JEA

SJRPP Unit 3 Combined Cycle

Unit Auxiliary Transformers

424014.63.3802

Request for Proposal Issue

15 May 2026

Black & Veatch

Overland Park, KS

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Table of Contents

01100 - Technical Scope and Performance Requirements 1
01100.1 Technical Scope of Work 1
01100.1.2 Technical Submittals 3
01100.2 Technical Attachments 6
01100.2.1 Engineer's Attachments 6
16151 – Power Transformers Datasheet 7
19000 - Quality System Requirements 33
19000.1 General Quality System Requirements 33
19000.1.1 Quality System 33
19000.1.2 Subtier Suppliers 33
19000.1.3 Inspection and Test Plan 33
19000.1.4 Inspections by Purchaser 35
19000.1.5 Code and Non-Code Inspection 37
21000 - Technical Supplemental Specifications 39
21000.1 Summary of Applicable Supplementals 39
21000.2 Technical Supplemental Specifications 39
D100 Site Meteorological and Seismic Data (Revised by Project: 09Sep25) 39
Q170 Welding of Electrical Equipment (Revised by Project: N/A) 40
Q170.1 General 40
Q170.2 Welding Processes 40
Q170.3 Filler Materials 40
Q170.4 Joint Design Requirements 41
Q170.5 Welding Procedure Requirements 41
Q170.6 Welder/Welding Operator Performance Qualification 44
Q170.7 Fabrication Controls 44
Q170.8 Nondestructive Examination (NDE) 45
Q301 Manufacturer's Standard Coating (Revised by Project: 7-Jan-2026) 47
Q301.1 Control and Electrical Equipment 48
Q301.2 Mechanical Equipment 48
Q301.3 Documentation 48
Q500 Shop Drawings and Instruction Manuals (Revised by Project: 09Sep25) 48
Q500.1 Submittal Requirements 48
Q500.2 Compliance Reports 49
Q500.3 Motor and Electric Actuator Information 49
Q500.4 Drawings 49
Q500.5 Wiring Diagrams 51
Q500.6 Instruction Manuals 52
Q500.7 Manufacturer's Data Report Requirements 52
Q500.8 Binding 53
Q501 Instruction Manuals (Revised by Project: 07Apr26) 56
Q501.1 Submittal Requirements 56
Q501.2 Instruction Manuals 56
Q502 Electrical Data (Revised by Project: 09Sep25) 59
Q502.1 Submittal Requirements 59
Q502.2 Motor and Electric Actuator Information 59
Q502.3 Wiring Diagrams 59
Q520 OEM 3D Equipment Model Development (Revised by Project: 09Sep25) 67
Q520.1 Submittal Requirements 67
Q520.2 Model Development 67
Q520.3 Piping System Requirements 69
Q520.4 Model Data 69
Q520.5 Out of Scope Content 69
Q520.6 Model Submittal 70
Q520.7 JEA's Review 71

Q520.8 Tekla Structures Model(s) (Structural Steel Detailing Models) 72
S100 Seismic Design (Revised by Project: 16Feb26) 73
S100.1 General 73
S100.2 Seismic Forces 74
S100.3 Seismic Design and Certifications 74
S100.4 Documentation 78
S400 Contractor Loads for Structures, Equipment, and Components (Revised by Project: N/A) 79
S400.1 General 79
S400.2 Required Contractor Loads 79
S400.3 Load Table Requirements 80
V100 Noise Abatement (Revised by Project: 09Apr26) 80

01100 - Technical Scope and Performance Requirements

01100.1 Technical Scope of Work

The work under these specifications shall include furnishing the following:

1. Unit Auxiliary Transformers (quantity and site location note below)
2. Oil for all transformers
3. Delivery DDP transformer to jobsite

All Work shall be produced in accordance with the current laws, ordinances, regulations, codes, standards, and rules applicable to Professional Engineers practicing in the state of Florida. If required by the applicable current laws, ordinances, regulations, codes, standards and rules; the Supplier design documents (calculations, drawings, specifications, statements of special inspections, certificates of compliance, etc.) shall be certified and sealed by an engineer licensed to practice in the state of Florida and shall be submitted to JEA.

In the event of technical conflicts, errors, or discrepancies, the detailed technical specifications, including this Section 01100 and all higher numbered sections, take precedence over Section 21000, Technical Supplemental Specifications.

Major Equipment Scope				
Item	**Description**	**Site**	**Tag Number(s)**	**Quantity**
1.	Unit 3- Unit Auxiliary Transformer A	SJRPP	3APE-XF-1000	1
2.	Unit 3- Unit Auxiliary Transformer B	SJRPP	3APE-XF-1001	1
3.	Unit 4-Unit Auxiliary Transformer A	SJRPP	4APE-XF-1000	1
4.	Unit 4- Unit Auxiliary Transformer B	SJRPP	4APE-XF-1001	1

Miscellaneous Materials Scope			
Item	**Description**	**Supplier (applies to)**	**Purchaser (applies to)**
1.	All nuts, bolts, gaskets, special fasteners, backing rings, and other accessories required for installation of components and furnished equipment.	All technical sections	
2.	All piping integral equipment and skids.	All technical sections	
3.	All coupling guards, belt guards, and personnel safety items required for furnished equipment.	All technical sections	
4.	All connections on furnished equipment for interfacing to Purchaser-furnished piping and instruments.	All technical sections	

Miscellaneous Materials Scope			
Item	**Description**	**Supplier (applies to)**	**Purchaser (applies to)**
5.	All valves and instruments required for automatic control and monitoring of the furnished system (or for manual control and monitoring of the system).	All technical sections	
6.	All instrument, power, and control wiring and RGS conduit integral to equipment, skids, or packages furnished. Junction boxes shall be furnished with terminal blocks and internal wiring to these terminal blocks for equipment requiring external connection.	All technical sections	
7.	Electrical and control wiring to connect furnished equipment terminal points to the plant electrical and control systems.		All technical sections
8.	Motor controls and starters for furnished equipment (integral to transformer control panel).	All technical sections	
9.	Ground pads and lugs for furnished equipment, skids and structures (NEMA two-hole pad on all four corners).	All technical sections	
10.	Start-up commissioning spare parts.	All technical sections	
11.	One set of consumable materials required for startup and testing (if required).	All technical sections	
12.	Touchup paint for field	All technical sections	
13.	Permanent foundations/tie-down pads and foundation		All technical sections
14.	All other features as specified in this procurement package.	All technical sections	

Miscellaneous Engineering/Services Scope			
Item	**Description**	**Supplier (applies to)**	**Purchaser (applies to)**
1.	Design, fabrication, Factory Acceptance Testing, packaging, and delivery of all equipment.	All technical sections	
2.	Shop drawing submittals.	All technical sections	
3.	Provide site-specific foundation load tables	D100, S100, S400	
4.	Shop testing including Purchaser Witness of transformer testing	All technical sections	
5.	Shop material inspection and testing.	All technical sections	

Miscellaneous Engineering/Services Scope			
Item	**Description**	**Supplier (applies to)**	**Purchaser (applies to)**
6.	Calibration of all instrumentation and relay furnished as part of Supplier equipment.	All technical sections	
7.	Field technical advisor service time (rates for time and travel).	All technical sections	
8.	Receiving, unloading, storing, and field erection of all equipment including oil dry and filling.		All technical sections
9.	Transformer field testing		All technical sections

01100.1.2 Technical Submittals

This article identifies all of the Technical Submittals that are required to be submitted to JEA by the Supplier. Included is the schedule basis for each submittal to support the overall engineering cycle for this project.

Item No.	Submittal Item	Submittal Dates				
		Calendar Days		Event	Due Date	LD's Apply
1	Advance Shipping Notice including Final Detailed Packing List	2	Before	Delivery of Equipment		No
2	Shipment Origin and Profile Reports for All Shipments of Work	90	Before	Initial Shipment with Monthly Updates		No
3	Engineering/Procurement/Production/ Testing and Inspection/Shipping Schedule and Status Report	30	After	Effective Date with Monthly Updates		Yes
4	Preshipment Inspection Notice	30	Before	Shipment of Equipment		No
5	Electronic Material List	30	After	Effective Date with Monthly Updates		Yes
6	Preventative Maintenance and Jobsite Handling and Storage Requirements, if Applicable		With	Electronic Material List		Yes
7	Safety Data Sheet (SDS) Forms		With	Each Shipment		No
8	Completed Spare Parts List (SPIR) and/or Recommended Spare Parts List, with Unit Prices and Names of Suppliers, Necessary to Cover a Full Operations Maintenance for a 3 year Cycle	90	After	Effective Date		No
9	Inspection and test plan including references to applicable standards and method of inspecting subtier suppliers	90	Before	Start of Fabrication		Yes

Item No.	Submittal Item	Submittal Dates				
		Calendar Days		Event	Due Date	LD's Apply
10	Inspection and test report for each inspection on the inspection and test plan	21	After	Test of Inspection		No
	Power Transformers - Unit Auxiliary					
11	Certification Letter or Certificate of Authorization (copy), if certified by a registered agency, e.g., ASME Certificate of Authorization, ISO Certificate	30	After	Effective Date		No
12	Subsupplier listing	5	Before	Issue of Subsupplier Purchase Order		No
13	Notification of inspection/test (for JEA hold/witness points)	14	Before	Test/Inspection		No
14	Quality Manual, uncontrolled copy	28	After	Effective Date		No
15	Leak Test Procedure	90	After	Effective Date		No
16	Factory Acceptance Test Procedure	90	Before	Test		Yes
17	Outline Drawing Containing the Following Information Required for Transformer Foundation Design (Not to Exceed Information as a Minimum): • Weights (Shipping & Oil Filled). • Oil Volume. • Dimensions of Rad/COPS Tanks for Oil Containment Design. • Overall Transformer Dimensions Including all Auxiliary Equipment, Base Dimensions and Top of Oil Tank. • Clearance Requirements from Buildings or Fire Walls. • Horizontal & Vertical Location of Center of Gravity.	30	After	Effective Date		Yes
18	Detailed Outline Drawing, including the following: • Location of Major Auxiliary Equipment. • List of transformer items, including the vendor's name, model number and quantity. • Iso-Phase Flange Details. • Certified Data for Items listed in Item 510.	60	After	Effective Date		Yes
19	Bushing & Arrester Outline Drawings	60	After	Effective Date		Yes

Item No.	Submittal Item	Submittal Dates				
		Calendar Days		Event	Due Date	LD's Apply
20	Wiring Diagrams & Elementary Diagrams	60	After	Effective Date		Yes
21	Nameplate Drawings	60	After	Effective Date		No
22	Recommended Erection Sequence in Detail	90	Before	Shipment of Equipment		Yes
23	Transformer Design Review Input Data	75	After	Effective Date		No
24	Short-Circuit Withstand Type Data or certificate of successfully passed short circuit test			With Proposal (if requested)		No
25	Design Data & Transformer Performance Curves Including: - No Load Overexcitation Capability(% vs. time): No Load Overexcitation Capability shall be furnished as a curve: V/HZ capability as a function of time. There shall be a short-time capability curve with a time scale from 0 to 120 minutes. There shall be a long-time capability curve with a time scale from 2 hours to 30 hours. No Load Overexcitation Capability shall be furnished in a numeric format. The time shall extend from 0 to 120 minutes with a one minute resolution. - Full Load Overexcitation Capability(% vs. time): Full Load Overexcitation Capability shall be furnished as a curve: V/HZ capability as a function of time. There shall be a short-time capability curve with a time scale from 0 to 120 minutes. There shall be a long-time capability curve with a time scale from 2 hours to 30 hours. Full Load Overexcitation Capability shall be furnished in a numeric format. The time shall extend from 0 to 120 minutes with a one minute resolution. - MVA Capability vs. Average Ambient Temperature - I^2t Damage Curves	75	After	Effective Date		Yes
26	Auxiliary Power requirements	60	After	Effective Date		Yes
27	Current transformer ratio correction factor and excitation curve with internal resistance (at stated temperature reference) of the CT stated on the secondary excitation characteristic curve.	90	After	Effective Date		Yes

Item No.	Submittal Item	Submittal Dates				
		Calendar Days		Event	Due Date	LD's Apply
28	Current transformer ANSI relaying and metering accuracy; thermal rating; secondary resistance at 75° C; phase angle correction factor curves	60	After	Effective Date		Yes
	Welding of Electrical Equipment					
29	Welding Procedure Specifications (WPS) with applicable Procedure Qualification Records (PQR) (when required by Q170)	60	Before	Start of Fabrication		No
	Manufacturer's Standard Coating			.		
30	Shop drawings that identify shop-applied coating systems	30	Before	Start of Fabrication		No
31	Manufacturer's product data sheets, to include DFT per coat, number of coats and total coating system DFT	30	After	Release to Proceed		No
	Shop Drawings and Instruction Manuals			.		
32	Completed Instruction Manuals (for instruction manual submittal requirements, refer to Technical Supplemental Q501 and the commercial submittals section.)		Upon	Shipment of Equipment		Yes
	Electrical Data					
33	Completed motor information sheets	60	After	Effective Date		Yes
34	Completed electric actuator information sheet	60	After	Effective Date		Yes

01100.2 Technical Attachments

This article lists the drawings and other technical attachments that have been prepared for the work under these specifications.

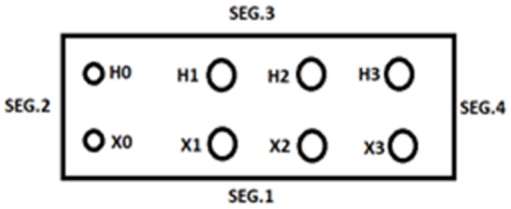
01100.2.1 Engineer's Attachments

None

16151 – Power Transformers Datasheet

Specific Ratings									
1	**Scope of Supply for UAT connected to CTG IPB ("A/B" Transformers)**								
2	SJRPP Unit 3 - Unit Auxiliary Transformer A SJPRP Unit 3 - Unit Auxiliary Transformer B								
3	**Rating**								
4	**Winding**	**MVA Ratings at 65° C**	**Nominal System Voltage (kV)**	**Winding Rated Voltage (kV)**	**Highest Equip-ment Voltage (kV)**	**Line BIL (kV)**	**Neutral BIL (kV)**	**Connection**	
5	High Voltage; HV	20/26.7/33.3	25	24	26	150	N/A	Delta	
6	Low Voltage; XV	20/26.7/33.3	8.7	6.9	6.9	110	110	Res Grd Wye	
7	**Frequency, Hz**	60	**Application**	Outdoor					
8	**Number of Phases**	3	**Transformer Type**	Step Down 2 Windings					
9	**Cooling Class**	ONAN/ONAF/ONAF	**Winding Material**	100% Copper					
10	**Vector Group**	LV lags HV by 30 deg (Dyn1)	**Altitude for Design**	Below 3300 ft (1000 m)					
11	**Ambient Temperature Range of Design**	30 ºC Daily Average / 40 ºC Max. for Any 24 Hour Period, -20 ºC Min.							
12	**Temperature Rise (Winding average)**	65	**Temperature Rise (Top oil)**	**65**					
13	**Max. Winding Hot Spot Rise**	80							
14	**Oil Preservation System**	Inert Gas Pressure System							
15	**Seismic Ground Acceleration Level**	See D100/S100							
16	**Audible Sound at Max. MVA (dBA)**	71 / 74 dB at ONAN/ONAF (0.3m / 2m)							
17	**Impedances (at rated voltage, 85 ° C Reference Temperature and 20 MVA Base)**								
18	**Windings**	**Impedance (%)**	**Tolerance (%)**						
19	H-X	18	±7.5%						
20	**Tap Changers**								
21	**Regulated Windings**	**Type**	**Tap Changer Control**	**Number of Steps**		**Total % Above Rated kV**	**Total % Below Rated kV**		
				Plus	**Minus**				
22	HV	De-Energized	Local Manual	2	2	5	5		
23	**Bushings**								
24		**BIL (kV)**	**Termination Compartment**	**Min Current Rating [A]**	**Termination Type**	**Location**	**Segment****		

25	HV	200	Yes	1200	Isolated Phase Bus**	Cover	3
26	XV	150	Yes	3300	Cable Bus	Wall	1
27	X0	110	No	3300	Conductor to Bushing	Cover	1

28	The Physical Arrangement and Terminal Identification Shall Be X1-X2-X3 from Left to Right When Facing the Low Voltage Side, H1-H2-H3 and from Right to Left When Facing HV Side. **** IPB to be provided by IPB supplier.**	

29	**Neutral Grounding Equipment**						
30	**Connection Point**	**Method**	**Ohms**	**Amperes**	**kV**	**Time Duration**	**Mounted on Transformer?**
31	X0	Resistance	8	500	6.9	10 seconds	Yes

32	**Current Transformers**						
33	**Location Point Bushings**	**Ratio Primary: Secondary**	**Accuracy Class**	**Burden**	**Position on Bushing**	**Qty per Bushing**	**Total**
34	HV	1200:5A MR (IEEE)	C800	B-8.0 Relaying (IEEE)	Lower	2	6
35	HV	2000:5A MR (IEEE)	0.3 Metering (IEEE)	B-1.8 Metering (IEEE)	Upper	1	3
36	XV	3000:5A MR (IEEE)	C800	B-8.0 Relaying (IEEE)	Middle	1	3
37	X0	500:5A SR (IEEE)	C400	B-4.0 Relaying (IEEE)	Middle	1	1

38	**Scope of Supply for UAT connected to STG IPB (Train "B" Transformers)**
39	SJRPP Unit 4- Unit Auxiliary Transformer A SJPRP Unit 4- Unit Auxiliary Transformer B

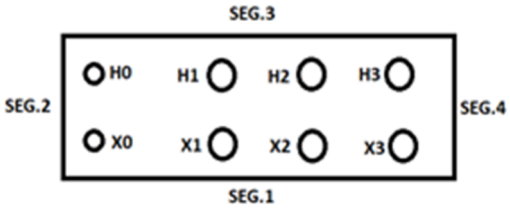
40	**Rating**								
41	**Winding**	**MVA Ratings at 65° C**	**Nominal System Voltage (kV)**	**Winding Rated Voltage (kV)**	**Highest Equip-ment Voltage (kV)**	**Line BIL (kV)**	**Neutral BIL (kV)**	**Connection**	
42	High Voltage; HV	20/26.7/33.3	25	18	26	150	N/A	Delta	
43	Low Voltage; XV	20/26.7/33.3	8.7	6.9	6.9	110	110	Res Grd Wye	

44	**Frequency, Hz**	60	**Application**	Outdoor
45	**Number of Phases**	3	**Transformer Type**	Step Down 2 Windings
46	**Cooling Class**	ONAN/ONAF/ONAF	**Winding Material**	100% Copper

47	**Vector Group**	LV lags HV by 30 deg (Dyn1)	**Altitude for Design**	Below 3300 ft (1000 m)	
48	**Ambient Temperature Range of Design**	30 ºC Daily Average / 40 ºC Max. for Any 24 Hour Period, -20 ºC Min.			
49	**Temperature Rise (Winding average)**	65	**Temperature Rise (Top oil)**	**65**	
50	**Max. Winding Hot Spot Rise**	80			
51	**Oil Preservation System**	Inert Gas Pressure System			
52	**Seismic Ground Acceleration Level**	See D100/S100			
53	**Audible Sound at Max. MVA (dBA)**	71 / 74 dB at ONAN/ONAF (0.3m / 2m)			
54	**Impedances (at rated voltage, 85 ° C Reference Temperature and 20 MVA Base)**				
55	**Windings**	**Impedance (%)**	**Tolerance (%)**		
56	H-X	18	±7.5%		
57	**Tap Changers**				

58	**Regulated Windings**	**Type**	**Tap Changer Control**	**Number of Steps**		**Total % Above Rated kV**	**Total % Below Rated kV**
				Plus	**Minus**		
59	HV	De-Energized	Local Manual	2	2	5	5

60	**Bushings**						
61		**BIL (kV)**	**Termination Compartment**	**Min Current Rating [A]**	**Termination Type**	**Location**	**Segment****
62	HV	200	Yes	1200	Isolated Phase Bus**	Cover	3
63	XV	150	Yes	3300	Cable Bus	Wall	1
64	X0	110	No	3300	Conductor to Bushing	Cover	1
65	The Physical Arrangement and Terminal Identification Shall Be X1-X2-X3 from Left to Right When Facing the Low Voltage Side, H1-H2-H3 and from Right to Left When Facing HV Side. **** IPB to be provided by IPB supplier.**						



66	**Neutral Grounding Equipment**						
67	**Connection Point**	**Method**	**Ohms**	**Amperes**	**kV**	**Time Duration**	**Mounted on Transformer?**
68	X0	Resistance	8	500	6.9	10 seconds	Yes

69	**Current Transformers**						
70	**Location Point Bushings**	**Ratio Primary: Secondary**	**Accuracy Class**	**Burden**	**Position on Bushing**	**Qty per Bushing**	**Total**

71	HV	1200:5A MR (IEEE)	C800	B-8.0 Relaying (IEEE)	Lower	2	6
72	HV	2000:5A MR (IEEE)	0.3 Metering (IEEE)	B-1.8 Metering (IEEE)	Upper	1	3
73	XV	3000:5A MR (IEEE)	C800	B-8.0 Relaying (IEEE)	Middle	1	3
74	X0	500:5A SR (IEEE)	C400	B-4.0 Relaying (IEEE)	Middle	1	1

	General Requirements: The Following Requirements are Applicable to All Transformers	
75	**Items Furnished by others and Interfaces**	
76	Refer to 01100 section.	
77	**Applicable Codes and Standards**	
78	**Work**	**In Accordance With**
79	Transformer (applicable versions of the following):	IEEE C57 Series and all reference documents (Latest Revision)

80	**Materials**	
81	The following materials shall be used:	
82	**Component**	**Material**
83	Core	High Grade Domain Refined CGRO steel
84	**Approved Manufacturers of Components**	
85	**Component**	**Material**
86	Core Steel	AK Steel TRANCOR, JFE, POSCO
87	Insulation	WEIDMANN
88	Copper	CTC from Sam Dong, MW from SamDong, ESSEX, REA
89	Press Rings	Rochling
90	Radiators	TTP
91	CT	Meramec
92	Fans	Krenz
93	Bushings	HITACHI ABB, PCORE

