CONTRACT AND SPECIFICATIONS FOR

DHPC PDC 13.8 KV SWITCHGEAR (REBID)

FOR
CITY OF HASTINGS

HASTINGS, NEBRASKA

CONTRACT NO. HU 2026-49

Sealed Proposals Will Be Opened Promptly At
4:00 PM, Wednesday, September 30, 2026

Bid Submitted By: _____

HASTINGS

THIS BID DOCUMENT MUST BE SUBMITTED WITH BID

ADVERTISEMENT FOR BIDS

The City of Hastings, Nebraska, will receive bids for the: **DHPC/PDC 13.8KV Switchgear (Rebid), Contract No. HU 2026-49** until 4:00 p.m. at the City of Hastings, 1228 N Denver Ave., Hastings, Nebraska, on Wednesday, September 30, 2026, at which time and place all bids will be publicly opened and read aloud. **This proposal includes the manufacture and full integration of new switchgear into a dedicated Power Distribution Center (PDC), with the complete preassembled unit tested and delivered to the Don Henry Power Center.**

If you plan on bidding and are not already on our approved bidders list for this project, you are REQUIRED to fill out the Plan Holders Submittal Form that is located on the City website: https://www.cityofhastings.org/bids/ .

The Contract Documents, including plans and specifications, are on file at the City of Hastings, 1228 N Denver Avenue, Hastings, Nebraska 68901. Copies of the plans and specifications in electronic (PDF) format may be obtained by visiting the City of Hastings Website: www.cityofhastings.org/bids. A paper copy is available for $75.00, plus sales tax ($5.25), plus shipping.

Each bid shall be accompanied by a certified check, drawn on a solvent bank in the State of Nebraska, or a bid bond in an amount of not less than five percent (5%) of the total bid of all contract construction costs, made payable to the City Treasurer of the City of Hastings, Nebraska, as security that the bidder to whom the contract may be awarded will enter into a contract to build all the improvements in accordance with this notice and give bond in the sum hereinafter provided for the construction of improvements.

No bid shall be withdrawn after opening of bids without the consent of the City of Hastings, Nebraska, for a period of sixty (60) days after scheduled time of closing bids.

Time is of the essence in this contract. In evaluating bid(s) received, the City will consider the timelines of completion of prior construction contracts, existing workload of bidders and available manpower that bidder commits to the project.

The successful bidder will be required to furnish a Performance Bond in the sum of the full amount of the Contract within ten (10) days of the date of award. No additional time will be allowed the Contractor for providing the Performance Bond.

DATED AT HASTINGS, NEBRASKA, this 4th day of September 2026.

_____

Tyler Ficken, City Clerk

For City Clerk: Publish and Attach two (2) Proofs of Publication
September 9, 2026
September 16, 2026

BIDDER'S CHECKLIST

DHPC/PDC 13.8KV SWITCHGEAR (REBID)

FOR

CITY OF HASTINGS

Contract No. HU 2026-49

☐ One signed cover sheet with your company's name filled in

☐ One signed original set of Proposal fill in sheets

☐ Acknowledgement of Addenda. All addendums received must be acknowledged and signed, if applicable.

☐ Firm unit pricing; or the lump sum pricing as applicable

☐ A certified check, cashiers check, or bid bond payable to the City of Hastings in an amount no less than five percent (5%) of the bid price included with the sealed bid envelope addressed in accordance with the Mailing or Hand Delivery Instructions.

IF YOU HAVE QUESTIONS OR NEED HELP ON THESE SPECIFICATIONS

CONTRACT NO: HU 2026-49

DHPC/PDC 13.8KV SWITCHGEAR (REBID)

PLEASE CONTACT ANY OF THE FOLLOWING:

TECHNICAL QUESTIONS

Dale Reinhold.
Project Engineer
City of Hastings
1228 N. Denver Avenue
Hastings, NE 68901

Ph# 402-462-3661
Cell# 402-432-4682
Email: bidquestions@cityofhastings.org

Lee Vrooman
Director of Engineering
City of Hastings
1228 N. Denver Avenue
Hastings, NE 68901

Ph# 402-462-3657
Email: bidquestions@cityofhastings.org

GENERAL QUESTIONS OR REQUESTS

Renae Griess
Administrative Assistant – Engineering Dept. City of Hastings
Ph# 402-462-3665
Email: bidquestions@cityofhastings.org

HASTINGS

INSTRUCTIONS TO BIDDERS

All proposal information, including any unit price fill in sheets or other required information, shall be submitted on the proposal forms hereto attached. Copies of addenda, if any, shall be signed and attached. City of Hastings does NOT accept faxed or emailed bid returns.

Bidders shall inform themselves of all relevant matters, and, if awarded the contract, shall not be allowed any extra compensation by reason of any matter or thing concerning which such Bidder might not have fully informed himself, prior to the bidding.

The Bidder bidding on the Specifications herein, who has exceptions to those called for in the Specifications, must so state in the space provided below and/or attach a letter explaining in detail the exceptions taken to those required in the Specifications. This letter of explanation shall become a part of the bid and shall be attached hereto. Failure by the Bidder to outline his exceptions will require the successful Bidder to comply with these Specifications.

EXCEPTIONS TO SPECIFICATIONS:

_____

_____

_____

_____

_____

The City will not assume obligations resulting from losses or damages until acceptance of the equipment.

If any person contemplating submitting a bid for this contract is in doubt as to the true meaning of any part of the Specifications or other proposed contract documents, he may submit to Purchaser a written request for an interpretation thereof. The person submitting the request will be responsible for its prompt delivery. Any interpretation of the proposed documents will be made only by addendum duly issued or delivered to each person receiving a set of such documents. The Purchaser will not be responsible for any other explanation or interpretation of the proposed documents.

All addendums must be signed and attached to bid documents.

THIS BID DOCUMENT MUST BE SUBMITTED WITH BID

IMPORTANT MAILING (OR HAND DELIVERY) INSTRUCTIONS

Please address your return envelope as shown in the example below. All bids must be sealed in a properly marked envelope.

To hand deliver, please drop off between the hours of 8:00am – 5:00pm Monday-Friday.

Your Return Address

City of Hastings
Attn: Renae Griess
1228 N Denver Avenue
Hastings, NE 68901

This Information MUST BE typed or written in the lower left hand corner of return envelope
OR SIMPLY CUT OUT AND TAPE ON YOUR RETURN ENVELOPE

✂ ✂ ✂ ✂

BID DOCUMENTS ENCLOSED
ATTN: Renae Griess, Administrative Assistant
Contract No: HU 2026-49
DHPC PDC/13.8KV Switchgear (Rebid)
Bid Opens: Wednesday, September 30, 2026 @ 4:00 PM

If returning Fed-X or similar carrier, please enclose the bid in an "inner" envelope which is sealed. Please make sure BOTH envelopes are properly marked on the OUTSIDE OF THE ENVELOPE as shown in the example above.

One bid per envelope. Bid submittal via email is not allowed. Bids must be checked in to the City of Hastings prior to 4:00pm deadline.

Proposal for DHPC/PDC 13.8kv Switchgear
Contract No. HU 2026-49 Re-Bid

TO: City of Hastings
1228 N. Denver Ave
Hastings, NE 68901

Bid Opening: Sept 30, 2026 (Wednesday)
SEALED BIDS MUST BE RECEIVED BY 4:00 P.M. AND WILL BE OPENED PROMPTLY AT THAT TIME

We, the undersigned, being familiar with all parts of these documents, being Notice to Bidders, Bid Proposal Price Sheets, Contract Document Forms, Plans and Specifications, Affidavit, and all other parts of this document, do herein submit our proposal to Manufacture and full integration of new switchgear into a dedicated Power Distribution Center (PDC), with the complete preassembled unit tested and delivered to the Don Henry Power Center.
for the following price as shown on the fill in sheets, **including Nebraska Sales Tax.**

The labor portion is not subject to sales tax; however, the material portion is taxed accordingly.
See following tax rules and regulation language*.

Essential Information Fill-In

Bidder's Contact Information	Bidder Response
Bidder's Proposal Date	
Company Name	
Taxpayer ID Number (or EIN)	
Proposal Primary Contact Name	
Title	
Address/Number, Street	
Address/City, State, Zip Code	
Email	
Phone	

Proposal Validity	
Bidder's Proposal Expiration Date (Project Requests 60 Day Validity)	
Taxes	
Does your proposal comply with the tax requirements? (Yes/No)	
Warranty	
Cost for warranty (18 months from equipment commissioning) provided (Yes or No)	
If No, please insert the price adder to meet the required base warranty period.	

00320.5 Purchase Order Pricing and Payment Schedule		
	Total Firm, Fixed, Lump Sum Purchase Order Price	$ -
Price Breakdown		
Item 1	**Equipment/Materials Description**	**Price**
1.1	Manufacture and full integration of new switchgear into a dedicated Power	

THIS BID DOCUMENT MUST BE SUBMITTED WITH BID

Proposal for DHPC/PDC 13.8kv Switchgear
Contract No. HU 2026-49 Re-Bid

	Distribution Center (PDC), with the complete preassembled unit tested and delivered to the Don Henry Power Center.			
1.4	Loose shipped MV SWGR spare parts			
1.5	Loose shipped PDC spare parts			
	Subtotal Equipment/Materials Price			**$ -**
Item 2	**Transportation/Delivery/Freight**			**Price**
	Packing, marking, and delivering all equipment/materials DAP/DDP Jobsite (Incoterms 2010). Partial Shipments Allowed.			
	Subtotal Transportation/Delivery/Freight Price			**$ -**
Item 3	**Operation and Maintenance Manuals**	**Quantity**	**Unit Rate**	**Price**
	Proof Copy of Operations and Maintenance Manuals, Electronic	1		$ -
	Final Copy of Operations and Maintenance Manuals, Hardcopy	5		$ -
	Final Copy of Operations and Maintenance Manuals, Electronic	1		$ -
	Subtotal Operation and Maintenance Manuals Price			**$ -**
Item 4	**Startup and Commissioning Spare Parts**			**Price**
	Spare Parts			$
	Subtotal Startup and Commissioning Spare Parts Price			**$ -**

Delivery DAP/DDP Jobsite*	**LD****	**Early Delivery*****	**Required Delivery**		**Bidder Response**
Don Henry Power Center (DHPC)	LD	**06-MAR-28**	**20-MAR-28**		
Loose Shipped items (spare parts, spare breakers, grounding devices, etc).	LD	**06-MAR-28**	**20-MAR-28**		

* All equipment/materials listed within this table shall consist of applicable accessories or other components that are required for Supplier to fulfill its obligations under this Purchase Order.

