

This one-pager summarizes the MH review of the City of San Francisco's 2018 carpet regulation, point by point. Further information on each of the bullet points below can be obtained by reading the

corresponding section in the full MH Review document. See the other side of this page for a useful diagram of hazards in carpet by Healthy Building Network (HBN).

MH REGULATION RESPONSE SUMMARY + ACTION TAKE-AWAYS

In the following list of the SF Approved regulation points, the items already addressed on MH's sustainability and design policies are

identified in ✓ grey. The other items are not yet officially incorporated into the Miller Hull Partnership (MH)'s own practices.

- **Carpet tile only** - no broadloom (rolled) carpet
Carpet tiles allow for easy replacement and minimize waste in comparison with broadloom carpet¹.
→ **Ask for carpet tile, avoid broadloom in commercial projects**
- ✓ **Cradle to Cradle Silver certification**
Includes a long list of prohibited chemicals, limits on VOCs, and requirements for sustainable lifecycle performance².
→ **Ask for carpet certified at least C2C Silver**
- **No poly- or perfluorinated (PFAS) compounds**
PFAS substances are associated with cancer, high cholesterol, and obesity, and can migrate out of products³.
→ **Ask for carpet with no stain-resistant chemicals**
- **45% recycled content. 10% post-consumer minimum**
Post-consumer recycled content diverts waste from landfills more than pre-consumer does⁴. Some typical recycled content used in carpet may be hazardous.
→ **Ask about the source of the recycled content in both backing and fiber and clarify potential hazard(s)**
- **No flame retardants**
Flame retardants do little, if anything, to slow or prevent fire⁵. They are also associated with cancer⁶, lower intelligence quotient (IQ)⁷, and reproductive harm⁸.
→ **Ask for carpet with no flame retardants**
- ✓ **No antimicrobials**
Antimicrobial chemicals are not necessary, and they make bacteria resistant to antibiotics and disrupt our hormones⁹.
→ **Ask for carpet with no antimicrobials**
- ✓ **Strict volatile organic compound (VOC) limitations**
Carpets must Meet Carpet and Rug Institute (CRI) Green Label Plus certification or any certifications in compliance with CDPH/EHLB Standard Method v1.1 or California Specification 01350¹⁰.
→ **Ask for carpet certified CRI Green Label Plus**
- ✓ **Transparency requirements: Environmental Product Declarations (EPDs), Health Product Declarations (HPDs)**
EPDs, HPDs, and Declare products must share all ingredients above 1,000 ppm. It is worth noting that being transparent and

not being hazardous are not the same thing.

→ **Ask for carpet with both EPDs and HPDs or Declare**

✓ **No polyvinyl chloride (PVC)**

PVC is associated with cancer, reproductive problems, and nerve disorders, and when PVC is made or disposed it releases cancer-causing dioxins¹¹.

→ **Ask for carpet with no PVC, not in fiber nor backing**

• **No coal fly ash**

Branded as "recycled content," coal fly ash is a byproduct of pollution control devices on coal-fired power plants, and contains mercury and other heavy metals like lead and arsenic¹². Other recycled content in carpet backing is also potentially hazardous, including SBR and vinyl.

→ **Ask about the source of recycled content in carpet backing and clarify potential hazard(s) before specification**

• **No polyurethane**

Uncured polyurethane off-gases hazardous isocyanates¹³. It is also flammable without the application of flame retardants.

→ **Make sure that any polyurethane used is 100% cured, and ask about flame retardants and occupational safety**

• **No styrene butadiene latex**

There is a correlation between SBR and cancer¹⁴. However, SBR alternatives are also questionable.

→ **Ask for carpet with no SBR and no vinyl acetate, and ask what material is used as the carpet textile back coating**

• **Requirements for fiber and dyeing (to make stain-resistant treatments less important)**

Solution-dyed fiber is inherently more stain resistant¹⁵, and the process saves energy and water over other dyeing methods¹⁶.

