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Adjunct ADJE0011-E-PDF

Appendix X5
Distribution Analysis
of Sieve Openings

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100 Barr Harbor Drive
P.O. Box C700
West Conshohocken, PA
19428-2959
USA
www.astm.org

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Regarding

Appendix X5. Distribution Analysis of Sieve Openings

A Subcommittee E29.01 Task Group for E11 desired to undertake a study to assess the assumption made in Technical Requirements Sect.6.1.5 that the openings in sieve cloth exhibit a Gaussian normal distribution.

Accordingly in 2022, four samples of each of 11 sieve designations from No.8 thru No.325 were submitted for analysis by both Newark Wire Cloth and W.S. Tyler. At least 100 openings of both warp and shute, were measured by an independent vision system expert, Robert Jackson of msiVision. The same equipment and image processing parameters were used for all measurements to assure consistency. The data sets were then submitted to Prof. Ji Meng Loh of the Mathematical Sciences Department at New Jersey Institute of Technology for analysis. Prof. Loh utilized the Shapiro-Wilks test to analyze each of the 88 data sets of 100 sieve opening measurements, using a significance level of 0.01 (i.e. probability of concluding non-normality when in fact the distribution is normal). He applied the conservative Bonferroni correction method to counteract the problem of multiple comparisons rejecting a false null hypothesis, and very conservatively removed only up to 1 outlier if it was at least 4 standard deviations from the mean. Normal Q-Q probability plots per ASTM D6299 were also made to visually inspect the distribution of the data relative to normal distribution values.

Based on 95 –98% of the measured sieve opening data sets exhibiting distribution normality, the use of Gaussian normal distribution statistical techniques are valid and appropriate for the development of maximum standard deviation tolerances.

The measurement data sets, the Task Group msiVision report, and the final analysis report from NJIT are available via ASTM as Adjunct ADJE0011-E-PDF.

The data in ADJE0011-E-PDF was provided to ASTM E29.01 by msiVision, © msiVision. The data in this report was then provided by ASTM E29.01 to NJIT to be further analyzed. NJIT does not have responsibility for the data. © New Jersey Institute of Technology.