



Ballot Vote Sheet

TO: The Commission
Alberta E. Mills, Secretary

THROUGH: Jessica L. Rich, General Counsel
Austin C. Schlick, Executive Director

FROM: Charlotte G. Alton, Attorney, Regulatory Affairs
Daniel R. Vice, Assistant General Counsel, Regulatory Affairs

SUBJECT: Petition Requesting Rulemaking to Mandate Testing and Labeling Regarding Slip Resistance of Flooring, Floor Coatings and Treatments, Floor Cleaning Agents, and Footwear

BALLOT VOTE DUE: Wednesday, October 30, 2024

CPSC staff is forwarding to the Commission a briefing package (Staff Briefing Package) assessing an April 11, 2023, petition from the National Floor Safety Institute (NFSI; Petitioner).¹ The petition asks CPSC to require by rule that manufacturers of floor coverings and coatings, chemical floor cleaners, and footwear: (1) test their products' slip resistance in accordance with NFSI test methods and (2) label these products in accordance with NFSI's labeling standard. NFSI submitted two previous petitions in 2016 and 2018, which CPSC denied. The current request is substantially the same as the prior petitions; however, the current petition increases the scope of products, including floor cleaning agents and footwear, and references the latest versions of the NFSI standards. On January 22, 2024, the Commission published a notice in the *Federal Register* requesting comments on the petition. The public comment period closed on April 22, 2024, and CPSC received 90 comments.

Staff's Briefing Package summarizes and responds to the comments, assesses the petition request, and recommends that the Commission deny the petition.

Please indicate your vote on the following options:

- I. Deny the petition, and direct staff to draft a letter of denial to the petitioner.

(Signature)

(Date)

¹ The petition, along with supporting and related material, can be found at: <https://www.regulations.gov/document/CPSC-2024-0003-0002>.

II. Defer the petition.

(Signature)

(Date)

III. Grant the petition and direct staff to begin developing a notice of proposed rulemaking or an advance notice of proposed rulemaking to mandate testing and labeling regarding the slip resistance of commercial and residential grade floor coverings, floor coatings and treatments, residential and commercial floor cleaning agents, and consumer footwear.

(Signature)

(Date)

IV. Take other action as specified below.

(Signature)

(Date)

Attachment: Staff Briefing Package: Petition CP 24-1: Petition Requesting Rulemaking to Mandate Testing and Labeling Regarding Slip Resistance of Flooring, Floor Coatings and Treatments, Floor Cleaning Agents, and Footwear



United States

Consumer Product Safety Commission

Staff Briefing Package

Petition CP 24-1:

Petition Requesting Rulemaking to Mandate Testing and Labeling Regarding Slip Resistance of Flooring, Floor Coatings and Treatments, Floor Cleaning Agents, and Footwear

October 23, 2024

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*This report was prepared by the CPSC staff.
It has not been reviewed or approved by,
and may not necessarily reflect the views of,
the Commission.*

ACKNOWLEDGEMENTS

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Executive Summary

The U.S. Consumer Product Safety Commission (CPSC or Commission) received a request from the National Floor Safety Institute (NFSI or the Petitioner) to initiate rulemaking to mandate that manufacturers of floor coverings and coatings, chemical floor cleaners/treatments, and footwear: (1) test their products' slip resistance, respectively, in accordance with the NFSI's B101.3-2022 standard *Test Method for Measuring the Wet Dynamic Coefficient of Friction of Hard-Surface Walkways* (directed to measuring the wet dynamic coefficient of friction (wet dynamic COF or DCOF), B101.2-2020 standard *Test Method for Determining the Impact on Wet Coefficients of Friction of Various Chemical or Physical Walkway Surface Cleaners and Treatments on common Hard-Surface Flooring Materials*, and B101.7-2021 *Standard Test Method for Lab Measurement of Footwear Heel Outsole Material Coefficient of Friction on Liquid-Contaminated Floor Surfaces*, respectively and (2) label these products in accordance with NFSI's B101.5-2023 standard, *Standard Guide for Uniform Labeling Method for Identifying the Wet Dynamic Coefficient of Friction (Traction) of Floor Coverings, Floor Coatings, Treatments, Commercial and Residential Floor Chemical Agents, and Consumer Footwear*, (directed to labeling products). The B101.5 standard is a point-of-sale labeling requirement for flooring products with a graphic comprising a traction scale and an arrow pointing to the measured COF of the product. The Petitioner asserts that providing the COF, via a label, point-of-sale will allow consumers to make an informed choice—which in turn, will reduce the occurrence of slip-and-fall incidents.

The Commission previously denied similar requests for rulemaking from the same Petitioner (Petitions CP 16-1 and CP 18-2). In 2015, Petition CP 16-1 requested that the Commission require manufacturers of floor coverings to measure the COF of their products and include warning labels on their products. The Commission denied CP 16-1, stating that there was insufficient evidence to demonstrate that the proposed action to mandate a floor covering label would assist consumers in assessing the comparative safety of floor covering products and lead to a reduced number of slip-and-fall incidents.¹

In 2018, Petition CP 18-2 requested that the Commission require manufacturers of floor coverings to test their products and to include a warning label on their products. The Commission determined that Petition CP 18-2 was substantially the same as the previous

¹ Final Denial Letter (Denial Letter for CP 16-1) from Todd A. Stevenson to Russel J. Kendzior, (Jan. 19, 2017), *available at*, <https://tinyurl.com/bdcmfkuw>.

petition and denied Petition CP-18-2 because the request had not adequately addressed the Commission's concerns from CP 16-1.²

In the current request (Petition CP 24-1), the Petitioner makes similar requests regarding measuring COF and labeling products with their measured COF. However, in CP 24-1 the scope of the request has been expanded to include additional products: floor cleaning agents and footwear.

According to the Commission's petition regulations, 16 C.F.R. § 1051.11(b), a Petitioner can refile a previously denied petition if they can demonstrate "new or changed circumstances or additional information" to justify reconsideration by the Commission. The new or changed circumstances or additional information that the Petitioner cites in CP 24-1 include an expanded scope of products and updated and additional standards, including the latest revised versions of the NFSI standards.³

Commission regulations provide that the Commission considers several factors in evaluating a petition, including whether "a rule is reasonably necessary to eliminate or reduce the risk of injury" and whether "failure of the Commission to initiate the rulemaking proceeding requested would unreasonably expose the Petitioner or other consumers to the risk of injury which the Petitioner alleges is presented by the product." 16 C.F.R. § 1051.9. Staff has reviewed CP 24-1 and concludes that the evidence provided in CP 24-1 fails to establish that COF is an accurate predictor of slips/falls, so the rulemaking proposed by the Petitioner is not reasonably necessary to eliminate or reduce the risk of injury. Staff also concludes that the petition fails to demonstrate that COF measurements are reliable, consistent, or accurate. In view of these findings, staff concludes that the petition fails to demonstrate that placing a label with a COF value on flooring products, floor cleaners, or footwear would reduce the incidence of slips and falls, so failure to initiate a rulemaking would not unreasonably expose consumers to the risk of injury. As in the previous petitions (CP 16-1, CP 18-2), CP 24-1 fails to provide persuasive evidence demonstrating that the proposed rule would either assist consumers in assessing the safety of floor coverings or reduce slip-and-fall incidents.

² Final Denial Letter (Denial Letter for CP 18-2) from Alberta E. Mills to Russel J. Kendzior, (Aug. 14, 2019), *available at*, <https://tinyurl.com/28tjuths>.

³ NFSI B101.2 was revised in 2020; NFSI B101.3 was revised in 2022; NFSI B101.5 was revised in 2023; and NFSI B101.7 was revised in 2021.

While staff agrees that accurate, relevant point-of-sale information for consumers may result in more appropriate flooring choices, staff still concludes that it is unlikely that injuries from slips and falls can be reduced through the action requested in the petition.



United States

Consumer Product Safety Commission

Briefing Memorandum

TO: The Commission
Alberta E. Mills, Secretary

DATE: October 23, 2024

THROUGH: Jessica Rich, General Counsel
Austin C. Schlick, Executive Director
DeWane Ray, Deputy Executive Director for
Operations

FROM: Duane E. Boniface, Assistant Executive Director,
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Brad Gordon, Project Manager
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Directorate for Engineering Sciences

SUBJECT: Petition Requesting Rulemaking to Mandate Testing and Labeling
Regarding Slip Resistance of Flooring, Floor Coatings and Treatments,
Floor Cleaning Agents, and Footwear

I. Introduction

The National Floor Safety Institute (NFSI, or Petitioner) was founded in 1997 and is a 501(c)(3) non-for-profit organization that provides a wide range of services, including: independent product testing and certification; educational training; and standards development. Since 2006, the NFSI has authored safety standards for slip, trip, and fall prevention through the B101 committee on slip, trip, and fall prevention.⁴

On April 11, 2023, the NFSI petitioned the Commission to initiate rulemaking to mandate testing and labeling regarding the slip resistance (traction) of commercial and residential grade floor coverings, floor coatings and treatments, residential and commercial floor cleaning agents, and consumer footwear. On January 22, 2024, the Commission published a notice in the Federal Register requesting comments on the

⁴ *Who we are*, NFSI.org, <https://nfsi.org/about-us/> (last visited October 2, 2024).

petition. The public comment period closed on April 22, 2024, and CPSC received 90 comments. The Petitioner's request was docketed as Petition CP 24-1.⁵

The Commission previously denied similar requests for rulemaking from the same Petitioner (Petitions CP 16-1 and CP 18-2). In the current request (Petition CP 24-1), the Petitioner repeats substantively the same requests regarding measuring COF and labeling products with their measured COF. However, the scope of CP 24-1 now also includes additional products: floor cleaning agents and footwear.

CPSC staff prepared this briefing package in response to CP 24-1. This memorandum summarizes staff's assessment of the following: the Petitioner's proposed requirements; relevant mandatory and voluntary standards; incident data; market and economic considerations; the effectiveness of the proposed label; and a recommendation for responding to the petition.

I. Petitioner's Request

The Petitioner requests that the Commission require that:

(A) manufacturers of commercial and residential grade floor coverings and coatings uniformly test their products' slip-resistance (Traction level) per the NFSI B101.3-2022 *Test Method for Measuring the Wet Dynamic Coefficient of Friction of Hard-Surface Walkways* and label them per the NFSI B101.5-2023 *Standard Guide for Uniform Labeling Method for Identifying the Wet Dynamic Coefficient of Friction (Traction) of Floor Coverings, Floor Coatings, Treatments, Commercial and Residential Floor Chemical Agents, and Consumer Footwear*;

(B) manufacturers of commercial and residential grade chemical floor cleaners and treatments uniformly test their products' slip-resistance (Traction level) per the NFSI B101.2-2020 *Test Method for Determining the Impact on Wet Coefficients of Friction of Various Chemical or Physical Walkway Surface Cleaners and Treatments on Common Hard-Surface Flooring Materials* and label their products per the NFSI B101.5-2023 *Standard Guide for Uniform Labeling Method for Identifying the Wet Dynamic Coefficient of Friction (Traction) of Floor Coverings, Floor Coatings, Treatments, Commercial and Residential Floor Chemical Agents, and Consumer Footwear*;

(C) manufacturers of footwear uniformly test their products' outsoles slip-resistance (Traction level) per the NFSI B101.7-2021 *Standard Test Method for Lab Measurement of Footwear Heel Outsole Material Coefficient of Friction on Liquid-Contaminated Floor*

⁵ The docketing notice and request for comments for CP 24-1 is available at 89 Fed. Reg. 3914 (Jan. 22, 2024).

Surfaces and label them per the NFSI B101.5-2023 Standard Guide for Uniform Labeling Method for Identifying the Wet Dynamic Coefficient of Friction (Traction) of Floor Coverings, Floor Coatings, Treatments, Commercial and Residential Floor Chemical Agents, and Consumer Footwear.

II. Overview of the NFSI Standards Required by the Petition

Below are descriptions of the NFSI voluntary standards relevant to NFSI's petition:

B101.2-2020. This standard provides methods for measuring the wet dynamic COF (wet DCOF)⁶ and the wet static COF (wet SCOF)⁷ of a wet hard walkway surface after applying a chemical floor cleaning agent or treatment. **B101.3-2022.** This standard specifies procedures and devices used for both laboratory and field-testing to measure the wet DCOF of hard-surface walkways.

B101.5-2023. This standard describes a uniform product labeling method which identifies the wet DCOF (traction) of floor products: floor coverings, floor coatings, and floor treatments.

B101.7-2023. This standard specifies procedures and devices used for laboratory testing of DCOF of footwear against walkway or working surfaces in the presence of a fluid contaminant.

III. Product Description

The petition identifies three products intended to be covered by a rule for rulemaking:

- (1) floor coverings and coatings (e.g., floor coverings such as hard wood flooring or tile; and floor coatings such as wax);
- (2) floor cleaning agents and treatments (e.g., commercial grade and residential grade cleaners); and

⁶ See, e.g., Testing the Slip Resistance Properties of Flooring, KTA.com, <https://kta.com/kta-university/testing-slip-resistance-flooring/> (the KTA website) (last visited Oct. 2, 2024) (“[DCOF] measures the amount of force required to keep an object in motion”); see also NFSI B101.2-2020, § 3.3 (defining DCOF as “the ratio of the horizontal component of force applied to a body required to overcome resistance to movement when the body is already in motion divided by the vertical component of the weight of the body or force applied to the surface where movement occurs.”).

⁷ See the KTA website (“[SCOF] measures the resistance of an object starting into motion”); see also NFSI B101.2-2020, § 3.8 (defines SCOF as “[t]he ratio of the horizontal component of force applied to a body that just overcomes the resistance to slipping to the vertical component of the weight of the object or force applied.”).

- (3) footwear (e.g., shoes, boots, etc.).

IV. Previous Petitions

The Petitioner previously submitted two requests for rulemaking.

In 2015, the Petitioner requested that the Commission initiate a rulemaking to require manufacturers of floor coverings and coatings to label their products COF in accordance with ANSI/NFSI B101.5-2014, *Standard Guide for Uniform Labeling Method for Identifying the Wet Static and Wet Dynamic Coefficient of Friction (Traction) of Floor Coverings, Floor Coverings with Coatings, and Treated Floor Coverings*. The B101.5-2014 standard required that both the wet SCOF and wet DCOF be measured according to the following two standards, respectively: (1) B101.1-2009 *Test Method for Measuring Wet SCOF of Common Hard-Surface Floor Materials* and (2) B101.3-2012 *Test Method for Measuring Wet DCOF of Common Hard-Surface Floor Materials (Including Action and Limit Thresholds for the Suitable Assessment of the Measured Values)* standards. The request was docketed as Petition CP 16-1.⁸ The Commission found that: (1) the petition did not establish an association between slip-and-fall incidents and particular types of flooring; (2) there was a lack of consistency and accuracy in test methods used; (3) there was insufficient information in the petition to indicate that a high COF decreased the risk of slips and falls; and (4) a labeling requirement would be insufficient to address the hazard because a coefficient of friction is likely only one of several factors involved in slip-and-fall incidents.⁹ The Commission denied the petition, stating that there was insufficient information to demonstrate that the proposed action to mandate a floor covering label would assist consumers in assessing the comparative safety of floor covering products or lead to a reduced number of slip-and-fall incidents.¹⁰

In 2018, the Petitioner submitted a revised petition docketed as CP 18-2.¹¹ The petition continued to request that manufacturers of floor coverings and coatings label their products' COF according to ANSI/NFSI B101.5-2014: for the purpose of providing point-of-sale information to assist consumers with purchasing decisions.¹² However, the Petitioner revised their request so that the only COF required to be measured was the wet DCOF (i.e., the requirement to measure wet SCOF was withdrawn).¹³ CP 18-2 also provided additional reports and studies to address the Commission's concerns from

⁸ The docketing notice for CP 16-1 is available at 80 Fed. Reg. 75639 (Dec. 3, 2015), *available at* <https://tinyurl.com/4kqv8wkv>.

⁹ Denial Letter for CP 16-1, 2–3.

¹⁰ *Id.* at 3.

¹¹ 83 Fed. Reg. 26228–29 (June 6, 2018), *available at* <https://tinyurl.com/mr4cjtj9>.

¹² CP 18-2, 1.

¹³ *Id.* 11–12.

CP 16-1. The Commission determined that CP 18-2 did not successfully address these concerns. The Commission maintained that: (1) there was a lack of consistency and accuracy among various test methods and a lack of consistency of test instruments; (2) there was insufficient evidence to support the assertion that a high COF value leads to a decreased hazard of slips and falls; and (3) there was limited effectiveness of the proposed label because COF is likely only one of a number of factors involved in slip-and-fall incidents.¹⁴ The Commission concluded that there was still a lack of sufficient information to demonstrate that the proposed action to mandate a floor covering label would assist consumers in assessing the comparative safety of floor coverings and coatings, or lead to a reduced number of slip-and-fall incidents.¹⁵

V. Epidemiology Assessment (TAB A)

CPSC staff conducted an analysis of injuries and incidents associated with slip-related injuries on floors that occurred from January 1, 2020, to December 31, 2022. Staff used two of CPSC's epidemiological databases: National Electronic Injury Surveillance System (NEISS) and Consumer Product Safety Risk Management System (CPSRMS). The results are summarized below.

