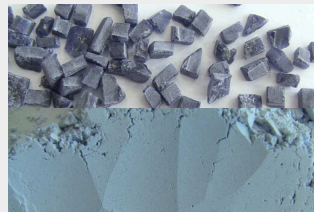
Morile planetare cu bile RETSCH sunt perfect adecvate pentru reducerea dimensiunii, de exemplu, a aliajelor, bentonitei, oaselor, fibrelor de carbon, catalizatorilor, celulozei, clincherului de ciment, ceramicii, cărbunelui, produselor chimice, mineralelor, cărbunelui, cocsului, compostului, betonului, deșeurilor electronice, fibrelor, sticlelor, hidroxiapatită, minereu de fier, caolin, calcar, oxizi metalici, minerale, minereuri, vopsele și lacuri, hârtie, pigmenți, materiale vegetale, polimeri, cuarț, semințe, pietre semiprețioase, nămol de epurare, zgură, soluri, țesuturi, tutun, mostre de deșeuri, lemn etc.

**Very hard, abrasive:
Industrial diamonds**



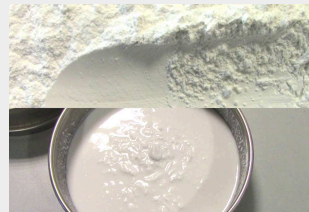
11 g sample
50 ml tungsten carbide
grinding jars
4 x 20 mm tungsten
carbide grinding balls
4 min at 400 rpm

**Hard-brittle:
Sodalite mineral**



85 g sample
125 ml zirconium oxide
grinding jars
7 x 20 mm zirconium
oxide grinding balls
12 min at 500 rpm

**Nano grinding:
Aluminum oxide**



100 g sample + 190 ml
sodium-phosphate
solution
500 ml zirconium oxide
grinding jars
1 kg 2 mm zirconium
oxide grinding balls
3:30 min net-grinding
at 650 rpm

*Grinding breaks help to
keep temperature
lower*

**Medium-hard, tough:
Polyester
terephthalate resin**



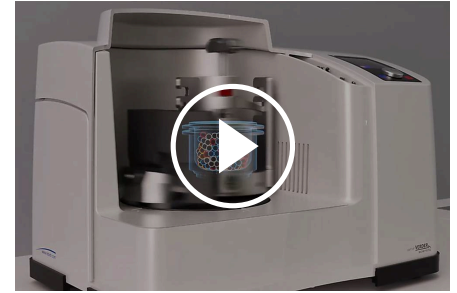
125 g sample
500 ml zirconium oxide
grinding jars
8 x 30 mm zirconium
oxide grinding balls
3 min at 350 rpm

MOARA PLANETARĂ CU BILE PM300

PRINCIPIU DE FUNCȚIONARE

În moara planetară cu bile incintele de măcinare sunt dispuse excentric pe un "disc solar". Discul se rotește în sens opus mișcării incintelor de măcinare, în raport de 1:-2. Bilele din incinte sunt supuse unor mișcări de rotație suprapuse, așa-numitele forțe Coriolis.

Diferența de viteză dintre bile și incintele de măcinare produce o interacțiune între forțele de frecare și de impact care eliberează energii dinamice ridicate. Interacțiunea dintre aceste forțe are ca rezultat un grad ridicat și foarte eficient de reducere a dimensiunilor în moara planetară cu bile.



[Click pentru video](#)

