

Title: SPECIFICATION FOR FABRICATION of BAKEOUT CONTROL SYSTEM CABINET

SPECIFICATION FOR
 FABRICATION of BAKEOUT CONTROL SYSTEM CABINET
 FOR
 LIGO VACUUM EQUIPMENT

Hanford, Washington
 and
 Livingston, Louisiana

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Information contained in this specification and its attachments is proprietary in nature and shall be kept confidential. It shall be used only as required to respond to the specification requirements, and shall not be disclosed to any other party.

REV LTR.	BY-DATE	APPD. DATE	DESCRIPTION OF CHANGE
1	PPS	FMS 3-26-96	Issued for Purchase, DEO #095
0		-	Issued for Bid DEO #089
PROCESS SYSTEMS INTERNATIONAL, INC.			SPECIFICATION
INITIAL APPROVALS	PREPARED	DATE	APPROVED DATE
	PPS	3/12/96	D. Mueller 3.12
Number		V049-2-068	Rev.
LIGO-E960070-01-V			1

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1 SCOPE OF WORK

This specification establishes minimum requirements for material, fabrication, documentation, packing, and shipping to Process Systems International, Westborough, MA. of the control system cabinet(s) in accordance with drawings and attachments.

2 DRAWING AND SPECIFICATION INTENT

- 2.1 Intent of the Drawings and Specifications is to assist and guide the Vendor and to establish minimum requirements.
- 2.2 Drawings indicate arrangement and approximate location of components.
- 2.3 Comply with specific, detailed requirements indicated in lieu of generally stated requirements.
- 2.4 Portions of these Drawings and Specifications are abbreviated and may include incomplete statements. Infer the omitted words or phrases such as "the Vendor shall", "shall be", "as indicated on the drawings", "in accordance with details", "a", "the", and "all".
- 2.5 Drawings and Specifications do not undertake to indicate every item necessary to produce a complete installation of the Work indicated or specified.

3 DEFINITIONS (ALSO SEE THE GENERAL CONDITIONS)

By Others	Work not under this Contract.
Indicated	Shown or noted.
Install	Place, secure, and connect.
Labeled	Approved by nationally recognized testing company.
Permitted	As by code, Contract Documents, or Buyer.
Provide	Furnish and install.
Buyer	Process Systems International (PSI).
Required	As by code or Contract Documents.
Submittal	Information required to show that the proposed equipment meets project requirements.
Use	<i>Provide material or equipment referenced.</i>
Vendor	Successful bidder accepting responsibility for equipment fabrication.
Work	Material, equipment and fabrication and other requirements as established in the Contract Documents.

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Wire (Verb) Connect to equipment indicated and provide wiring required for connection.
Wiring Conductors, raceways, and accessories as required for a complete installation.

4 EXCEPTIONS

Exceptions to the specification shall be specifically brought out under a schedule titled, "Schedule of Deviations". In the absence of the "Schedule of Deviations," it shall be deemed that the Vendor's offer is fully in compliance with this specification.

5 CODES AND STANDARDS

- 5.1 Comply with requirements of NFPA 70 (NEC) and NFPA 79 (Electrical Standard for Industrial Machinery).
- 5.2 The Drawings and Specifications do not undertake to repeat requirements written in the above code and standard.

6 LABELED EQUIPMENT

Provide labeled equipment where recognized national testing company standards, such as UL, exist.

7 INSTALLATION RESTRICTIONS

- 7.1 Arrange and install equipment in accordance with the manufacturer's specifications and as indicated on Drawings.
- 7.2 Permanently install a cabinet designation nameplate in a conspicuous location as indicated on Drawings.
- 7.3 Label equipment with designation as indicated. Use adhesive backed labels with 1/8" high lettering as applicable.
- 7.4 Label terminal strips as indicated using manufacturer's printed terminal strips labels.

8 SPECIFIED EQUIPMENT AND SUBSTITUTIONS

- 8.1 The manufacturer of the equipment specified is used as the basis of the design and to establish quality required for this project.
- 8.2 The description following a catalog number is basically to identify the product, but it may also call for accessories, options, and modifications which are beyond the cataloged product.
- 8.3 Submit proposed substitutions to Buyer for acceptance. With submittal, provide details of necessary changes to accommodate substitutions. Submit samples if requested.

