



MOARĂ PLANETARĂ CU BILE PM 400

The PM 400 is a robust floor model with 4 grinding stations and accepts grinding jars with a nominal volume from 12 ml to 500 ml. It processes up to 8 samples simultaneously which results in a high sample throughput.

The extremely high centrifugal forces of Planetary Ball Mills result in very high pulverization energy and therefore short grinding times.

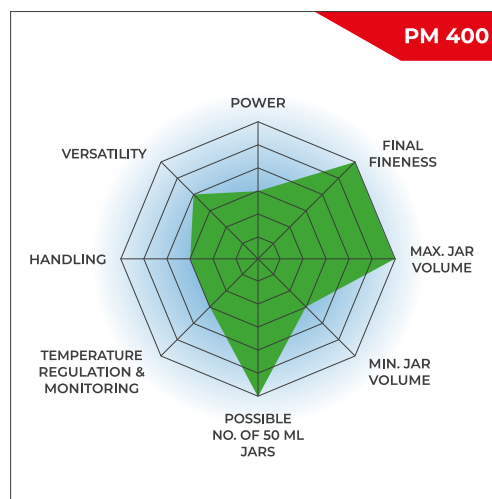
The mill is ideally suited for tasks in research like mechanochemistry (co-crystal screening, mechano-synthesis, mechanical alloying and mechanocatalysis), or ultrafine colloidal grinding on a nanometer scale, as well as for routine tasks such as mixing and homogenizing soft, hard, brittle or fibrous materials.

For mechanical alloying of hard-brittle materials, the PM 400 is available in a special “MA” version.



THE HIGH-VOLUME BALL MILL FOR HIGH THROUGHPUT APPLICATIONS

- | Max. speed 400 rpm, large sun wheel
- | Up to 10 mm feed size and 0.1 µm final fineness
- | 4 grinding stations for jars from 12 ml up to 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
- | Floor model, storable SOPs and cycle programs, 5 different jar materials for dry and wet grinding



RAPIDĂ & PUTERNICĂ

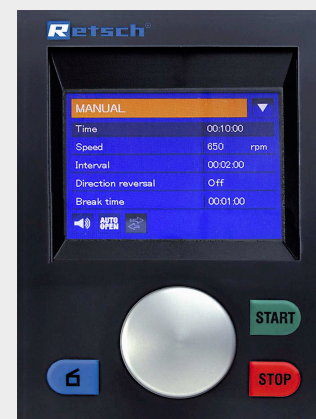
- | Măcinare până în domeniul submicronilor fără pierderi
- | Măcinarea umedă permite obținerea unor particule cu dimensiuni de ordinul nanometric (<100 nm)
- | Viteza variabilă de la 30 la 400 rpm, raport viteze 1:-2 | 1:-2.5 | 1:-3
- | Măcinare în șarje de max. 4 x 220 ml
- | 8 x 20 ml probă pe șarjă cu incinte suprapuse
- | Gamă variată de materiale pentru măcinare fără contaminare



MOARĂ PLANETARĂ CU BILE PM 400

REPRODUCTIBILITATE, SIGURANȚĂ ȘI MANIPULARE UȘOARĂ

- | Rezultate reproductibile datorită controlului vitezei
- | Fixare ușoară și sigură a incintelor de măcinare
- | Sistemul de siguranță Safety Slider împiedică pornirea mașinii fără ca incintele să fie bine fixate
- | Senzor inovator de contragreutate și dezechilibru pentru funcționare nesupravegheată
- | Setare confortabilă a parametrilor prin afișaj și operare ergonomică cu 1 buton
- | Ventilare automată a camerei de măcinare
- | 10 POS-uri pot fi stocate, timp de pornire programabil
- | Backup-ul în caz de pană de curent asigură memorarea timpului de măcinare rămas



SETĂRI & OPȚIUNI

- | Posibilitate de măcinare umedă și uscată
- | Potrivit pentru măcinări de lungă durată 99:59:59 h max.
- | Mod de operare cu pauze de răcire
- | Inversarea sensului de rotație ajută la minimizarea efectelor de colmatare