94	**Paint System and Colors**		**Power Supplies**	**Nominal Voltage**	**No. of Sources**	**Available Fault Current**
95	**Tank and Accessories Color**	ANSI #70 Light Gray	**Auxiliary Power**	480V Three Phase, 3-wire	2	65 kA
96	**Painting System**	Mfr Std	**Control DC**	125V, 2-wire	1	10 kA
97	**Porcelain Color**	Mfr Std	**Control AC**	120V Single Phase,	Derived by Supplier from the 480V supplied	As Required

98	**Convenience Outlet**	Yes
99	**Loss Evaluation (at rated voltage)**	**US$/kW**
100	No Load Losses (20° C Reference Temperature)	5000
101	Load Losses at Maximum MVA Rating (85° C Reference Temp.)	2600
102	Auxiliary Cooling Losses at Maximum MVA Rating	1600
103	**Accessories**	
104	Resistance Temperature Detector (RTD)	Hot Oil and Hot Spot – PT100
105	Dissolved Gas Detector	Provisions may be made for future installation of an online dissolved gas monitoring system.
106	Buchholz Relay	Yes – Double Float Type, Alarm and Trip Contacts
107	Pressure Relief Device (PRD)	Yes – Mechanical Type, Vendor Neutral
108	Winding temperature	Yes – Dial Type Indicator with Alarm Contacts
109	Oil level	Yes – Magnetic Oil Level Gauge (MOG) with Alarm Contacts
110	Oil temperature	Yes – Dial Type Indicator with Alarm Contacts
111	Fan failure alarm	Yes
112	Power supply failure alarm	Yes
113	Annunciator Panel	No
114	**Ancillary Equipment Locations**	
115	**Equipment**	**Segment**
116	Control Cabinet	4
117	Neutral Grounding Resistor	2,4
118	Temperature Indicators	4
119	Oil Level Indicators	4

120	Ground Pads	1, 2, 3 and 4	
121	**Additional Requirements**		
122	1. Core Flux Density at **110%** Rated Voltage (Web/M^2 or Tesla)	Not to exceed 1.925 T	
123	2. Winding Conductor Current Density (Amp/mm^2)	Not to exceed 4.0 A/mm^2 (Only unloaded Tertiary and Regulating windings can have up to 4.5 A/mm^2)	
124	3. Current transformer leads shall be extended into the control cabinet and shall be terminated on shorting type terminal blocks with preinsulated ring type connectors.		
Testing			
125	**Test Requirements**		
126	**Tests**	**In Accordance With (latest applicable version)**	**Conducted By**
127	Factory testing	IEEE C57 (Latest Revision)	Supplier
128	Field Testing	IEEE C57 (Latest Revision)	Supplier or Supplier's Subcontractor
129	**Technical Attachments**		
130	Technical attachments relevant to the work under this section are listed in Section 01100.		
131	**Supplemental Specifications**		
132	Technical supplemental specifications that are applicable to the work covered under this technical specification section are identified and included in Section 21000.		
Products			
133	**General**		
134	This specification is intended for procurement of outdoor oil-immersed power transformers. The Supplier shall provide a standard design for items within the scope of this specification, but which are not covered in detail by these specifications.		
135	The standard design shall be in accordance with accepted industry practices for electrical power generation.		
136	Transformer shall be suitable for both step-up and step-down operation and the source of power to be assumed from HV, LV or tertiary windings (if existed).		
137	**Loading and Rating**		
138	The current carrying capability shall be limited only by the capacity of the core and coils and not by other components such as winding leads, bushings, and tap changers.		
139	The vendor shall verify, by computer simulations, that above temperatures are not exceeded at any time during this overload condition. Calculations shall be provided to verify that neither top oil nor the hot spot conductor temperatures specified above are exceeded during the overload condition described.		
140	**Generation Step-Up Application**		
141	The transformer should be designed for application of generating step-up and follow relevant standard (IEEE C57.116).		

142	Generator step-up and unit auxiliary transformers will be directly connected to the generator in such a way that they may be subjected to load rejection conditions that result in an abnormally high voltage from the generator.			
143	Therefore, these transformers shall be designed to withstand, as a minimum, the resulting stresses with 1.4 times the rated voltage for 5 seconds, applied at the transformer terminals to which the generator is to be connected.			
144	**Through-Fault Withstand**			
145	Transformers furnished under these specifications shall be capable of withstanding, without damage, the mechanical and thermal stresses caused by short-circuit currents limited only by the impedance of the transformer.			
146	System impedance shall be considered equal to zero.			
147	System pre-fault voltage shall be equal to the voltage rating of the maximum tap or 1.05 times the principal tap, whichever is greater.			
148	Generator step-up and unit auxiliary transformers shall also be designed to withstand the resulting forces caused by a surge in terminal voltage and fault current contribution from the generator while coasting to a standstill.			
149	Unless additional information is specified about the time/current/voltage characteristics of the generator under fault conditions, the following criteria shall be considered the minimum acceptable to account for these factors:			
150	**Type of Generator**	**Type of Transformer**	**Voltage Overshoot (times rated voltage)**	**Time Duration of Fault (seconds)**
151	Combustion turbine	Unit auxiliary	1.25	2
152	If requested by Purchaser, conformance to these requirements shall be demonstrated by certified short-circuit test data on a transformer with similar core and coil design.			
153	**Mechanical Construction**			
154	Tanks, bases, radiators, covers, junction boxes, and any other attached compartments fabricated from steel shall withstand normal transportation, installation, and service stresses without distortion or damage.			
155	Tank shall have welded construction. Corner welds are not accepted, and the welds shall be at least 6 inches from the corners. Cover shall be welded and verified to resist any deflection under full vacuum condition. No sound mitigation is allowed to be installed inside the tank unless it is approved by JEA.			
156	Fall arrester plates shall be mounted on the tank cover as close as possible to the center of the cover.			
157	If a winding has multiple voltage levels, using a link-board is not acceptable. A properly selected switch shall be used to change the voltage.			
158	Two manholes of minimum 22 inch-diameter with handles shall be provided on the tank cover to easy access the bushings, CTs and leads inside the tank. Manholes cover shall be bolted to the tank by a raised flange.			
159	The complete tank shall be designed to withstand:	full vacuum and at least 125 percent of the maxium operating pressure of the oil preservation system furnished		
160	The tank cover shall be sloped or domed to shed water and to assist with the flow of gas bubbles to the gas detector piping and/or relay.			

161	Field installation shall not require any welding. The base shall allow skidding or moving on rollers in any direction.
162	Lifting lugs and jacking pads shall be provided for lifting and jacking the completely assembled transformer. The jacking pads must be located near each of the four corners.
163	The tank shall be designed so that all current transformers can be removed easily without removing the main transformer tank cover.
164	Holes with automatic drain valves shall be provided at the low point of the bus duct flange enclosures so that condensate and water will not accumulate.
165	The transformer tank base shall be engraved, or a placard shall be installed to clearly identify the dimensional centerline near the base of the tank on all four sides. If abbreviated, “C.L” shall be used to signify dimensional centerline.
166	The tank shall be marked on a minimum of two adjacent sides to show center of gravity. If abbreviated, “C.G.” shall be used to signify center of gravity.
167	Drawings, nameplates, test reports, and correspondence must use the English language and English units of measure with the metric equivalent in parentheses. The following minimum information must be shown on the transformer outline drawing: • All multiple quantities • Weights and oil volumes • Paint color • Footprint of base • Dimensional centerline. Location of Purchaser connections (bus duct, etc.) shall be referenced to centerline on all outline drawings. • Center of gravity (shown on two views) • Valve sizes and types • 77° F (25º C) oil level and low oil level • Location and detail sketch of ground pads • Location, cutout size, and open door dimensions of all cabinets • Bushing and arrester ratings, stud dimensions with thread information, and space arrangements with hole patterns • Location, hole sizes, and detail sketch of jacking, lifting, and pulling facilities. A statement should be made describing which lugs are for lifting the transformer when completely assembled and full of oil • Distance clearances around the envelope of the transformer that JEA must meet so as not to interfere with operation or maintenance of the transformer and its accessories. Some examples are cooling control cabinet swing door distance, pullout of radiator banks maintenance distances, etc. • List of items including vendor name, quantity, and model number of the equipment where applicable • All four sides and top view, as well as ISO view of the transformer.

168		Core and Coils
169		The transformer shall be Core-Type, shell-type construction is not acceptable. The core shall have high quality CRGO steel sheets, with step-lap mitered joint construction that is burr-free (less than 0.6 mils). The core highest temperature (hottest spot) shall not exceed 130° C at 30° C ambient temperature at any loading conditions or over-excitations.
170		Core through bolts of any materials (metal, fiberglass etc.) is not acceptable. Nuts, bolts, and clamps of the core assembly shall be provided with positive locking devices to prevent loosening. For core form transformers, the complete core and coil assembly shall be removable from the tank for repairs. Torque verification documents for all factory torqued connections shall be available for review by Purchaser.
171		The core shall be securely grounded to the tank. For core form transformers, the core ground connection shall be detachable and made in an externally located terminal box, accessible without requiring entry into the main tank. If the design includes a Series Transformer (Booster Transformer) or Preventive Autotransformer (PA), a separate core ground shall be brought out for each one.
172		The outermost core steel packets and tie bars/plates (if located internal to the windings) shall be divided as needed so that the maximum operating temperature does not exceed the Supplier's standard practice. This is an item that will be verified in design review meeting.
173		Flitch plates shall be designed to withstand the stresses not to exceed 60% of the material elastic limit. The stresses shall be considered as the maximum of short circuit stresses and the lifting stresses.
174		In no case shall tie bar sections be wider than 3 inches (75 mm) or core packet sections wider than 4-1/2 inches (115 mm).
175		For units large enough to require slit core packets and/or tie bars/plates as described above, and having tie bars/plates located adjacent to the core packet, and also between core clamps and the core limbs, insulation material provided between the bars/plates and the core packets as well as core cooling duct insulation shall be a high temperature, non-cellulosic material such as Nomex.
176		Windings shall be fixed under pressure with single piece clamping plate, located at the top and bottom of each set of windings (multiple piece end rings are not acceptable). End ring deflection for top and bottom press rings shall be limited to 2.5 mm.
177		These clamping plates shall be properly sized and braced for short circuit forces, made from suitable materials, and locked into place with suitable means.
178		Core and windings for the main unit, as well as the series transformers and preventive autotransformers shall be circular and power class. All windings shall be copper. When a continuously transposed conductor is used, it shall be epoxy bonded. Netting tape CTCs are acceptable for use in Helical design only.
179		Main unit's windings shall be Disc-type or Helical. Foil-wound (sheet-wound), layer windings or pancake windings are not acceptable. The only exception is foil wound Preventive Autotransformers (PA) for transformers rated less than 60MVA top rating. Regulating windings shall have a fully distributed construction. Exception is Tapped Helix RV windings that have the same magnetic center for all taps. Type of windings must be given in the bid proposal document.
180	T	Internal arresters or non-linear devices to limit the dielectric stresses are not allowed, unless it is approved by Purchaser. Using a reactor to control the short circuit forces is not preferred, and it should be approved by JEA.

181	All windings shall be self-supporting for inward (buckling) and outward (hoop) forces. Windings shall not rely on the core assembly for support to resist inward radial short-circuit forces.
182	Winding capability to resist inward radial forces shall be based on the ability of the conductor to resist forces in a "free-buckling" mode, which shall be less than 0.65 of the conductor's RP0.2 (2 percent yield strength). Tensile stresses in all windings shall be limited to 80% of 0.2% yield strength of the conductor material.
183	Stress in oil ducts shall not exceed 80% of Weidmann PD-inception curves for degassed oil. The DIL factor used for impulse waves shall be considered not greater than 2.5. New concept design for this transformer is not accepted unless it is approved by Purchaser, that means the Manufacturer shall have an experience in the design concept and successfully passed testing of this transformer.
184	Windings of 115kV and above shall be designed for basic switching impulse insulation levels (BSL) according to the IEEE C57.12.00 - Table 5 standard.
185	When the coils use paper insulation, it shall be thermally upgraded paper insulation. Proof of paper quality, testing and specifications shall be furnished upon request and shall be subject to acceptance/approval by JEA. The conductor insulation papers shall have a minimum 30% overlapped.
186	The active part shall go through vapor phase drying process (VPD) before placed in tank and filled with insulating oil.
187	All the leads shall be permanently stamped with their own ID and not with marker. Leads shall be fastened with cleats (pressboard clamps).
188	If there is a Series Transformer in the design, the turn ratio and the resistances of all its windings shall be measured and documented before the leads have been made. The document shall be provided to JEA. In such case, if the regulation winding is the innermost winding, proper calculations shall be made and provided to JEA regarding the temperature rise and hottest spot gradient of the winding as that winding cannot be accessed during the temperature rise test. Therefore, if it is found necessary (agreed by Purchaser), proper paper insulation with higher thermal capability (such as Nomex) shall be used for that winding.
189	**De-Energized Tap Changer (DETC)**
190	The operating handle shall have provisions for padlocking and shall be located no more than 60 inches (1,500 mm) above ground level. The tap position indicator shall be clearly visible from ground level.
191	The DETC shall be full capacity for all tap positions and the contacts shall be maintenance-free. The 3-phase transformers shall have a DETC mechanism such that no separate operation is required for tap-changing each phase. DETC Contacts shall be silver plated.
192	There shall be provisions for accessing the DETC without removing the cover. Each DETC shall have a nameplate. A locking mechanism shall be provided, the locking device shall accept use of padlock.
193	**Insulating Oil**
194	Unless otherwise specified, insulating oil for complete filling shall be furnished with each transformer. The oil shall not contain any polychlorinated biphenyls (PCBs) and shall be Type II, inhibited with 0.15 percent to 0.30 percent by weight of DBPC (2-6 ditertiary butyl paracresol).

195	The transformer main nameplate shall state that the oil is inhibited and contains no detectable PCBs (<2ppm) at the time of manufacture.	
196	The electrical insulating mineral oil to be permanently installed in all transformers furnished under these specifications shall be new, unused oil. The oil shall be tested in accordance with ASTM D-1275, Method B and to Doble CCD or IEC/CIGRE CCD, and shall be deemed "non-corrosive" according to criteria stated in these documents.	
197	Also, a Dibenzyl Disulfide (DBDS) test shall be performed and shall yield results less than 20 mg/kg by weight. Results of these oil tests shall be submitted to JEA at least 15 days before the oil is dispatched to the site (whether in the transformer body or by separate transport means.	
198	The Oil Quality shall meet the limits of the latest revision of the applicable standards.	
199	Oil shall be shipped by bulk container, such as a tanker or large flexible tank, designed specifically for such use. Shipment in drums is not allowed unless approved by JEA. Each shipping container shall have its oil tested for dielectric integrity prior to being installed in the transformer.	
200	When shipping weight permits, the transformer shall be shipped oil-filled. If the transformer is shipped without oil, then it shall be shipped pressurized with dry air or nitrogen.	
201	A pressure vacuum gauge and suitable shutoff valve shall be provided to monitor or add dry air or nitrogen during shipment.	
202	Each transformer and its associated equipment shall be designed and delivered capable of full vacuum filling in the field. The manufacturer's recommended assembly and filling procedures shall be submitted for Purchaser's review prior to shipment.	
203	**Oil Preservation System**	
204	The system shall include a gauge alarm contact and a gas sampling valve at ground level.	
205	The system shall be designed with an oil temperature alarm range of -13° F to 248° F (-25° C to 120° C). Unless specified, the Supplier will have the option of furnishing a sealed tank system, an automatically maintained inert gas pressure system, or a sealed bladder conservator system. Based on this choice, the appropriate following paragraph shall be applied:	
206	Inert Gas Pressure System	An alarm device with alarm contacts for remote indication of low gas supply shall be furnished. Valves shall be provided to permit purging the gas space and testing the seal on the tank by admitting dry nitrogen under pressure. The gas control equipment, including adequate space for nitrogen bottles, shall be protected by an easily accessible weatherproof **stainless steel** enclosure mounted on the transformer at the ground level. Sufficient nitrogen gas shall be furnished for the initial flushing, filling, and operation. If necessary, used gas cylinders may be returned to the manufacturer at his expense. A flexible hose made from stainless steel shall be provided between cylinder and regulator. Proper pressure gauge and alarms shall be provided.
207	**Bushings**	
208	Bushings mounted in a vertical position shall have a self-contained oil supply if they are oil type. Bushings shall be mounted on a raised flange.	
209	Oil-filled bushings shall have a sight gauge or other means to indicate oil level.	

210	All bushings shall be condenser type, with capacitance graded layers of insulating material for the purpose of controlling the distribution of the electric field, and **shall be equipped with a capacitance or power factor test tap**. If the bushing is mounted in a metal enclosed bus duct, the external terminal shall be designed for connection to a bus operating at 221° F (105° C). Gaskets, oil expansion areas, and paper insulation used in the assembly of the bushings shall be suitable for the required operating temperatures. All bushings shall be constructed by using wet process porcelain materials with a homogeneous surface. Porcelain parts of each bushing rated below 450 kV BIL shall be one piece. For "draw lead" type bushings, the transformer outline drawing shall indicate the size, number of strands, and material of the bushing draw lead.
211	Each bushing shall have a nameplate that includes the general information and electrical characteristics such as BIL, tested capacitances (C1 & C2) and power factors or Tan δ. Bushings below 1200A shall be Draw-lead type. All bushings supplied with the unit shall be tested on the transformer regardless of the vendor's test certificate. Bushings shall not limit the loading capability of the transformer. Bushings' power factor C1 shall not exceed 0.5 at 20° C, and C2 shall not exceed 1% at 20° C. The only exception for C1 power factor is the resin impregnated paper insulated bushings below 150kV BIL that shall not exceed 0.85% at 20° C.
212	Outline drawings of each bushing shall be included with the transformer approval drawings. Instruction manuals for each style of bushing shall be included with the transformer instruction manuals.
213	**Terminals**
214	Bushings shall be supplied with a NEMA 4-hole stud connector selected according to the bushing current rating. Aluminum-to-copper bimetallic transition plates shall be furnished.
215	At 230 kV and above, the terminals shall be corona free. System line connections will first connect to the associated surge arrester, if specified
216	**Terminations to the Transformer**
217	If a termination compartment is specified, then an air termination compartment should be provided on the tank wall to allow for cable entry from below. Details shall be provided with outline drawings.
218	Supplier shall provide a bolted flange connection to cable, nonsegregated, segregated, or isolated phase bus duct as specified.
219	Termination flanges shall be installed to within +/- 1/8" (3 mm) tolerance of the location indicated on the transformer outline drawing. Horizontal flange surfaces shall be level to within 1/8" (3 mm) tolerance side-to-side across the face of the flange. Vertical flange surfaces shall be installed "plumb" and oriented perpendicular to the centerline of the mating bus within 1/8" (3 mm) tolerance side-to-side across the face of the flange.
220	**Neutral Grounding Resistor (NGR)**
221	If specified, an NGR shall be mounted on the transformer and shall be of the heavy-duty, outdoor, stainless steel strip type with aluminum enclosure. The resistor assembly shall rest on station post type porcelain insulators. Electrical terminals on the resistor shall be insulated bushings. One resistor terminal shall be connected by copper bar bus to the transformer neutral and the other resistor terminal shall be connected by copper bar bus to the transformer ground pad. The grounding resistor enclosure shall be painted the same color as the transformer tank.

222	**Current Transformers (CTs)**	
223	CTs shall be of the bushing type and shall be mounted internal to the transformer tank. Multi-ratio CTs must have five leads. The continuous current thermal rating factor (TRF) shall be 2.0 minimum. The CT secondary leads shall be fed through the tank to a CT junction block and then brought down to the transformer control cabinet. CT excitation and overcurrent curves shall be submitted for approval. All CTs shall be accessible for replacement without removing the active part.	
224	**Cooling Equipment and Controls**	
225	Integrally mounted, removable cooling equipment shall be provided to maintain the specified transformer rating.	
226	Radiators mounted on the transformer shall be detachable.	
227	Manual control switches shall be provided in the control cabinet to allow testing and maintenance of the cooling fans and pumps, and for selecting automatic or manual control. Controls shall provide for changing the sequence of cooler groups.	
228	If any of the Supplier's control switches include an off position that prevents operation of any of the cooling equipment, a Form C alarm contact shall be provided for JEA's use.	
229	The cooling equipment control system shall have terminal points for incorporating a normally closed contact from JEA's protective relaying equipment. The open status of this contact shall stop the operation of all cooling equipment.	
230	Multiple contact points shall be provided for cooling systems that have redundant, separate power supplies.	
231	On ODAF only transformers, cooling equipment controls shall be arranged so that no single fault in the control circuitry will cause a loss of more than one half of the transformer's megavolt-ampere (MVA) capability.	
232	Cooling fans shall be located a minimum of 24 inches (610 mm) above the base of the transformer. Personnel protection OSHA-compliant guards shall be placed over fan blades. Fans shall be mounted on the sides of the radiators. Bottom mounted fans needs Purchaser’s approval before using in the design.	
233	**Cooling Equipment Maintenance**	
234	To support the removal and maintenance of the equipment without draining oil or removing the transformer from service, the following shall be provided:	Isolation valving for each cooler and/or each pump. Flange mounted, manually operated shutoff valves with bolts and provisions for padlocking in the open or closed position. Oil-tight covers for each connection to be used when cooling equipment is detached. Lifting eyes, oil drain, and vents for each cooling unit piping and pump section.