MOARA PLANETARĂ CU BILE PM300

DATE TEHNICE

Aplicabilitate	pulverizing, mixing, homogenizing, colloidal milling, mechanical alloying, mechanochemistry, co-crystal screening
Domenii in care se utilizeaza	agricultura, biologie, geologie / metalurgie, industria chimica, materiale de constructii / electronice, medicina / farmaceutice, mediu / reciclare, sticla / ceramica
Material probă	moale, dur, fragil, fibros - ud sau uscat
Principiul de reducere a dimensiunii	impact, frecare
Dimens. max. probă*	< 10 mm
Finețe finală*	< 1 μm, pentru macinare coloidală < 0.1 μm
Volum/masă probă admisă*	max. 2 x 220 ml
Posturi de macinare	2
Rata de viteză	1 : -2
Viteza roții solare	50 - 800 min-1
Diametrul efectiv al roții solare	180 mm
Acceleratie	64 g
Tipul incintelor de măcinare	optional areation covers, safety closure devices
Material de constructie a elementelor de macinare	hardened stainless steel, carbura de wolfram, agat, alumina sinterizata, oxid de zirconiu
Dimensiuni recipiente de macinare	12 ml / 25 ml / 50 ml / 80 ml / 125 ml / 250 ml / 500 ml
Stackable grinding jars	12 ml / 25 ml / 50 ml / 80 ml
Adapter for single-use glas vials	24 x 1.5 ml / 7 x 20 ml
Setarea timpului de macinare	digital, de la 00:00:01 la 99:59:59
Operare interval	da, cu inversarea sensului de rotatie
Durăta interval	00:00:01 la 99:59:59
Durata pauzei	00:00:01 la 99:59:59
POS-uri stocabile	12
Programe de cicluri stocabile	4
Măsurarea energiei posibile de intrare	da
Interfață	USB, RASPI
Antrenare	motor asincron cu convertizor de frecvență
Putere motor	2,5 kW
Alimentare electrica	200-240 V, 50/60 Hz

Conectare sursă de alimentare	monofazic
Grad de protecție	IP 20
Putere instalată	~ 3335 VA
W x H x D (închis)	745 x 525 x 580 mm
Masa netă:	~ 118 kg
Standard	CE
Brevet / brevet instalație	da

* în funcție de materialul probei și configurația/setările instrumentului

www.retsch.ro/pm300

INFORMAȚII DESPRE COMANDĂ

PLANETARY BALL MILL PM 300

(please order grinding jars and balls separately)

20.570.0001



PM 300 with 2 grinding stations, speed ratio 1 : -2

ACCESSORIES PLANETARY BALL MILLS

22.661.0005	Clamping unit for PM 300
03.025.0178	Adapter for stacking grinding jars 50 ml - 80 ml
03.025.0182	Adapter for the use of grinding jars 12 ml and 25 ml (only for PM 300)
03.486.0062	Opening aid for clamping unit of planetary ball mills
99.200.0041	IQ/OQ Documentation for PM 300

PRESSURE AND TEMPERATURE MEASURING SYSTEM GRINDCONTROL FOR PLANETARY BALL MILLS

incl. sensors and transmitter unit, insert of lid, software, case, opening aid and cleaning accessories for PM (please order grinding jars separately)

22.782.0033	GrindControl for PM grinding jar EasyFit 50 - 125 ml
22.782.0034	GrindControl for PM grinding jar EasyFit 250 - 500 ml

GRINDCONTROL LID INSERTS

03.474.0243	GrindControl lid insert for 50, 80, 125 ml, stainless steel
03.474.0246	GrindControl lid insert for 50, 80, 125 ml, zirconium oxide
03.474.0244	GrindControl lid insert for 250 or 500 ml, stainless steel
03.474.0247	GrindControl lid insert for 250 or 500 ml, zirconium oxide



ACCESSORIES FOR PM GRINDCONTROL WITH GRINDING JARS EASYFIT

05.114.0056		O-ring for 50, 80 or 125 ml
05.114.0054		O-ring for 250 ml - 500 ml grinding jars EasyFit (PM)
03.111.0438		Flat gasket for 50 ml, 80 ml or 125 ml
03.111.0439		Flat gasket for 250 ml - 500 ml
22.186.0007		Sintered filter with O-ring, set of 10 pieces
22.864.0001		Valve set M8x1 for GrindControl and aeration lids

GRINDING JARS EASYFIT

(grinding jars EasyFit are suitable for all planetary ball mills)

HARDENED STAINLESS STEEL

01.462.0239		12 ml
01.462.0240		25 ml
01.462.0516		50 ml
01.462.0517		80 ml
01.462.0518		125 ml
01.462.0519		250 ml
01.462.0520		500 ml

TUNGSTEN CARBIDE

01.462.0494		50 ml
01.462.0495		80 ml
01.462.0527		125 ml
01.462.0497		250 ml
01.462.0498		500 ml

AGATE

01.462.0509	50 ml
01.462.0511	80 ml
01.462.0515	125 ml
01.462.0502	250 ml
01.462.0506	500 ml



