

CRUSHING AND SCREENING

SGS MINERALS SERVICES

SGS Lakefield Orestest Pty Ltd (SGS) was originally founded in 1993 as Orestest Pty Ltd. SGS has since developed into a major metallurgical services organisation located in a purpose-built laboratory in Perth, Western Australia.

The laboratory is dedicated to providing high quality metallurgical testing across the broad spectrum of the minerals industry including:

- Gold ores
- Nickel laterites
- Base metal
- Iron ore
- Mineral sands
- PGM ores
- Rare-earths and other exotics
- Diamond ores
- Environmental services

SGS provides a comprehensive range of test work capabilities including bacterial leaching, crushing, screening, grinding, ultra fine grinding, gravity, magnetic & electrostatic separation, solvent extraction, electrowinning, flotation, pressure leaching, pressure oxidation, pressure acid leach and cyanide speciation. Pre-feasibility studies, on-site diagnostic metallurgical services, environmental testing and analytical services are also included in our range of capabilities.



FACILITIES AT SGS FOR CRUSHING AND SCREENING

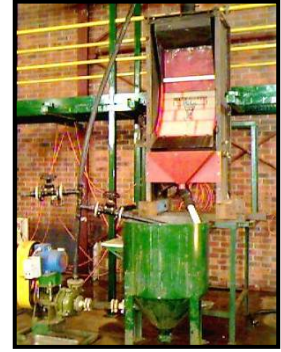
SGS offers the full range of industry standard comminution evaluation tests, including unconfined compressive strength, Bond abrasion, abrasion index mill, ball mill, rod mill and impact crushing determinations including JK Drop Weight Tests. Other specific items of equipment are detailed overleaf:

The following crushers are available at SGS:

	Smallest Setting	Largest Setting
Jaques 12"	25 mm	50 mm
Hadfield 12" * 9.5	15 mm	75 mm
Jaw Crusher 1:	10 mm	30 mm
Jaw Crusher 2:	4 mm	25 mm
Jaw Crusher 3	4 mm	20 mm
Pascall Jaw Crusher	2 mm	10 mm
Chipmunk Jaw Crusher	4 mm	20 mm
LM2 Pulveriser		
Cone Crusher	2 mm	12 mm
2 * Roll Crusher	0.5 mm	3 mm

The following screening equipment is available at SGS:

- Nordberg 1.2 m x 1.8 m vibratory screen: Available for wet or dry screening. Various screen apertures available in either woven wire or polyurethane.
- Kason Screens:
 - Three large – Diameter: 1200 mm
 - Two medium – Diameter: 500 mm
 - Two small – Diameter: 365 mm
- Apertures ranging from 25 μm – 106.0 mm.
- 400 mm x 400 mm Cheers screens with screen apertures from 0.500 mm – 31.5 mm.
- 300 mm Endecott test sieves from 25 μm to 125 mm.
- 200 mm Endecott test sieves from 25 μm to 75 mm.
- Three Ro-Tap sieve shakers to house a nest of 7 x 200 mm diameter sieves.
- One Endecott 2 MKII sieve shaker to house a nest of 5 x 300 mm diameter sieves.
- Derrick and DSM screen.
- Warman Cyclosizer: for sub-sieve sizing below 45 μm .



SGS has the following hydrocyclones for classification testwork:

- Warman 4" and 6" unit.
- Moseley 1/2", 1" and 2" rigs.
- Multitec 4"
- Warmen Cavex 4"



SGS has the following rotary splitters:

- Two small: one 6 splitter and one 8 splitter
- Two large: one 10 splitter and one 12 splitter



SGS has rod and ball mills suitable for 100 g samples through to pilot plant scale, including:

- Rod Mills:
 - » Bond Rod Mill with internal diameter 300 mm; length 610 mm
 - » Two standard size rod mills with internal diameter: 255 mm; length: 300 mm
 - » One rod mill with internal diameter: 255 mm; length: 250 mm
 - » One rod mill with internal diameter: 305 mm; length: 390mm
 - » One pilot plant scale rod mill with variable speed.
 - internal diameter: 500 mm
 - length: 1500mm
 - suitable for 50 – 100 tph
- Ball Mills
 - » Bond Ball Mill with internal diameter 300 mm; length 280 mm
 - » Pilot plant-scale ball mill with fixed speed.
 - internal diameter: 800 mm
 - length: 900 mm
 - feed chute and total diameter of 180 mm
 - suitable for 100 – 200 t/hr.



Extensive pilot plant facilities have been established at SGS, enabling continuous operation of unit operations such as scrubbing, trommelling, attritioning and size separation. These can be utilised for straight sample preparation or as beneficiation plants.

The mill consists of a cylindrical bowl filled with small diameter grinding media (usually 6 mm diameter steel, zirconia or alumina balls). Power for grinding is transferred to the charge by means of a vertical arm fitted with horizontal pins. The arm and pins are rotated to 'stir' the charge. Milling takes place by abrasive grinding between the balls.

This mechanism is far more efficient than conventional tumbling ball mills for grind sizes below about 25 µm. Typically, power requirements to grind concentrates from P80 = 75 µm to p80 = 5 µm are in the range of 60 - 90 kWh/t.

The optimum mass of material is calculated to fill the void space of the mill charge (this mass depends on solids density, percentage solids and volume of mill).

Power input to the mill is calculated by measuring the torque applied to the rotating shaft (via a load cell) and the speed of rotation of the shaft. The mill is usually operated at the optimum power density (eg, 130 kWh/m³ for steel media), which is achieved by setting the torque and speed of rotation at calculated values.

The time of milling is calculated to give a specific power input, eg, 100 kWh/t. This power is the 'uncorrected' power input; large commercial mills are more efficient than the laboratory mill, so that a 'corrected' power figure is quoted, based on factors supplied by Metprotech (these factors are derived from actual operating data on commercial mills).

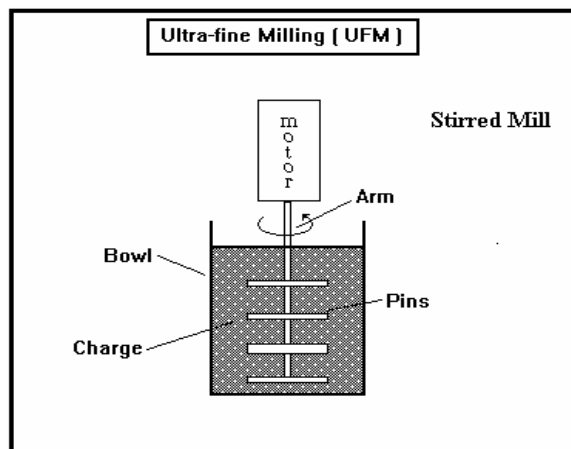
During batch milling, cooling water can be applied to a jacket on the mill to ensure that the charge temperature remains low.

At the conclusion of the milling cycle, the pulp plus media are wet screened at about 2 mm, to separate out and wash the grinding media. Milled pulp is settled or filtered (but not dried) and the solids then split, weighed and sent to subsequent testing.

Usually a small sample of milled solids is removed for laser sizing and (occasionally) analysis.

Media consumption can be estimated by weighing media before and after milling; however the relevance of the measurement compared to actual large operating mills is still subject to investigation.

SGS also has a pilot scale Metprotech ultra fine mill of dimensions 650 mm length x 220 mm diameter for larger projects.



For more information, please contact us:

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