→ **If carpet fiber is synthetic, ask for solution-dyed**

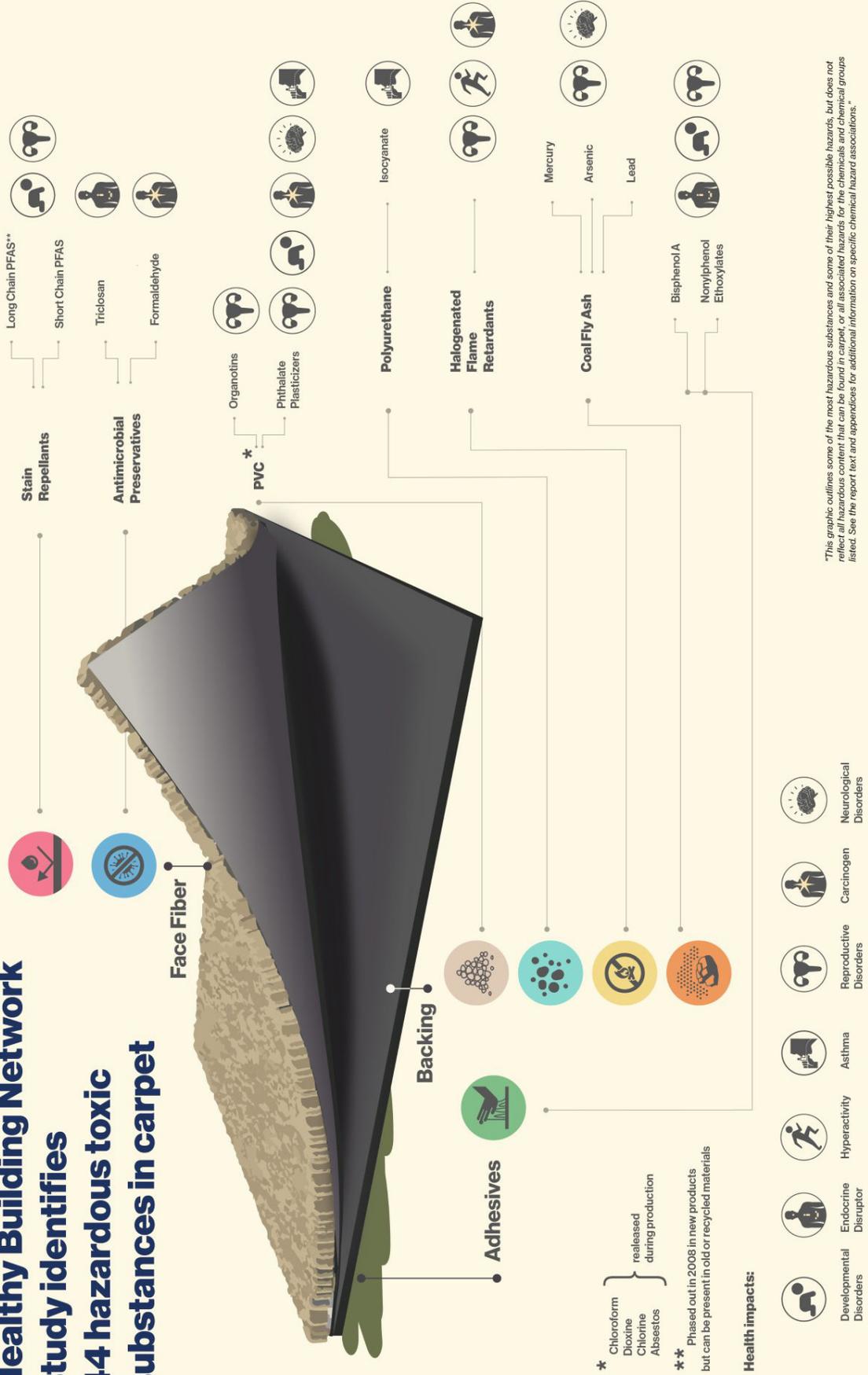
• **Certification requirements for adhesives**

Certifications focus on keeping VOC emissions from carpet adhesive low by avoiding the most toxic chemicals.

→ **Ask for carpet that is certified CRI Green Label Plus and/or CDPH/EHLB Standard Method v1.1 and/or California Specification 01350 compliant and/or C2C Bronze certified and/or (SCAQMD) Rule 1168 (2005) compliant**

DIAGRAM BY HEALTHY BUILDING NETWORK

Healthy Building Network study identifies 44 hazardous toxic substances in carpet



MH REVIEW: San Francisco Carpet Regulations 2018

THE MILLER HULL PARTNERSHIP, LLP



SF APPROVED

Use less, buy the right thing

Carpet tile only - no broadloom (rolled) carpet except for specific situations • **Cradle to Cradle Silver** certification (includes prohibition on many, not all, chemicals of concern) • No ~~poly- or perfluorinated compounds (PFAS)~~ • **45% recycled content, 10% post-consumer minimum** • No ~~flame retardants~~ • No ~~antimicrobials~~ • Strict ~~Volatile Organic Compound (VOC)~~ limitations • **Transparency requirements:** Environmental Product Declarations (**EPDs**), Health Product Declarations (**HPDs**) • No ~~polyvinyl chloride (PVC)~~ • No ~~coal fly ash~~ • No ~~polyurethane~~ • No ~~styrene butadiene latex~~ • Requirements for fiber and dyeing (to make stain-resistant treatments less important)

