

# THE COLLABORATIVE FOR HIGH PERFORMANCE SCHOOLS

## SECTION 01350

### SPECIAL ENVIRONMENTAL REQUIREMENTS

(Note 1)

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes Special Environmental Requirements: Work includes special environmental, sustainable, and “green” building practices related to energy conservation and efficiency, indoor air quality, and resource efficiency, including the following:
  - 1. Special Requirements:
    - a. Require practices to ensure healthy indoor air quality in final Project.
    - b. Maximize use of durable products.
    - c. Maximize use of products easy to maintain, repair, and that can be cleaned using non-toxic substances.
    - d. Maximize recycled content in materials, products, and systems.
    - e. Require use of wood that is certified sustainably harvested by the Forest Stewardship Council (FSC).
    - f. Maximize use of reusable and recyclable packaging.
    - g. Maximize use of products with low embodied energy (production, manufacturing, and transportation).
  - 2. Construction team is required to comply with sustainable building practices during construction and when considering materials for substitutions. Refer to Article 1.2 – Design Requirements.
  
- B. Related Requirements:

Refer to Specification sections for special environmental requirements for specific products.

  - 1. Section 01565: Site Waste Management Program.
  - 2. Section 01600: Product Requirements.
  - 3. Section 01810: Building Commissioning.
  - 4. Section 01820: System Demonstration.

##### 1.2 DESIGN REQUIREMENTS (Note 2)

- A. General: Owner has established with design team general environmental goals for design and for construction of Project; Contractor, subcontractors, suppliers, and manufacturers (construction team) are encouraged to participate where possible to realize Owner’s environmental goals.
  - 1. Intent is for environmental goals to be achieved in manner that ultimately provides safe and healthy environment for building occupants with minimal impact on local, regional and global environment.
  - 2. Contract Documents are not intended to limit alternative means of achieving environmental goals.
    - a. Suggestions from construction team for implementing goals are encouraged.
    - b. Team approach is encouraged.

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- B. Environmental Goals:
  - 1. Refer to specific Specifications sections for more detailed construction requirements related to specific materials and systems.
    - a. Energy Efficiency (Operations Throughout Project Life): Materials and systems are intended to maximize energy efficiency for operation of Project throughout service life (substantial completion to ultimate disposition – reuse, recycling, or demolition).
    - b. Indoor Environmental and Air Quality: Materials are selected and processes specified, such as preconditioning and temporary ventilation, to maximize healthy indoor air quality. Cleaning, surface coating, and renewal or replacement of interior materials should be feasible with lowest practical use of toxic, irritating, or odorous compounds. Ventilation system design, construction, and commissioning ensure adequate outside air supply under all anticipated conditions of use. Documentation of system design assumptions is included in Project Manuals to enable building operators and management to use and modify the system as required to provide continued assurance of indoor air quality. Additionally, materials are selected to provide appropriate indoor environmental qualities such as good acoustics and lighting.
    - c. Resource Efficiency (Project Construction): Materials and systems are to maximize environmentally-benign construction techniques, including construction waste recycling, reusable delivery packaging, and reusability of selected materials.
- C. Energy Conservation: Maximize energy conservation strategies in order to reduce life-cycle energy requirements.
  - 1. Reduce undesirable heat gain and heat loss through exterior envelope.
  - 2. Use daylight as the primary lighting source in classrooms and supplement with integrated and energy-efficient electrical lighting systems.
  - 3. Choose equipment with high-end energy performance characteristics, including lighting, HVAC systems, appliances, and office equipment.
  - 4. Where appropriate, use thermal storage strategies such as thermal mass of building or ground to minimize total energy consumption.
  - 5. Design mechanical systems for efficient operation throughout the typical operating range, from minimum to peak load.
- D. Sustainable Site Planning and Landscape:
  - 1. Maximize erosion and sedimentation control.
  - 2. Minimize site disturbance.
  - 3. Maximize planted areas.
  - 4. Reduce heat islands.
  - 5. Where possible, reduce or eliminate light pollution from site lighting. *(Note 3)*
  - 6. Reduce or eliminate use of pesticides.
  - 7. Rely on indigenous, dry or xeriscape planting. Maintain existing planting on site to reduce costs.
  - 8. Implement seasonal plant and soil maintenance schedule to maintain healthy soil and landscaping.
  - 9. Maximize stormwater runoff.
  - 10. Reduce water use with water efficient irrigation systems and local vegetation.
- E. Durable Materials:
  - 1. Select materials with longest useful service life.

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2. Select materials that deteriorate minimally under installed conditions, exposures, and uses.
  3. Select materials with surfaces that require minimal or no refinishing or resurfacing.
  4. Select materials with protective coating requirements that do not involve frequent application of toxic or odorous components for materials that require surface renewal or protection
  5. Select materials that can be re-used after their service life in this building.
  6. Select materials that can be recycled at the end of their useful lives for materials that cannot be re-used.
- F. Resource Efficient Materials: Use resource efficient materials; consider energy use over life cycle of material including harvesting, mining, manufacturing, transport, installation, use, operations, recycling and disposal.
1. Where possible and allowable by the Agency and Code with jurisdiction over the project, re-use existing building materials to extent feasible within design concept expressed in Contract Documents.
  2. Select materials that efficiently use resources such as energy, water, and component materials.
  3. Use construction practices such as material reduction and dimensional planning that maximize efficient use of resources and materials.
  4. Provide materials that utilize recycled content to maximum degree possible without being detrimental to product performance or indoor air quality.
  5. Where possible and feasible, provide for non-destructive removal and re-use of materials after their service life in this building.
  6. Select materials that use less embodied energy to manufacture.
    - a. Exceptions might include materials that result in net energy conservation during their useful life in building and building's life cycle.
  7. Select materials that conserve energy during building operations.
  8. Where possible, select materials harvested and manufactured regionally, within a 500-mile radius of the project site.
- G. Scarce, Irreplaceable, and Endangered Resources:
1. Select materials from abundant resources.
    - a. For natural resources, determine abundance based on ratio of removal rate from existing stocks to natural replacement/renewal rate, where this information is available.
    - b. For mineral resources, determine abundance based on ratio of removal rate from terrestrial storage minus amount re-entering commerce through recycling or resource recovery compared to total in terrestrial storage, where this information is available.
  2. Select renewable materials, and materials which can be replenished.
  3. Select materials that create minimal or no damage to natural habitats and natural environment.
  4. Select materials that can be easily refinished, repaired or refurbished to extend their useful life.
- H. Pollution: Select materials that generate least amount of pollution during mining, manufacturing, transport, installation, use, and disposal.
1. Avoid materials that emit greenhouse gases
  2. Avoid materials that require energy intensive extraction, manufacturing, processing, transport, installation, maintenance, or removal.

