

MPI Green Performance™ Standard

[GPS-1-08 and GPS-2-08]

For Paints & Coatings

Performance

A pilot program investigating OFP (Ozone Forming Potential) initiated by the National Institute of Building Sciences, addressed coating performance relative to environmentally preferable products with the following:

"Given that the primary function of paints and coatings is to provide protection for coated surfaces, and thus extend the life of such surfaces, it is imperative for any environmentally preferable product specification to address the equivalence in performance between products being compared. Inadequate consideration of product performance in the past has led to a selection of paints and coatings that have not provided comparable performance, leading to the premature aging of structures on the one hand, or excessive product use to offset performance shortcomings on the other hand."

Also in the draft specification was the requirement that "only products appearing in the current edition of the MPI Approved Products List under the category for the intended application will be considered for certification, and that continued listing in the MPI Approved Products List will be a condition of maintaining the certification".

As to recycled paints, there are at least two concerns. The first concern is that the waste stream must be verifiably environmentally preferable. The second is that recycled paint must meet the same minimum performance standards as comparable non-recycled paint, and that there must be comfort as to the ongoing continuance in spite of varying raw material streams. These concerns are being addressed in the new Green Seal Standard for Recycled Paint that requires MPI listing approval based upon testing to MPI's performance standards, and auditing both by Green Seal and by MPI.

The MPI Green Performance™ Standard therefore requires that all products shall meet or exceed the performance requirements of the applicable MPI product standard, evidenced by current listing in the MPI Approved Products List.

Note: This standard addresses environmental friendliness with performance in the context of differing geographical environmental regulatory trends. It does not address sustainability issues where higher VOC coatings perform significantly better. In these cases duty cycle considerations would prompt the use of higher-per-coat VOC coatings in order to extend the duty cycle thereby lowering the total VOCs. Some of these are stains, varnishes, industrial maintenance coatings, interior trim coatings, etc.

Environmental regulations also can bring 'unintended consequences' in the broader picture. Examples include: as yet unknown challenges through the use of new replacement solvents, and the need for better applicator knowledge in the safe use of newer formulated products. Another example is the more frequent repainting (due to lower product performance) that may be required, resulting in the contribution of additional VOCs and higher O. & M. costs.

Essential Elements of MPI's Green Performance™ Standard

- Performance
- Chemical Component Restrictions
- Maximum Allowable Limits of Volatile Organic Compounds (VOCs)

Chemical Component Restrictions

The MPI Green Performance™ Standard requires that the manufacturer shall demonstrate that the following chemical compounds are not used as ingredients in the manufacture of the product: [Trace elements (max. 5 ppm) as a by-product are excluded.]

Confirmed Human Carcinogens (as defined by ACGIH 0100Doc)

Acrolein	Diethyl phthalate	Formaldehyde	Methylene Chloride
Acrylonitrile	Dimethyl phthalate	Hexavalent Chromium	Naphthalene
Antimony	Di-n-butyl phthalate	Isophorone	Toluene (Methylbenzene)
Asbestos	Di-n-octyl phthalate	Lead	1,1,1-trichloroethane
Benzene	1,2-dichlorobenzene	Mercury	Vinyl Chloride
Butyl benzyl phthalate	Di (2-ethylhexyl) phthalate	Methyl ethyl ketone	
Cadmium	Ethylbenzene	Methyl isobutyl ketone	

The product must contain no more than 1.0% by weight of the sum total of aromatic compounds.
The product must contain no crystalline silica as an ingredient.

Volatile Organic Compounds (VOC) Requirements

The MPI Green Performance™ Standard (GPS-1) requires that the manufacturer demonstrate that VOC concentrations of the product shall not exceed those listed below as determined by U. S. Environmental Protection Agency (EPA) Reference Test Method 24 (Determination of Volatile Matter Content, Vapor Content, Density Volume Solids, and Weight Solids of Surface Coatings), Code of Federal Regulations Title 40, Part 60, Appendix A.

MPI Green Performance™ Standard (GPS-2) provides for a maximum allowable limit of 50 g/L of VOCs.

VOCs shall be listed as g/L (grams/liter). The calculation of VOC shall exclude water and tinting color added at the point of sale.

