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	NOTIFICATION OF SPECIFICATIONS REVISION	
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TECHNICAL SPECIFICATION

FOR

APS 1 ID BEAMLINE

MONOCHROMATIC HUTCH

WBS 1.4.1.5.1.3.8

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1.0 SCOPE

1.1 This Technical Specification establishes the requirements for the fabrication, inspection, delivery, erection, and testing of the APS 1 ID Beamline Monochromatic Hutch per drawing number 41050903-210000, a lead lined enclosure for experiment instrumentation hardware located on the APS experimental floor, in the quantities listed in Section 2.1 of the Statement of Work 41050103-00001.

1.2 The APS 1 ID Beamline Monochromatic Hutch shall be a free standing, self-supported structure fixed to the floor. This hutch shall be modular in construction and the module is a panel l meter wide and 3.3 meters high for side panels or 4 meters long for ceiling panels. This panel shall be manufactured as a steel, lead, steel sandwich with a steel frame welded to the inside wall. The assembled panels must create a structural system capable of supporting the hutch and attached equipment.

1.3 The APS 1 ID Beamline Monochromatic Hutch shall have two double panel doorways, one located on each side wall. One door panel shall be a pneumatically operated, personnel access door. The remaining three door panels shall be manually operated, equipment access panels. The personnel access door and the equipment access panels shall be physically identical; but the interlocking and functions are different. The equipment access panels shall be latched to the floor, and limit switches shall be used to detect the "panel closed" position. The pneumatic personnel access door shall be locked with a Kirk-key actuated magnetic lock and limit switches shall be used to detect the "door closed" position.

1.4 The APS 1 ID Beamline Monochromatic Hutch cable and utility access shall be through labyrinth side wall panels, and the beam transport pipe access shall be through a sliding "entry" panel. Ventilation shall be provided by two "quiet" exhaust fans mounted on roof labyrinth panels.

1.5 The APS 1 ID Beamline Monochromatic Hutch shall be X-radiation tight. All panel joints and corners, access penetrations, doors and removable panels shall be suitably overlapped and fitted to prevent any X-radiation leakage. The hutch shall be considered radiation tight in a given area if the radiation shielding integrity for ionizing X-radiation is shown and demonstrated to be equivalent to the thickness of lead specified on the drawings listed in Section 2.2 of this specification for the area in question.

1.6 The APS 1 ID Beamline Monochromatic Hutch shall be equipped with a 500 Kg (1/2 Ton) bridged crane with manual hoist for equipment handling. The crane shall have the maximum practical span across the hutch and cover the entire length of the hutch. The hoist shall have a minimum vertical clearance of 2,160 mm (85 inches) to the hook, and a minimum vertical clearance of 3,048mm (10 ft) to the crane beam.

2.0 APPLICABLE DOCUMENTS AND /OR SPECIFICATIONS

2.1 Application.

2.1.1 Deviations. The documents listed in paragraphs 2.2 through 2.6 of the exact issue shown form a part of this standard to the extent specified herein. Any deviations from these documents or their requirements shall be requested by the contractor and approved by the Laboratory prior to any contractor action being taken. Requests for Deviations shall be made on a Supplier Disposition Request (ANL-311).

2.1.2 Conflicts. Any conflicts between the requirements of this Technical Specification and those of any applicable document shall be brought to the attention of the Laboratory' s Subcontract Administrator prior to any related action on the part of the contractor.

2.1.3 Exceptions. Where the materials or standards to be employed in the manufacture of any part are not identified in this Technical Specification or the documents referenced herein, the contractor shall submit for the Laboratory's approval the materials or standards he proposes to use.

2.1.4 Referenced Documents. Documents which are referenced without citation of section or paragraph shall apply in their entirety. Where there is a citation of section or paragraph, only that cited portion is applicable.

2.1.5 Sub-Tier References. When a referenced document cites additional references, those sub-tier references shall not apply unless the Technical Specification or the Statement of Work specifically mentions them as required documents.

2.2 Drawings.

The drawing 41050903-210000, and its associated sub-tier drawings, specify the APS 1 ID Beamline Monochromatic Hutch which is to be fabricated by the contractor. This drawing, and its associated sub-tier drawings, are attached to this Technical Specification.