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3. Avoid materials that contain ozone-depleting chemicals (e.g. CFCs or HCFCs).
  4. Avoid materials that emit potentially harmful volatile organic chemicals (VOCs), as described in Article 2.2.
  5. Employ construction practices that minimize dust production and combustion by-products.
  6. Avoid materials that can leach harmful chemicals into ground water; do not allow potentially harmful chemicals to enter sewers or storm drains.
  7. Protect soil against erosion and topsoil depletion.
  8. Minimize noise generation during construction; screen mechanical equipment to block noise.
  9. Select materials that can be reused or recycled and materials with significant percentage of recycled content; conform with or exceed specified Project recycled content percentages for individual materials; avoid materials difficult to recycle.
  10. Protect natural habitats; restore natural habitats where feasible within scope of Project.
- I. Wood Products:
1. Use woods from Forest Stewardship Council (FSC) accredited certified sustainably harvested sources, and verify that the material itself is FSC-certified.
  2. Composite wood products with high-recycled content, which meet the indoor air quality data requirements, are acceptable. *(Note 4)*
- J. Water Efficiency:
1. Reduce the use of municipally supplied potable water.
  2. Reduce dependence on municipal storm water system for plumbing fixtures and irrigation. Eliminate irrigation or use micro-irrigation. Use no moisture sensors or clock timers on irrigation systems.
  3. Maintain natural aquifer conditions.
  4. Consider roofwater or groundwater collection system.
  5. Consider graywater collection system for irrigation systems.
  6. Commission irrigation, graywater, roofwater collection systems. Provide measurement and verification for these systems. Train maintenance staff on performance of all water collection and distribution systems.

### 1.3 SUBMITTALS

- A. Resource Efficient Product Data:
1. Environmental Issues Data: Submit following information, including manufacturer's certifications, verifying information, and test data, where Specifications sections require data relating to environmental issues including but not limited to:
    - a. Project Recyclability: Submit information to assist Owner and Contractor in recycling materials involved in shipping, handling, and delivery, and for temporary materials necessary for installation of products.
    - b. Recycled Content: Submit information regarding product post industrial recycled and post consumer recycled content.
      - 1) Use the "Recycled Content Certification Form", attached as Appendix A to this Section, signed by a corporate office holder (i.e. Chairman of the Board, President, Vice President, Secretary, or similar position of authority). *(Note 5)*
    - c. Product Recyclability: Submit information regarding product and product's component's recyclability including potential sources accepting recyclable materials.

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- d. Provide certification for all wood products provided by a Forest Stewardship Council (FSC) accredited certifier.
  - e. Provide final certification of well-managed\* forest of origin to provide final documentation of FSC-certified sustainably harvested status: Acceptable wood “certified sustainably harvested” certifications shall include:
    - 1) Wood suppliers’ certificate issued by one of the Forest Stewardship Council-accredited certifying agencies, such as Smart wood (800-434-5491) or Forest Conservation Program (510-832-1415);
    - 2) Suppliers’ invoice detailing the quantities of certified wood products for project;
    - 3) Letter from one of a certifying agency corroborating that the products on the wood supplier’s invoice originate from FSC-certified well-managed forests.  
(Note 6)
- B. Indoor Air Quality (IAQ) Data: (Note 7)
- 1. Environmental Issues: Submit emission test data produced by acceptable testing laboratory listed in Quality Assurance Article for materials as required in each specific Specification section.
    - a. Laboratory reports shall contain emissions test data on VOCs including total VOCs (TVOC), specific individual VOCs, formaldehyde and other aldehydes as described in this Specification Section.
    - b. In special cases it may be necessary to identify other specific chemicals for listing based on known quantity present or on known odor, irritation or toxicity.
    - c. Identify all VOCs emitted by each material as required in these Specifications.
    - d. Specific test conditions and requirements are set forth in this Section. For required tests, submit documentation of sample acquisition, handling, and test specimen preparation, as well as test conditions, methods, and procedures. The tests consist of a ten-day conditioning period followed by a 96-h test period.
      - 1) Samples collected during the test period at 24, 48, and 96 hours shall be analyzed for TVOC and formaldehyde. (Note 8)
      - 2) VOC samples collected at 96 hours shall be identified and quantified for all compounds that are Chemicals of Concern on lists in Article 2.
  - 2. Cleaning and Maintenance Products: Provide data on manufacturers’ recommended maintenance, cleaning, refinishing and disposal procedures for materials and products. These procedures are for final Contractor cleaning of the project prior to substantial completion and for provided materials and products as required by the specific specification sections.
    - a. Where chemical products are recommended for these procedures, provide documentation to indicate that no component present in the cleaning product at more than 1% of the total mass of the cleaning product is a carcinogen or reproductive toxicant as defined in the lists in this specification section.
    - b. For purposes of reporting, identification of product VOC contents shall not be limited to those regulated under Clean Air Act (CAA) but shall also include compounds exempted from the CAA definition and listing of VOCs.
    - c. California EPA and local air district definitions of VOCs based on CAA are not sufficient as they exempt compounds based on non-reactivity for outdoor air pollution control but still important for indoor air quality.
    - d. Avoid cleaning products containing alpha-pinene, d-limonene or other unsaturated carbon double bond alkenes due to chemical reactions with ozone to form aldehydes, acidic aerosols, and ultra fine particulate matter in indoor air. For State buildings, DGS has published specifications for Environmentally Preferable Janitorial

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Chemicals and a list of cleaning/maintenance products meeting these specifications. Both are available on the internet at:

<http://www.ciwmb.ca.gov/greenbuilding/Specs/Janitorial.doc> and  
<http://www.resd.dgs.ca.gov/BPM/lists.htm> .

(Note 9)

### **C. Certificates:**

#### **1. Environmental Issues Certifications:**

- a. Submit documentation certifying accuracy of post-industrial and post-consumer recycled content, and recyclability.
- b. Prior to Final Completion, submit certificate signed by corporate office holder (i.e. Chairman of the Board, President, Vice President, Secretary, or similar position of authority) of contractor, subcontractor, supplier, vendor, installer or manufacturer, provided they are primarily responsible for manufacture of product, indicating:
  - 1) Post-industrial and post-consumer recycled content of materials installed are same as those required by Project requirements.
  - 2) Product recyclability of materials installed are same as those required by Project requirements.
  - 3) Indoor air quality requirements. Certification shall state products and materials provided are essentially same, and contain essentially same components as products and materials tested.
- c. Comply with requirements specified in Section 01770 – Closeout Procedures.

### **D. Closeout Submittals: Submit data relating to environmental issues.**

1. Submit environmental product certifications, in two forms:
  - a. Two CD-ROMs organized by CSI 16 Division Format.
  - b. Four three-ring binders organized by CSI 16 Division Format with Table of Contents and with dividers for each division.

## **1.4 QUALITY ASSURANCE**

### **A. Environmental Project Management and Coordination: Contractor to identify one person on Contractor's staff to be responsible for environmental issues compliance and coordination.**

1. Experience: Environmental project manager to have experience relating to sustainable building construction.
2. Responsibilities: Carefully review Contract Documents for environmental issues, coordinate work of trades, subcontractors, and suppliers; instruct workers relating to environmental issues; and oversee Project Environmental Goals.
3. Meetings: Discuss Environmental Goals at following meetings.
  - a. Pre-construction meeting.
  - b. Pre-installation meetings.
  - c. Regularly scheduled job-site meetings.
  - d. Special sustainability issues meetings.

### **B. Environmental Issues Criteria: Comply with requirements listed in various Specification sections.**

### **C. Acceptable Indoor Air Emissions Testing Laboratories: (Note 10)**

1. Berkeley Analytical Associates; 815 Harbour Way South, Suite 6, Richmond, California 94804; telephone 510.236.2325; fax 510.236.2335; e-mail [berkeleyanalytical@ att.net](mailto:berkeleyanalytical@att.net) .