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9 WIRING SYSTEMS

9.1 POWER WIRE, 480 & 277 VAC

- 9.1.1 Provide #14 AWG or larger single, stranded copper, type MTW, conductors rated 90°C, 600 volts unless otherwise specified.
- 9.1.2 Use colored coded insulation in sizes up to #8 AWG, except up to #6 AWG for grounding conductors, and black insulated conductors in larger sizes (see *WIRING IDENTIFICATION*).
- 9.1.3 See *TESTING*.

9.2 CONTROL WIRING, 120 VAC

- 9.2.1 Provide #16 AWG or larger single, stranded copper conductors with Type MTW insulation rated for 90°C and 600 volts unless otherwise indicated. Install conductors in wireway marked "AC WIREWAY" as indicated.
- 9.2.2 Use colored coded insulation (see *WIRING IDENTIFICATION*).
- 9.2.3 See *TESTING*.

9.3 CONTROL WIRING, 24 VDC (discrete signals)

- 9.3.1 Provide #18 AWG or larger single, stranded copper conductors with Type MTW insulation rated for 90°C and 600 volts unless otherwise indicated. Install conductors in wireway marked "DC WIREWAY" as indicated.
- 9.3.2 See *TESTING*.

9.4 INSTRUMENT WIRING

- 9.4.1 4-20mA analog signals: Provide #18 AWG stranded copper, shielded twisted pair, single or multi-pair cables as indicated, rated 90°C and 300 volts. Install in wireway marked "DC WIREWAY" as indicated.
- 9.4.2 Thermocouple: Provide #20 AWG ANSI type JX, solid thermocouple extension cable shielded, rated 105°C and 300 volts.
- 9.4.3 See *TESTING*.

9.5 WIRING IDENTIFICATION

9.5.1 Power Wiring

9.5.1.1 Color code 480/277 volt conductors as follows:

- line A brown
- line B orange
- line C yellow
- neutral gray
- ground green

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9.5.2 Control Wiring

9.5.2.1 Color code 208/120 volt conductors as follows:

- 120 VAC—line red
- 120 VAC—neutral white
- 24 VDC blue
- ground green

9.5.2.2 Identify each single conductor at each end with indicated wire number or designation. Use self laminating, printed, Brady type wire marker.

9.5.3 Instrument Wiring

9.5.3.1 Shielded twisted pair cables shall have one black and one white conductor.

9.5.3.2 Identify each cable end with indicated cable number or designation. Use self laminating, printed, Brady type wire marker.

9.6 WIRING INSTALLATION

9.6.1 Provide sufficient wire length to permit grouping and training the wires and cables. Where applicable, use self-locking nylon wire ties; cut off loose ends. Take care not to exceed manufacturer's wire bending radii. Do not allow wiring to bear against edges of enclosures. Replace wiring cut too short to meet installation requirements.

9.7 WIRING TERMINATIONS AND CONNECTORS

9.7.1 Power Wiring

9.7.1.1 Where more than one conductor requires termination and terminals are not provided as part of the equipment, provide screw or pressure type insulated terminal blocks.

9.7.1.2 Tighten screw type hardware in accordance with manufacturer's published torque values. If not available, comply with UL 486A standards.

9.7.2 Control Wiring

9.7.2.1 Where more than one conductor requires termination and terminals are not provided as part of the equipment, provide screw or pressure type insulated terminal blocks.

9.7.2.2 Install stripped wire ends into terminal and tighten to manufacturers specifications. Do not install more than two wires in any one terminal point.

9.7.2.3 Remove insulation from ends of conductors using mechanical or electric heat type stripper.

9.7.3 Instrument Wiring

9.7.3.1 Where shielding is noted as "CUT AND TAPE", shielding shall be cut back and shall not be visible, or protrude from insulating sleeve.

9.7.3.2 Coil, insulate, and label ends of spare conductors.

9.7.3.3 Remove insulation from ends of conductors using mechanical or electric heat type stripper.

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9.8 EQUIPMENT GROUNDING CONDUCTORS

- 9.8.1 Where a ground lug is attached to a painted panel, remove paint under lug prior to the installation of ground lug.
- 9.8.2 If a grounding stud or existing panel mounting bolt is used, secure grounding conductor with ring type compression terminal, *star* type washer between the panel and grounding terminal, and hex nut.

10 TESTING

- 10.1 No equipment shall be energized without consent of the Buyer.
- 10.2 It is the Vendor's responsibility to conduct tests without damage to equipment.