Products meeting the MPI Green Performance™ Standard (GPS-1 & GPS-2) are listed at www.specifygreen.com and at www.paintinfo.com

Category Description	MPI Categories	Max. Allowable VOCs	
		GPS-1	GPS-2
Architectural			
Interior Flat Intermediate/Top Coats	49, 53, 55, 118, 133, 143	50 g/L	50 g/L
Interior Non-Flat Intermediate/Top Coats	43,44,47,48,51,52, 54, 89,114, 131,138 to 141, 144 to 148, 151, 153,154, 155, 157, 158, 226	100 g/L	50 g/L
Exterior Flat Intermediate/Top Coats	8, 10, 42,113	100 g/L	50 g/L
Exterior Non-Flat Intermediate/Top Coats	9, 11, 15, 38, 40, 41, 94, 119, 161, 163, 164, 213, 214	150g/L	50 g/L
Special Purpose			
Clear Varnishes	28,29,30,56, 57, 73, 74, 75, 128,129,130, 181	350 g/L	
Clear Sanding Sealers	84, 102	350 g/L	
Clear Lacquer	85, 86, 87	550 g/L	
Fire Retardant coatings – Pigmented	63, 64, 67, 126	350 g/L	
Fire Retardant coatings – Clear	62, 65, 66, 109, 111	650 g/L	
Floor Coatings	27, 58, 59, 60, 68, 127	250g/L	
Hi Temperature Coatings	2, 21, 22	420 g/L	
Industrial Maintenance Coatings	31, 35, 71, 72, 77, 78, 82, 83, 98, 101, 105, 108, 115, 201,202, 203, 215, 301	340 g/L	
Metallic Pigmented Coatings	1	500 g/L	
Multi-Color Coatings	112, 121	250 g/L	
Pigmented Lacquer	24, 122, 123, 124	550 g/L	
Pre-treatment Wash Primers	25, 80	420 g/L	
Primers & Undercoaters	4, 6, 17, 39, 45, 46, 50, 61, 69, 91, 116, 125, 134, 149	200 g/L	
Quick Dry Enamels	81, 96	250 g/L	
Recycled Coatings	10RC, 10RR, 15RC, 15RR, 44RC, 44RC, 53RC, 53RR, 54RC, 54RR	150 g/L	
Rust Preventative Coatings	23, 26, 76, 79, 95, 107, 135, 173, 275	400 g/L	
Shellac – Clear	88	730 g/L	
Specialty Primers	3,5,7,36,136,137, 223	350 g/L	
Stains	13, 14, 16, 33, 90, 92,156	250 g/L	
Traffic Coating	32, 70, 97	150 g/L	
Waterproofing Concrete/Masonry Sealers	34, 99, 104,117	400 g/L	
Zinc Rich Primers	18, 19, 20, 200	340 g/L	

- Note:**
- MPI categories listed opposite a category are the best 'fit' according to the definition information available.
 - These categories may be differently defined, or interpreted by various authorities having jurisdiction under various different regulations.
 - MPI Green Performance™ Standard users are responsible for determining appropriateness of this information for their individual use.
 - Dry Fog/Fall categories have been reclassified under Interior Flat/Non-Flat since the first version of this standard.

Definitions - For the purpose of this standard, the following definitions shall apply:

ARCHITECTURAL COATINGS are any coatings applied to stationary structures and their appurtenances, to mobile homes, to pavements, or to curbs.

COATING is a material which is applied to a surface in order to beautify, protect, or provide a barrier to such surface.

FLAT COATINGS are coatings that register a gloss of less than 5 on a 60-degree meter and less than 10 on an 85-degree meter.

INDUSTRIAL MAINTENANCE COATINGS are coatings, including primers, sealers, undercoaters, intermediate coatings and topcoats, formulated for or applied to substrates, including floors, that are exposed to one or more of the following extreme environmental conditions:

- (A) immersion in water, wastewater, or chemical solutions (aqueous and non-aqueous solutions), or chronic exposure of interior surfaces to moisture condensation;
- (B) acute or chronic exposure to corrosive, caustic or acidic agents, or similar chemicals, chemical fumes, chemical mixtures, or solutions;
- (C) repeated exposure to temperatures in excess of 250 degrees Fahrenheit;
- (D) repeated heavy abrasion, including mechanical wear and repeated scrubbing with industrial solvents, cleaners, or scouring agents; or
- (E) exterior exposure of metal structures.