SINTERED ALUMINUM OXIDE

01.462.0507	50 ml
01.462.0512	125 ml
01.462.0499	250 ml
01.462.0503	500 ml

ZIRCONIUM OXIDE

01.462.0508	50 ml
01.462.0510	80 ml
01.462.0513	125 ml
01.462.0500	250 ml
01.462.0504	500 ml

ADAPTER FOR GLASS VIALS

01.462.0540		Adapter for 24 x 1.5 ml glass vials, stainless, hardened steel
22.749.0009		Glass vial 1.5 ml incl. septum cap, 100 pieces
05.181.0112		Replacement pressure spring for adapter for 24 x 1.5 ml glass vials, 1 piece
01.462.0541		Adapter for 7 x 20 ml glass vials, stainless, hardened steel
22.749.0010		Glass vial 20 ml incl. septum cap, 100 pieces
05.181.0044		Replacement pressure spring for adapter for 7 x 20 ml glass vials, 1 piece

ACCESSORIES FOR GRINDING JARS EASYFIT FOR WET GRINDING,

GRINDING WITH INERT ATMOSPHERE AND MECHANICAL ALLOYING (MA)

AERATION LIDS (INCL. INLAY)

22.107.0613	for grinding jars EasyFit 50 ml - 125 ml, hardened stainless steel
22.107.0616	for grinding jars EasyFit 50 ml - 125 ml, tungsten carbide
22.107.0617	for grinding jars EasyFit 50 ml - 125 ml, agate
22.107.0615	for grinding jars EasyFit 50 ml - 125 ml, zirconium oxide
22.107.0618	for grinding jars EasyFit 250 ml - 500 ml, hardened stainless steel
22.107.0621	for grinding jars EasyFit 250 ml - 500 ml, tungsten carbide
22.107.0622	for grinding jars EasyFit 250 ml - 500 ml, agate
22.107.0620	for grinding jars EasyFit 250 ml - 500 ml, zirconium oxide
22.107.0619	for grinding jars EasyFit 250 ml - 500 ml, aluminum oxide
22.864.0001	Spare valve set for aeration lids M8x1



INLAY FOR AERATION LID

03.474.0225	for grinding jars EasyFit 50 ml - 125 ml, hardened stainless steel
03.474.0207	for grinding jars EasyFit 50 ml - 125 ml, tungsten carbide
03.474.0208	for grinding jars EasyFit 50 ml - 125 ml, agate
03.474.0206	for grinding jars EasyFit 50 ml - 125 ml, zirconium oxide
03.474.0226	for grinding jars EasyFit 250 ml - 500 ml, hardened stainless steel
03.474.0210	for grinding jars EasyFit 250 ml - 500 ml, tungsten carbide
03.474.0211	for grinding jars EasyFit 250 ml - 500 ml, agate
03.474.0209	for grinding jars EasyFit 250 ml - 500 ml, zirconium oxide
03.474.0215	for grinding jars EasyFit 250 ml - 500 ml, aluminum oxide

AERATION LIDS FOR GRINDING JARS EASYFIT

INCL. O-RINGS AND SINTERED FILTER (PLEASE ORDER LID INSERT AND GRINDING JAR SEPARATELY)

22.107.0636	Aeration lid for grinding jar EasyFit 50 ml - 125 ml
22.107.0637	Aeration lid for grinding jar EasyFit 250 ml - 500 ml

INSERT FOR GRINDING JAR EASYFIT

03.474.0261	Aeration lid insert for grinding jar EasyFit 50, 80 oder 125 ml, stainless steel
03.474.0262	Aeration lid insert for grinding jar EasyFit 50, 80 oder 125 ml, zirconium oxide
03.474.0263	Aeration lid insert for grinding jar EasyFit 50, 80 oder 125 ml, tungsten carbide
03.474.0268	Aeration lid insert for grinding jar EasyFit 50, 80 oder 125 ml, agate
03.474.0264	Aeration lid insert for grinding jar EasyFit 250 oder 500 ml, stainless steel
03.474.0265	Aeration lid insert for grinding jar EasyFit 250 oder 500 ml, zirconium oxide
03.474.0266	Aeration lid insert for grinding jar EasyFit 250 oder 500 ml, tungsten carbide
03.474.0267	Aeration lid insert for grinding jar EasyFit 250 oder 500 ml, aluminum oxide
03.474.0269	Aeration lid insert for grinding jar EasyFit 250 oder 500 ml, agate
22.186.0007	Sintered filter with O-ring, set of 10 pieces
22.864.0001	Valve set M8x1 for GrindControl and aeration lids