** "LD" means delivery of the specified Work after the "Required Delivery" date is subject to liquidated damages in accordance with applicable articles of Section GC.36.

*** Purchaser will not accept delivery of the Work prior to the "Early Delivery" date unless previously agreed by Purchaser in a Purchase Order Revision. Delivery in the period between the "Early Delivery" and "Required Delivery" date is at the discretion of the Supplier.

**** A key element of the utilization of Advanced Work Packaging (AWP) is the tracking and delivery of the equipment/materials and all related documentation, including submittals, within the Project's Construction Work Area (CWA) and Construction Work Package (CWP) scope boundaries.

The Supplier shall incorporate the Purchaser's CWA and CWP numbering system on all submittals, documentation and electronic data required for this Project. The Purchaser shall provide the Supplier with the required CWA and CWP numbers and where these numbers are to be incorporated.

Delivery of Purchaser Furnished Equipment to Supplier's PDC factory		**Early Delivery*****	**Required Delivery**		**Bidder Response**

THIS BID DOCUMENT MUST BE SUBMITTED WITH BID

Proposal for DHPC/PDC 13.8kv Switchgear
Contract No. HU 2026-49 Re-Bid

Purchaser Furnished: Relay Panels (2), termination cabinet (1)	[redacted]	TBD	TBD	[redacted]	

Unit Adjustment Prices
Unit adjustment prices may be used to adjust the fixed lump sum price (additions or deletions) to compensate Supplier for modifications to the Work. Each unit adjustment price is the total of the specific unit of Work to be added to the Purchase Order price for net additions, or to be deleted from the Purchase Order price for net deletions. Unit adjustment pricing includes furnishing and delivering complete **DAP/DDP Jobsite (Incoterms 2010)**, the specific unit designated, and includes all associated engineering and design costs, overhead, and profit markup.
Unit adjustment pricing is firm and remains valid for Purchaser's use to adjust the Purchase Order, commencing at the initial issue of the Purchase Order (the Effective Date), and extending to the end of the Warranty Period, unless otherwise stated or specified.

Equipment/Materials			
Item Description	**Unit of Measure**	**Unit Adjustment Price to Add**	**Unit Adjustment Price to Delete**
MV SWGR			
2000A EO Circuit Breaker, 50kA (loose)	Each	$ -	$ -
1200A EO Circuit Breaker, 50kA (loose)	Each	$ -	$ -

Technical Field Services Rates and Expenses			
The all-inclusive per diem adjustment rate includes all charges to Purchaser for each technical field service day, including but not limited to, all salary and overhead, local lodging, travel between the Jobsite and local lodging, meals, and miscellaneous expenses. A technical field service day is defined as a 10 hour Jobsite workday in which all Project construction and management personnel are working normal shifts.			**Unit Adjustment Price**
Per Diem Rate	Monday through Friday (10 hours/day)	$/day	$ -
Per Diem Rate	Saturday (10 hours/day)	$/day	$ -
Per Diem Rate	Sunday/Holiday (10 hours/day)	$/day	$ -
The all-inclusive hourly adjustment rate includes all charges to Purchaser, and may be used to adjust the above per diem rates for hours worked more or less than 10 hours/day.			**Unit Adjustment Price**
Adjustment Rate	Monday through Friday	$/hour	$ -
Adjustment Rate	Saturday	$/hour	$ -
Adjustment Rate	Sunday/Holiday	$/hour	$ -
The all-inclusive round trip adjustment rate includes all charges to Purchaser for traveling to and from the technical field service representative home base of operations and the Jobsite. It includes all transportation (air and ground), parking, tolls, meals, travel per diem, any salary and overhead while traveling, and other miscellaneous expenses associated with one round trip.			**Unit Adjustment Price**
Round Trip Rate		$/round trip	$ -

THIS BID DOCUMENT MUST BE SUBMITTED WITH BID

Proposal for DHPC/PDC 13.8kv Switchgear
Contract No. HU 2026-49 Re-Bid

Delivery/Completion Schedule		
If you do not agree to one or more delivery dates (see PRICE & PAY tab), submittal due dates (see SOS tab), or liquidated damages, declare an exception in the tab. Include the earliest possible delivery/completion dates in your exception and include a supporting preliminary milestone schedule.		
Delivery		**Bidder Response**
Total number of weeks to submit drawings after Effective Date. Refer to Technical Schedule of Submittals for drawing information.	# of weeks	
Purchaser's engineering drawing review period.	# of weeks	3
Total number of weeks to fabricate and prepare for shipment after drawing approval.	# of weeks	
Total number of weeks for delivery (Include time for transportation DAP/DDP Jobsite)	# of weeks	
Total # of weeks from Effective Date to delivery		
Will you make a single consolidated shipment?	Yes/No	
What is your projected shop loading capacity at expected time of award including this scope?	percentage	

Logistics	Bidder Response
Does any of the Work have special storage requirements (yes/no)? If yes, please provide details.	
Locations where the materials/equipment are manufactured	

Schedule of Submittals and Applicable Liquidated Damages		
Will you meet the below submittal dates as required by the RFP?	Yes/No	
If no, have you listed the earliest possible submittal dates as an exception in the first tab?	Yes/No	

Effective Date: **TBD**

This list may not be all-inclusive. It will, however, remain the Supplier's responsibility to comply with submittal requirements whether or not the submittal is included in the following list:

Item No.	Reference	Submittal Item	Submittal Dates				LDs Apply?	Bidder Complies? Yes/No
			Calendar Days		Event	Due Date		
Supplier Commercial Submittals								
C01	None	Shipment Notice and Packing List	2	Before	Delivery of Equipment		No	
C02	GC.37	Security Instruments	30	After	Effective Date	TBD	No	
C04	None	Engineering/Procurement/Production/ Testing and Inspection/Shipping Schedule and Status Report	30	After	Effective Date with Monthly Updates	TBD	No	
C05	None	Lien Waiver		With	Each Invoice (Except Final Invoice)		No	
C06	None	Final Lien Waiver		With	Final Invoice		No	

THIS BID DOCUMENT MUST BE SUBMITTED WITH BID

C07	None	Electronic Material List	30	After	Effective Date with Monthly Updates	TBD	No	
C08	None	Preventative Maintenance and Jobsite Handling and Storage Requirements, if Applicable		With	Electronic Material List		No	
C09	None	Preshipment Inspection Notice	30	Before	Shipment of Equipment		No	
C10	None	Recommended Spare Parts List, with Unit Prices and Names of Suppliers, as Purchaser or Owner may elect to buy from for 5 years after Project Substantial Completion	90	After	Effective Date	TBD	No	
C11	GC.29.12	Insurance Certificates	30	After	Effective Date	TBD	No	
C12	None	Attend Jobsite Safety Orientation, if providing field service		Prior to	Working at Jobsite		No	
C13	GC.35	Safety Data Sheet (SDS) Forms		With	Each Shipment		No	
C14	None	Transport General Arrangement Drawings and Lift Drawings	90	Prior to	Delivery of Equipment		No	
Technical Submittals								
	13125	**Pre-Manufactured Metal Equipment Building - MV PDC**						
T01	13125	Initial Bill of Material, Including Quantity, Description, and Part Number	45	After	Effective Date	TBD	No	
T02	13125	Final Bill of Material, Including Quantity, Description, and Part Number	90	After	Effective Date	TBD	No	
T03	13125	Initial Plan view outline - General arrangement, center of gravity weight, floor opening/cutout sizes and locations, mounting details, equipment arrangements, lighting, and cable entry area and door swing requirements. Drawing shall include not to exceed (NTE) weights and dimensions.	45	After	Effective Date	TBD	Yes	
T04	13125	Initital Elevation outline - General arrangement in elevation, recommended pier and tie-down locations, and wall opening sizes and locations.	45	After	Effective Date	TBD	Yes	
T05	13125	Final Plan view outline - General arrangement, center of gravity weight, floor opening/cutout sizes and locations, mounting details, equipment arrangements, lighting, and cable entry area and door swing requirements. Drawing shall include certified weights and dimensions.	90	After	Effective Date	TBD	Yes	
T06	13125	Final Elevation outline - General arrangement in elevation, recommended pier and tie-down locations, and wall opening sizes and locations	90	After	Effective Date	TBD	Yes	

THIS BID DOCUMENT MUST BE SUBMITTED WITH BID

T07	13125	Legend/design criteria outline - Design criteria and drawing legend	30	After	Effective Date	TBD	No	
T08	13125	Electrical interconnection diagram and circuit/cable list between supplier furnished equipment.	30	After	Effective Date	TBD	No	
T08A	13125	PDC shipping split reconnection wiring drawing	30	After	Effective Date	TBD	No	
T09	13125	Purchaser generated detailed interconnection wiring list. This list will contain control and power wiring that is integral to the PDC. The list will specify the To and From, cable type, cable configuration, insulation color, and conductor size. The interconnection wiring list will be issued in the form of a spreadsheet. The spreadsheet will not include all circuits between Supplier furnished equipment.	84	Before	Supplier's Scheduled Start of Manufacturing		No	
T10	13125	Certified design calculations	30	After	Effective Date	TBD	No	
T11	13125	Certified air conditioning, heating, and pressurization design load calculations with consideration of transmission and solar gain, people, lighting, mechanical and electrical equipment, motors, electronic equipment, computers, miscellaneous appliances, infiltration, and ventilation loads.	30	After	Effective Date	TBD	No	
T12	13125	For HVAC Equipment: Fan curves, motor data, coating data, dimensional data including piping connection sizes and location, weight, performance data, wiring diagrams and sound level data.	60	After	Effective Date	TBD	No	
T13	13125	For Filters: filter efficiency, airflow resistance, dust holding capacity, media material, thickness, density and dimensional data.	60	After	Effective Date	TBD	No	
T14	13125	For Dampers: AMCA certified pressure drop and leakage data.	60	After	Effective Date	TBD	No	
T15	13125	For Terminal Devices: Flow versus pressure drop and flow versus throw.	60	After	Effective Date	TBD	No	
T16	13125	For Temperature Controls: Wiring diagrams, control and electrical components data sheets, sequence of operations, control system architecture, and temperature control panel layout drawings.	60	After	Effective Date	TBD	No	
	16120	**AC/DC Panelboards**						
T96	16120	Outline drawings and breaker arrangement showing tagging information, BOM, ratings, part numbers, and bus configuration.	30	After	Effective Date	TBD		
T97	16120	Catalog Cutsheet for panelboards	90	After	Effective Date	TBD		
T98	16120	Typical instruction manual leaflet for panelboards	90	After	Effective Date	TBD		