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2. Air Quality Sciences, Inc.; 1337 Capital Circle, Atlanta, Georgia 30067; telephone 770.933.0638; fax 770.933.0641; e-mail [aqs@mindspring.com](mailto:aqs@mindspring.com).
  3. Other Laboratories:
    - a. Selection of testing laboratories shall include assessment of prior experience in conducting indoor source emissions tests.
    - b. Many laboratories participate in and are certified by American Industrial Hygiene Association laboratory accreditation program. <http://www.aiha.org/lists.html>.
      - 1) These laboratories are accredited to do analysis for hazards at levels of concern for industrial workplaces and not necessarily accredited, organized, or able to perform analysis for chemicals and particulate matter at concentrations of concern for indoor air.
    - c. The proposed laboratory shall be an independent company or organization not related to manufacturer of product to be tested.
    - d. Submit documentation on proposed laboratory for review and approval by Owner.
- D. Indoor Air Emissions Tests: *(Note 11)*
1. Provide environmental chamber test data from tests based on ASTM Standard D5116-97, Guide for Small Scale Environmental Chamber Determination of Organic Emissions from Indoor Materials/Products. ( Refer to ASTM, Annual Book of Standards, Volume 11.03. West Conshohocken, PA: American Society for Testing and Materials. <http://www.astm.org>.)
  2. Tests shall be conducted according to guidance contained in ASTM Standard D5116-97 on material test specimens pre-conditioned in clean air prior to testing.
    - a. Review test specimen collection, documentation, collection, preparation and shipping procedures with testing laboratory prior to preparing and shipping sample.
    - b. Test specimens shall be packaged in the normal manner at the factory and shipped directly to testing laboratory by the manufacturer. For materials that are not packaged in convenient consumer units, alternate procedures to preserve the chemical integrity of the specimen are required. Obtain test laboratory procedure sheet covering the handling and shipping of materials. If such information is not provided by the laboratory, then wrap the specimen in a manner that will eliminate direct contact with air or packaging materials other than an inert air barrier such as foil or laboratory grade plastic sheet wrapping material.
    - c. Conditioning: Condition all test specimens for ten days in clean air. Clean air should be free from the Chemicals of Concern listed in Article 2. Hold in clean vessels approximately the size of the test chambers and ventilated at the same air flow rate to be used in the test period. Suspend or place specimens on wire racks so that air freely circulates around all sides during the conditioning period. The air temperature and relative humidity during the conditioning period shall be  $23\pm 2^{\circ}\text{C}$  and  $50\pm 10\%$  RH. Otherwise, the material must be held in an environmental chamber for the entire period.
    - d. For wet-applied products and material assemblies, a realistic test specimen shall be prepared using the substrate material on which it will be applied in the building. Alternately, it may be necessary to use a substrate material that closely simulates the actual building substrate.
    - e. For material assemblies (e.g., floor and wall systems where the finish material is placed over a substrate, either with or without the use of adhesives), individual components of the assembly system shall be tested separately. If all components meet the emissions criteria established herein, no further testing shall be required. For assemblies where one component, such as a floor or wall covering adhesive,

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does not meet the criteria, the assembled system may be tested with specimen preparation following the manufacturer's recommended procedures for application of wet components and assembly of the system. If there is a difference between the manufacturers' recommended procedures and procedures required by the project specifications, the project specifications shall be followed.

- f. Wall and other types of paints shall be tested according to the specifications for the particular material. For example, if two coats are to be applied over a primer coat, then the test specimen shall be prepared accordingly, dried between coats per manufacturer's label instructions, and tested as a complete assembly after required conditioning. The total quantity of paint applied shall be reported based on the weight of the assembly immediately before and after the application of each coat.
3. The maximum concentration for any chemical emitted at 96 hours in emissions tests shall not result in a modeled indoor air concentration greater than  $\frac{1}{2}$  the chronic inhalation REL concentration of California Office of Environmental Health Hazard Assessment (OEHHA) Chronic Reference Exposure Limit (REL), with the exception of formaldehyde, which is discussed separately below.
4. Formaldehyde: No single product shall contribute more than one half ( $\frac{1}{2}$ ) the OEHHA staff recommended indoor air limit of  $33 \mu\text{g}/\text{m}^3$  (27 ppb) for formaldehyde. The calculated concentration of formaldehyde shall not exceed  $16.5 \mu\text{g}/\text{m}^3$ . Same modeling procedure as described above shall be used for formaldehyde. This concentration limit shall apply to all building and occupancy types. (Note 12)
5. Construction adhesives used in Work shall comply with following requirement: no component present in adhesive at more than 1% of total mass of adhesive shall be a carcinogen or reproductive toxicant as defined in the lists in this specification section.
6. Provide calculations of modeled concentrations based on emissions test results.
  - a. Calculations shall be submitted with all other documentation. This requires the calculation of emission factors based on emissions tests, then application of the emission factors, product loading factors in the building, and building parameters in a steady state mass-balance model. The model assumes zero outdoor concentrations, perfect mixing and no sink effects. Alternatively, follow procedures in ASTM D5116-97 and submit assumptions and calculations.
  - b. The concentration of a compound in the building shall be calculated using the following Equation;

$$\text{Concentration} = \frac{(\text{Emission factor}) * (\text{Loading factor})}{(\text{Air change rate})}$$

$$\text{For this equation, the units are: } \mu\text{g}/\text{m}^3 = \frac{(\mu\text{g}/\text{m}^2 \text{ hr}) * (\text{m}^2/\text{m}^3)}{(\text{h}^{-1})}$$

This can be simplified as follows:

$$\text{Concentration} = \frac{\text{Emission rate}}{\text{Air change rate}}$$

Note that the weekly average air change rate must be used in the calculations of concentrations of contaminants.

