

U.S. ENVIRONMENTAL PROTECTION AGENCY
NEW HEADQUARTERS PROJECT

ENVIRONMENTAL TESTING REQUIREMENTS FOR FURNITURE
DEVELOPED 1996

The following documents are the original criteria used in the furniture procurement for the EPA Headquarters.

I. INTRODUCTION

EPA is committed to providing their employees with a healthful, productive workplace. Providing good indoor air quality is a central component of this commitment. Good indoor air quality is influenced by several integral factors:

1. Good HVAC system design/construction/maintenance
2. Adequate ventilation with fresh air
3. Adequate filtration
4. Appropriate management of construction/remodeling work
5. Source management

The careful selection of materials is an important component of any source management strategy. Evaluating Volatile Organic Compound (VOC) emissions can improve building material/furnishing decision making. The following documents are the original criteria used in the furniture procurement for the EPA Headquarters.

II. EMISSION TESTING

There are no federal regulations governing VOC emissions from building materials. However, product manufacturers have begun to focus on limiting emissions of selected chemicals and have established testing programs for their products. Guidance for small chamber testing has been established (ASTM D 5116-90) and is being used by a number of product manufacturers to test their products in chambers.

In addition, the State of Washington in 1990 established emissions testing requirements for vendors interested in bidding on the State's furniture contract. This procurement required independent large chamber testing of an entire system under standardized test conditions. Emission levels for TVOC's, formaldehyde and particulates were measured.

EPA's New Headquarters Project intends to establish an environmental large chamber testing protocol for emissions testing of workstations to be procured under this contract. A brief outline of the anticipated requirements is included below for your information.

III.A. EPA's NEW HEADQUARTERS PROJECT SPECIFICATIONS FOR SYSTEMS FURNITURE

The EPA New Headquarters Project intends to establish emission standards for all workstations to be included under this contract. Testing protocols will be identified which will allow for standardized large chamber testing of a single composite workstation. This workstation is not a prototype for this procurement. It will include typical componentry to be used in a number of workstations which are being standardized to meet EPA's specific New Headquarters requirements.

EPA EMISSIONS TESTING REQUIREMENTS FOR SYSTEMS FURNITURE

Testing for the following parameters will be undertaken:

- TVOC's¹ <0.5 mg/m³
- Formaldehyde <0.05 ppm
- Total Aldehydes <0.1 ppm
- 4-PC (as an odorant) below the limits of detection²

¹ NOTE: TVOC's represents the sum of volatile organic compounds (VOC's) that can be analyzed and measured by the specified analytical method, and are calibrated referenced to toluene (by introducing known quantities of toluene onto a sorbent trap and introducing it into the analytical system exactly as a sample analysis would be).

² NOTE: The limit of detection is defined as the amount of the material (analyte) that can be distinguished from background, i.e., below the limits of detection means less than the quantitation limit of the analytical technique.

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IIIB. In addition, and subsequent to this testing, EPA reserves the right to undertake small chamber testing, in accordance with ASTM D 5116-90, for items such as panel fabric (which could change over the period of the contract) and other components including new items which become available during the period of the contract.

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IIIC. EPA also reserves the right to undertake discretionary testing of complete workstations at their own cost throughout the period of the contract. This is intended to ensure that the selected vendor's product continues to meet the established test standard. Should testing described in IIIB and IIIC produce results which exceed the accepted emissions standards, the vendor will be responsible for correction of the problem at his own cost.

IV. TEST PROTOCOLS

Environmental large chamber test protocols will use selected conditions representative of anticipated conditions at the new EPA headquarters complex. They will include the ventilation rate (ACH), product loading (m²/m³), (product loading is the ratio of the test specimen area to the chamber volume), humidity, and temperature. The environmental chamber testing will be conducted to the extent practicable in accordance with the guidance established for small chamber environmental testing (ASTM D 5116-90) and any up-dates to that document in place at the test date, together with modifications necessary to meet the requirements of large chamber testing.

