

ENGINEERING DOCUMENT REQUIREMENTS

1. DOCUMENT CATEGORY NUMBER	2. SPECIFICATION PARAGRAPH REFERENCE	3. DOCUMENT DESCRIPTION	4. PERMISSION TO PROCEED REQUIRED	5. SUBMITTAL SCHEDULE	6. QUANTITY REQUIRED	7. KIND OF COPIES	8. REMARKS
			YES/NO (X = Yes Blank = No)				
1.1	J0004, para 1.1	General Arrangement / Outline Drawings	X	45	1	E	Engineering
1.1	J0004, para 9.1	Installation Detail Drawings (Equip/Panel)	X	45	1	E	Engineering
1.1	J0004, para 1 & 9	System Block Diagram	X	30	1	E	Engineering
1.1	J0004, para 1 & 9	Detail Block Diagram	X	45	1	E	Engineering
1.1	J0004, para 1 & 9	Field Enclosure (Camera Controller Cabinet) Equipment Layout and Installation Detail Diagrams		45	1	E	Engineering
1.2	J0004, para 9.1	Assembly Drawings	X	45	1	E	Engineering
1.2	J0004, para 3.3.12, 5.1, 9.1	Field Enclosure (Camera Controller Enclosure) Equipment Assembly and wiring Diagrams	X	45	1	E	Engineering
1.4	J0004, para 9.1	Wiring Schematic Diagrams	X	45	1	E	Engineering
1.4	J0004, para 9.1	Equipment Internal Wiring Diagrams	X	45	1	E	Engineering
1.4	J0004, para 9.1	Control Equipment Room CCTV Cabinet Layout Diagrams	X	45	2	E & P	Engineering
1.4	J004, para 9.1	Camera Controller (Field) Enclosure Equipment Detailed Wiring Diagrams	X	45	2	E & P	Engineering
1.4	J0004, para 9.1	Interconnection Wiring Diagrams	X	45	1	E	Engineering
1.4	J0004, para 9.1	Cable wiring harness design	X	60	1	E	Engineering
1.4	J0004, para 9, 3.3.26	Temporary CCTV System Design	X	45	1	E	Engineering
1.4	J0004, para 9.1	Grounding Drawings	X	45	1	E	Engineering
3.0	J0004, para 1.1, 1.2, & 9.1	Spec Sheets for Recommended Field Communication Cables (Fiber, Coax, etc.) and connectors	X	30		E	Engineering
4.1/4.2/4.3	T0004, para 10, J0004, para 9	Combined Installation, Operation and Maintenance Manual - Preliminary	X	45	2	E & P	Engineering
4.1/4.2/4.3	T0004, para 10, J0004, para 9	Combined Installation, Operation and Maintenance Manual - Final		60 days prior to shipment*	4	E & P	Fabrication
4.4/29.0	T0004, para 8, J0004, para 7	Site Storage & Handling, Long-Term Storage and Shipping Preparation Procedures	X	60 days prior to shipment*	2	E & P	Fabricaiton
8.0	J0004, para 9.1, 3.1, 3.3.20, 3.3.21	Calculations	X	30*	1	E	Fabricaiton
8.0	J0004, para 9.1	Power Requirements (loads)	X	30	1	E	Engineering

G-321-E	10. PUEBLO CHEMICAL AGENT-DESTRUCTION PILOT PLANT (PCAPP) PROJECT	11. JOB NO. 24852		
	CCTV System Design, Engineering, Hardware, Installation Tech. Support & Test	12. PO NO.	PO REV	
		13. 24852-MRA-EEC0-00001	MR REV	0
ENGINEERING DOCUMENT REQUIREMENTS			SHEET 1 of 3	

