NORTH AMERICAN LAMINATE FLOORING ASSOCIATION

Macro-Scratch Testing Method

LAMINATE FLOORING

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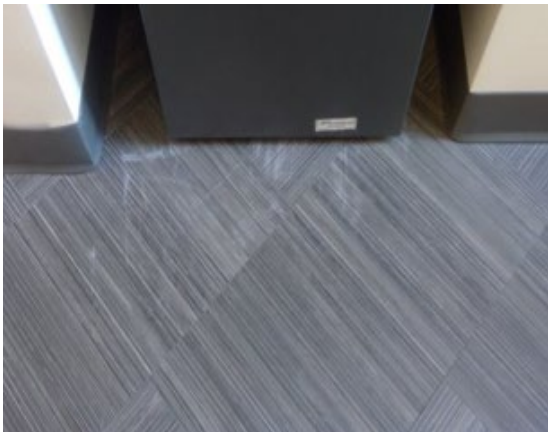
1. Scope

This is a test method intended to evaluate macro scratching on a laminate floor's surface, more commonly associated with deep, easily visible surface scratches. The intent is to simulate scratching caused by objects being dragged or slid across the floor. Examples might include sand or dirt under chair legs and scratching from pets, shoes, etc.

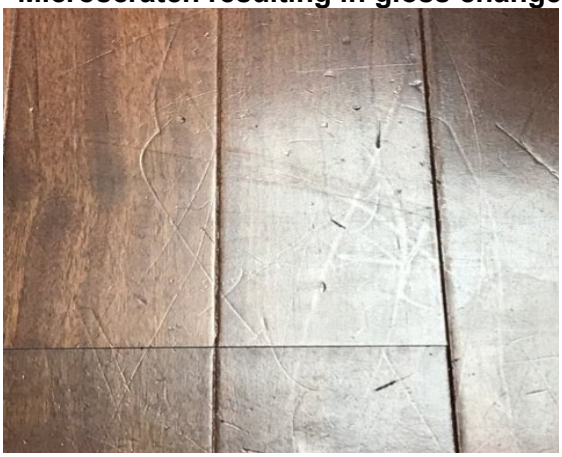
It is commonly accepted to divide scratches into three main categories: (1) fine surface scratches also called micro-scratches, (2) deep surface scratches, also called macro-scratches, and (3) surface abuse – denting and gouging.

Microscratch

Microscratch resulting in gloss change



Macro-scratch



Dent & Impact

(not scratches because finish is not abraded)

Gouge

This method involves comparative visual assessment for surface scratching, against an established rating system that goes from no change (Rating 0) to severe change (Rating 3). The rating scale includes both pictorial as well as descriptive assessment guidance to help with rating product(s). The gloss, color, and texture of the flooring can influence scratch testing and final assessment. When comparing or ranking more than one product, it is strongly recommended that specimens need to be of similar gloss, texture, and color for purposes of a fair and accurate assessment rating.

2. Test Apparatus

2.1. Scratch apparatus: Martindale abrasion and pilling tester with capabilities to run a linear pattern. See Appendix A.
2.2. Holder for sandpaper material
2.3. Viewing conditions: evenly diffused light giving an illumination on the test surface of 1200 ± 400 lx, diffuse daylight, or artificial daylight.
2.4. Scrub materials: 3M Pro Grade Precision – 80 grit sandpaper, or equivalent, cut-to-size of holder (3.5 in or 89 mm in diameter)
2.5. Double-sided tape: to attach the sandpaper material to the holder
2.6. Soft cotton cloth
2.7. Isopropyl alcohol: to clean specimen before macro-scratching
2.8. Weights: 2 x 6 N discs per station. Total weight of the discs: 920 ± 20 g. See Appendix A for setup.
2.9. Black permanent marker: for drawing a 3.5” (89mm) circle in middle of the sample prior to scratching

3. Specimens

3.1. For each test, three specimens shall be randomly selected from the manufactured lot. No two specimens shall be selected from the same tile or plank. If the product tested has a large color, gloss, or texture variation, the 3 specimens should be selected to cover the variation range and shall be taken from the most appropriate section of the plank or tile.
3.2. Each specimen shall measure approximately 6 in x 6 in x nominal thickness (150 mm x 150 mm x nominal thickness). If plank is not at least 6 in (150 mm) in width, use entire width of the board, edge profile intact.

