TAMBURLU DEĞIRMEN TM 300

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The TM 300 Drum Mill is utilized for preparing granules and powders through a grinding process conducted in either dry or wet conditions. This versatile grinder can function as either a Ball or a Rod Mill by employing the corresponding module. To ensure an efficient grinding process, it is essential to use a sufficient number of balls or rods. Depending on the sample material, a final fineness below 20 microns can be achieved.

The drum mill comprises a gear motor mounted on a robust steel frame, a set of separation grids, and a sample collector. The TM 300 is designed with a yoke and locking mechanism that facilitates easy access to the sample. Cleaning is made convenient by a quick-release locking mechanism, allowing effortless removal of the drum cover.

The TM 300 accepts sample volumes up to 20 l and is therefore also suited for upscaling processes.

Videoyu izlemek için tıklayın

TAMBURLU DEĞIRMEN TM 300

BENEFITS AT A GLANCE

TAMBURLU DEĞIRMEN TM 300

SAFE AND CONVENIENT OPERATION

The TM 300 stands out for its user-friendly features. The easy tilt mechanism facilitates the swift and uncomplicated emptying of the grinding jar. The removable sample collector simplifies the sample retrieval process, making it convenient for operators to access their collected materials.

The solid noise-protection hood contributes to a quieter and more comfortable working environment.

The TM 300 is equipped with an emergency switch, providing a quick

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and reliable means to halt the milling process in case of unforeseen circumstances, underscoring the commitment to user safety.

The redesigned drums and drum covers of the TM 300 feature improved handling, allowing the lid to be secured with just one screw for a perfect seal, even during wet grinding.

PARAMETER SETTING

Process parameters like grinding time or start/stop are conveniently set via the TM 300's large display interface. Settings include:

- Variable speed from 1 to 80 rpm
- Grinding time of up to 99:59:59 h:min:s
- Rotation direction, e. g. to reduce caking effects
- Programmable interval & break options for temperature-sensitive samples
- Delayed start function

TAMBURLU DEĞIRMEN TM 300

ACCESSORIES FOR EFFECTIVE GRINDING PROCESSES

Catering to various application needs, the TM 300 offers standard **grinding drums** ranging from 5 to 43.4 liters. This ensures that the mill is adaptable to a wide spectrum of processing tasks.

An optional **separation grid** provides convenient separation of balls and sample after the grinding process. It is suitable for grinding balls sized 10, 20 or 30 mm. A connection for dust extraction prevents release of dust.

The grinding jar comes equipped with a **gasket**, ensuring a secure seal for loss-free milling operations. This feature not only enhances the efficiency of the process but also minimizes the risk of material waste.

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5-liter Grinding drum

21.7-liter Grinding drum

Separation grid

TAMBURLU DEĞIRMEN TM 300

DRUM FILLING LEVEL FOR GRINDING BALLS AND RODS

While the maximum sample feed size depends on properties like hardness and breaking behaviour, a particle size of approximately 5 mm is ideal for the TM 300. Larger sizes are acceptable but should not exceed 15 mm. For sample lumps which break very easily or for deagglomeration effects, a feed size between 20 and 30 mm is feasible. For such easy-to-process samples, the sample filling level may be increased to 20 l.

If special drums of stainless steel 1.4404 in sizes 21.7 / 10 / 5 l together with grinding balls of steel 1.4404 are employed, it is possible to carry out **wet grinding** in the TM 300. The total filling volume for wet grinding may exceed the recommended amount for dry grinding. It may be helpful to use a large number of small grinding balls to increase friction.

Grinding drum	Mass of grinding balls	Grinding ball size (mm)	Number of rods	Optimum sample volume (l)
5 l	10 kg	<5 | 10 | 20 | 30	-	1 - 1.5
10 l	Buraya kadar 20 kg	<5 | 10 | 20 | 30	-	2 - 2.5
21.4 l	40 kg	<5 | 10 | 20 | 30	-	4 - 5
43.4 l	-	-	8	9 - 20

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TAMBURLU DEĞIRMEN TM 300

FIVE DRUM POSITIONS FOR CONVENIENT HANDLING

The user can set the grinding drums in five different positions which are secured by a screw. This ensures easy filling and emptying of the drum but also improves the mixing and grinding process. The largest rod module of 43.4 l cannot be brought into the mixing position due to lack of space.