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- c. Calculation of emission rate. Determine the emission rate by multiplying the emission factor by the amount of the material to be used in the building or air handler zone being evaluated. Multiply the emission factor by the area of the material in the building zone being assessed. Note that in some cases a length or mass may be the appropriate unit for emission factor that must then be multiplied by the length or mass of the emission source.
  - d. Provide to the laboratory the total area of the zone being assessed by consulting the Contract Documents or the design engineer, to identify the total area served by the air handler that serves the area(s) within it where the material will be applied. If the material is used in multiple zones, then calculations shall be made to determine the concentration in the zone with the highest loading ratio of material to volume or material to weekly average minimum air change rate, whichever is greater.
  - e. Provide to the laboratory the volume of the space served by the air handler by multiplying the floor area by the floor-to-floor clear height (top of finish floor to bottom of structure of floor above) and multiply by 0.9 (to take account of the portion of the volume that is occupied by solid objects). This value represents the ventilated volume for purposes of the calculations required here.
  - f. Determine the air change rate by dividing the volume of outside air introduced into the space per hour by the ventilated volume of the space.
  - g. Determine the weekly average air change rate by adding the minimum design air change rate during ventilation system operating hours times the number of hours the system is operated to an assumed air change rate from infiltration during ventilation system non-operational hours times the number of hours the system is off; then divide the total by the number of hours in a week, (168). Where no values are available from the design documents, use default values as follows:
    - 1) Offices:
      - a) Where design data are not available to calculate the weekly average air change rate, the modeling shall assume a weekly average air change rate for office buildings of 0.75 air changes per hour (ach). This "default" office air exchange rate is based on a typical weekly State office building 55 hour operating schedule and an assumed off-hours air change rate of 0.3 ach (assumed air change rate during normal operating hours is in excess of 1.0 per hour).
      - b) Where specific information is available, the project specific data should be used to calculate the weekly average air change rate. A default building air change rate of 0.2 per hour during non-HVAC operations should be used.
    - 2) Schools:
      - a) Modeling shall assume weekly average air change rate for school buildings of 0.9 per hour. This air change rate is based on an assumed 40 hours per week of ventilation system operation at 3.0 ach and 128 hours per week of 0.2 ach through infiltration.
      - b) Where specific information is available, the project specific data should be used to calculate the weekly average air change rate. A default building air exchange rate of 0.2 per hour during non-HVAC operations should be used.
    - 3) Other building types or occupancy types: Use ASHRAE Standard 62.1999 default occupant densities and ventilation rates for hours of operation and 0.2 ach for non operating hours unless actual rates are known in which case the actual rates and hours of operation are to be used.
7. Environmental Chamber Testing: Indoor Air Emissions Testing Laboratories may use a range of acceptable loading ratios in order to make use of various size chambers, since

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these are not standardized across laboratories. Loading ratios ranging from 0.25 m<sup>2</sup>/m<sup>3</sup> to 0.45 m<sup>2</sup>/m<sup>3</sup> will be acceptable.

- a. For dry products, loading ratios within reasonable limits are not critical for determining emission factors; conditioning of test specimens prior to testing will reduce or eliminate differences that may occur in unconditioned samples due to evaporation-limited emissions and sink effects from adsorption of VOCs during final stages of manufacturing or while in packaging during transport to and storage at the laboratory.
  - b. Higher loading ratios lower expected emission factor; however, the relationship is not linear, especially at higher concentrations. Therefore, where strong formaldehyde (or other chemical) sources are known or expected to be present, loading ratios should be selected to represent a median value for the plausible range of actual building loading ratios.
  - c. Loading ratios used shall be included in test report.
  - d. Contractors shall provide to product manufacturers information on actual quantity of material to be used in Project. The product manufacturers will then forward this information to Indoor Air Emissions Testing Laboratory so loading ratios can be adjusted toward actual loading ratio of Project. However, for most low-emitting materials used in construction, actual loading ratio will not significantly affect emission rates except for strong formaldehyde sources, primarily products using urea-formaldehyde resins. (Note 13)
8. Sample Preparation Requirements:
- a. Substrates for environmental chamber emissions tests of individual products or materials (materials tested separately):
    - 1) Dry solid sheet type products:
      - 2) a) Sheet stainless steel or aluminum tray to provide tight fit at edges and reduce emissions from edge of material specimen. If material does not fit very snugly, then use aluminized, low-emitting, clean room tape to seal edges. Dry fabric type products:
        - a) No substrate necessary.
    - 3) Wet products such as adhesives and sealers:
      - a) Sheet stainless steel, aluminum, or glass unless product is to be applied to gypsum board or other highly absorbent material. If substrate is a highly absorbent material, use a sample the substrate pre-conditioned for 24 hours to the temperature and humidity of the test chamber.
    - 4) Substrates for specific products:
      - a) Composite wood products (Section 06400): sample to be suspended or supported in chamber with all edges exposed and no edge masking.
      - b) Gypsum Board (Section 09260): no substrate (testing required ONLY if recycled content gypsum board or if water resistant types are used).
      - c) Acoustical Ceiling Panels (Section 09510): no substrate, sample to be suspended or supported in chamber with no edge masking.
      - d) Resilient flooring (Section 09650): stainless steel tray, fitted tightly so that only the upper surface is exposed. Alternately, cover back of flooring with sheet stainless steel and seal edges with low-VOC emitting aluminized clean room tape so only wear surface of flooring is exposed.
      - e) Carpet Tile and Broadloom Carpet (Section 09680): stainless steel tray, fitted tightly so that only the upper surface is exposed.
      - f) Flat and eggshell Paints (Section 09900): 5/8" gypsum board.

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- g) Semi-gloss paints (Section 09900): Where applied to metal, use sheet stainless steel. Where applied to gypsum board, use gypsum board conditioned as described in subsection c below.
    - h) Joint Sealers (Section 07900): Steel channel 0.64 cm by 0.64 cm by 25.4 cm Channel shall be filled with sealant.
  - b. Substrates for environmental chamber emissions tests of assemblies of products or materials (materials tested in an assembly):
    - 1) Laminates or wood veneers applied with adhesives (Section 06400): Medium density fiberboard (MDF).
    - 2) Resilient flooring applied with adhesives (Section 09650): Sheet stainless steel or glass plate.
    - 3) Carpet Tile/Broadloom Carpet applied with adhesives and adhesives (Section 09685/Section 09680): Sheet stainless steel or glass plate.
    - 4) Wall Coverings applied with adhesives (Section 09700 Series): 5/8" gypsum board. Prior to preparation of the test specimen, Gypsum board substrate shall be pre-conditioned for at least 24 hours at  $23 \pm 2^{\circ}\text{C}$  and  $50 \pm 10\%$  RH while ventilated with clean air. [Ventilation rate is not important.]
  - c. Protocol for Paint Testing: Preparation and handling of paint test specimen.
    - 1) Flat and Eggshell Paints:
      - a) Apply paints to 5/8" thick gypsum board. Hold Gypsum board substrate for at least 24 hours at  $23 \pm 2^{\circ}\text{C}$  and  $50 \pm 10\%$  RH while ventilated with clean air. Accurately weigh substrate just prior to painting, mask borders to avoid paint dripping on edges and leave center area for paint. Alternative approaches to protecting the edges are acceptable and shall be reported if used.
      - b) Apply paint using standardized roller procedure that simulates application of paint in building. For most wall paint applications use a 4" wide 3/8" nap roller intended for smooth surfaces.
      - c) Stir paint in container and transfer 100 mL of paint to heavy-duty aluminum foil disposable tray.
      - d) Saturate roller cover with paint by running back and forth in tray.
      - e) Apply paint to substrate using four strokes, two in vertical direction and two in horizontal direction, so entire area is uniformly covered.
      - f) Remove tape from substrate and re-weigh substrate.
      - g) Difference in weight determines amount of applied paint and coverage in grams of wet paint per square meter of substrate surface.
      - h) Place substrate on 6" by 6" piece of sheet stainless steel to cover entirely the back surface. Attach substrate to stainless steel with strips of low VOC aluminized clean room tape so only painted surface is exposed. For a blank specimen, similarly prepare an unpainted piece of gypsum. Alternate procedures to cover unpainted surfaces of gypsum board may be used and must be adequately described in the laboratory report if used.
      - i) Place sample in conditioning environment immediately and hold for ten days.
      - j) Where multiple coats, which may include primer, are being tested, apply paints and follow manufacturers' instructions for drying time between coats. Report weight of test specimen prior to and after each coat of paint is applied. Hold specimen in conditioning environment between coats. The ten-day conditioning period begins after application of final coat. Apply semi-gloss paint to clean steel sheet following same procedure as above for "flat

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and eggshell paints." No tape should be used. Sheet should be weighed immediately before and after painting.

