



# Pulverising Mill Bowls

A unique range of bowls from 40 to 8000 g nominal capacity



## Essa Genuine Pulverising Mill Bowls

A unique range of bowls from 40 to 8000 g nominal capacity.

The “bowl and disc” style grinding head forms the core of Essa’s extensive bowl range. Essa delivered this high-capacity, high-production bowl to the sample preparation market over 20 years ago. Today it remains the preferred bowl of choice in most of the world’s leading commercial assay laboratories.

These bowls are of through hardened steel construction for optimum life. They are available in 640, 800, 1600 and 3500 g nominal capacities.

Essa traditional “ring and roller” style bowls are available in the smaller 50, 100, 125, 300 & 400cc nominal capacities. These too are of through hardened steel construction, with tungsten carbide available in the 125cc size.

The top end of the range features Essa’s patented “ring and spigot” milling system. This innovative crushing and grinding configuration provides rapid preparation of large samples up to 8000 g in nominal capacity.

## Performance

The large-capacity “bowl and disc” bowls typically have the ability (when used on an Essa mill) to reduce ores, minerals, metallurgical samples, ceramics, soils, aggregates, chemicals and similar particulates to a nominal 0.075 mm product in approximately 3 to 5 minutes.

The “ring and roller” range are typically capable of producing an even finer product in approximately 1 to 3 minutes.

Sample masses from 1 kg to 8 kg can be processed in the “ring and spigot” bowl with a typical product size of 95% less than 0.250 mm achieved in between 4 to 10 minutes.

The performance expectation of all bowls is subject to the physical characteristics of the sample being milled and the final particle sizing required.

## The Essa Range of Heavy Duty Pulverising Mills



Micron Mill incorporates a fixed 8000 g “ring and spigot” bowl



LM5 houses a fixed 3500 g “bowl and disc” type bowl



LM2 & LM1.5 mills accept bowls between 40 and 1600 g capacity



LM1 mill accepts bowls between 40 and 800 g capacity





## Benefits

Sample preparation is an essential stage in the analytical process. Correct preparation procedures aim to produce a representative homogenous sub sample and underpin the integrity of obtaining meaningful analytical data. Essa's large-capacity, high-production grinding bowls and elements provide you with a range of options to achieve high-quality results.

- ▶ **A product you can trust:** Essa pioneered the development of large capacity pulverising in the mid-1980's and is an experienced specialist bowl manufacturer. Over this period we have developed a range of bowls featuring consistent and reliable steel composition in styles that suit almost every laboratory application.
- ▶ **Proven performer:** Essa bowls are used extensively by most commercial assay laboratories and many leading global exploration and mining companies.
- ▶ **Reduced operating costs:** cost benefits are gained through global availability and consistency of supply as a result of our large scale manufacturing process and efficient distribution network.
- ▶ **Improved sample quality:** every batch of steel used in our manufacturing process is tested by a certified laboratory to minimise the risk of unexpected contamination and to improve the certainty of final analysis.
- ▶ **Full traceability:** every bowl and grinding element is stamped with a serial number that cross-references to a 34 element steel analysis report.
- ▶ **Longer bowl life:** all bowls are through hardened to prolong operational life and to reduce sample contamination.
- ▶ **Guarantee of performance:** Essa's bowl warranty policy provides a pro rata credit for any premature bowl failure.
- ▶ **Versatile:** using a standard low cost spacer ring allows bowls from 40 g to 1600 g capacity to be used in a variety of Essa mills i.e. models LM1, LM1.5 and LM2.
- ▶ **Reduced safety risks:** heavier bowls and grinding elements are compatible with simple pneumatically actuated lifting devices (Millmates) that reduce the manual effort required when moving them between the mill and workstation.
- ▶ **Effective dust sealing:** larger bowl lids are fitted with an inexpensive and easily replaced polyurethane lid seal that prevents sample loss, reduces operator dust exposure and extends bowl life.

## A Unique Range of Bowls from 8000 g to 40 g Nominal Capacity



### “Ring and Spigot” Bowl

Handles very large capacity applications where a coarser grind is preferred. This patented configuration both crushes and grinds the sample and is ideally suited for automated utilisation. Wear components are easily replaced and the side wall discharge location provides efficient sample evacuation with reduced valve wear.