4. Procedure

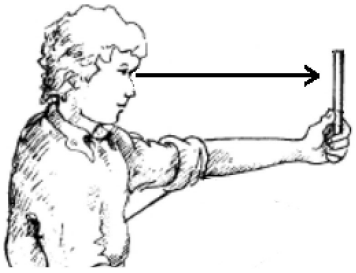
4.1. Condition the samples for at least 24 hours prior to the test at a temperature of 73°F ± 5°F (23°C ± 3°C) and a relative humidity of 50% ± 10%.
4.2. After conditioning, the test shall be carried out in test temperature of 73°F ± 5°F (23°C ± 3°C) and a relative humidity of 50% ± 10%.
4.3. Clean the surface of the specimen as recommended by manufacturers or with isopropyl alcohol and a clean, soft cloth. Allow the specimen to dry and make sure the samples surface is not already scratched before testing.
4.4. Using a stencil, the same size (3.5” or 89mm) as the cut-to-size sandpaper material, draw a circle with a marker in the middle of the sample to encompass the space to be macro-scratched for later inspection.
4.5. Fix the sample on the table of the Martindale tester using the double-sided tape, ensuring the tape covers the entire surface of the sandpaper and holder and that the decor layer texture orientation is perpendicular to the linear scratch pattern. The sandpaper shall be fixed with the tape on the guide plate of the holder. See Appendix A.
4.6. Select 50 rubs on the counter of the Martindale device, make sure the device is set up, so the movement is linear (not Lissajou pattern) and start the test. See Appendix A.

Macro-Scratch Testing Parameters				
Cycles	**Scratch Pattern**	**Scratch Grain Orientation**	**Abrasion Type**	**Weight (per station)**
50	Straight	Perpendicular to the scratch pattern	3M Pro Grade Precision – 80 grit	6 N + 6 N discs (total discs weight = 920 g) TOTAL weight [discs + spindle + holder] = 1,070 ± 20 g

Table A. Guideline for testing parameters

4.7. Once the 50 cycles are completed, remove the sample from the table and clean the surface with a clean, soft cloth, no isopropyl alcohol. Remove the used sandpaper material and discard it.

4.8. Hold the sample at a viewing distance of a nominal arm's length, rotating at all angles, and visually rate the samples Rating 0 to 3 according to Table B.



4.8.1. If the specimen is rated and determined to be a rating between ratings, i.e. Rating 2/Rating 3, enter half ratings, i.e. Rating 2.5.

4.9. Report values using NALFA data collection sheet.

4.10. The three ratings will be averaged together and rounded to the nearest tenth of a decimal.

4.10.1. If there is an outlier of > 2 ratings, e.g. Rating 0, Rating 0, Rating 3, among the three replicates, retest three additional replicates. Discard the minimum and maximum values from the set of six replicates and calculate the average of the remaining four values.

5. Report

5.1. Reference to this standard.

5.2. Description of the material under test.

5.3. Visual rating results of each individual specimen and the average of all 3 specimens.

5.4. Any deviation from the specific test method.

5.5. Date of the test.

5.6. Criteria of final reporting

Visual Rating Table for Surface Macro Scratching	
Final Average Rating	**Final Rating**
0 – 0.9	Little to no visible change in scratch or gloss
1.0 – 1.9	Slight amount of linear scratches and/or dulling
2.0 – 2.9	Significant amount of linear scratches and/or dulling
3	Severe amount of linear scratches and/or dulling

Table B.