Vendors who choose to submit a proposal for the forthcoming RFP, will be responsible for submitting the composite workstation components to the selected laboratory. Packaging of the componentry must be in accordance with the established protocol, details of which will be available to interested vendors. Schedule for delivery will be strictly enforced to ensure that the workstation components come directly from manufacturer's production line to the laboratory holding area, where they will be allowed to acclimatize for 24 hours prior to being assembled in the test chamber.

V. DURATION OF TEST & DOCUMENTATION

EPA believes that essential information can be gained by testing this composite workstation under the controlled conditions noted above for a maximum of seven days (168 hours). This period of time will allow for the identification of TVOCs, formaldehyde, total aldehydes, and 4-PC.

During this period sample collection for analysis of TVOCs, formaldehyde, total aldehydes and 4-PC will be made, starting at 1 hour after installation and continuing at pre-determined intervals throughout the 168 hours of the test period.

Sample collection will be fully documented by lab personnel. A representative from the manufacturer may be present at the sample collection if desired.

VI. COSTS

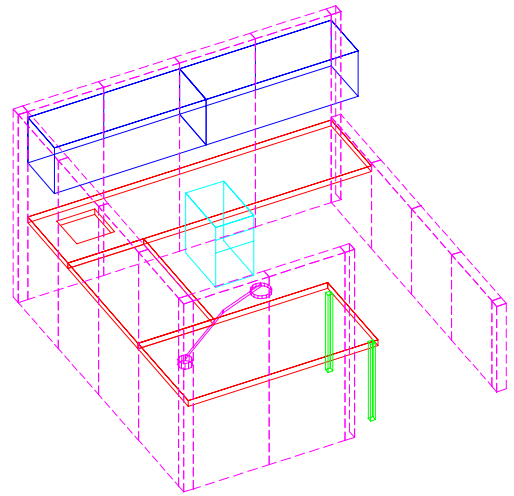
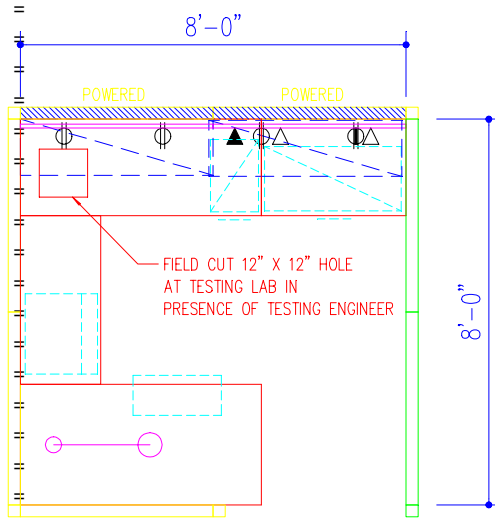
All costs associated with the testing of the workstation will be borne by the manufacturer. (with the exception of any possible tests conducted by the EPA as noted above in section IIIC.) The costs include, but are not limited to, packaging of the componentry, transportation, assembly, all costs associated with laboratory procedures and lab time, disassembly, and transportation back to manufacturer.

Note: It is anticipated that laboratory costs will be substantially lessened due to the reduction in time from the more typical thirty-nine (39) days test period to seven (7) days. However, no cost data are available at the moment.

VII. COMPOSITE WORKSTATION

A Plan and an axonometric drawing of the composite workstation for the EPA procurement are included, together with a list of typical components required for the workstation (See Appendix C). All manufacturers wishing to submit an RFP in response to the forthcoming solicitation must be prepared to deliver a workstation for testing which meets these basic requirements. Only minor variations in dimensions and scope will be accepted. The workstation will remain the property of each manufacturer, and can be returned at vendor's expense on completion of the testing.

EPA EMISSIONS TESTING REQUIREMENTS FOR SYSTEMS FURNITURE



- KEY**
- ⊕ DUPLEX OUTLET
 - ⊖ ISOLATION GROUND OUTLET
 - ▲ TELEPHONE OUTLET
 - △ DATA OUTLET

Note: Data locations are for information only.