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1. DOCUMENT CATEGORY NUMBER	2. SPECIFICATION PARAGRAPH REFERENCE	3. DOCUMENT DESCRIPTION	4. PERMISSION TO PROCEED REQUIRED	5. SUBMITTAL SCHEDULE	6. QUANTITY REQUIRED	7. KIND OF COPIES	8. REMARKS
			YES/NO (X = Yes Blank = No)				
8.0	J0004, para 9.1	Heat Dissipation of equipment	X	30	1	E	Engineering
8.0	J0004, para 3.2.3	RFI/EMI Report	X	30	1	E	Engineering
8.0	J0004, para 9.1 & 1.2	Instrument Air Requirements	X	30	1	E	Engineering
8.0	J0004, para 9.1 & 1.2	Cooling Water Requirements	X	30	1	E	Engineering
8.0	J0004, para 3.3.19.7	DVR and Video Recorder Sizing Calculations		45	1	E	Engineering
25.0	J0004, para 9	Inspection & Test Plan	X	45*	1	E	Fabrication
26.0	J0004, para 9.1 & 6	FAT Test Procedures	X	60*	1	E	Fabricaiton
26.0	J0004, para 9.1 & 6	SAT Test Procedures		30 days prior to shipment*	1	E	Fabricaiton
29.0	J0004, para 7.2, 9.1	Standard Packaging and shipping procedures	X	60 days prior to shipment*	1		Fabrication
30.0	J0004, para 10	Spare Components & Repair Parts List & Costs		30	1	E	Engineering : Also include one hard copy in each O&M manual See Note a.
32.0	T0004, para 2 & 4	Document Transmittal Sheet & Schedule		10	1	E	
35.0	T0002, para 4	List of Prohibited/Limited-Use Materials	X	30	1	E	Engineering
36.0	T0004, para 8	Quality Verification Document (QVD) Package		See Note b.	1	E	See Note b.
Misc	J0004, para 3.3.22.3	Software Licensing requirements		60 days prior to shipment	1	E	Engineering
	J0004, para 3.3.22.1	Software List with versions and Function of each software		30 days prior to shipment	1	E	Engineering
	J0004, para 1 & 9.1	Functional Specification	X	30	2	E&P	Engineering
		Software Documentation (Application Programs, operation Systems)		Shipment*		E	Fabrication
	J0004 para 1.1 & 9.1	Training Course Information		60 days prior to shipment*	1	E	Fabricaiton
	J0004, para 9.1	Protocal/Interface Design		30	2	E&P	Engineering
		Video Matrix Input & Output Assignment Tables	X	45	1	E	Engineering
	J0004 para 3.3.21.7	Pin-out details for connectors	X	45	2	E&P	Engineering
	J0004 para 9/ T0004, para 6	As Built Drawings		15 days after SAT completion*	2	E&P	Fabrication
	J0004 para 9.1	Weight of each loose-shipped item		30*	2	E&P	Fabricaiton

9. Notes:

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ENGINEERING DOCUMENT REQUIREMENTS

- a. After the initial submittal of the Transmittal Sheet, the following shall apply:
 - (1) Each document shall be accompanied by a Transmittal Sheet when being submitted for review.
 - (2) A final as-built Transmittal Sheet shall be submitted prior to shipment of equipment.
- b. The Seller shall submit for Buyer's review and approval one PDF file of each Quality Verification Documentation (QVD) package of documents specified on the G-321-V one week prior to delivery of each shipment. Buyer will not accept shipment without a complete and correct QVD package.
- c. When an asterisk follows the number in column 5, Submittal Schedule, it indicates the maximum number of calendar days after Buyer has provided written release to Seller to begin material acquisition and supply scope of the purchase order.

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**PUEBLO CHEMICAL AGENT-DESTRUCTION
PILOT PLANT (PCAPP) PROJECT
BECHTEL JOB NO. 24852**

G-321-E FORM INSTRUCTIONS

1. PURPOSE

The G-321-E Form establishes a basis for actions required of a Seller and provides the schedule for the submittal of engineering documents by the Seller. Note that the terms Buyer and Seller, which are used in Purchase Orders, are used in this form. For subcontracts, the terms Contractor, Subcontractor, and Subcontract should be substituted for Buyer, Seller, and Purchase Order, respectively. Where the word Supplier is well established in a title (e.g., Supplier Quality Representative), it will be maintained.

