THERMALLY FUSED LAMINATE (TFL) PANEL STANDARD 5-25

Voluntary Standard Sponsored by the Composite Panel Association (CPA)

Composite Panel Association

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VOLUNTARY STANDARD SPONSORED BY THE COMPOSITE PANEL ASSOCIATION (CPA)

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1. Abstract

This voluntary Standard, sponsored by the Composite Panel Association, sets forth requirements and test methods for surface performance and dimensional properties of thermally fused laminate (TFL) panels for the North American marketplace. Property requirements are expressed in metric and English. Normative annexes are considered part of a standard, informative annexes are not part of a standard. This Standard has two normative and four informative annexes. The informative Annex A, C, D and F contain additional industry terms, supplemental information on scratch perception, guidance on stain agents and photographs of the wear point for wear resistance; respectively. Normative Annex B and E contains large ball impact equipment diagrams torque specifications along with example photographs of test specimen preparation, and surface defects edge quality requirements.

2. Purpose

The purpose of the voluntary Standard for thermally fused laminate (TFL) panels is to provide a common basis for understanding throughout the industry and among and between those specifying and using industry products in North America.

3. Scope

3.1 This document specifies the surface requirements and dimensional tolerances of decorative TFL panels for interior use when fused to particleboard, medium density fiberboard (MDF) or hardwood plywood panels used to make finished products.

3.2 Standard applies to panels with a TFL fused to one or both surfaces of a substrate.

3.3 This Standard is not applicable to flooring products.

4. Terms and Definitions

4.1 Basis weight of paper: The dry weight of paper expressed in grams per square meter (gsm). English units expressed in pounds (lbs) per 3000ft^2.

4.2 Flatness: A measure of a surface's form that indicates all the points along that surface lie in the same plane.

4.3 Panel: A flat, rectangular piece of substrate laminated on one or two surfaces with TFL, with all trimmed edges $\geq$ 0.61 m (2 feet).

4.4 Panel average thickness: The average of the eight measurements taken 25.4 mm (1.0 inch) in from the edge at each panel corner and at the mid-length of each panel edge.

4.5 Panel average thickness from specified: The difference between the panel average thickness and the specified thickness.

4.6 Printed Décor: Paper that is mainly composed by alpha-cellulosic fiber that have generally a basis weight between 40-100 gsm (25 – 62 lbs/3000ft^2). The surface of the base paper is printed with multiple thin layers of ink using an engraved cylinder or digital printing. This operation will lead to a finish product ready for impregnation. Printed décor covers both solid cover and print images.

4.7 Solid Décor: Paper that is mainly composed by alpha-cellulosic fiber that have generally a basis weight between 60-140 gsm (37 – 86 lbs/3000ft^2). This paper contains pigment to provide a uniform coloration of the paper through the entire paper. This paper is ready to be impregnated.

4.8 Specified thickness: The thickness specified either by the manufacturer or by the purchaser.

4.9 Substrate: Particleboard or medium density fiberboard (MDF) as defined in product standards ANSI A208.1-2022 and ANSI A208.2-2022, respectively, or Hardwood Plywood defined in ANSI/HPVA HP-1-2024. Substrates shall comply with the Formaldehyde Emission Standards for Composite Wood Products final rule pursuant to Title VI of the Environmental Protection Agency Toxic Substances Control Act (TSCA) (40 CFR Part 770).

4.10 Thermally fused laminate (TFL): TFL is made by using a hot press to permanently fuse one or multiple resin-impregnated sheets of décor paper directly to a substrate, sealing the surface and creating a ready to use product. Subsequent surface treatments after pressing may be added to enhance

certain properties. Heat and pressure activate the resin, creating a cross-linked bond with one or both faces of a board substrate, achieving bonding, curing, and sealing in the same process without the use of an intermediate adhesive. The surface appearance may be a solid color or printed décor with optional degrees of texture and gloss. The décor paper generally weighs between 40 and 140 g/m^2 (25 – 86 lbs/3000ft^2).

4.11 Variance from panel average thickness: The difference between the panel average thickness and the individual thickness measurement that varies the most from that average.

4.12 Warp: Defined as the deviation of the geometry of a panel from an initial state of flatness. Other terms that are important include cup, bow, and twist. These terms refer to specific types of warp in a panel as follows:

- Cup - deviation from flatness in a plane oriented along the short dimension or width of a panel.
- Bow - deviation from flatness along the long dimension (length) of a panel.
- Twist - deviation from a flat plane between diagonal corners.

4.13 Wear Point (WP): For wear resistance testing, the WP is that point at which the first clearly recognizable wear-through of the print, pattern or solid color appears and the sub-layer becomes exposed in three quadrants. The sub-layer for printed patterns is the base paper on which the pattern is printed; for plain colors it is the first wood substrate of different color.

Informative Annex A provides additional industry terms and definitions.

5. Requirements

Table 1. Surface Performance Properties

Property Test Methods ISO 4586-2[1]	Description	Performance Level	Minimum Requirement
Large Ball Impact Resistance (modified)[2,3] *The Large Ball Impact test is optional (see footnote 3).*	Max impact height; indent diameter failure mode;		> 375 mm (14.8 inches) minimum height; < 10 mm (0.39 inches) or greater diameter indent
Lightfastness	Color change (minimum)		> 3 (Moderate Effect)
Scratch Resistance (modified)[2]	All Surface Types		≥ 2 Rating
Staining (Method B)	Cleanability Stain Reagents 1 – 10 Stain Reagents 11-16	Total Score	< 20 ≥ Rating 5 – no effect ≥ Rating 3 - moderate effect
Surface Defects	The following surface defects are permissible: • Dirt, spots, and similar surface defects. The admissible size of such defects is based on a maximum contamination area equivalent to 2.0 mm2/m2 (in^2/ft^2) of laminate and is proportional to the sheet size under inspection. The total admissible area of contamination may be concentrated in one spot or dispersed over an unlimited amount of smaller defects. • Fibers, hairs, and scratches. The admissible size of defects is based on a maximum contamination length equivalent to 20 mm/m2 (in/ft^2) of laminate and is proportional to the sheet size under inspection. The total admissible length of contamination may be concentrated in one defect or dispersed over an unlimited amount of smaller defects • Edge Quality (see normative Annex E)		
Wear Resistance (modified)[2]	Class 1: General TFL Applications – Typical for printed designs or pearlescent colors, low basis weight paper. Class 2: General TFL Applications – Typical for Unicolor décor papers. Class 3: TFL Applications where Higher Level of Wear Durability is required (institutional; commercial) – Typical for décor papers with wear barrier.	Standard Resistance Medium Resistance High Resistance	20 < WP < 50 50 ≤ WP < 150 WP > 150

Note[1] International Standard ISO 4586-2:2018-07 seventh edition, *High-pressure decorative laminates (HPL, HPDL) — Sheets based on thermosetting resins (usually called laminates) — Part 2:*

- Large Ball Impact Resistance – section 25
- Lightfastness – section 33
- Scratch Resistance – section 29
- Staining (Method B) – section 31
- Surface Defects – section 4
- Wear Resistance – section 11

Note[2]
See section 6, Test Methods, for detailed comparison between ISO 4586-2 and the CPA modifications to each applicable method.

Note[3]
The Large Ball Impact test is optional and is not a requirement of this Standard. The Large Ball Impact test result may be of interest when TFL is used as a horizontal surface.

Table 2. Dimensional Properties

Property	Test Method / Definition	Minimum Requirement
Flatness (does not apply to panels with TFL fused to only one surface)	EN 14323:2021 (E), Wood-based panels - Melamine faced boards for interior uses - Test methods; November 2021, section 6.2, follow with no modifications	$\leq$ 3 mm/m (0.036 inch/foot)
Panel average thickness from specified	See section 4, Terms and Definitions	$\pm$0.300 mm (0.012 inch)
Panel length or width tolerance	See section 4, Terms and Definitions	$\pm$2.0 mm (0.080 inch)
Specified thickness	See section 4, Terms and Definitions	Thickness specified either by the TFL panel manufacturer or by the purchaser.
Variance from panel average thickness	See section 4, Terms and Definitions	$\pm$0.125 mm (0.005 inch)
Warp	Standard Method for Measurement of Warp in Composite Panels, Composite Panel Association, August 2022	Permissible warp to be agreed upon by user and supplier.