CHAMBER TEST STATION

1 ea.	Worksurface with legs	30" x 60" - 29" hi
1 ea.	Return	20" x 42" - 29" hi
1 ea.	Worksurface w/ Field Cutout	24" x 60" - 29" hi
1 ea.	Worksurface	24" x 48" - 29" hi
1 ea.	Pedestal (2 box 1 file)	
1 ea.	Lateral File	30" x 18" - 27" hi
8 lin ft	Overhead Cabinets	
8 lin ft	Under-cabinet lights	
1 ea.	Pencil Drawer	
1 ea.	Keyboard Drawer	
1 ea.	Coat Hook	
12ea.	Tackboard	16" x 48"
1 ea.	Task light	
20 lin ft	Wall Panels (8 lin ft Powered)	65" high
8 lin ft	Wall Panels	42" high

EPA PROTOCOL FOR TESTING THE HQ FURNITURE
REQUIREMENTS FOR THE SHIPPING AND TESTING PROCEDURES

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SAMPLE FURNITURE LABEL

<p><i>Date and Time of Manufacture:</i></p> <p><i>Date and Time of Shipping:</i></p> <p><i>Shipping Company:</i></p> <p><i>Furniture Company:</i></p> <p><i>Furniture Description (e.g., Make and Model):</i></p> <p><i>Signature of Furniture Company Employee:</i></p> <p>=</p> <p>=</p>
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Because the workstation must be placed in the chamber within 48 hours of arrival at the chamber testing laboratory, the manufacturer should coordinate the schedule for arrival of all pieces of the workstation with the chamber testing laboratory.

PART 3 - EXECUTION

4.0 TARGET POLLUTANT EMISSION RATES

The target emission standards are defined as those “emission rates” of pollutants emanating from the product of concern which will not produce building air concentrations greater than the following:

- | | |
|--------------------------|-------------------------------|
| (a) Formaldehyde | <0.05 ppm |
| (b) TVOC’s | <0.5 mg/m ³ |
| (c) Total Aldehydes | <0.1 ppm |
| (d) 4-PC (as an odorant) | below the limits of detection |

The pollutant specification compliance is based on an outside air rate of 1.0 A.C.H. The loading rate is 1 full workstation per 25.7 m³. A workstation is defined in 2.0 above.

5.0 TEST PROTOCOLS

The environmental chamber testing will be conducted to the extent practicable in accordance with the guidelines established for small chamber environmental testing (ASTM D 5116-90) and any updates to that document in place at the test date, together with modifications necessary to meet the requirements of large chamber environmental

testing.

All data shall be made available for review by EPA's New Headquarters planning staff and their consultants.

Specific requirements for this protocol include, but are not limited to the following parameters, in addition to those noted above.

- (a) The tests shall be conducted in a chamber capable of accommodating the entire workstation as specified by EPA (See Appendix C). The range of chamber sizes which may be used is 21 to 29 m³. The volume of air that flows through the chamber will be at a constant volume of 25.7 m³/hr.
- (b) The environmental chamber will be constructed of inert, smooth surfaces such as stainless steel or glass and will assure that formaldehyde at the level of 0.05 ppm and representative volatile organics at the level of 10 ug/m³ are not irreversibly retained on the interior of the surfaces. Quality control data must be submitted showing that recovery rates of 85-115% are possible for formaldehyde, toluene, and decane at these levels, as per the recoveries specified by the analytical method.
- (c) The air within the chamber will be free of any obstructions or contamination such as internally mounted fan(s), humidifiers, or refrigeration coils. A fan with an external mounting may be used to keep the chamber air well mixed. The internal air will only come in contact with inert chamber walls, a fan with an external mounting, the air diffusion system and sampling ports.
- (d) Internal air velocity within the chamber will be reproducibly maintained at a level in the range of 0.05 to 0.1 m/sec. (10 to 20 fpm).
- (e) Internal chamber air will be well mixed and comply with 5% of the theoretical well-mixed model.
- (f) Clean air will be generated and used as the supply air to the chamber. It is necessary that the supply air backgrounds be sufficiently low to achieve statistically meaningful analytical measurements at the level anticipated. Purified air will be supplied to the chamber with background concentrations not exceeding 0.002 ppm formaldehyde, and 2 ug/m³ of total volatile organics with no individual organic exceeding this level. The ambient air (background) in the chamber should also not exceed these levels. Using gas chromatographic thermal desorption/mass spectrometric technique, the ambient air in the chamber will be sampled just prior to loading.
- (g) The chamber operation will be maintained with strict and reproducible operating parameters of 1.0 ± 0.05 A.C.H., 25° ± 2° C and 50% ± 5% relative humidity. These parameters shall be monitored continuously throughout the test, and shall be included in the final report.
- (h) The chamber will be operated under slight positive pressure relative to atmospheric pressure.
- (i) The test protocol will include evaluation of pollutant emissions over a nominal one (1) week 7 day period (± four (4) hours) to allow for mathematical modeling of the product