### “Bowl and Disc” Bowls

Rapid reduction of large sample masses together with a homogenising action provides improved sample quality and increased productivity. Incorporating only a single grinding element results in fewer moving parts and less pieces to clean.

#### Bowl Models and Steel Types

- ▶ B5000: Standard Steel
- ▶ B2000: Standard and Chrome Steel
- ▶ B1000: Standard and Chrome Steel
- ▶ B800: Standard and Chrome Steel

### “Ring and Roller” Bowls

Traditional style bowls that are easy to handle and suit smaller sample masses where a very fine product is required.

#### Bowl Models and Steel Types

- ▶ B400: Standard and Chrome Steel
- ▶ B300: Standard and Chrome Steel
- ▶ B125: Standard and Chrome Steel and Tungsten Carbide
- ▶ B100: Standard and Chrome Steel
- ▶ B50: Standard and Chrome Steel



## Bowl and Disc Type Bowl Range



**B5000**



**B2000**

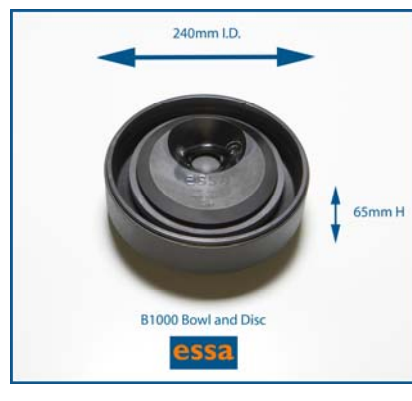


**B1000**



**B800**

Rec'd Sample Mass	1000 to 3500 g	300 to 1600 g	150 to 800 g	120 to 640 g
Bowl Weight	34.0 kg	12.5 kg	8.8 kg	6.4 kg
Disc Weight	21.5 kg	11.6 kg	8.1 kg	5.0 kg
Lid Weight	5.0 kg	3.5 kg	3.1 kg	2.3 kg
Bowl Internal Diameter	309 mm	258 mm	240 mm	210 mm
Bowl Internal Height	137.5 mm	93 mm	65 mm	65 mm
Available Steel Type	Standard	Standard & Chrome	Standard & Chrome	Standard & Chrome
Suitable Mill (50 Hz)	LM5	LM2 & LM1.5	LM2, LM1.5 & LM1	LM2, LM1.5 & LM1
Suitable Mill (60 Hz)	LM5	LM2	LM2 & LM1.5	LM2, LM1.5 & LM1





## Ring and Roller Type Bowl Range



**B400**



**B300**



**B125**

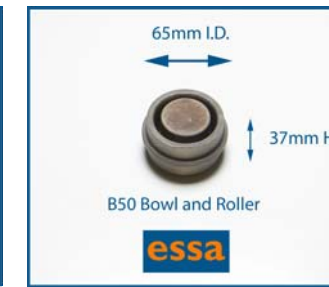


**B100**



**B50**

Nominal Capacity	400 cc	300 cc	125 cc	100 cc	50 cc
Rec'd Sample Mass	75 to 320 g	75 to 240 g	25 to 100 g	25 to 80 g	5 to 40 g
Bowl Weight	6.0 kg	6.0 kg	3.8 kg	3.6 kg	0.9 kg
Roller Weight	2.5 kg	1.7 kg	1.5 kg	1.5 kg	0.5 kg
Ring Weight	2.4 kg	Inner 1.7 kg / Outer 2.3 kg	1.5 kg	1.5 kg	n/a
Lid Weight	2.2 kg	2.2 kg	1.2 kg	1.2 kg	0.3 kg
Bowl Internal Diameter	200 mm	200 mm	140 mm	140 mm	65 mm
Bowl Internal Height	47 mm	47 mm	59 mm	50 mm	37 mm
Available Steel Type	Standard & Chrome	Standard & Chrome	Standard, Chrome & Tungsten Carbide*	Standard & Chrome	Standard & Chrome
Suitable Mill (50 Hz)	LM2, LM1.5 & LMI	LM2, LM1.5 & LMI	LM2, LM1.5 & LMI	LM2, LM1.5 & LMI	LM2, LM1.5 & LMI
Suitable Mill (60 Hz)	LM2, LM1.5 & LMI	LM2, LM1.5 & LMI	LM2, LM1.5 & LMI	LM2, LM1.5 & LMI	LM2, LM1.5 & LMI