6. Test Methods

6.1 Composite Panel Association (CPA) modifications to ISO's Resistance to impact by large diameter ball test method

International Standard ISO 4586-2:2018-07 seventh edition, *High-pressure decorative laminates (HPL, HPDL) — Sheets based on thermosetting resins (usually called laminates) — Part 2: Determination of properties* shall be followed for Large Ball Impact test method with the following exceptions to Section 25.

CPA Large Ball Impact			**ISO 4586 Standard Large Diameter ball**
Detail	Difference	ISO Section	Detail
Dead center	Preliminary specimen 1st strike location specification	25.5	Not specified
Start at 500 mm (19.7 inches)	Strike start height [on preliminary specimen] specification	25.5	Not specified
25 mm (0.98 inches) increments	Strike height increment adjustment [in reference to previous strike on preliminary specimen] specification	25.5	Not specified
1 drop in center; 4 drops at least 50 mm from center	Strike location distance on preliminary specimen specification	25.5	50 mm (1.97 inches) between points of impact & from edges
5 strikes; multiple specimens may be used during preliminary testing	Amount of strikes on preliminary specimen specification	25.5	Not specified
Amount of strikes on preliminary specimen specification	Number of new specimens with maximum height strikes specification	25.4; 25.5	Not specified; "For referee purposes, only one impact per specimen shall be made, with the point of impact as near as possible to the centre of the specimen."; "Sufficient

			specimens shall be prepared to obtain a final result (about five is usually sufficient)."
If more than 2 specimens fail, go back & test an additional preliminary specimen to determine a new lower height, and conduct 5 more single strikes (dead center) on 5 new test specimens	New specimens failure specification	25.5	Not specified; "Repeat the above procedure, as necessary, to determine the impact resistance of the laminate under test."
Secure test specimens in the clamping frame with wing nuts with minimal torque force of 1.2 to 1.5 Nm (0.88 to 1.11 pound feet of torque) to prevent movement of the sample. See Figure 1 in normative Annex B for a recommended wing nut tightening sequence proceeding from the number 1 nut to the number 8 nut.	Clamping tightening specification	25.5	No clamping specifications or instructions are provided.
Crack or 10 mm (0.39 inches) imprint (from carbon paper)	Failure criteria	Table 5; 25.5	The imprint diameter is specified in the performance criteria rather than in the procedure itself.
Carbon paper. CPA guidance for white or textured surfaces is to first make an initial observation of the carbon colored impact area, then for a second observation, gently wipe the impacted area with a cloth dampened with isopropyl alcohol or acetone to better observe any cracks in surface. See Figures 2 and 3 in normative Annex B.	Failure imprint options	25.5	Carbon paper only

6.2 Light Resistance – ISO Standard – no modifications

International Standard ISO 4586-2:2018-07 seventh edition, High-*pressure decorative laminates (HPL, HPDL) — Sheets based on thermosetting resins (usually called laminates) — Part 2: Determination of properties* shall be followed for Light Resistance Lightfastness (xenon arc)(Method B) test method in accordance with Section 33 without any modifications.

6.3 Composite Panel Association (CPA) modifications to ISO's Resistance to scratching test method

International Standard ISO 4586-2:2018-07 seventh edition, High-*pressure decorative laminates (HPL, HPDL) — Sheets based on thermosetting resins (usually called laminates) — Part 2: Determination of properties* shall be followed for resistance to scratching test method with the following exceptions to Section 29.

CPA Scratch Resistance			**ISO 4586 Standard**
Detail	Difference	ISO Section	Detail
Red contrast dye	Contrast medium specified by CPA	29.2.1	e.g. graphite, talcum, or solution of dye in alcohol
Between (5 ± 1) r/min (230 volt instrument) and (0.5 ± 0.1) r/min (115 volt instrument)	Rotational frequency	29.3.1.2	(5 ± 1) r/min.
Viewing angle and lighting not specified (not necessary due to contrast dye)	Ratings viewing technique	29.6	Place the specimen against the centre support in the viewing enclosure (see 29.3.2) in a position so that the specimen can be viewed at right angles to the plane of the surface.

Performance Criteria; CPA removed "Rating 1" since TFL panels consistently pass 1 N scratching

	Discontinuous scratches, or faint superficial marks, or no visible marks	**≥ 90 % continuous double circle of scratch marks clearly visible**
Rating 5	6 N (1.35 pounds)	> 6 N (> 1.35 pounds)
Rating 4	4 N (0.90 pounds)	6 N (1.35 pounds)
Rating 3	2 N (0.45 pounds)	4 N (0.90 pounds)
Rating 2	1 N (0.22 pounds)	2 N (0.45 pounds)

ISO Performance Criteria, Section 29.7

	Discontinuous scratches, or faint superficial marks, or no visible marks	**≥ 90 % continuous double circle of scratch marks clearly visible**
Rating 5	6 N (1.35 pounds)	> 6 N (> 1.35 pounds)
Rating 4	4 N (0.90 pounds)	6 N (1.35 pounds)
Rating 3	2 N (0.45 pounds)	4 N (0.90 pounds)
Rating 2	1 N (0.22 pounds)	2 N (0.45 pounds)
Rating 1	-	1 N (0.23 pounds)

Informative Annex C provides information about scratch perception.

6.4 ISO's Resistance staining (Method B) test method

International Standard ISO 4586-2:2018-07 seventh edition, *High-pressure decorative laminates (HPL, HPDL) — Sheets based on thermosetting resins (usually called laminates) — Part 2: Determination of properties* shall be followed for Cleanability/Stain Resistance test method in accordance with Section 31 without any modifications.

Informative Annex D provides information about staining agents.

6.5 Surface Defects (Assessment of appearance– ISO Standard)

International Standard ISO 4586-2:2018-07 seventh edition, High-*pressure decorative laminates (HPL, HPDL) — Sheets based on thermosetting resins (usually called laminates) — Part 2: Determination of properties* shall be followed for Assessment of appearance in accordance with Section 4 without any modifications.

6.6 Composite Panel Association (CPA) modifications to ISO's Resistance to surface wear test method

International Standard ISO 4586-2:2018-07 seventh edition, High-*pressure decorative laminates (HPL, HPDL) — Sheets based on thermosetting resins (usually called laminates) — Part 2: Determination of properties* shall be followed for resistance to wear test method with the following exceptions to Section 11.

CPA Wear Resistance			**ISO 4586 Standard**
Detail	Difference	ISO Section	Detail
miscible	Incorrect verbiage	11.5	immiscible
Isopropyl alcohol IPA	Cleaning agent specified	11.5	Non-hazardous organic solvent
Examine the specimen for wear after each 10 revolutions and examine the abrasive paper for clogging with abraded particles.	CPA requires recording observations after every 10 revolutions; ISO requires after	11.6.3	Examine the specimen for wear after each 25 revolutions and examine the abrasive paper for clogging with abraded particles.

	every 25 revolutions		
CPA revised the definition of initial wear point (IP) and renamed the term wear point (WP). The WP is that point at which the first clearly recognizable wear-through of the print, pattern or solid color appears and the sub-layer becomes exposed in three quadrants. The sub-layer for printed patterns is the base paper on which the pattern is printed; for plain colors it is the first wood substrate of different color.	CPA standard does not give details on size of wear through in the WP definition.	11.6.3	The initial wear point (IP) is that point at which the first clearly recognizable wear-through of the print, pattern or plain colour appears and the sub-layer becomes exposed in three quadrants. The initial wear point is reached when there are areas of at least 0,60 mm2 wear-through in two quadrants and an area of 0,60 mm2 wear-through becomes visible in a third quadrant. The sub-layer for printed patterns is the background on which the pattern is printed; for plain colours it is the first sub-layer of different colour.
No Final Wear Point (FP)	CPA standard does not require a determination of final wear point (FP); FP can be collected for additional info.	11.6.3	The final wear point (FP) occurs in the case of a patterned laminate when about 95 % of the pattern is removed in the abraded area, and in the case of a plain-colour laminate when an underlayer of a different colour is exposed over about 95 % of the abraded area.
Example of Insufficient Wear: Wear is in only one or two quadrants.	CPA added WP clarification; ISO has no IP clarification.	Not applicable	Not Applicable
Example of Excessive Wear: The wear point has been exceeded or wear is evident in all four quadrants.	CPA added WP clarification; ISO has no IP clarification.	Not Applicable	Not Applicable
Example of Ideal Wear for the Wear Point: That point at which the first clearly recognizable wear-through of the print, pattern or solid color appears and the	CPA added WP clarification; ISO has no IP clarification.	Not Applicable	Not Applicable

sub-layer becomes exposed in three quadrants. The sub-layer for printed patterns is the base paper on which the pattern is printed; for plain colors it is the first wood substrate of different color.			
See informative Annex F for photographs of 'Insufficient Wear, 'Ideal Wear,' Excessive Wear.'			
Not Applicable	CPA does not require ISO section 11.7 Expression of results	11.7	Calculate the wear resistance, expressed as a number of revolutions, for each specimen using the following formula: Wear resistance = IP + FP divided by 2 The initial wear point (IP) for the sample under test shall be the average of the IP values obtained on the three specimens. The resistance to surface wear of the laminate under test shall be the average of the wear resistance values obtained on the three specimens, rounded to the nearest 50 revolutions.