10.3 CONTROL AND INSTRUMENT WIRE TESTING

- 10.3.1 Check point-to-point continuity of each conductor to ensure that wiring is intact and terminated at the proper place at both ends.
- 10.3.2 Verify wire connections are made in accordance with terminal wiring diagrams and schedules.
- 10.3.3 Using highlighter (transparent marker), indicate on terminal wiring diagram sheets that each wire and connection has been verified. Make these sheets available to Buyer.
- 10.3.4 Replace defective wiring and retest.

10.4 RECEPTACLES TESTING

Test polarity and grounding of each receptacle device.

10.5 SCHEDULING, NOTIFYING, AND WITNESSING TESTING

Provide the Buyer with at least seven days notification of scheduled testing. With the notification, include a list of proposed tests and the expected time to perform these tests.

11 INSPECTION

The responsibility for inspection rests with the manufacturer; however, Buyer reserves the right to review equipment at any time during fabrication to assure that the materials and workmanship are in accordance with this specification and the code.

12 RELEASE FOR SHIPMENT

The Vendor shall have a signed "Release for Shipment" form provided by the Buyer's Quality Assurance representative prior to full or partial shipment of product.

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13 WARRANTY

The construction of equipment shall be performed in the highest manner of workmanship using only new and unused top quality materials. The equipment shall be guaranteed against defects in materials and workmanship for a period of one year from the date of placement in service.

14 RECORD DRAWINGS

Maintain a set of prints marking them to accurately reflect the actual fabrication. Deliver the set of marked prints to Buyer prior to shipment.

15 EQUIPMENT DELIVERY SCHEDULE

One cart is required May 17, 1996 :

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APPENDIX I

DRAWING LIST / CART

GENERAL INFORMATION DRAWINGS

V049-3-014 Rev 0 PLC/PC/Data Acquisition Layout

CABINET LAYOUT DRAWINGS

V049-3-013 Rev 0 Assembly, Heater Control Cart (6 sheets)

CABINET SCHEMATIC DRAWINGS

V049-3-011 Rev 0 Elect Schematic, Control System (8 sheets)

V049-3-012 Rev 0 Elect Schematic, Heater Power (2 sheets)

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APPENDIX II

ITEMS FURNISHED BY BUYER / CART

Allen-Bradley PLC Equipment

- (1) 1771-A3B 12 Slot Chassis
- (1) 1785-L30B PLC 5/30
- (1) 1771-DMC Co-Processor Module
- (1) 1771-DRS1 1 MEG memory expansion for 1771-DMC
- (1) 1784-KTX DH+ PC Interface Module
- (1) 1771-CP1 Power Supply Cable
- (1) 1771-P7 16 Amp Power Supply
- (7) 1771-OAD 120 VDC 16 Point Output Module
- (1) 1771-IAD 120 VDC 16 Point Input Module

Personnel Computer

- (1) P5-120 Gateway-2000 120 Pentium PC with
16 MB Ram, 1.2 GB HD, 6X CD-ROM, 3.5" 1.44 MB V036-3-17"
SVGA Monitor, Desktop Case, 104+ Keyboard, Microsoft Mouse,
running on Windows NT

Tempscan-1000A Thermocouple Acquisition System

- (1) TEMPSCAN-1000A Main Chassis, includes rack mounting hardware
- (1) EXP/11A 10 Slot expansion chassis, cable and rack mounting hardware
- (6) TEMPTC-32A 32 Channel T/C scanning Module for Non-Grounded T/C's
- (1) RS-232 Cable PC/AT serial port RS-232/422 Cable (9/25 pin sub-D) to
TEMPSCAN-1000A 6 feet long