9. Chemical Analyses:
    - a. VOC Analysis: Make multi-point calibrations using pure compounds whenever such compounds are available from commercial suppliers (such as Aldrich Chemical Company, Sigma Aldrich). Quantitative analyses performed using surrogate compounds shall be indicated in reported test results. Identify EPA and ASTM standard methods and practices, and testing laboratory calibration procedures, which should include a calibration at least once every three (3) months.
    - b. Formaldehyde and Acetaldehyde Analysis: Formaldehyde and Acetaldehyde analysis shall be performed following ASTM Standard D 5197 "Standard Test Method for Formaldehyde and other Carbonyl Compounds in Air (Active Sampler Methodology)"
  10. Reporting Requirements: In addition to reporting requirement stated elsewhere in Specifications, reports shall include: (a) all compounds emitted from sample that are on the most recent Chronic Reference Exposure Level list as published by the California Office of Environmental Health Hazard Assessment and listed in their website at [http://www.oehha.org/air/chronic\\_rels/allChrels.html](http://www.oehha.org/air/chronic_rels/allChrels.html), (b) all compounds on the California Proposition 65 list, and (c) all compounds on the California Toxic Air Contaminant list. In addition, the ten most abundant compounds shall be reported separately if not listed on any of these lists. For these compounds, report following:
    - a. measured chamber concentrations at each required time point.
    - b. calculated emission factors.
    - c. calculated building concentrations and assumptions used to make calculation.  
(Note 14)
- E. State Agency Buy Recycled Campaign (SABRC) Recycled Content: Implement the SABRC recycled-content goals for specific building products, including but not limited to: (Note 15)
1. Paper products;
  2. Glass products (windows, glazing, fiberglass, tile, construction blocks, loose-grain abrasives);
  3. Plastic products (carpet, plastic lumber, furniture made from plastic, fencing, parking bumpers, toilet partitions, entry mats, signage, sheet plastic and other plastic-containing building products);
  4. Solvents;
  5. Tire-derived products (entry-mats, resilient flooring, wheelchair and other ramps, playground surfacing, parking bumpers, speed bumps, tree ties, road surfacing);
  6. Steel products (structural steel, steel framing, architectural metal, reinforcing bars, sheet metal, metal siding, metal roofing, lockers, toilet partitions, office furniture for filing and storage);
  7. Paint (allowed only in exterior installations).
  8. Compost

### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Packaging: Deliver materials in recyclable or in reusable packaging such as cardboard, wood, paper, or reusable blankets, which will be reclaimed by supplier or manufacturer for recycling.
  1. General: Minimize packaging materials to maximum extent possible while still ensuring protection of materials during delivery, storage, and handling.

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- a. Unacceptable Packaging Materials: Polyurethane, polyisocyanate, polystyrene, polyethylene, and similar plastic materials such as “foam” plastics and “shrink-fit” plastics.
2. Reusable Blankets: Deliver and store materials in reusable blankets and mats reclaimed by manufacturers or suppliers for reuse where program exists or where program can be developed for such reuse.
3. Pallets: Where pallets are used, suppliers shall be responsible to ensure pallets are removed from site for reuse or for recycling.
4. Corrugated Cardboard and Paper: Where paper products are used, recycle as part of construction waste management recycling program, or return to material’s manufacturer for use by manufacturer or supplier.
5. Sealants, Paint, Primers, Adhesives, and Coating Containers: Return to supplier or manufacturer for reuse where such program is available.

### 1.6 PROJECT CONDITIONS

- A. No smoking will be permitted in indoor Project site locations, as per California Labor Code (Section 400-6413.5).
- B. Certifications:
  1. Environmental Product Certification:
    - a. Include manufacturer certification indicating product contains maximum recycled content possible without being detrimental to product performance
    - b. Include certification indicating cleaning materials comply with requirements of these Specifications.
- C. Construction Ventilation and Preconditioning:
  1. Temporary Construction Ventilation: Maintain sufficient temporary ventilation of areas where materials are being used that emit VOCs. Maintain ventilation continuously during installation, and until emissions dissipate after installation. If continuous ventilation is not possible via building’s HVAC system(s) then ventilation shall be supplied via open windows and temporary fans, sufficient to provide no less than three air changes per hour.
    - a. Period after installation shall be sufficient to dissipate odors and elevated concentrations of VOCs. Where no specific period is stated in these Specifications, a time period of 72 hours shall be used.
    - b. Ventilate areas directly to outside; ventilation to other enclosed areas is not acceptable.
  2. During dust producing activities (e.g. drywall installation and finishing) turn ventilation system off, and openings in supply and return HVAC system shall be protected from dust infiltration. Provide temporary ventilation as required.
  3. Preconditioning: Prior to installation, allow products which have odors and significant VOC emissions to off-gas in dry, well-ventilated space for 14 calendar days to allow for reasonable dissipation of odors and emissions prior to delivery to Project site.
    - a. Condition products without containers and packaging to maximize off-gassing of VOCs
    - b. Condition products in ventilated warehouse or other building. Comply with substitution requirements for consideration of other locations.
- D. Protection:

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1. Moisture Stains: Materials with evidence of moisture damage, including stains, are not acceptable, including both stored and installed materials; immediately remove from site and properly dispose. Take special care to prevent accumulation of moisture on installed materials and within packaging during delivery, storage, and handling to prevent development of molds and mildew on packaging and on products.
  - a. Immediately remove from site and properly dispose of materials showing signs of mold and signs of mildew, including materials with moisture stains.
  - b. Replace moldy materials with new, undamaged materials.
2. Ducts: Seal ducts during transportation, delivery, and construction to prevent accumulation of construction dust and construction debris inside ducts.

### 1.7 SEQUENCING

- A. Environmental Issues:
  1. On-Site Application: Where odorous and/or high VOC emitting products are applied on-site, apply prior to installation of porous and fibrous materials. Where this is not possible, protect porous materials with polyethylene vapor retarders.
  2. Complete interior finish material installation no less than fourteen (14) days prior to Substantial Completion to allow for building flush out

## **PART 2 - PRODUCTS**

### 2.1 CHEMICALS OF CONCERN

- A. Chemicals of Concern are those chemicals listed below as toxic air contaminants, carcinogens, teratogens, reproductive toxins, and chemicals with established Chronic Reference Exposure Levels (REL):
- B. Carcinogens: Chemicals listed as probable or known human carcinogens in the latest published edition of the following two lists:
  1. California Environmental Protection Agency, Air Resources Board (ARB), list of Toxic Air Contaminants (California Air Toxics). <http://www.arb.ca.gov/toxics/summary/summary.htm>
  2. California Environmental Protection Agency, Office of Environmental Health Hazard Assessment (OEHHA), Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). [http://www.oehha.ca.gov/prop65/prop65\\_list/Newlist.html](http://www.oehha.ca.gov/prop65/prop65_list/Newlist.html).
- C. Reproductive Toxicants: Chemicals known to cause reproductive toxicity including birth defects or other reproductive harm in the latest published edition of the following list: California Environmental Protection Agency, Office of Environmental Health Hazard Assessment (OEHHA), Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). [http://www.oehha.ca.gov/prop65/prop65\\_list/Newlist.htm](http://www.oehha.ca.gov/prop65/prop65_list/Newlist.htm).
- D. Chemicals with established Chronic Reference Exposure Levels (REL): Chronic RELs have been developed for 65 hazardous airborne substances as of January 2001. A chronic REL is an airborne concentration level that would pose no significant health risk to individuals indefinitely exposed to that level. RELs are based solely on health considerations, and are developed from the best available data in the scientific literature. The California Environmental