THIS BID DOCUMENT MUST BE SUBMITTED WITH BID

T99	16120	Catalog Cutsheet for each circuit breaker type.	90	After	Effective Date	TBD		
T100	16120	Time-current characteristic curves for each type of circuit breaker furnished within each panel	90	After	Effective Date	TBD		
	16101	**Medium Voltage Switchgear**						
T103	16101	Copies of Certified Test and Inspection Reports	14	After	Test or Inspection		No	
T101	16101	Prelminary Outline Drawings, including NTE height, length, width, vertical and horizontal center of gravity, and weight of each MV Switchgear Lineup.	30	After	Effective Date	TBD	Yes	
T102	16101	Final Outline Drawings, including height, length, width, vertical and horizontal center of gravity, and weight of each MV Switchgear Lineup.	90	After	Effective Date	TBD	Yes	
T103	16101	Typical Elementary Diagrams for Each MV Breaker or Controller Compartment or assembly Specified.	30	After	Effective Date	TBD	Yes	
T104	16101	Elementary Diagrams for MV gear, all compartments	90	After	Effective Date	TBD	Yes	
T105	16101	Fabrication Wiring Diagrams for MV gear.	30	Before	Shipment		Yes	
T106	16101	Final Wiring Diagrams for MV gear.	15	After	Shipment		Yes	
T107	16101	Wiring Diagram for test cabinet	60	After	Effective Date	TBD	Yes	
T108	16101	Network Architecture drawing showing network communications and equipment redundancy, if applicable.	90	After	Effective Date	TBD	No	
T109	16101	Component Data on All Electrical and Control Devices Being Provided, Including Electrical Ratings.	45	After	Effective Date	TBD	No	
T110	16101	Relay Instruction and Service Manual, Including Relay Curve Information.	60	After	Notice to Proceed		Yes	
T111	16101	Relay manufacturer calibration/ test reports	30	Before	Shipment		Yes	
T112	16101	Breaker calibration/timing test reports	14	After	Test		Yes	
T113	16101	Current transformer ratio correction factor and excitation curve with internal resistance (at stated temperature reference) of the CT stated on the secondary exicitation characteristic curve.	90	After	Effective Date	TBD	No	
T114	16101	Current transformer ANSI relaying and metering accuracy	60	After	Effective Date	TBD	No	
T115	16101	Current transformer thermal rating	90	After	Effective Date	TBD	No	
T116	16101	Current transformer secondary resistance at 25° C (77.0° F)	90	After	Effective Date	TBD	No	
T117	16101	Current transformer phase angle correction factor curves	90	After	Effective Date	TBD	No	
T118	16101	List of relays showing firmware version of each relay furnished; the Supplier shall order all realys with the latest version of the firmware.		Upon	Supplier Placing the Order for the Protective		No	

THIS BID DOCUMENT MUST BE SUBMITTED WITH BID

					Relays			
T119	16101	Communications network point register (16101.2.18.1.6)	90	After	Effective Date	TBD	No	
T120	16101	List showing manufacturer, model number, description, function for each communication device furnished.	90	After	Effective Date	TBD	No	
	Q301	**Manufacturer's Standard Coating**			.			
T121	Q301	Shop drawings that identify shop-applied coating systems	30	Before	Start of Fabrication		No	
	Q400	**General Equipment Requirements**			.			
T122	Q400	Shipment Plan providing details of field assembly work required as described in the Supplier's proposal.	30	After	Effective Date	TBD	No	
	Q500	**Shop Drawings and Instruction Manuals**			.			
T123	Q500	Proof instruction manual, refer to Technical Supplemental Q501 and the commercial submittals section.	90	Before	Shipment of Equipment		Yes	
T124	Q500	Final instruction manual, refer to Technical Supplemental Q501 and the commercial submittals section.	45	After	Shipment of Equipment		Yes	
	Q502	**Electrical Data**						
T125	Q502	Supplier Cable List for PDC's only	60	After	Effective Date	TBD	Yes	
	S100	**Seismic Design**			.			
T126	S100	Certificate of Compliance meeting Chapter 17 of the IBC	30	After	Effective Date	TBD	No	
	S500	**Building Code Required Special Inspections**						
T127	S500	Approved Fabricator Certification, as applicable	30	Before	Start of Fabrication		No	
T128	S500	Schedule of structural tests and special inspections	30	Before	Start of Fabrication		No	

Bid Submittals		
Provide all documents listed below with your proposal. For any documents not submitted, declare an exception in the first tab.		
Documents Required to be Submitted with Proposal		**Provided with Proposal?**
Reference	**Submittal Item**	**Yes/No**
None	This Proposal Fill-in Form in Microsoft Excel format, with no embedded programming and no permissive encoding restricting access to the data provided.	
Gen Info tab	Base Scope Price Impacts	
Del,Log,Sub tab	Special Storage Requirements, if Applicable	

THIS BID DOCUMENT MUST BE SUBMITTED WITH BID

Del,Log,Sub tab	Sub-supplier List, if Applicable	
Del,Log,Sub tab	Preliminary Milestone Schedule	
Del,Log,Sub tab	Staggered Shipping Schedule, if Applicable	
Del,Log,Sub tab	Current and Projected Shop Loading and Shop Capacity Curves	
None	Preliminary Material List and illustrate Supplier documentation consistency between EML, ASN, packing list, Purchaser tag#, Supplier PN# and erection/installation drawings.	
13125	**Pre-Manufactured Metal Equipment Building**	
13125	HVAC Design Engineer	
13125	HVAC Equipment Vendors	
16101	**Medium Voltage Switching Devices**	
16101	MV Switchgear Application Guide	
16101	Bill of quantities for medium voltage switchgear.	
16101	Drawings indicating the PDC layouts. Drawings shall be in sufficient detail to permit development of site arrangement drawings	
16101	Drawings indicating the switchgear one-line diagram showing equipment provided.	
16101	A list of special tools included in the proposal. The listing shall include a complete description and quantity of each item.	
16101	A complete priced recommended spare parts list, including the following:	
16101	A list of components with lead times longer than 30 days that will be ordered and shipped from another manufacturing facility for assembly in the final assembly plant.	
16101	The origin of major components (factory manufactured or assembled).	
16101	Network Architecture (showing network communications and equipment redundancy, if applicable)	
16120	**AC/DC Panelboards**	
16120	Outline drawing with dimensions and weights.	
16120	Recommended spare parts list.	
16120	Bill of material.	
16120	Manufacturer's catalog information.	
S500	**Building Code Required Special Inspections**	
S500	Approved Fabricator Certification, as applicable.	

Technical Fill-In Data Required with Proposal		
Complete all fields listed below. Declare an exception in the first tab for any field you do not complete.		
RFP Reference	**Submittal Item**	**Bidder Tech Fill-In Data**
13125	**Pre-Manufactured Metal Equipment Building**	
13125	Bidder's Name	

THIS BID DOCUMENT MUST BE SUBMITTED WITH BID

13125	Electrical/Control Building	
13125	Manufacturer	
13125	Location of manufacturer	
13125	City	
13125	State	
13125	Country	
13125	Standard for manufacturing and testing	
13125	Design permissible loading, lb/ft2 (kg/m2)	
13125	Floor	
13125	Roof	
13125	Wind	
13125	Dimensions, inches	
13125	Height	
13125	Depth	
13125	Length	
13125	Total weight, lb.	
13125	HVAC Units	
13125	Description	
13125	Rating - Cooling / Heating	
13125	Manufacturer	
13125	Location of manufacturer	
13125	City	
13125	State	
13125	Country	
13125	Lighting	
13125	Item	
13125	Description	
13125	Manufacturer	
13125	Location of manufacturer	
13125	City	
13125	State	
13125	Country	
13125	Standard for manufacturing and testing	
13125	Lighting fixture type	
13125	Switch type	
13125	Receptacle type	
13125	Contactor type	
16101	**Medium Voltage Switching Devices**	
16101	Major component manufacturing locations	
16101	Medium-voltage switchgear	
16101	Switching device switching medium (e.g. Vacuum)	
16101	Switching device insulating medium (e.g. Epoxy)	
16101	Control voltage and current inrush (amps)	
16101	Spring charging motor	
16101	Close coil	
16101	Trip coil	
16101	**Fill out the following for typical Equipment Assembly:**	

THIS BID DOCUMENT MUST BE SUBMITTED WITH BID

16101	Number of vertical sections	
16101	Overall dimensions of Equipment Assembly, in.	
16101	Height	
16101	Depth	
16101	Length	
16101	Total weight of completely assembled Equipment Assembly, lb.	
16101	Equipment Assembly individual shipping pieces	
16101	Number	
16101	Weight of largest shipping piece, lb.	
16101	Overall dimensions of largest shipping piece, in.	
16101	Height	
16101	Depth	
16101	Length	
16101	Weight of heaviest drawout component, lb.	
16101	Equipment assembly clear front space requirements, in.	
16101	Height	
16101	Width	
16101	Total Equipment Assembly heat loss (watts)	
16120	**AC/DC Panelboards**	
16120	Standards for manufacturing and testing	
16120	Type of cabinet finish	
16120	Busbar material	
16120	Bus configuration	
16120	Exterior paint color	
16120	AC Panelboard	
16120	Item	
16120	Description	
16120	Manufacturer	
16120	Location of manufacturer	
16120	City	
16120	State	
16120	Country	
16120	Rated voltage	
16120	Rated frequency	
16120	Rated short-circuit interrupting capability	
16120	Bus configuration	
16120	Enclosure type	
16120	DC Panelboard	
16120	Item	
16120	Description	
16120	Manufacturer	
16120	Location of manufacturer	
16120	City	
16120	State	
16120	Country	
16120	Rated voltage	

THIS BID DOCUMENT MUST BE SUBMITTED WITH BID

16120	Rated short-circuit interrupting capability	
16120	Bus configuration	
16120	Enclosure type	
16120	Circuit Breaker	
16120	**Ampere Rating/Number of Poles**	
16120	Manufacturer / Quantity Furnished	
16120	Device Rating / Manufacturer	
16120	Fuse switch	
16120	Fuse	

For purposes of sales/use tax, this project falls under Nebraska Sales and Use Tax Regulation 1-017 for Contractors. By definition, a contractor is "any person who repairs property annexed to, or who annexes property to, real estate, including leased property, by attaching building materials to the annexed property or improvement being built or repaired, or who arranges for annexation of property." Please refer to www.revenue.nebraska.gov/salestax.html for additional information.

