

Environmental Protection Agency

§ 770.20

the panel producer must reapply to an EPA TSCA Title VI TPC or CARB and obtain at least two test results in accordance with paragraph (a)(3) of this section that comply with the emission standards in paragraph (d)(1) of this section.

(h) Any time there is an operational or process change such as a change in resin formulation, press cycle duration, temperature, or amount of resin used per panel, at least five quality control tests under § 770.20 and at least one test result in accordance with paragraph (a)(3) of this section that indicate compliance with the emission standards in paragraph (d)(1) of this section are required.

(i) A change in the resin system invalidates the exemption or reduced testing approval for any product type produced after such a change.

[81 FR 89724, Dec. 12, 2016, as amended at 83 FR 5347, Feb. 7, 2018; 84 FR 43524, Aug. 21, 2019; 88 FR 10477, Feb. 21, 2023]

§ 770.20 Testing requirements.

(a) *General requirements.* (1) All panels must be tested prior to the application of a finishing or topcoat. Conditioning of panels for testing must start as soon as possible after panel production, but no later than 30 calendar days after the panels were produced.

(2) Facilities that conduct the formaldehyde testing required by this section must follow the procedures and specifications, such as testing conditions and loading ratios, of the test method being used.

(3) All equipment used in the formaldehyde testing required by this section must be calibrated and otherwise maintained and used in accordance with the equipment manufacturer's instructions.

(b) *Quality control testing*—(1) *Allowable methods.* Quality control testing must be performed using any of the following methods, with a showing of correlation for each method pursuant to paragraph (d) of this section:

(i) ASTM D6007-14 (incorporated by reference, see § 770.99).

(ii) ASTM D5582-14 (incorporated by reference, see § 770.99).

(iii) BS EN ISO 12460-3:2020 (incorporated by reference, see § 770.99) or

ISO 12460-3:2020(E) (incorporated by reference, see § 770.99).

(iv) DMC 2007 User's Manual (incorporated by reference, see § 770.99).

(v) DMC 2012 GP User's Manual (incorporated by reference, see § 770.99).

(vi) BS EN ISO 12460-5:2015 E (Perforator Method) (incorporated by reference, see § 770.99).

(vii) JIS A 1460:2021(E) (24-hr Desiccator Method) (incorporated by reference, see § 770.99).

(2) *Frequency of testing.* (i) Particleboard and medium-density fiberboard must be tested at least once per shift (eight or twelve hours, plus or minus one hour of production) for each production line for each product type. Quality control tests must also be conducted whenever:

(A) A product type production ends, even if eight hours of production has not been reached;

(B) The resin formulation is changed so that the formaldehyde to urea ratio is increased;

(C) There is an increase by more than ten percent in the amount of formaldehyde resin used, by square foot or by panel;

(D) There is a decrease in the designated press time by more than 20%; or

(E) The quality control manager or quality control employee has reason to believe that the panel being produced may not meet the requirements of the applicable standards.

(ii) Particleboard and medium-density fiberboard panel producers are eligible for reduced quality control testing if they demonstrate consistent operations and low variability of test values.

(A) To qualify, panel producers must:

(1) Apply in writing to an EPA TSCA Title VI TPC; and

(2) Maintain a 30 panel running average.

(B) With respect to reduced quality control testing, EPA TSCA Title VI TPCs:

(1) May approve a reduction to one quality control test per 24-hour production period if the 30 panel running average remains two standard deviations below the designated QCL for the previous 60 consecutive calendar days or more;

§ 770.20

40 CFR Ch. I (7–1–23 Edition)

(2) May approve a reduction to one quality control test per 48-hour production period if the 30 panel running average remains three standard deviations below the designated QCL for the previous 60 consecutive calendar days or more;

(3) Will approve a request for reduced quality control testing as long as the data submitted by the panel producer demonstrate compliance with the criteria and the EPA TSCA Title VI TPC does not otherwise have reason to believe that the data are inaccurate or the panel producer's production processes are inadequate to ensure continued compliance with the emission standards; and

(4) Will revoke approval for reduced quality control testing if testing or inspections indicate a panel producer no longer demonstrates consistent operations and low variability of test values.

(iii) Hardwood plywood must be tested as follows:

(A) At least one test per week per product type if the weekly hardwood plywood production at the panel producer is more than 100,000 but less than 200,000 square feet.