235	In addition, supports for arresters, conservator tanks, etc., mounted above the cooling equipment must be designed in such a way that no disassembly is required to access the cooling equipment for removal.
236	**Alarms and Indicators**
237	Alarm indication contacts shall be of the dry type, electrically separate and insulated from the ground, for operation on the specified dc control power system. All alarm and spare contacts and indication leads shall be wired to terminal blocks in the control cabinet for use by JEA.
238	These contacts shall be Form C, one normally open and one normally closed contact, which change status on an alarm condition. The functional description and actuation state of all alarm (and trip) contacts shall be clearly indicated with recommended set points, as applicable, on the Supplier's electrical schematics and interconnection wiring diagrams.
239	A dial type liquid temperature indicator relay shall be furnished to indicate top oil temperature. In addition to providing visible indication, it shall be equipped with separate high alarm and high-high alarm contacts, and with a manually resettable maximum temperature indicating hand.
240	A dial type, hot spot winding temperature indicator relay shall be furnished for the hottest winding. In addition to providing visible indication of the temperature of the winding, each indicator relay shall be equipped with separate alarm and control contacts for the cooling equipment.
241	Each winding temperature indicator relay shall incorporate a current transformer responsive to its associated phase winding current, calibrating resistor, temperature detector element, and heater, all mounted and connected to simulate the hot spot temperature of the winding.
242	If specified, an additional temperature detection system shall be furnished for the remote logging of oil temperature and hot spot winding temperature. The hot spot devices shall be located in one phase of each winding.
243	Each detector shall have 3 wire or 4 wire shielded cable and shall be either 10 ohm copper at 77° F (25° C) or 100 ohm platinum at 32° F (0° C) as indicated on the 16151 Specification Sheets.
244	A fault pressure relay and gas detector relay or Buchholz type system (combination gas detector and oil surge) shall be provided that will operate upon gas accumulation and for abnormal rates of pressure rise in the main tank and OLTC compartment, if provided. The system shall not be affected by mechanical shock, inrush currents, or impulse voltages.
245	The fault pressure relay system shall provide an auxiliary seal-in relay and reset switch arranged and connected to provide manually resettable lockout function on operation of the primary element. Isolation valves shall be provided for the testing of sudden pressure monitors.
246	The auxiliary seal-in relay shall be designed for operation on a dc protection scheme, shall include four electrically separate, field convertible contacts for use with remote equipment, and shall be mounted inside the main control cabinet.
247	A local dc indicating light shall be furnished to indicate relay reset required. Units not having oil conservator tanks do not require gas detection relays.
248	If cooling pumps are provided, an oil flow indicator with alarm contacts shall be provided for each pump
249	If cooling pumps are provided, an oil flow indicator with alarm contacts and bearing wear monitor system shall be provided for each pump.

250	If specified, a fault gas monitoring system shall be installed and shall be capable of detecting combustible gases and providing visual indication. Alarm contacts shall be provided for remote indication. The fault gas sensor shall be positioned in the tank as recommended by the manufacturer.
251	If a dissolved gas monitoring system is specified it shall be capable of detecting all combustible gases (hydrogen, methane, ethane, ethylene, acetylene), oxygen, carbon monoxide, carbon dioxide and moisture and providing a digital link to plant monitoring systems.
252	Data shall also be able to be downloaded on to a portable computer at the device. Required software for downloading and analyzing data shall be provided.
253	Alarm contacts shall be provided for remote indication. The fault gas sensor shall be positioned in the tank as recommended by the manufacturer**.**
254	Transformer gauges shall be tilted for ease of reading from ground level.
255	**Additional Accessories**
256	Sudden Pressure Relay(s) (SPR) or sometimes called Rapid Pressure Rise Relays (RPRR) including the seal-in relay shall be supplied with the transformer. Pressure Relief Device(s) (PRD) shall be installed on the tank (and a separate PRD shall be mounted on LTC compartment – if any).
257	A stainless steel nameplate shall be provided and mounted on the transformer such that it can be easily read at the eye-level.
258	The following accessories shall be provided and clearly identified in the proposal: Resetting mechanical pressure relief device with alarm contact and visual indicator. Associated piping, fittings, and attachments shall be provided to route the discharge from the pressure relief device to grade. Valve for drainage of the oil to within 1 inch (25 mm) of the bottom of the tank, including built-in, capped sampling connection on the discharge side. Upper filter valve located below the 77° F (25° C) liquid level and on the diagonally opposite wall as the drain valve for the return of filtered oil to the transformer. One set of single-pole, double-throw (spdt) alarm contacts for liquid level indicator and mechanical pressure relief device. Two grounding pads on each transformer tank, on diagonally opposite corners. One bolted clamp type connector for 1/0 AWG (50 mm^2) to 300 kcmil (150 mm^2) copper conductor for each tank grounding pad. 0.25 inch (6 mm) by 4 inch (100 mm) copper bar ground bus connecting each surge arrester and neutral bushing to the ground pads at base level. Exposed copper shall be painted the same color as the transformer. Nameplates for each major item of equipment and each terminal block in the control cabinet.

	One set of special tools for installation, maintenance, and dismantling of the equipment. Tools shall be new and unused and become the property of JEA. One additional gasket for each gasket located on the transformer, sealed for long-term storage.
259	**Control Cabinet**
260	The control cabinet for each transformer shall be intended for outdoor use and shall be dust-tight, raintight, sleet resistant, undamaged by external ice formation, and shall have suitable corrosion protection and made of steel with sufficient thickness to prevent buckling. Control Cabinet shall be minimum NEMA-3R.
261	All ventilating openings shall be louvered to prevent entrance of rain and shall be equipped with fine mesh dust filters and stainless steel insect screens.
262	The cabinet shall be provided with a gasketed, removable, blank bottom plate that can be drilled or punched in the field. There must be no obstructions beneath the cabinet so that JEA has clear access to connect the incoming cables or conduits.
263	Control cabinet doors shall have a three-point cabinet type latch with a single handle and shall include provisions for padlocking. For door width over 36”, double-door design shall be provided. Control cabinet shall include a light operated by a door switch.
264	Swing Panel design is required to mount all the control items behind it. Provide extra terminal blocks for Purchaser’s use (minimum 20% extra capacity).
265	Mechanical stops shall be provided for doors and hinged panels. The bottom of the control cabinet shall be mounted a minimum of 30 inches (760 mm) from the transformer base. The top of the control cabinet shall be a maximum of 78 inches (1,980 mm) from the transformer base.
266	The cabinet and all devices shall be easily accessible from the ground. The cabinet shall not be mounted on the radiators.
267	A copper grounding bar with terminal screws shall be located in a convenient position in the cabinet near the terminal blocks for grounding of incoming control and power cables.
268	Indicators, control devices, and terminal blocks mounted in the control cabinet shall have device nameplates.
269	The control cabinet shall be provided with space heaters capable of preventing condensation of moisture within the cabinet. Space heaters shall receive power from the transformer's internal control power source and shall have a voltage rating twice the energization voltage.
270	Space heaters shall be controlled by an adjustable thermostat, factory set to close on falling temperature at 80.6° F (27° C) (ON) and open on rising temperature at 95° F (35° C) (OFF).
271	As specified on the 16151 Specification Sheets, a single-phase 15 ampere, grounded convenience outlet shall be mounted inside the control cabinet, including ground fault protection with a test button and separate circuit breaker or fused protection.
272	Control cabinet shall have proper lighting to illuminate the swing panel and all readable items in the cabinet in darkness without using any flashlight.
273	**Transformer Monitor Relay (SEL-2414)**
274	A SEL-2414 Transformer Monitor Relay, Schweitzer Engineering Laboratories P/N 241421A1A3A3A3A3A1841, shall be installed in the transformer cabinet at a convenient eye-level height for observation and access. A window shall be installed to observe the SEL-2414.

275	Transformer alarms shall be wired to the inputs for indication purposes. Each alarm will be wired to a trip isolation switch, ABB P/N FRXG001001001 as follows: • First switch will be on the DC wetting side of the alarm. • Second switch will be before the alarm goes to the SEL-2414 input. • Third switch will be on the return side of the SEL-2414 input to successfully isolate the relay. The three sets of ABB test switches mentioned above will be installed in the transformer cabinet at a convenient eye-level height for observation and testing.
276	The transformer manufacturer will provide a SEL test report for the SEL-2414 to JEA.
277	A separate Panduit/punch out shall be provided in the transformer cabinet in order to accommodate a JEA supplied fiber optic cable to the SEL-2414. • For the fiber optic Panduit, the transformer manufacturer is to install in a location that allows for the minimum number of bends.
278	Nameplates for the SEL-2414 and test switches shall be provided. Each test switch nameplate nomenclature shall describe the associated transformer alarm or relay input it is wired to.
279	The output contacts for the SEL-2414 shall be wired to spare terminal blocks inside the transformer cabinet.
280	The transformer manufacturer shall provide a fiber optic patch panel for fiber optic connections within the transformer.
281	**DC Control Power**
282	Electrical devices served from this supply shall not impose any ground connections on the battery. For each DC supply specified, pull-out fuses shall be provided at the incoming terminals to protect downstream devices.
283	A voltage failure relay and a red indicating light shall be provided to monitor each DC supply (downstream of the fuses).
284	The voltage failure relay shall be provided with one set of Form C alarm contacts wired to field terminals for remote indication of loss of DC power. The red indicating light shall be provided with a nameplate engraved to read: “DC POWER AVAILABLE”.
285	**Auxiliary Power**
286	Auxiliary power will be furnished from external sources as specified on the 16151 Specification Sheets. Main compression type terminals shall be provided for terminating the auxiliary power circuits.
287	Main circuit protective devices shall be supplied between the main terminals and the auxiliary equipment. Additional branch circuit protective devices shall be supplied on branch circuits.
288	If two sources of auxiliary power are to be provided, automatic transfer equipment, including an automatic throwover contactor, or automatic transfer switch shall be furnished to transfer load from the normal source to the emergency source upon failure of the normal source.
289	AC control power shall be derived from the auxiliary power source(s). The availability of each auxiliary power source shall be monitored by a red indicating light. Each indicating light shall be provided with a descriptive nameplate.
290	The indicating light associated with the normal power source shall be engraved to read: “NORMAL SOURCE AVAILABLE”. The indicating light associated with the emergency power source shall be engraved to read: “EMERGENCY SOURCE AVAILABLE”.

291	Transformation equipment shall be provided as necessary within the control cabinet to supply the specified control power, which includes the space heater and convenience outlet circuits. All ungrounded legs of control power transformers shall be fused.
292	A voltage failure relay shall be supplied to monitor and alarm on the loss of each auxiliary power source voltage and each control circuit power source voltage including the space heater control voltage.
293	The Supplier shall provide Form C alarm contacts for JEA's use to indicate when any cooling equipment branch circuit protective device is open, unless a voltage failure relay downstream of the branch circuit protective device is provided with Form C alarm contacts.
294	If a voltage failure relay downstream of the branch circuit protective device is not provided, and an automatic transfer scheme is used with two sources of auxiliary power, the auxiliary power/control power immediately downstream of the transfer scheme shall be monitored with a voltage failure relay.
295	That relay shall be designed with enough time delay to prevent a nuisance alarm whenever the transfer scheme switches either from normal source to emergency source or from emergency source to normal source.
296	If the Supplier chooses to furnish motors or other auxiliary equipment designed to operate at a different voltage from the auxiliary power supply, the equipment required to transform the voltage of auxiliary power as supplied to the design voltage of the equipment shall be furnished.
297	**Wiring**
298	Current transformer leads shall be extended into the control cabinet and shall be terminated on shorting type terminal blocks with pre-insulated ring type connectors.
299	The secondary leads of the current transformers shall be 100 percent copper wire and 10 AWG (6 mm^2) as a minimum.
300	Control cabinet wiring shall be Class B, stranded copper, 14 AWG (2.5 mm^2) or larger, with flame retardant, cross-linked polyethylene insulation rated at 600 volts.
301	Splices will not be permitted in control wiring, current transformer leads, or instrument leads, unless screw terminals are provided within a splice box or where current transformer leads must pass through the tank wall.
302	Terminal blocks, except those used for current transformer circuits, shall be rated at 600 volts AC as a minimum and shall have screw terminals. Step type terminal blocks are not acceptable. Terminal blocks shall be furnished with white marking strips and without covers.
303	Terminal blocks for circuits above 240 volts AC shall have guards to prevent accidental contact. For every ten terminals used, two or more spare unused terminals shall be furnished on each terminal block for circuit modifications.
304	Terminal blocks for external connections shall be grouped in the control cabinet for easy accessibility and shall be unrestricted by interference from structural members and instruments. Sufficient space shall be provided on each side of each terminal block to allow an orderly arrangement of all leads to be terminated on the block.
305	On terminal blocks with electrical connections by both the Supplier and JEA, the Supplier's connections shall be made on one side of the block and JEA's connections shall be made on the opposite side.
306	Cables between the current transformers and accessories and the control cabinet shall be completely enclosed in rigid metallic conduit or tank braces or utilize steel wire armor construction with suitable supports. Exposed non-armored cables are not acceptable. Conduit and fittings shall be of intermediate metallic conduit (IMC) or rigid galvanized steel

	conduit construction and shall be sealed and gasketed. Short lengths of weather-resistant flexible cable may be used for accessories.
307	**Paint**
308	Metallic surfaces subject to corrosion shall be cleaned and painted with the manufacturer's premium standard cleaning system, paint system, and color, unless otherwise specified on the Power Transformers Specification Sheets.
309	Manufacturer shall use a lead-free paint. The exterior shall have at least two finish coating, each with a minimum 3mils thickness with ANSI #70 Light Gray color unless otherwise specified. The paint on the cover shall be non-skid.
310	The entire interior of the main tank and the control cabinet shall be painted white for improved inspection visibility. Exposed unpainted parts shall be fabricated of corrosion-resistant materials.
311	Touchup paint shall be compatible with, and the same color as, the factory applied paint. This additional paint shall be supplied in two separate 1 US gallon (4 liter) containers, properly identified, carefully packed with the accessories, and protected to avoid damage during shipment. A material safety data sheet shall be furnished with the shipping documents.
312	**Factory Tests**
313	Each transformer shall be completely assembled and tested at the factory in accordance with the latest revision of applicable standards (IEEE C57.12.90 and IEEE std.4) using materials and equipment that will be a part of the final assembled unit, specifically, bushings, cooling, and control equipment.
314	At some time during the manufacturing process, all equipment must be mounted to ensure proper fit. This includes, but is not limited to, bushings, the oil preservation system, arresters, neutral grounding equipment, control cabinets, and all cooling equipment.
315	JEA reserves the right to witness factory testing and shall be informed in writing at least **30 days** prior to the scheduled start date of factory tests so that arrangements can be made for a representative to be present.
316	JEA shall also be notified of the sequence of tests, not less than 10 days prior to testing. JEA's attendance at the factory testing is included in the contract price and shall not result in a change to the contract price if a decision is made by JEA to attend the tests.
317	Testing procedures and techniques are to be in accordance with normal accepted industry practice and the appropriate standards, and this specification where applicable.
318	The transformer shall not be released from the test area until the dielectric, temperature rise, loss measurements, and gas-in-oil test data have been approved by JEA.
319	JEA shall immediately be notified of any unusual event or damage occurring during the fabrication of each transformer and of all tests that do not meet the applicable standard values, manufacturer's standard values, and guaranteed values.
320	JEA reserves the right to inspect such damages or test failures. Corrective measures to overcome such damage or failure shall be subject to acceptance by JEA. The manufacturer shall not open the unit without approval of JEA, as JEA (or its representative) shall be present for inspection of the failed (or damaged) unit.
321	Tested and calculated data shall be included in the certified test report. In particular, the calculated hottest spot temperature rises of the windings shall be shown.
322	To minimize potential damage to the transformer during testing, the resistance, polarity, phase relation, turn ratio, no-load loss, percent impedance, temperature rise (when applicable), and load loss tests should precede dielectric tests. In this sequence, the beginning tests involve

	voltages and currents, which are usually reduced as compared to rated values, thus tending to minimize damaging effects to the transformer.	
323	The dielectric test sequence shall be arranged so that lightning and switching impulse tests precede the power frequency tests, and the final dielectric test performed shall be the induced overvoltage test.	
324	Dielectric tests (especially lightning and switching impulse tests) shall be performed on the transformer with the hot oil. For this purpose, if the temperature rise test is performed, the dielectric tests shall be performed immediately after the temperature rise test (within 2-hours of the temperature rise test). If there is no temperature rise test, manufacturer can propose a method to heat up the oil. Shutting off the radiator valves can also help the transformer to heat up faster or keep the heat longer during the test.	
325	In addition to all tests dictated by and described in the appropriate standards, the following tests and calculations are also required:	
326	Resistance	All resistances shall be corrected to 85° C and measured for all DETC and LTC taps of all windings (including tertiary winding, excluding buried tertiary).
327	Ratio, polarity, and Phase relation	Ratio measurement shall be made on every DETC and/or LTC tap position of all phases to the rated tap of all the other windings (including tertiary winding if applicable).
328	Regulation	The regulation of each transformer shall be provided for unity (1.0), nine-tenths (0.9), and eight-tenths (0.8) power factor lagging using tested values.
329	Insulation Resistance Tests	Windings insulation resistance (including the capacitance values) and core megger tests shall be performed, with resistance measurements corrected to 68° F (20° C). Core megger test shall be performed for each core in the design including Main unit, Series (booster) and PA cores. The accepted value is minimum 1GΩ (1000MΩ).
330	Insulation Power Factor Tests	The maximum acceptable value for insulation power factor is 0.5 percent when corrected to 68° F (20° C). Capacitance measurements shall also be made between windings and from windings to ground.
331	Bushings Power Factor and Capacitance	All bushings included with test taps shall be tested for power factor and capacitance tests (C1 and C2) at the factory regardless of the vendor's test certificate. Power factor shall not exceed the bushing's nameplate value. Capacitance shall also conform with Nameplate values.
332	Gas-in-Oil and Oil Quality tests	Oil quality tests shall be performed for below items for all samples before, during and after the tests: • Moisture, Interfacial tension, Acid number, Dielectric Breakdown Voltage (BDV) for both 1mm and 2mm gaps and dissipation factor (power factor) at 25° C and 100° C. These values shall meet the relevant standard limits. Dissolved gas-in-oil analysis (DGA) shall be made at below stages: • Before all tests • Before and after temperature rise tests (if applicable) • Before and after Dielectric Tests • Before and after overexcitation tests • After all tests

333	Impedance	The positive and zero sequence impedances shall be measured on all tap positions for units fitted with de-energized tap changers and at both tap extremes, nominal tap, and two other positions (one bridging position that has maximum turns per step and the other position selected by JEA) for units fitted with OLTCs and converted to 85° C. A zero-sequence equivalent circuit shall be provided in the test report including the rectangular form of the impedance (R+jX format). For units with tertiary or multiple voltage connection, impedance between all winding pairs shall be measured and provided in the test report, as well as the nameplate. A T-model including the impedance values shall be provided in the test report.
334	Temperature Rise Test	A full temperature rise test at both self-cooled and maximum cooling rating shall be performed on one unit of each design and rating specified herein and shall include whatever special procedures are normally implemented by the Supplier (such as measuring hot resistances of each main phase winding – even if multiple reheats and shutdowns are required) to confirm gradients of all windings and all phases are acceptable. Transformers having only a single force cooled nameplate capacity rating (OFAF or ODAF) shall include a temperature rise test at 60 percent of nameplate MVA rating (in addition to the test at 100 percent rating) with all pumps and fans operating, so that temperature rises and gradients needed for the hot spot calculations can be determined. For the second unit of the same design, temperature rise is required at only maximum cooling rating. Potential temperature rise test waiver: If available, data from an exact duplicate design *may* be submitted for review and approval by JEA. This shall be communicated during bidding stage. The hottest spot temperature rise calculation shall be performed using the "maximum eddy-current watt loss method." Use of empirical hot spot gradient factors to estimate hot spot temperature rises is not acceptable. Infrared thermographic photos shall be taken of the unit from all sides and top during the hottest part of this test to record hot spot temperature data. **Color copies** of these photos shall be included in the test report.
335	Impulse Tests	Dielectric tests shall be the last test on the transformer. Lightning impulse and chopped wave tests are required as routine tests on line and neutral terminals of all transformers, except that the chopped wave test is not required on the neutral terminals. Impulse test sequence shall be according to the latest version of IEEE standard. Switching impulse tests are required as a routine test on transformer windings rated 300 kV and above, using a test voltage from the relevant standard table. DGA shall be taken before the dielectrics and immediately after the test is finished. Samples shall be taken from top and bottom of the tank and shall be tested for the gasses, voltage break down, moisture content, physical characteristics such as color, viscosity etc.
336	Induced Overvoltage Tests	A Class II, 1 hour, induced overvoltage withstand test with partial discharge measurements shall be performed as a routine test on all transformers regardless of voltage class. Induced voltage levels (enhanced 7200 cycle and 1-hour level) shall be taken from the relevant standard tables. The partial discharge level shall not exceed 250

		picocoulombs (pC) and the increase in PD shall not be more than 50pC during the 1-hour test. The partial discharge measurements shall be simultaneously recorded in microvolts and shall not exceed 100 microvolts during the test.
337	Applied Voltage Tests	A short duration (1 minute) power frequency voltage test shall be performed as a routine test on all line and neutral terminals. Applied voltage test levels shall be taken from relevant standard tables.
338	No-Load and Excitation test	No-load loss and excitation current tests shall be performed before and after dielectrics at the 90%, 100%, 105% and 110% of rated voltage and rated frequency corrected to 20° C temperature. There should not be a considerable difference between the two measurements before and after dielectrics. Deviation in results of between 4% to 7% require an explanation and justification by the manufacturer. Deviations in results greater than 7% shall necessitate a thorough investigation by the manufacturer to determine the cause and recommended solution.
339	Leak Test	An oil leak test shall be performed on each completely assembled transformer, using a test pressure that is 25 percent greater than the normal operating pressure for 24 hours. The leak test procedure shall be submitted to JEA for review and approval.
340	Regulation and Efficiency	Regulation and percentage of efficiency shall be provided based on the measured and calculated values in separate tables. Efficiency to be provided at different load factors (25%, 50%, 75%, 100% and 110%) and Regulation at 0.8, 0.9 and unity power factors.
341	Sound Test	The average audible sound level test is required on all transformers, regardless of the duplicate or similar design. If the transformer is equipped with the tap changer (DETC or LTC), sound test shall be performed in a tap position that produces the highest noise (for units with LTC, test shall be performed in a bridging position where the maximum number of steps exist).
342	Control Wiring	All auxiliary equipment, CT circuits, and control wiring must be tested to verify proper connections. CT ratio and polarity must be checked. The insulation of the control circuits must be verified by applying a power frequency test voltage of 1500 volts for 1 minute or 1800 volts for 1 second with all of the circuits tied together.
343	Auxiliary Cooling Losses	Fan and pump auxiliary power requirements shall be measured and recorded.
344	Dimension Check	A complete dimensional check shall be performed on each transformer specified herein to confirm that the actual dimensions match the dimensions shown on the drawings previously submitted to JEA. The purpose of this check is to confirm that dimensions shown for isophase bus, non-segregated phase bus/cable bus, or other Purchaser's interfaces shall be identical to the information shown on the Seller's drawings. The bus connection dimensional check shall confirm that all bus connections have been installed in a manner that makes the connections level (or plumb and true to vertical surfaces, as appropriate) when the transformer is level.