INTRODUCTION

In pursuit of its goals to reduce waste and increase adoption of safer alternatives to harmful building products, San Francisco has established a regulation in 2018 that applies to carpet installed in city-funded projects like public schools, libraries, and government buildings. **San Francisco Department of the Environment developed the requirements of the regulation over a period of about two years based on various studies of the lifecycle health and environmental impact of carpet materials, and consultation with architects, manufacturers, and various certification bodies**¹⁸.

In this review, the Miller Hull Partnership (MH) has cross-referenced these regulations alongside the Miller Hull Partnership Red

List v1.0¹⁹ and Sustainability Action Plan 2017-2030 v1.0²⁰, both published in 2017, and clarified items appearing on the SF Approved list that are not covered in the MH documents. Each section in this document explains and reviews the corresponding point of the SF Approved regulation, with some sections going into more detail than others based on the topic.

The One Pager version of this document provides a summary of each point and the MH review, and indicates action items that MH employees can take to incorporate the principles behind these regulations into our Sustainability Action Plan.

REGULATION SUMMARY

In the following list, the items already addressed on MH's sustainability and design policies are in ✓ grey. The other items require

- **Carpet tile only** - no broadloom (rolled) carpet except for specific situations
- ✓ **Cradle to Cradle Silver certification** (includes prohibition on many, not all, chemicals of concern)
- **No poly- or perfluorinated (PFAS) compounds**
- **45% recycled content, 10% post-consumer minimum**
- **No flame retardants***
- ✓ **No antimicrobials**
- ✓ **Strict volatile organic compound (VOC) limitations**

According to the SF Approved database, which lists all products and services that meet the city's health and environmental requirements, there are currently only **four brands with products that meet all**

further explanation since they are not yet incorporated into MH's own practices.

- ✓ **Transparency requirements:** Environmental Product Declarations (EPDs), Health Product Declarations (HPDs)
- ✓ **No polyvinyl chloride (PVC)**
- **No coal fly ash**
- **No polyurethane**
- **No styrene butadiene latex**
- **Requirements for fiber and dyeing** (to make stain-resistant treatments less important)
- **Certification requirements for adhesives**

criteria included in the regulation: Shaw, Patcraft, Tandus, and Bentley¹⁷. When specifying **Bentley** carpets, the customer must specifically request that the carpet tiles be made with no coal fly ash.



* In accordance with MH's Red List v1.0, we vet specified products for halogenated flame retardants; this San Francisco regulation eliminates all flame retardants, halogenated and otherwise

CARPET TILE ONLY

According to the SF Approved regulation²¹, carpet tiles allow for easy replacement and minimize waste. The regulation states that the purchase of non-compliant products, including broadloom carpet and non-compliant hard-backed carpet tiles, is permitted only under the following circumstances:

- Area rugs;
- Patch replacements for existing carpet;
- Renovations that require replacement carpet of a specific thickness, where replacement carpet that both is the required thickness and meets the requirements of Item D, cannot reasonably be obtained;
- Carpet for historic spaces, where the San Francisco Historic Preservation Commission or some other public policy body must approve the carpet, and carpet that complies with the re-

quirements herein would necessarily fail to meet the standards of such a body.

All carpets must meet VOC requirements, regardless of waivers.



Carpet tiles²²



Broadloom carpet²³

→ **ACTION TAKE-AWAY:** *Ask for carpet tile, avoid broadloom in commercial projects*

CRADLE TO CRADLE SILVER

San Francisco's new carpet regulations require certification as Cradle-to-Cradle (C2C) Silver. San Francisco describes the reasons for this as being that C2C Silver "includes a longer list of prohibited chemicals, limits on volatile organic compounds (VOCs), and also carries requirements for materials reutilization, renewable energy and carbon management, water stewardship and social fairness"²⁴.

Products certified under C2C Version 2.1.1 or later with a Material Health score of Gold or Platinum, and products certified under Version 3.0 or Version 3.1 with a Material Health score of Bronze, Silver, Gold, or Platinum, are likely to comply with the Red List because they are inventoried to at least 100 ppm and because C2C uses a similar assessment protocol to the Red List.