Based on NEISS data, CPSC staff estimated approximately 603,700 emergency department (ED)-treated visits related to slips and falls in the years 2020-2022. CPSC staff found no statistically significant linear 3-year trend for annual estimated ED-treated slip injuries (p-value= 0.4636).¹⁶ Overall, slip rates for females were almost twice that for males (79 estimated ED-treated injuries per 100,000 females vs. 42 estimated ED-treated injuries per 100,000 males). Most of the estimated ED-treated slips (58%) occurred in residential settings. CPSC staff estimated that 19 percent of slips occurred in commercial or public settings, and 23 percent of the estimated ED-treated injuries did not provide information about the general location of the slip. About 14 percent of the estimated ED-treated injuries associated with slips occurred in a bathroom, 8 percent in a kitchen, 5 percent in a store, and 1 percent in a school. The remaining 72 percent were associated with other or unspecified locations. About 5 percent of the estimated ED-treated slip injuries occurred on a wood floor and 1 percent on a concrete floor. Less than 1 percent occurred on a linoleum or marble floor. About 84 percent did not provide information about any of the above floor types. Floor wetness was associated with 35 percent of estimated ED-treated slip injuries. Footwear was associated with 1.5 percent of the estimated ED-treated slip injuries. Floor cleaners or treatments were associated with less than 1 percent of estimated ED-treated slip injuries. Staff found that individuals 75 years and older had the highest rates for slips, with an estimated annual average of

¹⁴ Denial Letter for CP 18-2, 2-3.

¹⁵ *Id.* at 4.

¹⁶ A p-value represents the probability of occurrence by chance. Here, the p-value greater than 0.05 suggests the observed effect is likely due to random chance (i.e., there is no trend).

265 slips per 100,000 individuals in the US population—more than five times the average for all other age groups.

From the years 2020–2022, CPSC staff found 47 incidents in CPSRMS associated with slips and falls (i.e., slips or slip-related falls). The incidents include 19 fatalities, 16 injuries, and 12 non-injury incidents. Due to insufficient information in the data, CPSC staff could not determine how many injuries were associated with a floor's low COF. CPSC staff's data analysis conducted for Petition CP 18-2 also showed insufficient information to associate the COF with slips and falls. Based on staff's analysis of the available NEISS and CPSRMS data, staff concludes that there is insufficient detail in the data to correlate point-of-sale information on the COF of flooring, chemical floor cleaners, or footwear to the risk of slips or falls.

VI. Mechanical Engineering Assessment (TAB B)

To determine whether the petition addresses the concerns the Commission expressed when it denied NFSI's previous petitions, Engineering Sciences Mechanical Engineering (ESMC) staff examined: (1) the studies and reports included in the current petition; (2) studies previously examined in the CP 16-1 Staff Briefing Package¹⁷ and CP 18-2 Staff Briefing Package;¹⁸ and (3) additional related studies and related standards.

The Commission denied CP 16-1 and CP 18-2 because the Commission concluded there was insufficient information to demonstrate that COF of flooring could be measured accurately and then correlated to risk of slips and falls; there was also insufficient information to demonstrate that mandating a label for floor coverings would assist consumers in assessing the comparative safety of floor covering products, or lead to a reduced number of slip-and-fall incidents.

The current petition was docketed because the Office of the General Counsel concluded that Petitioner provided new information that met requirements for reconsideration by the Commission. 16 C.F.R. § 1051.11(b). The new information that the current petition presents includes:

¹⁷ U.S. Consumer Product Safety Commission, Petition CP 16-1: Labeling Requirements Regarding Slip-Resistance of Floor Coverings (Dec. 7, 2016) (CP 16-1 Staff Briefing Package), *available at* <https://tinyurl.com/42zm4ydf>.

¹⁸ U.S. Consumer Product Safety Commission, Petition CP 18-2: Labeling Requirements Regarding Slip-Resistance of Floor Coverings (Jul. 17, 2019) (CP 18-2 Staff Briefing Package), *available at* <https://tinyurl.com/2nmum2kw>.

- (1) An expanded scope of products which now includes floor cleaning agents and footwear; and
- (2) Updated and additional standards which include the latest revised versions of NFSI standards B101.2-2020, B0101.3-2022, B101.5-2023 and B101.7-2021.

In CP 24-1, the Petitioner makes three requests:

(1) Petitioner's first request. The first request is that manufacturers of commercial and residential grade floorings and coatings uniformly test their products' slip-resistance in accordance with NFSI B101.3-2022 *Test Method for Measuring the Wet Dynamic Coefficient of Friction of Hard-Surface Walkways* and label their products in accordance with NFSI B101.5-2023 *Standard Guide for Uniform Labeling Method for Identifying the Wet Dynamic Coefficient of Friction of Floor Coverings, Floor Coatings, Treatments, Commercial and Residential floor Chemical Agents, and Consumer Footwear*.

ESMC's assessment of Petitioner's first request:

The Petitioner's first request is similar to Petitions CP 16-1 and CP 18-2. The first petition, CP 16-1, requested that slip-resistance be measured using the B101.1-2009, *Test Method for Measuring Wet SCOF of Common Hard-Surface Floor Material*, and B101.3-2012, *Test Method for Measuring Wet COF of Common Hard-Surface Floor Material*, standards, whereas CP 18-2 only requested that slip-resistance be measured with B101.3-2012. CP 24-1 differs from CP18-2 in that it proposes using B101.3-2022 instead of the 2012 version of the standard to measure the flooring COF. CPSC staff compared the 2022 version of B101.3 with the 2012 version of the standard and found them to be substantially the same. Both B101.3-2012 and B101.3-2022 require using an NFSI-approved tribometer¹⁹ to measure the wet COF. In staff's prior assessment of CP 18-2, staff found that the NFSI tribometer certification process specified in B101.3 may provide more consistent COF values for the same test equipment, but it does not address that two or more tribometers could measure different COF values for the same surface.²⁰ Therefore, staff assesses that the 2023 version of B101.3 does not address the underlying concern of consistency and accuracy among various test methods and lack of consistency of test instruments.

¹⁹ P. J. Blau, *Experimental Aspects of Friction Research on the Macroscale*, in *FUNDAMENTALS OF TRIBOLOGY AND BRIDGING THE GAP BETWEEN THE MACRO- AND MICRO/NANOSCALES*, 264 (Bharat Bhusan ed., 2012) (defines a tribometer as "any apparatus that is designed for the purpose of estimating or directly measuring friction forces or their effects.")

²⁰ CP 16-1 Staff Briefing Package 39, 52; CP 18-2 Staff Briefing Package 28–29, 31.

Petition CP 24-1 provides data on falls from multiple sources—such as the National Health Review Survey, the Centers for Disease Control and Prevention, National Council on Aging, National Safety Council, and the Journal of American Geriatrics Society. The data and statistics highlight the high number of injuries and deaths in the United States due to falls, especially among the older population; however, staff found no evidence in the information correlating COF values of flooring at point-of-sale to risk of slips and falls. As such, staff concludes that the information provided in support of the Petitioner’s first request fails to support the assertion that a high COF value leads to a decreased risk of slips and falls.

In summary, CPSC staff concludes that the information provided in support of the Petitioner’s first request fails to: (1) address the Commission’s established concern of consistency and accuracy among various test methods and lack of consistency of test instruments; and (2) demonstrate that a high COF value leads to a decrease in slips and falls.

(2) Petitioner’s second request. The second request is that manufacturers of commercial and residential grade chemical floor cleaners and treatments test the slip resistance of their products in accordance with the B101.2-2020, *Test Method for Determining the Impact on Wet Coefficients of Friction of Various Chemical or Physical Walkway Surface Cleaners and Treatments on Common Hard-Surface Flooring Materials* and label their products in accordance with the B101.5-2023.

ESMC’s assessment of Petitioner’s second request:

CP 24-1 requests that the B101.2-2020 standard be used to measure the wet COFs of various floor cleaners and treatments. The procedure for measuring COF according to the standard includes using an NFSI-approved tribometer to measure the wet COF. Based on staff’s prior concern that the NFSI tribometer certification process does not address that two or more tribometers could measure different COF values for the same surface,²¹ staff concludes that the Petitioner’s second request does not adequately provide for consistency and accuracy among various test methods and test instruments.

The Petitioner asserts that “many commercial and residential floor cleaners will leave a slippery film which decreases the COF of the underlying floor and in-turn increases the risk of a slip and fall event.” The Petitioner provided a study conducted in January 2023 in which “17 of the most popular household floor cleaning products commonly available at retailers nationwide” were used on an unspecified floor and results showed that 12 of the 17 products reduced the slip resistance of the floor after application (CP 24-1, 25).

²¹ See *supra* n. 20.

Staff's previous assessments of CP 16-1 and CP 18-2 concluded that friction is one of multiple variables related to slips. While a slippery floor may lead to a slip or fall, the Petitioner did not provide evidence correlating specific COF values with a higher or lower risk of slip and fall. Likewise, staff's review of available NEISS and CPSRMS data found insufficient information on the slipperiness of floors that had been treated by cleaning agents and risk of slip and fall. Therefore, staff concludes that the information provided in support of the Petitioner's second request fails to support the assertion that a high COF value leads to a decreased risk of slips and falls.

In summary, CPSC staff concludes that the information provided in support of the Petitioner's second request fails to demonstrate: (1) that its proposed requirements for floor cleaning agents addresses the underlying concern of consistency and accuracy among various test methods and lack of consistency of test instruments; and (2) that a high COF value leads to a decrease in slips and falls.

(3) Petitioner's third request. The third request is that manufacturers of footwear test the slip resistance of their products' outsoles in accordance with the B101.7-2021 standard, *Standard Test Method for Lab Measurement of Footwear Heel Outsole Material Coefficient of Friction on Liquid-Contaminated Floor Surfaces* and label their products in accordance with the B101.5-2023 standard.

ESMC's assessment of Petitioner's third request:

CP 24-1 requires that the B101.7-2021 standard be used to measure the COFs of various footwear. The procedure for measuring COF according to the standard includes: (1) securing a flooring material to a rigid backing surface; (2) obtaining a U.S. men's size 9 shoe or a U.S. woman's size 8 shoe; (3) if the shoe heel outsoles are new, lightly abrading the shoe with silicon carbide paper; (4) applying a lubricant to the flooring material; (5) moving the shoe horizontally across the flooring material; and (6) calculating the COF based on the movement of the shoe. The Petitioner asserts: (1) that consumers are uninformed as to the inherent slip risk associated with shoes and boots worn in and outside of the workplace; and (2) that without uniform testing and labeling, consumers will be unaware of the safety risks associated with the shoes they purchase because many types of footwear, including some labeled as "slip resistant," actually have a low level of slip resistance.

The Petitioner did not provide test results showing that the procedure specified in B101.7-2021 provides consistent and accurate results. Additionally, based on available information, staff is unable to assess if the Petitioner's third request addresses the prior

concerns with consistency and accuracy among various test methods and lack of consistency of test instruments.

The Petitioner provided a study conducted in March 2022 in which NFSI tested 12 different styles of shoes (e.g., NIKE, Converse, and Tredsafe) commonly worn by workers in commercial restaurants. Of the 12 footwear products tested, five ranked as High-Traction per the NFSI B101.7 test standard and the remaining seven products were either Moderate or Low Traction. The Petitioner states that “street shoes” with low traction increase the risk of slip and fall when the walkway is wet/oily and that “NFSI research has revealed that such failure on the part of the footwear industry directly contributes to approximately 24% of slip and fall injuries.”

The Petitioner did not reference a published report of their research, nor did they describe the study’s scope and methodology that led them to conclude that consumers’ lack of knowledge of the actual slip resistant qualities of their shoes contributed to any particular percentage of slip and fall injuries. As such, staff is unable to verify the Petitioner’s findings.

After assessing the evidence, staff concludes that the Petitioner’s presented evidence is insufficient to demonstrate that a lack of traction ratings on footwear materially contributed to slips and fall injuries. While a slippery floor may lead to a slip or fall, the Petitioner did not provide evidence correlating specific COF values with a higher or lower risk of slip and fall. Likewise, staff’s review of available NEISS and CPSRMS found insufficient data to correlate the slipperiness of floors that had been treated by cleaning agents and risk of slip and fall. Therefore, staff concludes that the information provided in support of the petitioner’s third request fails to show: (1) consistency and accuracy among various test methods and consistency of test instruments; and (2) that a high COF value leads to a decreased hazard of slips and falls.

VII. Human Factors Analysis (TAB C)

Staff from the Engineering Sciences Human Factors Division (ESHF) provided an evaluation of the proposed labeling requirements for slip resistance of floor coverings and coatings, floor cleaning agents and treatments, and consumer footwear. ESHF staff found that the proposed label is essentially an informational label in the form of a symbol that is intended to have the effect of a safety message or warning.

For the warning to be effective, the label must be noticed, read, and understood, and motivate the appropriate selection of a product. Consumers, in general, and the older population, in particular, may not notice and read and understand the label. Additionally, the label does not contain shock value sufficient to motivate appropriate product

selection. Even if the warning was noticed, read, and understood, and contained motivational content, ESHF staff notes that because different test instruments produce different COF values for the same surface, a label is unlikely to provide accurate, reliable, and consistent information. Factors related to the user, product, and environment may also play a role in these incidents. A slip rating label based only on COF may provide a false sense of security because traction of the products is only one of many factors involved in slip-and-fall incidents. Staff raised these concerns in response to the 2016 and the 2018 petitions. However, the Petitioner provided no new evidence that would cause ESHF staff to believe that labeling the products' COF is likely to be effective.

VIII. Market and Economic Considerations (TAB D)

Staff from the Directorate for Economic Analysis (EC) conducted a market study to assess how sales and prices of the products identified in this petition have changed since 2016. Petition CP 24-1 includes the following products: (i) hard floor coverings; (ii) floor coatings and treatments (including finishes and paints); (iii) floor cleaning products; and (iv) consumer footwear. The market study's main findings are that prices have not changed significantly since CP 16-1, while sales volume increased by about 65 percent to 6.8 billion square feet. Detailed findings are presented in Tab D.

The Petitioner requested that CPSC require all manufacturers of in-scope products conduct slip-resistance testing and label their products with the slip-resistance coefficient found in testing. In the CP 18-2 Staff Briefing Package, staff found that at least 20 manufacturers supply hard flooring and floor finishing products to the residential market through various retailers. Staff has not found information in 2024 that updates the estimate of 20 firms. Staff also found that total estimated retail sales in 2023 were approximately 6,821 million square feet of flooring, with a value of around \$17 billion.

Developing the necessary information to assess the benefits of the petition's request would require two critical elements of information:

- (1) information on the proportion of injuries resulting from slips, and the slip resistance of the floors on which the falls occurred; and
- (2) information on the exposure of consumers to floors with different coefficients of friction.

Neither the Petitioner nor commenters have provided CPSC with data supporting the role of dynamic friction coefficient in slips and whether labeling or packaging flooring

products with such information would prevent slips. This information would allow EC staff to measure the potential benefits from mitigating societal costs of injuries from low slip-resistant flooring.

EC staff estimates that between 2020 and 2022 there were six deaths and 553,297 medically treated injuries annually from slips. However, to estimate the societal costs of slips that occurred on floors with low slip-resistance, EC staff would need information on the proportion of deaths and injuries resulting from slips on slip-resistance floorings. Staff is also interested in understanding the risk of falls on various types of floorings with different degrees of slip-resistance. By comparing the differences in the risk of falls by slip-resistance, staff could estimate the reduction in the number of falls that would occur. For purposes of staff's analysis of the petition, there is insufficient readily available information to provide these estimates.

IX. Past Compliance Actions (TAB E)

The Office of Compliance and Field Operations staff reviewed recall data between 2019 and 2024, and found no instances of Compliance action on flooring, floor coverings and coatings, floor cleaners, floor treatments, or footwear related to slip and fall hazards.

X. Public Comments (TAB F)

On January 22, 2024, the Commission published a notice in the Federal Register inviting public comments on the current petition.²² The public comment period ended on April 22, 2024, and CPSC received 90 comments.

Topics raised by comments include:

- Whether the 2024 petition did or did not address the Commission's concerns with the 2016 petition (CP 16-1) and the 2018 petition (CP 18-2),
- How the petition proposal would impact consumer safety,
- Commenter's opinions on existing standards,
- The existence of multiple contributing factors to slips and falls and fall-related injuries,
- Costs and benefits associated with the petition proposal,
- Potential conflict of interest, and

²² See *supra* n. 5.

- Additional considerations for enhancing flooring safety.