1.1 LEGEND

1. DOCUMENT CATEGORY NUMBER – Self-explanatory
2. SPECIFICATION/PURCHASE ORDER REFERENCE – When completed, provides reference for additional information
3. DOCUMENT DESCRIPTION – Description corresponding to document category number
4. PERMISSION TO PROCEED REQUIRED – Permission to proceed with fabrication or other specific processes described in DOCUMENT DESCRIPTION column.
5. SUBMITTAL SCHEDULE – Maximum number of calendar days after award that the listed document is to be submitted by Seller. When the number is followed by an asterisk, indicates maximum number of days after Buyer's written release to Seller to begin material requisition and supply scope of the purchase order
6. QUANTITY REQUIRED – Number of copies required to be submitted
7. KIND OF COPIES – P = Print (documents other than drawings); E = Electronic file
- 8, 9 Self-explanatory. Note: Items 10, 12, and 13 are generated automatically by BPS
- 10, 11
- 12, 13

DOCUMENT CATEGORY NUMBERS, DESCRIPTIONS, AND DEFINITIONS

- 1.0 DRAWINGS
 - 1.1 GENERAL ARRANGEMENT, OUTLINE DIMENSIONS, SERVICES, FOUNDATIONS, AND MOUNTING DETAILS – Drawings providing external envelope, including lugs; centerline(s); location and size for electrical cable, conduit, fluid piping, and other service connections; isometrics; and details related to foundations and mountings. (i.e., shipping weight, operating weight, anchor bolt sizes/material). Bill of materials shall be on the drawings, showing items, quantities, and ASTM equivalent designations.
 - 1.2 ASSEMBLY DRAWINGS – Detailed drawings indicating sufficient information to facilitate assembly of the component parts of an equipment item.
 - 1.3 SHOP DETAIL DRAWINGS – All drawings that are required for the fabrication/manufacture of the equipment. This is not to be limited to drawings provided by Bechtel if there are any issued with the purchase order. Shop detail drawings for standard industrial components are not required.
 - 1.4 WIRING DIAGRAMS – Drawings which show schematic diagrams, equipment internal wiring diagrams, and interconnection wiring diagrams for electrical items.
 - 1.5 CONTROL LOGIC DIAGRAMS – Drawings which show paths that input signals must follow to accomplish the required responses.
 - 1.6 PIPING AND INSTRUMENTATION DIAGRAMS – Drawings which show piping system scheme and control elements.
- 2.0 PARTS LISTS AND COSTS – Sectional view with identified parts and unit cost.
- 3.0 SELLER COMPLETED DATA SHEETS – Information provided by Seller on data sheets furnished by Bechtel or on Seller's own data sheets.
- 4.0 INSTRUCTIONS
 - 4.1 ERECTION/INSTALLATION – Detailed written procedures, instructions, and drawings required to erect or install material or equipment. Components shipped disassembled shall be match-marked for field assembly.
 - 4.2 OPERATING – Detailed written instructions describing how an item or system should be operated.

G-321-E FORM INSTRUCTIONS (Cont'd)

