

effect because spin g levels below 100g are used only in delicate cycles (not tested in the appendix J1 test procedure) and as an optional slow spin that is available in a limited number of models. The Department agrees that a linear least squares fit test cloth correction procedure based on 100g and greater RMC test data would result in a more reliable correction curve for the vast majority of clothes washer models in production. Using 100, 200, 350, and 500g as test points would still bracket the range of spin speeds in most clothes washers and provide a comprehensive and representative test for establishing the correction curves for new batches of test cloth. In light of these circumstances and the problems with use of the 50g test points, discussed above, the Department believes it is appropriate to modify the clothes washer test procedure in appendix J1 by replacing these test points with 100g test points.

C. Statistical Test To Validate New Lots of Energy Test Cloth

In this direct final rule, the Department is adopting a standard statistical procedure called “analysis of variance” or “ANOVA” as the lot-to-lot interactive-effect statistical test for screening out lots of test cloth whose RMC compared to g behavior is inconsistent with the baseline lot. The ANOVA statistical test detects the extent of the deviation of the shape of the RMC compared to the g-curve of a given lot of the test cloth from the shape of the RMC compared to the g-curve of the baseline lot. It would have detected the peculiarity of the 50g RMC values in the later lots running very high relative to the 100g, 200g, or 350g RMC values, compared to the baseline lot. With the 100g (instead of 50g), 200g, and 350g extractor test points, all of the lots that DOE has tested so far satisfy the ANOVA test criteria for an acceptable lot. The Department believes that the test will catch any unanticipated RMC compared to g-curve shape deviation in future lots.

The ANOVA test adds a second method for determining the “acceptability” of a new lot of test cloth that a manufacturer will use in conjunction with the criterion currently prescribed in appendix J1 for making this determination. That criterion is that the RMS error term (of the least squares fit used to determine the correction factors for a new lot of test cloth) must be <2%. The RMS error term measures the “goodness of fit” of the derived linear relationship between the baseline set of RMC values and corresponding RMC values for the new lot obtained at

each test condition. That is, it is intended to characterize the “closeness” or “lack of scatter” of the 12 data points to the “best-fit” (least squares) line that is subsequently used to calibrate (“correct”) the new-lot RMC value to the RMC value of the baseline lot.

Although the later lots discussed above met the criterion of an RMS of <2%, other difficulties subsequently emerged when using these lots for actual machine testing. Most notably, RMC measurements behaved erratically at the low (50g) spin speed conditions. Although linearly related to corresponding baseline RMC measurements, the RMC measurements of later lots (over an observed range of 30% to 70%) were inconsistent with baseline values in a more subtle way. Additional testing of the later lots (and other test lots as well) strongly supports the assertion that RMC values—recently obtained when conducting extractor tests at 50g spin speed conditions with any lot—are inconsistent with RMC results that were obtained at 50g of the original baseline lot.

Whatever the reason(s), recent extractor tests have yielded higher RMC measurements at all test conditions than those previously obtained for the baseline. If the measurements for a new lot of test cloth are consistently higher over the entire range of test conditions, the correction curve (as originally configured) and the test criterion (RMS <2%) would be sufficient to establish the acceptance—or rejection—of a new test lot. However, with the benefit of hindsight, the Department now knows that the difference between recent extractor tests and the baseline is not the same at all test conditions; in fact, the difference is most pronounced in the four time/temperature tests conducted at the 50g spin speed. In statistical terms, this inherent inconsistency is referred to as an “interactive effect” between test lots and spin speeds. The ANOVA is a commonly used statistical procedure for detecting interactive effects, if and when they exist. As applied to new lots of energy test cloths, this statistical test will detect the extent of the deviation of the RMC compared to the g-curve shape of a given lot from the RMC compared to the g-curve shape of the baseline lot. This could be either a gross difference in the overall slope or the peculiarity that has been observed in the later lots of the RMC values at 50g running very high relative to the RMC values at 100g, 200g, or 350g, compared to the baseline lot. The “P-value” (a theoretically-based probability) that ANOVA produces is interpreted as evidence of a real, repeatable interactive effect between lots and spin speeds. The

lower the P-value, the stronger the evidence of an interaction. A value less than 0.10 is sufficient to conclude that there is a problematic interaction, and the lot of test cloth being tested should not be used to measure RMC.

The Department evaluated an analysis of all cloth lot samples tested thus far. Analytical results and conclusions support the use of 100g test data rather than 50g data. It is interesting to note that there is no evidence of an interactive effect for earlier lots of test cloth, justifying the use of the correction curves based on the 50g to 350g range for those lots. Starting with later lots, interactive effects attributable to 50g test data are clearly evident. However, over the 100g-to-350g range, there is no evidence of an interactive effect with any of these lots. The Department believes that the P-value from the ANOVA test is an appropriate test for acceptance of new lots of test cloth.

D. Effect of Changes on Measured Efficiencies

In any rulemaking to amend a test procedure, section 323(e) of EPCA requires the Department to determine whether the amended test procedure would alter the measured energy efficiency of any covered product. (42 U.S.C. 6293(e)) If the amendment does alter measured efficiency, the Secretary must amend the applicable energy conservation standard so that products that minimally comply with the standard prior to the test procedure amendment will continue to comply. (42 U.S.C. 6293(e)(2)) These provisions prevent changes in a test procedure that would cause a product that complied with applicable Federal energy conservation standards using the previous test procedure from being forced into non-compliance as a result of using the new test procedure.

Today's rule amends the test procedure for clothes washers, appendix J1, which is designed to measure performance under new energy conservation standards that will take effect on January 1, 2004. Appendix J1 is not mandatory until then. Today's rule will produce insignificant changes in the measured efficiency of a limited number of models of clothes washers. These changes are important, however, because they will assure that measured efficiencies conform more closely to the results that would occur if a reference test cloth were used in every test. Use of the reference test cloth produces results that most accurately measure a clothes washer's performance under the energy conservation standards that will go into effect on January 1, 2004.