6. Precision & Bias

This test method provides a comparative rating for scratch performance of flooring samples. Specimens are evaluated against an example set of pictures and illustrations in order to rate an individual specimen on a scale of 0 (little to no change) to 3 (severe change). Because the test method is subjective, no precision statement has been determined.

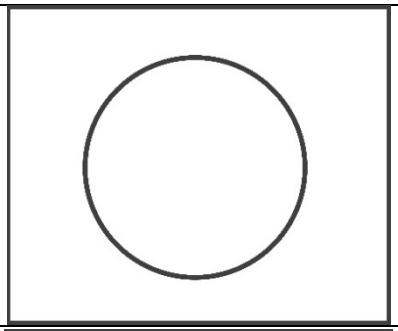
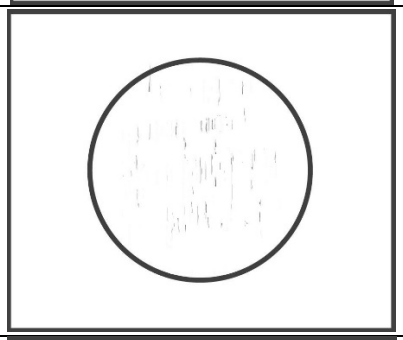
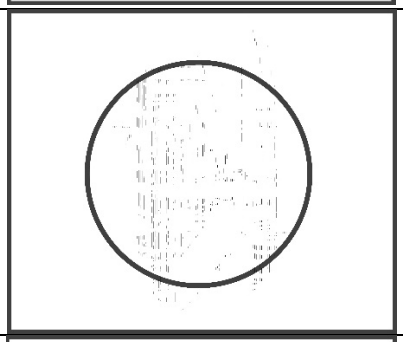
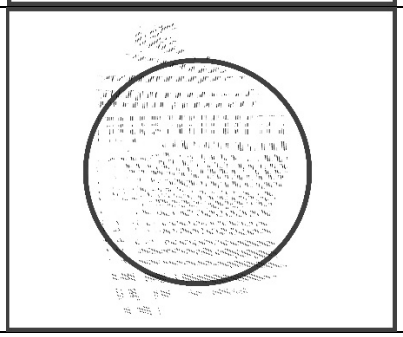
Visual Rating Table for Surface Macro-Scratching			
Rating	**Illustration Reference**	**Photo Reference**	**Description**
Scratch direction should be against the grain of the decor layer.			
0			Little to no visible change in scratch or gloss.
1			Slight amount (< 10%) of linear scratches and/or dulling; and generally noticed only at certain angles, no more than slight intensity
2			Significant amount (10-50%) of linear scratches and/or dulling; noticeable at most angles, significant intensity
3			Severe amount (> 50%) of linear scratches and/or dulling; generally noticeable at most angles, severe intensity
Note: intensity refers to visibility and depth of scratches			
Additional rating photo examples are provided in Appendix B.			

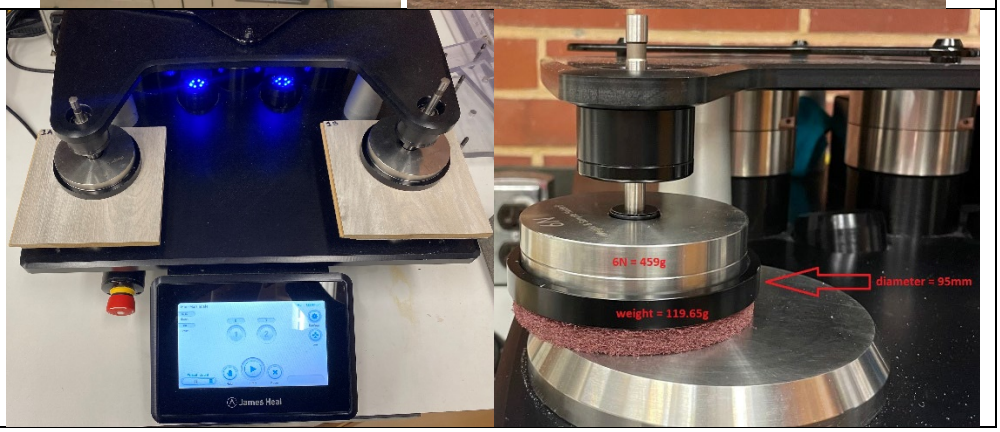
Table C. Illustration and photo examples of Ratings 0-3.