The C2C Certified mark provides consumers, regulators, employees, and industry peers with validation of a manufacturer's adherence to the C2C requirements, which cover 1) Material Health, 2) Material Reutilization, 3) Renewable Energy, 4) Water Stewardship, and 5) Social Fairness. C2C Version 3.0 Silver Certification means that the certified product meets the following standards²⁵:

- The product is 100% characterized by its generic materials (e.g., aluminum, polyethylene, steel, etc.) and/or product categories and names (e.g., coatings).
- Identify the appropriate metabolism, either as a technical nutri-

ent or biological nutrient for the product and its components.

- The product does not contain any Banned List* chemicals above the relevant thresholds based on supplier declarations.
- The product has been at least 95% assessed (by weight) using ABC-X ratings. Externally Managed Components (EMCs) are considered assessed and contribute to the overall percentage of the product that has been assessed. Products that are entirely Biological Nutrients in nature (e.g., cosmetics, personal care, soaps, detergents, etc.) must be 100% assessed.
- The product contains no substances known or suspected to cause cancer, birth defects, genetic damage, or reproductive harm (CMRs) after the A, B, C, X assessment has been carried out.



*The Banned Lists contain those chemicals and substances that are banned for use in C2C Certified products as intentional inputs above

1000 ppm. These substances were selected for inclusion on the Banned Lists due to their tendency to accumulate in the biosphere and lead to irreversible negative human health effects. In addition, several substances were selected due to hazardous characteristics associated with their manufacture, use, and

→ ACTION TAKE-AWAY: Ask for carpet certified at least C2C Silver

PFAS SUBSTANCES

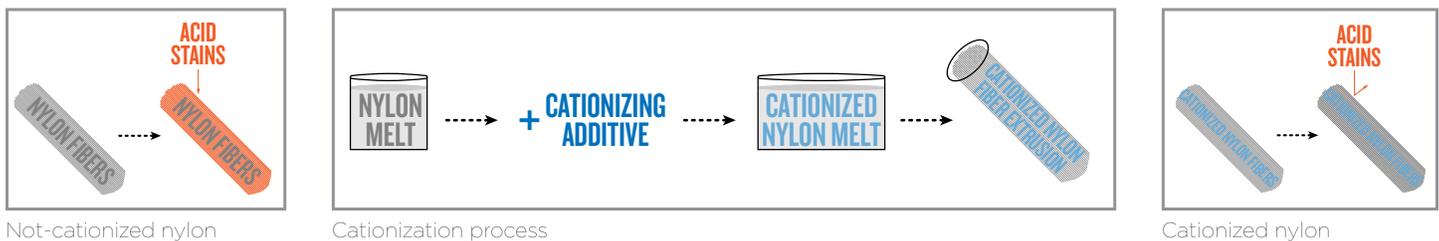
Per- and poly-fluoroalkyl substances (PFAS) are resistant to heat, water, and oil, and are typically used in carpet to provide stain resistance. These substances are banned in the new SF Approved regulation because they are associated with cancer, high cholesterol, and obesity. They have been found to migrate out of products and get into our air, dust, water, and bodies²⁷. San Francisco's regulation requires carpets to have cationic nylon yarn, types 6 or 6,6. This type of yarn is already soil stain resistant and does not require toxic fluorinated chemicals.

According to the SF Approved regulation, all fiber in carpet must be type 6 or 6,6 cationic nylon. Cationic yarn is yarn of any type (cotton,

disposal.

While C2C Silver Certification has third-party-verified standards for product ingredients and processes, there is no requirement of ingredient or process transparency.

nylon, other) that has been chemically modified to change its charge from negative to positive. Cationization is typically done in order to make the fiber receptive to basic dyes, which have a positive charge and can be applied to fiber at lower temperatures than other dyes. According to the SF Approved regulation, the cationic nylon must also be solution-dyed, so the dyeing benefits of cationizing fiber are moot in this context. However, the process of cationizing nylon has the side effect of making the fiber resistant to acid-based stains, because acid dyes have a negative charge. Cationic fiber attracts basic dyes and resists acid dyes. The most common type of food stains are acid stains²⁸, so cationic fiber is stain resistant without the application of toxic PFAS substances.



→ ACTION TAKE-AWAY: Ask for carpet with no stain-resistant chemicals

45% RECYCLED CONTENT, 10% POST-CONSUMER MINIMUM

SF Approved's new regulation requires that carpet tiles contain a minimum of 45% total recycled content, of which at least 10% must be post-consumer. The regulation does not differentiate between carpet fiber and carpet backing; rather the product as a whole must satisfy those minimums. This means that if a carpet backing satisfies the 45% and 10% levels, the fiber may be 100% new with 0% recycled content, and vice-versa.