Generally, supporters of the petition expressed interest in a reliable, easy to read labeling scheme that would inform consumers about a floor's slipperiness at the point-of-sale, thereby allowing consumers to make more informed choices for flooring purchases and improving floor safety. Opposition to the petition focused mostly on technical concerns with the test methods, instrumentation, and labeling. These commenters raised a concern that consumers may be left with a false sense of security which could negatively impact flooring safety. In some cases, commenters agreed that slips and falls should be addressed in some way, but did not agree with the petition's proposal.

XI. The Basis for Considering the Petition

The Commission's regulations on petitions state that when considering whether to grant or deny a petition, the Commission considers:

- (1) Whether the product that is the subject of the petition presents an unreasonable risk of injury;
- (2) Whether a rule is reasonably necessary to eliminate or reduce the risk of injury;
- (3) Whether failure to initiate rulemaking would expose the Petitioner or others to the risk of injury the Petitioner alleges the product presents; and
- (4) If the petition seeks a ban, whether the product is being or will be distributed in commerce and whether a feasible consumer product safety standard would adequately protect the public from the risk of injury.

The petition regulations also state that when considering these factors, the Commission will consider the petition in relation to the agency's priorities, as stated in the CPSC's Policy on Establishing Priorities and the Commission's resources available for rulemaking. 16 C.F.R. § 1051.9(a).

XII. Options

Options for Commission action to address the petition include:

(A) Grant the Petition

The Commission could begin rulemaking under sections 7 and 9 of the Consumer Product Safety Act (CPSA) to establish requirements for warnings or instructions. The

Commission could also engage in rulemaking under section 27(e) of the CPSA if it determines the petition's proposed label provides "performance or technical data related to performance and safety," and the label's information "assists consumers in evaluating the comparative safety" of flooring products.

Staff has reviewed relevant test methods, reports, and research articles. Current test methods, standard reference materials, and measurement devices cannot provide a true COF measurement. None of the studies demonstrates a definitive correlation between COF values and the risk of falling. The proposed label, even with modifications, could be confusing to consumers and its contents would be based on incomplete and potentially incorrect information. Thus, staff does not recommend granting the petition.

(B) Deny the Petition

The Commission could deny the petition if it determines there is insufficient information to show that the proposed floor covering label would reduce the number of slip-and-fall incidents, or for other reasons stated in Commission regulations such as the efficient allocation of Commission resources. 16 C.F.R. §§ 1009.8, 1051.9.

While staff agrees that point-of-sale information to compare the slip-resistance of different flooring types could help consumers choose the most appropriate hard surface flooring for a specific use (assuming such information was reliable and easy to understand), staff concludes that the proposed label would not assist consumers in assessing the comparative safety of flooring. Staff found little evidence to support the assertion that the test advanced in the petition yields accurate or meaningful results, or that the petition's label will assist consumers. Therefore, staff does not recommend that the Commission proceed with rulemaking to require the label proposed in the petition, because labeling is unlikely to have the intended effect of reducing incidents.

Denying the petition does not preclude the Commission from taking action to address the risk of slips and falls. In fact, the Commission may wish to assign resources to gain more understanding of the issues related to falls associated with hard surface flooring products.

(C) Defer Decision on the Petition

The Commission may defer a decision on the petition and direct staff to collect additional information (or take other action), if the Commission concludes that more information is required to decide whether to grant or deny the petition. Academia and standards bodies are conducting independent work to understand the correlation between floor characteristics and slip incidents. However, staff is concerned that the

underlying issues raised in both the 2016, 2018, and current Staff Briefing Packages require substantial effort to address. And staff is not aware of any impending voluntary standards or academic studies that would address the inadequacies of the petition proposal raised in this briefing package.

Deferring the petition does not preclude the Commission from initiating future rulemaking in response to this or another similar petition.

XIII. Staff Recommendation

CPSC staff recommends that the Commission deny the petition because the petition fails to provide substantial evidence that the requested actions would lead to a reduction in slips and falls. The Petitioner did not provide evidence correlating specific COF values with a higher or lower risk of slip and fall incidents, nor did the Petitioner alleviate concerns from prior petitions regarding the reliability of COF values. Likewise, staff's review of available NEISS and CPSRMS found insufficient data on slipperiness to establish the risk of slips and falls tied to specific products or COF values. Therefore, staff concludes that the information provided in support of the Petitioner's request fails to support the assertion that a high COF value leads to a decreased risk of slips and falls. Additionally, there is insufficient information to demonstrate that the requested rule would assist consumers in assessing the comparative safety of floor coverings or reduce slip-and-fall incidents.

Tab A: Estimated Number of Injuries and Reported Incidents Associated with Slipping on Floors



United States

Consumer Product Safety Commission

Memorandum

TO: Brad Gordon, Project Manager
Division of Mechanical and Combustion Engineering
Directorate for Engineering Sciences

DATE: October 22, 2024

THROUGH: Stephen Hanway, Associate Executive Director
Directorate for Epidemiology

Ryan Seebruck, Division Director
Division of Hazard Analysis

FROM: Tuan Lam, Mathematical Statistician
Division of Hazard Analysis

SUBJECT: Estimated Number of Injuries and Reported Incidents
Associated with Slipping on Floors, 2020-2022

I. Introduction

The Division of Hazard Analysis prepared this memorandum in response to Petition CP 24-1. This memorandum presents estimates of U.S. emergency department (ED)-treated injuries associated with slipping on floors from 2020 through 2022 and provides information about slip incidents reported to CPSC occurring between January 1, 2020 and December 31, 2022. The previous two petitions on this same topic similarly covered a three-year period for both injury estimates and slip incidents, but for 2012 through 2014. Key findings are listed in the summary section below, after those describing the methodology, injury estimates, and incident data.

II. Methodology

For this memorandum, CPSC staff searched two CPSC databases: the National Electronic Injury Surveillance System (NEISS) and the Consumer Product Safety Risk Management System (CPSRMS)²³ using product code 1807 (floors or flooring material) and the keywords “slip,” “slid,” “friction,” and “coefficient.” To address the interaction between footwear or floor cleaning products on floor slips, staff also searched for incidents using product codes 1615 (footwear), 930 (ammonia), 954 (general purpose

²³ The National Electronic Injury Surveillance System (NEISS) database contains the emergency department-treated injuries from a sample of hospitals nationwide. The Consumer Product Safety Risk Management System (CPSRMS) combines anecdotal reports from IPII (Injury or Potential Injury Incidents), DTHS (Death Certificates), and INDP (In-Depth Investigations) into one searchable incident database.

cleaner), 956 (bleach), 977 (spot removers or cleaning fluids) and keywords “floor,” “slip,” “slid,” “friction,” and “coefficient.”

The searches were conducted on June 12, 2024, and were limited by incident date to the period from January 1, 2020, to December 31, 2022. The searches resulted in 19,226 reports in NEISS and 98 in CPSRMS that were potential candidates for review. Subsequently, CPSC staff reviewed the narratives of each report to determine which incidents were out-of-scope for the purpose of this memorandum. For example, staff excluded incidents when the slip did not occur on the floor, such as when a person slipped from a bed, a chair or a wheelchair to the floor, or when a fall was the result of tripping, losing balance, or slipping on an object like a piece of fruit. Slips involving cleated footwear were excluded because the petition standards in NSFI B101.5 specifically exclude them. Similarly, slips on carpet and rugs were also excluded because the petition standards in NSFI B101.5 explicitly excludes those surfaces. Finally, any outdoor surfaces, such as a patio, were considered out of scope. CPSC staff’s review identified 15,513 in-scope NEISS cases and 47 in-scope CPSRMS incidents.

The number of in-scope incidents in CPSRMS is considerably lower than for the period from 2012–2014, but this should not be taken as evidence that floor-related slip hazards have been considerably reduced. Rather, the drop in incidents is likely driven by the fact that CPSC as an agency decided not to purchase as many fall-related death certificates in the intervening years. It is well understood that senior falls are a major cause of death and injury, and when these falls occur indoors, flooring can be coded as a consumer product involved. However, the agency has not found these death certificates to be highly useful in terms of its compliance work and thus reduced its expenditures on death certificates related to senior falls on flooring. As such, the number of flooring-related fatalities reported here is expectedly lower than in previous petitions when more fall-related death certificates were being purchased and should therefore be viewed as the minimum number known to CPSC.

III. Injury Estimates²⁴

(A) Overview

Staff estimates that 603,700 ED-treated injuries were associated with slipping on floors from January 1, 2020, to December 31, 2022. The 95 percent confidence interval (C.I.)

²⁴The injury estimates in this memorandum are based on data from NEISS. All estimates are rounded to the nearest hundred.

for this estimate is 405,200-802,100, based on a coefficient of variation (C.V.) of 0.1677.²⁵

(B) Yearly Injury Estimates

Staff generated yearly estimates of ED-treated injuries associated with slipping on floors for the period from 2020 through 2022 (Table 1). The yearly estimates ranged from 190,200 in 2020 to 209,400 in 2022. The data do not show a statistically significant trend for injuries associated with slipping on floors during the three-year period (p-value = 0.4636).

Table 1. Estimated ED-Treated Injuries Associated with Slipping on Floors, 2020–2022

Year	Count	Estimate	95% C.I.	C.V.
2020	5,146	190,200	130,400 – 250,100	0.1605
2021	5,505	204,000	137,100 – 270,900	0.1674
2022	4,862	209,400	133,100 – 285,700	0.1859
Total	15,513	603,700	405,200 – 802,100	0.1677

Source: National Electronic Injury Surveillance System (NEISS), June 12, 2024

(C) Injury Estimates by Demographics, Injury Reporting, and Product Type and Condition

CPSC staff categorized the incidents associated with slipping on floors by the victim's age and gender, body part injured, injury diagnosis, disposition, location of the incident, floor type, condition, footwear involvement, and floor treatment involvement. Presented below is staff's calculation of the estimated numbers of ED-treated injuries for each category for 2020 through 2022.

Table 2 provides the estimated ED-treated injuries associated with slipping on floors by age group where age was known. One case was excluded because age information was unavailable. Consumers 65 and older accounted for 46 percent of estimated ED-treated injuries. This is a notable increase compared to 2012–2014 when this group only represented 30 percent of the estimated injuries. All other age groups had a decrease in estimated injuries when compared to 2012–2014.

²⁵ Sample estimates and their standard errors enable the calculation of confidence intervals, which are ranges that include the average results of all possible samples with known probability. The coefficient of variation is the estimate's standard deviation expressed as a proportion of the estimate. See Schroeder and Ault (2001) for more information: The NEISS Sample (design and implementation) 1997 to Present (cpsc.gov).

Table 3 provides the average annual estimated ED-treated injury rates per 100,000 individuals in the US population for each age group.²⁶ The rates measure the frequency with which the injury occurred in a population over the 2020–2022 period. Such rates may better represent the injury risk associated with slipping on floors by age. The overall estimated ED-treated injury rate associated with slipping on floors was 61 per 100,000 individuals. The rates for individuals 75 and older were more than twice as high as for individuals 65 to 74 years old (265 vs 96), and more than 12 times as high as for teens (265 vs 22).

Table 2. Estimated ED-Treated Injuries Associated with Slipping on Floors by Age Group, 2020–2022

Age	Estimate	% Total
≤12	61,700	10%
13-19	20,400	3%
20-39	77,800	13%
40-64	163,700	27%
65-74	96,100	16%
≥75	184,000	30%
Total	603,600	100%

Source: National Electronic Injury Surveillance System (NEISS), June 12, 2024

Table 3. Estimated ED-Treated Injury Rates Associated with Slipping on Floors per 100,000 Individuals in the US Population by Age Group, 2020–2022

Age	Estimates per 100k Population
≤12	40
13-19	22
20-39	29
40-64	52
65-74	96
≥75	265
All ages	61

Sources: National Electronic Injury Surveillance System (NEISS), June 12, 2024; U.S. Census Bureau

Sixty-six percent of the estimated ED-treated injuries associated with slipping on floors were among females (see Table 4). The higher percentage of the estimated ED-treated injuries for females when compared to males was consistently seen for all age groups, except children 12 years old and younger. CPSC staff observed a similar pattern with estimated annual average slip-related injury rates per 100,000 individuals: females had higher rates than males for all age groups except children 12 years old and younger (Table 5).

²⁶ The population data for the denominator is available at the U.S. Census Bureau website: <https://www.census.gov/data/datasets/time-series/demo/popest/2020s-national-detail.html>

Table 4. Estimated ED-Treated Injuries Associated with Slipping on Floors by Age Group and Gender*, 2020–2022

Age	Gender			
	Males		Females	
	Estimate	Percentage	Estimate	Percentage
≤12	34,600	56%	27,100	44%
13-19	8,300	40%	12,100	60%
20-39	23,200	30%	54,500	70%
40-64	52,500	32%	111,100	68%
65-74	31,500	33%	64,600	67%
≥75	55,600	30%	128,400	70%
All ages	205,600	34%	397,900	66%

Source: National Electronic Injury Surveillance System (NEISS), June 12, 2024

*Estimates and percentages exclude one incident with unknown age as well as one incident with unknown gender.

Note: Percentages are row percentages, allowing for comparison between females and males within the same age group.

Table 5. Estimated ED-Treated Injury Rates Associated with Slipping on Floors per 100,000 Individuals in the US Population by Age Group and Gender*, 2020–2022

Age	Gender	
	Males	Females
≤12	44	36
13-19	18	27
20-39	17	41
40-64	34	71
65-74	67	123
≥75	193	316
All ages	42	79

Sources: National Electronic Injury Surveillance System (NEISS), June 12, 2024; U.S. Census Bureau

*Estimates and percentages exclude one incident with unknown age and one incident with unknown gender.

Table 6 provides the estimated ED-treated injuries for slipping on floors by body part injured. An incident can result in multiple body parts injured.²⁷ The head and face were the most common body parts injured and were involved in 36 percent of estimated ED visits associated with slipping on floors (218,100/603,700 = 0.36). This was followed by torso injuries (29%), leg/feet injuries (24%), and arm/hand injuries (20%). Nine percent of estimated injuries involved other parts.

²⁷ In October 2018, CPSC upgraded the NEISS system. As a result of this upgrade, an emergency-department visit is allowed to contain up to two codes for the body part injured and the diagnosis. If either of the two body part codes listed a specific body part, staff classified that body part as being injured in the incident for the data analysis purpose.

Table 6. Estimated ED-Treated Injuries Associated with Slipping on Floors by Body Part Injured, 2020–2022

Body Part*	Estimate	% Estimates
Torso	175,500	29%
Leg/Feet	147,900	24%
Head/ Face	218,100	36%
Arm/Hand	118,600	20%
Other	51,600	9%

Source: National Electronic Injury Surveillance System (NEISS), June 12, 2024.

*Torso regions include NEISS codes for upper trunk, pubic regions, and lower trunk. Leg/Feet include codes for knee, lower leg, ankle, upper leg, foot, and toe. Head/Face include codes for head and face. Arm/Hand include codes for shoulder, elbow, lower arm, wrist, upper arm, hand, and finger. Other includes all other body part codes.

Note: Multiple body parts can be injured in any incident; as such, percentages do not sum to 100.

Table 7 shows the estimated ED-treated injuries associated with slipping on floors by the eight most common injury diagnoses. An incident can result in multiple diagnoses.²⁸ The most common injuries were fractures, which were involved in 25 percent of estimated ED visits ($151,300/603,700 = 0.25$). This was followed by internal injuries (23%), contusions or abrasions (21%), strains or sprains (13%), lacerations (13%), hematomas (3%), concussions (2%) and dislocations (2%).

Table 7. Estimated ED-Treated Injuries Associated with Slipping on Floors by Injury Diagnosis, 2020–2022

Injury Diagnosis	Estimate	% Estimates
Fracture	151,300	25%
Internal	137,700	23%
Contusions, Abrasions	128,600	21%
Strain, Sprain	80,200	13%
Lacerations	77,300	13%
Hematoma	15,300	3%
Concussions	12,700	2%
Dislocations	9,400	2%

Source: National Electronic Injury Surveillance System (NEISS), June 12, 2024.

Note: Multiple diagnoses can stem from any incident; as such, percentages do not sum to 100. Table was limited to the top eight categories because thereafter, the percentage of the estimates was one percent or less.

Fifty-eight percent of the estimated ED-treated injuries associated with slips occurred at residential settings and 19 percent in commercial or public settings. Twenty-three percent of the estimated ED-treated injuries did not have information on whether the injury occurred in a residential or public setting.

²⁸ If either of the two diagnosis codes listed a specific diagnosis (type of injury), staff classified that diagnosis as being the type of injury for the data analysis purpose.