NONFLAT COATINGS are coatings that register a gloss greater than 5 on a 60 degree meter and a gloss of 10 or greater on an 85 degree meter.

CLEAR WOOD FINISHES are clear and semi-transparent coatings, including lacquers and varnishes, applied to wood substrates to provide a transparent or translucent solid film.

DRY-FOG COATINGS are coatings which are formulated only for spray application so that when sprayed, overspray droplets dry before falling on floors and other surfaces.

FIRE-RETARDANT COATINGS are coatings labeled and formulated to retard ignition and flame spread, that has been fire tested and rated by a testing agency approved by building code officials for use in bringing building and construction materials into compliance with federal, state and local building code requirements. The fire retardant coating shall be tested in accordance with ASTM Test Method E 84-99, incorporated by reference in paragraph (e)(4) or listed by Underwriter's Laboratories, Inc. as fire-retardant coatings with a flame spread index of less than 25.

FLOOR COATINGS are opaque coatings that are formulated for or applied to flooring; including but not limited to decks, porches, gymnasiums, and bowling alleys, but do not include Industrial Maintenance Coatings.

HIGH-TEMPERATURE INDUSTRIAL MAINTENANCE COATINGS are industrial maintenance coatings formulated for or applied to substrates exposed continuously or intermittently to temperatures above 400 degrees Fahrenheit (205 degrees Centigrade).

LACQUERS are clear or pigmented finishes, including lacquer sanding sealers, formulated with nitrocellulose or synthetic resins to dry by evaporation without chemical reaction. The dried film can be re-dissolved by the original solvent.

METALLIC PIGMENTED COATINGS are coatings, excluding roof coatings, containing at least 0.4 pounds per gallon (48 grams/liter) of coating, as applied, of elemental metallic pigment (excluding zinc), mica particles or any combination of metallic pigments and mica particles.

MULTI-COLOR COATINGS are coatings which exhibit more than one color when applied and which are packaged in a single container and applied in a single coat.

PRE-TREATMENT WASH PRIMERS are coatings which contain a minimum of 1/2 percent acid, by weight, applied directly to bare metal surfaces to provide necessary surface etching.

PRIMERS are coatings applied to a surface to provide a firm bond between the substrate and subsequent coats.

QUICK-DRY ENAMELS are non-flat coatings which comply with the following:

- (A) Shall be capable of being applied directly from the container by brush or roller under normal conditions, normal conditions being ambient temperatures between 60°F and 80°F;
- (B) When tested in accordance with ASTM D 1640 they shall: set-to touch in two hours or less, dry-hard in eight hours or less, and be tack-free in four hours or less by the mechanical test method.

QUICK-DRY PRIMERS, SEALERS, AND UNDERCOATERS are primers, sealers, and undercoaters which are intended to be applied to a surface to provide a firm bond between the substrate and subsequent coats and which are dry-to-touch in one-half hour and can be recoated in two hours (ASTM D 1640).

RECYCLED COATINGS are coatings formulated such that 50 percent or more of the total weight consists of secondary and post-consumer coatings and 10 percent or more of the total weight consists of post-consumer coatings, and manufactured by a certified recycled paint manufacturer.

RUST PREVENTATIVE COATINGS are coatings formulated for use in preventing the corrosion of metal surfaces in residential and commercial situations.

SANDING SEALERS are clear wood coatings formulated for or applied to bare wood for sanding and to seal the wood for subsequent application of coatings. To be considered a sanding sealer a coating must be clearly labeled as such.

SEALERS are coatings applied to either block materials from penetrating into or leaching out of a substrate, to prevent subsequent coatings from being absorbed by the substrate, or to prevent harm to subsequent coatings by materials in the substrate.

SHELLACS are clear or pigmented coatings formulated solely with the resinous secretions of the lac beetle (*Laccifer lacca*), thinned with alcohol, and formulated to dry by evaporation without a chemical reaction.