- 4.3 MAINTENANCE – Detailed written instructions required to disassemble, reassemble, and maintain items or systems in an operating condition.
- 4.4 SITE STORAGE AND HANDLING – Detailed written instructions, requirements, and time period for lubrication, rotation, heating, lifting, or other handling requirements to prevent damage or deterioration during storage and handling at jobsite. This includes shipping instructions for return.
- 4.5 LONG-TERM STORAGE/PREVENTIVE MAINTENANCE INSTRUCTIONS – Detailed written instructions, requirements, and time periods for lubrication, rotation, heating, lifting, or other handling requirements to prevent damage or deterioration during long-term storage at jobsite or at the Seller's facility. Storage period may be for up to two and a half years.
- 5.0 NOT USED
- 6.0 QUALITY ASSURANCE MANUAL / PROCEDURES
- 7.0 SEISMIC DATA REPORTS – The analytical or test report which provides information and demonstrates suitability of material, component, or system in relation to the conditions imposed by the stated seismic criteria.
- 8.0 ANALYSIS AND DESIGN REPORTS – The analytical data (stress, electrical loading, fluid dynamics, etc.) which demonstrate that an item satisfies specified requirements.
- 9.0 ACOUSTIC DATA REPORTS – The noise, sound, and other acoustic vibration data required by the procurement documents.
- 10.0 SAMPLES
 - 10.1 TYPICAL QUALITY VERIFICATION DOCUMENTS – A representative data package which will be submitted for the items furnished as required in the procurement documents.
 - 10.2 TYPICAL MATERIAL USED – A representative example of the material to be used.
- 11.0 MATERIAL DESCRIPTIONS – The technical data describing a material which a Seller proposes to use. This usually applies to architectural items, e.g., metal siding, decking, doors, paints, coatings.
- 12.0 WELDING PROCEDURES AND QUALIFICATIONS – The welding procedure, specification, and supporting qualification records required for welding, hard facing, overlaying, brazing, and soldering.
- 13.0 MATERIAL CONTROL PROCEDURES – The procedures for controlling issuance, handling, storage, and traceability of materials such as weld rod.
- 14.0 REPAIR PROCEDURES – The procedures for controlling material removal and replacement by welding, brazing, etc., subsequent thermal treatments, and final acceptance inspection. Provide a copy of the blank inspection form which will be used to document the results.
- 15.0 CLEANING AND COATING PROCEDURES – The procedures for removal of dirt, grease, or other surface contamination, and preparation and application of protective coatings. Provide a copy of the blank inspection form which will be used to document the results.
- 16.0 HEAT TREATMENT PROCEDURES – The procedures for controlling temperature and time at temperature as a function of thickness, furnace atmosphere, cooling rate, and methods, etc. Provide a copy of the blank inspection form which will be used to document the results.
- 17.0 NOT USED
- 18.0 NOT USED
- 19.0 UT – ULTRASONIC EXAMINATION PROCEDURES – Procedures for detecting discontinuities and inclusions in materials by the use of high-frequency acoustic energy. Provide a copy of the blank inspection form which will be used to document the results.
- 20.0 RT – RADIOGRAPHIC EXAMINATION PROCEDURES – Procedures for detecting discontinuities and inclusions in materials by X-ray or gamma ray exposure of photographic film. Provide a copy of the blank inspection form which will be used to document the results.
- 21.0 MT – MAGNETIC PARTICLE EXAMINATION PROCEDURES – Procedures for detecting surface or near-surface discontinuities in magnetic materials by the distortion of an applied magnetic field. Provide a copy of the blank inspection form which will be used to document the results.
- 22.0 PT – LIQUID PENETRANT EXAMINATION PROCEDURES – Procedures for detecting surface discontinuities in materials by the application of a penetrating liquid in conjunction with suitable developing materials. Provide a copy of the blank inspection form which will be used to document the results.

G-321-E FORM INSTRUCTIONS (Cont'd)

- 23.0 EDDY CURRENT EXAMINATION PROCEDURES – Procedures for detecting discontinuities in material by distortion of an applied electromagnetic field. Provide a copy of the blank inspection form which will be used to document the results.
- 24.0 PRESSURE TEST – HYDRO, AIR, LEAK, BUBBLE, OR VACUUM TEST PROCEDURES – Procedures for performing hydrostatic or pneumatic structural integrity and leakage tests. Provide a copy of the blank inspection form which will be used to document the results.
- 25.0 INSPECTION AND TEST PLAN – A detailed listing of inspections and tests that will be conducted throughout the manufacturing cycle, nature and frequency, type and size of samples, and the acceptance criteria. If any inspections or tests are to be performed by an outside agency, identify the activity and the agency.
- 26.0 PERFORMANCE TEST PROCEDURES – Tests performed to demonstrate that functional design and operational parameters are met. Provide a copy of the blank inspection form which will be used to document the results.
 - 26.1 MECHANICAL TESTS – e.g., pump performance data/curves, valve stroking, load, temperature rise, calibration, environmental, etc.
 - 26.2 ELECTRICAL TESTS – e.g., impulse, overload, continuity, voltage, temperature rise, calibration, saturation, loss, etc.
- 27.0 PROTOTYPE TEST REPORTS – Reports of a test which is performed on a standard or typical example of equipment or item, and which is not required for each item produced in order to substantiate the acceptability of equal items. This may include tests which result in damage to the item(s) tested.
- 28.0 PERSONNEL QUALIFICATION PROCEDURES – Procedures for qualifying welders, inspectors, and other special process personnel.
- 29.0 SELLER SHIPPING PREPARATION PROCEDURES – Procedures used by a Seller to prepare finished materials or equipment for shipment from Seller's facility to the jobsite.
- 30.0 SPARE COMPONENTS AND REPAIR PARTS – Support items subordinate to, or associated with, an end item that are required to service, repair, or overhaul an end item to sustain its operational readiness, including unit prices, for two years' service.
- 31.0 BULK AND CONSUMABLE ITEMS – Supplies that are normally used to service equipment, which lose their identity when used, such as electrical wire and cables, pilot lamps, fuses, gasket material, tubing, hose, adhesives, paints, oils, grease, solvents, and metal and plastic stock, e.g., rods and sheets, including unit prices.
- 32.0 SELLER'S DOCUMENT TRANSMITTAL SHEET AND SCHEDULE – Detailed listing of engineering documents, including drawings, the Seller will submit to satisfy the requirements listed on the G-321-E.
- 33.0 WELD DRAWINGS OR WELD MAPS – Drawings which identify all welds, joint designations, and the appropriate weld procedures. The drawings or weld maps shall indicate the joints not pre-qualified by AWS.
- 34.0 NDE Sampling – Description of how welds will be randomly selected for NDE.
- 35.0 LIST OF PROHIBITED/LIMITED-USE MATERIALS – A listing, by part number, of all components containing prohibited/limited-use materials listed in specification 24852-RD-3PS-000-T0002, paragraph 4, and a cross-reference listing of the drawings on which the components are shown.
- 36.0 QUALITY VERIFICATION DOCUMENTS – Required documents are specified on the G-321-V form. All documents are required to be verified and released by the Buyer's Supplier Quality Representative (SQR).
- 37.0 COMPONENT DATABASE INPUT – Separate listings of valves, instruments, specialty items, and equipment that have external interfaces, are shipped loose, or require field calibration or maintenance as described in specification 24852-RD-3PS-000-T0004, Section 11.