emission profiles over time. Operational and QC procedures will be adequate to maintain sample integrity over the entire test period.

- (j) Off-the-line products (workstation components) are to arrive at the testing laboratory within 48 hours of the testing date. The materials are to remain in their packaged state until immediately prior to loading into the environmental chamber. (The product selection, packaging and shipping protocols are described in Part 2, items 3.0-3.2.) The components are to be unpacked immediately prior to assembly and set-up in the environmental chamber. Care must be taken during assembly by the installers, in concert with the laboratory personnel, not to introduce any contamination into the chamber. The testing facility must have a QC procedure to minimize this concern. Testing of the pollutant levels must begin following one (1) hour of complete installation and enclosure in the environmental chamber.
- (k) Emission rates are to be determined from the environmental chamber measurements.
- (l) Dynamic analytical measurements will be made using methods sensitive and reproducible at the level in the low ppb range and other volatile organics. Appropriate standard and recovery data will be obtained for the classes of compounds and the concentration ranges found to substantiate the accuracy and precision of the analytical methods used.
- (m) Analysis of air samples for formaldehyde, TVOC's (total volatile organic compounds), total aldehydes, and 4 phenylcyclohexene are to be reported separately.
- (n) Quality control data on the chamber operational parameters as mentioned in Section 5.0, Test Protocols, items (a) through (f) above must be submitted with the final analytical data, as well as supporting documentation for the accuracy and precision of the analytical measurements. A statistically valid number of analytical measurements must be made for interpretative reasons, and external quality control audits must be incorporated into the overall measurements program.

5.1 SAMPLE COLLECTION AND ANALYSIS

- (a) Timing for sample collection for analysis for formaldehyde, TVOC's, total aldehydes and 4-PC; 1 hour after workstation assembly and enclosure in the chamber, and then at 4, 24, 72, 120, and 168 hours thereafter.
- (b) Air samples are to be analyzed and measured utilizing the specified analytic method and are to be calibrated referenced to toluene or other suitable analytical standards. (Air samples to be collected on multi-sorbent trap and analyzed by gas-chromatography-mass spectroscopy.)

5.2 AIR EXCHANGE RATE

Air exchange rate in chamber: 1.0 air changes per hour (ACH) of clean air for a 25.7 m³ chamber, or an equivalent ACH for a different size chamber (see Section 5.0, Test Protocols, item (a) for acceptable sizes). Air flow through chamber: use a one-pass system using clean purified air as referenced in 5.0 (f).

5.3 AIR VELOCITY

Air velocity within the chamber will simulate the building environment. Velocity as described in 5.0 (d) is required and must be verified upon completion of chamber test. Mixing shall be provided for by careful location of inlets and outlets for air supply and circulation. The report or the tests shall include a description of the air flow in the chamber. The report or the tests shall include a distribution of the air flow in the chamber and the determination of distribution patterns, mixing and local velocity at the surfaces of the test specimen. Local velocity shall be measured 1 cm. from specimen surfaces at no less than five representative locations.

5.4 QUALITY ASSURANCE/QUALITY CONTROL

Report of test must include complete description of the test system, analysis and results. All Quality Assurance/Quality Control (QA/QC) procedures must be reported.

5.5 REPRESENTATION AT TESTING LABORATORY

As its own cost, the manufacturer may choose to have a company representative present during the sample collection and analysis. This will be an observatory role. All work connected with the testing will be handled by lab personnel.