Filling position

Mixing position

Grinding position

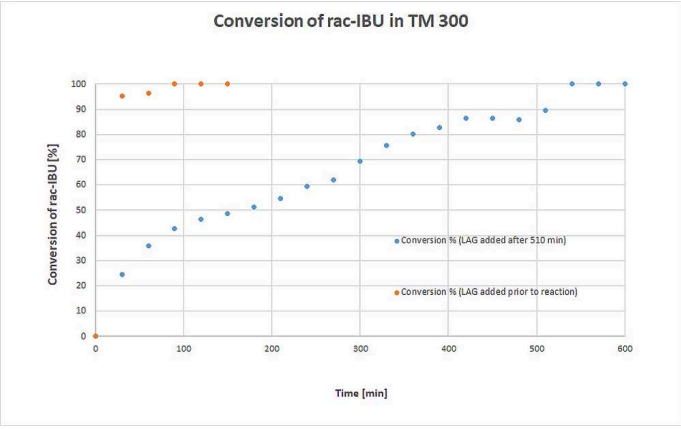
Emptying position

Complete emptying position

TAMBURLU DEĞIRMEN TM 300

THE SOLUTION FOR EFFICIENT AND SUSTAINABLE CO-CRYSTAL SYNTHESIS

The TM 300 is capable of meeting the demands of modern pharmaceutical manufacturing. This can be demonstrated by the example of the mechanochemical synthesis of rac-Ibuprofen:Nicotinamide co-crystals. The TM 300 is an environmentally friendly alternative to conventional solution-based methods. In just 90 minutes, 3.2 kg of co-crystals with a yield of 99 % were produced, using only minimal amounts of solvent in the so-called liquid assisted grinding (LAG) process. This reduces energy consumption compared to conventional methods and drastically minimizes environmental impact.



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Conversion of rac-IBU. Blue plot: neat grinding approach with addition of 10 kg of balls (d = 10 mm) after 270 min and 10 kg of balls (d = 30 mm) after 360 min; addition of LAG additive EtOH after 510 min. Orange plot: LAG-assisted approach with EtOH added prior to the reaction and 20 kg balls 10 mm.

Results presented by the research group of Michael Felderhoff [1]

TM 300 enables mechanochemical processes to be carried out on a kilogram scale, opening up new possibilities for sustainable industrial manufacturing processes. Particularly interesting is the minimal metal abrasion – the measured values were well below concerning levels and significantly lower than, for example, in eccentric vibratory mills. The table shows the minimal abrasion values in the TM 300 during the test run.

Sample	Al [ppm]	Cr [ppm]	Co [ppm]	Fe [ppm]	Ni [ppm]
Raw material IBU	11.3	39.0	25.7	71.9	34.9
Raw material Nicotinamid	8.9	33.3	26.7	40.0	33.3
Co-crystals after 30 min	10.8	35.9	30.8	51.3	38.5
After 60 min	11.0	37.0	31.7	63.4	39.6
After 90 min	17.2	43.8	35.9	64.6	45.3

SETUP:

- 2,03 kg rac IBU; 1,20 kg NIC
- 10 l drum for wet grinding, 20 kg 10 mm grinding balls stainless steel
- LAG Ethanol 0.1 ml/g
- 60 rpm for 90 min
- 99 % yield

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SPECIAL APPLICATION: BOND INDEX TEST

Another application area of the TM 300 is Bond Index Testing. The Bond Work Index is used to assess the grinding efficiency and to calculate the necessary grinding power when choosing comminution equipment in the design phase of, for example, a mining plant. Precise determination of BWI is crucial for the accurate design and estimation of costs linked to the comminution process in industries like cement, mining or steel.

Both the Ball Mill and the Rod Mill module can be used for the process. At least 15 to 20 kg sample material is required to simulate a closed grinding circuit.

BALL MILL MODULE

The Ball Mill Work Index (BWI) is used for the range from 2.1 mm down to 100 µm. The sample needs to be pre-crushed to particle sizes as defined below.