7. Identification

Each package or unit of panels shall be clearly marked by the manufacturer by a label or unit tag with at least the following information:

- manufacturer's name;
- production facility location;
- specified panel thickness;
- description of surface appearance (e.g., solid color, printed décor image, texture, gloss, etc.)
- statement of compliance to "CPA Thermally Fused Laminate (TFL) Panel Standard CPA 5-25."

8. Conformity Assessment

8.1 Manufacturers' inspection and testing

Each manufacturer who represents products as conforming to this Standard shall utilize statistically based sampling plans and appropriate quality control procedures to assure compliance with this Standard.

8.2 Sampling for acceptance

Should a buyer or third-party desire to perform the inspections and tests specified in this Standard, five panels shall be selected at random from the shipment. Panels which have been exposed to wide ranges of humidity may not conform to the property requirements of the Standard when subsequently tested. Should a dispute arise, the metric values, not the English unit values, shall be used.

9. Informative Annexes

A (Informative) - Additional Industry Terms and Definitions
B (Normative) - Large Ball Impact
C (Informative) - Scratch Perception
D (Informative) - Guidance for staining agents
E (Normative) - Surface Defects Edge Quality Requirements
F (Informative) - Photographs – Wear Point (WP)

Annex A (Informative)
Additional Industry Terms and Definitions

Antimicrobial: An antimicrobial pesticide is intended to disinfect, sanitize, reduce, or mitigate growth or development of microbiological organisms or protect inanimate objects from contamination caused by bacteria, viruses, fungi, protozoa, algae, or slime. Specifiers of antimicrobial TFL panels should look for products approved by Environmental Protection Agency (under FIFRA and FFDCA) and/or Health Canada (Pest Control Products Act (S.C. 2002, c. 28)). One widely recognized standard for measurement of antibacterial activity on plastics and other nonporous surfaces is ISO 22196:2011(E). The appropriate test method must be verified with the approval agency.

Balanced Construction: A substrate that has the same basis weight paper (sheet of TFL) fused on both surfaces.

Gloss: A surface luster or brightness. Gloss is determined by measuring how much light reflects off a surface expressed in gloss units (GU). Gloss is measured at 60 degrees using a glossmeter. For TFL, generally three levels of gloss are defined by the following range of GUs:

- Super matte <10 gloss unit
- Medium $\geq$10 to $\leq$40 gloss unit
- High >40 gloss unit

Lacquering: Coating the surface with lacquer to protect the finish.

Texture: The visual or tactile surface characteristics and appearance of the surface. For TFL, generally three levels of texture are defined by the following depth deviation measured in one millionth of a meter (µm). Depth is the platen impression resulting from the embossing process by which the surface of the TFL is given a relief effect.

- Smooth <20 µm
- Medium 20 to 79 µm
- Deep $\geq$80 µm

UV Treatment: Exposing a surface to ultraviolet (UV) light, which can be used to disinfect the surface by killing bacteria, viruses, and other microorganisms present on it, primarily by damaging their genetic material through the process known as ultraviolet germicidal irradiation.

Annex B (Normative)
Large Ball Impact Test Equipment and Application of Dye

In order to avoid effecting the test results, tighten the screws in the order outlined in the figure, starting with location number one and finishing with location number 8. Not tightening in this manner may cause increased torque and a lower result. Figure 1 provides the pattern for tightening down the sample fixture starting with screw number 1 proceeding sequentially to screw number 8.

Figure 1.

Figure 2.
Figure 2 illustrates the impact area prior to wiping with isopropyl or acetone.

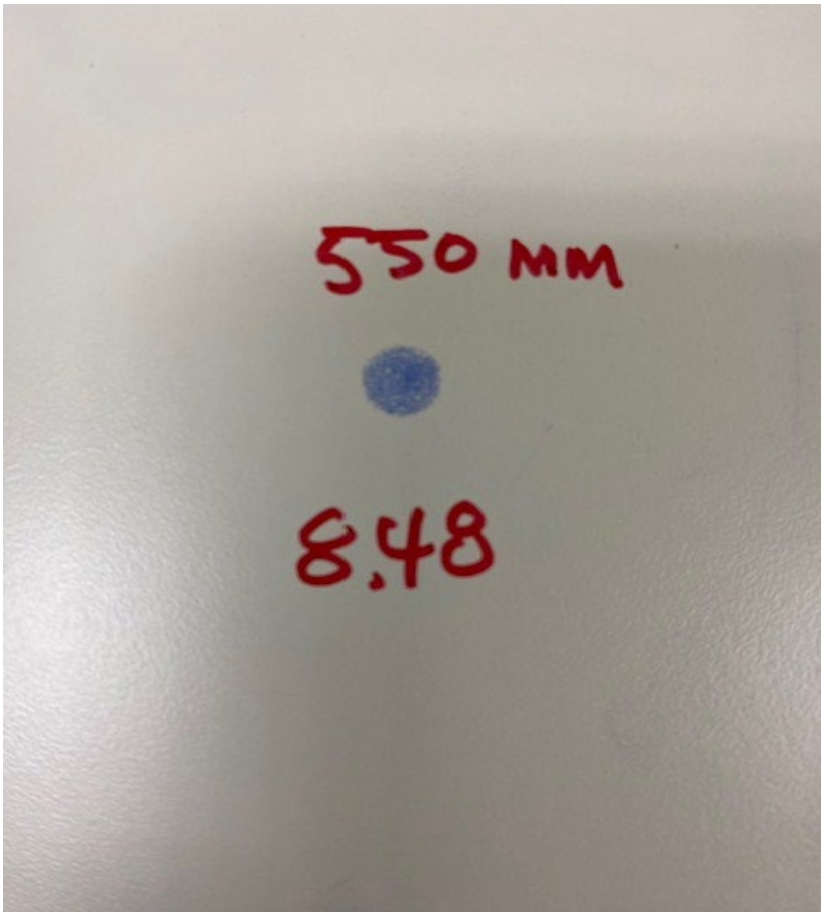
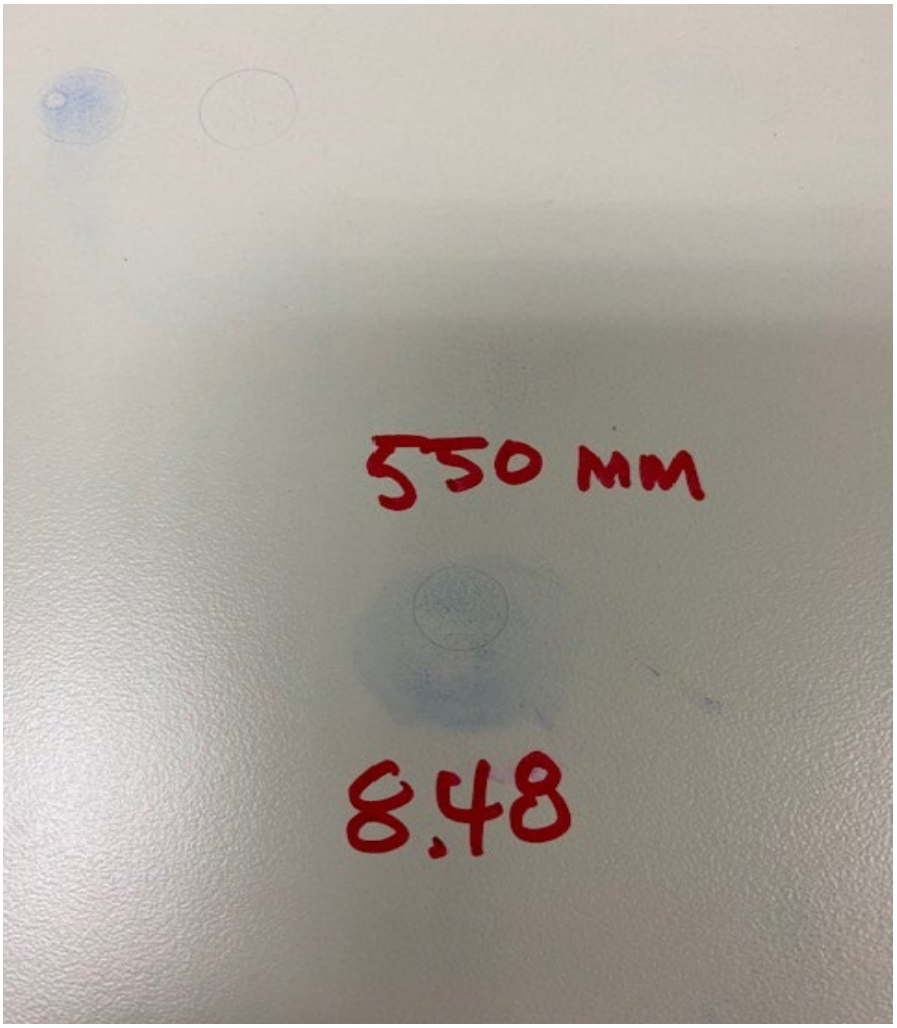