2.3 Welding.

2.3.1 Weld Symbols. Weld symbol interpretation shall be in accordance with the Standard Symbols for Welding, Brazing and Nondestructive Examination, ANSI/AWS A2.4-86.

2.3.2 Weld Practice. Welding practice shall conform to the Structural Welding Code, ANSI/AWS D1.1-90.

2.4 Materials.

2.4.1 Lead. Lead sheet materials shall conform to Federal Specification QQ-L-201f, Lead Sheet.

2.4.2 Paint. Paint shall comply with APS document number 4105-00024, Technical Specification for Painting Beamline Structures, and its associated sub-tier documents.

2.5 Design

The design of the APS 1 ID Beamline Monochromatic Hutch shall be in compliance with the applicable sections of the following documents and their sub-tier documents.

2.5.1 DOE Order 6430.1A, General Design Criteria.

2.5.2 International Conference of Building Officials, Uniform Building Code.

2.5.3 National Fire Protection Association, National Electric Code.

2.6 References.

The following documents provide useful information for implementing and/or a basis for the requirements of this Specification

2.6.1 DOE Order 5480.11, Radiation Protection for Occupational Workers.

2.6.2 DOE Order 5480.25, Safety of Accelerator Facilities.

2.6.3 DOE Order 5480.6, Radiological Control Manual, EH-0256T, June 1992.

2.6.4 Argonne National Laboratory, Environment, Safety and Health Manual, May 1, 1993.

2.6.5 NBS Handbook 111, Radiation Safety for X-Ray Diffraction and Fluorescence Analysis Equipment, ANSI N43.2-1977.

2.6.6 NBS Handbook 114, General Safety- Standards for Installations Using Non-Medical X-Ray and Sealed Gamma-Ray Sources, Energies up to 10 MeV, ANSI N543-1974.

3.0 TECHNICAL REQUIREMENTS

3.1 Design Requirements.

The designs of the APS 1 ID Beamline Monochromatic Hutch is defined in the drawings, and their associated sub-tier drawings, which are listed in Section 2.2 of this Technical Specification.

3.1.1 Mechanical.

3.1.1.1 Hutch Dimensions. The outside dimensions shall be as follows: Width, 4 meters (13.12 ft); Length, 7 meters (23 ft); and Height, 3.3 meters (11 ft).

3.1.1.2 Shielding Requirements. The back wall must have 13 mm (1/2") thickness of lead, front and side walls must be 10 mm (3/8") thick lead, and the roof must be 6 mm (1/4") thick lead.

3.1.1.3 Construction Guidelines. The hutch must meet DOE and Argonne radiation shielding requirements as set forth in DOE Radiological Control Manual and the Argonne Environment, Safety and Health Manual. Guidelines for appropriate construction practices are given in ANSI N43.2, ANSI N543, DOE Order 5480.11 and DOE Order 5480.25.

3.1.1.4 Structural System. Structures and their elements shall be designed following DOE 6430.lA, Section 0111-2, Loads.

3.1.1.4.1 Dead loads shall include roof dead loads of 100 psf, and the use of the interior unistrut for shelves supporting 200 lbs per linear foot of wall.

3.1.1.4.2 Live loads shall include live loads of 40 psf. and the scenario of the pneumatic door flying open.

3.1.1.4.3 Design loads shall include loads that can occur during construction and installation of the hutch.

3.1.1.5 Piping. All piping shall be 1/2 inch for the chilled water and for compressed air.

3.1.1.6 Personnel Access Door. The personnel access door shall be pneumatically actuated. Push buttons to open and close the door shall be located on the out side of the hutch. A door release button shall be located on the inside of the hutch to vent the cylinder and permit egress from the hutch. The leading edge of the door shall be equipped with a safety bar which, when contacting an obstacle while closing, will cause the door to open.

3.1.2 Electrical

3.1.2.1 Electrical Outlets. The electrical outlet power strips inside the hutch shall alternate between 110 VAC and dual 110 VAC/220 VAC power strips. That is, every other power strip shall be 110 VAC only. The 110 VAC power strips shall be connected to a separate breaker box for connection to "clean" (low noise) power while the dual voltage strips shall be connected to regular "dirty" power.

