



CLINICAL AND
LABORATORY
STANDARDS
INSTITUTE.



ESTABLISHMENT GUIDE

CLSI EP06 EG: Developer Validation of Linearity

Sample

Introduction

This establishment guide describes the minimum procedures necessary for a developer (either a manufacturer or a laboratory-developed test developer) to validate the linearity of a measurement procedure's analytical measuring interval (AMI). For additional information on validating linearity, see CLSI EP06.¹

NOTE: This protocol to validate linearity can be used only when the measurement procedure produces quantitative numerical results. CLSI EP06-EG is not intended for qualitative test methods; see CLSI EP12.²

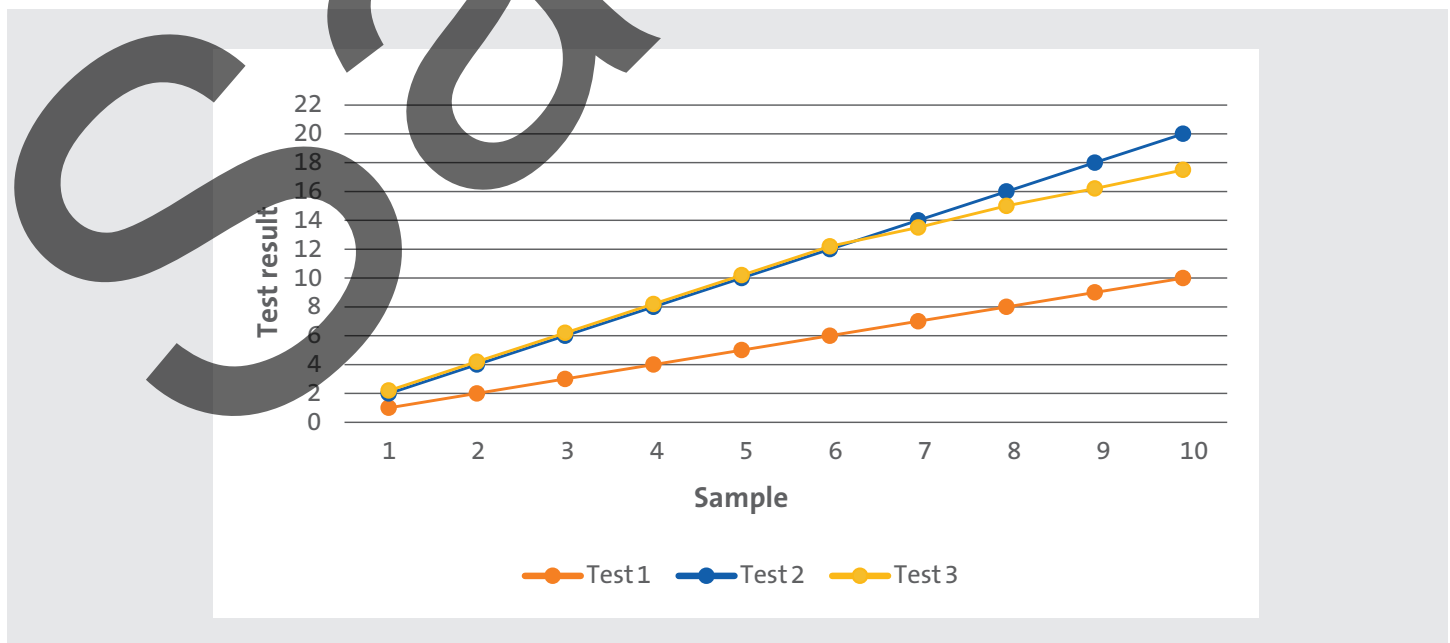
IMPORTANT NOTE: CLSI EP06-EG is not intended for laboratory verification of linearity. Instead, end users should consult Chapter 4 of CLSI EP06¹ as well as CLSI EP06-IC³ for guidance and tools for verifying established linearity performance claims made by a developer.

What Is Linearity?

A measurement procedure is linear throughout a given interval when the results, on average, are proportional to the true values of the samples. In the graph below, both test 1 (orange line) and test 2 (blue line) are linear and proportional through the example interval but give very different values. Each line can be depicted in the following equations:

- Test 1: $Y = X$
- Test 2: $Y = 2X$

This concept of proportionality is important for patient decision-making. That is, when a patient sample is measured, a change in a test result over time (eg, a 40-mg/dL change in glucose results over a two-hour period) must reflect the change in the patient's condition.



What Is the Linearity Interval?

The linearity interval is the range of values (low to high) that falls on a straight line. In the graph above, test 3 (yellow line) is linear only up to a value of 12. Then, the values begin to fall below the straight line. In this case, test 3 is linear from 1 to 12; therefore, its linearity interval is said to be 1 to 12. The lowest value shown to be linear is called the lower limit of the linearity interval (LLLI), and the highest value shown to be linear is called the upper limit of the linearity interval (ULLI). A measurement procedure is said to be linear when the procedure is linear throughout its stated AMI.

Validation of the Linearity Interval

The linearity interval validation process is outlined in the figure below.



Abbreviations: % deviation, deviation from linearity calculated as a percentage; ADL, allowable deviation from linearity; QC, quality control.