345	Sweep Frequency Response Analysis (SFRA) Tests	Each transformer supplied under these specifications shall undergo an SFRA test using a Doble SFRA test set and leads and be performed in accordance with Doble's instructions and recommendations. A test shall be performed after all electrical tests specified herein are complete, but prior to draining the oil. Also, the Supplier shall furnish a small temporary test bushing mounted in each bushing cover plate to be used for performing an SFRA after the insulating fluid has been drained and the unit prepared for shipping. One dry SFRA test shall be performed at the factory and the Supplier shall make arrangements to perform a dry SFRA test as part of the receipt inspection procedures. If the transformer is delivered by railcar, the SFRA test shall be performed before the unit is untied/removed from the railcar. Software data from all tests shall be provided to JEA.
346	**Certified Test Report**	
347	The Manufacturer shall submit to JEA electronic copy of the Certified Test Report (CTR) itemizing all test results with guaranteed values immediately after completion of testing including all DGA and oil quality results. All the performed tests shall be included with a proper comparison of guaranteed values and standard's acceptable values. The transformer shall not be shipped until the CTR is approved by JEA.	
348	**Photographs**	
349	Three sets of color photographs of each core and coil assembly shall be furnished with the instruction books. The photographs shall be taken just prior to placing the completed core and coil assembly into the tank.	
350	All photographs shall be 8 inch by 10 inch (200 mm by 250 mm) glossy prints labeled with the transformer manufacturer's name and serial number. Five different views shall be provided as follows: top view, front view, left side view, right side view, and rear view.	
351	Digital photographs in JPEG format may be supplied in lieu of glossy prints.	
352	**Loss Evaluation**	
353	The guaranteed transformer losses shall be stated on the 16151 Specification Sheets and shall be at the reference temperature(Load loss at of 167° F or 185° F (75° C or 85° C), as specified and No-Load loss at 20° C).	
354	The US$/kW values stated on the 16151 Specification Sheets will be used to evaluate this data. The guaranteed losses multiplied by the appropriate US$/kW values will be added to the quoted price and used in determining the lowest evaluated bid.	
355	When a budgeted kW value is given for total losses on the 16151 Specification Sheets, each transformer should be designed for guaranteed losses at or below this level. Bids will be evaluated so that a penalty will be assessed only if the guaranteed losses (at top MVA) exceed the budgeted losses using the stated US$/kW multiplied by the amount that the budgeted losses are exceeded; no bonus will be given if these values are below the budgeted amount.	
356	The contract price will be reduced on any transformer that is tested and found to have losses greater than the guaranteed losses. The price reduction shall be the difference between the actual (tested) losses and the guaranteed losses multiplied by the appropriate US$/kW value. Zero tolerance will be used on tested losses for evaluating penalties. No credit will be given to the Supplier if the tested losses are less than the guaranteed values.	
357	**Shipping- Impact Recorders, Dew Point Temperature**	

358	The Supplier shall supply and mount 2 QTY of 3-axis motion impact recorders (in suitable weatherproof enclosures) directly on each transformer prior to shipment that records for a minimum 45 days. The impact recorder shall provide a permanent record of the magnitude of axial, transverse, and vertical forces to which the transformer is subjected while in transit. For ocean shipment, the impact recorder shall have a time duration long enough for the transformer to reach the installation site.
359	For units shipped under dry gas, the moisture content of the insulation shall be estimated by the following method immediately prior to shipment. Dry gas shall be installed in the main tank and held at a pressure of 0-5psig (0-0.35 kg/cm^2) for at least 18 hours. The dew point temperature and ambient temperature of the gas shall be measured with a suitable device, and the results used in conjunction with the vapor pressure and percent moisture by weight graphs found in IEEE C57.93. If the percent moisture by weight of the paper exceeds 0.5 percent, the unit shall undergo further processing until this level is achieved. If the pressure in the main tank is between 0-5psig (0-0.35 kg/cm^2) at the time the dew point is measured, it is not necessary to make any adjustments to the readings taken from the aforementioned graphs.
360	The Supplier shall provide a representative and equipment necessary to perform a receipt inspection of the unit prior to unloading. If the unit is shipped by rail, the receipt inspection shall be made prior to unloading from the railcar. Tests to be performed during this inspection shall include dew point, core ground, and SFRA. If any inspections, tests, or impact recorders indicate possible shipping damage, the Supplier shall perform an internal inspection of the unit**.**
361	**Design Review**
362	JEA reserves the right to perform an independent review of the Supplier's design including the active part design, outline drawings, short circuit performance, dielectric withstand capability etc. The Supplier shall provide, in a timely fashion, any requested data and information necessary for this review (including the attached Design Review Input Form) to be performed and shall make the design team available for discussion of the results of this review at a time and location selected by JEA.
363	**Installation Services – Not Used**
364	**Oil Filling – Not Used**
365	Not Used
366	Unless otherwise specified, the oil shall be included in the price of the transformer, and the field work shall be priced separately.
367	**Field Advisor**
368	Furnishing the Field Advisory services of one or more field service representatives for technical assistance shall be included. The service representatives shall be technically competent, factory trained, experienced in the installation and operation of power transformers, and authorized by the Supplier to perform the work stipulated.
369	Unless otherwise indicated, Field Advisors shall be fluent in English. Duties shall include the following: • Providing technical direction to the erector for installation of all items and equipment shipped loose. • Directing the correction of any design or manufacturing defects. • Inspecting and testing the equipment after assembly. Making or directing any changes or adjustments required to assure proper operation. Providing services required as a condition of the warranties.

370	Duties may include, but not be limited to, the following at the discretion of Purchaser: • Instructing JEA's personnel in the operation and maintenance of the transformer and all accessory equipment. • Providing technical direction during startup and initial operation.
371	**Complete Assembly and Erection – Not Used**
372	**Additional requirements:**
373	Unit auxiliary transformers may be subjected to severe short-circuit, large motor starting conditions and over excitation conditions. These transformers shall be designed and constructed per ANSI/IEEE C57.116 and: a. To withstand, without injury, the mechanical and thermal stresses caused by through faults on the external terminals of any winding(s), with 105% rated voltage maintained across the terminals of all other windings intended for connection to sources of energy. The short circuit thermal time duration shall be 5 sec. b. To withstand the specified three phase through fault current, as modified by turns ratio and impedance, on each tap connection. c. If double secondary, on the basis that the unfaulted secondary is carrying the worst case load (0- to 100-percent of the maximum 65ºC rise rating of the winding at 80-percent power factor) at the time of fault initiation and until full load rejection. d. The secondary windings of double secondary transformers will not necessarily be equally loaded, with loading varying from no-load to full-load. There may be fault contributions from either or both low voltage connections. e. For over excitation duty, based on the specified symmetrical through fault current applied to the impedance of the transformer, assuming a constant 60-Hz frequency (no generator over speed).
374	Unit auxiliary transformers (UAT) connecting to isolated phase bus shall have a flanged throat around each high voltage bushing for termination of Purchaser's isolated phase generator bus termination box. The bushings and bushing arrangement shall be subject to Purchaser's approval.
375	Bushings shall be designed to meet the current requirements and thermal duty associated with this bus connection. Low voltage bushings for UATs mounted in an isolated phase bus enclosure shall be rated for 125C
376	When designing a UAT with an isolated phase bus connection, the following shall be considered: • A high current connection thru an enclosure • Effects of circulating currents • Method of terminating the isolated phase bus • Use of nonmagnetic material in high current areas • Use of high temperature gaskets and bushings
377	There must be coordination between the transformer design and the supplier of the isolated phase bus duct. The type and size of the interface enclosure, the location of the shorting plate on the bus and the location and routing of the grounding cable should be considered and evaluated. The effect of any tank heating can be kept below acceptable limits determined by the transformer manufacturer.
378	Evaluations should be performed using programs such as thermal finite element analysis (FEA) modeling to confirm the thermal coordination between the transformer and isolated phase bus. During the transformer's temperature rise test, the calculated thermal characteristics of the enclosure internals should be adjusted as needed according to temperature rise results to validate the FEA model results. One approach to modeling the interaction between the transformer and the isophase phase bus could include: • FEA model of thermal response of the transformer can be created without the bushing

	enclosure • Data from the transformer temperature rise test could be used to validate the model without enclosure • FEA model shall be adjusted/modified to include bushings within the enclosure • 3-dimensional data may be provided to JEA for future reference in service.
379	Programmable Logic Controllers (PLC) shall not be used for control. All controls shall be from the Plant DCS.

19000 - Quality System Requirements

If the Supplier believes that an inconsistency exists between this section and other portions of the contract documents, the Supplier shall immediately notify Purchaser for resolution.

19000.1 General Quality System Requirements

19000.1.1 Quality System

The Supplier shall demonstrate a documented Quality Management System (QMS) by providing supporting QMS documentation as defined in the Schedule of Submittals. The Supplier's quality system shall comply with ISO 9001 Quality Management Systems and/or ASME, when applicable by contract scope, and the codes and standards listed throughout this document.

The Supplier's QMS shall ensure that all equipment, assemblies, services, and commodities supplied are in conformance with the contract drawings and specifications.

The Supplier's QMS shall provide assurance that design, procurement, materials, manufacturing processes, inspection and testing, packaging, shipping, storage, and related services comply with the requirements of the contract documents. The Supplier's QMS shall have a defined process for reporting, segregation, evaluation, disposition, and closure of nonconforming product. This QMS shall be available to JEA for review and/or audit at all of Supplier's locations where work is being performed subject to these contract documents.

19000.1.2 Subtier Suppliers

The Supplier shall obtain JEA's approval in writing prior to using subtier suppliers for manufacturing or engineering activities.

All applicable requirements of the contract documents (i.e., technical, quality, and administrative) shall be passed on to the applicable organizations within the Supplier and subtier supplier's companies. The Supplier shall ensure that subtier suppliers have the capabilities to fulfill contract document requirements. Suppliers shall monitor subtier suppliers' quality of work and shall indicate the strategy on their inspection and test plan.

Suppliers shall submit required procedures, drawings, quality management documentation, and/or other submittals when required in the Schedule of Submittals for approval and/or information of subtier supplier's capabilities, processes, or in-process work involving the engineering, fabricating, and manufacturing of equipment and commodities for JEA.

Subtier supplier qualification and monitoring are the responsibility of the Supplier. Purchaser has the authority to perform quality audits and inspections and monitor and/or review subtier supplier processes and facilities, at all locations where work is being performed subject to these contract documents.

19000.1.3 Inspection and Test Plan

In accordance with the Schedule of Submittals, a detailed inspection and test plan (i.e., a Quality Control Plan, including shop and field inspection and test plans) for the work/equipment shall be submitted to JEA as specified in the contract documents prior to starting fabrication, site installation/erection or commissioning activities as applicable by scope. JEA will designate any additional test witness points or other inspection points required during review of the Supplier's submitted detailed shop and field inspection and test plan.

The inspection and test plan (ITP) shall identify the inspection and testing points including the acceptance criteria for major components of the work, relevant procedures, specifications, codes, the facility location, and inspection target dates for each inspection or test. The ITP shall be complete when first submitted and shall be maintained current throughout the life of the contract. When the ITP is revised, the Supplier shall submit a revised ITP for review. A monthly inspection target date schedule shall be provided to

JEA. The Supplier must review the dates for accuracy before submitting each month. This monthly inspection target date schedule shall be included in the Supplier's monthly report in accordance with the Schedule of Submittals. The ITP shall also include the Supplier's strategy for inspecting subtier supplier's work, including inspection by the Supplier at his subtier supplier's facilities. The Supplier shall inspect the work of subtier suppliers to the extent necessary to ensure that proper materials and equipment are furnished and that fabrication, assembly and erection are accomplished in accordance with the contract documents. Commercial off-the-shelf items are exempted from these requirements.

The Supplier shall keep JEA informed of the progress of the work. When shop inspection and test points have been designated by JEA as witness, in-process and/or hold points, the Supplier shall notify JEA at least 14 calendar days in advance of the appropriate times for inspections and testing.

- A pre-fabrication inspection is a point prior to fabrication and inspection activities where JEA will meet with the Supplier at the primary location of fabrication to review fabrication and inspection related activities that will take place. Discussion typically include, but are not limited to; materials, codes, standards, sub-suppliers, welding processes, test facilities and methods, and shop loading. Inspection target is approximately 2 weeks prior to the start of fabrication.

- A witness inspection point (if API – Observe) is a step in manufacturing where the Supplier is obligated to notify JEA at least 14 calendar days in advance of the performed operation so that it may be witnessed unless specified otherwise in the Schedule of Submittals. If the Supplier properly notified JEA but JEA was not present at the time and date specified by the Supplier, the Supplier may proceed.

- A hold inspection point (If API - Witness) is a designated stopping place during or following a specific activity at which JEA's inspection or witness is required before further work can be performed. The Supplier may not proceed beyond the hold point without inspection or witness by JEA, unless prior written authorization is obtained from JEA.

- An in-process inspection point (if API – Observe) is a Purchaser inspection that occurs during the manufacture of the Supplier's goods. If the Supplier properly notified JEA but JEA was not present at the time and date specified by the Supplier, the Supplier may proceed.

- A preshipment inspection point is a Purchaser inspection that may include a check of shipping blinds, packaging, loading and/or verification of purges, dimensional check, coatings protection and/or document review (shop quality, shipping documents). Preshipment inspections can be witness or hold points.

- A final inspection point is a Purchaser inspection that may include dimensional check, weld end preps, cleanliness, coatings/coatings protection, and/or shop quality document review. Final inspections can be witness or hold points.

JEA may waive the witness of tests; waivers for hold points shall be in writing. Waivers in no way absolve or relieve the Supplier of complying with contractual requirements.

If the Supplier has notified JEA defining the specific test date and time and the Supplier is not ready to conduct the test at the stated date and time, the Supplier shall be accountable for all additional expenses incurred by JEA.

The following table lists the minimum surveillance activities that JEA will perform:

Surveillance Type	Point	Task

Pre-Fabrication Meeting	Hold	Pre-fabrication meeting (verify materials, codes/standards, sub-suppliers, qualified welders, test facilities, shop space, etc.)
In-Process Surveillance Activities	In-Process	Shop Surveillance at approximately 30% Completion for manufacturing process of the core, coil, and tank fabrication. Confirm manufacturing meets design requirements. (If new shop or supplier an in person visit must occur; otherwise, the supplier can submit pictures for review to meet the intent of this inspection)
In-Process Surveillance Activities	In-Process	Inspection during welding operations prior to coating. Inspect all corner joints and sharp edges which can cause catastrophic failure for the transformer tank (ensure supplier's procedures are in compliance with the requirements from the specification)
In-Process Surveillance Activities	In-Process	Inspect blasting and coating operators for the paint and coat finish of the transformer tank (including review of the supplier's documents and procedures)
Witnessed Tests	Witness	Witness Factory Acceptance Testing (FAT) each transformer
Pre-Shipment Inspection	Hold	Pre-shipment inspection (including dimensional check, cleanliness, weld end preps, coatings and coatings protection, welding quality, shop quality document reviews, etc.) each transformer

Note: Article 19000.1.3 above shall include Supplier contact information, contract #, shop order #, related tag #, inspection date, start time, shop location, and PPE or other specific requirements.

JEA may make additions and deletions of surveillance activities based on, but not limited to, the following:

Supplier ITP.

Supplier performance.

Purchaser requests.

Equipment assessment.

Design reviews.

19000.1.4 Inspections by Purchaser

JEA may elect to perform assessments, quality audits, or witness testing at any time during the manufacturing process. JEA may designate an authorized agent for assessments, witness testing, or quality audits. Authorized agent may be an employee of JEA or an outside agency. When an outside agency is designated as an authorized agent for JEA, such designation will be in writing with a copy provided to the Supplier. When the term "Purchaser's representative" is used, it may mean JEA or the authorized agent.

The following requirements shall apply for Purchaser's inspection at the Supplier's mill, factory, yard, warehouse, or subtier supplier's facilities.

19000.1.4.1 Access. JEA's representative shall have the right to access the Supplier's and subtier supplier's work and related documents during the manufacturing process without delaying the schedule.

The Supplier shall provide, without cost, reasonable facilities including tools, personnel, and instruments for demonstrating acceptability of the work.

19000.1.4.2 Surveillance Activities. In accordance with the contract documents, designated hold points for witnessing mill and/or factory tests shall be performed in the presence of JEA's representative unless waived in writing by JEA's representative. The Supplier shall bear all costs for such tests, except the compensation and expense of JEA's representative.

19000.1.4.3 Control of Special Processes. It is the Supplier's responsibility to ensure that qualified personnel are employed to perform special processes such as welding, nondestructive examination (NDE), coating, painting, etc. If special processes are conducted by unqualified employees, JEA has the right to validate and test the product at Supplier's expense and/or reject the product. The Supplier shall be able to demonstrate the qualifications of personnel in writing.

19000.1.4.4 Nonconformance. Upon identification of a noncompliance of the contract documents and/or applicable codes, the Supplier shall document the noncompliant issue in accordance to Supplier's nonconformance procedure. For noncompliance issues where the nonconforming disposition is characterized as "Use-As-Is" or "Repair" as defined in Article 19000.1.4.4.1, the Supplier shall submit the nonconformance report to JEA for review and approval. During witness and hold point activities, if JEA's representative identifies a noncompliance issue, the Supplier shall document the noncompliance issue and provide a copy of the documentation to JEA's representative. If the Supplier disagrees and does not document the noncompliance, JEA's representative shall issue a nonconformance report to the Supplier for disposition and action. The Supplier shall correct, in a timely manner, all deficiencies identified in the nonconformance report.

19000.1.4.4.1 Nonconformance Disposition Definitions.

Rework - Process by which a nonconforming item is made to conform to a prior specified requirement by completion, correction, reassembling, or other means.

Repair - Process of restoring a nonconforming item to such a condition that the capability of an item to function reliably and safely is unimpaired, even though that item still may not conform to the original requirement.

Use As Is - A disposition which may be used for a nonconforming item when it can be established that the discrepancy will not adversely affect the functional requirements of its intended use (including performance, maintainability, fit, and safety).

Reject/Scrap - Action taken to eliminate a nonconforming item from its specified use and either reject the item or have it scrapped, as appropriate.

19000.1.4.5 Rejection. If any items or articles are identified that do not meet the requirements of the contract documents, the lot, or any unacceptable portion thereof, may be rejected. Before offering specified materials or equipment for shipment, the Supplier shall inspect the material and equipment and eliminate any items that are defective or do not meet the requirements of the contract documents. The fact that equipment or materials have been previously inspected, tested, and accepted does not relieve the Supplier of responsibility in the case of later discovery of flaws or defects.

19000.1.4.6 Receipt Inspection. Materials or equipment purchased under these contract documents may be inspected at the specified receiving points and will either be accepted or rejected. Receipt inspection may include testing to determine compliance with the contract documents. Initial receipt inspection acceptance tests will be performed. Items found to be defective may be returned to the Supplier for correction at the Supplier's expense, including shipping cost, or the cost to correct and inspect the item will be charged to the Supplier.

19000.1.4.7 Deviation. Any technical deviations sought by the Supplier to the contract documents shall require written approval from Purchaser prior to the deviation or change being implemented.

19000.1.4.8 Repair. The Supplier shall submit a repair procedure to Purchaser for all repairs as determined by contract, code, or repair dispositions definition in Article 19000.1.4.4.1. The Supplier shall obtain Purchaser approval of the repair procedure prior to starting the repair.

19000.1.5 Code and Non-Code Inspection

19000.1.5.1 Code Inspection. Code inspection includes functions performed by an authorized inspector, his delegates, government agencies, or other independent third-party inspectors to verify compliance with the applicable codes, government regulations and, when specified, the engineering design.

19000.1.5.1.1 Determination of code requirements. All equipment or materials purchased or specified in accordance with a code or government regulation shall be inspected as required by that code or regulation.

The codes, laws, or regulations of record applicable to a project, together with any additional requirements, shall be those referenced in the Project Design Data.

19000.1.5.1.2 Personnel Qualifications. Inspections and examinations required by all codes, laws, or government regulations applicable to the project shall be made by inspectors and other personnel who are officially qualified in accordance with those applicable codes, laws, or government regulations.

Welders, nondestructive examination personnel, and other construction specialists required to be tested or certified by the applicable code, law or government regulation shall be verified as having satisfied these requirements.

In no case shall JEA inspector or inspection representative be construed as the authorized code or independent third-party inspector.

19000.1.5.2 Non-Code Inspection. Non-code inspection includes functions performed by Purchaser or its authorized agent to:

- Review, monitor, and conduct surveillance of JEA Quality Control Program and its implementation.
- Perform quality control functions required by Purchaser standards or specifications that are in addition to code requirements.

The inspection of a Supplier facility by Purchaser or its inspection representative may include, but is not limited to inspections identified in table above, the complete or partial performance of the following:

1. Verification of the use of qualified welders and qualified welding procedures.

2. Checks on materials, dimensions, and finishes.

3. Review/audit of nondestructive examinations, including alloy verification if required, including ensuring that personnel are qualified to perform these examinations.

4. Witnessing of pressure tests and equipment mechanical and performance tests.

5. Review of documentation.

6. Audit of the Supplier's quality control program, including document control and disposition of nonconforming work. Audits shall take place at the point of fabrication.

The extent of inspection to be performed on materials and equipment supplied by each Supplier shall be determined by considering the Supplier's quality control program and previous experience of Purchaser with the Supplier.

Purchaser or a designated representative of Purchaser may perform inspections in addition to or exceeding code requirements in order to meet quality standards specified by Purchaser or the Client.

19000.1.5.3 Owner Participation. If applicable, the Owner's inspector shall be given full access to Supplier facilities for inspection. JEA inspector shall act as the official spokesman in all discussions with the Supplier. Supplier shall refer any conflict between Purchaser Order requirements and the Client inspector's requirements to Purchaser for resolution.

In the event JEA inspector is not present when the Owner's inspector encounters an unacceptable condition which may cause a delay in shipment, the Owner's inspector shall immediately send complete information regarding the condition, proposed corrective measures, and estimated delay through the established channels to Purchaser for Purchaser action.