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

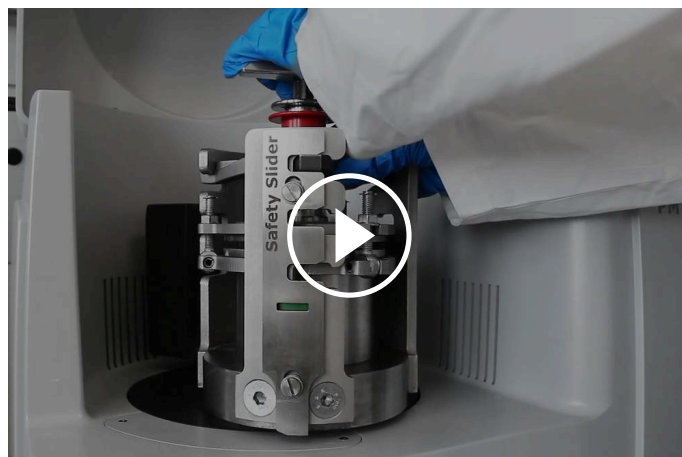


Benefit from particularly
ergonomic handling while
achieving the same finenesses
down to the nanometer range.

MOARĂ PLANETARĂ CU BILE PM 400

SIGURANȚA PE PRIMUL LOC: PRINDEREA INCINTEI

Funcționarea morilor planetare cu bile RETSCH este deosebit de sigură. Acestea dispun de un sistem de siguranță Safety Slider robust care ne asigură că moara poate fi pornită numai după ce vasul de măcinare a fost fixat în siguranță. Siguranța cu acțiune automată asigură așezarea corectă și sigură a incintei. Acest sistem mecanic solid este mai puțin predispus la defecțiuni decât soluțiile electronice - utilizatorul are acces deplin la probă în orice moment. Atunci când sistemul electronic se defectează, nu este posibilă deblocarea incintelor, de exemplu.



[Click pentru video](#)

MOARĂ PLANETARĂ CU BILE PM 400

WET AND NANO-SCALE GRINDING WITH THE PM 400

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.

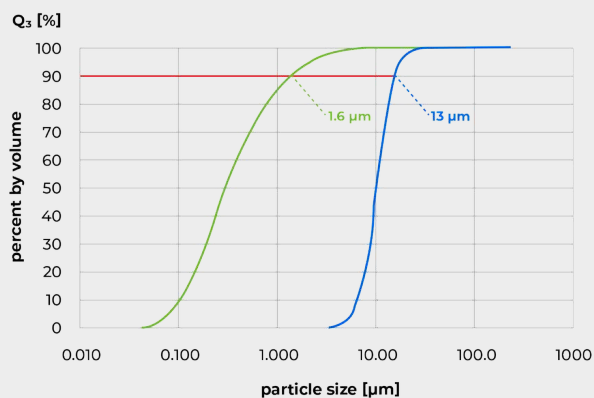
Pentru mai multe detalii despre umplerea incintei, măcinarea umedă și recuperarea probei măcinată, urmăriți videoclipul.



[Click pentru video](#)

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

The graphic shows the result of grinding glass at 360 rpm in the PM 400. After 1 h of pulverization in ethanol with 1 mm grinding balls, the D90 value of the original sample was reduced from 13 μm to 1.6 μm .

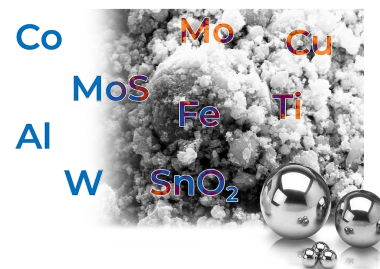


*Grinding of glass in ethanol with 1 mm grinding balls.
Blue curve: original sample; green curve: pulverized sample after
60 min.*

PM 400 MA FOR MECHANOCHEMICAL APPLICATIONS

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.

The PM 400 MA with an increased speed ratio of 1:-2.5 or 1:-3.0 is designed specifically for these applications. The optimum speed ratio and all other grinding parameters need be determined by trial and error for a specific product.



MOARĂ PLANETARĂ CU BILE PM 400

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.



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

Both the aeration 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.



GrindControl



Aeration lid



[Click pentru video](#)

Video:
Aeration lid

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](#)

MOARĂ PLANETARĂ CU BILE PM 400

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

Tabelul prezintă încărcătura recomandată (în bucăți) de bile de măcinare de diferite dimensiuni în raport cu volumul borcanului de măcinare, cantitatea de probă și dimensiunea maximă de alimentare.

MOARĂ PLANETARĂ CU BILE PM 400

PROBE TIPICE

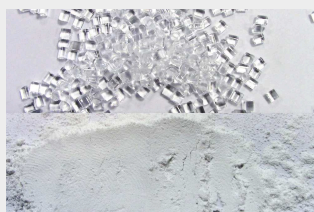
Morile planetare cu bile RETSCH sunt perfect adecvate pentru reducerea dimensiunii, de exemplu, a aliajelor, bentonitei, oaselor, fibrelor de carbon, catalizatorilor, celulozei, clincherului de ciment, ceramicii, cărbunelui, produselor chimice, mineralelor, cărbunelui, cocsului, compostului, betonului, 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.