PART 4 - ADDITIONAL TESTING

6.0 MANUFACTURER RESPONSIBILITY

If, after installation of the product, a strong odor is detected, EPA may request a random sample/component of the workstation be retested. The manufacturer shall bear responsibility for retesting the suspect component in an appropriately sized chamber test to verify the system meets the emissions testing requirements for EPA's New Headquarters Project. If the suspect component does not meet the specified requirements, the Manufacturer shall replace the component throughout with one which does meet the emissions testing requirements for EPA's New Headquarters Project, at no cost to EPA.

6.1 EPA'S TESTING OPTION

At any time during the manufacture of componentry designated for the new EPA Headquarters project, and/or during installation or thereafter, EPA reserves the right to undertake discretionary testing of individual components and/or a complete workstation (excluding fabric) at their own cost. Should such testing produce results which exceed the accepted emission standards as established by this protocol, the manufacturer shall be responsible for replacing the components or workstations throughout the project with replacement(s) which meet the emissions testing requirements for EPA's New Headquarters Project, at no cost to EPA.

EPA EMISSIONS TESTING REQUIREMENTS FOR SEATING

The following documents are the original criteria used in the furniture procurement for the EPA Headquarters.

Part 1 – GENERAL

1.0 INTRODUCTION

EPA is committed to providing their employees with a healthful, productive workplace. Providing good indoor air quality is a central component of this commitment. Good indoor air quality is influenced by several integral factors:

1. Good HVAC system design/construction/maintenance
2. Adequate ventilation with fresh air
3. Adequate filtration
4. Appropriate management of construction/remodeling work
5. Source management

The careful selection of materials is an important component of any source management strategy. Evaluating Volatile Organic Compound (VOC) emissions can improve building material/furnishing decision making.

2.0 EMISSION TESTING

There are no federal regulations governing VOC emissions from building materials. However, product manufacturers have begun to focus on limiting emissions of selected chemicals and have established testing programs for their products. Guidance for small chamber testing has been established (ASTM D 5116-90) and is being used by a number of product manufacturers to test their products in chambers.

In addition, the State of Washington in 1990 established emissions testing requirements for vendors interested in bidding on the State's furniture contract. This procurement required independent chamber testing of office seating (desk and guest chairs) under standardized test conditions. Emission levels for TVOC's, formaldehyde and particulates were measured.

In order to comply with the intent of their mission, EPA's New Headquarters Project is working towards establishing an indoor pollutant source management plan which will provide assurance that minimum target pollutant concentration standards for articulated office and pull-up chairs and finish materials are met by applying uniform testing controls and procedures.

3.0 EPA's NEW HEADQUARTERS PROJECT: OUTLINE SPECIFICATIONS FOR OFFICE SEATING.

Standardizing mid-size chamber testing of two (2) chairs, one fully articulated typical desk chair, plus one typical guest chair will be undertaken. The chairs may be tested individually or tested simultaneously in a single mid-size chamber in accordance with the conditions noted below. If tested individually each chair is to meet one-half (1/2) the "Target Pollutant Concentration Rates" listed in Part 3, Section 5.0. The desk chair will be ergonomic with a fully articulated back and seat, swivel/tilt mechanism, castors, arms and all components necessary for maximum comfort and adjustability. The guest chair will be of rigid construction with either legs or a sled base. Both chairs will be fully upholstered. However, the outer upholstery fabric covering will not be included in the test chamber. These chairs are being standardized to meet EPA's specific requirements.

Note: If the selected chairs are the product of different companies the chairs *must be* tested in separate chambers. If the chairs have a single manufacturer they may be tested together in a single chamber. The tests may be conducted simultaneously or sequentially with all of the noted protocols being observed throughout the test period(s). Refer to item “6.0 Test Protocols.”

3.1 TESTING OF UPHOLSTERY FABRICS

In addition, and subsequent to this testing, EPA reserves the right to undertake small chamber testing, in accordance with ASTM D 5116-90, for items such as upholstery fabric (which could change over the period of the contract) and other components.