Seventy-nine percent of patients with ED-treated injuries associated with slipping on floors were treated and released, 20 percent were hospitalized (including admits, transfers, or being held for observation), and 1 percent left against medical advice or had an unknown disposition. CPSC staff cannot provide estimates of deaths on arrival to the emergency room due to the small sample size.²⁹ Fifty-eight percent of hospitalizations were for persons 75 years and older, 22 percent were for those in the 65-74 age group, 16 percent for those in the 40-64 age group, and 2 percent were for those in the 20-39 age group. Children younger than 12 years old accounted for 1 percent of hospitalizations. CPSC staff cannot provide an estimate for teen hospitalizations due to the small sample size.²⁹ Fractures were the most common injury for those who were hospitalized, being present for 62 percent of hospitalizations. Twenty-two percent of hospitalizations were associated with injuries to internal organs. Fifteen percent of hospitalizations were associated with contusions, abrasions, lacerations, and/or hematomas. Strains, sprains, dislocations, and/or concussions were only associated with 3 percent of hospitalizations.

Information on the location of estimated ED-treated injuries associated with slipping on floors was determined first by searching for the 'loc' (locale) variable associated with schools and daycares. The remaining locations were determined by searching narratives for keywords related to common rooms or in-home locations (e.g., "bath," "shower," "bedroom," "kitchen," "store," "mall," "market," "shop," "gas station," names of popular retailers). Approximately 14 percent of the estimated injuries occurred in a bathroom, 8 percent in a kitchen, 4 percent in a store, and 1 percent at school. The slips in a bedroom contributed less than 0.5 percent for the total estimates of ED-treated injuries associated with slipping on floors. Seventy-three percent of estimated ED-treated injuries associated with slipping on floors were not associated with schools or daycares or did not contain the above keywords on the location of the slip, thereby representing a combination of other or unspecified locations.

Information on floor type was determined by searching narratives for keywords related to common floor types (e.g., "tile," "wood," "ceramic," "vinyl," "linoleum," "stone," "concrete," "marble," and "lamine"). Five percent of the estimated ED-treated injuries associated with slipping on floors occurred on a wood or a hardwood floor, and 1 percent occurred on a concrete floor. Linoleum and marble flooring each accounted for less than 0.5 percent of estimated ED-treated injuries associated with slipping on floors. Staff could not obtain reliable estimates of injuries associated with slipping on tile, ceramic, vinyl, laminate, or stone floors.²⁹ Eighty-four percent of estimated ED-treated

²⁹ CPSC considers estimates to be unstable and potentially unreliable when the estimate is less than 1,200, the number of cases is less than 20, or the coefficient of variation (CV) exceeds 33%.

injuries associated with slipping on floors did not contain the above keywords on the floor type and therefore represent a combination of other or unspecified floor types.

Thirty-five percent of the estimated ED-treated injuries associated with slipping on floors mentioned that the slip occurred on a wet floor.³⁰ The percentage of ED-treated injuries associated with slipping on wet floors could be higher than the estimate presented in this memorandum. Most of the narratives for estimated ED-treated injuries did not state whether the floor was dry. Accordingly, the flooring potentially could be wet even if the incident description did not specifically mention a wet floor.

About 1.5 percent of estimated ED-treated injuries associated with slipping on floors mentioned footwear.³¹ Most of the narratives for estimated ED-treated injuries did not state whether the person was wearing footwear.

Less than 0.5 percent of estimated ED-treated injuries associated with slipping on floors involved floor cleaners or treatments.³² As with wet incidents, this number could be higher as most incidents did not mention whether they involved floor treatments. For example, incidents involving mopping may have involved floor treatment products but were excluded from these estimates unless the narrative specifically mentioned a floor treatment product or the incident specified product codes associated with floor treatment products.

There were zero in-scope incidents associated with the keywords, “coefficient” or “friction.” Consequently, staff is unable to associate these keywords with any estimated ED-treated injuries.

IV. Review of Incident Data³³

CPSC staff is aware of 47 incidents associated with slipping on floors that happened in the years 2020 through 2022 (beyond those reported through NEISS). The reported incidents included 19 fatalities, 16 injuries, and 12 non-injury incidents. Injuries included

³⁰ Wet floors incidents were determined using keywords “wet”, “water”, “urin”, “pee”, “juice”, “coffee”, “milk”, “liquid”, “soda”, “fluid”, “mop”, “clean”, and “wash.” All instances of the terms “wet” were considered in wet floors. Aside from the term “wet”, all other wet-related keywords were further examined for scope.

³¹ Footwear incidents were determined by the presence of product code 1615 (footwear), which does not include socks. However, socks are also excluded from the definition of footwear in NFSA B101.5 and B101.7.

³² Floor treatment incidents were determined by inclusion of product codes 930 (ammonia), 954 (general purpose cleaner), 956 (bleach), or 977 (spot removers or cleaning fluids), or the keyword “wax.”

³³ CPSC staff searched CPSRMS.

fractures, concussions, lacerations, bruises and soreness of different parts of the body, twisted ankles, ligament tears, and other injuries that were not specified.

Ten incidents associated with slipping on floors involved persons 75 years or older, two incidents involved those 65 to 74 years old, and 11 involved individuals 40 to 64 years old. Five incidents involved persons younger than 39 years old. Nineteen incidents did not include age information.

Twenty-four incidents associated with slipping on floors indicated that a female slipped, 13 indicated that a male slipped, and 10 did not provide information about gender.

Twenty-two incidents did not specify where the slip occurred. Among incidents that had information about location, a kitchen was the most frequently mentioned (8 incidents) followed by a bathroom (4 incidents) or stairs (4 incidents). Three slip incidents took place in a bedroom and three incidents took place in store. A hospital room, a post office, and a church were each the locations of exactly one incident.

Ten incidents were associated with tile flooring, eight with wood flooring, three with vinyl flooring, one with laminate flooring, and one with ceramic flooring. Twenty-nine incidents did not specify what kind of flooring was involved in the incident.³⁴

Eleven incidents involved a wet floor. These incidents included the following: a wet floor, a cleaned or mopped floor, water on the floor, or urine on the floor. The remaining 36 incidents did not specify whether the slip was wet or dry.

Twenty-two incidents involved footwear.³¹ Two incidents involved floor cleaners or treatments.³² Zero in-scope incidents were associated with the keywords, “coefficient” or “friction.”

V. Summary

Injury data

- From January 1, 2020, to December 31, 2022, there were an estimated 603,700 ED-treated injuries associated with slipping on floors.

³⁴ Some incident reports mentioned more than one surface type.

- Staff found no statistically significant linear 3-year trend for the annual ED-treated slip injuries in the years 2020-2022 (p-value = 0.4636), with injuries ranging from 190,200 in 2020 to 209,400 in 2022.
- Individuals 75 and older had the highest rates for the slips, with an estimated annual average of 265 slips per 100,000 individuals in the US population—more than five times the average for all other age groups.
- Rates for females were almost twice that for males (79 estimated ED-treated injuries per 100,000 females vs. 42 estimated ED-treated injuries per 100,000 males).
- Most slips (58%) occurred in residential settings. CPSC staff estimated that 19 percent of slips happened in commercial or public settings, and 23 percent of the estimated ED-treated injuries did not provide information about the general location of the slip.
- About 14 percent of estimated ED-treated injuries associated with slips occurred in a bathroom, 8 percent in a kitchen, 5 percent in a store, and 1 percent in a school. Less than 0.5 percent of slips occurred in a bedroom. The remaining 73 percent were associated with other or unspecified locations.
- About 5 percent of the estimated ED-treated slip injuries occurred on a wood floor and 1 percent on a concrete floor. Less than 1 percent occurred on linoleum or marble floor. About 84 percent did not provide information about any of the above floor types.
- Floor wetness was associated with 35 percent of estimated ED-treated slip injuries.
- Footwear was associated with 1.5 percent of estimated ED-treated slip injuries.
- Floor cleaners or treatments were associated with less than 1 percent of estimated ED-treated slip injuries.
- The keywords “friction” and “coefficient” were not mentioned in case narratives of ED-treated slip injuries.

Incident data

- In the years 2020–2022 CPSC staff found 47 additional incidents associated with slipping on floors reported to CPSC outside of NEISS. The incidents include 19 fatalities, 16 injuries, and 12 non-injury incidents.
- Slip incidents were more frequent for females than males (24 vs 13). Ten incidents did not provide information about gender.
- Eight slip incidents occurred in kitchens, 4 in a bathroom, 4 on stairs, 3 in a bedroom, 3 in a store, 1 in a hospital, 1 in a post office, and 1 at church. Twenty-two incidents did not specify where the slip occurred.
- Ten slip incidents mentioned a tile floor. Eight slip incidents mentioned hardwood/ wood flooring, 3 mentioned vinyl flooring, 1 mentioned laminated floor, and 1 mentioned ceramic floor. Twenty-nine incidents did not provide information about floor type.

- Eleven of the 47 slip incidents involved a wet floor.
- Twenty-two of the 47 slip incidents involved footwear.
- Two of the 47 slip incidents involved floor cleaners or treatments.
- Zero of the 47 slip incidents were associated with the keywords, “friction” or “coefficient.”

Tab B: Mechanical Engineering Assessment of Standards and Studies Related to Flooring Slip-Resistance (Traction)



United States

Consumer Product Safety Commission

Memorandum

TO: Floor Coverings Petition File**DATE:** October 23, 2024**THROUGH:** Caroleene Paul, Director
Division of Mechanical and Combustion Engineering
Directorate for Engineering Sciences**FROM:** Brad Gordon, Project Manager
Division of Mechanical and Combustion Engineering
Directorate for Engineering Sciences**SUBJECT:** Mechanical Engineering Assessment of Standards and Studies Related to
Flooring Slip-Resistance (Traction)

I. Introduction

The National Flooring Safety Institute (NFSI, the Petitioner) is requesting that the Consumer Product Safety Commission (CPSC) issue a rule to mandate that manufacturers of floor coverings and coatings, chemical floor cleaners, and footwear label these products in accordance with the B101.5-2023 *Standard Guide for Uniform Labeling Method for Identifying the Wet Static and Wet Dynamic Coefficient of Friction (Traction) of Floor Coverings with Coatings, and Treated Floor Coverings*. The Petitioner previously submitted similar requests directed to floor coverings and coatings (CP 16-1, 2016 petition; CP 18-2, 2018 petition).

The Commission denied both these requests because it concluded there was insufficient information to demonstrate that mandating a floor cover label would assist consumers in assessing the comparative safety of floor covering products, or lead to a reduced number of slip-and-fall incidents. In the Denial Letter for CP 18-2³⁵ the Commission stated that the following concerns were not addressed:

Concern #1. Lack of consistency and accuracy among various test methods and lack of consistency of test instruments;

³⁵ See *supra* n. 2.

Concern #2. Insufficient evidence to support the assertion that a high COF value leads to a decreased hazard of slips and falls; and

Concern #3. Limited effectiveness of the proposed label because COF is likely only one of a number of factors involved in slip-and-fall incidents.

In this memorandum, Engineering Sciences Mechanical Engineering (ESMC) staff evaluates: (1) whether concerns #1 and concern #2 have been adequately addressed by the 2024 petition;³⁶ and (2) extends this inquiry to the Petitioner's two new product categories (floor cleaners and treatments; footwear).

II. Differences Between the Past Petitions and CP 24-1

In the 2016 petition (CP 16-1), the Petitioner requested that manufacturers of hard surface flooring materials and floor coatings be mandated to uniformly label their products to provide point-of-sale information about their products' degree of slip resistance in accordance with ANSI/NFSI B101.5-2014. CP 16-1 included requirements for both static coefficient of friction (SCOF) and dynamic coefficient of friction (DCOF) slip resistance values per the test methods described in ANSI/NFSI B101.1-2009, *Test Method for Measuring Wet SCOF of Common Hard-Surface Floor Materials*, and ANSI/NFSI B101.3-2012, *Test Method for Measuring Wet DCOF of Common Hard-Surface Floor Materials*, respectively. In the 2018 petition (CP 18-2) the Petitioner's request was revised by only requiring DCOF slip-resistance be measured in accordance with B101.5-2014.

In the most recent petition, CP 24-1, the Petitioner makes similar requests to CP 18-2: with regards to measuring COF and labeling flooring products. CP 24-1 differs from CP 18-2 in that it uses the most recent versions of the B101.3 and B101.5 standards: B101.3-2022 and B101.5-2023. The differences between the revised standards are discussed in section III below. Additionally, CP 24-1 includes the following new requests, directed to floor cleaners and footwear:

- (1) **Floor cleaners and treatments.** CP 24-1 requests that floor cleaners and treatments have their COF measured in accordance with NFSI B101.2-2020, *Test Method for Determining the Impact on Wet Coefficients of Friction of Various Chemical or Physical Walkway Surface Cleaners and Treatments on Common Hard-Surface Flooring Materials*. CP 24-1 further requests that each of these

³⁶ ESMC staff leaves evaluation of concern #3 to ES Human Factors staff.

products are labelled with their measured COF, in accordance with the B101.5-2023 standard.

- (2) **Footwear.** CP 24-1 requests that footwear have their COF measured in accordance with NFSI B101.7-2021, *Standard Test Method for Lab Measurement of Footwear Heel Outsole Material Coefficient of Friction on Liquid-Contaminated Floor Surfaces*. CP 24-1 further requests that each of these products are labelled with their measured COF, in accordance with the B101.5-2023 standard.

III. Staff's Assessment of Relevant Standards from the Previous and Current Petitions

(A) The B101.3-2012 and B101.3-2022 standards are substantially the same

CP 16-1 and CP 18-2 both required that COFs for flooring product's surface be assessed using the B101.3-2012 standard. In contrast, CP 24-1 uses the most recent B101.3 standard: B101.3-2022. Both B101.3-2012 and B101.3-2022 require using an NFSI-approved tribometer to measure the wet COF. There are minor differences between the standards such as formatting, updated definitions, etc. Staff assess that B101.3-2012 and B101.3-2022 are substantially the same in terms of their respective procedures for measuring COFs. Therefore, the COF test methods in CP18-2 are identical to this petition, CP 24-1. As in staff's assessment of CP 18-2, concerns remain that the test method in the current B101.3-2022 does not address inconsistency of test instruments nor did the Petitioner provide test data or studies to validate NFSI's approved tribometers consistently and accurately measure COF for various surfaces.

(B) Synopsis of the B101.2-2020 standard

CP 24-1 requires that the B101.2-2020 standard be used to measure the wet COFs of various floor cleaners and treatments. The procedure for measuring COF according to the standard includes using an NFSI-approved tribometer to measure the wet COF.

(C) Synopsis of the B101.7 standard

CP 24-1 requires that the B101.7-2021 standard be used to measure the COFs of various footwear. The procedure for measuring COF according to the standard includes: (1) securing a flooring material to a rigid backing surface; (2) obtaining a U.S. men's size 9 shoe or a U.S. woman's size 8 shoe; (2) if the shoe heel outsoles are new, lightly abrading the shoe with silicon carbide paper; (3) applying a lubricant to the flooring material; (4) moving the shoe horizontally across the flooring material, at 0.5 meters per second—until the normal force builds up to 250 newtons within a set time frame of

200 milliseconds; and (5) calculating the COF by dividing the friction force in the sliding direction by the normal force.

IV. Evaluation of the Evidence

(A) Previous Reports

Of the slip-and-fall reports cited in CP 18-2, staff's literature review indicates that there are at least two pending issues with tribometry: (1) that measuring the DCOF value using different tribometers on the same surface can result in different values; and (2) that there does not appear to be a generally accepted standard reference surface which can be used to validate DCOF values and calibrate tribometers. Staff also concludes that CP 24-1 does not appear to provide adequate evidence which remedies these issues. That is, the petition fails to: (1) specify a particular reference surface; and (2) provide sufficient evidence that tribometers falling within the scope of the petition would obtain the same DCOF values for the selected reference surface.

The following three references provided the basis for staff's concern that COF measurements and tribometers produce inconsistent results:

- (1) First, the Powers reference³⁷ attempts to establish reference surfaces to validate tribometer measurements. The study divided 80 participants into four groups, and each group walked on one of four reference surfaces on a test walkway. The study classified each trial as "no slip," "heel slip," or "toe slip." Researchers used 12 tribometers to measure the COF of the four reference surfaces. Powers found that "different tribometers yield different COF values for a given surface." (Powers, 370.)
- (2) Second, the Troyer reference³⁸ establishes that ASTM reference tiles can vary tremendously from tile to tile.
- (3) Third, the Masory reference³⁹ examines COF measurements between two tribometers of the same type using ASTM reference tiles. Masory identified problems, such as variability of different reference surfaces and variability within the same reference surface.

³⁷ C. M. Powers *et al.*, *Validation of walkway tribometers: Establishing a reference standard*, 55 JOURNAL OF FORENSIC SCIENCE, 335, 335-370 (2010) (Powers).

³⁸ DREW D. TROYER, PROJECT TO ESTABLISH STANDARD COF VALUES FOR ASTM F2508-11 STANDARD TILES (2011).