SPECIALTY PRIMERS are coatings formulated for or applied to a substrate to block stains, odors or efflorescence; to seal fire, smoke or water damage; to condition excessively chalky surfaces; to block stains such as from woods prone to extractive bleeding; or recommended for application to highly alkaline concrete, plaster, and other cementitious surfaces. An excessively chalky surface is one that is defined as having chalk rating of four or less as determined by ASTM D-4214 – Photographic Reference Standard #1 or the Federation of Societies for Coatings Technology "Pictorial Standards for Coatings Defects".

STAINS are opaque or semi-transparent coatings that are formulated to change the color but not conceal the grain pattern or texture.

TRAFFIC COATINGS are coatings formulated for or applied to public streets, highways, and other surfaces including, but not limited to, curbs, berms, driveways, and parking lots.

UNDERCOATERS are coatings formulated for or applied to substrates to provide a smooth surface for subsequent coats.

VARNISHES are clear wood finishes formulated with various resins to dry by chemical reaction.

WATERPROOFING CONCRETE/MASONRY SEALERS are clear or pigmented sealers that are formulated for sealing concrete and masonry to provide resistance against water, alkalis, acids, ultraviolet light, and staining.

ZINC-RICH INDUSTRIAL MAINTENANCE PRIMERS are primers formulated to contain a minimum of 65 percent metallic zinc powder (zinc dust) by weight of total solids for application to metal substrates.

Category Description	US EPA	CARB	OTC	EC	SCAQMD 7/1/07	LEED CANADA NC 1.0 - Mar 07	Green Seal	LEED- NC 2.2	SCAQMD 1/1/04	MPI GPS-1	MPI GPS-2
Interior Flat Intermediate & Topcoats	250	100	100	100	100	50	50	50	100	50	50
Interior Non-Flat Intermediate & Topcoats	380	150	150	150	50	150	150	150	150	100	50
Exterior Flat Intermediate & Topcoats	250	100	100	100			100			100	50
Exterior Non-Flat Intermediate & Topcoats	380	150	150	150			200			150	50
Special Purpose Exceptions											
Clear Varnishes	450	350	350	350	275	275		350	350	350	
Clear Sanding Sealers	550	350	350	350	275	275		275	350	350	
Clear Lacquer	680	550	550	550	275	275		550	550	550	
Clear Brushing Lacquer	680	680	680	680	275	275			680	680	
Dry Fog Coatings	400	400	400	400	150				400	50/150	50
Fire Retardant Coatings-Pigmented	450	350	350	350	100/50				350	350	
Fire Retardant Coatings-Clear	850	650	650	650	100/50				650	650	
Floor Coatings	400	250	250	250	50	50		100	100	250*	
Industrial Maintenance Coatings	450	250	340	340	100				250	340*	
High Temperature Coatings	650	420	420	420	420				420	420	
Faux Finishing Coatings	700	350	350	350	350				350	350	
Metallic Pigmented Coatings	500	500	500	500	500				500	500	
Multicolor Coatings	580	250	250	250	250				250	250	
Pigmented Lacquers	680	550	550	550	275				550	550	
Pretreatment Wash Primers	780	420	420	420	420				420	420	
Primers & Undercoats	350	200	200	200	100	100		150	200	200	
Quick Dry Enamels	450	250	250	250	50				250	250	
Recycled Coatings	-	250	250	250	250		250		250	150	
Rust Preventative Coatings	400	400	400	400	100	250	250	250	400	400**	
Sealers	350	200	200	200	100	100		200	200	200	
Shellacs-Clear	730	730	730	730	730	730		730	730	730	
Shellacs-Pigmented	550	550	550	550	550	550		550	550	550	
Specialty Primers	350/400	350	350	350	100	100		200	350	350	
Stains	550/350	250	250	250	100	100		250	250	250	
Traffic Marking Coatings	450/150	150	150	150	100				150	150	
Waterproofing Concrete Masonry Sealers	600/400/700	400	400	400	100	100		250	400	400	

* While SCAQMD has a lower limit, MPI is not convinced that a wide spectrum of products is available below those levels to warrant matching the level for these performance-critical substrates.

** LEED references Green Seal GC-03 which has only three "performance requirements" – MPI is not convinced that either adhesion or hiding power is nearly adequate, and their corrosion resistance "performance requirement" is nonexistent although this characteristic is absolutely critical here.

Note #1: EC (Environment Canada) is proposing implementation in 2008.