19000.1.5.4 Code or Third-Party Inspection. Unless the governing code or authority requires the Owner to assume the responsibility for the authorized code inspection, JEA shall make the necessary arrangement with the Supplier for all required code or third-party inspections, and shall collect the Authorized Inspectors Reports and the Manufacturer's Data Reports.

21000 - Technical Supplemental Specifications

This section contains technical supplemental specifications that provide additional requirements applicable to the work covered under the technical sections.

21000.1 Summary of Applicable Supplementals

The applicable technical supplementals are indicated below.

	Technical Section Number	Technical Section Name
1	16151	D100, Q170, Q301, Q500, Q501, Q502, Q520, S100, S400, V100

21000.2 Technical Supplemental Specifications

The technical supplemental specifications follow.

D100 Site Meteorological and Seismic Data (Revised by Project: 09Sep25)

Work shall be designed according to the following building code and site conditions:

General Design Data:	
Building Code	2023 Florida Building Code
Site Elevation (Mean Sea Level), ft	4
Wind Design Data:	
Basic Wind Speed, V, Nominal 3 second gust wind speed at 33 ft (10 m) above ground for Exposure C category, mph	140
Exposure Category	C
Importance Factor, Iw	1.0
Ground Snow Load, Pg, lb/ft2 (kN/m2)	0
Seismic Design Data:	
0.2 Second Maximum Considered Earthquake (MCER) Spectral Response Acceleration, Ss	0.17g
One Second Maximum Considered Earthquake (MCER) Spectral Response Acceleration, S1	0.065g
Site Class	D
Seismic Design Category	B
Importance Factor (Seismic Loads), Ie	1.5

Q170 Welding of Electrical Equipment (Revised by Project: N/A)

Q170.1 General

This Technical Supplemental Specification defines the requirements for welding and visual nondestructive examination (NDE) of weldments of electrical equipment but not including aluminum iso-phase bus duct or substation bus. This technical supplemental does not apply to any pressure retaining equipment or to critical, load bearing structures for electrical equipment.

Any conflict identified between the requirements of this Welding Technical Supplemental Specification and the provisions of any applicable industry standard, code, regulation, or any specification, standard, or purchasing document contractually required for a given application shall be referred to Purchaser for resolution prior to the start of welding.

Where requirements of a referenced code or standard differ from the Welding Technical Supplemental Specification sections, the more stringent or restrictive requirements shall apply.

Any request for deviation from specified requirements shall be submitted in writing and shall include the proposed deviation, rationale for the deviation, any technical data supporting the deviation, and historical experience supporting the deviation.

Q170.2 Welding Processes

Unless otherwise specified, the manufacturer's standard welding processes may be utilized with the following restrictions:

The gas metal arc welding (GMAW) process utilizing the short-circuiting transfer mode shall be limited to materials 1/4 inch and thinner. When welding in the vertical position on materials greater than 1/8 inch (3 mm), progression shall be in the uphill direction.

Vertical progression for the shielded metal arc welding (SMAW) process shall be in the uphill progression, except that progression may be up or down for SMAW electrodes with high-cellulose type coverings.

Vertical progression for the flux cored arc welding (FCAW) process and the GMAW process with globular, spray arc, or pulse spray transfer shall be in the uphill progression.

Vertical progression for the gas tungsten arc welding (GTAW) process shall be in the uphill progression, except that material 1/16 inch (1.6 mm) or less may be welded in the downhill progression.

Self-shielded Flux Core Arc Welding (FCAW) shall not be used.

Q170.3 Filler Materials

When required by design, the minimum specified strength of the welding consumable shall be at least equal to the base metal's minimum specified strength.

Q170.3.1 Filler Materials for Plain Carbon Steels

The welding consumable for welding similar base metal types shall have a chemical composition as similar as possible to the base materials to be welded.

The minimum specified ultimate tensile strength (MSUTS) of the filler metal shall be within 12 kips per square inch (ksi) (80 megapascals [MPa]) plus/minus of the MSUTS of the base material being welded.

Q170.3.2 Filler Materials for Carbon Steel to Stainless Steel
Filler metals for welding carbon steel to austenitic stainless steel shall be equivalent to the following:

AWS Specification	AWS Classification
A5.9	ER309 or ER309L
A5.4	E309 or E309L
A5.22	E309TX-X or E309LTX-X

Q170.3.3 Filler Material for Welding 300 Series Stainless Steels
Filler metal for welding the following austenitic stainless steel base material types shall be in accordance with the following:

Base Material Grade	Filler Material Type
304	308, 308L, 316, or 316L
304L	308L or 316L
316	316 or 316L
316L	316L

Q170.3.4 Filler Material Control
Storage, handling, and drying of SMAW electrodes and submerged arc welding (SAW) flux shall, as a minimum, be in accordance with the manufacturers' recommendations.

Bare rod in straight lengths shall be individually flag tagged, stamped, or otherwise identified with the American Welding Society (AWS) classification or product classification.

Each spool of solid or cored rod shall be tagged, labeled, or otherwise identified with the AWS classification or product classification.

Any SMAW electrodes that have been wet or have damaged coatings shall not be used. Any welding filler metals or fluxes not readily identifiable shall not be used.

The Supplier shall utilize practices to ensure proper storage (dry conditions), issuance, and use of welding consumables.

Q170.4 Joint Design Requirements
Weld symbols shall be utilized on the engineering drawings or the welding procedure specifications (WPSs) to indicate the appropriate weld joint design and weld size for all weld joints.

Weld joint designs based on "Prequalified Weld Joint Details" as defined in Fig. 3.3 or 3.4 of AWS D1.1, "Structural Welding Code-Steel," or AWS D1.6, "Structural Welding Code-Stainless Steel," are recommended, whenever possible. (AWS Code shall all be the most current edition or that otherwise specified.)

Information on symbols for welding and NDE may be found in AWS Standard A2.4, "Standard Symbols for Welding, Brazing and Nondestructive Examination."

Q170.5 Welding Procedure Requirements
All welding shall be performed utilizing written WPSs.

WPSs do not need to be qualified; however, all WPSs are required to include and address the following essential, minimum information:

Company Name, WPS number, revision number, date, and authorization name.

Welding process.

Base material type(s) or groupings (e.g., ASTM A36, Type 304 SS, ASME P-No. 1).

For the GMAW process, the electrical transfer mode (e.g., short arc, globular, spray, or pulse spray).

For the GMAW process with short arc transfer, the maximum allowed base metal thickness.

Joint design (reference to joint design on engineering drawings is acceptable).

Filler metal standard and classification (e.g., AWS A5.1, E7018).

If applicable, include the following:

Flux manufacturer/brand.

Shielding gas type or mixture (and flow rate). *The shielding gas type or mixture shall be appropriate for the welding process, electrode type and GMAW arc transfer mode.*

Appropriate welding parameters (i.e., amp, volt, travel speed) versus welding consumable diameter.

Current and polarity (e.g., DCEP, DCEN, or AC).

Minimum preheat temperature and maximum interpass temperature.

Permitted welding position(s) and progression (up or down) for vertical welding.

Backgouging method.

As applicable to the material being welded, the following minimum preheat and maximum interpass temperature restrictions shall apply:

For low and medium carbon steels:

Welding Process	**Electrode Type**	**Thickness**	**Min. Preheat***
SMAW	Non–Low Hydrogen	≤ 3/4 in. (20 mm) > 3/4 in.	32° F (0° C) 150° F (65° C)
SMAW, SAW, GMAW, FCAW, GTAW	SMAW Low Hydrogen	≤ 3/4 in. (20 mm) > 3/4 in.	32° F (0° C) 50° F (0° C)
* Minimum preheat shall be sufficient to dry any moisture. The maximum interpass temperature shall not exceed 600° F (325° C)			

For austenitic stainless steels: The minimum preheat shall be sufficient to dry any moisture. The maximum interpass temperature shall not exceed 350° F (175° C).

Q170.5.1 Requirements Specific to Aluminum Alloys
For aluminum alloys: The minimum preheat shall be sufficient to dry any moisture. For heat treatable aluminum alloys or the 5000 Series aluminum-magnesium alloys containing more than 3 percent magnesium, the interpass temperature shall not exceed 250° F (120° C). For other aluminum alloys, the interpass temperature shall not exceed 350° F (175° C).

Only the GMAW and GTAW processes are permitted.

The shielding gas shall be welding grade argon, helium or an argon / helium mixture.

Q170.5.2 References to Welding Procedure Qualification Standards
When the Supplier opts to utilize qualified or prequalified welding procedures, the following standards are provided as a reference to help aid in selecting an appropriate welding standard:

ASME BPVC Section IX, "Qualification Standard for Welding Procedures and Welders."

AWS B2.1, "Specification for Welding Procedure and Performance Qualification."

AWS B2.1.xxx (Manufacturer may adopt appropriate AWS Standard WPSs.)

AWS D1.1, "Structural Welding Code–Steel."

AWS D1.2, "Structural Welding Code–Aluminum."

AWS D1.3, "Structural Welding Code–Sheet Steel."

AWS D1.6, "Structural Welding Code–Stainless Steel."

AWS D9.1, "Sheet Metal Welding Code."

BS EN ISO 15614-1, "Specification and Qualification of Welding Procedures for Metallic Materials."

CSA W59-03, "Canadian Standards Association, Welded Steel Construction."

(All referenced codes shall be the most current edition or that otherwise specified.)

Q170.5.3 Welding Procedure Submittals
WPSs shall be available at the shop facility or construction site and shall be submitted to JEA for review.

WPSs and any applicable Procedure Qualification Records (PQRs) shall be submitted for review by Purchaser prior to the start of fabrication for the following defined components associated with oil piping, equipment and components:

Main Tank
Circulating Pump
Circulating Piping & Valves
Radiators/Heat Exchangers
Conservator

Submittal of welding procedures and applicable PQRs shall apply to all suppliers and subsuppliers. Suppliers shall review the documents in accordance with the specification requirements and shall accept

all of their subsuppliers' welding procedures and applicable PQRs prior to submitting accepted documents to Purchaser.

The submittal shall also include a weld map or tabulated listing of WPSs to be used. The applicable code(s) of construction and production base material types and grades shall be listed on the weld map or listing.

Q170.6 Welder/Welding Operator Performance Qualification

Welders shall be qualified in accordance with an appropriate code selected by the Supplier. The code, for example, may be selected from ASME Section BPVC IX, AWS B2.1, AWS D1.1, AWS D1.2, AWS D1.3, AWS D1.6, etc.

The welder qualification records shall be available at the shop facility or construction site and shall be submitted along with continuity logs to JEA for review.

Each manufacturer or contractor is responsible for the qualification of welders or welding operators. Welder or welding operator performance qualification testing shall be performed under the full supervision and control of the manufacturer or contractor.

Q170.7 Fabrication Controls

Q170.7.1 Welding Preheat and Interpass Temperature

The minimum preheat temperature shall be obtained in the weld joint area prior to welding. The minimum preheat temperature shall be sufficient to ensure that moisture is removed from the material to be welded.

Preheat and maximum interpass temperatures shall be monitored and checked by temperature indicating crayons, thermocouples (TCs), surface contact pyrometers or thermometers, or other suitable methods.

Q170.7.2 Postweld Heat Treatment (PWHT)

PWHT shall not be performed without prior written approval of Purchaser.

Q170.7.3 Fabrication Controls for Austenitic Stainless Steels

The following requirements shall apply when fabricating austenitic stainless steels.

Handling, transportation, and storage practices that minimize the potential for contamination shall be used. Alloy materials are required to be stored, off the ground or concrete, and stored to minimize contact with soils and stagnant water.

Fabrication and erection practices that minimize disrupted surfaces (e.g., disruption from excess grinding, coarse grit blasting, or excessive, heavy power brushing) shall be used.

Control methods shall be implemented, as necessary, to prevent contamination of alloy surfaces from nearby welding and grinding operations on carbon steels. The use of antispatter or other suitable methods shall be considered to prevent the adherence of spatter from welding, grinding, or arc gouging activities.

Welders and fitters shall be instructed not to perform unnecessary wire brushing and abrasive finishing operations.

Grinding shall be by aluminum oxide, zirconium oxide, or silicon carbide grinding wheels that shall not have been used on carbon or low alloy steels. Hand or power wire brushing shall be by stainless steel brushes that shall not have been used on carbon or low alloy steels. All tools used in fabrication shall be protected to minimize contact with steels or free iron. Grinding wheels and brushes shall be identified and controlled for their use on these materials only to ensure that contamination of these materials does not occur.

Unless otherwise specified, rough-ground surfaces shall be final finished with a 100 grit or finer, flexible-backed abrasive (e.g., sanding disk, flap drum, flap wheel). Burnishing of surfaces with clogged or excessively degraded abrasives is not permitted.

Antispatter compounds, marking fluids, marking pens, tape, temperature indicating crayons, and other tools shall have a total halogen content of less than 200 parts per million.

All labels and tape on stainless steels shall be removed prior to service. Mechanical removal by grinding or wire brushing is not allowed. All markings and tape and label adhesive residues shall be solvent removed from the material surface using a nonchlorinated solvent. Any oily residues from cleaning solvents shall be removed using a suitable nonchlorinated cleaner with clean cleaning cloths.

Labels intended for permanent equipment identification shall not be removed.

Q170.7.4 Miscellaneous Fabrication Control Requirements

Welding shall not be performed when surfaces of the parts to be welded are wet. The parts to be welded shall be protected from deleterious contamination and from rain, snow, and excessive wind during welding.

Prior to welding, the weld preparation and adjacent base material surfaces shall be cleaned and kept free from paint, oil, grease, dirt, scale, rust, and other foreign materials.

Welding slag and spatter shall be removed from all welds.

A gas or gas mixture used for shielding shall be welding grade.

Arc strikes outside of the area of permanent welds should be avoided on any base metal. Cracks or blemishes caused by arc strikes shall be ground to a smooth contour and visually checked to ensure soundness.

All defects in welds or base materials shall be removed and repaired.

Welding machine ground leads and clamps shall be located to avoid passing welding current through equipment, snubbers, bearings, or any other items where transfer of electrical current may result in damage to equipment.

Q170.8 Nondestructive Examination (NDE)

As a minimum, individuals performing visual examinations are required to be competent in metals fabrication and examination. The individual's competency may be obtained either through training or experience.

The responsible supplier's welding inspector shall perform in-process visual inspections at suitable intervals during the fabrication and erection process to ensure the applicable requirements of the referenced code, design specification, and WPS are met. Such inspections, on a sampling basis, shall be performed prior to assembly, during assembly, and during welding.

All completed welds shall receive 100 percent visual examination by the Supplier's welding inspector.

Visual inspection of welds shall be performed prior to any painting, coating, or galvanizing. Visual weld examination acceptance criteria shall be in accordance with the requirements herein.

Records of these examinations shall be documented.

The following defines the visual acceptance criteria for completed welds:

As-welded surfaces are permitted; however, the surfaces of welds shall be free from coarse ripples, deep grooves or valleys, and shall be reasonably uniform in width and size throughout their full length.

For high visibility areas of equipment where surface appearance is critical, such as the front of control panels, there is a higher expectation of surface appearance to be provided (e.g., a smooth, uniform weld appearance without uneven finish marks).

The faces of fillet welds shall be slightly convex, flat, or slightly concave.

Excessive reinforcement of butt welds shall be avoided.

Undercut shall not exceed 1/32 inch (0.8 mm).

The following discontinuities are rejectable and require repair: Cracks, incomplete fusion, overlap, and surface porosity.

Definitions: Incomplete fusion is where fusion did not occur between weld beads and the base material or between adjoining weld beads. Overlap is the protrusion of weld metal beyond the weld toe (and hence obscures the weld toe).

Butt joints shall be filled to the full cross section except that localized depressions at weld stops are permitted as long as the stop is free of cracks and porosity, the stop has a smooth contour, and the depression does not exceed the lesser of: 1/16 inch (1.6 mm) or one fourth the base metal thickness.

The minimum size and length of fillet or lap welds shall be verified. Undersize fillet welds may be rewelded, or a nonconformance report shall be issued and the undersize weld may be used as-is when the designer approves the undersize weld(s).

In all instances for the following specified continuous fillet weld sizes (L), the weld may be less than the specified nominal size without correction for up to 10 percent of the weld length by the following amounts (U) unless otherwise prohibited by the designer:

L, Specified Size	U, Allowable Decrease
3/16" (5)	1/16" (2)
1/4" (6)	3/32" (2.5)
≥ 516 (8)	1/8" (3)

The weld region shall be free of spatter and slag.

Arc strikes outside the area of permanent welds should be avoided. Cracks or blemishes caused by arc strikes shall be blended to a smooth.

Removal of temporary attachments has not damaged the materials contour and visually examined to ensure soundness.

Freedom from excessive distortion.

Random dimensional checks and proper material alignment.

Q170.8.1 Records
Records of final visual examination shall be documented and submitted to Purchaser upon request. Visual examination records shall be kept by Supplier for a minimum of 1 year after shipment.

Q301 Manufacturer's Standard Coating (Revised by Project: 7-Jan-2026)

Unless otherwise specified, the manufacturer's standard coating systems shall be applied in the shop to ferrous metal surfaces of equipment and materials. The coating systems shall provide resistance to corrosion caused by weather and industrial environments. Manufacturer's standard coating systems shall be specified to provide medium (M) durability in accordance with BS EN ISO 12944, Paints and Varnishes – Corrosion Protection of Steel Structures by Protective Paint Systems, for Corrosivity Category C4 as defined in Table 1 for the intended service environment. Surfaces that will be inaccessible after assembly shall be protected for the life of the equipment.

Table 1 – Atmospheric Corrosivity Categories and Examples of Typical Environments

	Thickness loss (after first year of exposure)				
	Low-carbon steel		Zinc (galvanized)		
Corrosivity category	Thickness loss (µm)	Thickness loss (mils)	Thickness loss (µm)	Thickness loss (mils)	Examples of typical environments (exterior)
C3 medium	>25 to 50	>1 to 2 mils	>0.7 to 2.1	>0.03 to 0.08 mil	Urban and industrial atmospheres, moderate sulfur dioxide pollution; coastal areas with low salinity
C4 high	>50 to 80	>2 to 3.1 mils	>2.1 to 4.2	>0.08 to 0.17 mil	Industrial areas and coastal areas with moderate salinity
C5 very high	>80 to 200	>3.1 to 8 mils	>4.2 to 8.4	>0.17 to 0.33 mil	Industrial areas with high humidity and aggressive atmosphere and coastal areas with high salinity
CX extreme	>200 to 700	>3.8 to 27.5 mils	>8.4 to 25	>0.33 to 0.98 mil	Offshore areas with high salinity and industrial areas with extreme humidity and aggressive atmosphere and subtropical and tropical atmospheres.

Coating material and application shall conform to the regulations of the air quality management agency having jurisdiction. Materials shall be formulated to contain less than 0.06 percent lead or chromium in the dried film.

Surfaces shall be cleaned, prepared, and coated in accordance with the coating manufacturer's instructions and specified codes. Surfaces to be painted shall be prepared, as necessary, to provide a smooth, uniform base for painting.

Coating films that show defects such as sags, checks, blisters, teardrops, and fat edges will not be accepted. Any coated surface that contains any of the previously mentioned defects shall be repaired or, if necessary, entirely removed from the member or unit involved and the surface recoated.

All internal surfaces that will be exposed to steam or treated feedwater shall be blasted with aluminum oxide (pink or white grade), cut steel wire (Society of Automotive Engineers (SAE) J441), steel grit, or steel shot. The blasting media used shall contain no more than 1.2 percent complexed silica and 0 percent free silica.

Surfaces to be finish painted after installation shall be shop painted with one coat of the manufacturer's standard primer.

Touchup paint shall be provided for repair painting of at least 10 percent of the finish painted equipment surface. The touchup paint shall be the same type and color as the shop applied material. Application instructions shall be provided.

No coating shall be applied to surfaces within 3 inches (75 mm) of field welded connections, except that the weld end preparation on carbon and low alloy steel materials may consist of an aluminum-based pre-welding consumable coating, such as Deoxaluminate, Bloxide or an equivalent product. This coating may be welded through if applied in accordance with the manufacturer's instructions. Complete removal of the coating is neither required nor prohibited, unless signs of rust or other foreign materials such as oil, grease, dirt, or excessive coating are apparent, in which case these areas shall be cleaned.

Coating dry film thicknesses shall be measured using a magnetic or electronic thickness detector in accordance with Society for Protective Coatings (SSPC)-PA2. Additional coating shall be applied to all areas that show a deficiency in dry film thickness.

Q301.1 Control and Electrical Equipment

Control and electrical equipment, including panels, cabinets, switchgear, transformers, and motors, shall be finish painted. Exterior surfaces shall be the manufacturer's standard color unless specified otherwise. The interior portions of cabinets shall be painted a light reflecting color.

Q301.2 Mechanical Equipment

Mechanical equipment, including pumps, compressors, valves, valve operators, external piping surfaces, and other similar equipment, shall be cleaned, prepared, and primed. If mechanical equipment will operate at temperatures above 200° F (93° C) and will not be insulated, a high temperature coating system designed for the operating temperatures shall be applied.

Q301.3 Documentation

Shop drawings shall identify the shop applied coating systems. Data to be provided shall include the coating system manufacturer's name and product designation, the degree of surface preparation, dry film thickness, finish color, and Safety Data Sheets (SDSs). Final dry film thickness test results shall be submitted to JEA for verification.

Q500 Shop Drawings and Instruction Manuals (Revised by Project: 09Sep25)

This section, in conjunction with the Schedule of Submittals, stipulates the requirements for engineering data that Contractor shall submit for design information and review. Document submittal procedures shall be in accordance with the requirements of this Purchase Order.

Q500.1 Submittal Requirements

Technical data shall be submitted in electronic format.

Electronic technical data submittals shall be made using the Project Central project collaboration system, a Web-based file transfer service. If Contractor does not already have Project Central transmittal capability, JEA will provide the required credentials for access upon Purchase Order award.

Notification to JEA that submittals have been posted to Project Central shall be in accordance with the correspondence requirements of this Purchase Order.

Q500.2 Compliance Reports

Reports shall be submitted that record the tests and/or calculations required in the specification technical sections. Reports shall be submitted for each piece of equipment or each plant system. Specified drawings shall be submitted with the compliance reports.