³⁹ Oren Masory, *Comments on ASTM F2508 – 13*, 6 J. ERGONOMICS, 1, 1–8, (2010).

(B) Evidence provided in CP 24-1

The Petitioner provided a study conducted in January 2023 in which “17 of the most popular household floor cleaning products commonly available at retailers nationwide” were used on an unspecified floor and results showed that 12 of the 17 products reduced the slip resistance of the floor after application. (CP 24-1, 25.) The Petitioner did not state whether these COF values were measured in accordance with the B101.3-2023 standard. The Petitioner did not provide any scientific data to establish a correlation between specific COF values (or range of COF values) and the risk of slips and falls.

Additionally, the Petitioner provided a study it conducted in March 2022 in which “NFSI tested 12 different styles of shoes commonly worn in commercial restaurants. Some of the shoes were labeled as “Slip Resistant” and others were not. Of the 12 footwear products tested five ranked as High-Traction per the B101.7-2021 standard and the remaining seven products were either moderate or low Traction. The Petitioner states that “street shoes” with low traction increase the risk of slip and fall when the walkway is wet/oily and that “NFSI research as revealed that such failure on the part of the footwear industry directly contributes to approximately 24% of slip and fall injuries.” The study did not quantify the reduced slip resistance to the risk of slips and falls, nor did the Petitioner reference any studies. Furthermore, CPSC staff is not aware of any scientific studies to show a correlation between specific COF values (or range of COF values) and the risk of slips and falls.

V. Discussion

(A) Assessment of Petitioner’s Requests

In CP 24-1, the Petitioner made three requests:

(1) Petitioner’s first request. The first request is that manufacturers of commercial and residential grade floorings and coatings uniformly test their products’ slip-resistance in accordance with NFSI B101.3-2022 *Test Method for Measuring the Wet Dynamic Coefficient of Friction of Hard-Surface Walkways* and label their products in accordance with NFSI B101.5-2023 *Standard Guide for Uniform Labeling Method for Identifying the Wet Dynamic Coefficient of Friction of Floor Coverings, Floor Coatings, Treatments, Commercial and Residential floor Chemical Agents, and Consumer Footwear*.

ESMC Staff’s assessment of Petitioner’s first request:

The Petitioner’s first request is similar to Petitions CP 16-1 and CP 18-2. CP 16-1 requested that slip-resistance be measured using the B101.1-2009, *Test Method for Measuring Wet SCOF of Common Hard-Surface Floor Material*, and B101.3-2012, *Test*

Method for Measuring Wet COF of Common Hard-Surface Floor Material, standards, whereas CP 18-2 only requested that slip-resistance be measured with B101.3-2012. CP 24-1 differs from CP18-2 in that it uses B101.3-2022 instead of the 2012 version of the standard to measure the flooring COF. CPSC staff compared the 2022 version of B101.3 with the 2012 version of the standard and found them to be substantially the same. Both B101.3-2012 and B101.3-2022 require using an NFSI-approved tribometer⁴⁰ to measure the wet COF. In staff's prior assessment of CP 18-2, staff found that the NFSI tribometer certification process specified in B101.3 may provide more consistent COF values, but it does not address that two or more tribometers could measure different COF values for the same surface.⁴¹ Therefore, staff assesses that the 2023 version of B101.3 does not address the underlying concern of consistency and accuracy among various test methods and lack of consistency of test instruments.

Petition CP 24-1 provides data on falls from multiple sources—such as the National Health Review Survey, the Centers for Disease Control and Prevention, National Council on Aging, National Safety Council, and the Journal of American Geriatrics Society. The data and statistics highlight the high number of injuries and deaths in the United States due to falls, especially among the older population; however, staff found no evidence in the information correlating COF values of flooring at point-of-sale to risk of slips and falls. As such, staff concludes that the information provided in support of the Petitioner's first request fails to support the assertion that a high COF value leads to a decreased risk of slips and falls.

In summary, ESMC staff concludes that the information provided in support of the Petitioner's first request fails to: (1) address the underlying concern of consistency and accuracy among various test methods and lack of consistency of test instruments; and (2) demonstrate that a high COF value leads to a decrease in slips and falls.

(2) Petitioner's second request. The second request is that manufacturers of commercial and residential grade chemical floor cleaners and treatments test the slip resistance of their products in accordance with the B101.2-2020, *Test Method for Determining the Impact on Wet Coefficients of Friction of Various Chemical or Physical Walkway Surface Cleaners and Treatments on Common Hard-Surface Flooring Materials* and label their products in accordance with the B101.5-2023.

⁴⁰ See *supra* n. 19.

⁴¹ See *supra* n. 20.

ESMC Staff's assessment of Petitioner's second request:

CP 24-1 requests that the B101.2-2020 standard be used to measure the wet COFs of various floor cleaners and treatments. The procedure for measuring COF according to the standard includes using an NFSI-approved tribometer to measure the wet COF. Based on staff's prior concern that the NFSI tribometer certification process does not address that two or more tribometers could measure different COF values for the same surface,⁴² staff concludes that the Petitioner's second request does not address the underlying concern of consistency and accuracy among various test methods and lack of consistency of test instruments.

The Petitioner asserts that "many commercial and residential floor cleaners will leave a slippery film which decreases the COF of the underlying floor and in-turn increases the risk of a slip and fall event." The Petitioner provided a study conducted in January 2023 in which "17 of the most popular household floor cleaning products commonly available at retailers nationwide" were used on an unspecified floor and results showed that 12 of the 17 products reduced the slip resistance of the floor after application (CP 24-1, 25). Staff's previous assessments of CP 16-1 and CP 18-2 concluded that friction is one of multiple variables related to slips. While a slippery floor may lead to a slip or fall, the Petitioner did not provide evidence correlating specific COF values with a higher or lower risk of slip and fall. Likewise, staff's review of available NEISS and CPSRMS found insufficient data on the slipperiness of floors that had been treated by cleaning agents and risk of slip and fall. Therefore, staff concludes that the information provided in support of the Petitioner's second request fails to support the assertion that a high COF value leads to a decreased risk of slips and falls.

In summary, ESMC staff concludes the information provided in support of the Petitioner's second request fails to demonstrate: (1) that its proposed requirements for floor cleaning agents addresses the underlying concern of consistency and accuracy among various test methods and lack of consistency of test instruments; and (2) that a high COF value leads to a decrease in slips and falls.

(3) Petitioner's third request. The third request is that manufacturers of footwear test the slip resistance of their products' outsoles in accordance with the B101.7-2021 standard, *Standard Test Method for Lab Measurement of Footwear Heel Outsole Material Coefficient of Friction on Liquid-Contaminated Floor Surfaces* and label their products in accordance with the B101.5-2023 standard.

⁴² See *supra* n. 20.

ESMC Staff's assessment of Petitioner's third request:

CP 24-1 requires that the B101.7-2021 standard be used to measure the COFs of various footwear. The procedure for measuring COF according to the standard includes: (1) securing a flooring material to a rigid backing surface; (2) obtaining a U.S. men's size 9 shoe or a U.S. woman's size 8 shoe; (2) if the shoe heel outsoles are new, lightly abrading the shoe with silicon carbide paper; (3) applying a lubricant to the flooring material; (4) moving the shoe horizontally across the flooring material; and (5) calculating the COF based on the movement of the shoe. The Petitioner asserts that consumers are uninformed as to the inherent slip risk associated with shoes and boots worn in and outside of the workplace; without uniform testing and labeling consumers will be unaware of the safety risks associated with the shoes they purchase because many types of footwear, including some labeled as "slip resistant," actually have a low level of slip resistance.

The Petitioner did not provide test results showing that the procedure specified in B101.7-2021 provides consistent and accurate results. Additionally, based on available information, staff is unable to assess if the Petitioner's third request addresses the prior concerns with consistency and accuracy among various test methods and lack of consistency of test instruments.

The Petitioner provided a study conducted in March 2022 in which NFSI tested twelve (12) different styles of shoes (e.g. NIKE, Converse, and Tredsafe) commonly worn by workers in commercial restaurants. Of the 12 footwear products tested, five ranked as High-Traction per the NFSI B101.7 test standard and the remaining seven products were either Moderate or Low Traction. The Petitioner states that "street shoes" with low traction increase the risk of slip and fall when the walkway is wet/oily and that "NFSI research has revealed that such failure on the part of the footwear industry directly contributes to approximately 24% of slip and fall injuries."

The Petitioner did not reference a published study of their research, nor did they describe the study's scope and methodology that lead them to conclude that consumer's lack of knowledge of the actual slip resistant qualities of their shoes contributed to 24% of slip and fall injuries. As such, staff is unable to verify the Petitioner's findings.

After assessing the evidence, staff concludes that the Petitioner's presented evidence is insufficient to demonstrate that a lack of traction ratings on footwear directly contributed to slips and fall injuries. While a slippery floor may lead to a slip or fall, the Petitioner did not provide evidence correlating specific COF values with a higher or lower risk of slip

and fall. Likewise, staff's review of available NEISS and CPSRMS found insufficient data on the slipperiness of floors that had been treated by cleaning agents and risk of slip and fall. Therefore, staff concludes that the information provided in support of the petitioner's third request fails to address the Commission's concerns from CP 16-1 and CP 18-2: (1) that there is a lack of consistency and accuracy among various test methods and lack of consistency of test instruments; and (2) that there is insufficient evidence to support the assertion that a high COF value leads to a decreased hazard of slips and falls.

(B) CP 24-1 fails to meet the Commission's Concerns

ESMC staff assessed CP 24-1 with a focus on concerns #1 and #2 raised by the Commission.

(1) *Concern # 1: Lack of consistency and accuracy among various test methods and lack of consistency of test instruments.*

As mentioned above, the standard for measuring COF in the CP 18-2 petition was B101.3-2012. CP 24-1 requests the use of the revised B101.3-2022 for measuring COFs. However, after comparing these two standards, staff concludes them to be substantially the same. Staff found no evidence demonstrating that the B101.3 test methods are consistent and accurate. As in the previous petitions, this petition fails to provide evidence that there is consistency of test instruments, such as tribometers.

Furthermore, staff concludes that in the Powers study, nine tribometers showed a wide range of COF values for the same surface: when tested under wet conditions (COF = 0.06-0.69). The four tribometers capable of ranking the surfaces correctly from least to most slippery, measured different COF values for the same surface. These large intertribometer differences suggest that the value obtained from a given tribometer cannot be used to compare slipperiness of two different surfaces, potentially resulting in confusion when different COF values from different tribometers are used to measure slipperiness. This study demonstrates the difficulty in measuring COF due to the multitude of variables involved in friction testing and differences in the mechanical design and COF calculation methods used by different tribometers.

Additionally, the research by Troyer discussed in this memo showed that the ASTM reference tiles can vary tremendously from tile to tile. The Masory reference reinforces these results: since Masory examined COF measurements between two tribometer of the same type, using ASTM reference tiles. Furthermore, Masory identified problems such as variability of different reference surfaces and variability within the same reference surface.

The conclusions from Troyer, Powers, and Masory suggest that standard reference surfaces and procedures need further development to ensure that a tribometer can measure COF accurately and statistically differentiate reference surfaces. Staff is unaware of standard reference surfaces that can obtain an absolute COF value that can be used to validate and calibrate tribometers. Based on staff's review of the B101.3-2022, staff concludes that the test method is the same as the B101.3-2012; therefore, staff assesses that this latest petition still has issues pertaining to a lack of consistency and accuracy among various test methods and a lack of consistency of test instruments. Accordingly, staff's assessment is that the petition has not adequately addressed the Commission's first concern.

Moreover, the above findings suggest that measuring the COF value using different tribometers on the same surface can result in different values and standard reference surfaces. Likewise, staff is unaware of any reference material having an absolute COF which can be used to validate and calibrate tribometers.

(2) *Concern # 2: Insufficient evidence to support the assertion that a high COF value leads to a decreased hazard of slips and falls.*

CP 24-1 provides data and statistics related to slips and falls (e.g., CP 24-1, 2, 4-22) that highlight the high number of injuries and deaths in the United States due to falls, especially among the older population. Staff's review of the information found no evidence demonstrating that: (A) that COF is a controlling variable in slips and falls; and (B) that controlling COF alone would be sufficient for reducing the risk of slips and falls. As such, CPSC staff concludes that the data and statistics in CP 24-1 are insufficient to support the assertion that a high COF value leads to a decreased hazard of slips and falls.

VI. Conclusion

ESMC staff reviewed CP 24-1 as well as the analyses presented in the CP 16-1 and CP 18-2 Briefing Packages. The Petitioner made three requests:

- (1) that manufacturers of commercial and residential grade floor coverings and coatings uniformly test their products' slip-resistance (Traction level) per the NFSI B101.3-2022;
- (2) that manufacturers of commercial and residential grade chemical floor cleaners and treatments uniformly test their products' slip-resistance (Traction level) per the ANSI/NFSI B101.2-2020;

(3) that manufacturers of footwear uniformly test their products' outsoles slip-resistance (Traction level) per the NFSI B101.7-2021.

Staff concludes that each of these requests fails to address the Commission's concerns for the following reasons:

First request. Staff concludes that the information provided in support of the Petitioner's first request fails to: (1) address the underlying concern of consistency and accuracy among various test methods and lack of consistency of test instruments; and (2) demonstrate that a high COF value leads to a decrease in slips and falls.

Second request. Staff concludes the information provided in support of the Petitioner's second request fails to demonstrate: (1) that its proposed requirements for floor cleaning agents addresses the underlying concern of consistency and accuracy among various test methods and lack of consistency of test instruments; and (2) that a high COF value leads to a decrease in slips and falls.

Third request. Staff concludes that the information provided in support of the petitioner's third request fails to address the Commission's concerns from CP 16-1 and CP 18-2: (1) that there is a lack of consistency and accuracy among various test methods and lack of consistency of test instruments; and (2) that there is insufficient evidence to support the assertion that a high COF value leads to a decreased hazard of slips and falls.

Tab C: Human Factors Staff's Analysis of Petition



Memorandum

TO: Brad Gordon, Project Manager
Division of Mechanical and Combustion Engineering
Directorate for Engineering Sciences

DATE: October 21, 2024

THROUGH: Rana Balci-Sinha, Ph.D., Director,
Division of Human Factors

FROM: Sharon R. White
Engineering Psychologist

SUBJECT: Evaluation of Labeling of the Slip Resistance of
Commercial and Residential Grade Floor Coverings
and Coatings, Residential and Commercial Floor
Cleaning Agents, and Consumer Footwear

I. Background

Russel J. Kendzior, President and Chairman of the Board of the National Floor Safety Institute (NFSI) (Petitioner), petitioned the U.S. Consumer Product Safety Commission (Commission) to initiate rulemaking to require that manufacturers of commercial and residential grade floor coverings and coatings, floor cleaners and treatments, and footwear label their products to inform consumers of the product's slip resistance.

The Petitioner requested that the Commission mandate a similar requirement in the 2016 (CP 16-1) and 2018 (CP 18-2) petition, specifically requesting that the Commission require manufacturers of floor coverings, floor coverings with coatings, and treated floor coverings, to label their product's Coefficient of Friction (COF). The Commission denied both petitions because the action requested by the Petitioner was unlikely to reduce injuries from slips and falls.

The current petition expands the scope of the request to include additional products to be covered by the rule - commercial and residential grade chemical floor cleaners and treatments, and footwear. Additionally, the Petitioner proposed a different graphic in response to concerns raised in CP 18-2 about the then proposed label. The Petitioner is currently proposing a label that represents a graphic of a gas gauge like traction scale in which the indicating arrow within the symbol must point to the specified traction range - low, medium, or high. Only the word, TRACTION, is beneath the scale to indicate that

the traction range – low, medium, or high- refers to traction. See Figure 1 below. Also, unlike the CP 16-1 and CP 18-2 proposed labeling requirements, the currently proposed labeling requirements stipulate that manufacturers and/or retailers provide an informational display describing the purpose of and that provides an interpretation of the label at the point of purchase. The informational display must include a statement indicating that factors other than COF play a role in slip-and-fall incidents.

II. Discussion

(A) Injury Data

Staff in the Directorate for Epidemiology identified 47 in scope⁴³ reported slip-and-fall incidents in the Consumer Product Safety Risk Management System database that occurred between January 1, 2020, and December 31, 2022. This category includes 20 fatalities, 18 nonfatal injuries, and 9 consumer complaints. The data show that of the 47 incidents, 23 percent involved persons 75 years and older; 23 percent involved persons 40-64 years old; 4 percent involved individuals 65-74 years old; 10 percent involved those age 5 months to 32 years old; and 38 percent were of unknown ages. The reported problems are listed below, beginning with the most frequently reported concerns:

- Slippery footwear (22 incidents) was the most common problem reported (46%). Consumers reported slipping in shoes or slippers in the kitchen, a room, or on a hardwood floor and falling.
 - Of the 22 incidents, 7 were consumer complaints. In these instances, consumers complained about slippers and shoes sliding or slippery soles.
- Incidents (18) described as slipped and fell (38%)
 - at various locations (e.g., hospital, convenience store, in kitchen) (10 incidents).
 - on wet floor (4 incidents)
 - on bathroom floor (3 incidents)
 - while trying to pick up something from bedroom floor (1 incident)
- Incidents involving slip and falls after consumer cleaned floor with floor cleaner (2 incidents)
- Incidents involving consumers slipping while wearing socks (2 incidents)

⁴³ Source: The Division of Hazard Analysis' memorandum, Estimated Number of Injuries and Reported Incidents Associated with Slipping on Floors, 2020-2022 (TAB A).