SAFETY CLOSURE DEVICES

22.867.0011	for grinding jars EasyFit 50 ml - 125 ml
22.867.0012	for grinding jars EasyFit 250 ml - 500 ml
02.486.0055	Opening aid for safety closure device

GASKETS FOR GRINDING JARS EASYFIT

O-RINGS

05.114.0086	O-ring for 12 ml grinding jar EasyFit
05.114.0085	O-ring for 25 ml grinding jar EasyFit
05.114.0054	O-ring for 250 ml - 500 ml grinding jars EasyFit
05.114.0056	O-ring for 50 ml - 125 ml grinding jars EasyFit
05.114.0063	O-ring for 250 ml - 500 ml grinding jars EasyFit, agate
03.111.0438	Flat gasket for 50 ml, 80 ml or 125 ml
03.111.0439	Flat gasket for 250 ml - 500 ml



GRINDING BALLS

HARDENED STEEL

05.368.0029  5 mm Ø

05.368.0030  7 mm Ø

05.368.0059  10 mm Ø


05.368.0032  12 mm Ø


05.368.0108  15 mm Ø

05.368.0033  20 mm Ø


05.368.0057  30 mm Ø

STAINLESS STEEL

22.455.0010  2 mm Ø, 500 g (approx. 110 ml)

22.455.0011  3 mm Ø, 500 g (approx. 120 ml)

22.455.0002  3 mm Ø, 200 pieces (approx. 6 ml)

22.455.0001  4 mm Ø, 200 pieces (approx. 14 ml)

22.455.0003  5 mm Ø, 200 pieces (approx. 25 ml)

05.368.0034  5 mm Ø

05.368.0035



7 mm Ø

05.368.0063



10 mm Ø

05.368.0037



12 mm Ø

05.368.0109



15 mm Ø

05.368.0062



20 mm Ø

05.368.0105



25 mm Ø

05.368.0061



30 mm Ø

TUNGSTEN CARBIDE

22.455.0006



3 mm Ø, 200 pieces (approx. 6 ml)

22.455.0005



4 mm Ø, 200 pieces (approx. 14 ml)

22.455.0004



5 mm Ø, 200 pieces (approx. 25 ml)

05.368.0038



5 mm Ø

05.368.0039



7 mm Ø

05.368.0071



10 mm Ø

05.368.0041



12 mm Ø

05.368.0110



15 mm Ø

05.368.0070



20 mm Ø

05.368.0069



30 mm Ø

AGATE

05.368.0024



5 mm Ø

05.368.0025



7 mm Ø

05.368.0067



10 mm Ø

05.368.0027



12 mm Ø

05.368.0111



15 mm Ø

05.368.0028



20 mm Ø

05.368.0065



30 mm Ø

SINTERED ALUMINUM OXIDE

05.368.0021



10 mm Ø

05.368.0112



15 mm Ø

05.368.0054



20 mm Ø

05.368.0053




30 mm Ø

05.368.0052




40 mm Ø


ZIRCONIUM OXIDE


32.368.0005  0.1 mm Ø, 0.5 kg (approx. 135 ml)


32.368.0003  0.5 mm Ø, 0.5 kg (approx. 135 ml)

32.368.0004  1 mm Ø, 0.5 kg (approx. 135 ml)


05.368.0089  2 mm Ø, 0.5 kg (approx. 135 ml)


05.368.0090  3 mm Ø, 0.5 kg (approx. 140 ml)

22.455.0007  3 mm Ø, 200 pieces (approx. 6 ml)


22.455.0009  5 mm Ø, 200 pieces (approx. 25 ml)


05.368.0146 7 mm Ø


05.368.0094  10 mm Ø

05.368.0096  12 mm Ø

05.368.0113  15 mm Ø

05.368.0093  20 mm Ø

05.368.0106  25 mm Ø

05.368.0092  30 mm Ø