Note #2: LEED 2.2 presently contains VOC levels of 50 g/L for "flats" and 150 g/L for "non-flats" with some 'other' categories from SCAQMD as at Jan. 01, 2004.

Note #3: MPI GPS-1-08 is MPI Green Performance™ Standard May 2008 (first published as GPS-1-05 July 2005). MPI GPS-2-07 was published July 2007.

Note #4: South Coast Air Quality Management District (SCAQMD) Rule 1113 Architectural Coatings rules in effect on January 1, 2004 and on July 1, 2007.

Note #5: LEED 1.0 is a Canadian licensed version published in 2004 but with a new revision in March 2007 requiring SCAQMD levels in place "at time of building permit".

Note #6: MPI GPS is the only standard requiring significant performance. Both ECO LOGO and Green Seal Recycled Standards now require MPI performance listing.

Note #7: LEED 2.2 has VOC's listed at 275 max for the clear sanding sealer although reference SCAQMD 1/1/04 who listed VOC's at 350.

4.3. Volatile Aromatic Compound Content Limit. The product shall contain no more than 0.5% by weight of sum total of volatile aromatic compounds. Testing for the concentration of these compounds will be performed if they are determined to be present in the product during a materials audit.

4.4. Volatile Organic Compound (VOC) Content Limit. The VOC concentration of the product shall not exceed those listed below in grams of VOC per liter of product as determined by ASTM D6886-03 Standard Test Method for Speciation of the Volatile Organic Compounds (VOCs) in Low VOC Content Waterborne Air-Dry Coatings by Gas Chromatography using 280°C as a specified limit. Alternatively, International Organization for Standardization (ISO) 11890-2 Paints and varnishes -- Determination of volatile organic compound (VOC) content Part 2: GC/MS method may be used, but must use 280°C as a marker. Another scientifically validated test method may be used if accompanied by justification for the method modification and documented in sufficient detail.

The calculation of VOC shall exclude water and colorants added at the point-of-sale.

Product Type	VOC level (in g/L)
Flat Topcoat	50
Non-Flat Topcoat	100
Primer or Undercoat	100
Floor Paint	100
Anti Corrosive Coating	250
Reflective Wall Coating	50
Reflective Roof Coating	100

4.5. Effective as of January 1, 2010, Colorant Added at the Point-of-Sale VOC Content Limit. The VOC concentration of the product including the colorant added at the point-of-sale shall not exceed those listed below in grams of VOC per liter of product as determined by the methods listed in Section 4.4. Green Seal will apply an average VOC level calculation unless a manufacturer can provide documentation of the colorant(s) VOC levels and specifies that only those colorant(s) tested shall be used with the product.

Product Type	VOC level (in g/L)
Flat Topcoat with colorant added at the point-of-sale	100
Non-Flat Topcoat with colorant added at the point-of-sale	150

Product Type	VOC level (in g/L)
Primer or Undercoat with colorant added at the point-of-sale	150
Floor Paint with colorant added at the point-of-sale	150
Anti Corrosive Coating with colorant added at the point-of-sale	300
Reflective Wall Coating with colorant added at the point-of-sale	100
Reflective Roof Coating with colorant added at the point-of-sale	150

5.0 END-OF-LIFE MANAGEMENT

5.1. Consumer Education. The manufacturer shall provide information to the consumer through print, online or other accessible media including:

- Instructions for purchasing the appropriate amount of product needed for a specified job.
- Instructions for adequate ventilation during paint application and drying period.
- Instructions on proper use of the product.
- A statement encouraging consultation with local authorities for proper disposal or recycling opportunities for leftover product and packaging.
- If a manufacturer provides a take-back program, instructions on how the product and packaging can be returned.

5.2. Leftover paint from the manufacturing process shall be utilized locally and/or domestically where there are existing markets.

6.0 PACKAGING REQUIREMENTS

6.1. Packaging. The packaging shall contain a minimum of 20% recovered material content. An exception shall be made for packaging that can be recycled as part of a manufacturer take-back program.

6.2. Heavy Metal Restrictions. Heavy metals, including lead, mercury, cadmium, and hexavalent chromium, shall not be intentionally introduced. Further, the sum of the concentration levels of these metals present shall not exceed 100 parts per million by weight (0.01%); an exception is allowed for packages that would not exceed this maximum level but for the addition of