Mediu-dur, casante: coal



4 x 150 g probă
500 ml volum incintă
inox
25 x 20 mm bile inox
2 min la 350 rpm

Mediu-dur, dur: PMMA



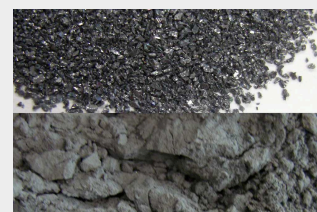
4 x 130 g sample
500 ml zirconium oxide
grinding jar
15 x 25 mm zirconium
oxide grinding balls
30 min pre-grinding at
400 rpm
150 x 10 mm zirconium
oxide grinding balls
16 h fine-grinding at
300 rpm

Dure și casante: granit



4 x 80 g sample
250 ml agate grinding
jar
6 x 30 mm agate
grinding balls
15 min at 400 rpm

Dur: silicon carbide



4 x 400 g sample
500 ml zirconium oxide
grinding jar
60 x 15 mm zirconium
oxide grinding balls
25 min at 400 rpm

Pentru a găsi cea mai bună soluție de măcinare accesați baza noastră de date

MOARĂ PLANETARĂ CU BILE PM 400

PRINCIPIU DE FUNCȚIONARE

The grinding jars are arranged eccentrically on the sun wheel of the planetary ball mill. The direction of movement of the sun wheel is opposite to that of the grinding jars in the ratio 1:-2 (or 1:-2.5 or 1:-3).

The grinding balls in the grinding jars are subjected to superimposed rotational movements, the so-called Coriolis forces. The difference in speeds between the balls and grinding jars produces an interaction between frictional and impact forces, which releases high dynamic energies.

The interplay between these forces produces the high and very effective degree of size reduction of the planetary ball mill.



[Click pentru video](#)

MOARĂ PLANETARĂ CU BILE PM 400

DATE TEHNICE

Aplicabilitate	pulverizing, mixing, homogenizing, colloidal milling, mechanical alloying, mechanosynthesis, nano grinding, 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. 4 x 220 ml, max. 8 x 20 ml cu recipiente stivuite de concasare
Posturi de macinare	4 / 2
Rata de viteză	1:-2 / 1:-2.5 / 1:-3
Viteza roții solare	30 - 400 min ⁻¹
Diametrul efectiv al roții solare	300 mm
Acceleratie	26.8 g
Tipul incintelor de măcinare	EasyFit, optional areation covers, safety closure devices
Material de constructie a elementelor de macinare	oțel călit, oțel inoxidabil, carbura de wolfram, agat, alumina sinterizata, silicon nitride, 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
Durată interval	00:00:01 la 99:59:59
Durata pauzei	00:00:01 la 99:59:59
POS-uri stocabile	10
Măsurarea energiei posibile de intrare	da
Interfață	RS 232 / RS 485
Antrenare	motor asincron cu convertizor de frecvență
Putere motor	1.5 kW
Alimentare electrica	230 V, 50 Hz

Conectare sursă de alimentare	monofazic
Grad de protecție	IP 30
Putere instalată	~ 2200 W (VA)
W x H x D (închis)	836 x 1220 (1900) x 780 mm
Masa netă:	~ 290 kg
Standard	CE
Brevet / brevet instalație	SafetySlider (DE 202008008473)

* în funcție de materialul probei și configurația/setările instrumentului

www.retsch.com/pm400

INFORMAȚII DESPRE COMANDĂ

PLANETARY BALL MILL PM 400

on wheels (please order grinding jars and balls separately)

20.535.0001  PM 400 with 4 grinding stations, speed ratio 1 : -2

20.535.0007  PM 400 MA with 4 grinding stations, speed ratio 1 : -2.5, for mechanical alloying

20.535.0008  PM 400 MA with 4 grinding stations, speed ratio 1 : -3, for mechanical alloying

la cerere, sunt disponibile alte versiuni electrice, la același preț

ACCESSORIES PLANETARY BALL MILLS

22.661.0002  Clamping unit for PM 100 / PM 400

03.025.0178 Adapter for stacking grinding jars 50 ml - 80 ml

02.728.0048  Counter aid for sun wheel PM 100, PM 200 and PM 400

03.486.0062 Opening aid for clamping unit of planetary ball mills

99.200.0009  IQ/OQ Documentation for PM 400

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
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