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37	2 EA	234 030.27	ENTRELEC	MARKING TAGS, 8MM, 1-100
38	15 EA	167 075.25	ENTRELEC	FUSE BLOWN INDICATOR
39	1 EA	TED134060WL	GE	CIRCUIT BREAKER, 480VAC/60A/3PH.
40	1 EA	TEDUV1	GE	UNDERVOLTAGE RELEASE, 120VAC
41	1 EA	TEDAS2AB1R	GE	AUXILIARY SWITCH
42	2 EA	A-LF16M18	HOFFMAN	FLUORESCENT LIGHT, 120VAC
43	1 EA	5262	HUBBELL	15A DUPLEX RECEPTACLE
44	1 EA	074-01-032	HUBBELL	CORD GRIP, 1.35 CORD DIA
45	1 EA	074-01-010	HUBBELL	CORD GRIP, .616 CORD DIA.
46	1 EA	2311	HUBBELL	MALE PLUG, 20A, 125V
47	1 EA	560P7W	HUBBELL	MALE PLUG, 60A, 3 PH. Y 277/480
48	1 EA	6531-ULM	INDUSTRIAL COMPUTER	19" RACK MOUNT FOR 17" MONITOR
49	1 EA	I-115	ISLATROL	POWER FILTER, 115VAC, 1PH. 15A
50	2 EA	15295A32	McMASTER-CARR	HEAVY-DUTY STORAGE HOOK
51	4 EA	8890T14	McMASTER-CARR	LIFTING EYE, 3/8"-16
52	112 EA	50F2741	NEWARK	PLUG, 2 POLE, 20A, 600V, PANEL MNT
53	3 PK	50F2730	NEWARK	TERMINAL, MALE, BRASS, CRIMP, 100 PCS
54	4 EA	TJP-4-48-J	OMEGA	TYPE "J" CONNECTOR PANEL, 12 X 4
55	2 EA	LAM2A2/0-14-6	PANDUIT	POWER LUG
56	24 LF	E1.5X3LG6	PANDUIT	WIREWAY, 1 1/2" X 3"
57	24 LF	C1.5LG6	PANDUIT	WIREWAY COVER, 1 1/2" X 3"
58	12 LF	E2X3LG6	PANDUIT	WIREWAY, 2" X 3"
59	12 LF	C2LG6	PANDUIT	WIREWAY COVER, 2" X 3"
60	6 LF	E3X3LG6	PANDUIT	WIREWAY, 3" X 3"
61	6 LF	C3LG6	PANDUIT	WIREWAY COVER, 3"
62	34 EA	ARC.68-S6-Q	PANDUIT	ADJUSTABLE RELEASE CLAMP
63	97 EA	K10P-11A15-120	POTTER & BRUMFIELD	RELAY, 120VAC, 277VAC 10A CONTACT
64	97 EA	27E895	POTTER & BRUMFIELD	RELAY SOCKET
65	97 EA	20C297	POTTER & BRUMFIELD	HOLD DOWN SPRING
66	1 EA	SH2484	BUD INDUSTRIES	24" FIXED SHELF
67	2 EA	TJP-2-24-J	OMEGA	TYPE "J" CONNECTOR PANEL, 12 X 2
68	2 EA	A-EK460NDH	HOFFMAN	ELECTRICAL DOOR INTERLOCK
69	2 EA	FNQ-1/10	BUSS	FUSE, 1/10A, 500V, TIME DELAY
70	2 EA	35301	THOMAS & BETTS	COPPER GROUND LUG, #10 SCREW
71	1 EA	A-VK44	HOFFMAN	LOUVER PLATE KIT
72	1 EA	194L-E25-1751	ALLEN BRADLEY	25A LOAD SWITCH
73	1 EA	194L-HCB-001	ALLEN BRADLEY	25A LOAD SWITCH ACTIVATOR
74	1 EA	800MR-P16AS	ALLEN BRADLEY	PILOT LIGHT, AMBER, 120VAC

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ATTACHMENT "A"
PAINTING REQUIREMENTS

1 SCOPE

This attachment establishes minimum requirements for paint material, application, and durability of smooth and textured finishes to equipment as indicated on the Drawings and as follows .

2 SURFACE PREPARATION

- 2.1 Remove dirt, oil products, water vapor, oxidation, slag, scale, flux, and other foreign materials from surfaces to be painted in accordance with good commercial practice and industry accepted methods. Clean surfaces with solvent prior to painting.
- 2.2 Use industry-accepted fillers to cover minor surface imperfections such as press-in stud heads, flat head screws, rivets, indentations, and welds.

3 PRIME COAT

Apply Sherwin-Williams Polane spray fill D61-A23. Sand smooth after application.

4 FINISH COAT

- 4.1 Phthalo Blue, Textured Coating:
Apply Sherwin-Williams Polane "T", #F63TX-L-1465 (PSI stores # 300614).
- 4.2 Carbide Black:
Apply Sherwin-Williams Polane "T", #F63-B12. (PSI stores #300608)
- 4.3 Submit proposed substitutions to Buyer for acceptance.

NOTE: THERE IS NO REV. ϕ

ATTACHMENT "A"	
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