



Designation: B1027 – 24

Standard Guide for Obtaining a Representative Sample of Copper and Copper Alloy in Particulate Form for Analysis¹

This standard is issued under the fixed designation B1027; 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 guide covers the procedures of acquiring a representative sample of copper and copper alloy scrap in the form of small particles for analysis. This method is for (but not limited to) determining the chemical composition using Atomic Emission Spectroscopy (AES), but other methods of tests may also be used depending on laboratory sample preparation. This guide addresses a composite analysis of the lot examined by the user.

1.2 This guide is also intended to be adaptable and work with different techniques that might be appropriate for different situations based on how copper and copper alloy scrap particles are collected and how the product is delivered.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

B215 Practices for Sampling Metal Powders

B846 Terminology for Copper and Copper Alloys

E135 Terminology Relating to Analytical Chemistry for Metals, Ores, and Related Materials

¹ This guide is under the jurisdiction of ASTM Committee B05 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.08 on Recycled Materials.

Current edition approved July 1, 2024. Published July 2024. DOI: 10.1520/B1027-24.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

3. Terminology

3.1 *Definitions*—For definitions of terms used in this guide, refer to Terminologies **E135** and **B846**.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *composite sample, n*—blended entire gross sample.

3.2.2 *cone and quarter, v*—as used in this guide, a method of subdividing a test lot or test sample into smaller unbiased quantities.

3.2.3 *correct sampling, n*—as used in this guide, defined by the work of Dr. Pierre Gy as “a sampling scenario in which all particles in a population have the same probability of ending up in the sample.”³

3.2.4 *granulated material, n*—as used in this guide, product from scrap recyclers mechanically chopping bare and insulated wire or other forms of copper or copper alloys to recover to granules to put back into the value stream of recycled products.

3.2.5 *gross sample, n*—total quantity of granules adequate for the intended purpose(s), consisting of all the increments combined.

3.2.6 *increment, n*—quantity of granules obtained by a sampling device at one time from a larger quantity of granules.

3.2.7 *particulated material, n*—as used in this guide, all material in the form of small granules whether mechanically chopped or not.

3.2.7.1 *Discussion*—Examples of particulated material other than granulated include chips, powders, and turnings that may not have been further processed after generation before being presented for use or sale as scrap. Users are cautioned that all forms of particulated material, as defined in this guide, may not flow freely through all types of equipment mentioned herein.

3.2.8 *sample (or chute) splitter, n*—a particle analysis sorting tool used to randomly divide a sample into smaller, unbiased testable portions; for reference, **Fig. 1** below from Practices **B215** is an example of a sample splitter.

3.2.9 *scoop, n*—as described and depicted in Practices **B215**.

³ Gy, P. M., *Sampling of Heterogeneous and Dynamic Material Systems*, Elsevier: New York, NY, 1992.

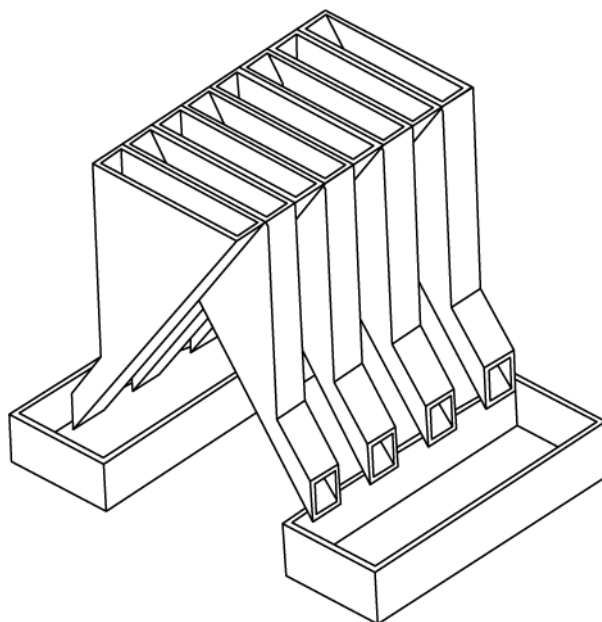


FIG. 1 Sample Splitter

3.2.10 *slot or tube samplers with an auger point (multi-level or single-level)*, *n*—as described and depicted in Practices B215.

3.2.11 *spinning riffler*, *n*—as described and depicted in Practices B215.

3.2.12 *test sample*, *n*—as used in this guide, a composite of material taken by approximate proportional weight from random containers of the lot to be sampled.

3.2.13 *top dressed loads*, *n*—as used in this guide, where there are top layers of material placed in the container of a materially different quality or composition than the material underneath, and the material underneath is of a lesser or inferior quality or value, or is a different material; top dressed loads do not include lots that have accumulated an incidental layer of ambient dust, etc. from storage.

4. Significance and Use

4.1 This guide is intended primarily for the sampling of particulated copper and copper alloy material for compliance with compositional specification requirements. “Granulated chops” commonly refers to wire and cable, but it may also include other forms and applications of copper such as, but not limited to, transformer windings, plumbing tube, radiators, and sheet. This guide also applies to lots of material that are already particulated in the as-received condition, that is, not subjected to mechanical processing such as turnings, shavings, dust, and fines.

4.2 Particles $\frac{3}{4}$ in. and down in their largest dimension are recommended for sampling as “chops” or “particulates” in accordance with this guide. Larger particles may lend themselves to other methods of inspection, including visual, at the discretion of the user.

4.3 As-received particulated material packaging may vary as a function of the shippers’ and receivers’ capabilities. In

areas of confinement, gaylord or container boxes are commonly used, but some shipments can be loose and unpackaged that can be dumped onto the floor for inspection.

4.4 Various physical sampling techniques are applicable: for example, shoveling to fill a bucket, or use of a pipe sampler or auger to obtain a core sample, representative of a full height sample of the cross-section of scrap in accordance with Practices B215. Tools described and depicted in Practices B215, and applicable here (but not limited to), include:

- 4.4.1 Sample or chute splitters;
- 4.4.2 Slot or tube samplers;
- 4.4.3 Scoops;
- 4.4.4 Spinning riffles.

4.5 Users are encouraged to read Practices B215 Section 5 “Apparatus” for descriptions of equipment that may be applicable to sampling particulated copper material.

4.6 Pneumatic aspirators may also be employed to gather samples, as shown in Fig. 2 below.

4.7 The above list of tools and devices is neither mandatory nor all-inclusive. Users are guided to employ whatever tools, devices and practices are necessary in order to reasonably achieve correct sampling.

4.8 Sampling of scrap metal differs from sampling of metal powders and ores (discussed in Practices B215) in the following ways:

4.8.1 Scrap may reasonably, properly, and commonly include blends of material or containers of material from multiple original sources.

4.8.2 Scrap metal processing is subject to different kinds of human intervention than powders and ores.

4.8.3 Scrap metal quality and composition is often traded as a grade rather than as a specified composition or quantified on recovery, and therefore evaluation is often more complex.