For calculating this proposal:

- All contractors are to include sales/use tax on materials in the bidder's prices, if applicable.
- **Option 1 contractors must separately state materials, sales tax, labor, and other charges on all invoices for the project. Any invoices submitted that do not include this required breakdown of the charges will not be accepted for payment. (This requirement does not apply to Option 2 or 3 contractors.)**
- The sales/use tax rate on building materials is 7.0% for projects within Hastings' city limits and 5.5% for projects outside of city limits.
- Contractor labor charges for this proposal are not subject to sales/use tax per the Nebraska Department of Revenue Notice to Contractors effective October 1, 2007.
- In submitting this bid, the bidder certifies that he will comply with all applicable laws, ordinances, and codes of the City of Hastings and the State of Nebraska.
- For this project, Contractor will supply all materials.

What contractor option have you registered with the Nebraska Department of Labor (must select one)? Please refer to https://dol.nebraska.gov for additional information.

Option 1 _____

Option 2 _____

Option 3 _____

Is Nebraska Sales/Use Tax included in the pricing.

Yes _____ No _____

(ALL COSTS TO INCLUDE CITY AND STATE SALES TAX)

Any modification of bid proposal will be considered non-conformance of the bid. All exceptions to the proposal shall be noted as an exception to the bid.

City of Hastings may at its own discretion delete any project area and / or component prior to award of contract.

THIS BID DOCUMENT MUST BE SUBMITTED WITH BID

Proposal for DHPC/PDC 13.8kv Switchgear
Contract No. HU 2026-49 Re-Bid

In submitting this proposal, it is further understood that the City of Hastings reserves the right to reject any or all proposals and may waive any informalities and may accept the proposal which best suits its needs. It is further understood that this proposal may not be withdrawn for a period of sixty days (60) days after bids are opened.

All proposals shall have original signatures. Electronic time-stamped signatures will be acceptable. Photocopied or printed versions of bid bonds will be accepted without original signatures, however a hardcopy with original signatures must be received by City of Hastings within 5 business days.

OFFICIAL NAME & ADDRESS

Firm Name	Signature
Address	Typed or Printed Name
City, State, Zip	Title
Phone No.	Date
Fax No.	Email Address

ALL BIDS MUST BE CHECKED IN THE CITY OF HASTINGS
PRIOR TO 4:00 PM DEADLINE

THIS BID DOCUMENT MUST BE SUBMITTED WITH BID

Proposal for DHPC/PDC 13.8kv Switchgear (Rebid)
Contract No. HU 2026-49

TO: City of Hastings
1228 N. Denver Ave
Hastings, NE 68901

Bid Opening: September 30, 2026 (Wednesday)
SEALED BIDS MUST BE RECEIVED BY 4:00 P.M. AND WILL BE OPENED PROMPTLY AT THAT TIME

We, the undersigned, being familiar with all parts of these documents, being Notice to Bidders, Bid Proposal Price Sheets, Contract Document Forms, Plans and Specifications, Affidavit, Material List, and all other parts of this document, do herein submit our proposal to furnish, install, and perform all tasks required to complete said project area(s) for the total costs.

The labor portion is not subject to sales tax; however, the material portion is taxed accordingly. The project is outside of city limits and is subject to 7**% sales tax**. See following tax rules and regulation language.

Item#	Description	Unit Price	Total
1	Manufacture and full integration of new switchgear into a dedicated Power Distribution Center (PDC), with the complete preassembled unit tested and delivered to the Don Henry Power Center.		$
TOTAL			
			$
In Words			

Project Completion Date:

Note: Unit prices shall prevail in the case of potential mathematical discrepancies.

The labor portion is not subject to sales tax; however, the material portion is taxed accordingly. See following tax rules and regulation language.

For purposes of sales/use tax, this project falls under Nebraska Sales and Use Tax Regulation 1-017 for Contractors. By definition, a contractor is "any person who repairs property annexed to, or who annexes property to, real estate, including leased property, by attaching building materials to the annexed property or improvement being built or repaired, or who arranges for annexation of property." Please refer to www.revenue.nebraska.gov/salestax.html for additional information.

For calculating this proposal:

- All contractors are to include sales/use tax on materials in the bidder's prices, if applicable.
- **Option 1 contractors must separately state materials, sales tax, labor, and other charges on all invoices for the project. Any invoices submitted that do not include this required breakdown of the charges will not be accepted for payment. (This requirement does not apply to Option 2 or 3 contractors.)**
- The sales/use tax rate on building materials is 7.0% for projects within Hastings' city limits and 5.5% for projects outside of city limits.

THIS BID DOCUMENT MUST BE SUBMITTED WITH BID

Proposal for DHPC/PDC 13.8kv Switchgear (Rebid)
Contract No. HU 2026-49

- Contractor labor charges for this proposal are not subject to sales/use tax per the Nebraska Department of Revenue Notice to Contractors effective October 1, 2007.
- In submitting this bid, the bidder certifies that he will comply with all applicable laws, ordinances, and codes of the City of Hastings and the State of Nebraska.
- For this project, Contractor will supply all materials.

What contractor option have you registered with the Nebraska Department of Labor (must select one)? Please refer to https://dol.nebraska.gov for additional information.

Option 1 _____

Option 2 _____

Option 3 _____

Is Nebraska Sales/Use Tax included in the above prices.

Yes _____ No _____

(ALL COSTS TO INCLUDE CITY AND STATE SALES TAX)

The undersigned bidder agrees to furnish the required performance bond and to enter into a contract within ten (10) days after acceptance of the Proposal and further agrees to complete all work covered by the foregoing Proposal in accordance with specified requirements.

Exceptions: No ☐ Yes ☐ (If yes, list on ***"Instructions to Bidders"*** page)

Any modification of bid proposal will be considered non-conformance of the bid. All exceptions to the proposal shall be noted as an exception to the bid.

City of Hastings may at its own discretion delete any project area and / or component prior to award of contract. City of Hastings will award all bid sections to one contractor.

In submitting this proposal, it is further understood that the City of Hastings reserves the right to reject any or all proposals and may waive any informalities and may accept the proposal which best suits its needs. It is further understood that this proposal may not be withdrawn for a period of sixty days (60) days after bids are opened.

THIS BID DOCUMENT MUST BE SUBMITTED WITH BID

Proposal for DHPC/PDC 13.8kv Switchgear (Rebid)
Contract No. HU 2026-49

All bid documents, including proposals, bid bonds, subcontractor designation, etc., must be submitted with original signatures. No copies will be accepted.

OFFICIAL NAME & ADDRESS

Firm Name	Signature
Address	Typed or Printed Name
City, State, Zip	Title
Phone No.	Date
Fax No.	Email Address

ALL BIDS MUST BE CHECKED IN TO THE CITY OF HASTINGS PRIOR TO 4:00 PM DEADLINE

THIS BID DOCUMENT MUST BE SUBMITTED WITH BID

AGREEMENT

THIS AGREEMENT, made and entered into this day of 2026, by and between the City of Hastings, Party of the First Part, hereinafter called the "Purchaser" or "City", and a of (town) in the State of , Party of the Second Part, hereinafter called the "Contractor".

WITNESSETH: THAT,

WHEREAS: The Purchaser has caused the necessary contract documents to be prepared for defining material, equipment, and/or labor to be supplied to the City of Hastings, and delivered complete as specified in the accompanying contract documents.

WHEREAS: The Purchaser has advertised for bids from Contractors, has received said bids, analyzed same and duly awarded a contract to the "Contractor", "Party of the Second Part", for material, equipment, and/or labor as hereinafter set forth and as stated more in detail in the Proposal and related contract documents to wit; Notice to Bidders, Instructions to Bidders, Specifications; all of which documents are attached hereto and made a part of this Contract.

NOW, THEREFORE: It is hereby agreed that for the sum of . ($)

to be paid by the Purchaser, within Thirty (30) days after the acceptance of material, equipment, and/or labor by the Purchaser, to the Contractor, the Contractor agrees to furnish all materials, equipment, and/or labor as required by the accompanying specifications, and the aforesaid contract documents, for **DHPC/PDC 13.8KV Switchgear (Re-bid) HU 2026-49.**

All materials, equipment, and/or labor shall be in accordance with the accompanying contract documents and specifications which are as much a part of this Agreement as if repeated verbatim herein.

It is further agreed that the Contractor will start work promptly, furnish the necessary drawings promptly and complete the work in the number of days set forth in the Proposal.

IN WITNESS WHEREOF: The Parties of the First and Second Parts have hereto set their hands and seals on the day and year above written.

AGREEMENT

CITY OF HASTINGS
Party of the First Part

By: _____

Date: _____

ATTEST:

_____
City Clerk

CONTRACTOR
Party of the Second Part

_____

By: _____

Title: _____

Date: _____

SEAL

APPROVED TO FORM:

_____
City Attorney

Note: If executed by one other than President, Partner or the individual Owner, a Power-of-Attorney authorizing execution should accompany this Contract.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

That we, the undersigned, _____ as principal, and _____, a corporation organized and existing under the laws of the State of _____, and duly authorized to transact business in the State of Nebraska, as surety are held and firmly bound unto the CITY OF HASTINGS, NEBRASKA, a municipal corporation organized and existing under the laws of the State of Nebraska, hereinafter referred to as CITY, in the penal sum of _____ Dollars ($_____), lawful money of the United States, for the payment of which will and truly be made, we the said principal and the said surety do hereby bind ourselves, our heirs, executors, administrators and assigns, jointly and severally, by these presents as follows:

The condition of this obligation is such that, whereas the principal, by an instrument in writing attached hereto and bearing the date of _____ 20__, has agreed with the CITY to do all work necessary and to furnish all labor, materials, supplies, tools and equipment to

_____

_____

as specified thereby and in the specifications, proposals and contract forming the Contract Documents attached thereto and made a part hereof:

NOW THEREFORE, if the principal shall well and truly in good, sufficient and in a workmanlike manner, and to the satisfaction of the CITY perform and complete the work required, and shall defend, indemnify and save harmless the CITY against all damages, claims, demands, expenses and charges of every kind (including claims of patent infringement) arising from any act, omission or neglect of said principal, his agents, servants or employees, with relation to said work, and shall pay all costs, charges, rentals and expenses for labor, materials, supplies and equipment and deliver the said improvement to the CITY completed and ready for operation and free from all encumbrances or claims for labor, materials or otherwise, and shall pay all other expenses lawfully chargeable to the CITY, and this bond shall also be for the use and benefit of all persons who may perform any work or labor or furnish any material in the execution of said Contract and may be sued on thereby in the name of any such party claiming the benefit hereof, then this obligation shall be void, otherwise the same shall remain in full force and effect. This obligation shall be in full force and effect for the full guarantee period provided in the specifications contained herein.

PERFORMANCE BOND

PROVIDED FURTHER, that said surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation on this bond, and it does hereby waive notice of any change, extension of time, alteration or addition to terms of the Contract, to the work or to the specifications.

