Designation: E 1833 – 96

Standard Practice for Sampling of Blister Copper in Cast Form for Determination of Chemical Composition[1]

This standard is issued under the fixed designation E 1833; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice describes a procedure for the sampling and sample preparation of cast blister copper for the determination of chemical composition.

1.2 This practice is intended to cover the general principles of sampling applicable to cast blister copper forms.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

E 88 Practice for Sampling Nonferrous Metals and Alloys in Cast Form for Determination of Chemical Composition[2]

E 255 Practice for Sampling Copper and Copper Alloys for the Determination of Chemical Composition[3]

3. Terminology

3.1 Practice E 255 lists all the necessary terminology used for the understanding of this practice.

4. Summary of Practice

4.1 Each selected copper piece is drilled by means of a commercial drill press using a ¾-in. carbide-tipped, or tool steel drill. The speed of sampling shall be so regulated that excessive heating, and consequent oxidation, is avoided. Carbide-tipped tools are recommended. Drill cuttings are collected with a commercial vacuum cleaner and ground in a cutter mill. Sample size reduction is accomplished with the use of a riffle and Tyler screens.

5. Significance and Use

5.1 This practice for sampling of cast blister copper is intended primarily to test such materials for compliance with compositional specifications. It is assumed that all who use these methods shall be trained samplers capable of performing common sampling procedures skillfully and safely.

5.2 The selection of correct test pieces and the preparation of a representative sample from such test pieces are necessary prerequisites to every analysis. The analytical results will be of little value unless the sample represents the average composition of the material from which it was prepared.

6. Apparatus

6.1 *Bucket*, plastic sack-lined.
6.2 *Cards*, sampling information.
6.3 *Center Punch-Spring Steel*.
6.4 *Chalk*, blackboard type.
6.5 *Cutter Mill or Hance Grinder*.
6.6 *Drill Bit*, approximately ¾-in. diameter and a length sufficient to penetrate the blister copper form completely.
6.7 *Drill Press*, commercial type, 610 rpm.
6.8 *Electromagnet*, hand-held or other permanent magnet.
6.9 *Hammer*, blacksmith type.
6.10 *Pan*, square metal or plastic, approximately 10 × 10 in.
6.11 *Paper*, Kraft.
6.12 *Pulp Sample Sacks*.
6.13 *Riffle*, Jones Type, or other of similar design.
6.14 *Rotap Machine*, or similar sieve shaking device.
6.15 *Template*, drilling sequence, Fig. 1, Note 1.
6.16 *Tyler Screen*, 20 mesh, 12 in.
6.17 *Tyler Screen*, 60 mesh, 12 in.
6.18 *V-blender*, or similar style mixer.
6.19 *Vacuum Cleaner*, commercial quality.

7. Procedure

7.1 *Sampling*:

7.1.1 Different parts of a blister copper form may vary in composition. A sample, therefore, must be taken with care to be representative of that form. To obtain a sample representative of a lot of the product, a number of test pieces should be sampled individually. The sample taken should be representative and large enough to suffice for all of the required determinations and reserve material for the settlement of disputes.

7.1.2 Fit the drilling sequence template to one edge of the blister copper form. The edges of the template should be even with the edges of the blister copper form. One corner of the

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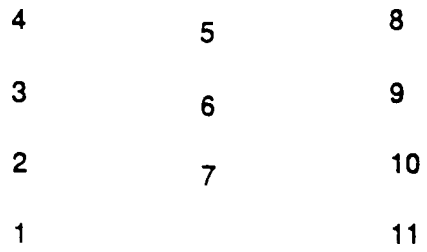
[2] *Annual Book of ASTM Standards*, Vol 03.05.

[3] *Symposium on Sampling and Analysis of Copper Cathodes, ASTM STP 831*, ASTM, 1987.



NOTE 1—Template should have external measurements that would exactly fit ¼ of the dimensions of the cast blister bars.

FIG. 1 Drilling Sequence Template

template should be near one corner of the form and the opposite corner should be near the center of the bar. The template should cover approximately one-quarter of the surface area of the blister copper form.