\* Please note that the weights and dimensions for the tungsten carbide 125 cc bowl differ from the standard and chrome steel specifications stated above. Please refer to the separate tungsten carbide bowl data sheet.





Homogeneity Test Results: Essa LM2 Mill and B2000 Bowl				
Position	Sample Taken in Bowl	Sample No.	Lab 1 (mg/L Cu)	Lab 2 (mg/L Cu)
Top of Bowl	120 deg	1	50.80	48.80
	240 deg	2	49.50	50.00
	360 deg	3	49.70	49.00
			3 repeat	
Middle of Bowl	120 deg	4	50.50	49.00
	240 deg	5	50.50	50.00
	360 deg	6	51.00	49.00
			6 repeat	
Bottom of Bowl	120 deg	7	50.40	50.50
	240 deg	8	50.40	49.30
	360 deg	9	50.00	49.90
Mean Value: Samples 1 to 9			50.31	49.51
Standard Deviation: Samples 1 to 9			0.46	0.52
Recombined and Mixed		10	50.00	50.10
		11	50.00	50.30
		12	49.10	49.90
Mean Value: Samples 10 to 12			49.70	50.10
Mean Value: Samples 1 to 12			50.16	49.64
Standard Deviation: Samples 1 to 12			0.55	0.54
Diorite: 10-12 mm 95% of Total Sample		13	0.90	0.80
		14	0.90	0.81
Chalcopyrite: 10 mm 5% of Total Sample		15	992.40	1100.00
		16	979.20	1100.00
			16 repeat	
Adjusted Value			50.15	55.60

**TABLE 1:** Laboratory test results from an experiment designed to test the homogeneity of material produced from a vibratory pulverising mill (Model LM2) and large capacity disc type pulveriser bowl (B2000).

## Sample Homogeneity

In the mid-1980s Labtechnics (who merged with Essa in 1997) developed large capacity pulverising bowls for use in model LM2 and LM5 pulverising mills.

As a result laboratories had the ability to produce a large, homogeneous, pulverised sample which significantly reduced the error in sampling.

These bowls consist of a single, solid “flying saucer” shaped disc (or puck) operating in a bowl with a concave curved bottom surface.

These “bowl and disc” type bowls includes our models B800, B1000, B2000 and B5000 bowls.

The high mass of this single puck in combination with the spatula-like grinding interaction between its lower curved surface and that of the bowl provides a highly efficient pulverising performance. The puck also has an off-centre, truncated conical hole through it to assist in the mixing of the sample to assure homogeneity.

Tests show that the sample produced in an LM2 or LM5 mill with a “flying saucer type” disc and bowl is very homogeneous (table 1) and therefore justifies taking a sample aliquot directly from the bowl.

Table 1 shows the laboratory test results from an experiment designed to test the homogeneity of material produced from a vibratory pulverising mill (Model LM2) and large capacity disc type pulveriser bowl (B2000).

50 g of chalcopyrite ore (10 mm in size) and 950 g of diorite (10 to 12 mm in size) were combined and milled in the B2000 bowl for a period of three minutes.

On completion of the grinding cycle a number of sample portions were taken from various positions in the bowl. The remaining material was then removed, combined and thoroughly mixed.

The combining, at a ratio of 1:19 (by weight), of a relatively high grade copper sample within a low grade matrix of diorite and subsequent pulverising should indicate whether sufficient homogenising has taken place to allow a representative sub-sample to be taken directly from the bowl for assaying.

The results of this test work indicate that there does not seem to be any significant differences in grade from any level and therefore the disc-type grinding element and bowl produces a homogeneous sample. Any variation can be more than compensated for by analytical reading error.

