

MOUNT ISA MINES LIMITED
LABORATORY AND TECHNICAL INFORMATION
SERVICES

METHODS FOR THE SIZING ANALYSIS
OF
ORES AND METALLURGICAL SAMPLES

Sizing a Sample

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PROCESS:
MET02.03

LATIS/ Sizing a Sample

Amendment Record

DATE	Version	Reason for Change	Auth.
31.10.1997	1.0	Document Issued	MDR
9/2/00	2.0	Procedure updated and clarified	MDR
29/03/04	2.1	On use check form added and some minor changes made to update method.	JWST

1 SCOPE

This procedure is used to perform a sizing analysis where the fractions produced may be further processed to enable chemical analysis. Various screen sizings and also various combinations of fractions will be selected according to the wishes of the metallurgist who is requesting the sizing.

2 APPLICATION

This procedure is applicable to metallurgical samples including (but not limited to) - run-of- the-mill production samples, flotation testing samples or daily or period composite samples.

3 PRINCIPLE

The requirement for sizing analysis of the samples being worked with by a metallurgist, is fundamental in the understanding of what is being achieved or aimed for. Sometimes the range of sizings is sufficient and sometimes the chemical composition is required as well.

4 REFERENCED DOCUMENTS

The following JSA should be referenced in connection with this procedure:

SIZ.005 - Making a nest of screens.

Also the following Methods:

MET01.01 - Preparation of the Laboratory Sample for Assay; and

MET 01.05 - Rotary Splitting and Bagging of Drill Core for Laboratory Testing.

5 EQUIPMENT

- 5.1 Clean Sieves - individual, brass frame, stainless steel mesh, 200 mm diameter, ranging in mesh opening from 26.9 to 0.038 millimetres (Appendix C – sets out the IMPERIAL equivalents of metric mesh sizes).
- 5.2 Analytical balance – calibrated and capable of reading accurately to three decimal places.
- 5.3 Plate - enamel, rounded.
- 5.4 Plate - enamel, flat.
- 5.5 Brushes for cleaning sieves – suitable brushes that will NOT damage the screens (eg soft horse hair OR hog bristle).

6 PROCEDURE (WHERE FRACTIONS ARE REQUIRED FOR ASSAY)

This process is started when the Laboratory Coordinator issues instructions to the Research Operator based on a metallurgist's requirements as detailed in a Milling Research Request Form. These requirements detail the assays needed and the sizings and combinations wanted. In the case of Period sizings these requirements are preordained.

6.1 Collect and identify the samples from the appropriate area and take them to the sample preparation room.

6.2 Dry the samples, if necessary, cool and refer to Sample Prep (MET01.01) and Wet Screening Procedure (Appendix B).

Note 1: Be careful not to burn the samples.

6.3 Obtain one rounded, clean and unchipped plate for each sample.

6.4 Obtain a tag for each sample and obtain a sizing pad. Write up the sample names on the tags and write up the sizing sheet as instructed.

6.5 Refer to Rotary Splitter Procedure (MET01.05) if required.

6.6 Place the plate on the balance and tare.

6.7 Take the plate off the balance and cut out an estimated 150g (gram) of sample. Refer to Sample Preparation Procedure (MET01.01).

6.8 Replace the plate onto the balance.

6.9 Record the weight of the sample on the appropriate tag and on the sizing pad.

6.10 Place the rest of the sample into a suitably labelled reserve bag.

6.11 Repeat steps 6.3 to 6.10 for all samples in the batch.

6.12 Sample is ready to be Wet Screened (see Appendix B).

6.13 Select the dry screens required and check they are clean and not damaged.

6.14 Make up the nest of screens (see Appendix A).

6.15 Brush all the dried oversize wet screened material onto the top screen of the dry screen nest.

6.16 Place the nest into the rotap machine

6.17 Set timer/s on rotap machine for 20 minutes.

6.18 When the time has elapsed and the rotap is finished operating, remove the nest of screens.

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- 6.19 Ideally use the same balance used to record initial weight to record fraction weights.
- 6.20 Tare off the plate on the balance and remove plate from balance.
- 6.21 Carefully pour the sample remaining on the top screen onto the plate and use the brush to complete the transfer.

Note 2: Brush any oversize material that is lodged between the mesh into the coarser fraction.

- 6.22 Record the fraction weight in the appropriate place of the sizing sheet.
- 6.23 Pour and brush the material onto clean waste paper to be transferred to a bag labelled with the appropriate sample and mesh number.
- 6.24 Repeat step 6.20 to 6.23 for each screen.
- 6.25 Combine the base plate material with the bucket containing under-size material from your wet screening.
- 6.26 Filter bucket and dry sample on hot plates.
- 6.27 Tare off the same amount of filter paper as the filtered under-size material is on.
- 6.28 Remove filter papers from balance.
- 6.29 Place the dried filtered under-size material on filter paper onto the balance to weigh the undersized material.
- 6.30 Record the weight of the dried filtered under-size material in the appropriate place on the sizing sheet.
- 6.31 Place the sample from the filter paper to the respective sample bag.
- 6.32 Add up the screen weights and subtract this from the total weight to obtain the weight of under-size material.

