



Practice for Dispersing Pigments and Other Materials into Water-Based Suspensions with a High Intensity Mixer¹

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1. Scope

1.1 In preparing ceramic glazes and slurries for use, it is often necessary to add pigments to develop a desired fired color, to incorporate viscosity control agents for developing, or providing to develop the desired thickness of the glaze on the ware, to add materials which stabilize the suspension, control bacterial growth, and develop the desired hardness of the glaze on the ware to allow moving and handling before firing. While it is convenient to add these materials to the glaze or slurry in the dry form, it is often possible to use slurries where these materials are dispersed in a slurry and the slurry then added to the liquid glaze. Regardless of the state of the additions (dry or slurry), the dispersion can be done efficiently and effectively by the use of a high intensity mixer (sometimes referred to as a dissolver) and the procedure used is described here.

1.2 The values stated in SI units are to be regarded as the standard.

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:

C 242 Terminology of Ceramic Whitewares and Related Products²

3. Terminology

3.1 Standard terminology for ceramic whitewares and related products is given in Terminology C 242.

4. Significance and Use

4.1 The traditional method of preparing glazes and slurries has been to add stains (pigments), stabilizers, viscosity control agents, bactericides, and so forth, to the pebble mill batch along with normal batch materials such as clay, frit, quartz,

feldspar, whiting (calcium carbonate), zinc oxide, opacifier, and so forth. This method had the disadvantage of over grinding some of the materials of the batch and under grinding other materials. While part of the disadvantage could be alleviated by double or triple batching (where the pebble mill was stopped at one or two points in the cycle and one or more materials added), the practice was labor intensive and not always well controlled. Another disadvantage of the traditional method was that it was necessary to thoroughly wash out the mill between batches of different colors. An obvious advantage, however, was that small components of the batch (such as pigments) were thoroughly dispersed in the batch and even today it is necessary to use this procedure when small quantities of strongly colored pigments are to be used.

4.2 With the advent of high speed intensive mixers using a rotating shaft-mounted impeller, it is now the usual practice to add pigments, conditioners, and so forth, to the batch from the pebble mill and accomplish the same uniform dispersion as would be the case if the pigments were milled in rather than “stirred” in. In addition, the pigments tend to yield a stronger color in the glaze because they have not been over ground in the pebble mill. It is not uncommon to make a reduction in the amount of pigment needed to develop the desired color when the pigment is stirred in rather than milled in. An even greater benefit is using the “stirred in” technique is that a single large batch of a base glaze (for example, clear) can be made by milling, and individual colors developed by stirring appropriate pigments and conditioners into small amounts of the base glaze. In this way, a large pebble mill can be dedicated to clear base glaze and cleaning the mill between batches is not needed. Glaze stains frequently are treated with proprietary materials which assist in dispersing the stain into the glaze.

5. Apparatus

5.1 There are two types of high intensity mixers (dissolvers), those designed for laboratory use, where capacity is approximately 10 to 15 litres of liquid, and those designed for production use, where capacity can be 1200 litres or more. Typical characteristics of both types of mixer are shown in Table 1.

5.2 Essential installation and operating “tips” for the mixers are:

5.2.1 The motor power must be sufficient to maintain

¹ This practice is under the jurisdiction of Committee C21 on Ceramic Whitewares and Related Products and is the direct responsibility of Subcommittee C21.03 on Methods for Whitewares and Environmental Concerns.

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² *Annual Book of ASTM Standards*, Vol. 15.02.