3.1.2.2 Ground Detection. Each electrical outlet strip shall be equipped with a Ground Fault Circuit Interrupt unit.

3.1.2.3 Illumination. Sufficient lighting shall be provided to give an illumination level of 100 to 150 foot-candles at any point within the hutch.

3.1.2.4 Exhaust Fans. The ceiling exhaust fans shall be "quiet" fans producing less than 65 dB of noise at distances greater than 1 meter. The fans shall have a capacity in excess of 250 l/s of air. The fans shall be provided with an on-off switch and a variable speed control that permits adjustment from 100% to at least 40%. The speed control setting shall be a screwdriver adjustment.

3.2 Material Requirements.

The contractor shall use the materials specified in the drawings, and their associated sub-tier drawings, which are listed in Section 2.2 of this Technical Specification, and certification of materials used in the fabrication shall be submitted to ANL.

3.2.1 General. All materials used inside the hutch shall be capable of withstanding a high X-radiation environment.

3.2.2 Lead. Lead sheet used in the hutch shall conform to Federal Specification. QQ-L-201f, Grade C.

3.2.3 Steel. Steel sheet used in the hutch shall conform to DOE Order 6430.1A, General Design Criteria., Section 0512.

3.3 Fabrication Requirements.

Fabrication of the APS 1 ID Beamline Monochromatic Hutch shall be in accordance with the drawings which are listed in Section 2.2 of this Technical Specification.

3.4 Assembly and Workmanship.

3.4.1 The parts shall be free of burrs and sharp edges, and free of dents, gouges and scratches.

3.4.2 The parts shall be clean and free of dirt, oil and grease with the exception of the appropriate lubrication on moving bearing surfaces. Bearing surfaces shall be lubricated as required by the assembly drawing.

3.4.3 All assembly requirements for alignment marks, keying or pinning specified on the appropriate assembly or sub-tier drawing shall be done after verification that the assembly meets the dimensional requirements of the drawing.

3.4.4 All fasteners on moving devices shall be locked by means of wires, jam nuts, set screws, spring washers or similar locking devices to prevent loosening. All drilled head screws shall be wired to lock them in place.

3.4.5 All structural bolts for the wall and ceiling panels shall have the nuts tack welded to prevent loosening after erection of the hutch.

3.5 Painting.

The 1 ID Monochromatic Hutch shall be painted according to APS document no. 4105-00024, Technical Specification for Painting Requirements of Beamline Structures. The paint color shall be Pratt and Lambert #2127, Snowflake or equivalent, with a semi-gloss finish.

3.6 Drawings.

3.6.1 Since the drawings and documents listed in section 2.2 completely define the fabrication requirements of the APS 1 ID Beamline Monochromatic Hutch, the preparation of new drawings by the contractor will not be required unless alternate designs and/or modifications to the designs submitted by the Laboratory are proposed by the contractor.

3.6.2 The contractor is required to review the drawings and other documentation provided by ANL for errors and inform ANL of any discrepancies and errors. Any changes or corrections must be documented by the contractor as "marked drawing" changes to the engineering drawings for the affected item and submitted for ANL's approval. If approved, revised drawings will be issued by ANL.

3.6.3 The Contractor shall be responsible for the structural integrity of the hutch, and shall have the structure reviewed by a certified structural engineer.

3.6.4 The marking and submission of marked drawings to ANL to indicate any "as-built" changes is the responsibility of the Contractor.

3.6.5 The drawing numbers in most cases will be preceded by a "P" prefix on the drawing itself. After the acceptance of the first unit and any corrections as detailed in 3.6.2 and 3.6.3, the "P" prefix on the drawing number on the drawing will be dropped.

3.6.6 Drawings can be furnished to the contractor on disk or by E-mail in AutoCAD (version 12) format (DWG) as the preferred format or in DXF format. The contractor should submit any corrected or modified drawings to ANL for approval in AutoCAD format.

4.0 QUALITY ASSURANCE AND TEST REQUIREMENTS

The following examination requirements shall comprise the minimum acceptable for the APS 1 ID Beamline Monochromatic Hutch.

4.1 Certification.

All certification of designs, materials, hardware, processes, calibrations and test data shall be signed by a contractor representative authorized to sign such certifications.

4.2 Examination Requirements.

4.2.1 Materials Examination. All raw materials shall be examined visually to detect suspect or counterfeit parts, obvious defects and the state of cleanliness.