Note 3: If this weight is the same or up to 1% higher than the actual weight then write in the calculated weight. If it is lower or greater than 1% higher then see your Supervisor or the Metallurgist.

- 6.33 Enter the results into the computer in the appropriate file.
- 6.34 Forward the results to the Metallurgist.
- 6.35 Check with the Metallurgist to confirm the combinations required.
- 6.36 Combine the required fractions into one bag.

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- 6.37 Spex mill grind all fractions (see MET01.02).
- 6.38 Take samples and paper work to XRF if required.
- 6.39 Thoroughly clean area and all equipment used.

7 PROCEDURE (NO ASSAYS REQUIRED)

- 7.1 Follow steps 6.1 to 6.22.
- 7.2 Discard fraction.
- 7.3 If more that one sample to be sized follow steps 6.15 to 6.22.
- 7.4 Discard fractions.
- 7.5 Calculated % weights.
- 7.6 Enter results into the computer in appropriate file.
- 7.7 Forward the original sizing sheet with a copy of the request form to the Originator of the request form.
- 7.8 Give a copy of the sizing sheet with the original request form to the Laboratory Coordinator.
- 7.9 Follow steps 6.56.

APPENDIX AMAKING A NEST OF SCREENS AND SCREEN HANDLING

On request for a sizing analysis the appropriate screens may have to be set up in order to correspond to the requirements.

- 1.0 Making a nest of screens.
- 1.1 Always hold and stack screens in the horizontal position.
- 1.2 Note the screen size order.
- 1.3 Select the coarsest screen size and check for suitability (holes, cracks or mesh blockage). Record the result of the check on the On Use Form (Appendix D).
- 1.4 If the screen is damaged in any way, inform your Supervisor and clear any blockages by placing the screen in an ultrasonic bath.
- 1.5 Place screen on paper towel and on its side against a wall on the bench to dry.
- 1.6 Repeat step 1.3 to 1.5 with the subsequent screen sizes, moving from the coarsest screen size to the finest screen size and place each face down on top of the previous screen.
- 1.7 Select the screen base pan and check its condition – then place the pan on the base of the last screen in the nest.
- 1.8 Reverse the nest by placing one hand on the bottom of the base pan and the other hand under the first screen on the bench and turning the assembly over.
- 1.9 Check the screen size order again, against the requirements on the request form.

NOTES:

The screens used in the Metallurgical Services Laboratory are Endecott screens and are kept in particular sets which shall not be broken up.

It is worth stating that the reliability of a sizing test is dependant on the preparation of the sample and the efficiency of the screens used.

Damage to screens is usually the result of neglect, bad handling techniques or wear and tear. All screen faults should be reported to your Supervisor immediately.

Always carry screens in an upright position. After weighing fractions the screens should be placed face down on the bench as detailed above.

If screens are not required again they should be cleaned and stored in the correct area.

APPENDIX B – WET SCREENING

B1 Select a suitable screen (either a 270# or 400# screen is used depending upon requirements) and position it above a 10 litre bucket using the screen holder. Attach a screen spacer to the top of the screen.

B1 Wash 80-150g of the dry sample onto the screen of choice.

Note 1: If the sample is very coarse (ie +28#) then use more sample – about 300g.

B2 Utilising a fine spray from a water hose wash the sample backwards and forwards across the screen (the minus material will pass through the screen to be collected in the bucket).

Note 2: DO NOT use excessive water pressure as this may cause loss of particles from the screen.

B3 DO NOT use a rubber bung to break up agglomerates – instead place this material onto a plate and then break up the agglomerates. Pour this material back on to the screen.

B4 Keep the amount of wash water to a minimum (not more than 4L). The minus material collected in the is then combined with –270# or –400# material from dry screening and sent for precycloning.

B5 The plus material remaining on the screen is is then washed off onto a plate and dried. It may be dry screened later.

APPENDIX C - SCREEN DETAILS

A typical nest or set of screens is set out below in order.

Mesh (Imperial) Order	Mesh (Metric) Order		
1/2"	12.50		
3/8"	9.50		
4#	4.75		
6#	3.35		
8#	2.36		
10#	1.70		
14#	1.18		
20#	0.85		
28#	0.600		
35#	0.425		
48#	0.300		
65#	0.212		
100#	0.150		
150#	0.106		
200#	0.075		
270#	0.053		
400#	0.038		
Base/Receiver	Base/Receiver		

