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Foreword

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This document was prepared by Technical Committee ISO/TC 202, *Microbeam analysis*, Subcommittee SC 4, *Scanning electron microscopy*.

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Introduction

The scanning electron microscope (SEM) is a very versatile instrument, which is widely used in production, development and scientific research across the world. While they are easy to operate and provide results quickly, there are a number of notorious problems, which hinder operating them at their best performance. These are the reasons for lack of excellent repeatability in SEM imaging and measurements. The most bothersome ones among these are unintended motions of the sample stage and the primary electron beam, geometry distortions, wrong image magnification, image blur (lack of sharp focus), noise and electron beam-induced contamination. Quantification of these essential performance parameters is very useful to ensure that all SEMs perform at manufacturers specifications and at users' own purpose. Quantified knowledge helps in the evaluation of measurement uncertainties, and necessary repairs.

This document pertains to measurement methods for the following SEM performance parameters:

— Image sharpness (spatial resolution, primary electron beam focusing ability).

— Drifts (the sample stage, the electron beam and the electron-optical column).

— Cleanliness (lack of beam-induced contamination).

— Image magnification and linearity (both in X and Y directions).

— Background noise.

— Primary electron beam current.

These parameters will also be influenced by the SEM conditions such as the lifetime of source (emitter conditions), lifetime of liner tube and apertures (contamination of the electron optical parts), time and intensity of last cleaning of vacuum chamber by the plasma cleaning or Ultra Violet irradiation, the sample preparation and final surface cleaning.

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