Part 2 – PROTOCOL FOR SHIPPING FURNITURE TO CHAMBER TESTING LABORATORIES

4.0 SELECTION PROCESS

The chair components selected for testing should be taken directly off the production line. It should be representative of and treated no differently (including temperature and air flow) from other similar types of furniture. The chair components should be randomly selected. Neither the first nor the last piece in a production batch should be selected. The chair components should not be selected based on any physical attribute that distinguishes it from the other chair components in the batch. The chair components will be selected in the presence of an EPA official or his or her representative.

4.1 PACKAGE PROTOCOL

The chairs should be shrink-wrapped directly off the production line (after assembly), consistent with the Manufacturer’s standard practice. An unused sample of the packing material must be included with each shipment. The chairs should not be placed in a cardboard or corrugated carton without protective wrapping, to minimize possible contamination from the packing materials.

4.2 SHIPPING & LABELING

The chairs should be shipped to arrive at the chamber testing laboratory within 48 hours of manufacture. Each piece should be labeled (see example below) with the date, and time of manufacture and shipping to enable the testing laboratory to place the furniture in the chamber at the appropriate time.

SAMPLE FURNITURE LABEL

<p><i>Date and Time of Manufacture:</i></p> <p><i>Date and Time of Shipping:</i></p> <p><i>Shipping Company:</i></p> <p><i>Furniture Company:</i></p> <p><i>Furniture Description (e.g., Make and Model):</i></p> <p><i>Signature of Furniture Company Employee:</i></p>
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Pre-assembled chairs must be placed in the chamber within 24 hours of arrival at the chamber testing laboratory. The manufacturer should coordinate the schedule for arrival of both the office type chair and the pull-up chair with the chamber testing laboratory.

PART 3 - EXECUTION

5.0 TARGET POLLUTANT EMISSION RATES

The target emission standards are defined as the “concentration” of pollutants emanating from the product of concern which will not produce building air concentrations greater than the following:

- (a) TVOC’s <0.5 mg/m³
- (b) Formaldehyde <0.05 ppm
- (c) Total Aldehydes <0.1 ppm
- (d) 4-PC (as an odorant) below the limits of detection²

The pollutant specification compliance is based on an outside air rate of 1.0 A.C.H. The loading rate is 2 pre-assembled chairs per 26.0 m³. The chairs for this protocol are defined in 3.0 above.

¹NOTE: TVOC’s represents the sum of volatile organic compounds (VOC’s) that can be analyzed and measured by the specified analytical method, and are calibrated referenced to toluene (by introducing known quantities of toluene onto a sorbing trap and introducing it into the analytical system exactly as a sample analysis would be).

²NOTE: The limit of detection is defined as the amount of the material (analyze) that can be distinguished from background, i.e., below the limits of detection means less than the quantitation limit of the analytical technique.

6.0 TEST PROTOCOLS

The environmental chamber testing will be conducted to the extent practicable in accordance with the guidelines established for small chamber environmental testing (ASTM D 5116-90) and any updates to that document in place at the test date, together with modifications necessary to meet the requirements of large chamber environmental testing.

All data shall be made available for review by EPA's New Headquarters planning staff and their consultants. Specific requirements for this protocol include, but are not limited to the following parameters, in addition to those noted above.