(B) At least two tests per week per product type if the weekly hardwood plywood production at the panel producer is 200,000 square feet or more, but less than 400,000 square feet.

(C) At least four tests per week per product type if the weekly hardwood plywood production at the panel producer is 400,000 square feet or more.

(D) If weekly production of hardwood plywood at the panel producer is 100,000 square feet or less, at least one test per 100,000 square feet for each product type produced; or, if less than 100,000 square feet of a particular product type is produced, one quality control test of that product type every month that it is produced.

(E) Quality control tests must also be conducted whenever:

(1) The resin formulation is changed so that the formaldehyde to urea ratio is increased;

(2) There is an increase by more than ten percent in the amount of formaldehyde resin used, by square foot or by panel;

(3) There is an increase by more than 20% in the adhesive application rate;

(4) There is a decrease in the designated press time by more than 20%; or

(5) The quality control manager or quality control employee has reason to believe that the panel being produced may not meet the requirements of the applicable standard.

(iv) Composite wood products that have been approved by an EPA TSCA Title VI TPC or CARB for reduced testing under § 770.18(b) through (c) must be tested at least once per week per product type and, for particle board and medium-density fiberboard, per production line, for products produced that week, except that hardwood plywood panel producers who qualify for less frequent testing under paragraph (b)(2)(iii)(D) of this section may continue to perform quality control testing under that provision.

(3) *Results.* Any test result that exceeds the QCL established pursuant to § 770.7(c)(4)(i)(C) must be reported to the EPA TSCA Title VI TPC in writing within 72 hours. The panel producer must comply with § 770.22 with respect to any lot represented by a quality control sample that exceeds the QCL. Where multiple products are grouped in a single product type for testing, this includes all products in the group represented by the sample.

(c) *Quarterly testing.* Quarterly testing must be supervised by EPA TSCA Title VI TPCs and performed by TPC laboratories.

(1) *Allowable methods.* Quarterly testing must be performed using ASTM E1333–14 (incorporated by reference, see § 770.99) or, with a showing of equivalence pursuant to paragraph (d) of this section, ASTM D6007–14 (incorporated by reference, see § 770.99).

(2) *Sample selection.* (i) Samples must be randomly chosen by an EPA TSCA Title VI TPC.

(ii) Samples must be selected from each certified product type for quarterly testing purposes. For hardwood plywood samples, the samples must be randomly selected from products that represent the range of formaldehyde emissions of products produced by the panel producer.

(iii) Samples must not include the top or the bottom composite wood product of a bundle.

(iv) Test results may represent a single chamber value or, if using the ASTM D6007-14 apparatus, the average value of testing nine specimens representing evenly distributed portions of an entire panel. The nine specimens must be tested in groups of three specimens, resulting in three data points, which must be averaged to represent one test value for the panel those specimens represent.

(3) *Sample handling.* Samples must be closely stacked or air-tight wrapped between the time of sample selection and the start of test conditioning. Samples must be labeled as such, signed by the EPA TSCA Title VI TPC, bundled air-tight, wrapped in polyethylene, protected by cover sheets, and promptly shipped to the TPC laboratory. Conditioning must begin as soon as possible, but no later than 30 calendar days after the samples were produced.

(4) *Results.* Any sample that exceeds the applicable formaldehyde emission standard in § 770.10 must be reported by the EPA TSCA Title VI TPC to the panel producer in writing and to EPA, in accordance with § 770.8, within 72 hours. The panel producer must comply with § 770.22 with respect to any lot represented by a sample result that exceeds the applicable formaldehyde emission standard. Where multiple products are grouped in a single product type for testing, this includes all products in the group represented by the sample.

(5) *Reduced testing frequency.* Composite wood products that have been approved by an EPA TSCA Title VI TPC or CARB for reduced testing under § 770.18(c) need only undergo quarterly testing every six months.

