



## HOW TO GUIDELINES

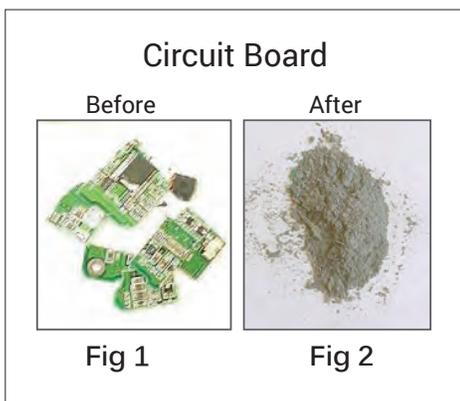
### The use of Cryogenic grinding to comply with the RoHS/WEEE Directive

The Restriction of Hazardous Substances (RoHS) and Waste Electrical and Electronic Equipment (WEEE) Directives of the European Union were introduced to minimize the accumulation of hazardous waste in landfills from the disposal of electrical and electronic equipment. The concentrations of hazardous substances such as lead, cadmium, mercury, chromium VI, polybrominated diphenylethers (PBDEs), and polybrominated biphenyls (PBBs) are restricted in electrical and electronic products and/or components.

RoHS/WEEE states that if the component can be mechanically separated, then each component is subject to the RoHS limits. The definition of exactly what this means is an ongoing process. One thing is certain; in order to get an accurate analytical result, these products and components must be reduced to homogenous, representative samples.

Many components such as circuit boards, wire, solder, polymers and resins are difficult if not impossible to grind using traditional methods. Cryogenic grinding in the SPEX SamplePrep Freezer/Mill® is the easiest way to homogenize these materials. Using cryogenic grinding to chill samples until they are brittle, and then break them up through impact, crushing, or shearing allows the toughest samples to be ground.

Consider analyzing circuit boards: (Fig. 1) A small piece taken from a board at random would not be representative of the whole board. Sampling many boards, and homogenizing them, assures that the sample used for analysis is representative of the batch.



The sample is cut into manageable pieces, these are then placed in the appropriately sized Chromium-Free Grinding Vial (Cat. No. 6771, 6871, or 6883). This vial also contains a magnetically driven Cr-free impactor. The vial is then loaded into the Freezer/Mill and immersed in liquid nitrogen until the contents are thoroughly chilled, usually a matter of 10-15 minutes. For high throughput applications, up to 3 additional vials can be chilled in the pre-cool chamber inside the mill. The sample inside the vial is then pulverized, and because the sample is isolated in a closed grinding vial, cross-sample contamination is easily controlled

and sample integrity is maintained. Grinding time can vary depending on the type of sample but a grinding time of approximately 10 minutes can be expected. The resultant fine, uniform powder (Fig. 2) can then be used for XRF, ICP or other types of analysis.

For further information, please request our study entitled "Evaluation of sampling methods for compliance with RoHS/WEEE analysis"

HOW TO SUBJECT (HT003):  
**RoHS/WEEE**

APPARATUS  
**Freezer/Mill®**

APPLICATION  
Cryogenic grinding of  
electronic and computer  
components

 **6775**  
FREEZER/MILL®



 **6875**  
FREEZER/MILL®



WATCH THE VIDEO!  
Scan the QR code or  
visit [youtube.com/  
sampleprep](https://youtube.com/sampleprep)



CE



## 6775 FREEZER/MILL®

This small cryogenic mill processes samples ranging from 0.1 - 5 grams. Touch screen stores up to 20 user-defined grinding programs for easy quick recall. Also includes run history, training videos, manuals and accessories.

<b>Voltage</b>	115V/60Hz or 230V/50Hz
<b>Dimensions</b>	19 in (48 cm) x 10.5 in (27 cm) x 12.75 in (32 cm)
<b>Weight (lbs)</b>	26 lbs (11.8 kg)
<b>Power Cord</b>	3-prong grounded plug 115V, 60Hz. 2-prong European cord for 230V, 50 Hz.



### 6771 - SMALL CR-FREE GRINDING VIAL SET

Ideal for RoHS/WEEE testing of electronic components for chromium. This cr-free grinding vial set includes one 6771P small cr-free steel impactor, two 6771E small cr-free, ASTM 06 steel end plugs, and one pack of (3) 6751C4 small polycarbonate center cylinders.

## 6875 FREEZER/MILL®

Large cryogenic mill that grinds 0.1 - 100 grams of sample. Touch screen stores up to 20 user-defined grinding programs for easy quick recall. Also includes run history, training videos, manuals and accessories.

<b>Voltage</b>	115V/60Hz or 230V/50Hz
<b>Dimensions</b>	20.5 in (52 cm) x 21.5 in (55 cm) x 18 in (46 cm)
<b>Weight (lbs)</b>	44 lbs (24kg)
<b>Power Cord</b>	3-prong grounded plug, 115V 60Hz or 2-prong European plug, 230V/50Hz



CE



### 6883 - MID-SIZE CR-FREE GRINDING VIAL SET

Ideal for grinding electronic components to test for chromium under RoHS/WEEE directives. One grinding vial includes one 6883P mid-size cr-free steel impactor, two 6883E mid-size cr-free steel end plugs, and one pack of 6811C4 mid-size polycarbonate center cylinders. Sample capacity up to 25 mL (1 - 40 g).



### 6871 - LARGE CR-FREE GRINDING VIAL SET

Ideal for grinding electronic components to test for chromium under RoHS/WEEE directives. This grinding vial set includes one 6871P large cr-free steel impactor, two 6871E large cr-free steel end plugs, and one pack of 6801C4 (3) large polycarbonate center cylinders.

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