- (a) The tests shall be conducted in a chamber capable of accommodating the 2 pre-assembled chairs as described in 3.0 and as specified by EPA. The range of chamber sizes which may be used is 5 to 26 m³. The volume of air that flows through the chamber will be at a constant volume of 1.0 A.C.H., and the volume of air would depend on the chamber size. Therefore, if a 6m³ size is used, a constant volume of 6m³/h would be used, and if the chamber used is 26m³, a constant volume of 26m³/h would be used
- (b) The environmental chamber will be constructed of inert, smooth surfaces such as stainless steel or glass and will assure that formaldehyde at the level of 0.05 ppm and representative volatile organics at the level of 10 ug/m³ are not irreversibly retained on the interior of the surfaces. Quality control data must be submitted showing that recovery rates of 85-115% are possible for formaldehyde, toluene, and decane at these levels, as per the recoveries specified by the analytical method.
- (c) The air within the chamber will be free of any obstructions or contamination such as internally mounted fan(s), humidifiers, or refrigeration coils. A fan with an external mounting may be used to keep the chamber air well mixed. The internal air will only come in contact with inert chamber walls, a fan with an external mounting, the air diffusion system and sampling ports.
- (d) Internal air velocity within the chamber will be reproducibly maintained at a level in the range of 0.05 to 0.1 m/sec. (10 to 20 fpm).
- (e) Internal chamber air will be well mixed and comply with 5% of the theoretical well-mixed model.
- (f) Clean air will be generated and used as the supply air to the chamber. It is necessary that the supply air backgrounds be sufficiently low to achieve statistically meaningful analytical measurements at the level anticipated. Purified air will be supplied to the chamber with background concentrations not exceeding 0.002 ppm formaldehyde, and not to exceed 10 ug/m³ of total volatile organics (TVOC's) with a 2 ug/m³ limit for any individual VOC. The ambient air (background) in the chamber should also not exceed these levels. Using gas chromatographic thermal desorption/mass spectrometric technique, the ambient air in the chamber will be sampled just prior to loading.
- (g) The chamber operation will be maintained with strict and reproducible operating parameters of 1.0 ± 0.05 A.C.H., 25° ± 2° C and 50% ± 5% relative humidity. These

parameters shall be monitored continuously throughout the test, and shall be included in the final report.

(h) The chamber will be operated under slight positive pressure relative to atmospheric pressure.

(i) The test protocol will include evaluation of pollutant emissions over a nominal one (1) week 7 day period (\pm four (4) hours) to allow for mathematical modeling of the product emission profiles over time. Operational and QC procedures will be adequate to maintain sample integrity over the entire test period.

(j) Off-the-line pre-assembled chairs are to arrive at the testing laboratory within 48 hours of the testing date. The materials are to remain in their packaged state until immediately prior to loading into the environmental chamber. (The product selection, packaging and shipping protocols are described in Part 2, items 4.0-4.2.) The components are to be unpacked immediately prior to assembly and set-up in the environmental chamber. Care must be taken during assembly by the installers, in concert with the laboratory personnel, not to introduce any contamination into the chamber. The testing facility must have a QC procedure to minimize this concern. Testing of the pollutant levels must begin following one (1) hour of complete installation and enclosure in the environmental chamber.

(k) Dynamic analytical measurements will be made using methods sensitive and reproducible at the level in the low ppb range and other volatile organics. Appropriate standard and recovery data will be obtained for the classes of compounds and the concentration ranges found to substantiate the accuracy and precision of the analytical methods used.

(l) Analysis of air samples for formaldehyde, TVOC's (total volatile organic compounds), total aldehydes, and 4 phenylcyclohexene are to be reported separately.

(m) Quality control data on the chamber operational parameters as mentioned in Section 5.0, Test Protocols, items (a) through (f) above must be submitted with the final analytical data, as well as supporting documentation for the accuracy and precision of the analytical measurements. A statistically valid number of analytical measurements must be made for interpretative reasons, and external quality control audits must be incorporated into the overall measurements program.

6.1 SAMPLE COLLECTION AND ANALYSIS

(a) Timing for sample collection for analysis for formaldehyde, TVOC's, total aldehydes and 4-PC; 1 hour after workstation assembly and enclosure in the chamber, and then at 4, 24, 72, 120, and 168 hours thereafter.

(b) Air samples are to be analyzed and measured utilizing the specified analytic method and are to be calibrated referenced to toluene or other suitable analytical standards. (Air samples to be collected on multi-sorbent trap and analyzed by gas-chromatography-mass spectroscopy.)

6.2 AIR EXCHANGE RATE

Air exchange rate in chamber: 1.0 air changes per hour (ACH) of clean air for a 6.0 m³

chamber, or an equivalent ACH for a different size chamber (see Section 6.0, Test Protocols, item (a) for acceptable sizes). Air flow through chamber: use a one-pass system using clean purified air as referenced in 6.0 (f).