Figure 3.
Figure 3 illustrates the impact area prior after wiping with isopropyl or acetone making the circle crack more visible.



Annex C (Informative)
Scratch Perception

Thermally Fused Laminate (TFL) is a commonly used laminate, increasing in popularity for decorative surfacing of composite panels. The resistance of the TFL surfaces to scratching is an important property to assure the long-term performance of the TFL surfaces in service. The challenge is that the perception of scratches of TFL surfaces with equal physical scratch resistance performance varies depending on the TFL surface texture, gloss, color/print and viewing angle.

In general, darker laminates reveal scratches more than lighter colors, higher gloss more than lower gloss and smoother textures than surfaces with more texture. The TFL resin surfaces are clear and invisible, allowing the underlying color and print to vividly show through. The scratch creates a change in the light refraction of the resin surface that shows up as a "white" line. This is a little bit like water being transparent while snow is white. The molecule is the same, but the way light interacts with the liquid water vs. snow particles makes the snow appear white rather than clear. Therefore, darker, less "white" surfaces have greater scratch perception than lighter, more "white" surfaces. Less textured surfaces have scratches that are continuous, whereas on higher textured surfaces the scratches are disjointed as the scratch moves along the texture. Higher gloss surfaces have a greater perception of scratches because the scratch causes a low gloss line and disruption of the glossy surface that is readily picked up by the human eye due to the contrast.

Several methods for scratch resistance testing are available. This standard uses the ISO 4586-2018 method 29 Resistance to Scratching method whereby a sample is attached to the turnstile of the scratch testing apparatus. A stylus with a diamond point is laid onto the decorative surface and a specific weight measured in Newtons (N) applied. Then the turntable is turned on for 1 revolution. If the scratch is visible at the applied weight, then a lower weight is applied in 1N increments until the applied weight no longer produces a scratch. If a scratch is not visible, then more weight is added in 1N increments until a scratch becomes visible. The scratch resistance is given a number rating based on the amount of N force applied.

Annex D (Informative)
Guidance for staining agents

CPA offers the following additional guidance for selecting and using agent substances when performing the ISO Resistance staining (Method B) test method.

- It is recommended that a 7.5% concentration of iodine be used for consistency throughout North America. Avoid using iodine containing citrus acid.
- Use large nationally recognized brand names. Avoid the lowest cost point products.
- Check the expiration data.
- It is recommended that an agent not be used if 50%, by volume, of the agent has already been used. Evaporation could cause an increase in concentration.
- Shake the agent container well before using.

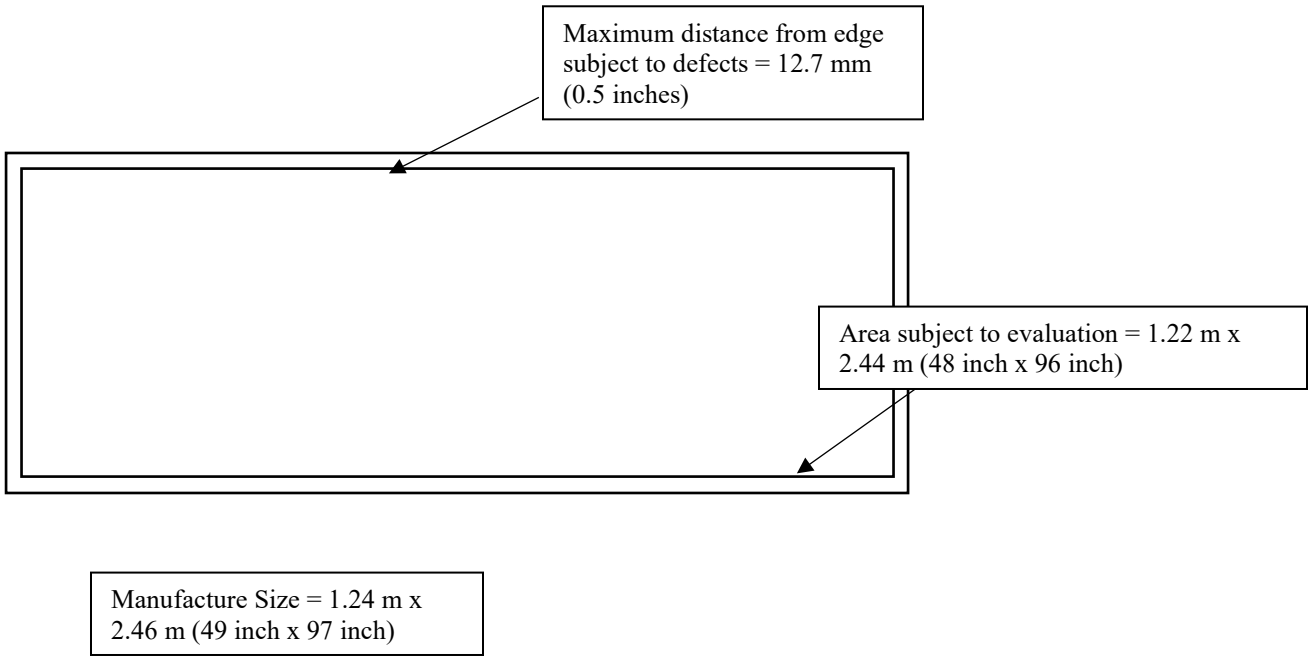
Annex E (Normative)
Surface Defects Edge Quality Requirements

CPA Edge quality requirement

Visual defects (e.g. moisture marks, lack of gloss, corner damage, missing paper, etc.) can be present on all four edges of the TFL panel, providing the defect-free length and width are at least the manufactured size minus 25.4 mm (1 inch). Defects shall not extend more than 12.7 mm (0.5 inches) in from any manufactured edge. See Figure 1 below.

Figure 1.

Example: 49 inch x 97 inch panel



(provided for comparative purposes)

ISO 4586-3:2018(E)

6.2.5.3 Edge quality

Visual defects (e.g. moisture marks, lack of gloss, corner damage, etc.) can be present on all four edges of the laminate, providing the defect-free length and width are at least the nominal size minus 20 mm.

Annex F (Informative)
Photographs - Wear Point (WP)

Definition of Wear Point (WP)
CPA revised the ISO definition of initial wear point (IP) and renamed the term wear point (WP). The WP is that point at which the first clearly recognizable wear-through of the print, pattern or solid color appears and the sub-layer becomes exposed in three quadrants. The sub-layer for printed patterns is the base paper on which the pattern is printed; for plain colors it is the first wood substrate of different color.