(d) *Equivalence or correlation.* Equivalence between ASTM E1333-14 (incorporated by reference, see § 770.99) and ASTM D6007-14 (incorporated by reference, see § 770.99) must be demonstrated by EPA TSCA Title VI TPCs at least once each year or whenever there is a significant change in equipment, procedure, or the qualifications of testing personnel, or reason to believe that the equivalence is no longer

valid. Equivalence may be demonstrated between several similar model or size and construction ASTM E1333-14 (incorporated by reference, see § 770.99) and ASTM D6007-14 (incorporated by reference, see § 770.99) apparatuses located in the same EPA TSCA Title VI TPC laboratory. Once equivalence has been established for three consecutive years, equivalence must be demonstrated every two years or whenever there is a significant change in equipment, procedure, or the qualifications of testing personnel. Correlation between ASTM E1333-14 (incorporated by reference, see § 770.99) or, upon a showing of equivalence in accordance with paragraph (d) of this section, ASTM D6007-14 (incorporated by reference, see § 770.99) and any other test method used for quality control testing must be demonstrated by EPA TSCA Title VI TPCs or panel producers, respectively, before the certification of composite wood products, and then whenever there is a significant change in equipment, procedure, the qualifications of testing personnel, or reason to believe that the correlation is no longer valid. Correlation may be established between several similar model or size and construction mill quality control test methods defined in paragraph (b)(1) of this section located at any one physical mill quality control testing laboratory to the EPA TSCA Title VI TPC's laboratory's ASTM E1333-14 (incorporated by reference, see § 770.99) and/or ASTM D6007-14 (incorporated by reference, see § 770.99) apparatus. If the TPC laboratory's ASTM E1333-14 or equivalent ASTM D6007-14 test chamber is used for panel producer quality control testing, no correlation as determined in paragraph (d)(2) of this section would be required. Equivalence and correlation sample selection should be conducted in accordance with paragraph (c)(2)(iv) of this section.

(1) *Equivalence between ASTM E1333-14 and ASTM D6007-14 when used by the TPC for quarterly testing.* Equivalence must be demonstrated for at least five comparison sample sets in each range tested by the TPC, which compare the results of the two methods. Equivalence must be demonstrated for any ranges listed in paragraph (d)(1)(iv) of

§ 770.20

40 CFR Ch. I (7–1–23 Edition)

this section that represent the formaldehyde emissions of composite wood products tested by the TPC.

(i) *Samples.* (A) For the ASTM E1333–14 method (incorporated by reference, see § 770.99), each comparison sample must consist of the result of testing panels, using the applicable loading ratios specified in the ASTM E1333–14 method (incorporated by reference, see § 770.99), from similar panels of the same product type tested by the ASTM D6007–14 method (incorporated by reference, see § 770.99).

(B) For the ASTM D6007–14 method (incorporated by reference, see § 770.99), each comparison sample shall consist of testing specimens representing portions of panels similar to the panels

tested in the ASTM E1333–14 method (incorporated by reference, see § 770.99) and matched to their respective ASTM E1333–14 method (incorporated by reference, see § 770.99) comparison sample result. The ratio of air flow to sample surface area specified in ASTM D6007–14 (incorporated by reference, see § 770.99) must be used.

(C) The five comparison sample must consist of testing a minimum of five sample sets as measured by the ASTM E1333–14 method (incorporated by reference, see § 770.99).

(ii) *Average and standard deviation.* The arithmetic mean, \bar{x} , and standard deviation, S , of the difference of all comparison sets must be calculated as follows:

$$\bar{X} = \sum_{i=1}^n D_i / n \quad S = \sqrt{\sum_{i=1}^n (D_i - \bar{X})^2 / (n - 1)}$$

Where \bar{x} = arithmetic mean; S = standard deviation; n = number of sets; D_i = difference between the ASTM E1333–14 and ASTM D6007–14 method (incorporated by reference, see § 770.99) values for the i th set; and i ranges from 1 to n .

(iii) *Equivalence determination.* The ASTM D6007–14 method (incorporated by reference, see § 770.99) is considered equivalent to the ASTM E1333–14 method (incorporated by reference, see § 770.99) if the following condition is met:

$$|\bar{X}| + 0.88S \leq C$$

Where C is equal to:

0.026 for the lower range;
0.038 for the intermediate range; and
0.052 for the upper range.

(iv) *Equivalence Ranges.* EPA TSCA Title VI TPCs must demonstrate equivalence in at least two of the three formaldehyde emission ranges listed in paragraphs (d)(1)(iv)(A) through (C) of this section unless the EPA TSCA Title VI TPC will only certify hardwood plywood products in the low range. If the EPA TSCA Title VI TPC will only cer-

tify hardwood plywood products in the low range, the EPA TSCA Title VI TPC may demonstrate equivalence in only that range and would then be restricted to only certifying those composite wood products in that range. Equivalence in one range must be demonstrated for at least five comparison sample sets in that range which compare the two methods.