- Minerals: < 3.35 mm and sieved
- Drillcore: < 3.35 mm and sieved
- Half Drillcore: < 3.35 mm and sieved

The optimum number of grinding balls is 285. With the ball diameters varying due to wear, the overall number should be adjusted from time to time to ensure a total mass of 20.125 grams.

The grinding jar of the Bond Index Ball Mill measures 12'' x 12'' and has well-rounded corners.

ROD MILL MODULE

The Rod Mill Work Index (RWI) is used for particle size determination in a size range from 25 mm down to 2.1 mm. The sample needs to be pre-crushed to particle sizes as defined below.

- Minerals: < 12.50 mm and sieved
- Drillcore: < 12.50 mm and sieved
- Half a drillcore: < 12.50 mm and sieved

The grinding jar for the Bond Index Rod Mill is 12" x 24" in size and has a wave-shaped design.

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TIPIK ÖRNEK MALZEMELER

RETSCH tamburlu değirmenler gerçek anlamda çok yönlüdür. Örneğin: aktif karbon, alaşımlar, bentonit, kemikler, karbon fiberleri, katalizörler, selüloz, çimento klinkeri, seramikler, kimyasal ürünler, kil mineralleri, kömür, kok, kompost, beton, elektronik hurda, fiberler, alçıtaşı, cam gibi homojenleştirirler. saç, hidroksil apatit, kaolin, kireç taşı, metal oksitler, mineraller, cevherler, boya ve vernik, kağıt, farmasötik ürünler, pigmentler, bitkiler, polimerler, kuvars, tohumlar, yarı değerli taşlar, kanalizasyon çamuru, cüruf, toprak, doku, tütün, atık, odun vb.

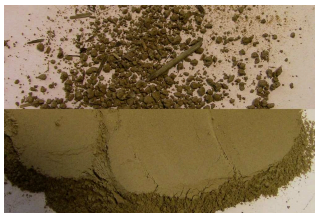
HARD-BRITTLE: SERAMIK

5 l sample
21.7 l ball module
Pre-grinding:
40 kg x 20 mm grinding balls
4 h at 60 rpm
Fine grinding:
40 kg x 10 mm grinding balls
5 h at 60 rpm

HARD-BRITTLE: PLASTIK MADDELER

4.5 l sample
21.7 l ball module
Pre-grinding:
40 kg x 30 mm grinding balls
3 h at 60 rpm
Fine grinding:
40 kg x 10 mm grinding balls
4 h at 60 rpm

MEDIUM-HARD: SOIL



25 kg sample
43.4 l rod module
8 grinding rods
1 h at 80 rpm

FIBROUS-TOUGH: SAWDUST

4.2 l sample
21.7 l ball module
40 kg x 30 mm grinding balls
5 h at 70 rpm

Örnek hazırlama göreviniz için en iyi çözümü bulmak için uygulama veri tabanımızı ziyaret ediniz

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FONKSIYON PRENSIBI

Tamburlu bir değirmende, numune (genellikle önceden ezilmiş malzeme) öğütme bilyeleriyle birlikte tamburun içine yerleştirilir ve dış kuvvetlere maruz bırakılır. Bilyalı Değirmen, kuru durumda katı maddenin darbe ve sürtünme ile ince öğütülmesi için kullanılır. Numune ve öğütme bilyelerini içeren tambur, yatay bir eksen etrafında dönmektedir. Daha büyük bilye çapları kullanıldığında parçacıklar daha kolay kırılırken, daha küçük çaplar önemli ölçüde daha yüksek bir nihai inceliğe yol açar.

The ball and the rod mill basically have the same concept comprising either a 12''x12'' jar with grinding balls or a 12''x24'' jar with grinding rods.

The jar is attached to a rotating yoke which is driven by a motor and can be placed in three different positions: Upwards for loading, horizontal for grinding, downwards for discharging.

To carry out the Bond Index test the pre-defined number of grinding balls or grinding rods is required. The electronic control integrated in the drive is equipped with an overload protection and permits and controls different speeds.

During the grinding process the difference in speeds between the balls / rods and grinding jar produces an interaction between frictional and impact forces, which releases the required comminution energy. The interplay between these forces produces a very effective degree of size reduction.