PROVIDED FURTHER, that if the principal of his, their or its subcontractor or subcontractors fail to duly pay for any labor, materials team, hire sustenance, provisions, provender or any other supplies or materials used or consumed by such contractor of his, their or its subcontractors in performance of the work contracted to be done, the surety will pay the same in any amount not exceeding the sum specified in the bond together with interest as provided by law.

IT WITNESS WHEREOF, said principal and surety have hereunto set their hands and seals at _____ this _____ day of _____, 20____,

This Bond is executed in triplicate counterparts.

_____
Principal

(Seal)

_____
Street Address

_____
Witness

_____
City, State, Zip

_____
Name of Person Executing

_____
Surety

By:_____

ATTEST:

_____

Title:_____

A F F I D A V I T

State of Nebraska)
) ss.
County of Adams)

I _____, _____
Name Title

of _____
Firm Name

do hereby certify that all subcontractors, vendors, persons or firms who have furnished labor or material for the

_____

_____

have been fully paid and that all taxes have been paid.

_____
Signature

_____
Date

Subscribed and sworn to me this _____ day of _____, 20____

_____
Notary Public

My commission expires_____.

A signed and notarized copy of affidavit must be in City of Hastings file before the final payment may be made.

Copy of forms will be supplied by City of Hastings prior to final payment.

GENERAL CONDITIONS

GC.1 CONTRACT DOCUMENTS. It is understood and agreed that the Notice to Bidders, Instructions to Bidders, Proposal, Proposal Data, Contract Agreement, Performance Bond, Payment Bond, General Conditions, Special Conditions, Specifications, Drawings, Addenda, and Change Orders issued by the Purchaser or the Engineer, and specifications and engineering data furnished by the Supplier and accepted by the Purchaser, are each included in this Contract and the work shall be done in accordance therewith.

GC.2 DEFINITIONS. Words, phrases, or other expressions used in these contract documents shall have meanings as follows.

1. "Contract" or "contract documents" shall include the items enumerated above under CONTRACT DOCUMENTS.

2. "Purchaser" shall mean the City of Hastings named and designated in the Contract Agreement as "Party of the First Part," and their duly authorized agents. All notices, letters, and other communication directed to the Purchaser shall be addressed and delivered to:

   City of Hastings
   1228 North Denver Avenue
   P.O. Box 289
   Hastings, Nebraska 68902-0289

   Attention: Mr. Lee Vrooman
   Director of Engineering

3. "Supplier" shall mean the corporation, company, partnership, firm or individual named and designated in the Contract Agreement as the "Party of the Second Part," who has entered into this Contract for the performance of the work covered thereby, and its, his, or their duly authorized representatives.

4. "Sub-Supplier" shall mean and refer only to a corporation, partnership, or individual having a direct contract with the Supplier for performing work covered by these contract documents.

5. "Engineer" shall mean Black & Veatch Corporation, a Delaware corporation.

6. "Date of contract," or equivalent words, shall mean the date written in the first paragraph of the Contract Agreement.

7. "Day" or "days," unless herein otherwise expressly defined, shall mean a calendar day or days of 24 hours each.

8. "The work" shall mean the equipment, supplies, materials, labor, and services to be furnished under the contract and the carrying out of all obligations imposed by the contract documents.

9. "Drawings" or "plans" shall mean all (a) drawings furnished by the Purchaser as a basis for proposals, (b) supplementary drawings furnished by the Purchaser to clarify and to define in greater detail the intent of the contract drawings and specifications, (c) drawings submitted by the successful bidder with his proposal, provided such drawings are acceptable to the Purchaser, (d) drawings furnished by the Purchaser to the Supplier during the progress of the work, and (e) engineering data and drawings submitted by the Supplier during the progress of the work, provided such drawings are acceptable to the Engineer.

10. Whenever in these contract documents the words "as ordered," "as directed," "as required," "as permitted," "as allowed," or words or phrases of like import are used, it shall be understood that the order, direction, requirement, permission, or allowance of the Purchaser or Engineer is intended only to the extent of judging compliance with the terms of the contract; none of these terms shall imply that the Purchaser or the Engineer has any authority or responsibility for supervision of the Supplier's forces or construction operations, such supervision and the sole responsibility therefor being strictly reserved for the Supplier.

11. Similarly the words "approved," "reasonable," "suitable," "acceptable," "proper," "satisfactory," or words of like effect and import, unless otherwise particularly specified herein, shall mean approved, reasonable, suitable, acceptable, proper, or satisfactory in the judgment of the Purchaser or Engineer, to the extent provided in (10) above.

12. Whenever in these contract documents the expression "it is understood and agreed" or an expression of like import is used, such expression means the mutual understanding and agreement of the parties executing the Contract Agreement.

13. "Official acceptance" shall mean the Purchaser's written acceptance of all work performed under this Contract, based on the Engineer's final inspection and issuance of a final payment certificate.

14. “Final Acceptance” shall mean that all work has been completed in accordance with these specifications, the project has been walked down, punch list items have been completed, and Purchaser is ready to accept the Work as complete.

GC.3 EXECUTION OF CONTRACT. Once the bids have been evaluated, the Purchaser will electronically submit the Contract Agreement to the Supplier. The Supplier shall sign the Contract Agreement and return to Purchaser for the final approval process. Upon final approvals, the Contract Agreement will be signed by the Purchaser and electronically returned to the Supplier. Supplier shall then mail one hardcopy of required bonds, one electronic or hardcopy of insurance documents, and one electronic or hardcopy of power of attorney forms to the Purchaser. The date of contract on the bond forms and power of attorney forms shall match the date provided on the Contract Agreement by the Purchaser.

The Purchaser will review the final documents and electronically send a final conformed contract to the Supplier.

GC.4 LEGAL ADDRESSES. The business address of the Supplier listed in the Proposal is hereby designated as the place to which all notices, letters, and other communication to the Supplier will be mailed or delivered. The address of the Purchaser appearing on Page GC-1 is hereby designated as the place to which all notices, letters, and other communication to the Purchaser shall be mailed or delivered. Either party may change his address at any time by an instrument in writing delivered to the Engineer and to the other party.

GC.5 SCOPE AND INTENT OF CONTRACT DOCUMENTS. The various parts of the contract documents are intended to supplement but not necessarily duplicate each other. Any work exhibited in one part and not in another shall be executed as if it had been set forth in all parts, so that the work will be performed according to the complete design as determined by the Engineer.

Should anything necessary for a clear understanding of the work be omitted from the contract documents, or should the requirements appear to be in conflict, the Supplier shall secure written instructions from the Engineer before proceeding with the work affected thereby. It is understood and agreed that the work shall be performed according to the true intent of the contract documents.

GC.6 INDEPENDENT SUPPLIER. The relationship of the Supplier to the Purchaser shall be that of an independent supplier.

GC.7 ASSIGNMENT. The Supplier shall not assign the work, or any part thereof, without the previous written consent of the Purchaser, nor shall he assign, by power of attorney or otherwise, any of the money payable under this Contract unless written consent of the Purchaser has been obtained. No right under this Contract, nor claim for any money due or to become due hereunder shall be asserted against the Purchaser, or persons acting for the Purchaser, by reason of any so-called assignment of this Contract or any part thereof, unless such assignment has been authorized by the written consent of the Purchaser. In case the Supplier is permitted to assign moneys due or to become due under this Contract, the instrument of assignment shall contain a clause subordinating the claim of the assignee to all prior liens for services rendered or materials supplied for the performance of the work.

GC.8 ORAL STATEMENTS. It is understood and agreed that the written terms and provisions of this agreement shall supersede all oral statements of representatives of the Purchaser, and oral statements shall not be effective or be construed as being a part of this Contract.

GC.9 REFERENCE STANDARDS. Reference to the standards of any technical society, organization, or association, or to codes of local or state authorities, shall mean the latest standard, code, specification, or tentative standard adopted and published at the date of taking bids, unless specifically stated otherwise.

GC.10 SOURCE OF MATERIALS. Supplier to fill in applicable information on proposal sheets.

GC.11 SUPPLIER TO CHECK DRAWINGS AND LISTS. The Supplier shall check all dimensions, elevations, and quantities indicated on the drawings and lists furnished to him by the Engineer. The Supplier shall notify the Engineer of any discrepancy between the drawings and the conditions at the site, or any error or omission in the drawings, or in the layout as given by stakes, points, or instructions, which he may discover in the course of the work. The Supplier will not be allowed to take advantage of any error or omission in the drawings or other contract documents. Full instructions will be furnished by the Engineer should such error or omission be discovered, and the Supplier shall carry out such instructions as if originally specified.

GC.12 FIGURED DIMENSIONS TO GOVERN. Dimensions and elevations indicated on the drawings shall be accurately followed even though different from scaled measurements. No work indicated on the drawings, the dimensions of which are not indicated, shall be executed until necessary dimensions have been obtained from the Engineer.

GC.13 NO WAIVER OF RIGHTS. Neither the inspection by the Purchaser or Engineer or any of their officials, employees, or agents, nor any order by the Purchaser or Engineer for payment of money, or any payment for, or acceptance of, the whole or any part of the work by the Purchaser or Engineer, nor any extension of time, nor any possession taken by the Purchaser or its employees, shall operate as a waiver of any provision of this Contract, or of any power herein reserved to the Purchaser, or any right to damages herein provided, nor shall any waiver of any breach in this Contract be held to be a waiver of any other or subsequent breach.

GC.14 AUTHORITY OF THE ENGINEER. To prevent delays and disputes, and to discourage litigation, it is agreed by the parties to this Contract that the Engineer shall determine the quantities of work which are to be paid for under the contract and shall resolve all questions in relation to the work.

If, in the opinion of the Supplier or the Purchaser, a decision made by the Engineer is not in accordance with the meaning and intent of the contract, either party may file with the Engineer and the other party to the contract, within 30 days after receipt of the decision, a written objection to the decision. Failure to file an objection within the allotted time will be

considered acceptance of the Engineer's decision and the decision shall become final and conclusive.

The Engineer's decision and the filing of the written objection thereto shall be a condition precedent to the right to request mediation or to start action in court.

It is the intent of this agreement that there shall be no delay in the execution of the work and the decision of the Engineer as rendered shall be promptly observed.

GC.15 ENGINEERING INSPECTION. The Purchaser may appoint (either directly or through the Engineer) such inspectors as the Purchaser deems proper to inspect the work for compliance with the contract documents. The Supplier shall furnish all reasonable assistance required by the Engineer, or inspectors, for the proper inspection of the work. Should the Supplier object to any interpretation of the contract by an inspector, the Supplier may make written appeal to the Engineer for a decision.