Q500.3 Motor and Electric Actuator Information

If required by the Specifications, Motor and Electric Actuator Information shall be submitted in accordance with Supplemental Q502.

Q500.4 Drawings

Drawings shall be in sufficient detail to indicate the kind, size, arrangement, component weight, breakdown for shipment, and operation of component materials and devices; the external connections, anchorages, supports, and grouting requirement; the dimensions needed for installation and correlation with other materials and equipment; and the information specifically requested in the Schedule of Submittals.

Drawings for use in installation and erection shall include a Bill of Quantity (BOQ), identifying the unit of measure, quantity, description, part number (or piece mark identifier), location reference on the drawing and any other details required by JEA. It may be acceptable to have the BOQ detail in other means or media, if approved in advance by JEA.

Contractor shall fully complete, check, and certify drawings, including drawings produced by a subcontractor, for compliance with the Purchase Order requirements prior to submittal. Drawings shall have title block entries that clearly indicate the drawing is certified.

Each submitted drawing shall be project unique and shall be clearly marked with the name of the project, unit designation, JEA’s Purchase Order title, JEA’s Purchase Order file number, project equipment or structure nomenclature, component identification numbers USSS-XXXX-TNNNAB, and JEA's name. Equipment, instrumentation, and other components requiring JEA-assigned identification tag numbers shall be clearly identified on the drawings. If standard drawings are submitted, the applicable equipment and devices furnished for the project shall be clearly marked.

Transmittal letters shall identify which Schedule of Submittals item (by item number) is satisfied by each drawing or group of drawings. The transmittal letter shall include the manufacturer’s drawing number, revision number, and title for each drawing attached as well as all fields listed in the transmittal letter. Each drawing title shall be unique and shall be descriptive of the specific drawing content. Transmittal letters for resubmitted drawings shall include JEA’s drawing numbers.

Catalog pages are not acceptable, except as drawings for standard nonengineered products and when the catalog pages provide all dimensional data, all external termination data, and mounting data. The catalog page shall be submitted with a typed cover page clearly indicating the name of the project, unit designation, specification title, specification number, component identification numbers, model number, Contractor’s drawing number, and JEA's name.

Drawings shall be submitted with all numerical values in English and/or metric (SI) units.

All multi sheet documents shall be submitted in their entirety for all revisions.

Q500.4.1 Drawing Submittal
A standard drawing submittal template form is included at the end of this section. Contractor shall use this form for all submittals. (An electronic copy of this form will be made available upon Purchase Order award.)

Drawings shall be submitted electronically in unlocked[1] (i.e., no document restrictions or password protection) Portable Document Format (PDF). AutoCAD or MicroStation format files are not acceptable. If Contractor does not have the capability to provide Portable Document Format (PDF), an alternative submittal format shall be used as mutually agreed between JEA and Contractor.

Reproducibles can be plots or photocopies for drawings larger than 34 inches by 44 inches.

Q500.4.2 Drawing Processing
Contractor's engineering schedule shall allow a minimum of three (3) weeks for transmittal, processing, and review of drawings and data by JEA.

Unless this Purchase Order indicates that a drawing or engineering data submittal by Contractor is to be for JEA's information only, JEA, upon receipt of submittals, shall review and return same to Contractor, marked "No Exceptions Noted," "Exceptions Noted," "Received for Distribution," "Returned for Corrections," "Release for Record," "Void," "Superseded" or "Hold" The timing of Contractor's submittals and JEA's review shall be in accordance with the Completion Dates for same as set forth in the Purchase Order. The submittal of any drawing or other submittal document by Contractor to JEA under this Purchase Order will be certification by Contractor that the information set forth therein is accurate in all material respects.

Q500.4.2.1 No Exceptions Noted (NE) or Received for Distribution (RD). Upon receipt of a submittal marked "No Exceptions Noted" or "Received for Distribution," Contractor may proceed with its Work to the extent of and in accordance with the submittal. Contractor shall not resubmit unless the drawing or document is revised, in which case it shall be resubmitted as a new document revision in accordance with Q500.4.2.7.

Q500.4.2.2 Exceptions Noted (EN). Upon receipt of a submittal marked "Exceptions Noted" and if Contractor concurs with JEA's comments, Contractor shall incorporate same and may proceed with its Work to the extent of and in accordance with the annotated submittal. Contractor shall submit to JEA within fourteen calendar days a revision to the original submittal in which JEA's comments have been incorporated. If Contractor determines that it cannot incorporate JEA's comments without prejudice to Contractor's warranty or other obligations under this Purchase Order, Contractor shall so advise JEA in writing within seven calendar days of its receipt of JEA's comments, stating the reasons therefore. Contractor may proceed with its Work to the extent of and in accordance with the annotated submittal only upon JEA and Contractor resolving JEA's comments.

Q500.4.2.3 Returned for Corrections (RC). Upon receipt of a submittal marked "Returned for Corrections," Contractor shall immediately take all necessary action to revise its submittal in accordance with JEA's comments, the Specification, and the Drawings, and shall resubmit to JEA for review the corrected original submittal, voiding previous information and adding new documents if required. In no event shall Contractor proceed with the affected Work until its revised submittals have been returned to Contractor marked "No Exceptions Noted" or "Exceptions Noted" by JEA.

Q500.4.2.4 Release for Record (RR). Receipt of a submittal marked "Release for Record" indicates that there are no specific objections to the document. Work may proceed. Certain project information required by JEA's document management system may have been added electronically to the drawing and provided to Contractor for the record. Contractor shall not resubmit the drawing or document unless

[1] If a submitted PDF is locked or password protected, the file will be unlocked using appropriate tools to allow import into the electronic drawing review tool.

revisions to the design are required. If revisions are required, Contractor shall incorporate JEA's information and resubmit as a new revision. JEA's project-specific information shall be added if future revisions and submittals are made.

Q500.4.2.5 Void (VO) or Superseded (SS). Receipt of a submittal marked “Void” or “Superseded” does not require any action by Contractor. “Void” indicates that the submittal is no longer applicable to the project and is not being replaced by other drawings or data. “Superseded” indicates that different drawings or data have replaced the previously submitted drawings and data; this status does not pertain to revisions of the same drawings and data.

Q500.4.2.6 Hold (HO). A submittal may be given a status of "Hold" by JEA, or the Contractor may have "Holds" on the submitted drawing.

For a Hold status designated by JEA, the Contractor shall not proceed with the work that is designated on "Hold" except as specifically directed by JEA. Additional information required for the Contractor to release the "Hold" will be transmitted from JEA later.

The Contractor shall provide information to JEA about the cause for any "Holds" designated on the drawing and immediately take all action necessary to resolve the "Holds". The Contractor shall resubmit the drawing for review once the "Holds" are removed from the drawing and should make all efforts to not submit drawings to JEA until drawing review comments have been received back from JEA.

Q500.4.2.7 Resubmittals. If during or subsequent to the completion of the submittal process, Contractor makes further changes to the equipment and materials shown on submittals that have been reviewed by JEA, the changes shall be clearly marked on the submittal by Contractor and the submittal process shall be repeated. If changes are made by Contractor after delivery to the Jobsite, drawings conforming to construction records indicating the changes shall be prepared by Contractor and submitted to JEA for review. Any resubmittal of information shall clearly identify the revisions by footnote or by a form of back-circle, with revision block update, as appropriate. The Contractor shall put the Black & Veatch drawing number on the transmittal letter and submit a complete document.

Q500.4.2.8 JEA’s Review. JEA's review of drawings and other submittals will cover only general conformity of the data to the Specifications and Drawings, external connections, interfaces with equipment and materials furnished under separate specifications, and dimensions that affect plant arrangements. JEA's review does not include a thorough review of all dimensions, quantities, and details of the equipment, material, device, or item indicated or the accuracy of the information submitted. Review and comment by JEA of Contractor's Drawings or other submittals shall not relieve Contractor of its sole responsibility to meet the Completion Dates requirement of this Purchase Order and to supply Goods that conform to the requirements of this Purchase Order.

Q500.4.2.9 File Returns to Contractor. Project Central (or Contractor’s approved document management tool) shall be used to return PDF files to Contractor.

A copy of the manifest will be returned to Contractor indicating drawings statused as NE (No Exceptions Noted).

Each packet of drawings returned to Contractor will include a manifest generated by JEA. The manifest will include a list of drawings transmitted, manufacturer's drawing numbers, JEA's assigned drawing numbers, JEA's drawing titles, and the status of the drawings.

Files returned to Contractor will be in PDF format.

Q500.5 Wiring Diagrams

If required by the Specifications, Wiring Diagrams shall be submitted in accordance with Supplemental Q502.

Q500.6 Instruction Manuals

If required by the Specifications, Instruction Manuals shall be submitted in accordance with Supplemental Q501.

Q500.7 Manufacturer's Data Report Requirements

Q500.7.1 Manufacturer's Data Report Requirements for Suppliers

The Contractor shall submit a Manufacturer's Data Report (MDR) for all furnished equipment and materials within ten (10) working days after the equipment and materials have been released for shipment to site. The MDR shall include the following information as a minimum.

1. Table of contents

2. Procedures
    a. Complete list of all supplier's Welding, PWHT, NDE and Coating Procedures used to manufacture the equipment and materials.

3. Qualifications
    a. Complete list of all supplier's Welding and Inspection Personnel used during manufacture of the equipment and materials.

4. Materials
    a. Material List and corresponding Material Certificates and Material Test Reports for all Major Components, Castings, Forgings and Pressure Parts.

    b. Complete list of all Welding Consumable Certificates and Test Reports for all weld materials incorporated into the equipment and materials.

    c. Material Substitution Sheet (for substitutions approved by JEA, when applicable).

    d. Material Safety Data Sheets (MSDS) for all Coatings included in the equipment and materials at time of release for shipment.

5. Approved Inspection and Test Plan incorporating all JEA's and Statutory or Regulatory requirements.

6. Inspection and Test Records required by the Inspection and Test Plan and/or Manufacturer's Standards. Examples of these records include:

    a. Weld Data Records inclusive of Weld Maps, PWHT, Hardness, PMII, Radiographs, and other NDE records for Critical Components and Systems

    b. Dimension Inspection Report including trial/final assembly (when required)

    c. Thermal Refining Report Including Chart, and Hardness Test (if applicable)

    d. Pressure Test Report (Including Hydraulic, Pneumatic and Leakage Test)

    e. Balance Test Report (Static and / or Dynamic)

    f. Performance Test Report (Including Chart For Pumps, Fans)

    g. Routine/Function Test Report

h. Factory Acceptance Test (primarily for Electrical Equipment i.e. Transformers, Digital Control Systems, PLCs, etc.)

i. Blasting / Coating Inspection Report

j. Other Tests/Records Required By Code, Standard or Manufacturer's Requirements

k. Release For Shipment Report

7. All associated defect or nonconformance reports with final disposition

8. All Statutory Equipment Regulatory Reports (ASME, PED, other local regulatory requirements)

9. Letter of Conformity (when applicable)

10. A detailed checklist to verify that all regulatory, contractual and quality assurance requirements have been met, including documentation of JEA's approvals

Q500.7.2 Not Used

Q500.8 Binding

Each copy of the MDR shall be assembled and bound in three-ring or post binders designed for rough usage. Light-duty binders will not be acceptable.

Front covers and backbones of the MDRs shall be permanently marked with lettering in accordance with the Typical Instruction Book Cover attached at the end of Technical Supplemental Q501, except that the title shall say Manufacturer's Data Report in lieu of Instruction Book.

DC Use Only

DC Packet:

Contractor Name	Transmittal Letter	Date: XX/XX/XXXX Sheet: 1 OF XX

Project: Project Name				Mixed Submittal ☐ New Submittal ☐ Resubmittal ☐
Contract: Enter Contract Title Here	Contract No.: XX.XXXX	Packet Designation: XX	Transmittal No.: XXXX	

Number of Documents: XX

Contractor Drawing Data			B&V Drawing No. (Resubmittals Only)	Document Data from the Schedule of Submittals			
Mfr. Drawing No. & Sh. No.	Rev No.	Mfr. Document Title:		Doc Class	Unit #	Seqn ID	Schedule of Submittal Item No.

Distribution for groups who should review documents: For B&V Internal Use Only

☐ Chemical/Process ☐ Electrical ☐ Civil/Structural
☐ Control ☐ Mechanical ☐ **Other** ☐ All of the Above

Special Instructions: For B&V Internal Use Only

Guideline for Filling in Transmittal Letter

An electronic copy of this form is available upon request from the RE upon Contract Award.

1. **Packet Designation**
   This information will be supplied by the Responsible Engineer upon award of contract.

2. **Submittal Information**
   Mixed Submittal – A combination of new drawings and resubmitted drawings.
   New Submittal – All drawings are new.
   Resubmittal – All drawings have been previously submitted.

3. **Manufacturer Drawing No. and Sheet No.:**
   Mfr # 12345 Sh 1

4. **Rev. No.:**
   Current rev. of drawing; Rev. # A, B, C, or 1, 2, 3, etc.

5. **Mfr. Doc. Title (CONTAINS 120 CHARACTERS):**
   Title of Manufacturer's Drawing; example: HRSG Wind Tunnel Fans

6. **B&V Drawing No. (RESUBMITTALS ONLY):**
   Give B&V drawing # assigned to drawing; example: 5-35001

7. **Document Classification (Type of drawing Mfr is submitting on transmittal):**
   - ☐ 04 Quality Documents/Manuals (weld procedures, etc.)
   - ☐ 05 Contractor's Drawings
   - ☐ 06 Contractor's Technical Data (test reports, curves, specs, etc.)
   - ☐ 07 Construction Books, Operating and Maintenance Manuals

8. **Unit No. (Unit the job is for):**
   0 through 9 or C for Common.

9. **Sequence Identifier (Type of drawing Mfr is submitting):**
   - ☐ 0 General Arrangements/Equipment Access
   - ☐ 1 Foundations and Foundation Interface
   - ☐ 2 Structural Steel, Enclosures, Ductwork
   - ☐ 3 Mech/Chem Equipment, Valves, Piping
   - ☐ 4 P&IDs/Flow Diagrams
   - ☐ 5 Electrical
   - ☐ 6 Instrumentation and Control
   - ☐ 7 Technical Information and Lists
   - ☐ 8 Other
   - ☐ 9 Construction/Erection

10. **Schedule of Submittal Item No.**
    This information is listed in the Schedule of Submittals for the contract.

Q501 Instruction Manuals (Revised by Project: 07Apr26)

This section, in conjunction with Section Q500 and the Schedule of Submittals included in the Supplemental Terms and Conditions of this Purchase Order, stipulates the requirements for Instruction Manuals that Contractor shall submit for design information and review. Document submittal procedures shall be in accordance with the requirements of this Purchase Order, Section Q500, and the following.

Q501.1 Submittal Requirements

Hard copies shall be submitted to the address indicated for Technical Documents in the Supplementary Terms and Conditions of this Purchase Order for the documents listed below. The following number of copies shall be submitted unless otherwise indicated in the Schedule of Submittals:

Submittal Description	Copies Required
Proof Copies	1
Final Copies	4
Electronic Copies (searchable)	1

Q501.2 Instruction Manuals

Contractor shall furnish proof and final instruction manuals for the unloading, storage, installation, operation, and maintenance of the equipment. The manuals shall be delivered as specified in the Schedule of Submittals.

Manuals shall include the following information specific to the furnished equipment. The documents or drawings submitted within the Instruction Manual shall be consistent with the documents or drawings previously submitted for JEA's review. Documents or drawings which were previously submitted for review and are included within the Instruction Manual shall be identical, with the same revision number. If these documents or drawings were revised due to design revisions subsequent to issuance of the Instruction Manuals, the document or drawing shall be resubmitted in accordance with Article Q500.4.2.7 in Supplemental Q500 so JEA can provide updated drawings to the holders of the Instruction Manuals.

Table of contents and index tabs. (If multiple volumes are required, a table of contents listing materials included in each volume shall be supplied for each volume.)

Specifications, test data, and all performance curves specified in the technical specifications.

Description of the equipment, including illustrations showing elevations, cross section, and all details of the equipment with all parts named, numbered, and identified with JEA's tag numbers. When multiple model numbers are shown on the drawings, the equipment supplied for the project shall be clearly identified.

Complete and detailed operating instructions, including safety precautions, philosophy of operation and, where applicable, process optimization techniques.

Detailed minor and major maintenance instructions, including description, use of special tools furnished, and preventive maintenance schedule.

Instructions for receiving, inspection, storage, and handling of equipment prior to installation.

Installation instructions.

Inspection procedures.

Troubleshooting guide.

All fluid systems schematics and piping diagrams.

Control logic diagrams, as applicable.

Electrical wiring diagrams, as applicable.

Calibration Data Sheet for each adjustable instrument included in the scope of supply.

Motor Information Sheets, as applicable.

Electric Actuator Information Sheets, as applicable.

Control Panel Arrangements, as applicable.

Contractor and Sub-supplier operating and maintenance manuals.

Illustrated parts breakdown.

Assembly drawings.

Parts lists.

List of acceptable lubricants.

Nameplate information and shop order numbers for each item of equipment and associated component parts thereof.

List of recommended spare parts.

List of maintenance tools furnished with the equipment.

The above listed requirements are the minimum requirements; however, requirements that are clearly not applicable to the equipment may be deleted with JEA's approval. Additional information that is necessary for proper operation and care of the equipment shall also be included.

Q501.2.1 Binding

Each copy of the manuals shall be assembled and bound in three-ring or post binders designed for rough usage. Light-duty binders will not be acceptable.

Front covers and backbones of the manuals shall be marked with lettering per the Typical Instruction Book Cover attached at the end of this section.

TYPICAL INSTRUCTION BOOK COVER

(Backbone)	(Cover)	
NAME OF EQUIPMENT	CLIENT'S NAME	36
	NAME OF UNIT	24
	UNIT NUMBER	24
CLIENT'S NAME	INSTRUCTION BOOK	36
	FOR	36
	NAME OF EQUIPMENT	36
	VOLUME NUMBER*	36
NAME OF UNIT	PURCHASE ORDER NUMBER**	24
	MANUFACTURER'S NAME	24
	MANUFACTURER'S ADDRESS	24
UNIT NUMBER		
PURCHASE ORDER NUMBER**		
	BLACK & VEATCH	14
	OVERLAND PARK, KANSAS	14
VOLUME NUMBER*		

NOTES:
1. All lettering shall be a block style font such as Arial.
2. All backbone lettering shall be 14 point.
3. Cover lettering shall be point sizes indicated in column to right of cover illustration.
4. *Volume number required only if instructions are contained in more than one volume.
5. **JEA assigned Purchase Order number.

Q502 Electrical Data (Revised by Project: 09Sep25)

This section, in conjunction with Section Q500 and the Schedule of Submittals included in the Supplemental Terms and Conditions of this Purchase Order, stipulates the requirements for Electrical Data that Contractor shall submit for design information and review. Document submittal procedures shall be in accordance with the requirements of this Purchase Order, Section Q500, and the following.

Q502.1 Submittal Requirements

Electronic copies shall be submitted to the address indicated for Technical Documents in the Supplementary Terms and Conditions of this Purchase Order for the documents listed below. The following number of copies shall be submitted unless otherwise indicated in the Schedule of Submittals:

Submittal Description	Copies Required
Motor Information Sheets	Electronic
Electric Actuator Information Sheets	Electronic
Wiring Diagrams	Electronic
Contractor Cable Data	Electronic
Contractor Circuit List	Electronic

Q502.2 Motor and Electric Actuator Information

Samples of Motor Information Sheets and Electric Actuator Information Sheet are included at the end of this section. Electronic copies of these information sheets shall be requested from JEA and electronically completed by filling in the requested data. These shall be then submitted by the dates shown in the Schedule of Submittals.

An information sheet shall be completed for each motor and electric actuator furnished under the Purchase Order.

Q502.3 Wiring Diagrams

Connection and interconnection wiring diagrams furnished by Contractor shall be drawn with all devices indicated in their relative physical locations and shall accurately show the equipment and terminals arranged as they would appear to a person wiring the equipment. When accepted by JEA, termination schedules identifying field terminations may be substituted for wiring diagrams for connections external to equipment.

When the equipment furnished by the Contractor is split for shipment and provided with terminal blocks and wiring required to interconnect the shipping sections in the field, the wiring diagrams from the Contractor shall clearly identify that the wiring across the shipping splits needs to be field installed.

Where interconnecting wiring from different items of equipment or sectional wiring diagrams of the same item of equipment appear on different wiring diagram sheets, all interconnections shall be clearly identified. Where sectional wiring diagrams are required for a single item of equipment, such as a relay panel or control panel, the section of the panel that is represented by each individual wiring diagram sheet shall be keyed on that sheet in a manner acceptable to JEA.

Information indicated on Contractor's drawings shall include wiring and terminal numbers of the individual panel items as they actually will appear in the panel, set points, contact arrangements of switches and relays (state of device and device contacts shall be clearly indicated), and internal wiring of relays and instruments. Spare terminals and all unused contacts of the individual panel items shall be shown on the drawings.

Elementary diagrams shall be cross-referenced to terminal markings on the connection and interconnection diagrams, but do not need to indicate complete details of circuits external to the panels, unless required by JEA. Each item of panel mounted equipment indicated on the diagrams shall be identified by item number and name.

Q502.3.1 As-Built Drawings
As-built prints of each final electrical wiring and elementary diagram for equipment shall be furnished in accordance with Article Q500.4.2.7. An electronic copy of each drawing shall be submitted to JEA.

Q502.3.2 Contractor Cable Data and Circuit List
Where the Contractor scope includes design of circuits to be installed by JEA, the Contractor shall submit one (1) Contractor circuit list per Purchase Order as noted below.

Where Contractor provides cable, the Contractor shall submit one (1) Contractor cable list per Purchase Order as noted below.

Samples of Supplier Cable Data and Circuit List formats are included at the end of this section. Electronic copies of these information sheets shall requested from JEA and electronically completed by filling in the requested data. These shall be then submitted by the dates shown in the Schedule of Submittals.

Contractor data shall be submitted for each cable type and circuit furnished under the Purchase Order.