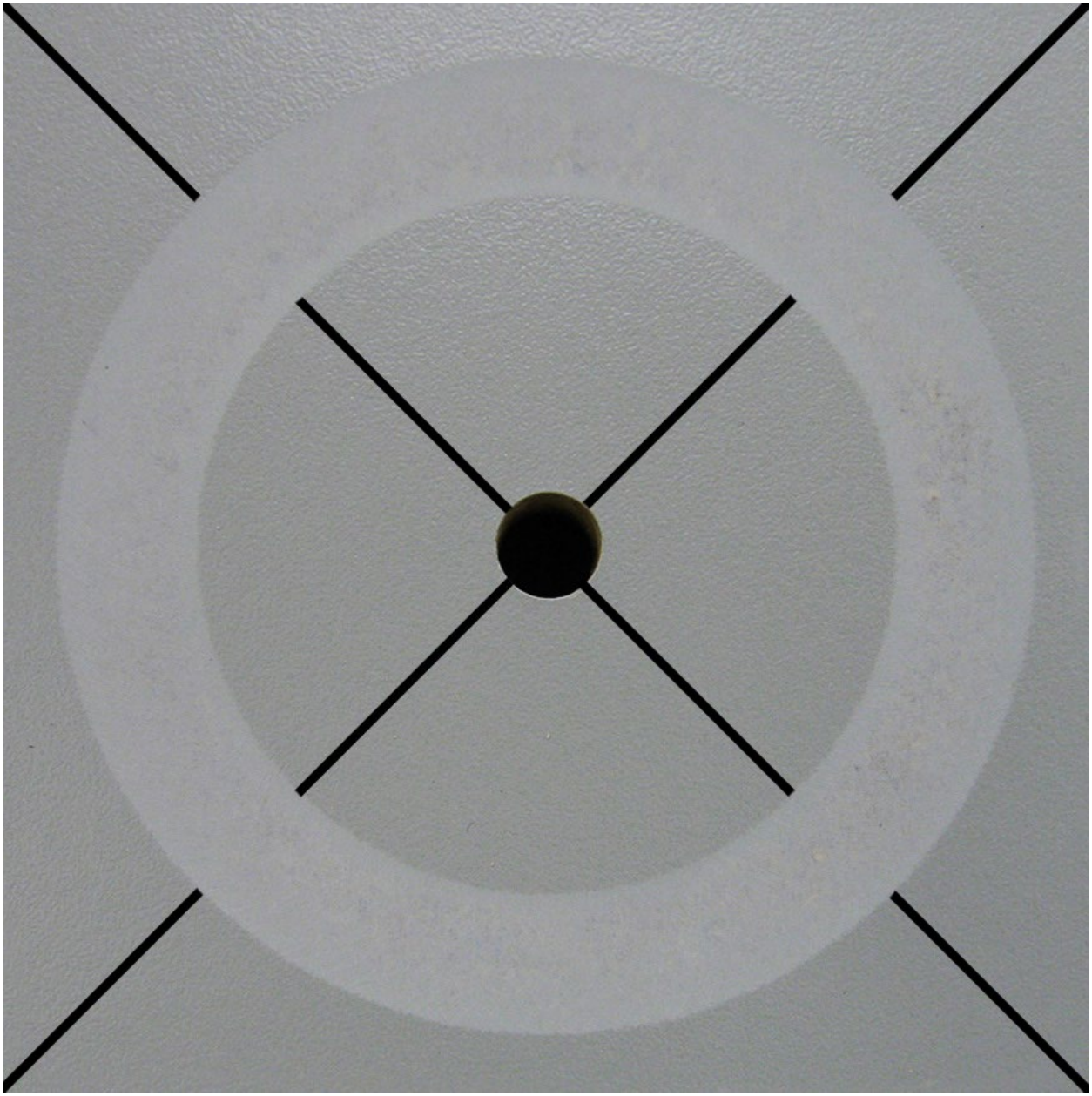
Example of Insufficient Wear
Wear is in only one or two quadrants.

Example of Ideal Wear for the Wear Point
That point at which the first clearly recognizable wear-through of the print, pattern or solid color appears and the sub-layer becomes exposed in three quadrants. The sub-layer for printed patterns is the base paper on which the pattern is printed; for plain colors it is the first wood substrate of different color.

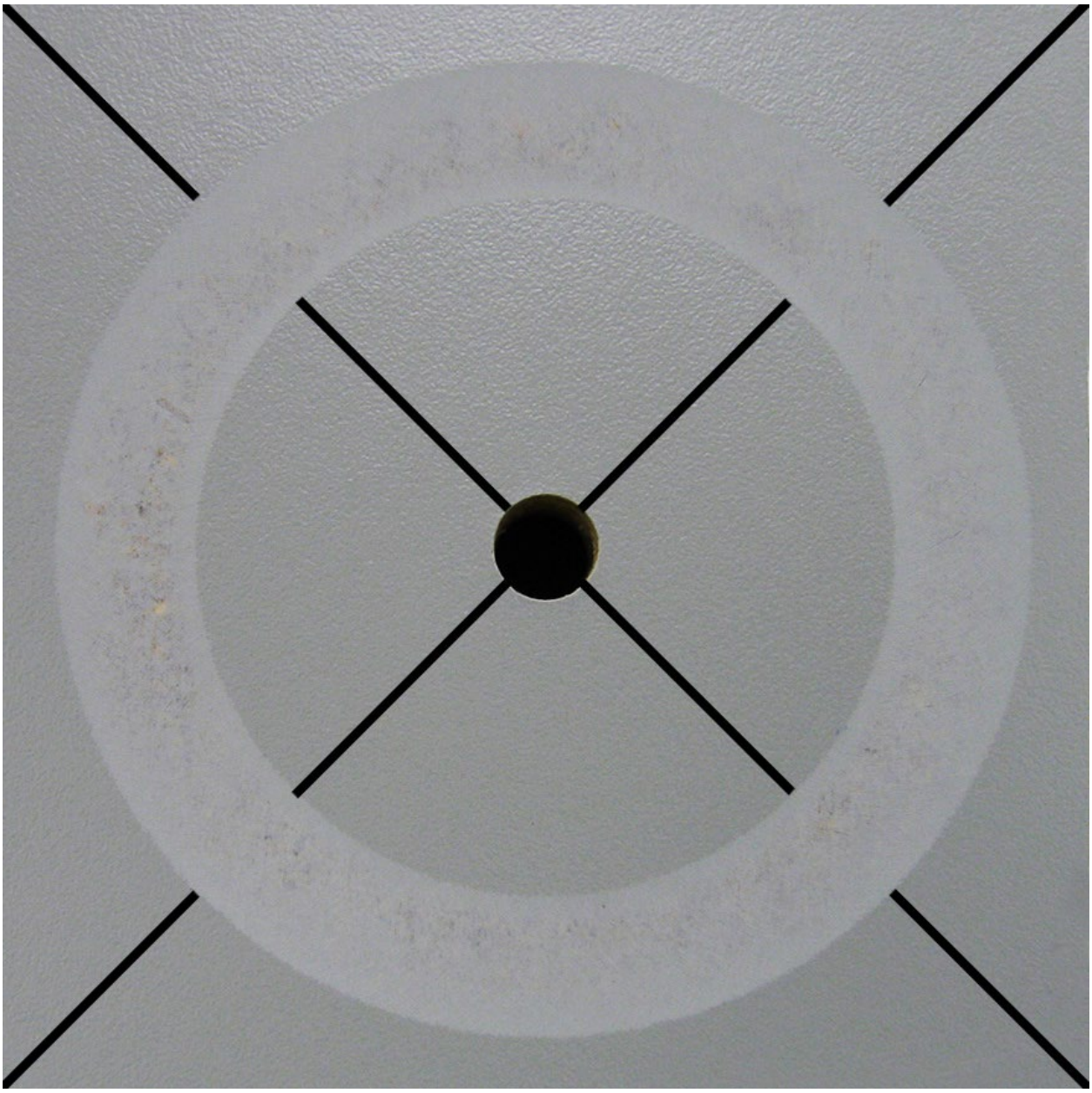
Example of Excessive Wear
The wear point has been exceeded or when wear is evident in all four quadrants.

On the following pages, example photographs are illustrations of insufficient, ideal, and excessive wear points for examples of solid color gray, white and printed maple TFL.