What is the difference between recycled content and post-consumer recycled content? The term "post-consumer" indicates content made from waste that has been used by a consumer, disposed of,

and diverted from landfills. Examples of this are aluminum cans and newspapers that are collected in a curbside recycling bin²⁶. This post-consumer recycled content is different from pre-consumer recycled content, which is made from manufacturer waste that never actually made it to the consumer. Examples of this type of content are scraps, rejects, or trimmings, i.e., waste product that ends up on the factory floor and is re-purposed into something new rather than trashed. If the content is labeled "recycled content," without the qualifier of "post-consumer," it is usually pre-consumer recycled content. Some argue that pre-consumer recycled content does not really count as recycled, since manufacturers have a long practice of

and financial interest in reusing and re-purposing scrap materials. Post-consumer recycled content has greater value when it comes to

diverting waste from landfills.

→ **ACTION TAKE-AWAY:** *Ask about the source of the recycled content in both backing and fiber and clarify potential hazard(s)*

FLAME RETARDANTS

According to SF Approved, the ban on all flame retardants is part of this regulation because flame retardant chemicals “**do little, if anything, to slow or prevent fire**”²⁹. They also assert that the chemicals migrate out of products and escape into the air, dust, and human bodies³⁰. SF Approved also cites research showing that these chemicals are **associated with cancer**³¹, **lower intelligence quotient (IQ)**³², and **reproductive harm**³³.

How, then, do materials pass fire and smoke rating tests without the use of flame retardants? For the carpet backing, SF Approved has banned the use of polyurethane, a flammable material commonly used in carpet backing. As for the textile used in carpet, **it is possible for textiles to be Inherently Flame Retardant (IFR) or Durably Flame Retardant (DFR)**. These textiles are typically made of wool, but it is also possible to produce **a synthetic fiber that has been co-polymerized with an organophosphate flame retardant**.

→ **ACTION TAKE-AWAY:** *Ask for carpet with no flame retardants*

ANTIMICROBIAL CHEMICALS

FROM THE SF APPROVED SITE³⁶:

Antimicrobial chemicals are banned because they can make bacteria resistant to antibiotics and disrupt our hormones. It is not necessary for city department carpet to have antimicrobial chemicals.

→ **ACTION TAKE-AWAY:** *Ask for carpet with no antimicrobials*

VOC REQUIREMENTS

VOCs are defined by the California Standard Method for Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers as **carbon-containing compounds (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonates and ammonium carbonate) with vapor pressures at standard conditions approximately ranging between those for n-pentane through**

This flame retardant is chemically reacted into the polyester threads and therefore unlikely to migrate out of the textile in significant quantities³⁴.

The carpets that have been pre-approved by SF Approved are made up primarily of different proprietary types of solution-dyed nylon and polyester. Given their presence on the approved list, and the fact that nylon and polyester are typically flammable without the use of a flame retardant, it is possible that the fiber solution has a co-polymerized flame retardant, rendering the fiber IFR or DFR. With DFR nylon and polyester, there are chemical solvents that can alter the flame resistant properties of these fibers, but such chemicals do not usually come into contact with carpet in most applications³⁵. It is unclear at present whether or not the carpets approved by SF Approved use a co-polymerized flame retardant.

FROM MILLER HULL RED LIST V1.0³⁷:

Anti-microbial coatings are not needed and have more harmful human health effects.

n-heptadecane. Formaldehyde and acetaldehyde are considered to be VOCs³⁸.

In San Francisco, Carpet products must meet **Carpet and Rug Institute (CR1) Green Label Plus certification** or other certifications of compliance with the California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic

Chemical Emissions from Indoor Sources Using Environmental Chambers (AKA **CDPH/EHLB Standard Method v1.1 or California Specification 01350**).

CRI Green Label Plus is an independent testing program that identifies carpet, adhesives, and cushion with very low VOC emissions. Carpet products undergo a 14-day VOC testing process³⁹. CDPH/EHLB Standard Method v1.1 and California Specification 01350 provide

→ **ACTION TAKE-AWAY:** Ask for carpets certified CRI Green Label Plus

TRANSPARENCY REQUIREMENTS

The new SF Approved carpet regulations require that products provide **Environmental Product Declarations (EPDs)** and **Health Product Declarations (HPDs)**. HPDs must have carpet content characterized, screened, and inventoried to at least 1,000 ppm under v2.0 or newer. A Living Building Challenge (LBC) Compliant **Declare label** can be used in place of an HPD⁴², and requires that ingredients are disclosed to 100ppm.