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Protection Agency, Office of Environmental Health Hazard Assessment (OEHHA) establishes and publishes RELs. (Note 16)

**Table 1.** Chronic Reference Exposure Levels for organic chemicals with possible indoor sources, based on the California OEHHA list as of September 2002 (The most recent list shall be used for this specification as published at [http://www.oehha.org/air/chronic\\_rels/allChrels.html](http://www.oehha.org/air/chronic_rels/allChrels.html))

	<i>Substance (CAS #)</i>	<i>Listed in CAPCOA (1993)</i>	<i>Chronic Inhalation REL (<math>\mu\text{g}/\text{m}^3</math>)</i>	<i>Hazard Index Target(s)</i>	<i>Human Data</i>
1	<a href="#">Acetaldehyde*</a> (75-07-0)	<input checked="" type="checkbox"/>	9	Respiratory system	
2	<a href="#">Acrolein</a> (107-02-8)	<input checked="" type="checkbox"/>	0.06	Respiratory system; eyes	
3	<a href="#">Acrylonitrile</a> (107-13-1)	<input checked="" type="checkbox"/>	5	Respiratory system	
4	<a href="#">Ammonia</a> (7664-41-7)	<input checked="" type="checkbox"/>	200	Respiratory system	<input checked="" type="checkbox"/>
5	<a href="#">Arsenic</a> (7440-38-2) & arsenic compounds	<input checked="" type="checkbox"/>	0.03	Development; Cardiovascular system; Nervous system	
6	<a href="#">Benzene</a> (71-43-2)	<input checked="" type="checkbox"/>	60	Hematopoietic system; development; nervous system	<input checked="" type="checkbox"/>
7	<a href="#">Beryllium</a> (7440-41-7) and beryllium compounds	<input checked="" type="checkbox"/>	0.007	Respiratory system; immune system	<input checked="" type="checkbox"/>
8	<a href="#">Butadiene</a> (106-99-0)		20	Reproductive system	
9	<a href="#">Cadmium</a> (7440-43-9) & cadmium compounds	<input checked="" type="checkbox"/>	0.02	Kidney; respiratory system	<input checked="" type="checkbox"/>
10	<a href="#">Carbon tetrachloride</a> (56-23-5)	<input checked="" type="checkbox"/>	40	Alimentary system; development; nervous system	
11	<a href="#">Carbon disulfide</a> (75-15-0)		800	Nervous system; reproductive system	<input checked="" type="checkbox"/>
12	<a href="#">Chlorinated dioxins</a> (1746-01-6) & <a href="#">dibenzofurans</a> (5120-73-19)	<input checked="" type="checkbox"/>	0.00004	Alimentary system (liver); reproductive system; development; endocrine system; respiratory system; hematopoietic system	
13	<a href="#">Chlorine</a> (7782-50-5)	<input checked="" type="checkbox"/>	0.2	Respiratory system	

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14	<a href="#">Chlorine dioxide</a> (10049-04-4)		0.6	Respiratory system	
15	<a href="#">Chlorobenzene</a> (108-90-7)	<input checked="" type="checkbox"/>	1000	Alimentary system; kidney; reproductive system	
16	<a href="#">Chloroform</a> (67-66-3)	<input checked="" type="checkbox"/>	300	Alimentary system; kidney; development	
17	<a href="#">Chloropicrin</a> (76-06-2)	<input checked="" type="checkbox"/>	0.4	Respiratory system	
18	<a href="#">Chromium hexavalent:</a> soluble except chromic trioxide	<input checked="" type="checkbox"/>	0.2	Respiratory system	
19	<a href="#">Chromic trioxide</a> (as chromic acid mist)	<input checked="" type="checkbox"/>	0.002	Respiratory system	<input checked="" type="checkbox"/>
20	<a href="#">Cresol mixtures</a> (1319-77-3)	<input checked="" type="checkbox"/>	600	Nervous system	
21	<a href="#">Dichlorobenzene (1,4-)</a> (106-46-7)	<input checked="" type="checkbox"/>	800	Nervous system; respiratory system; alimentary system; kidney	
22	<a href="#">Dichloroethylene (1,1)</a> (75-35-4)	<input checked="" type="checkbox"/>	70	Alimentary system	
23	<a href="#">Diesel Exhaust*</a>		5	Respiratory system	
24	<a href="#">Diethanolamine</a> (111-42-2)		3	Cardiovascular system; nervous system	
25	<a href="#">Dimethylformamide (N,N-)</a> (68-12-2)		80	Alimentary system ; respiratory system	<input checked="" type="checkbox"/>
26	<a href="#">Dioxane (1,4-)</a> (123-91-1)	<input checked="" type="checkbox"/>	3,000	Alimentary system; kidney; cardiovascular system	
27	<a href="#">Epichlorohydrin</a> (106-89-8)	<input checked="" type="checkbox"/>	3	Respiratory system; eyes	
28	<a href="#">Epoxybutane (1,2-)</a> (106-88-7)		20	Respiratory system; cardiovascular system	
29	<a href="#">Ethylbenzene</a> (100-41-4)		2,000	Development; alimentary system (liver); kidney; endocrine system	
30	<a href="#">Ethyl chloride</a> (75-00-3)	<input checked="" type="checkbox"/>	30,000	Development; alimentary system	
31	<a href="#">Ethylene dibromide</a> (106-93-4)	<input checked="" type="checkbox"/>	0.8	Reproductive system	<input checked="" type="checkbox"/>
32	<a href="#">Ethylene dichloride</a> (107-06-2)	<input checked="" type="checkbox"/>	400	Alimentary system (liver)	
33	<a href="#">Ethylene glycol</a> (107-21-1)		400	Respiratory system; kidney; development	<input checked="" type="checkbox"/>
34	<a href="#">Ethylene glycol monoethyl ether</a> (110-80-5)	<input checked="" type="checkbox"/>	70	Reproductive system; hematopoietic system	