MOTOR INFORMATION SHEET

Sheet 1 of 2

DRIVEN EQUIPMENT DATA

Name			
ID(s)			
Manufacturer			
Driven Equip Max Brake Load		Horsepower (hp) or kW at Design Conditions	

MOTOR DATA – ALL MOTORS (check choices)

☐ Horizontal	☐ Vertical	☐ Induction	☐ Synchronous				
Manufacturer							
Model							
Outline/Wiring/Connection Drawing Numbers _____							
Design Standard*		Nameplate: Volts		Phase		Hz	
For NEMA Motors - Nameplate hp		Service Factor					
Locked-Rotor Code Letter		NEMA Design Letter					
For IEC Motors - Nameplate kW							
Max Continuous Voltage (rated frequency)		Min Continuous Voltage (rated frequency)					
Duty Type: ☐ Continuous	☐ Definite Time (minutes)		Full Load Speed (rpm)				
Full Load Current at Rated hp or kW (amps)							
Locked-Rotor Current (amps)							
NEMA or IEC Enclosure		Frame Size					
IEC Cooling (IC Code)		IEC Mounting (IM Code)					
Design Ambient Temperature (°C)		Insulation System Class					
Temp Rise by Resistance (at service factor load) for NEMA Motor (°C)							
Space Heaters (SP) Furnished? ☐ Yes ☐ No	Total SP Load: Watts		Volts		Phase		
Bearings: Type							
	Lubrication Type		System				
	ABMA L-10 Rating Life, Not Less than		Hours				
	Connection: (check one) ☐ Direct	☐ Belt	☐ Chain				
Overall Mean No-Load Sound Pressure Level, re micro-pascals (0.0002 microbar), Reference Distance of 3 Feet			Free Air				
Total Motor Weight (lb)		Is Motor Reversible? ☐ Yes	☐ No				
Stator Weight (lb)		Rotor Weight (lb)					
Multi-Connectable Motors: (check choices)	☐ Part Winding	☐ Star-Delta	☐ Variable Torque	☐ Constant Torque			
	☐ Constant Horsepower	☐ PAM	☐ Two Winding	☐ One Winding			
	☐ Other						
rpm	FL Amps	LR Amps	rpm	FL Amps	LR Amps		
rpm	FL Amps	LR Amps	rpm	FL Amps	LR Amps		
For Motors in Hazardous Locations: Motor Enclosure Maximum Surface Temperature (°C)							
Will Motor Contain a Surface Temperature Control Thermostat Requiring Connection into the Motor Starter Control Circuit?	☐ Yes	☐ No					
Motor Full-Load Efficiency as Defined by NEMA MG-1-2006 Tables 12-10, 12-11, and 12-12: (check one)	☐ Normal Efficiency	☐ Energy Efficient	☐ Premium Efficiency				
	Full Load Nominal Efficiency Rating						

*NEMA, IEC, etc.

MOTOR INFORMATION SHEET

Name	
ID(s)	

ADDITIONAL MOTOR DATA TO BE SUBMITTED

Motors 100 hp (75 kW) and Larger and for All Motors Rated Above 1000 Volts

Efficiency, Percent Guaranteed, Load: 1/2		3/4		4/4			
Power Factor, Percent Guaranteed, Load: 1/2		3/4		4/4			
Power Factor at Locked Rotor Current							
Minimum Starting Voltage in Percent of Rated Voltage: Calculated			Specified				

Accelerating Time:

At Rated Voltage (seconds)	
At Minimum Specified Starting Voltage (seconds)	

Locked-Rotor Safe Stalled Time (seconds):

	Rated Voltage		Minimum Specified Starting Voltage
Motor Initially at Maximum Specified Ambient Temperature (Cold)			
Motor Initially at Service Factor Load Operating Temperature (Hot)			

For All Motors Rated Above 1000 Volts

Current and Torque Versus Speed Curves at Maximum, Rated, and Minimum Specified Starting Voltage.							
Drawing Number							(Attach curves.*)
Power Factor and Efficiency Versus Speed Curves at Rated Voltage.							
Drawing Number							(Attach curves.*)
Current Versus Time Curves at Maximum, Rated, and Minimum Specified Starting Voltage.							
Drawing Number							(Attach curves.*)
Locked-Rotor Thermal Limit Curves (current versus time), Curves in Both Cold and Hot Operating Conditions, and Stator Running Thermal Overload Curves at Rated Voltage.							
Drawing Number							(Attach curves.*)
Torque in: (check one)	☐ lb-ft	☐ N-meter					
Locked-Rotor Torque		Pull-up Torque		Breakdown Torque			
Inertia in: (check one)	☐ lb-ft2	☐ GD2					
Motor Rated		Motor Rotor		Driven Equipment		Coupling	
Temperature Alarms and Trips for Motors Equipped with Sensors:							
Stator Winding RTD	Alarm (°C)		Trip (°C)				
Bearing Temperature	Alarm (°C)		Trip (°C)				
Motor Subtransient Reactance		Motor Open Circuit Time Constant					
Short-Circuit Time Constant		Starting Power Factor					

Number of Successive Starts:

	At Rated Voltage
Motor Initially at Maximum Specified Ambient Temperature (cold with driven equipment connected), number	
Motor at Rated Temperature Rise Prior to Starting (hot with motor coupled), number	
Cooling Period Required After Completion of the Preceding Maximum Number of Successive Starts Before Making Additional Starts, minutes	
Motor Stopped Cooling Time Constant, minutes	
Motor Running Cooling Time Constant, minutes	

List of Drawings and Specifications:

Lubrication Oils and Greases, drawings	
External Fluid Circuits for Bearing Cooling, drawings	
External Fluid Circuits for Stator Cooling, drawings	

*Submit tabulated data with curves for high inertia loads.

ELECTRIC ACTUATOR INFORMATION SHEET

Name	ID Number

GENERAL INFORMATION

Manufacturer	
Model No.	
Rated Output Torque (ft-lb) or (Nm)	
Factory Torque Switch Settings	
Open	
Close	
Torque Close Seating Required for This Application (Yes/No)	
Speed of Operation	
Open to Close (sec)	
Close to Open (sec)	
Maximum Differential Pressure Which Actuator is Capable of Operating Against (psi) or (Pa)	
Valve Stem Diameter (in.) or (mm)	
Thrust Allowance for Valve Packing Friction Weight (lb) or (N)	
Gear Housing Material	
Self-Locking Gearing (Yes/No)	

MOTOR DATA

Manufacturer			
Enclosure/Cooling Rating			
Horsepower/rpm or kW/rpm			
Voltage/Phase/Hz			
Full Load Current (amps)			
Locked-Rotor Current (amps)			
Load Current for Setting Overload Relay Protection (amps)			
Motor Time Rating at Maximum Driven Equipment Torque in a 50° C Ambient (minutes)			
Motor Space Heater (watts/volts)			
Are Motor Self-Reset Thermal Switches, if Provided, Required to be Wired in Contractor's Starter Coil Circuit? (Yes/No/Recommended)			

CONTROLS DATA

Enclosure Rating	
Network Communications, if Applicable	
Enclosure Space Heater (watts/volts)	
Integral Starter (Yes/No)	

DRAWINGS

Item	Drawing Title	Drawing Number	Revision
Outline Diagram			
Schematic/Wiring Diagram			

SUPPLIER CIRCUIT LIST

CKT		TYPE	REV	PQTY	PCBL	FMEQUIPTAG	FMEQUIPDES1	FMEQUIPDES2	FMDEVICE	TOEQUIPTAG	TOEQUIPDES1	TOEQUIPDES2	TODEVICE	REMARK1	REMARK2
CIRCUIT NUMBER		CIRCUIT TYPE	REVISION	CIRCUIT CABLE QTY	SUPPLIER CABLE TYPE NO.	FROM EQUIPMENT TAG	FROM EQUIPMENT DESCRIPTION LINE 1	FROM EQUIPMENT DESCRIPTION LINE 2	FROM EQUIPMENT DEVICE	TO EQUIPMENT TAG	TO EQUIPMENT DESCRIPTION LINE 1	TO EQUIPMENT DESCRIPTION LINE 2	TO EQUIPMENT DEVICE	REMARK LINE 1	REMARK LINE 2
(MAX 20 CHARACTERS)						(MAX 20 CHARACTERS)	(MAX 20 CHARACTERS)	(MAX 20 CHARACTERS)	(MAX 20 CHARACTERS)	(MAX 20 CHARACTERS)	(MAX 20 CHARACTERS)	(MAX 20 CHARACTERS)	(MAX 20 CHARACTERS)	(MAX 25 CHARACTERS)	(MAX 25 CHARACTERS)
(EXAMPLE)															
1WWCK2506001		L	0	1	1	1APC-MCC-0151	480V COOLING TOWER	MCC 151	SECTION 3	1WWC-DS-0004A	CTW BLCWDOWN SUMP	MSH DISC SWITCH		REF DWG	916:6PE0128-130

Supplier Circuit List column definitions:	
CIRCUIT NUMBER - Supplier's circuit number. Each entry must be unique. (Maximum of 20 alphanumeric characters)	
CIRCUIT TYPE - Available type code entries for circuit type are:	
Type Code	Description
H	High Voltage Power (15KV and Above)
M	Medium Voltage Power (5KV and 8KV)
L	Low Voltage Power (480 VAC, 120 VAC)
D	DC Power (125 VDC)
C	Control
E	Electronics/Noise Sensitive (Sensitive circuits that can easily be degraded by power supply noise)
REVISION - Revision number of the last change to the individual subject circuit. (Maximum of 2 numeric characters)	
CIRCUIT CABLE QTY - Quantity of "SUPPLIER CABLES" required for the circuit (i.e. multiple single conductor cables may be required for a circuit)	
SUPPLIER CABLE TYPE NO. - Type number from "Supplier Cable Data List"	
FROM EQUIPMENT TAG – Tag number of equipment or device at which the subject circuit originates. (Purchaser's Tag No. If None, Supplier's Piece No. per article 00612.1) (Maximum of 20 alphanumeric characters)	
FROM EQUIPMENT DESCRIPTION LINE 1 – Name or description of equipment or device at which the subject circuit originates. (Maximum of 20 alphanumeric characters)	
FROM EQUIPMENT DESCRIPTION LINE 2 – Additional room for name or description of equipment or device at which the subject circuit originates. (Maximum of 20 alphanumeric characters)	
FROM EQUIPMENT DEVICE – Compartment designation for multi-compartment equipment (i.e. vertical section of motor control center) or specific component of large equipment (i.e. specific terminal box on equipment with multiple terminal boxes) (Maximum of 20 alphanumeric characters)	
TO EQUIPMENT TAG – Tag number of equipment or device at which the subject circuit terminates. (Purchaser's identification/tag number in accordance with the specification) (Maximum of 20 alphanumeric characters)	
TO EQUIPMENT DESCRIPTION LINE 1 – Name or description of equipment or device at which the subject circuit terminates. (Maximum of 20 alphanumeric characters)	
TO EQUIPMENT DESCRIPTION LINE 2 – Additional room for name or description of equipment or device at which the subject circuit terminates. (Maximum of 20 alphanumeric characters)	
TO EQUIPMENT DEVICE – Compartment designation for multi-compartment equipment (i.e. vertical section of motor control center) or specific component of large equipment (i.e. specific terminal box on equipment with multiple terminal boxes) (Maximum of 20 alphanumeric characters)	
REMARK LINE 1 – Supplier's reference drawing(s) that define circuit termination information. (Maximum of 25 alphanumeric characters)	
REMARK LINE 2 – Additional room for supplier's reference drawing(s) that define circuit termination information. (Maximum of 25 alphanumeric characters)	

SUPPLIER CABLE DATA LIST

SUPPLIER CABLE TYPE NUMBER	CABLE PROVIDED BY SUPPLIER (Y/N)	NUMBER OF CONDUCTORS	CONDUCTOR SIZE	OUTER DIAMETER	WEIGHT (LB/FT)	PAIRED CABLE (Y/N)	TRIAD CABLE (Y/N)	PAIR OR TRIAD SHIELDS (Y/N)	PREFAB CONNECTOR (Y/N)	OVERALL SHIELD (Y/N)	CONTAINS GROUND CONDUCTOR (Y/N)	DESCRIPTION/PART NUMBER

Supplier Cable Data List definitions:
SUPPLIER CABLE TYPE NUMBER – Number sequentially starting with number 1.
CABLE PROVIDED BY SUPPLIER – Is cable provided by supplier? (Y/N) If yes, provide manufacturer/part number in DESCRIPTION/PART NUMBER field.
NUMBER OF CONDUCTORS – Number of current carrying conductors. For cables with an integral ground conductor, the ground conductor is counted in column “HAS GROUND CONDUCTOR (Y/N)”.
CONDUCTOR SIZE – Size of individual conductors in awg or kcmil.
OUTER DIAMETER – Nominal overall diameter of cable.
WEIGHT – Net weight of cable in pound per linear foot.
PAIRED CABLE – Does cable contain individual cable pair(s)? (Y/N)
TRIAD CABLE - Does cable contain individual triad(s)? (Y/N)
PAIR OR TRIAD SHIELDS – If cable contains individual pair(s) or triad(s), does each pair or triad have a shield? (Y/N)
PREFAB CONNECTOR – Does cable have prefab connector provided on one end? (Y/N) Cables with prefab connectors on both ends would be entered as single conductor cables with an outer diameter equal to the outer diameter of the prefab connector.
OVERALL SHEILD – Does cable have an overall shield? (Y/N)
GROUND CONDUCTOR – Does cable include an integral ground conductor? (Y/N)
DESCRIPTION/PART NUMBER – Information to confirm identification of cable prior to installation.

Q520 OEM 3D Equipment Model Development (Revised by Project: 09Sep25)

This section, in conjunction with the Schedule of Submittals, stipulates the requirements for Plant Equipment Layout and Modeling data that the Contractor shall submit for mechanical plant arrangements and equipment modeling. Document submittal procedures shall be in accordance with the requirements of this Purchase Order.

Q520.1 Submittal Requirements

Technical data shall be submitted in electronic format. Hard copy prints of the electronic files shall also be submitted, as specified below.

Electronic technical data submittals shall be made using the Project Central project collaboration system, a web-based file transfer service. If Contractor does not already have Project Central transmittal capability, JEA will provide the required credentials for access upon Purchase Order award.

Notification to JEA that submittals have been posted to Project Central shall be in accordance with the correspondence requirements of this Purchase Order.

The hard copy prints shall be submitted to the address indicated for Technical Documents in the Supplementary Terms and Conditions of this Purchase Order and as specified in the Schedule of Submittals:

Q520.2 Model Development

The Contractor shall provide a copy of their three-dimensional (3-D) model(s) in a format as agreed to by JEA and described below.

While AutoCad can import a variety of formats, the preferred ones are .dwg, .sat, .stp and .dgn

The 3-D model shall match the Contractor’s 2-D certified drawings, the expectation is the Contractor’s 2-D certified drawings are extracted from the 3-D model. If that is not the case JEA shall be notified of the process.

Clash detection/interference checking shall be the responsibility of the Contractor for all components within the Contractor's scope of responsibility. Contractor and PIE Supplier shall coordinate where PIE Supplier has components in the Contractor's responsible area and vice versa.

Models shall be in sufficient detail to indicate the kind, size, arrangement, component weight, breakdown for shipment, and operation of component materials and devices; the external connections, anchorages, and supports required; the dimensions needed for installation and correlation with other materials and equipment; and the information specifically requested in the Schedule of Submittals.

The models shall contain separate files and/or individual layers for all equipment supplied under this contract, including but not limited to: all major equipment, auxiliary equipment, tubing, piping, valves, piping insulation, pipe supports, ducting including duct stiffeners, and structural and architectural components. Separate files or layers shall be used to differentiate systems and/or components. Examples include the following:

The models shall contain the level of outline detail necessary to perform accurate space control with adjacent commodities designed by others. Items associated with manufacturing such as nameplates, internal details, fasteners, and threaded holes generally increase the complexity and size of the model. These items shall be segregated by layers as described below:

> All large and small bore piping systems, including supports, valves, in-line devices and other components.

Roads, sumps, manholes, construction access, and maintenance requirements.

Foundations, underground utilities, and fire hydrants.
Steel, gusset plates, angled bracing, floors, concrete, platforms, suspended floors, stairs, handrails, ladders, and other access requirements.

All cable tray, wireway, and conduit 3 inches and larger.

Architectural components, including interior and exterior walls, roofs, ceilings, doors, windows.

Breeching (Ductwork, duct stiffeners, duct insulation).

Mechanical/Chemical/heating and ventilation equipment (non-major).

Electrical equipment (non-major), instrumentation, light fixtures, light supports, and light poles.

Material handling items such as diverter gates, surge bins, chutework, feeders, drive motors, reducers, etc.

Maintenance items recommended by the vendor based on process experience.
(Tools, carts, dollies, etc.)

Pull space envelopes for all equipment removal and equipment access areas such as removal of heat exchanger bundles, swing space for manway hatches, thermocouple removal, strainers, etc.

Any items that have thermal expansion (i.e., hot and cold positions).

All information as required to prepare the site arrangement models and plant arrangement models.

Other design information as requested by JEA.

Each file must have layer names which are recognizable and representative of the entities they are on, i.e., steel, walls, windows, floors, etc. Orientation, common axis points, scale, rotation, layer content, drawing units and insertion point of the Contractor's model shall remain consistent between all files as well as within layer of each file as agreed with JEA.

The Contractor will provide models based on project specific requirements and shall include any database specific information necessary to fully specify the supplied equipment. This may include instances where files will be inserted or imported.

AutoCAD model files shall utilize the following types of features:

AutoCAD files shall be accompanied by a cross reference document with each file name and corresponding drawing title and description. File naming convention shall be determined on a project specific basis during the initial kickoff meeting. For Contractor models, the file name shall be 12 characters or less with no spaces.

For AutoCAD deliverable
3D Solid - (boxes, cylinders, extruded polylines, etc.) this is the preferred modeling method.

3D Polylines - Preferred method of modeling features such as power lines and cables. Polylines with thickness shall not be used.

A Navisworks file or Bentley Navigator i-model containing the entire computerized 3-D model shall be provided in accordance with the Schedule of Submittals.

Q520.3 Piping System Requirements

Piping systems shall use JEA specified system codes and each system shall be designed on an individual layer within one file.

Q520.4 Model Data

3D model review meetings shall be held as specified in Article 01100.1 with a Navisworks file or Bentley Navigator i-model.

Periodic electronic interference checks shall be performed, and interferences corrected in a timely manner, then follow-up electronic interference checks shall be performed until all interferences have been resolved.

Design data specifics to be included in the 3D model include the following minimum requirements:

Piping systems shall be identified and readable, segregated by line numbers in accordance with the Contractor P&IDs.

All equipment and miscellaneous parts shall be identified and readable (sample stations, panels, access doors, hatches, manways, etc.)

In-line instruments shall be identified and readable (e.g. control valves with actuator, flow meters, pressure indicators, level gauges, etc.)

All column row spacing. (On large 3D Models or when applicable)

Interfacing existing plant equipment, ductwork, piping, platforming, steel, etc.

Platform, stair, and access requirements to access equipment and piping components and personnel/life safety requirements.

Accurately modeled equipment based on preliminary information and subsequent detailed vendor models.

Location and elevation of all equipment, taking into consideration required operational and maintenance accessibility, clearance with structure and other surrounding equipment, required space for associated piping and valve layout, and base height.

I.D. of equipment including instrumentation and electrical equipment using JEA equipment numbers.

Electronic files which are linked to a database(s) should not include any proprietary data. Proprietary information should be removed from the files before submitting to JEA.

Q520.5 Out of Scope Content

Suppliers are required to submit only model content within their scope. If out of content scope is found, JEA will ask the Contractor to remove the out of scope content in future submittals. JEA may reject any submittal with excessive out of scope content and ask the Contractor to eliminate the out of scope content and resubmit the file/model. JEA reserves the right to remove out of scope content from the Contractor's

models at the Contractor's expense if the Contractor refuses to take the necessary steps to eliminate out of scope content from their submittals.

If out of scope content in the files is required, this data shall be placed on layers that can be easily identified so JEA can choose to delete some or all of its content prior to being inserted into the Contractor's integrated plant 3D model.

Q520.6 Model Submittal

Models shall be submitted electronically in the format described in Article Q520.2 above.

Model submittals shall be performed by the vendor.

All model files will be positively identified by revision and identified in the file name. For resubmission of model files where revisions have been performed, only those files that have been revised shall be submitted.

Contractor shall fully complete and certify models for compliance with the Purchase Order requirements.

Each submitted drawing shall be project unique and shall be clearly marked with the name of the project, unit designation, JEA's Purchase Order title, JEA's Purchase Order file number, project equipment or structure nomenclature, component identification numbers, and JEA's name. Equipment, instrumentation, and other components requiring JEA-assigned identification tag numbers shall be clearly identified on the models. If standard models are submitted, the applicable equipment and devices furnished for the project shall be clearly marked.

Transmittal letters shall identify which Schedule of Submittals item (by item number) is satisfied by each drawing or group of models. The transmittal letter shall include the manufacturer's drawing number, revision number, and title for each drawing attached. Each drawing title shall be unique and shall be descriptive of the specific drawing content. Transmittal letters for resubmitted models shall include JEA's drawing numbers.

If hard copies are required for submittal, the separately submitted hard copy drawing prints shall be black line on white background. Blue line on white background or color prints is not acceptable. JEA will use an electronic imaging system in processing the hard copy models. All copies shall be suitable for electronic imaging and shall have the maximum contrast. Print size shall not exceed 34 inches by 44 inches. Copies shall be folded to 8-1/2 inches by 11 inches. Copies shall be collated in sets.

Catalog pages are not acceptable, except as models for standard nonengineered products and when the catalog pages provide all dimensional data, all external termination data, and mounting data. The catalog page shall be submitted with a typed cover page clearly indicating the name of the project, unit designation, specification title, specification number, component identification numbers, model number, Contractor's drawing number, and JEA's name.

Models shall be submitted with all numerical values in English and/or Metric (SI) units.

For technical questions regarding the model structure and scope, the point of contact shall be the vendor's appointed technician or delegate.

Q520.6.1 Model Transfer

The frequency of model transfer between JEA and the Contractor shall be in accordance with the Schedule of Submittals. A file index spreadsheet shall be provided with each transfer, from both JEA and the Contractor. This file index spreadsheet will contain the following information:

Model name.

Model description.

Model revision.

File status.

New - First instance of model file being sent.

Not Sent - Model file has been sent previously, but there are no changes during current transfer so model file is not being sent again.