An EPD is an **independently verified and registered document that communicates transparent and comparable information about the life-cycle environmental impact of products**⁴³.

An HPD is a **document that provides a full disclosure of the potential chemicals of concern in products** by comparing product ingredients to a set of priority “hazard” lists based on lists from organizations and government agencies⁴⁴.

A Declare label answers three questions: **1) Where does a product come from? 2) What is it made of? and 3) Where does it go at the end of its life?** The Declare label color-codes hazardous chem-

icals so that they stand out to the consumer, and it categorizes the product on three tiers: 1) “Declared,” 2) “LBC Compliant,” or 3) LBC Red List Free⁴⁵. **Third-party verification of both HPDs and the Declare label is not required**, though it is an option for manufacturers, and the label indicates whether or not it has been third-party verified.

Miller Hull’s **Red List v1.0**⁴¹ requires that there be no VOC off-gassing from wet-applied products, and none of the following six Red List chemicals: 1) PVC, 2) Halogenated Flame Retardants, 3) Hexavalent Chromium (Hex 6), 4) Phthalates, 5) Formaldehyde, 6) BPA.

In accordance with MH’s Sustainability Action Plan v1.0, **every MH project should have at least one Declare product**, and at least one additional product with a transparency label.

It is worth noting that **being transparent and not being hazardous are not the same thing**. A product could have any of the above declarations or labels and still contain toxic or hazardous materials; the declaration/label simply means that the manufacturer is being open and honest about the presence of those ingredients. The level that ingredients must be shared for EPDs, HPDs, and Declare is 1,000 ppm, so any ingredients, toxic or otherwise, that occur in quantities lower than 1,000 ppm would not need to be listed on any of these labels or declarations.



→ **ACTION TAKE-AWAY:** Ask for carpets with both EPDs and HPDs or Declare

POLYVINYL CHLORIDE (PVC)

FROM THE SF APPROVED SITE⁴⁶:

Polyvinyl chloride (PVC) is banned because it usually has phthalates (some of which disrupt our hormones and probably causes cancer), and sometimes it has lead (which can cause reproductive problems and nerve disorders), and when PVC is made or disposed, it releases cancer-causing dioxins.

→ **ACTION TAKE-AWAY:** *Ask for carpets with no PVC, not in fiber nor backing*

COAL FLY ASH

When “recycled content” credits became popular in the early 2000s, manufacturers filled carpet backings with coal fly ash, or coal ash. At the time, green building certifications rewarded recycled content regardless of the source and content of the waste. So what is coal ash? **Branded as “recycled content,” coal ash is actually a byproduct of pollution control devices on coal-fired power plants.** These devices transfer mercury and other heavy metals like lead and arsenic into coal ash. Despite the toxicity of coal ash, its designation as potential “recycled content” means that since the early 2000’s it has become a common filler material in carpet backing⁴⁸. Coal ash is used by manufacturers primarily to provide the overall recycled content of their carpet. Additionally, if industries are able to market coal fly ash as a material worthy of “beneficial reuse,” it reduces the cost of operating coal-fired power plants and also of hazardous waste disposal⁴⁹.

While a 2014 EPA report found that the use of coal ash in gypsum wallboard and concrete contains no hazard to human health, this conclusion is debatable⁵⁰, and the report did not consider coal ash in carpet backings. The report did not take into account release pathways such as dust from construction and demolition, and it did

→ **ACTION TAKE-AWAY:** *Ask about the source of recycled content in carpet backing and clarify potential hazard(s) before specification*

POLYURETHANE

Polyurethane foam is derived from petrochemicals, and is one of the most common synthetic fillings⁵⁵. Polyurethane is the result of the reaction between polyols (alcohols with multiple -OH groups) and diisocyanates. These two compounds come together to make long molecules consisting of urethane linkages that repeat over and over, resulting in poly (many) urethanes⁵⁶. Isocyanates are hazardous

FROM MILLER HULL RED LIST V1.0⁴⁷:

PVC’s many problems are outlined in detail in MH’s Red List v1.0, including its biocumulative toxins, inability to be recycled, and documented association with human health problems.

not consider the cumulative impact of incorporating coal ash and the toxic chemicals it contains into building interiors’ largest surface areas: floors, walls, and ceilings⁵¹.