Solid Gray Color TFL – Insufficient

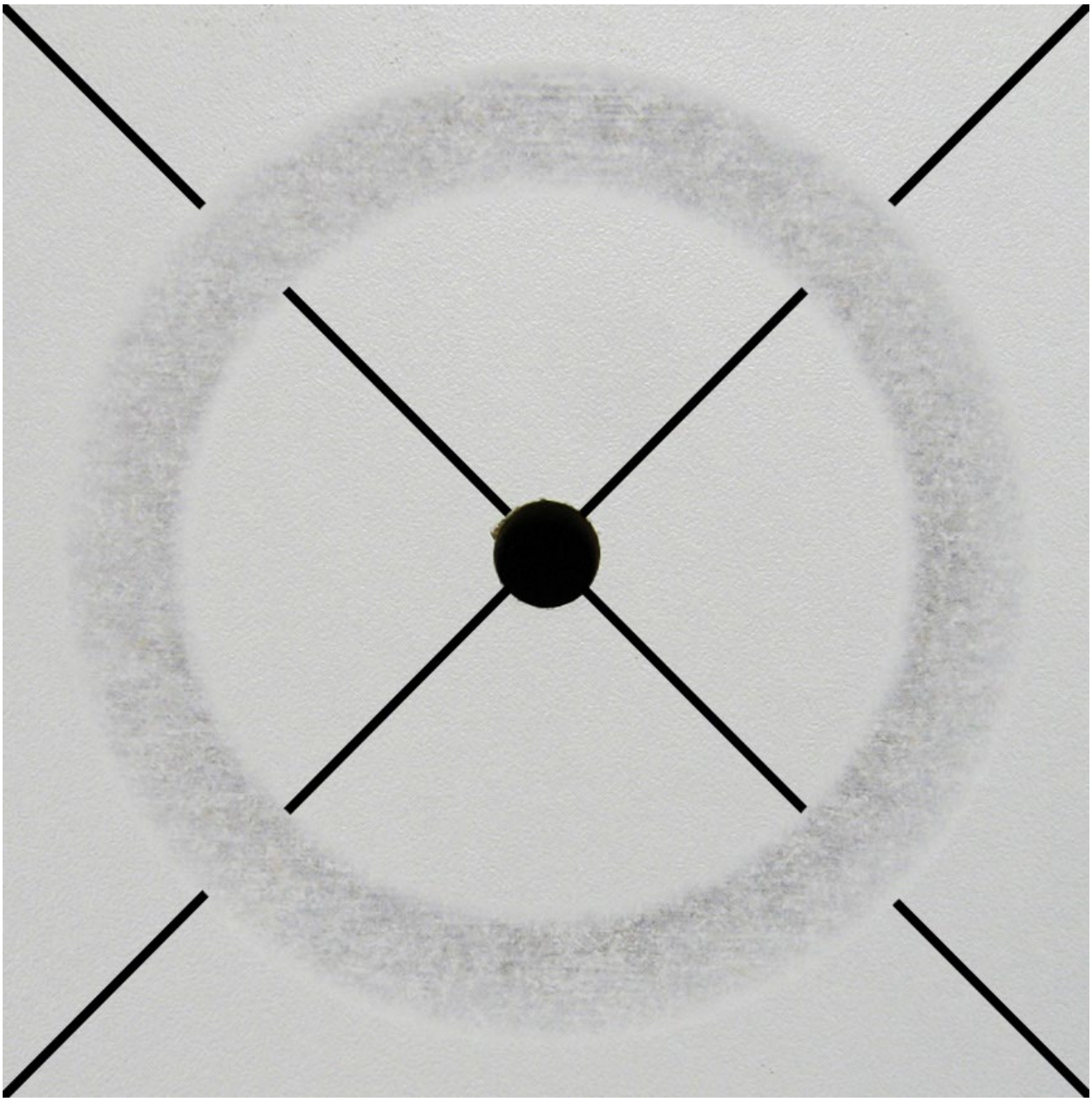


Solid Gray Color TFL – Ideal

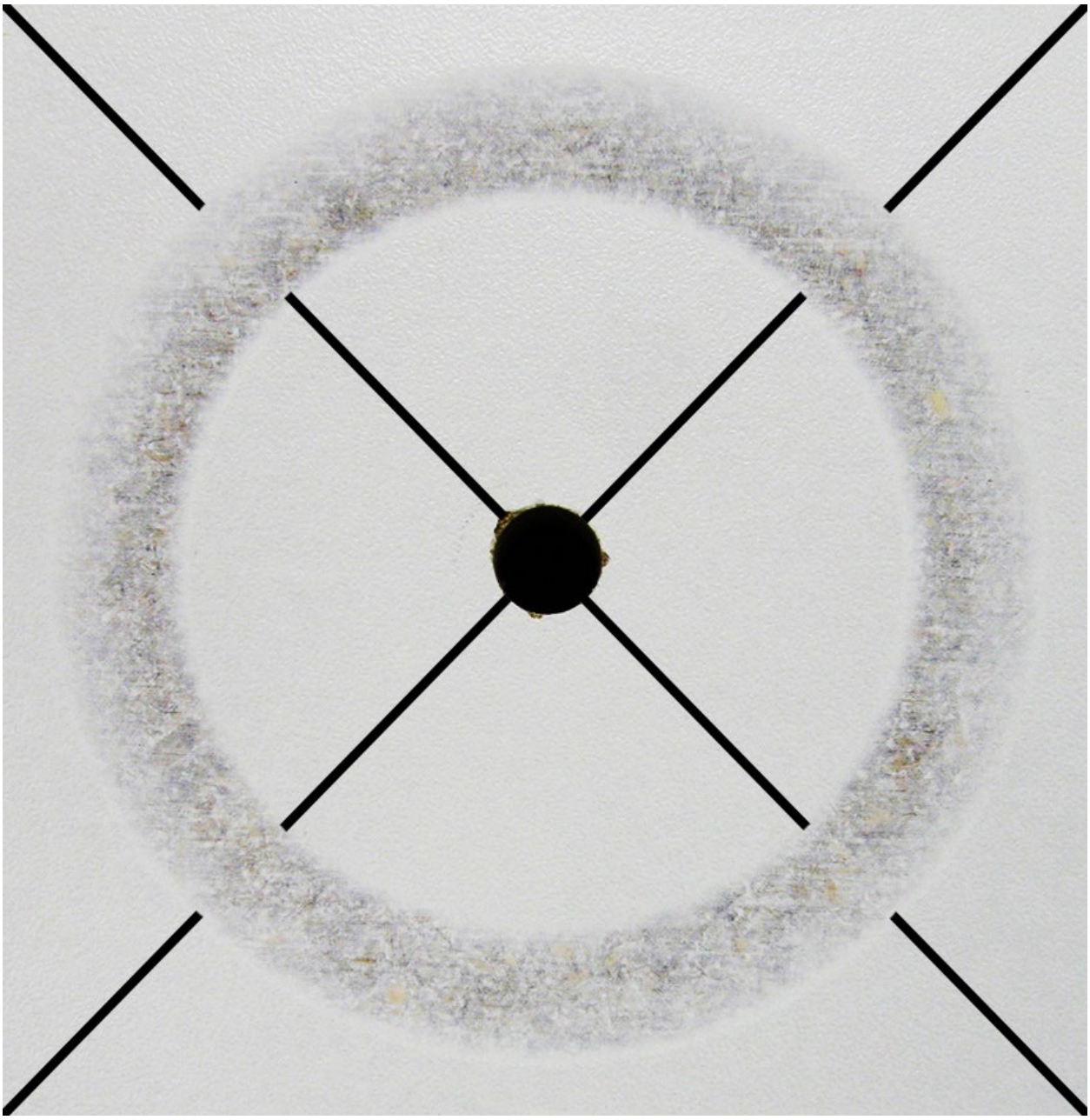


Solid Gray Color TFL – Excessive

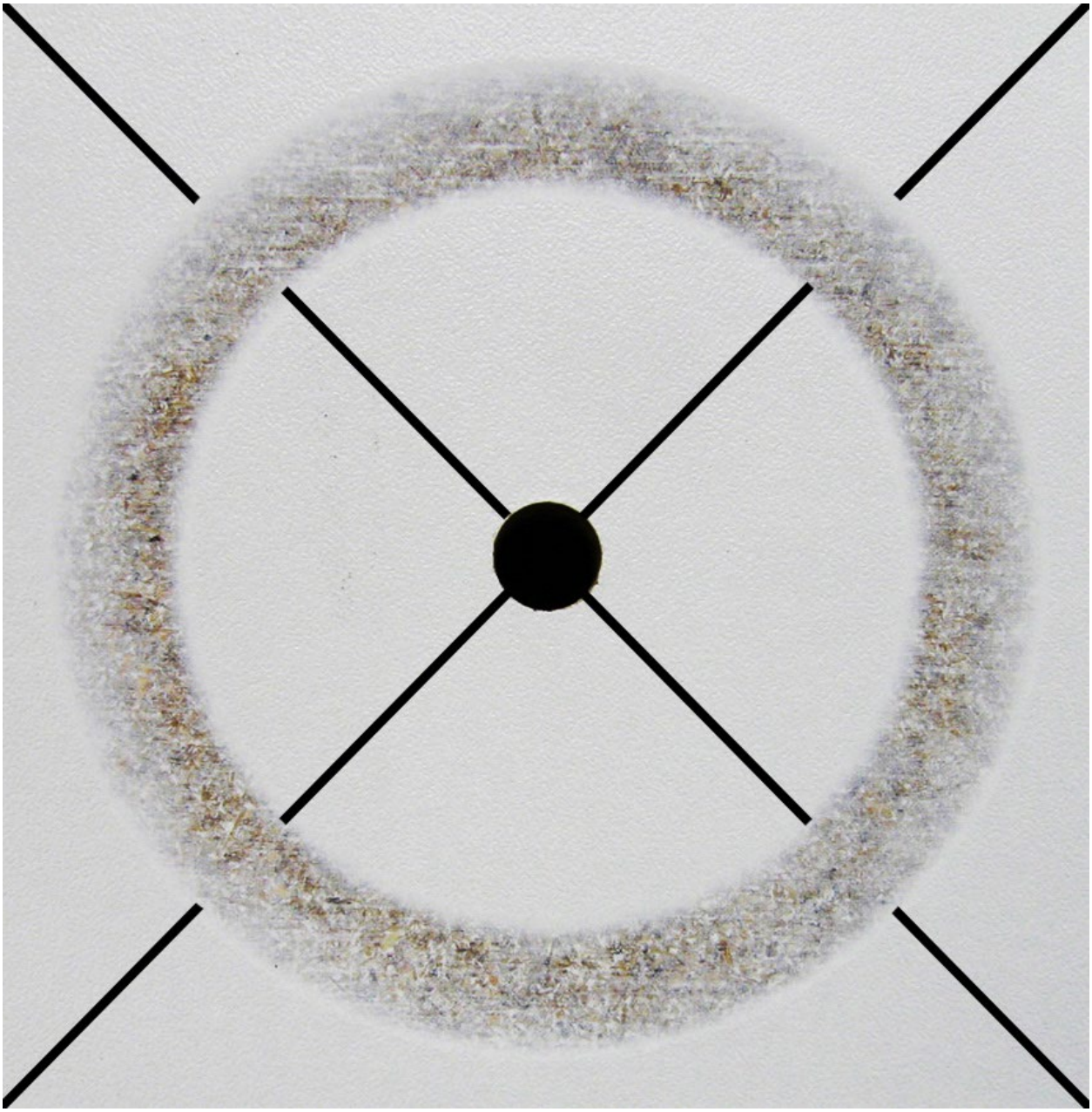
Solid White Color TFL - Insufficient



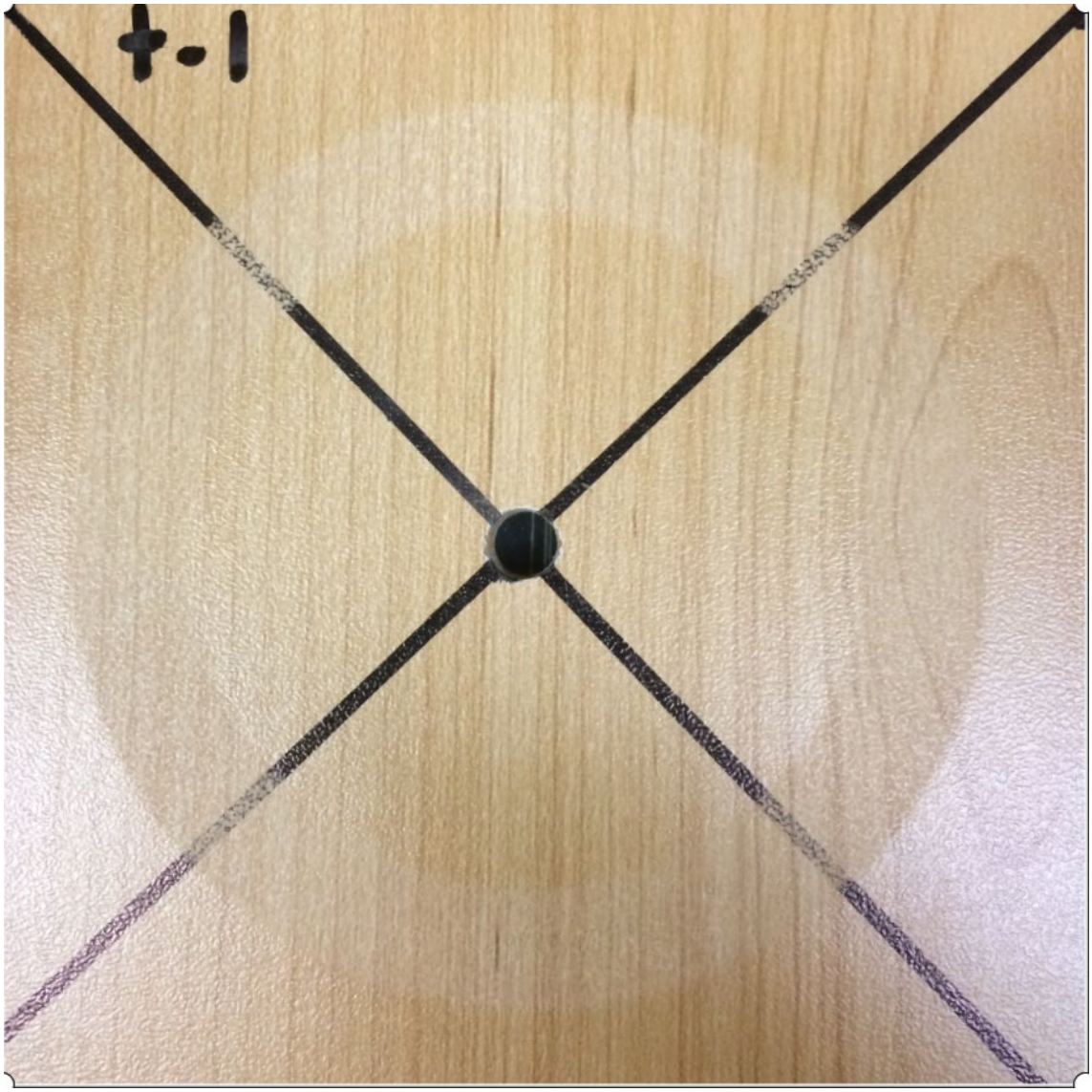
Solid White Color TFL – Ideal



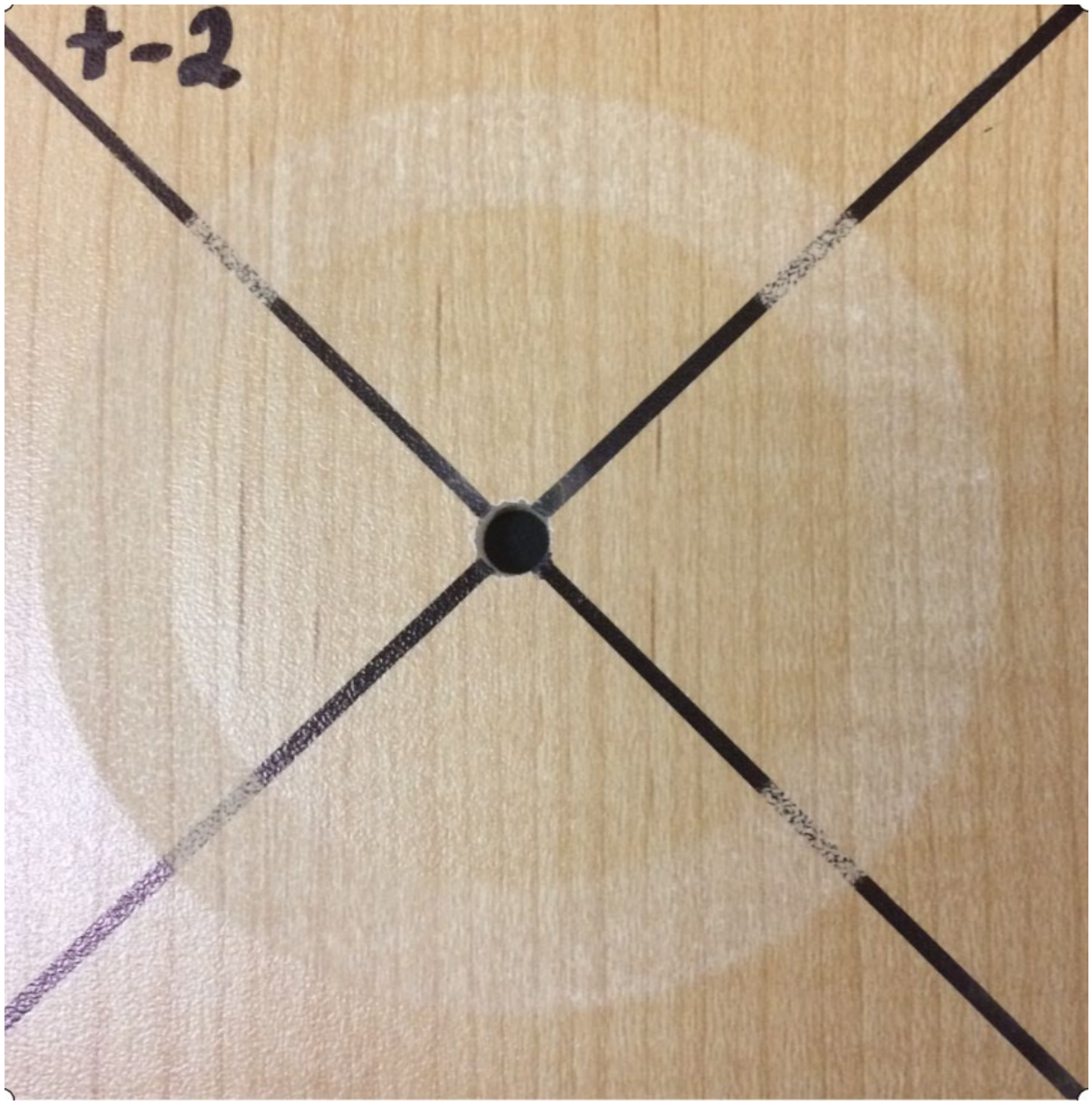
Solid White Color TFL - Excessive



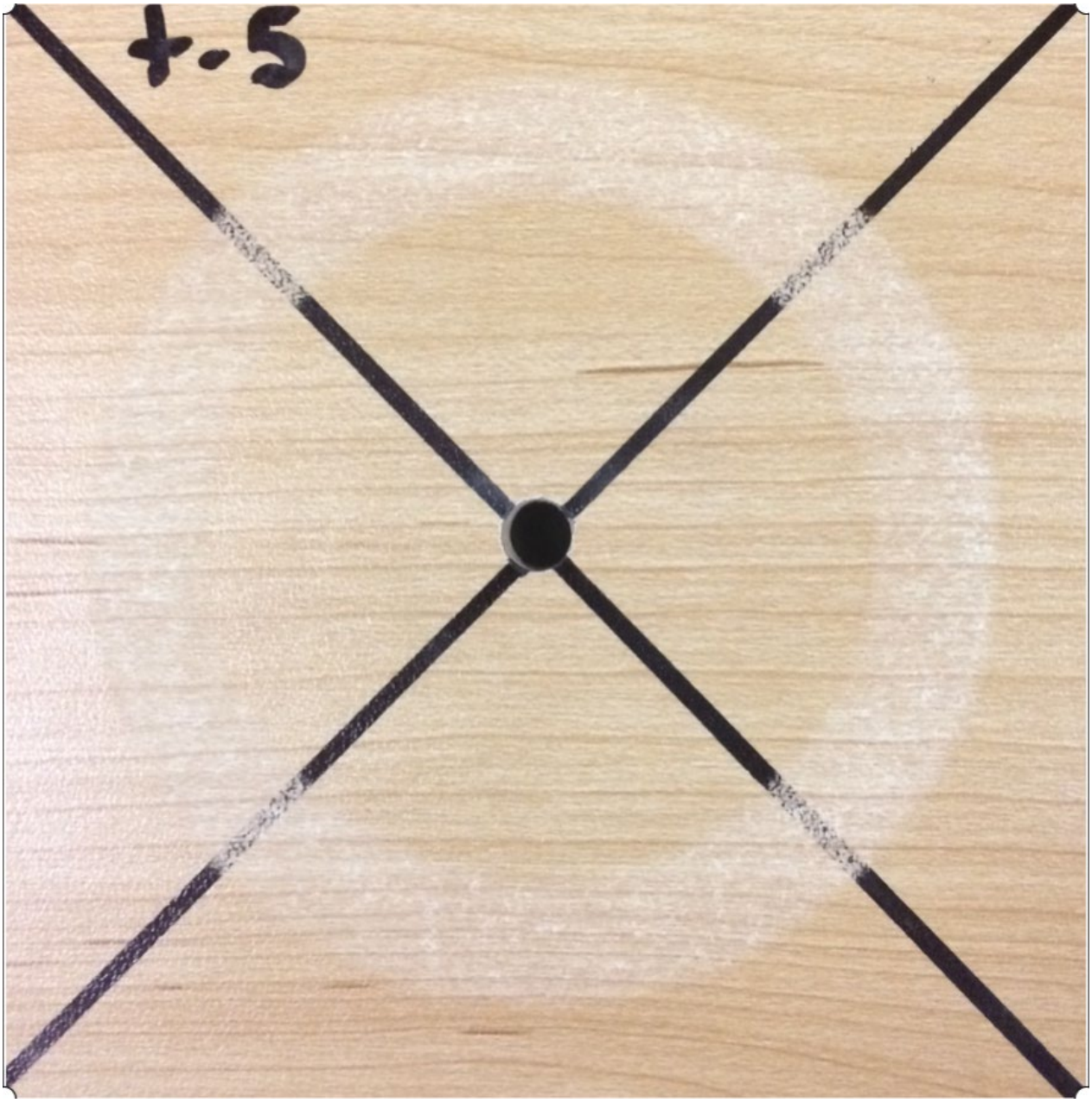
Printed Maple Décor TFL – Insufficient



Printed Maple Décor TFL – Ideal



Printed Maple Décor TFL – Excessive



COMPOSITE PANEL ASSOCIATION (CPA)

The Composite Panel Association (CPA), founded in 1960, represents the North American wood-based composite panel and decorative surfacing industries on technical, public policy, quality assurance and product acceptance issues. CPA General Members include the leading manufacturers of particleboard, medium density fiberboard (MDF), hardboard and engineered wood siding and trim in North America, representing more than 92% of industry manufacturing capacity. CPA Associate Members include manufacturers of decorative surfaces, furniture, cabinets, mouldings, doors and equipment, along with laminators, distributors, industry media and adhesive suppliers committed to product advancement and industry competitiveness. CPA is a vital resource for specifiers, manufacturers and users of industry products. The association provides leadership on federal, state and provincial regulatory and legislative matters of interest to industry. As an internationally recognized and accredited standards developer, CPA writes, publishes and maintains the industry's definitive ANSI product standards. CPA also operates the International Testing Center (ITC) and manages the Grademark Certification Program, the largest and most stringent testing and certification program of its kind for North American composite panel products. CPA developed the Eco-Certified Composite (ECC) Sustainability Standard and Certification Program, a voluntary industry standard for composite wood panels and finished products made with particleboard, MDF, hardboard and engineered wood siding and trim.