As samples are affected, there may be slight changes in gloss; with continued abrasion, that gloss change will turn into dullness, whiteness, and a more severe amount of visible scratches. Percentage values in rating descriptions refer to areas of viewing circles affected after testing.

Appendix A.

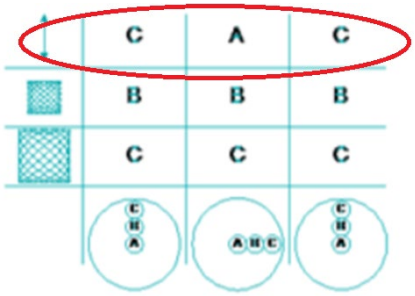
Scratch Apparatus

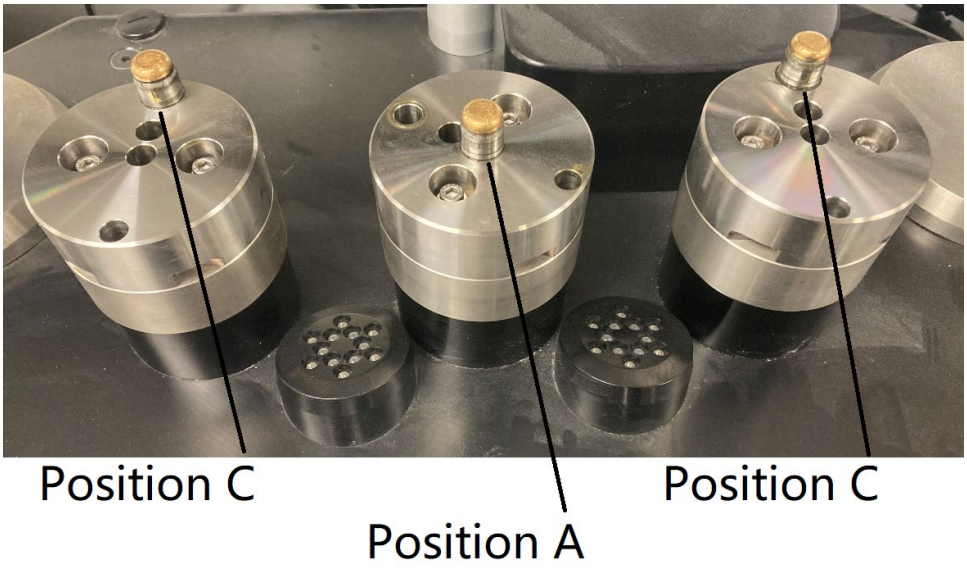
1. **Equipment examples**

Example 1: Martindale equipment with 3 samples holder	
Example 2: Martindale equipment with 1 sample holder (this example illustrates achieving weight in more than 1 way; this holder has a bottom rim, so there is slight added weight to accommodate the spacer, but the weight variation is insignificant at only 1.6% heavier than other configurations)	
Example 3: Martindale equipment with 2 samples holder	