- Consumer complaints of slippery tile (2 incidents)

(B) Factors Contributing to Slip-and-Fall Incidents

The primary risk factor for slips and falls is poor grip or low friction between the footwear (foot) and the underfoot surface (e.g., the floor) (Sherehiy et al., 2009). However, COF is only one factor that can affect the slipperiness of the floor. Surface roughness, floor texture, and traction changes of the floor overtime due to wear of the floor are among other floor characteristics that can affect the slipperiness of the floor. Environmental factors such as contaminants (water, oil, grease, and similar), floor cleaning and maintenance products are also risk factors for slips and falls. Footwear is another contributory factor in slip-and-fall incidents. Age-related changes related to the user including sensory, cognitive, and motor systems changes are additional risk factors. Certain medications prescribed for older adults that have been associated with increased risk for falls may also play a role.

(C) NFSI B101.5 Labeling Requirements

As earlier mentioned, the Petitioner requests that the Commission mandate the NFSI B101.5 labeling requirements to address the fall-related incidents. Section 4 of the standard contains the labeling requirements. The standard requires that one of the symbols below (Figure 1) representing the Dynamic Coefficient of Friction (DCOF) under wet conditions be placed on the principal display panel of the packaging or container of the floor coverings and coatings, floor cleaners and treatments, and footwear (products). The values for COF are derived from test methods described in the NFSI B101.3-2022, B101.2-2020, and B101.7-2021 as previously discussed. The symbols can be either black and white or to enhance the label, colored. Additionally, the size of the symbol must be legible at the intended viewing distance and not be less than 1.0 inch by 1.0 inch. Moreover, the product manufacturer and/or retailer should provide an informative display describing the purpose and that provides an interpretation of the label.

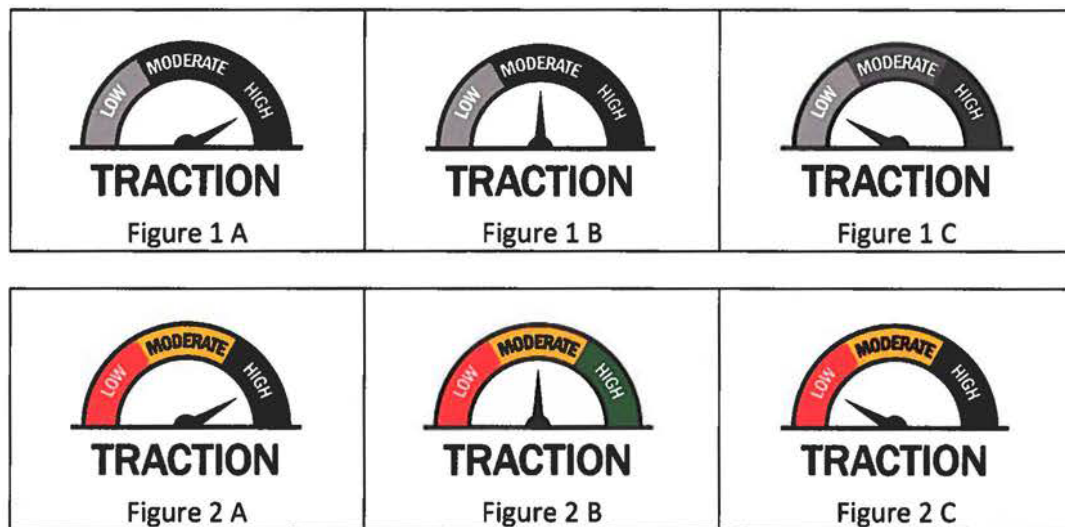


Figure 1

(D) Analysis of NFSI B101.5 Labeling Requirements

The proposed label is essentially an informational label in the form of a symbol that is intended to have the effect of a safety message or warning.⁴⁴ Therefore, Human Factors (ESHF) staff assesses this informational label (or symbol) similar to the way staff assesses warning labels. As stated in the memorandum in response to CP 16-1 and again in the ESHF report responding to CP 18-2, in order for warnings to be effective, they must be noticed, read and understood, and motivate behavioral change.

Noticing the Label

Flooring. Flooring comes in different sizes of packaging. For example, the packaging can measure 5.9 inches wide x 50.78 inches long x 2.5 to 3 inches high. Product information, including colored visuals, are typically printed on the top, bottom, and around the perimeter of the packaging, from one end of the packaging to the other. Given that the Petitioner proposed an informational label, as such, it may blend in with the rest of the product information on the packaging and compete for the consumer's attention. Therefore, the possibility exists that the label may not grab the consumer's attention or consumers may not notice the label altogether. Older adults particularly have difficulty detecting and attending to relevant information while simultaneously

⁴⁴ Warnings consist of a signal word panel (i.e., Warning, Caution, Danger), statement of hazard and consequences, and what to do to avoid the hazard.

ignoring irrelevant information (McLaughlin and Mayhorn, 2014). In other words, older adults are easily distracted and may therefore miss the label.

A black and white label may not stand out from the surrounding black and white text on the packaging. Even if the label was noticeable, consumers may still not notice the label due to their lack of perception of a hazard and the familiarity effect. Consumers are likely to perceive flooring as a safe and familiar product. Research shows that consumers are less likely to look for and notice warnings on products that they perceive as safe and familiar. And, if the product is sold in the U.S., this may increase the likelihood that consumers will not look for a safety-related label because people largely believe that consumer products sold in the U.S. are reasonably safe (Kim and Wogalter, 2011).

Also, many flooring products are displayed by the piece in showrooms where consumers make purchasing decisions and without the presence of the product packaging. Additionally, consumers may prefer contractors, designers, or others in the flooring business to conduct consulting and sales in the consumers' own home. In this case, consumers would decide on flooring purchases looking at the flooring samples provided without the presence of the packaging. Therefore, without the presence of the packaging, consumers will not see the proposed label at all in these cases.

Furthermore, many consumers move into a home where flooring is already installed or hire a builder to build a new home. These consumers are not likely to see the packaging in which the flooring was delivered. On a related note, according to the Petitioner, falls occur more often in nursing homes because people in nursing homes are usually older, have more chronic health conditions, have more difficulty walking, and have other more serious challenges common to this population that could lead to falls. Most nursing homes are commercial facilities. Therefore, this audience is not likely to even see the very label that is intended for them.

Floor Cleaners and Treatment. The NFSI indicated that it conducted a cleaner study in January 2023 and found that of the 17 most popular household floor cleaning products commonly found at retail establishments nationwide, 12 of the products reduced the slip resistance of the floor after application. According to NFSI, these products tend to leave a slippery film that increases the risk of slip-and-fall incidents. Therefore, the NFSI proposes that the product contain a label indicating its traction level to inform consumers at the point of purchase.

Research indicates that layout of text can attract attention. Generally, the use of generous white space and bold bulleted lists are preferred to long, dense text (Taylor and Wogalter, 2011). Long dense text is commonly found on the backs of floor cleaning products and on cleaning products in general. Therefore, the possibility exists that consumers will not read information on these products which increases the likelihood that consumers will not notice information on the traction level of the cleaners. If consumers do read the text, consumers may look for specific product information such as directions on how to use the product (Inaba, Parsons, and Smillie, 2004) and therefore, potentially overlook and/or miss the label on traction level altogether.

Additionally, the subject product is a familiar one that presents no obvious hazard beyond that it can present chemical hazards (e.g., eye irritant or ingestion hazard). This increases the likelihood that consumers are not likely to look for a label on the traction of the floor cleaner.

Footwear. Retailers place shoes on display in a variety of ways to attract the consumers attention. Some retailers place one shoe among a selection of shoes on or around a stand, table, or shelf in the shoe section of the store so that consumers can interact with the shoes. Consumers interact with the shoe box (package) when the sales representative brings out the shoes so that consumers can try them on. In discount department stores and outlet stores, the shoe package is stacked by shoe size below the shoe on display. In both cases, consumers are likely to try on the shoes without inspecting the packaging because consumers would likely have already retrieved the shoe information of interest (e.g., size, price, and brand) from the shoes themselves and/or the shoe display.

Some discount department stores use shoe hangers to hang shoes on a rack in the shoe section. Shoes displayed in this manner typically have hang tags on them. Product information such as size, price, and brand are displayed on the shelf, at the top of the hanger, on the shoes themselves and hang tag. Presumably, the hang tag would be considered the packaging and would be competing for the consumer's attention due to other locations from which consumers could obtain product information.

Shoes sold second hand in thrift stores or consignment shops are not likely to have a traction label. This is because shoes sold in these markets typically do not come in their original packaging which is where the Petitioner requests that manufacturers be mandated to place a traction label.

Like flooring, consumers are likely to perceive footwear as a safe and familiar product. As pointed out in the past two petitions, research indicates that consumers do not look for safety-related information on familiar products and on products perceived as safe.

Therefore, based on all the above, consumers may miss the label on traction level provided on the packaging of footwear to make an informed purchasing decision. Older adults are even more likely to miss this information because their ability to distribute their attention across different stimuli (e.g., product information) declines with age (Lesch et al, 2011).

Processing the Label

ESHF staff assessed that even if consumers do notice the Petitioner's proposed label on the packaging of the subject products, they may not read and understand it. ESHF staff assesses this for the following reasons:

- The appearance of the symbol looks technical. It is a graphic of a gas gauge like traction scale as earlier described. Although there are circumstances where it is appropriate to communicate technical information, researchers indicate that, as a general rule, it is not useful to communicate such information to a general target audience. Such warnings require an appreciation of technical information (in this case symbols) for a full and complete understanding of the intended message (Wogalter, Mayhorn, and Laughery, Sr., 2021). Consumers to whom the label would be directed, and particularly older consumers, may not possess such appreciation of the COF of the subject products. Researchers further posit that it may be counterproductive because if consumers encounter technical-looking labels it may result in the consumer not attending to it and thereby overlooking potentially useful information.
- It is necessary to test symbols before they are used to determine whether they convey their intended meaning (DTI, 2000, Wogalter, Conzola, and Smith-Jackson, 2002; Hicks, Bell, and Wogolter, 2003; Deppa, 2009; ANSI Z535.3 - 2011; Wogalter, Laughery, Sr., and Mayhorn, 2012; and Wogalter, Mayhorn, and Laughery, Sr., 2021). Although the Petitioner claimed that the current label/symbol was tested for comprehension, the Petitioner did not provide any information indicating that the symbol was tested, or how any testing was done.
- The proposed symbols leave it up to the consumer to infer information, which puts consumers at risk of making incorrect inferences. For example, consumers may infer that the low/moderate/high traction symbol relates to the quality of the product and not to the safety of the product. Hancock, Fisk, and Rogers (2005)

maintain that the ability to make and understand inferences declines with age. Also, some consumers may correctly recognize that the moderate and low tractions have a slip risk, however, their purchasing decisions may be influenced by factors beyond traction level such as cost, aesthetics, and longevity of the product. Moreover, consumers may correctly believe, for example, that a floor with high traction is more slip resistant. However, this may create a false sense of security because factors beyond COF of the surface play a role in falls. Staff pointed this out in response to the 2016 and 2018 petitions.

- The Petitioner even recognizes that consumers may not understand the label because the proposed labeling requirements stipulate that the manufacturer and/or retailer provide an informational display with an interpretation of the label.
- The informational display requested in the petition states that it must include 5 statements, at a minimum, using the exact wording that the Petitioner provided. The required statements vary in length from medium to long. Thus, consumers may not read the informational display due to the cost, in terms of time and effort, to do so.

Motivating Behavioral Change

As mentioned in memorandums in response to CP 16-1 and CP 18-2, to motivate consumers to select the appropriate products, the informational label should tell consumers why they need to do so. It should tell consumers the consequences (e.g., falls and serious injuries and death) of not selecting the “appropriate” product, but the Petitioner’s proposed label does not. Even if the label explicitly states the consequences, consumers may not comply with the label. Motivation is closely tied to behavior. One of the most influential factors for motivation relative to warnings is cost of compliance, in terms, of time, effort, money, or convenience. A consumer’s purchase decisions may be influenced by factors beyond the traction level of the product such as the cost of the product. The choice of footwear, for example, is predominantly driven by fashion and cost rather than by function (Bakken et al., 2007). Furthermore, the label may provide a false sense of security because COF is only one of many factors involved in slip-and-fall incidents. Factors related to the user, product, and environment may play a role in these incidents. The Petitioner recognizes this in proposing that the manufacturer’s informational display should contain a statement noting that other factors can affect the safety of floors.

III. Conclusion

For the Petitioner’s proposed label to be effective, the label must be noticed, read, and understood, and motivate behavioral change. Consumers, in general, and older

consumers, in particular, may not notice, read, and understand the label for the reasons discussed in this report. Many consumers, including nursing home residents, are not likely to see the label at all. Furthermore, the label may provide a false sense of security because traction of the products is only one of many factors involved in slip-and-fall incidents. Factors related to the user, product, and environment also play a role in these incidents. Staff raised these concerns in response to the 2016 and the 2018 petitions. However, the Petitioner provided no new evidence that would cause staff to believe that labeling the products' COF is likely to be effective.

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Tab D: Market and Economic Considerations for Labeling Requirements on Floor Coverings



Memorandum

TO: Brad Gordon, Project Manager
Division of Mechanical and Combustion Engineering
Directorate for Engineering Sciences

DATE: October 23, 2024

THROUGH: Alexander Moscoso
Associate Executive Director
Directorate for Economic Analysis

Jose Tejeda
Supervisory Economist Division Director
Directorate for Economic Analysis

FROM: Bretford Griffin, Economist
Directorate for Economic Analysis

SUBJECT: Market and Economic Considerations for Labeling
Requirements on Floor Coverings

I. Introduction

On April 11, 2023, the National Floor Safety Institute (NFSI; Petitioner) requested that the U.S. Consumer Product Safety Commission (CPSC) initiate rulemaking to mandate testing and labeling regarding the slip resistance (traction) of commercial and residential grade floor coverings, floor coatings and treatments, residential and commercial floor cleaning agents, and consumer footwear. This petition was filed by CPSC as Petition CP 24-1.

When CPSC receives a petition, the Directorate for Economic Analysis (EC) provides (1) a brief discussion of market information, and (2) a preliminary estimate of the annual cost to society of the hazard, if accurate information is readily available.

II. The Market

Staff last conducted a market study for flooring products for the CP16-1 briefing package in 2016. This market study found at least 20 manufacturers supplying hard flooring and floor finishing products to the residential market through various retailers. These manufacturers produced approximately 4.14 billion square feet of flooring in 2014, with retail sales of around \$10 billion.

For this petition, staff conducted another market study to assess how sales and prices have changed since 2016. Staff found that prices have not changed significantly since CP 16-1, while sales volume increased by about 65 percent to 6.8 billion square feet.

The Petitioner requested that CPSC require all manufacturers of in-scope products to conduct slip-resistance testing and label their products with the slip-resistance coefficient found in testing. Petition CP 24-1 includes the following products: (i) hard floor coverings, (ii) floor coatings and treatments (including finishes and paints), (iii) floor cleaning products, and (iv) consumer footwear.

III. Hard Floor Coverings

Hard floor coverings encompass a range of materials including resilient and non-resilient (i.e., rigid floor materials like stone and ceramic) flooring. Along with wood, these products include vinyl, cork, linoleum, bamboo, laminate, ceramic tile, and natural stone. Flooring products are available in a variety of colors, shapes, and designs and can be sold as individual planks or as sheets. Some flooring products, such as laminate, engineered wood, and luxury vinyl tile (LVT), can snap or lock into place and do not require glue or nails for installation. Others, such as solid wood, require nails, glue, or sealant. Floor covering products can be purchased at specialty stores and home improvement stores. Prices are typically quoted per square feet and prices vary depending on the material.

Staff investigated changes in flooring pricing and found that the nominal price ranges had not significantly changed since CP 16-1. Namely, the retail price of vinyl flooring is less than \$1 per square foot, and luxury vinyl is as high as \$7 per square foot. Retail prices for laminate flooring are priced from less than \$1 to about \$4 per square foot. Ceramic and porcelain floor tile are priced between about \$1.50 and \$4 per square foot. Retail prices for bamboo and cork flooring are about \$4.50 per square foot and \$5 per square foot, respectively. Hardwood flooring is generally priced between \$3 and \$7 per square foot. Retail prices for natural stone range from less than \$3 to more than \$15 per square foot.⁴⁵ While the nominal price ranges have remained the same, real prices have decreased since CP 16-1 as significant general inflation has occurred since then.