NOTE: ITEMS 38 THRU 49 NOT USED

- 50.0 INSTRUMENT INDEX – Complete list identifying all instrumentation supplied containing as a minimum; item number, quantity, manufacturer, component part number, detailed description, etc.
- 51.0 CONTROL PANEL/CABINET GENERAL ARRANGEMENT – Drawings which show dimensions, equipment orientation and mounting details wireway locations, cable entry areas, module and terminal block arrangements, etc.
- 52.0 EXTERNAL WIRING, TUBING AND PIPING DIAGRAMS – Drawings which show terminal block details, layout for termination of field wiring, shielding and grounding requirements, and location of process connections for all instruments.

G-321-E FORM INSTRUCTIONS (Cont'd)

- 53.0 CABLE REQMTS – Details of cables, including minimum bending radius, maximum bending radius, maximum pulling tension, maximum permissible sidewall pressure, overall connector size, cable outside diameter, and connector details.
- 54.0 INSTRUMENT INSTALLATION DETAILS – Installation drawings detailing requirements for installing all field mounted instrumentation.
- 55.0 INSTRUMENT LOOP DIAGRAMS – A schematic representation showing detailed arrangement of instrumentation components in a loop.
- 56.0 ELECTRICAL LOAD REQMTS – Drawings should identify the electrical load requirements (peak and continuous) for all power sources. Indicate heat dissipation and power requirements for each cabinet or freestanding device in the system.
- 57.0 PRESSURE REQMTS/AIR CONSUMPTION – Drawings should identify air consumption and pressure requirements (peak and continuous) for all users.
- 58.0 DIGITAL/SAMA LOGIC DRAWINGS – System digital/SAMA logic diagrams showing functional operation of the system. Ladder diagram, sequential function chart, function block diagram, or structured text for programmable logic controllers
- 59.0 GRAPHIC DISPLAY DIAGRAMS – Graphic display diagram including definitions of colors used, changeable fields, poke fields, point identification, etc. For systems that do not have graphic display, provide diagrams that pictorially depict the equipment and identify the associated data available through the FCS interface.
- 60.0 SYSTEM BLOCK DIAGRAM – Diagram showing how system is developed. It shall show all of the system cabinets (including processor, I/O racks, modules, power supplies, spare I/O, etc.) communication cable connections, connector termination details, power requirements, and power distribution. Any dip switches that require settings shall be indicated on this drawing. The manufacturer and catalog numbers shall be shown for each component.
- 61.0 I/O WIRING AND CONNECTION DIAGRAM – Drawings which show internal cabinet details, wiring, and connections. I/O cards to be shown with manufacturers' part number, the I/O rack and slot number in which the module is located, the devices connected to each terminal of the module and terminations point to point wiring.
- 62.0 FCS INTERFACE I/O LIST – Complete list identifying I/O for FCS interface.
- 63.0 SOFTWARE PROGRAMMING PACKAGE – A complete programming software package, including all required documentation, for PLC system.