4.2.2 Fabrication and Weld Examination.

4.2.2.1 General. All items shall be subjected to visual and dimensional examination to verify conformance with drawing requirements.

4.2.2.2 Liquid Penetrant Examination. All welds shall be examined by the liquid penetrant method. The use of liquid penetrant materials from aerosol spray cans using Freon as the propellant is prohibited on austenitic stainless steel.

4**.2.2.3** Examination of Weld Repairs. Weld repairs shall be reexamined by the examination method(s) which revealed the original defect. In addition, other nondestructive examination methods which will assure the quality of the material has been maintained may be used upon agreement between the contractor and the Laboratory.

4.2.3 Calibration and Control of Instruments. Accuracy of instrumentation used during tests shall be verified by the contractor by means of periodic calibration traceable to the National Institute of Standards and Technology. The Laboratory shall be given timely notice of any calibration discrepancies or problems. Calibration records shall be available to the Laboratory's personnel.

4.2.4 Marking and Identification. When raw materials are cut or sectioned, all markings shall be transferred to the unmarked portion of the material.

4.2.5 Examination of Lifting, Handling, and Shipping Fixtures. Following proof load testing of lifting, handling, shipping fixtures and attachment lugs, all structural welds of these items shall be examined by the magnetic particle or liquid penetrant method. In addition, all slings and hooks, not containing structural welds, used in lifting the item shall, as a minimum, be visually examined for structural defects.

4.2.6 Acceptance Testing. The acceptance testing shall be performed in accordance with the ANL approved contractor's test plan, and the results submitted to the Laboratory for approval. The following items are the minimum requirements for inclusion in the acceptance tests.

4.2.6.1 Verification of Overall Dimensions. The maximum width and height of the assemblies with respect to the appropriate reference surfaces shall be verified to be in conformance with the assembly drawing for the item.

4.2.6.2 Verification of Door Panel Motion. The motion of each moving door panel shall be tested for the following: Range of motion, Binding, Locking, Rubbing or Scraping, and Swing or Wobble.

4.2.6.3 Door Cycle Test. The hutch pneumatically operated, personnel access door shall be actuated 100 times to cycle the door through its normal stroke. The proper door closed position (radiation tight) shall be confirmed for each cycle.

4.2.6.4 Verification of Radiation Shielding. The radiation shielding integrity for ionizing X-radiation of each wall and ceiling after erection of the hutch shall be demonstrated and verified to be equivalent to the thickness of lead specified on the drawings listed in Section 2.2 of this specification.

4.2.6.5 Air Line Leak Check and Flow Test. Only clean, filtered oil free air shall be used for testing.

4.2.6.5.1 Air lines shall be leak checked by pressurizing them to normal line pressure (80 to 110 psi) and having the lines valved off for one hour during which the pressure in the line must not fall more than 10%.

4.2.6.5.2 Air lines shall be flow tested for continuity with 2 cfm minimum flow required at 2 psi or less pressure drop per foot of pipe.

4.2.6.6 Water Pressure and Flow Tests. Only clean, filtered tap water shall be used for testing. After testing, the water lines shall be dried by blowing them out with clean, dry, oil free air.

4.2.6.6.1 Water lines shall be pressure tested to 200 psi. No evidence of leakage is permissible.

4.2.6.6.2 Water lines shall be flow tested for continuity with 5 gpm minimum flow required at 1 psi or less pressure drop per foot of pipe.

5.0 PREPARATION FOR DELIVERY

5.1 Each package shipped shall be identified by the appropriate purchase order number, assembly number and a sequential package identity number if there is more than one.

5.2 Any moving components on an assembly must be firmly secured for shipment in a manner that precludes damage from motion and vibration.

5.3 Assemblies must be secured for shipment in fashion that protects the assembly from dust, dirt and weather or water damage. The assemblies must be securely fastened, padded, boxed and/or crated for shipment in a suitable manner for prevention of shipment damage to any assembly and its weather/dust protection and insure their safe delivery to the Laboratory.

5.4 The 1 ID Monochromatic Hutch shall be erected on the experimental floor of the Advanced Photon Source at a location to be specified by cognizant APS personnel. Final delivery and acceptance shall be after successful completion of inspection and acceptance testing per section 4.2 above.