6.3 AIR VELOCITY

Air velocity within the chamber will simulate the building environment. Velocity as described in 6.0 (d) is required and must be verified upon completion of chamber test. Mixing shall be provided for by careful location of inlets and outlets for air supply and circulation. The report or the tests shall include a description of the air flow in the chamber. The report or the tests shall include a distribution of the air flow in the chamber and the determination of distribution patterns, mixing and local velocity at the surfaces of the test specimen. Local velocity shall be measured 1 cm. from specimen surfaces at no less than five representative locations.

6.4 QUALITY ASSURANCE/QUALITY CONTROL

Report of test must include complete description of the test system, analysis and results. All Quality Assurance/Quality Control (QA/QC) procedures must be reported.

6.5 REPRESENTATION AT TESTING LABORATORY

As its own cost, the manufacturer may choose to have a company representative present during the sample collection and analysis. This will be an observatory role. All work connected with the testing will be handled by lab personnel.

PART 4 - ADDITIONAL TESTING

7.0 MANUFACTURER RESPONSIBILITY

If, after installation of the chairs, a strong odor is detected, EPA may request a random desk chair and/or guest chair be retested in a mid-size chamber. The manufacturer shall bear responsibility for retesting the suspect chair (or chairs) in an appropriately sized chamber test to verify the system meets the emissions testing requirements for EPA's New Headquarters Project. If the suspect chair (or chairs) does not meet the specified requirements, the Manufacturer shall replace the component throughout with one which does meet the emissions testing requirements for EPA's New Headquarters Project, at no cost to EPA.

Note: In the event that testing as described in Item 7.0 is necessary, EPA will provide the vendor and the testing facility with information relating to acceptable chamber size and parameters for these tests.

7.1 EPA'S TESTING OPTION

At any time during the manufacture of componentry to be used in chairs designated for the new EPA Headquarters project, and/or during installation or thereafter, EPA reserves the right to undertake discretionary testing of individual components and/or a complete chair (excluding fabric) at their own cost. Should such testing produce results which exceed the accepted emission standards as established by this protocol, the manufacturer shall be responsible for replacing the components or workstations throughout the project with

replacement(s) which meet the emissions testing requirements for EPA's New Headquarters Project, at no cost to EPA.

PART 5 – RELATED INFORMATION

8.0 COSTS

All costs associated with the testing of the two office chairs will be borne by the manufacturer. (with the exception of any possible tests conducted by the EPA as noted above in section 7.1.) The costs include, but are not limited to, packaging of the componentry, transportation, assembly, all costs associated with laboratory procedures and lab time, disassembly, and transportation back to manufacturer.

Note: It is anticipated that laboratory costs will be substantially lessened due to the reduction in time from the longer time frame testing such as the State of Washington's (1990) thirty-nine (39) days test period to seven (7) days. However, no cost data are available at this time.

All manufacturers wishing to submit a response to the forthcoming solicitation must be prepared to deliver to one of the noted laboratories as indicated in item 9.0 below, a single desk chair specification for testing. Only minor variations in profile will be strictly enforced. The office seating submitted for testing will remain the property of each manufacturer, and can be returned at vendor's expense on completion of the testing.

9.0 TESTING LABORATORIES

Attached please find the name, address, and contact personnel together with fax and telephone numbers for the three (3) testing laboratories EPA has identified as acceptable for the independent mid-size chamber testing of vendors' office chairs. Testing will be undertaken in accordance with the protocol outlined above.

Vendors may select any one of the three laboratories listed below. Other independent laboratories may also be acceptable to EPA. Should a vendor wish to utilize a laboratory other than those listed, the name, contact person, and telephone number should be submitted in writing to Mr. Jeffrey L. Davidson at EPA's Safety, Health and Environmental Management Division, for approval prior to proceeding. The tentative schedule for testing of office chairs has been set for August/September, 1996. However, final arrangements will have to be made by the vendor(s) after the technical and cost review process is complete, and an actual date can be established for testing.

LABORATORIES

Air Quality Services

1337 Capitol Circle
Atlanta, GA 30067

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