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.

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Standard Guide for Establishing a Linear Correlation Relationship Between Analyzer and Primary Test Method Results Using Relevant ASTM Standard Practices[1]

This standard is issued under the fixed designation D7235; 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.

INTRODUCTION

Operation of a process stream analyzer system typically involves four sequential activities: *(1) Analyzer Calibration*—When an analyzer is initially installed, or after major maintenance has been performed, diagnostic testing will typically be performed to demonstrate that the analyzer meets manufacturer's specifications and historical performance standards. These diagnostic tests may require that the analyzer be adjusted so as to provide predetermined output levels for certain reference materials. *(2) Correlation to Primary Test Method*—For process stream analyzer systems where the application objective is to provide prediction of results from a Primary Test method, once the diagnostic testing is completed, process stream samples will typically be analyzed using both the analyzer system and the corresponding primary test method. A mathematical function will be derived that relates the analyzer output to the primary test method (PTM). The application of this mathematical function to an analyzer output produces a predicted PTM result. *(3) Initial Validation*—Once the relationship between the analyzer output and primary test method results has been established, an initial validation is performed using an independent data set to demonstrate that the predicted PTM results agree with those from the primary test method within the tolerances established from the Correlation activities and with no statistically observable systemic bias. *(4) Continual Validation*—During normal operation of the process analyzer system, quality assurance testing is conducted to demonstrate that the agreement between analyzer and primary test method results during the Initial Validation is maintained. This document provides guidance for item *(2)* above.

1. Scope*

1.1 This guide covers a general methodology to develop and assess the linear relationship between results produced by a total analyzer system versus the results produced by the corresponding primary test method (PTM) that the analyzer system is intended to emulate, using the principles and approaches outlined in relevant ASTM standard practices and guides.

1.2 This guide describes how the statistical methodology of Practice D6708 can be employed to assess agreement between the PTM and analyzer results, and, if necessary, develop linear correlation to further improve the agreement over the complete operating range of the analyzer. For instances where there is insufficient variation in property level to apply the Practice D6708 multi-level methodology, users are referred to Practice D3764 to perform a level specific bias evaluation. The correlation relationship information obtained in the application of this guide is applicable only to the material type and property range of the materials representative of those used to perform the assessment. Users are cautioned against extrapolation of the relationship beyond the material type and property range being studied.

1.3 This guide applies if the process stream analyzer system and the primary test method are based on the same measurement principle(s), or, if the process stream analyzer system uses a direct and well-understood measurement principle that is similar to the measurement principle of the primary test method. If the process stream analyzer system uses a different measurement technology from the primary test method, provided that the calibration protocol for the direct output of the analyzer does not require use of the PTM, this practice also applies.

[1] This guide is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.25 on Performance Assessment and Validation of Process Stream Analyzer Systems.

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*A Summary of Changes section appears at the end of this standard

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