7.1.3 Chalk the number one hole, then remove the template. Use the center punch and mark the chalked area for drilling. With a high-pressure air hose, blow off the excess chalk and dust particles on the copper form. Care shall be exercised that foreign material is not included with the drilling.

7.1.4 Begin drilling the blister copper form in the marked area. Be careful to keep the drill bit properly aligned. The speed of sampling shall be so regulated that excessive heating and consequent oxidation is avoided.

7.1.5 Blister copper drill cuttings, as they are produced, are picked up by a commercial vacuum cleaner and deposited in the vacuum receiving chamber. Place the 10 × 10 in square pan under the blister copper form, in line with the drill bit. When the drill bit has completely penetrated the blister form, drill cuttings fall into this pan.

7.1.6 Vacuum the blister copper drill cuttings, present in the pan, into the vacuum receiving chamber. If a vacuum is not available, brush drill cuttings into a receiving pan with a stiff 3-in. paint brush.

7.1.7 Repeat 7.1.2-7.1.6 for each template location until all eleven holes have drilled in the same quadrant of eleven different blister copper forms.

7.1.8 Move the template to the next quadrant location on the blister copper form and repeat steps 7.1.2-7.1.7 for each remaining quadrant on the copper forms.

7.1.9 Repeat 7.1.2-7.1.8 for all copper forms in the gross sample of the lot. Transfer the drill cuttings from the vacuum receiving chamber to a plastic sack-lined bucket. Record all pertinent information on the sample information card and place the card in the bucket. Place the lid on the bucket and seal it.

7.2 *Sample Preparation*:

7.2.1 Adjust the cutter mill to coarse grind. Slowly pour the gross sample into the cutter mill to reduce large congiomerates of sample. Place the gross sample into the V-blender and blend for 15 min. Riffle the sample to split the gross sample into two equal representative fractions, A and B. Place the A increment into storage and label, "bulk reserve" sample. Continue to riffle the B fraction until approximately 4000 g of sample have been obtained. Place all surplus increment splits from the B fraction into the A increment bulk storage container.

7.2.2 Using the 4000 g B increment sample obtained in 7.2.1, place this material into the 20 mesh 12-in. Tyler screen. Place the screen and its −20 mesh holding pan into a sieve shaker for 15 min. Separate the +20 mesh material, which is present upon the 20-mesh screen, from the −20 mesh holding pan. Regrind the +20-mesh material in the cutter mill until 100 % of the +20-mesh material will pass through the 20-mesh Tyler screen.

7.2.3 Spread all of the −20-mesh material obtained in 7.2.2 in a flat area approximately ¼ in. on the brown Kraft paper.

7.2.4 Comb the spread −20 mesh blister copper material with the hand held magnet. Hold the magnet approximately ¾ in. above the flattened material. The magnet will remove a sampling bias due to iron metal shavings from the cutter mill.

NOTE 1—The magnet also may remove other magnetic material from the drill cuttings. Adjust the height of the magnet until only the iron filings are removed.

7.2.5 Place the combed −20 mesh blister copper into the 60 mesh Tyler screen. Place the 60 mesh Tyler screen, blister copper, and 60 mesh holding pan into the sieve shaker. Shake for 15 min. Remove the +60 mesh blister copper material.

NOTE 2—Screen size may be changed by contractual agreement.

7.2.6 Weigh in grams, both the +60 mesh and −60 mesh blister copper material. Record the weights obtained upon the receiving pulp sacks.

7.2.7 By division, split separately the +60 mesh material and the −60 mesh material with a riffle until the contractually agreed laboratory samples can be obtained. The samples should be divided into three equal portions, placed in an identified container and sealed. One portion each shall be reserved for the manufactured, purchaser, and umpire.

NOTE 3—Sample division may be changed by contractual agreement.

7.3 *Sample Storage*—Material to be stored over a long period, which oxidizes readily alters in composition under varying atmospheric conditions, or which may be contaminated by paper or cardboard, should be kept in an airtight container or suitable size and composition under a protective gas such as nitrogen.

7.4 *Resampling*—In case of dissatisfaction with the sample prepared from the product, either party may require that the consignment of blister copper be reprepared.

8. Keywords

8.1 blister copper; sampling