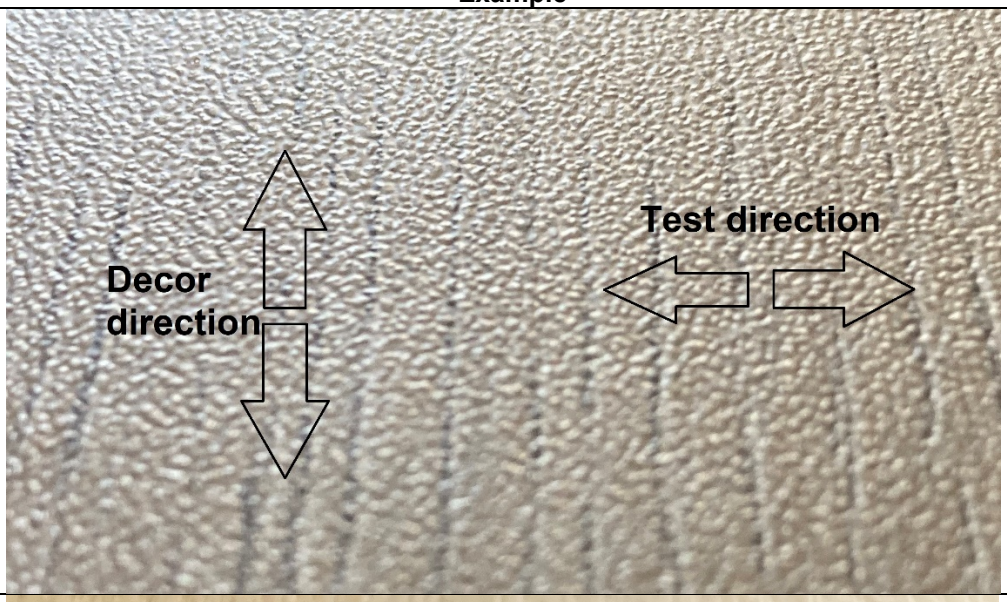
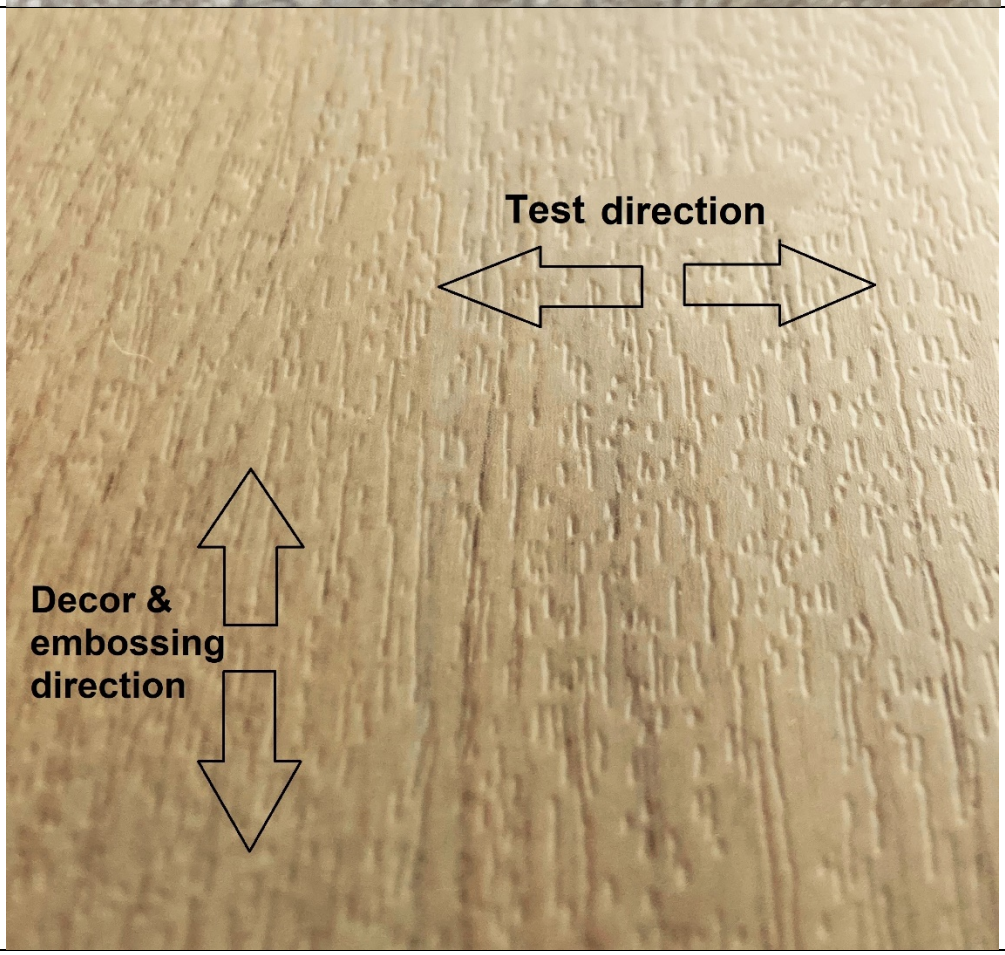
Testing Equipment	Spindle weight (g)	Holder weight (g)	Additional Weight (g)	Total weight (g)
Example 1	33	120	2*459 = 918	**1071**
Example 2	32.5	119.5	16.5 + (260*2) + (4*100) =936.5	**1088.5**
Example 3	33	120	2*459 = 918	**1071**

