Designation: D 5090 – 90 (Reapproved 2001)

Standard Practice for Standardizing Ultrafiltration Permeate Flow Performance Data[1]

This standard is issued under the fixed designation D 5090; 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 covers the standardization of permeate flow for ultrafiltration (UF) systems.

1.2 This practice is applicable to natural waters including brackish waters, seawaters, and ultrapure waters including those used in power generation and microelectronics and pharmaceuticals production. It is not necessarily applicable to waste waters.

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:*

D 1129 Terminology Relating to Water[2]

3. Terminology

3.1 *Definitions*—For definitions of terms used in this practice, refer to Terminology D 1129.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *concentrate, reject, or brine*—that portion of feed which does not pass through the membrane.

3.2.2 *device pressure drop (ΔP)*—the difference between the feed pressure and the concentrate pressure.

3.2.3 *feed*—the fluid that enters the device.

3.2.4 *permeate*—that portion of the feed which passes through the membrane.

3.2.5 *permeate flow rate*—the quantity of permeate produced per unit time.

3.2.6 *recovery or conversion*—the ratio of permeate flow rate to total feed flow rate, expressed as a percent.

3.2.7 *stage*—a device or group of devices, several of which may be included in a system, which share common manifolds on the feed, concentrate and permeate stream plumbing. The concentrate from one stage becomes the feed to the following stage.

3.2.8 *ultrafiltration device*—a single housing (vessel), comprising or containing an ultrafiltration element or multiple elements and supporting materials.

4. Summary of Practice

4.1 This practice consists of calculating the permeate flow of UF systems at a standard set of conditions using data obtained at actual operating conditions.

5. Significance and Use

5.1 During the operation of a UF system, conditions including pressure and temperature, can vary, causing permeate flow to change (see Note 1). To effectively evaluate system performance, it is necessary to compare permeate flow data at the same conditions. Since data may not always be obtained at the same conditions, it is necessary to convert the UF data obtained at actual conditions to a set of constant conditions, thereby standardizing the data. The user of this practice determines the standard conditions. This practice gives the procedure to standardize UF data on pure water only.

NOTE 1—Feed concentration, crossflow velocity, and both device and total system recovery will also influence permeate rate, especially when operating on other than pure water. This practice does not address those system conditions.

5.2 This practice can be used for systems which contain spiral-wound, tubular, plate and frame, and hollow fiber devices.

5.3 This practice can be used for a single-element or a multi-element system. However, if the UF system is staged, standardize the permeate flow and salt passage for each stage

[1] This practice is under the jurisdiction of ASTM Committee D19 on Water and is the direct responsibility of Subcommittee D19.08 on Membranes and Ion Exchange Materials.

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