Flooring can be installed either by professional installers or homeowners. While a small do-it-yourself (DIY) market exists for vinyl sheet flooring, most vinyl floors are installed by professionals. Vinyl, wood, and laminate were the three most popular flooring

⁴⁵ These retail prices are based on retail prices originally observed on several websites including homedepot.com, homeflooringpros.com, and improvenet.com which was compared to current prices on homedepot.com and lowes.com. Price information was collected on July 6, 2016 and August 20-21, 2024.

products used in the residential market due to their low cost and ease of installation. Engineered wood is used more often in remodeling than new construction.

IV. Number and Size of Firms Associated with Hard Flooring Products

Manufacturers of hard flooring may be classified in one of several different North American Industrial Classification (NAICS) categories depending upon the primary material used. Table 1 summarizes the total number of firms in each of these categories and the number of firms considered to be small firms according to the Small Business Administration criteria.⁴⁶ Table 1 has broad categories and include many products other than flooring. Table 1 also provides some information on the number of specialty floor covering retailers and home centers.⁴⁷

Table 1: Firms in NAICS Categories That Include Hard Floor Covering Manufacturers

NAICS Code	Description	Number of firms	Number of small firms
321918	Other Mill Work including Flooring (includes wood flooring)	1,425	1,389
326199	All Other Plastics Product Manufacturing (includes vinyl flooring)	4,639	4,368
327120	Clay building material and refractories manufacturing (includes ceramic and porcelain tile)	326	302
327991	Cut stone and stone product manufacturing (includes granite and marble flooring)	1,978	1,953
Total number of manufacturers		8,368	8,012
442210	Floor Covering Stores	8,174	8,160*
444110	Home Centers	1,515	1,495*
Total number of retailers		9,689	9,655

Source: 2021 SUSB data; *Number of firms with fewer than 500 employees.

Flooring firms are considered small by the Small Business Administration if they have fewer than 750 employees. The exception is ceramic tile manufacturers (NAICS

⁴⁶ The 2021 Statistics of U.S. Businesses provides data for the number of firms by number of employees. The most recent Small Business Administration (SBA) Size Standards are available at: <http://www.sba.gov/size>

⁴⁷ Because dollar sales would not take into consideration the types of floor covering retailers, staff is providing information on the number of firms. Firms with fewer than 100 employees are considered small.

category 327120) who are considered small businesses if they have fewer than 500 employees.

Staff previously identified at least 20 manufacturers that supply hard flooring products to the residential market. This includes a few large manufacturers that own multiple brands and supply multiple types of flooring products, particularly for wood and tile. Staff has not found information in 2024 that updates the 20 firms estimate. The U.S. residential flooring market is dominated by a few large firms that offer a range of products in most market segments and price ranges. Staff conducted an internet search for flooring brands and found over 30 brands of hard flooring products.⁴⁸ A single manufacturer or importer can offer multiple brands.

V. U.S. Consumption for Hard Surface Flooring

In 2014, total U.S. consumption for hard surface flooring in single family and multifamily housing was approximately 4,140 million square feet. By 2023 this figure had grown to an estimated 6,821 million square feet⁴⁹. Most hard surface flooring sold in 2014 was used in existing homes and single-family homes.⁵⁰ Vinyl, decorative tile, wood, and laminate each accounted for a significant portion of the sales. The consumption for other hard surface flooring, including cork, linoleum, and bamboo accounted for less than 3 percent of the sales in 2014.⁵¹ Staff has no information that product usage and product mix has significantly changed. Table 2 summarizes the consumption for hard surface flooring in 2023 by various categories.⁵²

⁴⁸ Staff observed more than 30 brands of flooring products being sold online on homedepot.com and lowes.com: last accessed August 2024.

⁴⁹ Staff produced the 2023 Sales estimate by using 2023 Statista Flooring sales data and adjusting for the difference between the original 2014 Freedonia study the Statista data from the same period.

⁵⁰ Hard surface flooring includes resilient floor coverings and non-resilient products. These products include vinyl, rubber, linoleum, cork, wood, laminate, tile flooring, natural stone, glass, and metal flooring

⁵¹ Note that the 2014 proportions for *Type of Flooring* were used in in the 2023 estimates and as such the current proportions are not strictly exogenous.

⁵² Consumption (or sales) is calculated as the sum of production and imports, less exports (The Freedonia Group, 2015).

Table 2: 2023 Flooring Sales by Categories (millions of square feet)

Category	2023 Sales	2014 Sales
Total Consumption	6,821	4,140
Single Family Housing	5,774	3,505
Multifamily Housing	824	500
Manufactured Housing	222	135
Existing Housing	5,618	3,410
New Housing	1,203	730
Type of Flooring		
Vinyl	3,054	925
Decorative Tile (incl. ceramic, porcelain, and natural stone)	1,736	1,270
Wood	907	935
Laminate	913	910
Other (e.g., cork, linoleum, bamboo)	211	100

According to 2019 National Association of Home Builders data, the average size of a room in new homes was approximately 275 square feet.⁵³ If the average room size for houses built in 2019 and beyond stay the same, then the surface flooring sold in 2023 would be 22 million rooms⁵⁴.

Based on the U.S. consumption data in Table 2 and the retail prices for several types of flooring reported earlier, the total retail value of hard flooring sales in 2023 is an estimated \$17 billion.⁵⁵ This estimate does not account for discounted prices for contractors, nor does it include the cost of installation.

VI. Floor Coatings and Treatments

Floor finish products include paints, finishes, and coatings that are applied to the floor covering product as final step in manufacturing process or as treatments to existing home products. As aftermarket products, floor paints and coatings can be used to

⁵³ Emrath, Paul. March 14, 2019. Special Studies: Spaces in New Homes. National Association of Home Builders, url: <https://www.nahb.org/-/media/224EC507D1B94735B1BDBC6C39B1E8E6.ashx#>

⁵⁴ From the National Association of Home Builders 2019 report, 6.14 million sqft of new home construction / 275 sqft per room ≈ 22 million rooms constructed.

⁵⁵ 6.2 million sqft of hard flooring sold x \$2.42 retail price per sqft (2014) ≈ \$17 billion in 2023 retail sales.

resurface and retouch the original floor covering as well as to fill in cracks. The petition could change the COF values for in-use floors and as uncoated products. Floor paints, finishes, and coatings are sold at retailers in quart and gallon sizes. Staff does not have readily available information about the market for floor coating and treatment products.

VII. Floor Cleaning Products

The current petition requested that CPSC require manufacturers of chemical floor cleaners and treatments (commercial and residential grade) to test their products in accordance with NFSI B101.2, *Test Method for Determining the Impact on Wet Coefficients of Friction of Various Chemical or Physical Walkway Surface Cleaners and Treatments on Common Hard-Surface Flooring Materials*. Additionally, the Petitioner asked that CPSC require these products to be labeled in accordance with NFSI B101.5 *Standard Guide for Uniform Labeling Method for Identifying the Wet Dynamic Coefficient of Friction (Traction) of Floor Coverings, Floor Coatings, Treatments, Commercial and Residential Floor Chemical Agents, and Consumer Footwear*.⁵⁶

Staff found market information on the household cleaner market from readily available sources.⁵⁷ In 2022, sales for in-scope cleaner products were \$2.4 billion. This includes: \$1.7 billion, from 391 million units of *All-purpose cleaner/Disinfectant* sold at an implied price of \$4.36; \$459 million from 104 million units of *Nonabrasive tub/tile cleaner* sold at an implied price of \$4.40; \$118 million from 17.5 million units of *Specialty cleaner/Polish* sold at an implied price of \$6.74; \$113 million from 54.5 million units of *Abrasive tub/Tile cleaner* sold at an implied price of \$2.07; and \$43 million from 7.7 million units of *Lime/Rust remover* sold at an implied price of \$5.55.

Staff conducted an internet search and found 40 unique brands of floor cleaner.⁵⁸ Some firms may own multiple brands, therefore there are likely less than 40 firms serving the majority of the market. Some brands are specific to particular floor cleaning devices. This could indicate that the cleaner brands are private labels that the device firms outsource for their device.

⁵⁶ For more information see: <https://www.regulations.gov/document/CPSC-2024-0003-0002>

⁵⁷ Information on the US cleaning products market comes from "Cleaning products industry in the U.S.", Statista, accessed August 2024

⁵⁸ Staff searched Amazon for "floor cleaner" and filtered the results by unique brand.

VIII. Footwear

According to Statista's Market Insights report⁵⁹ on Footwear, in 2022 the U.S. footwear market was valued at \$85.8 billion. The average revenue per capita,⁶⁰ was \$256.40 with a volume per capita of 5.4 pairs. This implies an average footwear retail price of \$47.48. The market segments from the data source are Sneakers, Athletic footwear, Leather footwear, and Textile & Other footwear.

According to Statista the volume of U.S. Sneaker sales in 2022 was estimated at 0.4 billion pairs with about \$21.6 billion in revenue in 2022. The average revenue per user was \$64.50. The Athletic footwear segment was an estimated \$14.5 billion in 2022 with 112.3 million pairs sold. The value of the U.S. Leather footwear segment in 2022 was estimated at \$23.7 billion but staff has no information on the volume of units sold. The Textile & Other footwear revenue per user in the U.S. is an estimated \$78, with 3.1 pairs per capita sold and a price per unit of \$25.

According to the Statista report, the three key footwear manufacturers selling in the U.S. market are Nike, Puma, and Adidas.⁶¹ An internet search of U.S. footwear manufacturers yielded another 19 firms, five of which are large firms.⁶² In total, Staff estimates that there are at least 22 firms producing footwear for the U.S. market.⁶³ Eight of these firms are large while 14 are small or of unknown size. Staff does not have good information on how many other firms may produce shoes outside of their primary line of business.

IX. Societal Cost of Injuries

Staff conducted an analysis of the societal cost of injuries based on readily available information from the Petitioner, public comments, and previous briefing packages. Staff examined narratives of data from emergency departments (ED) that treated injuries and deaths, and submitted public comments. Staff concluded that accurately estimating the societal costs, and thus potential benefits, would be difficult because there is not enough information about the slip-resistance of the products associated with the injuries. Likewise, there is no data on the degrees of slip-resistance for flooring currently installed to which consumers are currently exposed. Without this information as

⁵⁹ Information on the US Footwear market comes from Akin, Mine, "Footwear: market data analysis & forecast", Market Insights report, *Statista*, August 2023.

⁶⁰ Total revenue from U.S. footwear sales divided by the total U.S. population.

⁶¹ Note that there are other much smaller firms producing consumer footwear in the U.S. market however Nike, Puma, and Adidas dominate the footwear market,

⁶² See <https://www.allamericanmade.com/shoes-made-in-usa/>

⁶³ Staff conducted an internet search of shoe manufacturers and found an article detailing 20 companies manufacturing shoes in the U.S. (<https://www.allamericanmade.com/shoes-made-in-usa/>). Staff searched for firm size information on their respective websites and PitchBook.

reference points, staff cannot estimate the reduction in injuries, and therefore societal cost.

Additionally, neither the Petitioner nor commenters have provided CPSC with data supporting the role of dynamic friction coefficient in slips and whether labeling or packaging flooring products with such information would prevent slips. Staff would ideally have this information to measure the potential benefits from mitigating societal costs of injuries from low slip-resistant flooring.

However, staff has constructed estimates which show societal cost of non-fatal slips associated with floor coverings between 2020 and 2022. This would represent the maximal societal cost savings of any potential intervention; however, any rulemaking action would almost certainly be addressed to only a portion of this maximal amount.

Staff found NEISS reported annual injuries of 201,213 and another 352,084 injuries treated annually outside of the emergency department.⁶⁴ Each injury on average costs society \$67,362, largely due to hospitalization and pain and suffering. Total injury costs sum to \$37.3 billion.⁶⁵ The breakdown of total costs includes: \$4.2 billion in *Medical Costs*;⁶⁶ \$6.0 billion in *Work Loss*,⁶⁷ and \$27.1 billion in *Pain and Suffering*.⁶⁸

Table 3: Cost of Medically Treated Non-Fatal Injuries by Cost Component and Treatment Location (3 percent discount rate) for 2020-2022

Place of Treatment	National Estimate	Medical Cost	Work Loss	Pain and Suffering	Average Total Cost	Total Cost
Doctor I Clinic	339,718	\$ 1,169	\$ 4,025	\$ 22,419	\$ 27,612	\$9,381M
Emergency Department	161,775	\$ 4,272	\$ 3,413	\$ 43,865	\$ 51,550	\$8,340M
Hospital-Adm Direct	12,366	\$ 56,304	\$ 77,528	\$ 218,901	\$ 352,733	\$4,362M

⁶⁴ Other treatment locations include doctors' offices, clinics, and outpatient service centers as wells hospitals via direct admission.

⁶⁵ Injury cost dollar figures are reported in 2024 dollars.

⁶⁶ Medical costs include three categories of expenditures: (1) medical and hospital costs, (2) ancillary costs e.g. prescriptions, medical equipment, and ambulance transport, and (3) costs of health insurance claims processing.

⁶⁷ Work loss estimates include: (1) the forgone earnings of the victim,(2) the forgone earnings of parents and visitors (3) Imputed long-term work losses of the victim that would be associated with permanent impairment; and (4) employer productivity.

⁶⁸ Pain and Suffering costs include the intangible costs of injury and reflect the physical and emotional trauma of injury, as well as the mental anguish of victims and caregivers.

Hospital-Adm via ED	39,438	\$ 60,143	\$ 79,513	\$ 245,475	\$ 385,132	\$15,189M
AVERAGE		\$ 7,512	\$ 10,869	\$ 48,980	\$ 67,362	.
TOTAL	553,297	\$4,156M	\$6,014M	\$27,100M	.	\$37,271M

The maximal societal cost of fatal slips associated with floor coverings is \$77.8 million (6 fatalities × \$12.97M VSL).⁶⁹ Note that EC uses a VSL of \$12.97 million.⁷⁰

Although there were six fatalities⁷¹ and 201,213 ED-treated injuries annually from 2020 through 2022 associated with slips,⁷² it is unlikely that all of the deaths and injuries involving slips would have occurred on floors with low slip-resistance.

X. References

ANSI B101.5-2023 Standard Guide for Uniform Labeling Method for Identifying the Wet Static and Wet Dynamic Coefficient of Friction (Traction) of Floor Coverings, Floor Coverings with Coatings, and Treated Floor Coverings.

ANSI A137.1– 2012 American National Standard for Ceramic Tile.

ASTM D2047– 2011 Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.

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The Freedonia Group. 2015. *Industry Study #3284: Hard Surface Flooring*. April 2015. NFSI B101.1-2009 Test Method for Measuring West SCOF of Common Hard-Surface Floor Materials.

⁶⁹ VSL stands for the value of a statistical life which is defined as amount of money that people are willing to pay for a small reduction in mortality.

⁷⁰ For this analysis, staff applied estimates of the VSL developed by the U.S. Department of Health and Human Services (HHS). The HHS VSL is currently about \$12 million dollars.

⁷¹ Note that the number of in-scope incidents in CPSRMS are expectedly lower than for the period from 2012–2014, when more fall-related death certificates were being purchased and should therefore be viewed as the minimum number known to CPSC. See [EPI TAB] for more detail.

⁷² Memorandum from Tuan Lam, Directorate for Epidemiology, dated October 22, 2024, Subject: Estimated Number of Injuries and Reported Incidents Associated with Slipping on Floors, 2020-2022.

NFSI B101.3-2020 Test Method for Measuring Wet COF of Common Hard-Surface Floor Materials (Including Action and Limit Thresholds for the Suitable Assessment of Measured Values). 2016. *Resilient Floor Covering Institute*. <http://rfci.com/about-us/>.