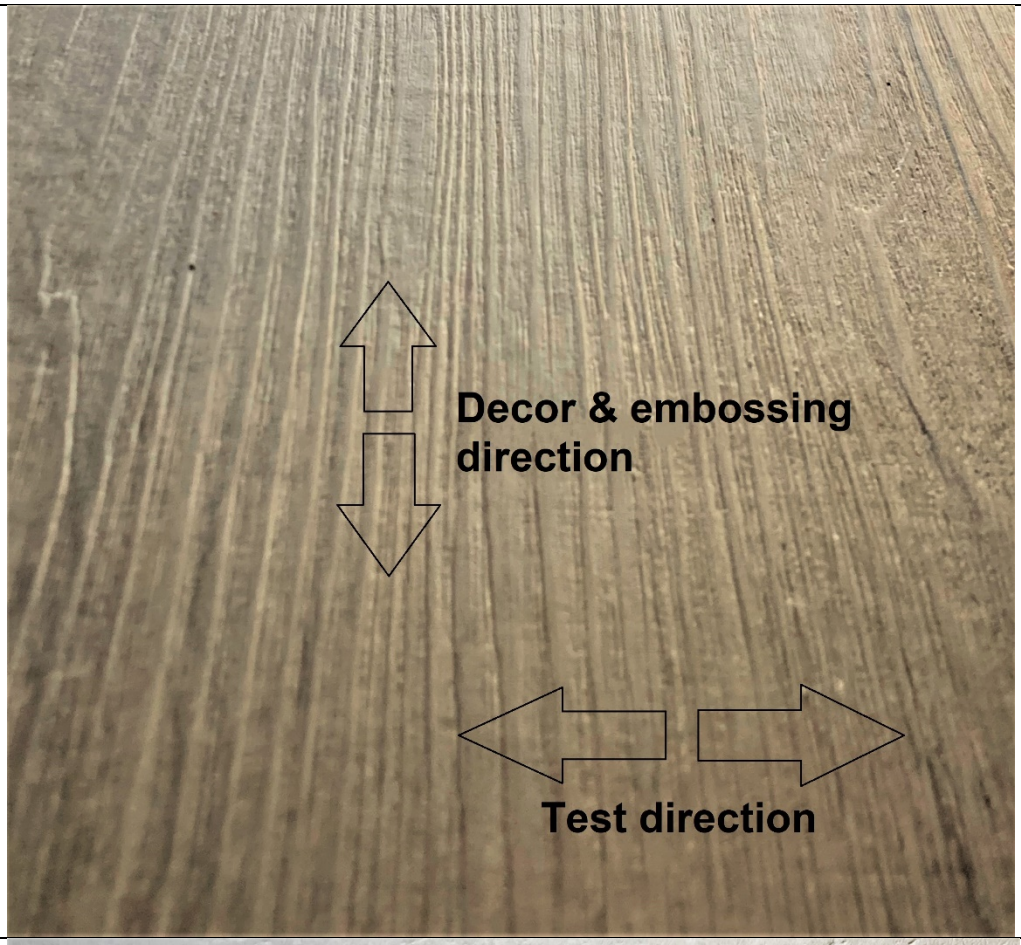
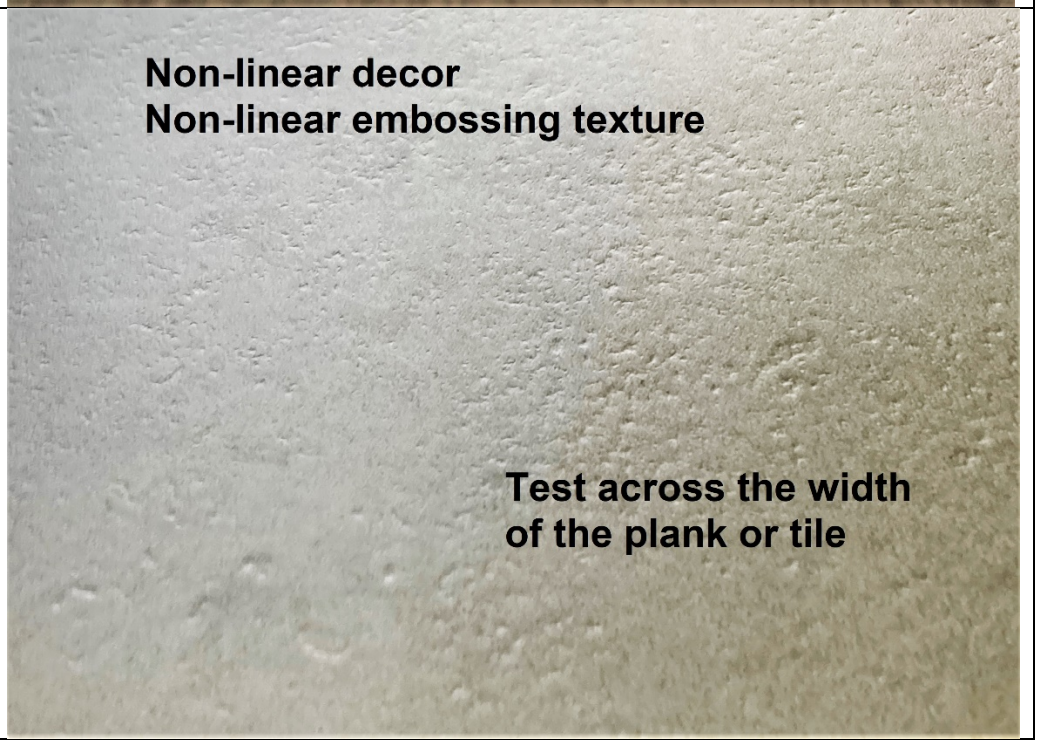
2. **Machine set up**
   Set up the machine to have long straight pattern: position C, A, C





3. **Different textures to illustrate correct direction of decor pattern**
    - For some products, decor direction will be obvious, e.g., Texture 2 and Texture 3 below.
    - For some products, e.g., orange peel (Texture 1) and stone (Texture 4), there may not be an obvious decor and embossing direction. In this case, we recommend scratching the product in the width of the direction of the board.

Texture Type	Example
1	
2	

3	 Decor & embossing direction Test direction
4	 Non-linear decor Non-linear embossing texture Test across the width of the plank or tile

Appendix B.

Rating Sample Examples

Photos have been cropped for visual purposes.

1. Additional examples of ratings

Rating 0	Little to no visible change in scratch or gloss.
Rating 1	
	

	Rotated to see scratches

Rating 2		
		
		
	Rotated to see scratches	

Rating 3		
		
		

Rating 3 – Demonstration of > 50% of scratched area, but only seen at certain angles	

2. **High color variation samples**
    - Samples with high variation in color throughout the planks or tiles, shown below, should be excluded from this testing.