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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Practice for The Selection of Maximum Transit-Rate Ratios and Depths for the U.S. Series of Isokinetic Suspended-Sediment Samplers¹

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1. Scope

1.1 This practice covers the maximum transit-rate ratios and depths for selected suspended-sediment sampler-nozzle-container configurations.

1.2 This practice explains the reasons for limiting the transit-rate ratio and depths that suspended-sediment samplers can be correctly used.

1.3 This practice give maximum transit-rate ratios and depths for selected isokinetic suspended-sediment sampler/nozzle/container size for samplers developed by the Federal Interagency Sedimentation Project.

1.4 Throughout this practice, a samplers lowering rate is assumed to be equal to its raising rate.

1.5 The values stated in inch-pound units are to be regarded as the standard. The SI units given in parentheses are for information only.

1.6 *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:

D 1129 Terminology Relating to Water²

D 4410 Terminology for Fluvial Sediment²

D 4411 Guide for Sampling Fluvial Sediment in Motion³

3. Terminology

3.1 Definitions:

3.1.1 For Definitions of terms used in this practice, refer to Terminology D 1129 and Terminology D 4410

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *approach angle*—the angle between the velocity vector of the approaching flow and the centerline of the nozzle.

3.2.2 *approaching flow*—flow immediately upstream of a nozzles entrance.

3.2.3 *compression rate*—the rate at which the air is compressed in the sample container and is a function of the speed at which the sampler is lowered in the sampling vertical.

3.2.4 *isokinetic*—the conditions under which the direction and speed of the flowing water/sediment mixture are unchanged upon entering the nozzle of a suspended-sediment sampler.

3.2.5 *maximum transit rate*—the maximum speed at which the sampler can be lowered and raised in the sampling vertical and still have the sample collected isokinetically.

3.2.6 *transit rate*—the speed at which the suspended sediment sampler is lowered and raised in the sampling vertical.

3.2.7 *transit-rate ratio*—the ratio computed by dividing the transit rate by the mean stream velocity in the vertical being sampled.

4. Summary of Practice

4.1 This practice describes the maximum transit-rate ratios and depths that can be used for selected isokinetic suspended-sediment sampler/nozzle/container configurations to insure isokinetic sampling. (Manufacturing differences in the production of sediment samplers may result in some samplers not collecting a sample isokinetically. It is the users responsibility to insure through calibration that the sampler does collect a sample isokinetically. Guide D 4411 describes a process for checking calibration of suspended-sediment samplers.)

5. Significance and Use

5.1 This practice describes the maximum transit-rate ratios and depths that can be used for selected isokinetic suspended-sediment sampler/nozzle/container configurations in order to insure isokinetic sampling.

5.2 This practice is designed to be used by field personnel collecting whole-water samples from open channel flow.

6. Background

6.1 The distribution of velocity and sediment concentration in a sampling vertical is very complex. The velocity of the flow will generally decrease with depth while the suspended-sediment concentration will normally increase with depth in a vertical. For a sediment sampler to collect a representative volume, the water-sediment mixture must enter the nozzle without undergoing a change in direction or speed. Ideally, the

¹ This practice is under the jurisdiction of ASTM Committee D-19 on Water and the direct responsibility of Subcommittee D19.07 on Sediment, Geomorphology, and Open Channel Flow.

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² *Annual Book of ASTM Standards*, Vol 11.01.

³ *Annual Book of ASTM Standards*, Vol 11.02.