Inspectors shall have the authority to reject work which is unsatisfactory, faulty, or defective or does not conform to the requirements of the contract documents. Inspection shall not relieve the Supplier from any obligation to construct the work strictly in accordance with the contract documents.

Upon the failure of the Supplier or its Subsuppliers to comply with any of the requirements of this Contract (but not limited to quality or safety), the Purchaser shall have the authority to stop any portion of the work affected by such failure until such failure is remedied. If the Purchaser issues a Stop Work Order, the Purchaser shall not be liable for any costs or expenses claimed by Supplier arising out of such issuance. The construction schedule shall not be delayed or extended as a result of the Purchaser’s issuance of a Stop Work Order.

GC.16 SUPPLIER DEFAULT. If the work to be done under this Contract is abandoned by the Supplier; or if this Contract is assigned by him without the written consent of the Purchaser; or if the Supplier is adjudged bankrupt; or if a general assignment of his assets is made for the benefit of his creditors; or if a receiver is appointed for the Supplier or any of his property; of if at any time the Engineer certifies in writing to the Purchaser that the performance of the work under this Contract is being unnecessarily delayed, that the Supplier is violating any of the conditions of this Contract, or that he is executing the same in bad faith or otherwise not in accordance with the terms of said contract; or if the work is not substantially completed within the time named for its completion or within the time to which such completion date may be extended; then the Purchaser may serve written notice upon the Supplier and his surety of the Purchaser's intention to terminate this Contract. Unless within 5 days after the serving of such notice, a satisfactory arrangement is made for continuance, this Contract shall terminate. In the event of such termination, the surety shall have the right to take over and complete the work, provided that if the surety does not commence performance within 30 days, the Purchaser may take over and prosecute the work to completion, by contract or otherwise. The Supplier and his surety shall be liable to the Purchaser for all excess cost sustained by the Purchaser by reason of such prosecution and completion. The

Purchaser may take possession of, and utilize in completing the work, all materials, equipment, tools, and plant on the site of the work.

GC.17 BEGINNING, PROGRESS, AND COMPLETION OF THE WORK. The time of completion is a basic consideration of this Contract. Unless otherwise specified in these contract documents or advised by written order of the Purchaser, the Supplier shall begin work within 10 days after the date of contract. The work shall be prosecuted to completion in accordance with the specified schedule, subject to adjustment as provided in these contract documents.

A detailed construction schedule shall be prepared by the Supplier and submitted to the Purchaser for review. The schedule shall contain the various activities required to perform the work and the dates the activities will be started and completed in order to complete the work in accordance with the specified schedule requirements. The Supplier is responsible for determining the sequence and time estimates of the detailed construction activities. However, the Purchaser reserves the right to require the Supplier to modify any portion of the schedule the Purchaser determines to be impracticable or unreasonable; as required to coordinate the Supplier's activities with those of other suppliers, if any, engaged in work for the Purchaser on the site; to avoid undue interference with the Purchaser's operations; and to assure completion of the work by the date or dates stipulated. Upon acceptance by the Purchaser of the Supplier's detailed construction schedule, the Supplier will be responsible for maintaining such schedule.

If at any time the Supplier's work is behind schedule, he shall immediately put into effect definite procedures for getting the work back on schedule. The procedures shall be subject to review and modification by the Purchaser.

GC.18 HINDRANCES AND DELAYS. The Supplier expressly agrees that in undertaking to complete the work within the time specified, he has made allowances for all hindrances and delays which might usually be expected to occur in performing the work. No claims shall be made by the Supplier for such hindrances and delays.

If the Supplier experiences hindrances and delays which, in his opinion, are not usually to be expected in the performance of the work and which affect the performance of the work, he may request a change in the contract. Such hindrances and delays may include, but not be limited to, acts or failure to act by the Purchaser or other suppliers employed by the Purchaser, fires, floods, labor disputes, epidemics, or acts of God. Such hindrances and delays shall not include rain, snow, or other inclement weather. Claims by the Supplier for any change in the contract due to such hindrances and delays shall be made in accordance with the requirements of Article GC.22, CHANGES TO THE CONTRACT. The Supplier shall use all reasonable means to minimize the extent of the delay.

GC.19 SUSPENSION OF WORK. The Purchaser reserves the right to suspend and reinstate execution of the whole or any part of the work without invalidating the provisions of the contract.

Suspension or reinstatement of the work will be by written notice to the Supplier from the Purchaser.

Suspension of work shall not automatically entitle the Supplier to additional compensation or a change in the contract time; however, the Supplier will be reimbursed for real and unavoidable direct costs incurred by him as a result of such suspension and/or the contract will be extended as required to compensate for any delay due to such suspension. Claims by the Supplier for change of contract time or an adjustment of the contract price, due to work suspensions ordered by the Purchaser shall be made in accordance with the requirements of Article GC.22, CHANGES TO THE CONTRACT. The Supplier shall use all reasonable means to minimize the consequences of such suspension.

GC.20 CANCELLATION OF WORK. The Purchaser reserves the right to cancel the unshipped portion of the work by giving written notice to the Supplier. In the event of cancellation, the Purchaser will pay the Supplier reasonable and proper cancellation costs.

Cancellation of the work shall not constitute the basis for a claim for damages or loss of anticipated profits.

The Supplier shall, after consultation with the Purchaser, take all reasonable steps to minimize the costs related to cancellation. The Supplier shall provide the Purchaser with an accounting of costs claimed, including adequate supporting information, and the Purchaser may, at its expense, audit the claimed costs and supporting information.

GC.21 MODIFICATIONS. The Supplier shall modify the work whenever so ordered by the Purchaser and such modifications shall not affect the validity of the contract. Modifications may involve changes in the amount of the work to be performed or changes in the contract time for which appropriate changes to the contract will be made.

Contract changes due to modifications shall be made in accordance with the requirements of Article GC.22, CHANGES TO THE CONTRACT.

GC.22 CHANGES TO THE CONTRACT. The contract may be changed only by duly executed change orders issued by the Purchaser.

If, in the opinion of the Purchaser or the Supplier, any event or action by the other party justifies a change in the contract, either party shall initiate with the other party, within 5 days after such event or action, a request for a change to the contract. All documentation required to substantiate the proposed change shall be submitted within a minimum reasonable time after initiating the request for change. Upon the parties reaching agreement regarding the proposed change, the Purchaser will issue a written change order therefor.

Notwithstanding the foregoing provisions requiring duly authorized change orders, in the event agreement has been reached between authorized representatives of the parties regarding the change in the contract pending processing of such change order, the Supplier shall proceed with the work on the basis of written interim authorization from the Purchaser.

If the Supplier claims that any instruction, request, drawing, specifications, or other directive or action of the Purchaser or the Engineer constitutes a change in the contract, but has not been authorized as such by a change order in writing by the Purchaser, the Supplier shall immediately request a written interim authorization and proceed without delay to perform the work in accordance with such authorization. The Supplier shall provide written notice of the claim or dispute to the Engineer and the Purchaser within 5 days of the request for interim authorization. The Supplier's failure to give said written notice within the 5 day period shall constitute a waiver and relinquishment of any such claim or dispute. The Purchaser's written interim authorization shall not constitute approval of the claim for increased or decreased work, but shall be a condition precedent to the Supplier's right to receive payment for such work and to the Supplier's right to prosecute or maintain any proceeding to recover for such work.

GC.22.1 Contract Price Changes. The contract price may be changed due to modifications which involve extra work or decreased work; or due to work suspensions, hindrances, and delays over which the Supplier has no control. Claims for changes in the contract price shall conform to the requirements specified herein.

GC.22.1.1 Increased Price. If a change in the contract is required due to work suspensions or hindrances and delays, the contract price will be increased according to agreed lump sums, agreed acceleration costs, or other demonstrable costs submitted by the Supplier and substantiated to the satisfaction of the Purchaser.

If a change in the contract price is required due to a modification which increases the amount of the work, and the added work or any part thereof is of a type and character which can properly and fairly be classified under one or more unit price items of the contract, then the contract price will be increased according to the amount actually done and at the applicable unit price. Otherwise, such work shall be paid for as herein-after provided.

Contract price changes for modifications involving extra work will be based on agreed lump sums or on agreed unit prices whenever the Purchaser and the Supplier agree upon such prices before the extra work is started; otherwise, payments for extra work will be based on actual direct cost plus the specified percentage allowance.

For the purpose of determining whether proposed extra work will be authorized, or for determining the payment method for extra work, the Supplier shall submit to the Engineer, upon request, a detailed cost estimate for proposed extra work. The estimate shall indicate itemized quantities and charges for all elements of direct cost. Charges for the Supplier's and subsupplier's extra profit, extra general superintendence, extra field office expense, and extra overheads shall be indicated as a percentage addition to the total estimated direct cost. Unless otherwise agreed upon by the Supplier and the Purchaser, such percentage additions shall be 15 percent for the extra work performed by the Supplier's own forces or 20 percent for extra work performed by a subsupplier.

When payment for extra work is based on actual direct cost, the Supplier will be paid the actual direct cost plus an allowance of 15 percent if the extra work is performed by the Supplier's own forces or 20 percent if the extra work is performed by a subsupplier. The allowance will be paid as full compensation for the Supplier's and subsupplier's extra profit, extra general superintendence, extra field office expense, extra overheads, and all other elements of extra cost not defined herein as actual direct cost.

The actual direct cost shall include only those extra costs for labor and material expended in direct performance of the extra work and may include the following.

a. The actual payroll cost of all workmen such as laborers, mechanics, craftsmen, and foremen.

b. The Supplier's or subsupplier's net cost for materials and supplies.

c. The rental charge for vehicles and construction equipment.

d. The transportation charges for equipment.

e. The charges for extra power, fuel, lubricants, water, and special services.

f. The charges for extra payroll taxes, bond premiums, and insurance premiums.

The form in which actual direct cost records are kept, the construction methods, and the type and quantity of equipment used shall be acceptable to the Engineer.

Construction equipment which the Supplier has on the jobsite and which is of a type and size suitable for use in performing the extra work shall be used. The hourly rental charges for equipment shall not exceed 1/2 percent of the latest applicable monthly rental rates as published by Dataquest Incorporated in its "Rental Rate Blue Book" and shall apply to only the actual time the equipment is used in performing the extra work.

When extra work requires the use of equipment which the Supplier does not have on the jobsite, the Supplier shall obtain the concurrence of the Engineer before renting or otherwise acquiring additional equipment. The rental charges for the additional equipment shall not exceed the latest applicable "Rental Rate Blue Book" published rental rates.