(A) *Lower Range:* Less than, or equal to 0.05 ppm.

(B) *Intermediate Range:* Greater than 0.05 ppm to less than or equal to 0.15 ppm.

(C) *Upper Range:* Greater than 0.15 ppm.

(2) *Correlation between ASTM E-1333–14 (incorporated by reference, see § 770.99), or equivalent ASTM D6007–14 (incorporated by reference, see § 770.99), and any quality control test method.* Correlation must be demonstrated by establishing an acceptable correlation coefficient (“ r ” value) or following the threshold approach at paragraph (d)(2)(i)(B) of this section.

(i) *Correlation.* The correlation must be based on a minimum sample size of

Environmental Protection Agency

§ 770.21

five data pairs and a simple linear regression (unless the threshold approach at paragraph (d)(2)(i)(B) of this section is used) where the dependent variable (Y-axis) is the quality control test value and the independent variable (X-axis) is the ASTM E1333-14 (incorporated by reference, see § 770.99) test value or, upon a showing of equivalence in accordance with paragraph (d) of this section, the equivalent ASTM D6007-14 (incorporated by reference, see § 770.99) test value. Either composite wood products or formaldehyde emissions reference materials can be used to establish the correlation.

(A) *Cluster Approach.* A panel producer may work with its EPA TSCA Title VI TPC to develop a correlation and linear regression between the TPC's ASTM E1333-14 (incorporated by reference, see § 770.99) or equivalent ASTM D6007-14 (incorporated by reference, see § 770.99) test method and the panel producer's quality control method under paragraph (b) of this section. In the event of clustered test results, a panel producer may fit a line through a point near the origin (the intersection of the X and Y axes) and the average value of the clustered data pairs. The point near the origin should represent the value for the EPA TSCA Title VI TPC's ASTM E1333-14 (incorporated by reference, see § 770.99) or equivalent ASTM D6007-14 (incorporated by reference, see § 770.99) test method and the panel producer's quality control method under § 770.20(b) when each testing apparatus is empty or when a very low emitting sample is tested. The average value of the clustered data pairs represents the average of a minimum of five data pairs that compare the test results of the EPA TSCA Title VI TPC's ASTM E1333-14 (incorporated by reference, see § 770.99) or equivalent ASTM D6007-14 (incorporated by reference, see § 770.99) test method with the panel producer's quality control method under paragraph (b) of this section. The line between the point near the origin and the average value of the cluster provides the linear regression. This line may be used by the panel producer and TPC to develop a quality control limit for the product.

(B) *Threshold Approach.* As an alternative to the linear regression and

cluster approaches, a panel producer may use the average value of the clustered data pairs from the EPA TSCA Title VI TPC's ASTM E1333-14 (incorporated by reference, see § 770.99) or equivalent ASTM D6007-14 (incorporated by reference, see § 770.99) test method and the panel producer's quality control method under paragraph (b) of this section as the quality control limit for the product. In this approach, no linear regression line is established. The average value would be assigned as the upper quality control limit for production of the subject composite wood product and must be below the applicable emission standard.

(ii) *Minimum acceptable correlation coefficients ("r" values).* The minimum acceptable correlation coefficients are as follows, where "n" is equal to the number of data pairs, and "r" is the correlation coefficient:

Degrees of freedom (n-2)	"r" value
3	0.878
4	0.811
5	0.754
6	0.707
7	0.666
8	0.632
9	0.602
10 or more	0.576

(iii) *Variation from previous results.* If data from an EPA TSCA Title VI TPC's quarterly test results and a panel producer's quality control test results do not fit the previously established correlation, the panel producer must have its TPC establish a new correlation and new QCLs.

(iv) *Failed quarterly tests.* If a panel producer fails two quarterly tests in a row for the same product type, the panel producer must have its TPC establish a new correlation curve.

(e) *Quality assurance and quality control requirements for panel producers.* Panel producers are responsible for product compliance with the applicable emission standards.

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§ 770.21 Quality control manual, facilities, and personnel.

(a) *Quality control manual.* (1) Each panel producer must have a written