Updated - Model file has been sent previously and is being sent again with changes to content.

Superseded - Model file has been sent previously but is being superseded by another model file being sent.

Deleted - Model file has been sent previously but is being deleted from the model entirely without replacement.

Resent - Model file is being resent without change.

Renamed - Model file has been sent previously but has been renamed from previous model file name.

Model status.

In Progress - Normal working status of model data.

Closed - Model data is frozen for remainder of project unless a change is requested.

Date of last action (when was last action performed on model file).

Comments (revision notes, significant changes, etc.).

Q520.7 JEA's Review

JEA's review of models and other submittals will cover only general conformity of the data to the specifications and models, external connections, interfaces with equipment and materials furnished under separate specifications, and dimensions that affect plant arrangements. JEA's review does not include a thorough review of all dimensions, quantities, and details of the equipment, material, device, or item indicated or the accuracy of the information submitted. Review and comment by JEA of Contractor's models or other submittals shall not relieve Contractor of its sole responsibility to meet the completion dates requirement of this Purchase Order and to supply goods that conform to the requirements of this Purchase Order.

Q520.7.1 Model Review Methodology

3D model review meetings shall be held as specified in the Schedule of Submittals with a Navisworks file. 3D Model review at 30%, 60% and 90% of design stage of the package should include but not limited to Material handling concepts (corridors & weight constraints), Operation & accessibility, Design completeness, Piping walkthrough, Cable tray and lighting arrangement, Structure and platform arrangement.

The model review shall be conducted by the Contractor's responsible engineer or designer with B&V in attendance, based on discipline requirements. A full explanation of the 3D model components by the

Contractor is required. B&V has the right to ask, query and comment about any and all of the 3D model components shown. All the comments on the 3D model reviews must be documented and agreed by all parties at the end of the model review. Black & Veatch and the Contractor shall come to an agreement during the kickoff/conditioning meeting stage to determine the process and responsibility for providing an electronic storage solution for the 3D model, the attendance sheet, and tracking of comment sheets.

Q520.8 Tekla Structures Model(s) (Structural Steel Detailing Models)

The frequency of model transfer between JEA and the Contractor shall be in accordance with the Schedule of Submittals. A file index spreadsheet, and model file(s) shall be provided with each transfer, from both JEA and the Contractor. This file index spreadsheet will contain the following information, and Model files shall follow these guidelines where applicable:

The Version of Tekla Structures for which the model was created (Example: TeklaStructures 20.1 Imperial or Metric Database).

2 Model databases in DB1 & DB2 format – (Typically: projectname.db1 & projectname.db2).

Material database file – matdb.bin (documentation to support correct steel shape sizes and dimensions if designed from design code other than AISC or CISC).

Geographic location – Model shall be located and detailed in its correct global position or a definable location in relation to known coordinate (based on General Arrangement drawings - per contract).

File status.

New - First instance of model file being sent.

Not Sent - Model file has been sent previously, but there are no changes during current transfer so model file is not being sent again.

Updated - Model file has been sent previously, and is being sent again with changes to content.

Superseded - Model file has been sent previously, but is being superseded by another model file being sent.

Deleted - Model file has been sent previously, but is being deleted from the model entirely without replacement.

Resent - Model file is being resent without change.

Renamed - Model file has been sent previously, but has been renamed from previous model file name.

Model status.

In Progress - Normal working status of model data.

Closed - Model data is frozen for remainder of project, unless a change is requested.

Date of last action (when was last action performed on model file).

Comments (revision notes, significant changes, etc.).

S100 Seismic Design (Revised by Project: 16Feb26)

S100.1 General

This article specifies the general criteria and procedures that shall be used to ensure that structures, components, and equipment meet performance objectives during and following a seismic event.

The building or structure structural system shall provide a continuous load path or paths, with adequate strength and stiffness to transfer all seismic forces from the point of application to the final point of resistance.

Structures, components, and equipment shall be designed so that seismic forces are positively transferred to the supporting structure or foundation. The transfer method shall be acceptable to JEA and may include, but not be limited to, bolts, welds, guides, bumpers or shear lugs as appropriate. Frictional resistance due to gravity shall not be considered in evaluating the required resistance to seismic forces.

For seismic design of vessels, tanks, and other components, contents that are flammable, explosive, corrosive, acidic, caustic, toxic, or that otherwise present a danger if released shall be considered hazardous materials.

Seismic design shall be performed in accordance with the building code specified in Supplemental Specification D100 Site Meteorological and Seismic Data along with the applicable edition (as required by the specified building code) of the following references:

American Institute of Steel Construction (AISC), AISC 360, "Specification for Structural Steel Buildings."

American Institute of Steel Construction (AISC), AISC 341, "Seismic Provisions for Structural Steel Buildings."

American Concrete Institute (ACI), ACI 318, "Building Code Requirements for Structural Concrete."

American Concrete Institute (ACI), ACI 307, "Design and Construction of Reinforced Concrete Chimneys."

American Society of Mechanical Engineers (ASME), "Boiler and Pressure Vessel Code" and all addenda.

American National Standards Institute (ANSI), "ASME Code for Pressure Piping, ASME B31.1, Power Piping."

Manufacturers Standardization Society of the Valve and Fitting Industry (MSS), MSS SP-58, "Pipe Hangers and Supports - Materials, Design, and Manufacture."

American Petroleum Institute (API), API 650, "Welded Steel Tanks for Oil Storage."

American Water Works Association (AWWA), AWWA D100, “Welded Carbon Steel Tanks for Water Storage.”

National Fire Protection Association (NFPA), NFPA 13, “Standard for the Installation of Sprinkler Systems.”

Other nationally recognized and accepted design standards and references as appropriate.

S100.2 Seismic Forces

Seismic forces shall be determined from the basic seismic parameters given in Supplemental D100. The design forces and their distribution over the height of the building or structure shall be determined using a linearly elastic analysis model and the procedures listed in the specified building code. Load combinations, including seismic, shall be in accordance with the specified building code.

W_p for tanks, bins, and silos shall represent the weight of the tank structure and appurtenances and the operating weight of the contents at maximum rated capacity. Hydrodynamic effects of contents shall be considered in the seismic design of vessels and tanks as required by the specified building code.

Seismic dynamic forces shall be considered in the seismic design of below ground structures in addition to the static soil pressures.

S100.3 Seismic Design and Certifications

S100.3.1 Buildings

Buildings shall provide sufficient strength and ductility to resist the specified seismic effects and may use any of the basic structural systems permitted by the specified building code. Usage of structural systems shall be in accordance with the limitations prescribed in the specified building code. The effects of both plan and vertical irregularities shall be considered, as required by the specified building code.

Buildings shall be seismically analyzed using either the Equivalent Lateral Force Method or Modal Analysis in accordance with the specified building code and shall meet all of the design, proportioning, detailing, inspection, and quality assurance provisions of the specified building code.

The effective seismic weight, "W" as defined in ASCE 7, for buildings shall include the total dead load, the total operating weight of permanent equipment and the effective contents of vessels, and applicable portions of other loads, as required by the specified building code.

S100.3.2 Nonbuilding Structures

Nonbuilding structures include all self-supporting structures, other than bridges, and dams, that are supported by the earth; that carry gravity loads; and that may be required to resist seismic effects. These include, but are not limited to, heat recovery steam generators (HRSGs), cooling towers, stacks, chimneys, pipe racks, trussed towers, tanks, vessels, bins, and hoppers. Design of nonbuilding structures shall provide sufficient strength and ductility, consistent with the requirements for buildings, to resist the specified seismic effects.

Nonbuilding structures shall be seismically analyzed using either the Equivalent Lateral Force Method or Modal Analysis in accordance with the specified building code, and shall meet all of the design, proportioning, detailing, inspection, and quality assurance provisions of the specified building code and other referenced codes.

The effective seismic weight, "W," for nonbuilding structures shall include all dead load as defined for buildings and shall also include all normal operating contents of tanks, vessels, bins, and piping.

S100.3.3 Nonstructural Components

S100.3.3.1 General. Nonstructural components include architectural, mechanical, and electrical parts, portions, and equipment that are permanently attached to and supported by a building or structure but are not part of the structural system, such as nonbearing walls and partitions, ceilings, storage racks, access floors, tanks, pumps, piping, fans, HVAC ductwork, elevators, electrical panels, cable tray, and other nonstructural items.

Components shall have the same Seismic Design Category as the structure to which they are attached.

Components shall be designed to withstand seismic forces and displacements determined in accordance with the applicable building codes and standards.

Lateral horizontal seismic loads shall be applied at the component's center of gravity and distributed relative to the component's mass distribution. The loads shall be applied independently in at least two orthogonal directions in combination with service loads associated with the component. In addition, the component shall be designed for a concurrent vertical seismic load that acts in either direction. Loads for components shall take into account the actual attachment locations relative to elevation in a structure and/or attachment to more than one structure. Loads shall account for the reversibility of seismic forces.

Lateral horizontal displacements shall be determined from the structure's structural analysis. In general, relative displacements between components with attachment at the same floor elevation may be considered negligible. Components attaching to two or more floor elevations or between two or more structures shall be evaluated for relative seismic displacements. Displacements between two structures shall be considered to be out-of-phase.

All components shall be assigned a component importance factor in accordance with ASCE 7, Section 13.1. The components assigned a factor greater than 1.0 are part of a Designated Seismic Systems in accordance with IBC. The following table indicates the systems that have been assigned a Component Importance Factor, I_p, of 1.5.

Designated Seismic Systems	
System Code	**System Title**
APK	Emergency Generation (fuel oil tank only)
BSV	Fuel Oil Unloading
CGA	Hydrogen Storage
CGE	Ammonia Storage
FOA	Fuel Oil Receiving and Storage
FOB	Fuel Oil Supply
FPA	Building Fire Protection
GTB	Generator Step-Up Transformers
PSB	Auxiliary Boiler Fuel
TGD	Turbine Lube Oil
TGH	Hydrogen Seal Oil
WSE	Fire Protection Water Supply and Storage (fuel oil tank only)

All other components shall be assigned a Component Importance Factor, I_p, of 1.0.

Seismic forces for components shall be determined in accordance with the applicable codes and standards and as noted in Table 1 – Horizontal Seismic Design Forces.

Table 1 - Horizontal Seismic Design Forces (Fp)			
Components and Equipment	**a_p**	**R_p**	**I_p**
Piping for I_p = 1.0, ASME B31, welded joints	2.5	12.0	1.0
Piping for I_p = 1.5, ASME B31, welded joints	2.5	12.0	1.5
Boiler	1.0	2.5	1.0
Turbine	1.0	2.5	1.0
Pressure Vessels (not skirt supported)	1.0	2.5	1.0
Pressure Vessels (skirt supported)	2.5	2.5	1.0
Pumps	1.0	2.5	1.0
Electrical Bus Ducts	1.0	2.5	1.0
HVAC Equipment	2.5	6.0	1.0
HVAC Equipment with Vibration Isolation	2.5	2.5	1.0
Electrical Conduit and Cable Tray	2.5	6.0	1.0

S100.3.3.2 Equipment. Seismic design of mechanical and electrical equipment, attachments, and supports shall consider the dynamic effects of the equipment; its contents; piping attached to its nozzles; and, when appropriate, its supports.

Most mechanical and electrical equipment is presumed to be inherently rugged and capable of surviving strong motions and earthquakes provided it is adequately attached to the structure.

Stresses due to seismic loading and displacements shall be combined with operating loads and any external nozzle loads and compared to the appropriate Code allowable.

S100.3.3.3 Piping Systems. W_p for piping systems shall represent the total distributed operating weight of the piping system, including, but not limited to, any insulation, fluids, and concentrated loads such as valves, condensate traps, and similar components.

Seismic effects that shall be analyzed in the design of piping systems include the dynamic effects of the piping system, contents, and, when appropriate, supports. The interaction between the piping system and the supporting structures, including other mechanical and electrical equipment, shall also be considered.

In addition to seismic loadings, piping systems shall be designed to withstand dead plus operating loading, occasional (wind or hydrotesting) loading, and thermal loadings. Wind loadings shall not be considered as acting concurrently with seismic loadings.

The design of piping systems, supports, and components shall be completed in accordance with the requirements of the ASME B31.1 Code. The following clarifications shall be utilized in the analysis of piping systems:

> Piping systems, including supports, are considered to be high deformability elements due to the ductile nature of most steel utilized in piping systems. Where piping systems and support elements have limited or low deformability, appropriate values from Table 13.6-1

in ASCE 7 shall be used for the Component Response Modification Factor (R_p) in determining seismic loading.

Stresses due to seismic loading and structure displacements shall be determined for each of the two orthogonal directions and compared to the allowable code separately. As allowed by the code, stresses due to displacements may be evaluated as primary loads and combined with other occasional loads or evaluated as secondary loads and combined with other displacements such as thermal expansion.

Displacements within the same structure may be assumed in phase and applied to the pipe based on actual movements at attachment elevations. Displacements between buildings or structures shall be considered out-of-phase, and the displacement shall be applied to the piping system so that the values have a maximum range based on the actual movements at attachment elevations.

Seismic loads shall be combined with other occasional loads, including but not limited to, turbine trip and relief valve thrust load cases.

In-line components shall be designed with the same loads as the piping system, taking into consideration the center of gravity and weight of the component and all attaching items such as operators. Valve procurement specifications shall utilize the maximum seismic design load factors for allowable criteria so that valves may be installed at any elevation in the building or structure.

Seismic displacements shall be limited to 3 inches (75 mm) in each of two horizontal orthogonal directions and one vertical direction.

Seismic supports shall be designed to withstand the effects of seismic loading in both tension and compression.

Dead weight supports shall be evaluated for bucking and uplift. Rod supports shall not be put in compression due to seismic loading.

Spring supports shall be evaluated to ensure that variable and constant support assemblies remain loaded during the design seismic event.

Supports, attachments, and/or anchorages shall be designed for all loading conditions such as dead weight, occasional loads, displacements, and thermal expansion.

With the exception of piping and support systems required to be seismically analyzed and designed in accordance with NFPA 13, seismic design is not required for piping and attachments of high-deformability material where provisions are made to protect adjacent piping from impact, avoid impact with other structural or nonstructural components, or protect the piping in the event of such impact, and that meet the conditions below.

Piping in Seismic Design Category C

Any pipe with an I_p of 1.0.

Piping 2-inch (50 mm) nominal diameter and smaller with an I_p greater than 1.0

Piping in Seismic Design Category D, E, or F

Piping 1-inch (25 mm) nominal diameter and smaller with an I_p greater than 1.0

Piping 3-inch (75 mm) nominal diameter and smaller having an I_p of 1.0.

Seismic forces for piping shall be determined in accordance with the applicable codes and standards and as noted in Table 1 – Horizontal Seismic Design Forces.

S100.3.3.4 Equipment and Components Supported by Structures. Seismic design of components supported by structures shall be based on the seismic design forces at the attachment elevation of the Contractor's equipment or component, as noted in the technical specifications, in accordance with the requirements of the specified building code. The following table provides the applicable information for each Purchaser furnished structure to support the Contractor in developing these forces.

S100.3.3.5 Certifications.

S100.3.3.5.1 Certifications of architectural, mechanical, and electrical components. The Contractor shall submit manufacturer's documentation for components, supports, and attachments in accordance with ASCE 7 Section 13.2.1. This requirement is applicable to the following:

Architectural components, supports, and attachments.

Mechanical and Electrical components, supports, and attachments of Designated Seismic Systems.

S100.3.3.5.2 Manufacturer's special certification of designated seismic systems. The Contractor shall submit manufacturer's certifications complying with ASCE 7 Section 13.2.2 subject to approval by the Authority Having Jurisdiction.

S100.3.3.5.3 Experience data. The use of experience data as an alternative for seismic capacity shall be in accordance with ASCE 7, Section 13.2.6. Seismic qualification shall be acceptable to the Authority Having Jurisdiction. Nationally recognized guidelines for acceptable experience data are provided in *Experience Based Seismic Equipment Qualification*. EPRI, Palo Alto, CA: 2007. 1016125. The following are features of acceptable experience data:

- Components are compared to equipment with performance of similar equipment in past earthquakes in locations with similar seismic design accelerations.
- Components are of equal or better construction than the referenced component.
- Data is based on earthquake motions measured by instruments.

S100.4 Documentation

Complete structural support and anchorage details shall be shown on all drawings, including the size of members, details of connections, and other connection information typically identified for incorporation into structures or foundations.

Equipment and component drawings shall indicate the total load and/or loads to be transmitted to the structure that must ultimately restrain the components, equipment, or structure. This information shall include the weight, dimensions locating the center of gravity of the component or equipment, or the seismic design forces (magnitude, direction, and location) acting on the supports.

If requested by JEA, design calculations shall be submitted for all structures, equipment, or components which are designed in accordance with this Supplemental Specification. If requested by JEA, these calculations shall be certified by a professional engineer registered in the appropriate jurisdiction.

The following seismic design data shall be indicated on the design drawings:

Risk Category.

Mapped Spectral Response Accelerations, S_s and S_1.

Spectral Response Coefficients, S_{DS} and S_{D1}.

Site Class.

Seismic Design Category.

For Structures and Nonbuilding Structures Similar to Buildings:

Importance Factor, I.

Basic Seismic Force Resisting System.

Design Base Shear.

Seismic Response Coefficient, C_s.

Response Modification Factor, R.

Overstrength Factor, Ω_o.

Analysis Procedure.

For Nonstructural Components Including Equipment:

Component Importance Factor, I_p.

Seismic Design Force, F_p.

Component Response Modification Factor, R_p.

Component Amplification Factor, a_p.

S400 Contractor Loads for Structures, Equipment, and Components (Revised by Project: N/A)

S400.1 General

This article specifies the Contractor load information that shall be provided for all structures (including structures which support equipment), components (including tanks, vessels, and piping or cable tray systems) and all equipment or skid mounted equipment that is directly supported by structural steel and/or concrete foundations, unless noted otherwise within these specifications. Accurate loads are critical to proper design of the supporting structures and communication of load information between the Contractor and JEA must be consistent and inherently clear.

S400.2 Required Contractor Loads

The following load types shall be provided when applicable:

- Dead Loads
- Live Loads
- Operating Loads

- Thermal Loads
- Impact Loads
- Soil Loads
- Hydrostatic Loads
- Wind Loads
- Snow Loads
- Ice Loads
- Rain Loads
- Seismic Loads
- Construction Loads
- Fatigue Loads
- Vibration Loads

It is the Contractor's responsibility to determine which loads apply to the structure, component, or equipment.

S400.3 Load Table Requirements

Loads provided by the Contractor shall be in tabular format clearly identifying the load classification (Not-to-Exceed, Final) and the load type (Dead, Live, Fluid/Contents, Wind, Seismic, Snow, Rain, Ice, Impact, Dynamic, etc.), magnitude, direction, and units. If the equipment or structure stores a fluid or other bulk material, loads shall be provided for empty, operating, and full conditions. The document on which the loading information is provided shall clearly indicate the Contractor's name, structure/equipment/component name, purchase order number, and revision number.

S400.3.1 Load Classifications

S400.3.1.1 Not-To-Exceed (NTE) Loads. NTE loads are defined as loads that may be used for detailed design by the Contractor but are not classified as final or certified loads. NTE loads are generally submitted by the Contractor when certified load information is not available but the Contractor needs to begin detailed design of the supporting structure(s). NTE loads shall be based on data that is representative of the equipment being supplied without excessive safety factors on the loads. It is expected that final loads will not exceed the NTE loads. Any load submittal classified as "Not-to-Exceed" in the Schedule of Submittals shall be in accordance with this article.

If the Contractor anticipates that the certified loads for any structure, piece of equipment, and/or load case may be more than or significantly less than previously submitted NTE loads, the Contractor shall notify JEA as soon as they are aware of this situation and re-submit the load tables with the updated NTE loads soon thereafter.

S400.3.1.2 Final (Certified) Loads. Certified loads are defined as loads that have been verified as final and accurate by the Contractor and which may be used for detailed design by the Contractor. Certified loads shall be submitted by the Contractor as soon as the verified load information becomes available but no later than the date identified in the Schedule of Submittals. Certified loads shall be submitted by the Contractor regardless of whether NTE loads were submitted at a prior date. Any load submittal classified as "final" or "certified" in the Schedule of Submittals shall be in accordance with this article.

V100 Noise Abatement (Revised by Project: 09Apr26)

The near-field noise emissions for each equipment package furnished under these specifications shall not exceed a spatially-averaged free-field A-weighted sound pressure level of 85 dBA (referenced to 20 micropascals) measured along the equipment envelope at a height of 5 feet (1.5 meters) above floor/ground level and any personnel platform during normal operation. The equipment envelope is defined as the perimeter line that completely encompasses the equipment package at a distance of 3 feet (1 meter) horizontally from the equipment face. The near-field noise emissions include the contribution of

all noise associated with the equipment package, inclusive of all ONAN/ONAF operations. Normal operation includes all operating conditions up to the equipment rated capacity exclusive of start-up, shutdown, and upset conditions.

Where the drive motors, variable frequency drives (VFDs), or mechanical drives for the equipment are also furnished under these specifications, the total combined near-field sound pressure level of the motor, VFD, or mechanical drive and the driven equipment measured as a single component, operating at design load, shall not exceed a spatially-averaged free-field A-weighted sound pressure level of 85 dBA (referenced to 20 micropascals) measured along the equipment envelope.

During off-normal operation such as start-up, shut-down, and upset conditions the equipment sound pressure level shall not exceed a maximum of 110 dBA at all locations along the equipment envelope, including platform areas, that are normally accessible by personnel.

Contractor shall identify any equipment which may not comply with the 85 dBA criteria and shall obtain JEA's written approval for each such deviation based on Contractor's predicted noise emissions level, provided that the overall far-field noise emission guarantees of the Facility are not negatively impacted. Far-field noise requirements should be coordinated with the Contractor and may require amended noise emission targets per equipment package to maintain compliance with Jacksonville Environmental Protection Board (JEPB) Rule 4 (Noise Pollution Control) Part II regulations.

Compliance with the near-field noise emissions requirement shall be determined in accordance with industry standards ASME PTC-36, IEEE C57.12.90-2021, and NEMA TR1-2013. Compliance shall be based on not exceeding the allowable sound pressure level including background sound level corrections and excluding any correction for measurement uncertainties.