Alternatives to coal fly ash used to increase recycled content in carpet backings are polyvinyl butyral (PVB), post-consumer styrene butadiene latex/rubber (SBR, an SF Approved banned substance), post-consumer vinyl carpet tile crumb and carpet fiber, and post-consumer glass and/or calcium carbonate residues derived from carpet recycling processes⁵². Of these alternatives, SBR and PVC are potentially as problematic as coal ash.



Coal ash pond spill near Wilmington, North Carolina⁵³



Close-up image of coal ash⁵⁴

air pollutants and known asthmagens⁵⁷, and occupational safety is an item of concern when it comes to handling the raw material that makes polyurethane. Isocyanates and other chemicals used in the polyurethane production process⁵⁸ can “off gas” from the polyurethane product when it is delivered to the consumer, but typically at levels far below those considered harmful⁵⁹ if the polyurethane is

completely cured. When fully-reacted or “cured,” polyurethane polymer is chemically inert and therefore nontoxic⁶⁰.

In carpet polyurethane is used as an ingredient in cushion-backed carpet backing. **The biggest problem for polyurethane in the context of the 2018 San Francisco Carpet Regulations is its high flammability⁶¹.** Additionally, the exposure of polyurethane to fire causes the release of significant amounts of various toxic products⁶². Polyurethane’s flammability makes it so that **it is common for manufacturers to apply a flame retardant to products containing polyurethane.** In California, a 2014 regulation made it so that polyurethane foam could meet fire safety standards without the use of flame retardants, though the regulation did not ban the use of flame retardants⁶³. If a carpet product contains polyurethane, designers should ask about 1) occupational safety in manufacturing, 2) the polyurethane curing process, and 3) whether, why, and how flame retardants are used in that product.

→ **ACTION TAKE-AWAY:** *Make sure that any polyurethane used is 100% cured, and ask about flame retardants and occupational safety*

STYRENE BUTADIENE LATEX

Styrene butadiene latex or rubber (SBR) is a synthetic rubber derived from the organic compound styrene and the industrial gas butadiene. In carpet, SBR is typically used as a back-coating on the textile in tufted carpets, holding the tufts in place while improving stability and reducing fraying at the edge⁷³.

Numerous studies^{74 75 76} have concluded that there is a correlation between SBR and cancer, most commonly leukemia.

Typically, in the carpet products approved by SF Approved’s new regulations, other petrochemicals are used in the place of SBR to perform its function. One example of an alternative chemical used is vinyl acetate. According to the Environmental Working Group (EWG)’s Skin Deep cosmetic database, which compares the ingredients on personal care product labels and websites to information in nearly 60 toxicity and regulatory databases, gives a hazard score of

→ **ACTION TAKE-AWAY:** *Ask for carpet with no SBR and no vinyl acetate, and ask what material is used as the textile back coating*

FIBER + DYEING PROCESS

There are many different ways to dye carpet fibers, but they can essentially be divided into two categories: solution dyeing, and all other



Visualizing the chemical reaction that results in polyurethane foam⁷²

A note about carpet backing:

The majority of carpets sold in the United States have “soft” or “cushion” backings, which are typically made of polypropylene, polyurethane, or other synthetic material. The carpet types that SF Approved has cleared for use are all hard-backed. While they do not use polyurethane, they still contain a variety of petrochemicals, including polyvinyl butyral (PVB) and polyolefin. Chlorine is the source of many of the concerns with PVC. Petrochemicals that do not contain chlorine tend to be classified as a lower hazard than PVC⁶⁴.

“Moderate hazard,” a 4/10, with a “Fair” amount of data⁷⁷. Vinyl acetate is classified by the EPA as “possibly carcinogenic to humans,” and while there is “inadequate evidence” for a classification as a human carcinogen, it is a “confirmed animal carcinogen with unknown relevance to humans”⁷⁸. Vinyl acetate would therefore be considered a “regrettable substitution”⁷⁹ to SBR, and it is not clear how much less hazardous the alternatives to SBR are than SBR itself.

The words “latex” and “rubber” have become generic labels, and they do not imply the presence of natural latex. 100% natural latex is not used in any of the SF Approved carpet options, and it is not clear that it could perform the desired function of SBR. 100% natural latex can be produced sustainably, but is not always. The locations of rubber tree plantations and of latex and rubber manufacture, and the certifications provided with 100% natural latex products, are meaningful in terms of determining the sustainability of the product⁸⁰.

methods⁶⁵. Non-solution-dyed fibers, both synthetic and natural, are produced or harvested in a grey/beige color called a “greige good.”