GC.22.1.2 Decreased Price. If a change in the contract price is required due to a modification which decreases the amount of work, such decrease shall not constitute the basis for a claim for damages or anticipated profits on work affected by such decrease. Where the value of omitted work is not covered by applicable unit prices, the Engineer shall determine, on an equitable basis, the amount of (a) credit due the Purchaser for contract work deleted as a result of an authorized change, (b) allowance to the Supplier for any actual loss incurred in connection with the purchase, delivery, and subsequent disposal of materials or equipment required for use on the work as planned and which could not be used in any part

of the work as actually built, and (c) any other adjustment of the contract amount where the method to be used in making such adjustment is not clearly defined in the contract documents.

Unless otherwise agreed upon by the Purchaser and the Supplier, the credit due the Purchaser for reductions in the amount of work to be done shall be the estimated direct cost of the deleted work plus an overhead allowance of the following.

10 percent of the estimated direct cost if the work was to have been done by the Supplier's own forces, or

15 percent of the estimated direct cost if the work was to have been done by a subsupplier.

Direct cost referred to above shall include the category of costs listed as actual direct costs, Items (a) to (f) inclusive of the article entitled Increased Price.

GC.22.2 Contract Time Changes. The contract time may be changed due to work modifications, hindrances and delays, and work suspensions over which the Supplier has no control.

Contract time will not be changed for delays caused by unfavorable weather or unsuitable ground conditions normally incident to the work, inadequate construction force, failure to place timely orders for equipment and materials, or other causes within the control of the Supplier.

GC.23 STEP DISPUTE RESOLUTION In the event of any controversy, claim or dispute between the Parties arising out of or relating to this Agreement, including its enforcement, such controversy, claim or dispute, including disputes regarded as such by only one of the Parties, the Parties shall negotiate in good faith to resolve such dispute, including third party mediation, if the Parties so agree.

If no settlement is achieved, either Party may pursue a claim in a federal or state court with competent jurisdiction.

GC.24 LAWS AND REGULATIONS. The Supplier shall observe and comply with all ordinances, laws, and regulations, and shall protect and indemnify the Purchaser and the Purchaser's officers and agents, including the Engineer, against any claim or liability arising from or based on any violation of the same.

GC.25 TAXES, PERMITS, AND LICENSES. The Supplier shall pay all sales, use, and other taxes that are lawfully assessed against the Purchaser or Supplier in connection with the work and shall obtain and pay for all required licenses, permits, and inspections.

The Supplier will be compensated for any increase in tax rates, license fees, and permit fees or any new taxes, licenses, or permits imposed after the date of the Proposal; provided, however, that this provision shall be limited to sales, use, and excise taxes assessed against the completed work and to licenses and permits required specifically for the proposed work.

GC.26 PATENTS. Royalties and fees for patents covering materials, articles, apparatus, devices, equipment, or processes used in the work shall be included in the contract amount. The Supplier shall satisfy all demands that may be made at any time for such royalties or fees and he shall be liable for any damages or claims for patent infringements. The Supplier shall, at his own cost and expense, defend all suits or proceedings that may be instituted against the Purchaser for alleged infringement of any patents involved in the work and, in case of an award of damages, the Supplier shall pay such award. Final payment to the Supplier by the Purchaser will not be made while any such suit or claim remains unsettled.

GC.27 MATERIALS AND EQUIPMENT. Unless specifically provided otherwise in each case, all materials and equipment furnished for permanent installation in the work shall conform to applicable standard specifications and shall be new, unused, and undamaged when installed or otherwise incorporated in the work. No such material or equipment shall be used by the Supplier for any purpose other than that intended or specified, unless such use is specifically authorized by the Purchaser in each case.

All required tests in connection with acceptance of source of materials shall be made at the Supplier's expense by a properly equipped laboratory of established reputation whose work and testing facilities are acceptable to the Purchaser. Any change in origin or method of preparation or manufacture of a material being routinely tested will require new tests. Reports of all tests shall be furnished to the Engineer or Purchaser in as many copies as required.

GC.28 WARRANTY. The Supplier guarantees that the work herein contracted will be as specified and will be free from defects in design, workmanship, and materials. Supplier does not guarantee or warrant parts subject to normal wear and tear during operation. If within the warranty period the work fails to meet the provisions of this warranty, the Supplier shall promptly correct any defects, including nonconformance with the contract documents by adjustment, repair, or replacement of all defective parts or materials at the Supplier's option and expense, after consulting with the Purchaser on the proposed remedy plans.

Except as otherwise prescribed by the terms of any special warranties required by the contract documents, the warranty period shall begin from the date of equipment commissioning and run for a period of 36 months.

The cost of all materials, parts, labor, transportation, supervision, special tools, and supplies required for replacement or repair of parts and for correction of defects shall be paid by the Supplier or by the surety.

This warranty shall be extended to cover all repairs and replacements furnished under the warranty and the period of the warranty for each such repair or replacement shall be 12

months after correction of the defect except as otherwise prescribed by the terms of any special warranties required by the contract documents.

The Supplier will be given an opportunity to confirm the existence of the defect, but he shall not delay the correction while making such determination.

If within 10 days after the Purchaser has notified the Supplier of a defect, failure, or abnormality in the work, the Supplier has not started to make the necessary repairs or adjustments, the Purchaser is hereby authorized to make the repairs or adjustments or to order the work to be done by a third party; the cost of the work to be paid by the Supplier.

In the event of an emergency where, in the judgment of the Purchaser, delay would cause serious loss or damage, repairs or adjustments may be made by the Purchaser or a third party chosen by the Purchaser without advance notice to the Supplier and the cost of the work shall be paid by the Supplier or by the surety.

Supplier makes no other representations or warranties of any other kind, express or implied, by fact or by law, other than those contained in these General Conditions. All warranties other than those specifically set forth herein are expressly disclaimed except those warranties of the manufacturers of the supplies furnished to Supplier by the manufacturer(s).

GC 29 SUPPLIER'S INSURANCE COVERAGE. The Supplier shall not commence work under this Contract until Supplier has obtained all the insurance required under this article. Furthermore, the Supplier shall not allow any sub-supplier to commence work under this Contract until the sub-supplier has obtained the same insurance as is required of the Supplier. The sub-supplier alone shall be responsible for the sufficiency of its own insurance program.

GC.29.1 Certificates of Insurance. Certificates of Insurance acceptable to the City shall be filed with the City prior to commencement of the work. These Certificates shall contain a provision that coverages afforded under the policies will not be canceled, or materially altered, until at least 30 days prior written notice has been given to the City. All insurance carried shall conform to the relevant provisions of the respective Project Documents and be with insurance companies which are rated "A, X" or better by Best's Insurance Guide, or other insurance companies of recognized responsibility satisfactory to the City.

GC.29.2 Additional Insureds. Insurance coverages furnished under this Contract, with the exception of Workers' Compensation and Employer's Liability, shall include the City of Hastings and their partners, directors, officers, agents, and employees as Additional Insureds on a primary and noncontributory basis, and shall include Products and completed operations with respect to the activities of the Supplier and shall be maintained for the full duration of the project including for a period after completion to include the statute of repose.

Notwithstanding any other provision of these policies, the insurance afforded shall apply separately to each insured, with respect to any claim, suit, or judgment made or brought by or for any other insured, as though a separate policy had been issued to each, except the

insurer's liability shall not be increased beyond the amount or amounts for which the insurer would have been liable had only one insured been named.

The City shall not by reason of their inclusion under these policies incur liability to the insurance carrier for payment of premium for these policies.

GC.29.3 Waiver Of Subrogation. The Supplier and their sub-supplier shall require their insurance carriers, with respect to all insurance policies, to waive all rights of subrogation against the City their partners, directors, officers, agents, and employees.

GC.29.4 Workers' Compensation And Employer's Liability Insurance. The Supplier shall procure, and shall maintain during the life of this Contract, Workers' Compensation Insurance as required by workers' compensation laws of the State of Nebraska and also of the state in which the sub-supplier is domiciled.

The Supplier shall also be protected against claims for injury, disease, or death of employees which, for any reason, may not fall within the provisions of a workers' compensation law. The Employer's Liability Insurance shall contain the following limits of liability:

Bodily Injury by Accident	$500,000 each accident
Bodily Injury by Disease	$500,000 each employee
Bodily Injury by Disease	$500,000 policy limit

GC.29.5 General Liability Insurance. This insurance shall be written per project on an "occurrence" policy form, including coverage for premises/operations, products/completed operations, broad form property damage, blanket contractual liability, independent supplier's and personal injury, with no exclusions for explosion, sudden and accidental pollution or an absolute or total pollution exclusion, collapse and underground perils. The commercial general liability policy shall also include a severability of interest clause and a cross liability clause in the event more than one entity is "named insured" under the liability policy. If applicable, this policy shall also be endorsed to include railroad protective with limits no less than replacement cost of the value of any real property covered under any rail agreement entered into by the City. If work is being done near a railroad track, the 50' railroad right of way exclusion must be deleted.

Limits of Insurance shall be as follows:

Each Occurrence Limit	$1,000,000
Products/Completed Operations	$2,000,000
General Aggregate Limit	$2,000,000
Personal and Advertising Injury	$1,000,000

GC.29.6 Pollution Liability – (If Applicable).

Limits of at least: $1,000,000 per occurrence; $1,000,000 aggregate

If Supplier or its Sub-subsupplier's work includes but not limited to remediating, handling, processing or disposing of hazardous material including but not limited to asbestos

containing materials, silica, lead, PCBs, contaminated soil, etc, coverage shall be provided for bodily injury, property damage and clean-up costs resulting for pollution conditions.

GC.29.7 Riggers Liability – (If applicable). Should work involve the moving, lifting, lowering, rigging or hoisting of property or equipment Supplier shall carry Rigger's Liability Insurance to insure against physical loss or damage to the property or equipment on a Replacement Cost Basis

GC.29.8 Automobile Liability Insurance. This insurance shall be written under a Business Auto Policy and shall protect the Supplier and Additional Insureds against claims arising from injuries to members of the public or damage to property of others arising from the use of automobiles whether such automobiles are owned, non-owned, or hired. Automobile insurance shall include Motor Carrier Endorsement Act MCS 90 and transportation pollution coverage if applicable. If work is being done near a railroad track, the 50' railroad right of way exclusion must be deleted.

Limit of Liability $1,000,000 each accident

GC.29.9 Umbrella Liability Policy. This insurance shall protect the Supplier and the Additional Insureds against all claims in excess of the limits provided under the employer's liability, automobile liability, and general liability policies. The liability limits of the umbrella liability policy shall be not less than $5,000,000 per occurrence. This policy shall be an "occurrence" type policy. However, City reserves the right to require higher limits with respect to each project.