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35	<a href="#">Ethylene glycol monoethyl ether acetate</a> (111-15-9)	<input checked="" type="checkbox"/>	300	Development	
36	<a href="#">Ethylene glycol monomethyl ether</a> (109-86-4)	<input checked="" type="checkbox"/>	60	Reproductive system	
37	<a href="#">Ethylene glycol monomethyl ether acetate</a> (110-49-6)	<input checked="" type="checkbox"/>	90	Reproductive system	
38	<a href="#">Ethylene oxide</a> (75-21-8)	<input checked="" type="checkbox"/>	30	Nervous system	
39	<a href="#">Formaldehyde</a> (50-00-0)	<input checked="" type="checkbox"/>	3	Respiratory system; eyes	<input checked="" type="checkbox"/>
40	<a href="#">Glutaraldehyde</a> (111-30-8)	<input checked="" type="checkbox"/>	0.08	Respiratory system	
41	<a href="#">Hexane (n-)</a> (110-54-3)		7000	Nervous system	
42	<a href="#">Hydrazine</a> (302-01-2)	<input checked="" type="checkbox"/>	0.2	Alimentary system; endocrine system	
43	<a href="#">Hydrogen chloride</a> (7647-01-0)	<input checked="" type="checkbox"/>	9	Respiratory system	
44	<a href="#">Hydrogen cyanide</a> (74-90-8)	<input checked="" type="checkbox"/>	9	Nervous system; endocrine system; cardiovascular system	<input checked="" type="checkbox"/>
45	<a href="#">Hydrogen sulfide</a> (7783-06-4)	<input checked="" type="checkbox"/>	10	Respiratory system	
46	<a href="#">Isophorone</a> (78-59-1)		2000	Development; liver	
47	<a href="#">Isopropanol</a> (67-63-0)		7,000	Kidney; development	
48	<a href="#">Maleic anhydride</a> (108-31-6)	<input checked="" type="checkbox"/>	0.7	Respiratory system	
49	<a href="#">Manganese &amp; manganese compounds</a>	<input checked="" type="checkbox"/>	0.2	Nervous system	<input checked="" type="checkbox"/>
50	<a href="#">Mercury &amp; mercury compounds</a> (inorganic)	<input checked="" type="checkbox"/>	0.09	Nervous system	<input checked="" type="checkbox"/>
51	<a href="#">Methanol</a> (67-56-1)	<input checked="" type="checkbox"/>	4,000	Development	

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52	<a href="#">Methyl bromide</a> (74-83-9)	<input checked="" type="checkbox"/>	5	Respiratory system; nervous system; development	
53	<a href="#">Methyl chloroform</a> (71-55-6)	<input checked="" type="checkbox"/>	1,000	Nervous system	
54	<a href="#">Methyl isocyanate</a> (624-83-9)		1	Respiratory system; reproductive system	
55	<a href="#">Methyl t-butyl ether</a> (1634-04-4)		8,000	Kidney; eyes; alimentary system (liver)	
56	<a href="#">Methylene chloride</a> (75-09-2)	<input checked="" type="checkbox"/>	400	Cardiovascular system; nervous system	<input checked="" type="checkbox"/>
57	<a href="#">Methylene dianiline</a> (4,4'-) (101-77-9)	<input checked="" type="checkbox"/>	20	Eyes; alimentary system (hepatotoxicity)	
58	<a href="#">Methylene Diphenyl Isocyanate</a> (101-68-8)		0.7	Respiratory system	
59	<a href="#">Naphthalene</a> (91-20-3)	<input checked="" type="checkbox"/>	9	Respiratory system	
60	<a href="#">Nickel &amp; compounds</a> (except nickel oxide)	<input checked="" type="checkbox"/>	0.05	Respiratory system; hematopoietic system	
61	<a href="#">Nickel oxide</a> (1313-99-1)		0.1	Respiratory system; hematopoietic system	
62	<a href="#">Phenol</a> (108-95-2)	<input checked="" type="checkbox"/>	200	Alimentary system; cardiovascular system; kidney; nervous system	
63	<a href="#">Phosphine</a> (7803-51-2)	<input checked="" type="checkbox"/>	0.8	Respiratory system; alimentary system; nervous system; kidney; hematopoietic system	
64	<a href="#">Phosphoric acid</a> (7664-38-2)		7	Respiratory system	
65	<a href="#">Phthalic anhydride</a> (85-44-9)	<input checked="" type="checkbox"/>	20	Respiratory system	<input checked="" type="checkbox"/>
66	<a href="#">Propylene</a> (115-07-1)		3,000	Respiratory system	
67	<a href="#">Propylene glycol monomethyl ether</a> (107-98-2)		7,000	Alimentary system (liver)	
68	<a href="#">Propylene oxide</a> (75-56-9)	<input checked="" type="checkbox"/>	30	Respiratory system	
69	<a href="#">Selenium and selenium compounds</a> (other than hydrogen selenide)	<input checked="" type="checkbox"/>	20	Alimentary system; cardiovascular system; nervous system	<input checked="" type="checkbox"/>

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70	<a href="#">Styrene</a> (100-42-5)	<input checked="" type="checkbox"/>	900	Nervous system	<input checked="" type="checkbox"/>
71	<a href="#">Sulfuric acid</a> (7664-93-9)		1	Respiratory system	
72	<a href="#">Tetrachloroethylene*</a> (perchloroethylene) (127-18-4)	<input checked="" type="checkbox"/>	35	Kidney; alimentary system (liver)	
73	<a href="#">Toluene</a> (108-88-3)	<input checked="" type="checkbox"/>	300	Nervous system; respiratory system; development	
74	<a href="#">Toluene diisocyanates</a> (2,4-&2,6-)	<input checked="" type="checkbox"/>	0.07	Respiratory system	<input checked="" type="checkbox"/>
75	<a href="#">Trichloroethylene</a> (79-01-6)	<input checked="" type="checkbox"/>	600	Nervous system; eyes	<input checked="" type="checkbox"/>
76	<a href="#">Triethylamine</a> (121-44-8)		200	Eyes	
77	<a href="#">Vinyl acetate</a> (108-05-4)		200	Respiratory system	
78	<a href="#">Xylenes</a> (m-, o-, p-)	<input checked="" type="checkbox"/>	700	Nervous system; respiratory system	<input checked="" type="checkbox"/>

**2.2 SUBSTITUTIONS**

- A. Substitutions Environmental Issues: Requests for substitutions shall comply with requirements specified in Section 01630 – Product Substitution Procedures, with following additional information required where environmental issues are specified.
1. Indicate each proposed substitution complies with requirements for VOCs.
  2. Owner, in consultation with Architect reserve right to reject proposed substitutions where data for VOCs is not provided or where emissions of individual VOCs are higher than for specified materials.
  3. Comply with specified recycled content and other environmental requirements.

# **THE COLLABORATIVE FOR HIGH PERFORMANCE SCHOOLS**

## **PART 3 - EXECUTION**

### **3.1 FIELD QUALITY CONTROL**

- A. Building Flush Out: Just prior to Substantial Completion, flush out building continuously (i.e. 24 hours per day, seven (7) days a week) using maximum tempered outside air (or maximum amount of outside air while achieving reasonable indoor temperature) for at least fourteen (14) calendar days. If interruptions of more than a few hours are required for testing and balancing purposes, extend flush out period accordingly.
  - 1. When Contractor is required to perform touch-up work, provide temporary construction ventilation during installation and extend building flush-out by a minimum of four (4) days after touch-up installation with maximum tempered outside air for 24 hr per day.
  - 2. If construction schedule permits, extend flush-out period beyond 15 days.
  - 3. Return ventilation system to normal operation following flush-out period to minimize energy consumption.