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Tab E: CPSC recalls involving the slip resistance of floor coverings, floor cleaning agents, and footwear from 2019 to 2023



United States

Consumer Product Safety Commission

Memorandum

TO: Brad Gordon, Project Manager
Division of Mechanical and Combustion Engineering
Directorate for Engineering Sciences

DATE: October 23, 2024

THROUGH: Jennifer Sultan
Office of Compliance

FROM: Blake Rose,
Office of Compliance

SUBJECT: CPSC recalls involving the slip resistance of floor coverings, floor cleaning agents, and footwear from 2019 to 2023

This memorandum was prepared in response to a request from the Project Manager for CP 24-1 which requests that the U.S. Consumer Product Safety Commission (CPSC) initiate rulemaking under the Consumer Product Safety Act (CPSA) to require that:

(A) manufacturers of commercial and residential grade floor coverings and coatings uniformly test their products' slip-resistance (Traction level) per the NFSI B101.3-2022 *Test Method for Measuring the Wet Dynamic Coefficient of Friction of Hard-Surface Walkways* and label them per the NFSI B101.5-2023 *Standard Guide for Uniform Labeling Method for Identifying the Wet Dynamic Coefficient of Friction (Traction) of Floor Coverings, Floor Coatings, Treatments, Commercial and Residential Floor Chemical Agents, and Consumer Footwear*;

(B) manufacturers of commercial and residential grade chemical floor cleaners and treatments uniformly test their products' slip-resistance (Traction level) per the NFSI B101.2-2020 *Test Method for Determining the Impact on Wet Coefficients of Friction of Various Chemical or Physical Walkway Surface Cleaners and Treatments on Common Hard-Surface Flooring Materials* and label their products per the NFSI B101.5-2023 *Standard Guide for Uniform Labeling Method for Identifying the Wet Dynamic Coefficient of Friction (Traction) of Floor Coverings, Floor Coatings, Treatments, Commercial and Residential Floor Chemical Agents, and Consumer Footwear*;

(C) manufacturers of footwear uniformly test their products' outsoles slip-resistance (Traction level) per the NFSI B101.7-2021 *Standard Test Method for Lab Measurement of Footwear Heel Outsole Material Coefficient of Friction on Liquid-Contaminated Floor Surfaces* and label them per the NFSI B101.5-2023 *Standard Guide for Uniform Labeling Method for Identifying the Wet Dynamic Coefficient of Friction (Traction) of Floor Coverings, Floor Coatings, Treatments, Commercial and Residential Floor Chemical Agents, and Consumer Footwear*.

The Office of Compliance and Field Operations staff reviewed recall data between 2019 and 2024, and found no instances of Compliance action on flooring, floor coverings and coatings, floor cleaners, floor treatments or footwear related to slip and fall hazards.

Tab F: Response to Comments Received on Petition



Memorandum

TO: Flooring Petition File

THROUGH: Mark Kumagai, Associate Executive Director
Directorate for Engineering Sciences

FROM: Brad Gordon, Project Manager
Directorate for Engineering Sciences

SUBJECT: Response to Comments

DATE: October 23, 2024

I. Introduction

CPSC published a request for comments on the floor coverings petition (CP 24-1, or the 2024 petition) in the *Federal Register* on January 22, 2024, with the comment period ending on April 22, 2024.⁷³ The Commission received 90 comments,⁷⁴ with support and opposition for the petition divided among the comments.

Topics raised by the commenters included:

- Whether the 2024 petition did or did not address the Commission's concerns with the 2016 petition (CP 16-1) and the 2018 petition (CP 18-2),
- How the petition proposal would impact consumer safety,
- Commenters' opinions on existing standards,
- The existence of multiple contributing factors to slips and falls and fall-related injuries,
- Costs and benefits associated with the petition proposal,
- Potential conflict of interest, and
- Additional considerations for enhancing flooring safety.

Generally, supporters of the petition expressed interest in a reliable, easy to read labeling scheme that would inform consumers about a floor's slipperiness at the point-of-sale, thereby allowing consumers to make more informed choices for a specific flooring situation and improving floor safety. Opposition to the petition focused mostly on technical concerns with the test methods, instrumentation, and labeling. These commenters raised a concern that consumers may be left with a false sense of security which could negatively impact flooring safety. In some cases, commenters agreed that

⁷³ 89 *Fed. Reg.* 3914–15 (Jan. 22, 2024).

⁷⁴ Petition Requesting Rulemaking to Mandate Testing and Labeling Regarding Slip Resistance of Flooring, Floor Coatings and Treatments, Floor Cleaning Agents, and Footwear, Regulations.gov, available at, <https://www.regulations.gov/document/CPSC-2024-0003-0002/comment>. (last visited Oct. 2, 2024).

slips and falls should be addressed in some way—but did not agree with the petition’s proposal.

Below is a summary of the comments as well as CPSC staff’s responses.

II. Comments Received and Staff’s Responses

(A) CP 24-1 Does Not Address Staff’s Concerns

Comment 1: Several commenters⁷⁵ stated that CP 24-1 does not address CPSC staff’s concerns raised in response to CP 16-1 and CP 18-2. Numerous commenters conveyed that CP 24-1 fails to provide evidence that the proposed changes would result in a reduction in the number of slips and falls.

Response 1: As discussed elsewhere in this briefing package, staff concludes that the concerns leading to denial of petitions CP 16-1 and CP 18-2 have not adequately been addressed by the 2024 petition. Except for specifying the latest versions of standards that were referenced in past petitions and expanding the scope to include floor cleaning agents and footwear, the 2024 petition presents neither substantive changes to the proposals in CP 16-1 and CP 18-2, nor persuasive supporting evidence for the proposed standards. The underlying reasons CPSC staff recommended denial (inconsistent coefficient of friction (COF) measurement and lack of correlation between COF and slips/falls) have not been addressed.

(B) Impacts on Consumer Safety

Comment 2: Commenters were divided in opinion regarding how the proposed testing and labeling would affect the likelihood of slips and falls and fall-related injuries. Many commenters stated that the proposed standards, or other mandatory testing and labeling standards for flooring would provide a common-sense and low-cost approach to reducing slips and falls.⁷⁶ Many commenters believed that the proposed standards would better inform consumers and design professionals, resulting in the selection of safer flooring materials and a reduction in injuries and deaths from falling. Some commenters stated that such labeling may create pressure in the market for manufacturers to make safer floors.

⁷⁵ Tile Council of North America, Inc.; Ceramic Tile Distributors Association; Household and Commercial Products Association; and Saf-Gard Safety Shoe Company.

⁷⁶ Safer Walkways Association, Rob McNealy, Dan Wagner, etc.

Response 2: CPSC staff agrees that consumers potentially could benefit from being able to compare the slip resistance of hard flooring materials at the point-of-sale; however, the test method for slip resistance would need to be reliable and valid. Based on the published research, different devices for measuring slip resistance of various surface combinations yield different COF measurements for the same flooring surface. Therefore, the value obtained from a given tribometer may not accurately represent the user's risk of slipping, and even less so in wet conditions. Furthermore, a label based on the floor's COF is unlikely to provide accurate and reliable information. Finally, the label could provide a false sense of security because COF is only one of many factors involved in slip-and-fall incidents.

Comment 3: Numerous commenters⁷⁷ stated that the proposed standards would adversely impact consumer safety by misleading consumers with inaccurate information. Commenters noted that another potential consequence is that consumers would rely solely on the proposed inaccurate information, at the expense of considering other information critical to selecting the most appropriate flooring for a given application.

Response 3: Although the Petitioner claimed that the current label/symbol was tested for comprehension, the Petitioner did not provide any information indicating that the symbol was tested, or how it was tested if testing did occur. A label as proposed by the Petitioner is unlikely to provide accurate and reliable information for the reasons given in response to Comment 2. Furthermore, the label may provide a false sense of security because traction of the products is only one of many factors involved in slip-and-fall incidents. Factors related to the user, product, and environment also play a role in these incidents. Staff raised these concerns in response to the 2016 and the 2018 petitions. However, the Petitioner provided no new evidence that would persuade staff to believe that labeling the products' COF is likely to be effective in reducing slips and falls.

Comment 4: Commenters raised procedural concerns, such as: the lack of accreditation and evidence supporting the proposed testing and labeling standards, and that the proposed standards were not developed by a voluntary consensus standard body.

Response 4: Staff concludes no reason to believe that accreditation by any particular organization is necessary for a standard to be valid. Additionally, even if NFSI's standards were not developed by a voluntary consensus standard body, staff concludes that there is no good reason to immediately discard these standards based on that factor alone—especially given that that NFSI's current B101 standards are substantially

⁷⁷ W Mootz_ Standards, Armen Alajian, Tingley Rubber Corporation, etc.

the same as their ANSI-accredited counterparts cited in CP 18-2 (see Tab B of this briefing package). With these findings in mind, staff concludes the commenters' concerns unpersuasive.

(C) Commenters' Opinions on Existing Standards

Comment 5: Commenters⁷⁸ were divided in opinion as to whether the B101 standards referenced in CP 24-1 are valid. Several commenters in favor of CP 24-1 conveyed that these standards were reliable. In particular, Impact General Inc. commented that the GS-1 tribometer provides unparalleled accuracy in measuring COF. Numerous commenters were concerned that there are technical issues with the B101 standards, including issues with different tribometers obtaining different values of COF for the same material, that certain tribometers used in the B101 standard (such as the BOT-3000) are unreliable, and that ANSI A326.3 is a better standard for assessing flooring safety.

Response 5: Staff agrees that there are limitations to the accuracy of tribometer measurements. If a measurement technique cannot be expected to accurately measure all hard flooring surfaces within scope, consumers cannot depend on the label to inform them about the correct flooring to choose for a given application. The Petitioner's request to use the latest version of the B101.3 and B101.5 standards fails to provide new evidence which addresses the Commission's reasons for denial of CP 16-1 and CP 18-2: in terms of consistent/accurate COF measurement and correlation of that measurement to risk of slips/falls.

Comment 6: Some commenters⁷⁹ suggested that ANSI A326.3 is a better standard for assessing slip resistance than the NFSI B101.3 standard.

Response 6: Multiple standards exist for testing flooring slip resistance. These standards can vary in interpretation and determination of flooring slip-resistance values. Staff cannot comment on the appropriateness of other standards because this type of evaluation is not within the scope of staff's review of CP 24-1. However, staff did find that the ANSI A326.3 standard recites the following with regards to the factors which affect slips: "There are many factors that affect the possibility of a slip occurring on a surface, including, by way of example, but not in limitation, the following: the material of the shoe sole and the degree of its wear; the presence and nature of surface contaminants; the speed and length of stride at the time of a slip; the physical and mental condition of the individual at the time of a slip; whether the floor is flat or inclined;

⁷⁸ Schluter Systems, Armen Alajian, Peter Townsend, Merola Tile, etc.

⁷⁹ Yves Lafortune, Scott Moore, Dal-Tile, Merola Tile, etc.

how the hard surface flooring material is used and maintained; and the DCOF of the material, how the flooring surface is structured, and how drainage takes place if liquids are involved.”⁸⁰

Comment 7: Some commenters⁸¹ stated that there are existing standards in place for some flooring types, and they added that in some cases, COF is already communicated to consumers.

Response 7: Staff is aware that some manufacturers provide information regarding COF measurements and use guidance. For example, American Wonder Porcelain, Florida Tile, and Atlas Concorde include DCOF information with their flooring products, measured in accordance with the ANSI A326.3 standard. In some instances, these manufacturers list intended uses based on the measured DCOF.⁸² According to commenters, manufacturers report information specific to a type of hard surface flooring or use scenario. Staff is unaware of how many flooring industry sectors and manufacturers provide slip-resistance information, and likewise is not aware of any manufacturer who relate COF values directly to the risk of slips and falls on a given hard surface flooring. Staff also has not seen any evidence that existing information regarding COF measurements has had any impact on slip and fall hazards.

Comment 8: The Resilient Floor Covering Institute noted that the Occupational Safety and Health Administration (OSHA) and guidelines under the Americans with Disabilities Act (ADA) have not established mandatory standards for slipperiness due to the difficulty of accurately measuring the slip resistance of floors.

Response 8: The ADA Standards for floor and ground surface explain that standards do not specify a minimum level of slip resistance (i.e., a COF) because no consensus method exists for rating slip resistance.⁸³ OSHA released a final rule to update the general industry walking-working surfaces and fall-protection standards.⁸⁴ The OSHA floor safety rule does not address COF. The final rule states that the requirements expected to yield the largest benefits from preventing falls on the same level are found

⁸⁰ A326.3-2021, American National Standard Test Method for Measuring Dynamic Coefficient of Friction of Hard Surface Materials, 1.

⁸¹ Scott Moore, Dal-Tile, etc.

⁸² See, e.g., Product Use Classifications, FloridaTile.com, *available at*, <https://www.floridatile.com/productuseclassifications/> (showing tile classifications (interior, dry; interior, wet; etc.) based on measured DCOFs) (last visited Oct. 2, 2024).

⁸³ <https://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-ada-standards/guide-to-the-ada-standards/chapter-3-floor-and-ground-surfaces>

⁸⁴ 29 C.F.R. Part 1910 [Docket No. OSHA-2007-0072] Walking-Working Surfaces and Personal Protective Equipment (Fall Protection Systems)

in § 1910.22 General Requirements, which addresses proper maintenance of the surface conditions, maximum loading, access and egress, and inspection, maintenance, and repair processes.

(D) Multiple Contributing Factors to Slips, Falls, and Fall-Related Injuries

Comment 9: Many commenters⁸⁵ stated that the slip resistance of installed hard flooring cannot adequately be captured by a point-of-sale flooring COF value because numerous factors contribute to slips and falls. Commenters listed contributing factors related to flooring, such as: post-installation coatings or finishes, surface contamination, care products, wear, and installation issues. Commenters listed non-flooring factors as well, such as: footwear, human locomotion, unsteady gait or other impairments, and area lighting. Because these factors might not be captured in the proposed label, commenters expressed concern that the proposed slip-resistance label would give consumers a false sense of security in the safety of hard flooring products. Many commenters felt that these other factors: (1) contribute more to the likelihood of slipping and falling than point-of-sale flooring COF values; and (2) make determinations about real-world slip resistance a very difficult and complicated task. Additionally, several commenters pointed out that COF can change over time with wear and, thus, point-of-sale COF can give consumers a false sense of safety as their flooring products degrade with use.

Response 9: Staff agrees that numerous factors can affect the likelihood of slips and falls and fall-related injuries beyond the point-of-sale slip-resistance values for flooring, cleaning agents, and footwear.. Additionally, CP 24-1 fails to provide evidence that COF is a useful standalone metric for predicting slips and falls. Additionally, in the CP 16-1 Staff Briefing Package, staff reported that two main contributing factors beyond the point-of-sale flooring slip-resistance value: health issues, such as muscle weakness, poor vision, difficulties with keeping balance, or taking medications; and environmental factors, such as type of footwear, dirt or oil contamination of the flooring surface, and poor lighting. Furthermore, CP 18-2 cites reports from Chang, WR, Falls Prevention, LLC, and the CNA Insurance Company, which indicate that factors such as after-sale finishes, maintenance, or contamination can contribute to slips and falls.

⁸⁵ Florim USA; Mannington Mills, Inc.; Tile Council of North America, Inc.; etc.

(E) Costs and Benefits of the Petition Proposal

Comment 10: Commenters⁸⁶ were divided on whether the petition proposal would yield benefits. Numerous supporters of the petition commented that the proposal would yield benefits by: (1) reducing healthcare/medical costs; (2) reducing legal costs; (3) lowering insurance costs; and (4) reducing the cost of fall-related injuries and death. Several commenters believed that the proposal would increase sales for manufacturers and incentivize manufacturers to make flooring products with higher wet COF as well as better footwear. Several manufacturers commented that the proposed changes would be overly burdensome to manufacturers and consumers resulting in increased prices for footwear and flooring products. Several commenters stated that the proposed changes could expose manufacturers to unnecessary legal costs (e.g., litigation).

Response 10: Neither the Petitioner nor commenters have provided CPSC with data supporting the correlation of dynamic friction coefficient and risk of slips and whether labeling or packaging flooring products with such information would prevent slips. Staff's determination of the potential costs might require a survey of manufacturers to determine if and how they currently test the slip resistance of their products and the difference between the cost of the methods that they currently use and the cost of the method proposed in the petition. To estimate the potential benefits of labeling flooring for slip resistance, staff requires information on the proportion of injuries resulting from slips, and the slip resistance of the floors on which the falls occurred; information on the exposure of consumers to floors with different coefficients of friction; and information on the impact that labeling would have on the purchase decisions of consumers. Obtaining this information would require a significant investment of time and resources. The information is not necessary for staff to provide a recommendation on disposition of the petition.

(F) Potential Conflict of Interest

Comment 11: Several commenters⁸⁷ suggested that NFSI has a conflict of interest in the outcome of CP 24-1, identifying potential financial gains by the Petitioner. Commenters asserted that mandating these standards would give NFSI control over current and future devices to measure COF, as well as validation of such devices.

⁸⁶ For example, S Frontera, Safer Walkways Association, Leon Russell, and Dan Wagner are in favor of the petition; whereas Tingley Rubber Corporation, Vibram USA, Footwear Distributors & Retailers of America expressed dissent.

⁸⁷ Armen Alajian; Ceramic Tile Distributors Association; CED Technologies, Inc.; etc.

Response 11: Staff does not have sufficient information to evaluate these comments, and such an evaluation is not necessary to provide a staff recommendation on the petition.

(G) Additional Considerations for Enhancing Flooring Safety

Comment 12: The National Center for Health Research proposed that the CPSC and NFSI should include safety standards regarding exposure to endocrine disrupting chemicals (EDCs) and other potentially dangerous exposures for flooring.

Response 12: Staff concludes that the subject matter of this comment is not within scope of CP 24-1.