After fiber production, dye is applied to the fiber to add pigment. Dyeing processes are complex, involve various stages, and can involve heating water and adding various chemicals during the dyeing process to achieve different properties. Overall, however, the general idea is that pigment is applied to a greige-colored fiber.

Solution dyeing is different, and it only applies to synthetic fibers. Synthetic fibers exist in a liquid state before that liquid is forced through tiny holes called spinnerettes to create fibers⁶⁶. In solution dyeing, pigment is added to the molten polyester solution as it is being made into small plastic pellets. These pellets are then re-melted and extruded into fibers⁶⁷ through the spinnerettes. In this way, the pigment is integral to the fiber from the beginning.

SF Approved's new regulations require that all carpet fiber be solution-dyed, and solution-dyeing has several benefits. In the context of the SF approved regulations, **solution-dyed fiber is inherently more stain resistant, and therefore does not require additions of banned substances like PFAS and antimicrobial chemicals⁶⁸**. The SF Approved regulations also require that the fibers used in carpet be type 6 or 6,6 cationic nylon. This fiber type suffers from poor light-fastness when it is dyed after becoming fiber⁶⁹. If the type 6 or

→ **ACTION TAKE-AWAY: If carpet fiber is synthetic, ask for solution-dyed**

REQUIREMENTS FOR CARPET ADHESIVES

Carpet tile adhesives can be made from substances such as styrene butadiene latex/rubber (SBR) (an SF Approved banned substance), vinyl acetate (an SBR alternative that is also associated with health problems in humans), and other petrochemicals associated with health concerns. Many carpet tile adhesives are not Red List free, and it can be challenging to find a preferred product. The only carpet tile adhesives certified C2C Silver are the Shaw 5100 adhesive⁸³ and Tandus Centiva C-14E Pressure Sensitive Adhesive⁸⁴, both acrylic-based. The exact chemical ingredients of these products are not public. Mohawk Group's FlexLok tab system is Declare, HPD, and CRI Green Label certified.

Under the new SF Approved certification, all carpet tile adhesives must be certified **Carpet and Rug Institute (CRI) Green Label Plus**, and meet the California Department of Public Health (CDPH)/ Environmental Health Laboratory Branch Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers (AKA **CDPH/EHLB Standard Method v1.1 or California Specification 01350**).

6,6 cationic nylon obtains its pigment through solution dyeing rather than another method, light-fastness is improved⁷⁰.

While SF Approved touts the stain-resistance benefits of solution dyeing, the process has other environmental benefits. **Solution dyeing can save water and energy and reduce pollution compared with other dyeing processes**. Because dye is not being applied to fibers after-the-fact, the fibers do not need to go through the typically required soak, rinse, wash, addition of chemical agents, and heat cycles. During these eliminated processes, dyes and other chemicals can make their way into the local water supply⁷¹. With solution dyeing, these cycles are eliminated or dramatically reduced.



Synthetic fiber in pellet form⁸¹



Spinnerettes⁸²

CRI Green Label Plus is an independent testing program that identifies carpet, adhesives, and cushion with very low VOC emissions. Carpet products undergo a 14-day VOC testing process⁸⁵. CDPH/ EHLB Standard Method v1.1 and California Specification 01350 provide detailed requirements for testing and allowable emission limits of chemicals tied explicitly to health-based exposure levels⁸⁶.

Tape adhesives must have a Material Health Certificate (MHC) certified Cradle to Cradle (C2C) Bronze v3.1 or newer or higher, while wet adhesives must have an MHC certified C2C Silver v3.1 or higher. Wet adhesives must also meet **South Coast Air Quality Management District (SCAQMD) Rule 1168 (2005)** for wet adhesives (less than 50 grams per liter), which is a rule designed to reduce emissions from adhesives and related products of VOCs, toxic air contaminants, and stratospheric ozone-depleting compounds.

Typically, carpet manufacturers require the use of a moisture control system with newly-poured concrete in order to warrant their product. MH does not currently know of any available products of this kind

that are Red List-free, as they all contain BPA and formaldehyde.
Mohawk FlexLok tabs has the potential to serve as both a moisture

control system and adhesive, but MH has not yet specified this
product.

→ **ACTION TAKE-AWAY:** *Ask for carpet that is certified CRI Green Label Plus and/or CDPH/EHLB Standard Method v1.1 and/or California Specification 01350 compliant and/or C2C Bronze certified and/or (SCAQMD) Rule 1168 (2005) compliant*

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