### **3.2 CLEANING**

- A. Final Cleaning Environmental Issues:
  - 1. Clean interior and exterior surfaces exposed to view; remove temporary labels, stains, and foreign substances; polish transparent and glossy surfaces using cleaning and maintenance products as described in Part 1 of this Section.
  - 2. Clean equipment and fixtures to sanitary condition using cleaning and maintenance products as described in Part 1 of this Section.
  - 3. Vacuum carpeted and soft surfaces with high efficiency particulate arrestor (HEPA) vacuum.
  - 4. If ducts were not sealed during construction, and contain dust or dirt, clean ducts using HEPA vacuum immediately prior to Substantial Completion and prior to using ducts to circulate air. Oil film on sheet metal shall be removed before shipment to site. However, ducts shall be inspected to confirm that no oil film is present. Remove oil.
  - 5. Replace all air filters (i.e., pre and final filters) just prior to Substantial Completion.
  - 6. Remove and properly dispose of recyclable materials using construction waste management program described in Section 01565 – Site Waste Management Program.

### **3.3 PROTECTION**

- A. Environmental Issues:
  - 1. Protect interior materials from water intrusion or penetration; where interior products not intended for wet applications are exposed to moisture, immediately remove from site and dispose of properly.
  - 2. Protect installed products using methods that do not support growth of molds and mildews.
    - a. Immediately remove from site materials with mold and materials with mildew.

**END OF SECTION**

**APPENDIX A**

**THE COLLABORATIVE FOR HIGH PERFORMANCE SCHOOLS**

Project Name: \_\_\_\_\_

**RECYCLED CONTENT CERTIFICATION FORM**

This form is to be completed by a Corporate Officer of the Product Manufacturer for the General Contractor. The General Contractor must return the certification, completed for each product with recycled content as required by specific Specification Sections. Attach additional sheets if necessary.

<p><b>GENERAL CONTRACTOR</b></p> <p>Name:</p> <p>Address:</p> <p>Telephone, fax, e-mail:</p>	<p><b>SUBCONTRACTOR/INSTALLER</b></p> <p>Name:</p> <p>Address:</p> <p>Telephone, fax, e-mail:</p>	<p><b>PRODUCT MANUFACTURER</b></p> <p>Name:</p> <p>Address:</p> <p>Telephone, fax, e-mail:</p>
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Item #	Product Category <sup>1&amp;2</sup> <i>(Include if applicable)</i>	Product Description CSI section number <sup>3</sup> <i>(Needed for all products)</i>	Quantity Bid	Unit of measure	Cost of material, (Excluding installation labor)	Weight in pounds	% As a percent of total weight			Total % <sup>8</sup>
							% Virgin Content <sup>5</sup>	% Post-consumer <sup>6</sup>	% Post-industrial <sup>7</sup>	
		CSI section:								100
		CSI section:								100
		CSI section:								100
		CSI section:								100
		CSI section:								100
		CSI section:								100

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*Printed Name: (a corporate officer)*

*Title*

*Date*

*Signature*

## APPENDIX A

## THE COLLABORATIVE FOR HIGH PERFORMANCE SCHOOLS

### GENERAL NOTES:

- A. The Public Contract Code Sections, listed below, apply to California public (DGS) projects only. The required document has been adapted for use on other types of projects, including public schools.
- B. Public Contract Code Sections 10233, 10308.5, and 10354 require all vendors and contractors to certify in writing, under penalty of perjury, to the state agency awarding a contract, the minimum, if not the exact percentage, of post-consumer and post-industrial material in the materials, goods, or supplies offered or used.
- C. Public Contract Code Section 12205(a) requires all state agencies to require all contractors to certify in writing, under penalty of perjury, the minimum, if not the exact percentage, of post-consumer and post-industrial material in the materials, goods, or services provided or used.

### NOTES:

- (1) Product Category: (Fill in above, if applicable. This information is used to determine compliance with the State Agency Buy Recycled Campaign.)
  1. Compost/Co-compost
  2. Glass Products
  3. Lubricating Oils
  4. Paint
  5. Plastic Products
  6. Paper Products
  7. Printing and Writing Papers
  8. Solvents
  9. Steel Products
  10. Tires
  11. Tire-derived Products
- (2) Product category is used for State agency reporting for State projects, excluding public schools. Products that are made from multiple material types should be reported in the product category of the material type representing most of the product. The amount of material used in the product can be measured by weight or volume. If, for instance, a chair is made from steel, aluminum, and plastic and most of the material, either by weight or volume, is plastic, report it as a plastic product. If, however, most of the product, either by weight or volume, is steel, report the purchase as a steel product.
- (3) Identify the Construction Specifications Institute (CSI) Specification Section number for the product, as indicated in the Project Specifications.
- (4) Below are products preliminarily identified in the Project Specifications as having minimum recycled content requirements. Refer to the Project Specifications for individual sections in the specifications for recycled content level that must be achieved. Recycled content guidelines shall include, but not be limited to, the products below (to be revised for each project):
  1. Parking Bumpers  
(Section 2760)
  2. Fluid-Applied Waterproofing  
(Section 07140)
  3. Concrete reinforcement  
(Section 03200)
  4. Bentonite Waterproofing  
(Section 07170)
  5. Structural steel  
(Section 05120)
  6. Metal Decking  
(Section 05300)
  7. Building Insulation  
(Section 07210)
  8. Steel doors and frames  
(Section 08110)
  9. Glazing  
(Section 08800)
  10. Paints and Coatings  
(Section 09900)
  11. Cold-Formed Metal Framing  
(Section 05400)
  12. Gypsum board  
(Sections 09255, 09260, 09265)
  13. Ceramic tile  
(Section 09300)
  14. Acoustical ceilings  
(Section 09510)
  15. Resilient flooring  
(Section 09650)
  16. Carpeting  
(Sections 09682, 09686)

## **APPENDIX A**

## **REFERENCE SPECIFICATIONS FOR ENERGY AND RESOURCE EFFICIENCY**

17. Metal Toilet Compartments  
(Section 10160)

18. Identifying Devices  
(Section 10400)

19. Architectural Woodwork  
(Section 06400)

- (5) Virgin material content is that portion of the product made from non-recycled material, that is, the material is neither post-industrial nor post-consumer material.
- (6) Post-consumer material is defined as "a finished material which would have been disposed of as a solid waste, having completed its life cycle as a consumer item, and does not include manufacturing wastes." This is material such as a newspaper that is read, recycled and then made into recycled content newsprint or some other recycled product. Post-consumer material is generally any product that is bought by the consumer, used, and then recycled into another product.
- (7) Post-industrial (also referred to as pre-consumer or secondary material) is defined as "fragments of finished products or finished products of a manufacturing process, which has converted a resource into a commodity of real economic value, but does not include excess virgin resources of the manufacturing process." This is material such as newsprint that is trimmed from a roll in the paper plant that is returned to the beginning of the process to make recycled content newsprint. The material (product) did not get to the consumer before being recycled. Post-industrial material DOES NOT include post-consumer material. FOR EXAMPLE: If a Printing and Writing Paper contained 20% post-consumer material, you would indicate 20 in the post-consumer column and 80 in the virgin column. If the product had 40% secondary material and 20% post-consumer material, you would indicate 40 in the post-industrial column, 20 in the post-consumer column, and 40 in the virgin column.
- (8) The sum of the percentages for virgin, post-consumer, and post-industrial content must equal 100 percent.