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TEKNIK VERI

Uygulamalar	pulverizing, mixing used as Bond Index Tester: quantification of grindability of ores and minerals
Uygulama alanı	biyoloji, cam / seramik, ilaç / eczacılık, inşaat malzemeleri, jeoloji / metalurji, kimya, mühendislik / elektronik, tarım, çevre / geri dönüşüm
Besleme malzemesi	yumuşak, sert, kırılgan, lifli
Boyut küçültme prensibi	sürtünme
Malzeme giriş büyüklüğü	< 20 mm used as Bond Index Tester: < 3.35 mm with ball module / 12.50 mm with rod module
Çıkış büyüklüğü	< 20 µm used as Bond Index Tester: < 100 µm with ball module / 2,100 µm with rod module
Parti boyutu / besleme miktarı	minimum 1 l / maximum 20 l used as Bond Index Tester: min. 15 kg with ball module / min. 20 kg with rod module
Dönme hızı	1 - 80 min-1 used as Bond Index Tester: 70 min-1 with ball module / 46 min-1 with rod module
Öğütücü istasyon sayısı	1
Öğütücü elemanların malzemesi	Sertleştirilmiş çelik, stainless steel used as Bond Index Tester: hardened steel
Öğütme tamburu boyutları	5 l / 10 l / 21.7 l / 43.3 l used as Bond Index Tester: 21.7 l with ball module / 43.3 l with rod module
Öğütme süresi ayarı	dijital
Tahrik	Frekans konvertörlü ile 3 fazlı asenkron motor
Motor gücü	0.75 kW
Elektriksel veriler	farklı voltajlar
Güç bağlantısı	1-faz
Koruma kodu	IP 41
Güç tüketimi	~ 1800 VA
G x Y x D kapalı	1500 x 1200 x 700 mm

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Net ağırlık	~ 306 kg
Standartlar	CE

* besleme malzemesi ve cihaz yapılandırmasına / ayarlarına bağlıdır

REFERENCES

[1] Jan-Hendrik Schöbel, Frederik Winkelmann, Joel Bicker, and Michael Felderhoff; Mechanochemical kilogram-scale synthesis of rac:ibuprofen:nicotinamide co-crystals using a drum mill; RSC Mechanochemistry, 2025, DOI: 10.1039/D4MR00096J

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SIPARIŞ BILGISI

TAMBURLU DEĞIRMEN TM 300

DRUM MILL TM 300 FOR DRY GRINDING
COMPLETE INCL. DRUM, BASE FRAME, COLLECTING UNIT WITH SEPARATING SCREENS FOR 20 MM BALLS
(PLEASE ORDER BALL FILLING/ROD FILLING SEPARATELY)

				Drum		
21.301.2001		TM 300	230 V, 50/60 Hz	21,7 l	öğütme bilyaları için	çelik 1.0037
21.301.2002		TM 300	230 V, 50/60 Hz	10 l	öğütme bilyaları için	çelik 1.0037
21.301.2003		TM 300	230 V, 50/60 Hz	5 l	öğütme bilyaları için	çelik 1.0037
21.301.2004		TM 300	230 V, 50/60 Hz	43.4 l	öğütme çubukları için	çelik 1.0037

aynı fiyata diğer elektrikli versiyonlar mevcuttur

DRUM MILL TM 300 FOR WET GRINDING
COMPLETE INCL. DRUM, BASE FRAME, COLLECTING UNIT WITH SEPARATING SCREENS FOR 20 MM BALLS
(PLEASE ORDER BALL FILLING/ROD FILLING SEPARATELY)

				Drum		
21.301.2005		TM 300	230 V, 50/60 Hz	21,7 l	öğütme bilyaları için	stainless st. 1.4404
21.301.2006		TM 300	230 V, 50/60 Hz	10 l	öğütme bilyaları için	stainless st. 1.4404
21.301.2007		TM 300	230 V, 50/60 Hz	5 l	öğütme bilyaları için	stainless st. 1.4404

aynı fiyata diğer elektrikli versiyonlar mevcuttur

DRUM MILL TM 300 FOR BOND INDEX TESTING
INCL. DRUM, BASE FRAME, COLLECTING UNIT WITH SET OF SEPARATING SCREENS FOR BALLS/RODS
(PLEASE ORDER BALL FILLING/ROD FILLING SEPARATELY)

				Drum		
21.301.2008		TM 300	230 V, 50/60 Hz	21.7 l	with rounded corners	öğütme bilyaları için

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21.301.2009		TM 300	230 V, 50/60 Hz	43.4 l	with wave form	öğütme çubukları için

aynı fiyata diğer elektrikli versiyonlar mevcuttur

ACCESSORIES TM 300 FOR DRY GRINDING

BALL FILLINGS/ROD FILLING FOR DRY GRINDING, ,

23.455.0018	Bilya dolgusu, 30 mm Ø	(20 kg)	çelik 1.3505
23.455.0015	Bilya dolgusu, 20 mm Ø	(20 kg)	çelik 1.3505
23.455.0019	Bilya dolgusu, 10 mm Ø	(20 kg)	çelik 1.3505
23.455.0020	Bilya dolgusu, 5 mm Ø	(20 kg)	çelik 1.3505
23.455.0035	Bilya dolgusu, 30 mm Ø	(8 kg), 20 mm Ø (6 kg), 10 mm Ø (6 kg)	çelik 1.3505
23.455.0016	Rod filling (for drum 43.4 l only)	(8 pcs.)	çelik 1.3505

DRUMS FOR DRY GRINDING, ,

23.462.0056	Tambur 5 l	öğütme bilyaları için	Stahl 1.0037
23.462.0058	Tambur 10 l	öğütme bilyaları için	Stahl 1.0037

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23.462.0060	Tambur 21,7 l	öğütme bilyaları için	Stahl 1.0037
23.462.0062	Tambur 43.4 l	öğütme çubukları için	Stahl 1.0037

ACCESSORIES TM 300 FOR WET GRINDING

BALL FILLINGS FOR WET GRINDING, ,

23.455.0021	Bilya dolgusu, 30 mm Ø	(20 kg)	paslanmaz çelik 1.4404
23.455.0022	Bilya dolgusu, 20 mm Ø	(20 kg)	paslanmaz çelik 1.4404
23.455.0023	Bilya dolgusu, 10 mm Ø	(20 kg)	paslanmaz çelik 1.4404
23.455.0024	Bilya dolgusu, 5 mm Ø	(20 kg)	paslanmaz çelik 1.4404
23.455.0036	Bilya dolgusu, 30 mm Ø	(8 kg), 20 mm Ø (6 kg), 10 mm Ø (6 kg)	paslanmaz çelik 1.4404

DRUMS FOR WET GRINDING, ,

23.462.0057	Tambur 5 l	öğütme bilyaları için	paslanmaz çelik 1.4404
23.462.0059	Tambur 10 l	öğütme bilyaları için	paslanmaz çelik 1.4404
23.462.0061	Tambur 21,7 l	öğütme bilyaları için	paslanmaz çelik 1.4404

ACCESSORIES TM 300 FOR BOND INDEX TESTING

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BALL FILLINGS/ROD FILLING FOR BOND INDEX TESTING				
73.455.0018	Ball filling	çelik 1.3505	for drum 12" x 12"/21,7 l	
73.455.0019	Çubuk dolgusu	çelik 1.0037	for drum 12" x 24"/43,4 l	

diğer çelik malzemeler istek üzerine

DRUMS FOR BOND INDEX TESTING				
23.462.0063	Tambur 21,7 l	with rounded corners	öğütme bilyaları için	çelik 1.0037
23.462.0064	Tambur 43.4 l	with wave form	öğütme çubukları için	çelik 1.0037

diğer çelik malzemeler istek üzerine

ACCESSORIES TM 300 FOR DRY GRINDING AND WET GRINDING

AYIRMA ELEKLERI	
03.407.0144	Ayırma elekleri 28 mm, 30 mm Ø bilyalar için
03.407.0141	Ayırma elekleri 15 mm, 20 mm Ø bilyalar için
03.407.0142	Ayırma elekleri 8 mm, 10 mm Ø bilyalar için

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