GC.29.10 Professional Liability (Applicable for suppliers providing or is responsible for providing design/engineering/surveying services/or consulting services):

Limits of at least: $1,000,000 per occurrence; $1,000,000 aggregate

Policy shall provide for a retroactive date prior to the starting date of services for which this agreement applies. Policy shall not exclude bodily injury, property damage, or pollution liability. Coverage shall remain in force for a minimum of 3 years following substantial completion of construction through either policy renewal or the purchase of an Extended Reporting Provision. Supplier agrees to waive its rights of recovery. Subsupplier's insurer shall endorse the policy to waive subrogation against Owner and their respective agents, officers, directors and employees.

GC.29.11 Transportation Insurance. Supplier shall purchase inland marine coverage at the expense of Supplier on all equipment and materials, where City has an insurable interest. Insurance shall protect for Supplier and City from physical loss of equipment while loading, unloading, in transit to jobsite, and until equipment or materials have been installed or received by City.

GC.29.12 Proof of Carriage of Insurance. Satisfactory certificates of insurance shall be filed with the City prior to starting any construction work on this contract. The certificates shall state that thirty (30) days written notice shall be given to the City before any policy covered thereby is changed or canceled.

GC.29.13 Property Insurance A.K.A. Builder's Risk. Unless otherwise provided, the SUPPLIER shall purchase and maintain property insurance, a.k.a. builder's risk insurance, on the building construction project in amount thereto for entire work at site on a replacement cost basis. Such property insurance shall be maintained, unless otherwise provided in contract documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final acceptance of work by OWNERS. Insurance shall include interests of OWNERS, SUPPLIER, SUBSUPPLIER, and sub-subsuppliers in work. This property insurance covering work will have deductible for each occurrence, which will be responsibility of SUPPLIER.

Before an exposure to loss may occur, the SUPPLIER will provide a copy of the property insurance policy or evidence of property insurance, upon request that includes all property insurance coverages. The SUPPLIER will not cancel or allow such policy to expire without written notice to the other.

Waivers of Subrogation: OWNER and SUPPLIER and all SUBSUPPLIERS waive all rights against
(1) each other and any of their subsuppliers, sub-subsuppliers, agents and employees, each of the other, and (2) OWNER'S or SUPPLIER'S consultants, separate suppliers, if any, and any of their subsuppliers, sub-subsuppliers, agents and employees, for damages caused by fire or other perils to extent covered by property insurance obtained, or other property insurance applicable to work, except such rights as they have to proceeds of such insurance held by OWNER and/or SUPPLIER as fiduciary. OWNER and/or SUPPLIER, as appropriate, shall require of OWNER'S and/or SUPPLIER'S consultants, separate suppliers, if any, and subsuppliers, sub-subsuppliers, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. Policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay insurance premium directly or indirectly and whether or not person or entity had an insurable interest in property damaged.

GC.30 Indemnification. To the fullest extent permitted by laws and regulations, the Supplier shall defend, indemnify, and hold harmless the City, their officers, directors, partners, consultants, agents, and employees from and against all claims, damages, losses, and expenses, direct, indirect, or consequential (including but not limited to fees and charges of engineers, architects, attorneys, and other professionals and court and arbitration costs) arising out of or resulting from the performance of the work by the Supplier, any sub-supplier, any person or organization directly or indirectly employed by any of them to perform or furnish any of the work, or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder or arises by or is imposed by law and regulations regardless of the negligence of any such party.

In any and all claims against the City, or of any of their officers, directors, partners, consultants, agents, or employees by any employee of the Supplier, any sub-supplier, any person or organization directly or indirectly employed by any of them to perform or furnish

any of the work or anyone for whose acts any of them may be liable, this indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for the Supplier or any such sub-supplier or other person or organization under workers' or workmen's compensation acts, disability benefit acts, or other employee benefit acts, nor shall this indemnification obligation be limited in any way by any limitation on the amount or type of insurance coverage provided by the City, the Supplier, or any of their sub-suppliers.

GC.31 RELEASE OF LIABILITY. Acceptance by the Supplier of the last payment shall be a release to the Purchaser and every officer and agent thereof, from all claims and liability hereunder for anything done or furnished for, or relating to the work, or for any act or neglect of the Purchaser or of any person relating to or affecting the work.

GC.32 CLAIMS FOR LABOR AND MATERIALS. The Supplier shall indemnify and save harmless the Purchaser from all claims for labor and materials furnished under this Contract. When requested by the Purchaser, the Supplier shall submit satisfactory evidence that all persons, firms, or corporations who have done work or furnished materials under this Contract, for which the Purchaser may become legally liable, have been fully paid or satisfactorily secured. In case such evidence is not furnished or is not satisfactory, an amount will be retained from money due the Supplier which, in addition to any other sums that may be retained, will be sufficient, in the opinion of the Purchaser, to liquidate all such claims. Such sum will be retained until the claims as aforesaid are fully settled or satisfactorily secured.

Before final acceptance of the work by the Purchaser, the Supplier shall submit to the Engineer a notarized affidavit stating that all subsuppliers, vendors, persons, or firms who have furnished labor or materials for the work have been fully paid and that all taxes have been paid. If a performance bond has been executed, a statement from the surety shall also be submitted consenting to the making of the final payment.

GC.33 FINAL INSPECTION. When the work has been substantially completed and at a time mutually agreeable to the Purchaser and Supplier, the Purchaser will make a final inspection of the work as to the acceptability and completeness of the work.

GC.34 PAYMENTS. Payment schedule will be as follows:

- Upon delivery of Switchgear to PDC Shop 40% of contract amount
- Upon delivery of all Equipment/Materials to jobsite 50% of contract amount
- Upon Completion of Energization and Testing 10% of contract amount

The City will retain five percent (5%) of the total contract amount for all work completed.

Payment of the retainage will be made within forty (45) days after project is substantially complete, provided the Contractor submits a Letter of Credit for 125% of the uncompleted work.

GC.35 HAZARDOUS MATERIALS. As required under Federal Hazardous Communications Standards and certain state and local laws, the Supplier shall provide Material Safety Data Sheets covering all hazardous materials furnished under or otherwise associated with the work under this Contract. The Supplier shall provide the Purchaser with either copies of the applicable Material Safety Data Sheets or copies of a document certifying that no Material Safety Data Sheets are required under any federal, state, or local law, regulation, statute, or ordinance in effect at the jobsite.

Hazardous materials are defined in the applicable statue which may use the terminology "toxic substances" instead of "hazardous materials." The Supplier is responsible for determining if any substance or material furnished, used, applied, or stored under this Contract is within the provisions of any applicable statute.

If the work under this Contract includes onsite construction or erection, the Supplier shall provide written notice of the presence of hazardous materials to local fire, medical, and law enforcement agencies as required with a copy of such notice to the Purchaser.

The Supplier shall provide labeling of hazardous materials and training of employees in the safe usage of such materials as required under any applicable federal, state, or local law, regulation, statute, or ordinance.

GC.36 LIQUIDATED DAMAGES.

GC.36.1 General**.** Supplier's failure to meet the requirements identified in this Article GC.36 will cause Purchaser to incur harm that will be very difficult to ascertain with certainty. The Parties therefore agree the liquidated damages specified in this Article GC.36 represent a reasonable estimate of Purchaser's harm and are not intended as a penalty. The Purchaser and Supplier specifically agree the per business day amount to be assessed as liquidated damages is fair and reasonable and not excessive. The parties further agree that said per calendar day amount accurately reflect the anticipated loss and inconvenience to the public and lost revenue to or use by the Purchaser due to the project not being completed by the end of the project period or the end of the contract completion date.

Supplier's obligation to pay liquidated damages for breach of one specified requirement does not relieve Supplier of its obligation to pay liquidated damages for breach of another specified requirement. Supplier's payment of liquidated damages for breach of the specified requirement is Purchaser's sole and exclusive remedy with regard to Supplier's breach of that requirement, except for any other express remedies, with the exception of GC.36.6, stated in the Purchase Order. Seller’s maximum aggregate liability for all Liquidated Damages under Section GC.36.2 and GC.36.3 shall not exceed ten percent (10%) of the Contract price.

GC.36.2 Submittals. The submittals subject to liquidated damages for late delivery are listed in the Proposal sheets, titled "Schedule of Submittals and Applicable Liquidated Damages." To be considered complete, all documents comprising a submittal must be delivered to Purchaser and must be properly prepared and sufficient to allow Purchaser to

determine that the Work will meet the requirements of this Purchase Order. Liquidated damages will accrue for each failure to deliver a complete submittal beginning on the first calendar day after the submittal due date and continuing until that submittal is completed. Liquidated damages will be assessed for each failure at the rate of one thousand dollars ($1000) per business day, but shall be capped at five percent (5%) of the Contract price.

GC.36.3 Delivery of Equipment. Equipment subject to liquidated damages for late delivery are listed in the Proposal sheets. If all components comprising the item of equipment do not meet the Purchase Order requirements and are not free of damage or defects when delivered, liquidated damages will accrue for each failure as shown below.

Beginning on the first calendar day after the specified delivery date for each item of equipment and continuing until delivery of the item of equipment is completed delay liquidated damages will be assessed at the rate of three thousand dollars ($3000) per calendar day. Supplier will not be subject to liquidated damages for Purchaser's inability to accept delivery of equipment.

Liquidated Damages will be assessed at the rates listed above, but shall be capped at ten percent (10%) of the Contract price.

GC.37 SECURITY INSTRUMENTS

Supplier shall give Purchaser separate performance and payment bonds in the format of AIA Document 312 - 2010 Performance Bond and Payment Bond, each in the amount of the Purchase Order Price. Supplier shall submit the bonds to Purchaser by the due date specified in the article titled "Schedule of Submittals and Applicable Liquidated Damages." The bonding company must be licensed to bond in the state in which the Project is located and must be rated "A" or better by A.M. Best and included in the Department of the Treasury's Listing of Approved Sureties (Department Circular 570).

Supplier shall give Purchaser an irrevocable standby letter of credit in an amount equal to 10% and in a form acceptable to the Purchaser. The letter of credit must be issued by a U.S. commercial bank having a credit rating of at least "A" by S&P or "A2" by Moody's or be satisfactory to Purchaser. Supplier agrees to have the letter of credit confirmed by a US commercial bank acceptable to Purchaser if the letter of credit is issued by other than a US commercial bank. The letter of credit must be submitted to Purchaser prior to final payment and remain valid through the Guarantee Period.

GC.38 CONSEQUENTIAL DAMAGES

Except for Supplier's third party obligations arising out of or liability for breach of Articles GC.26 and/or GC.30, Purchaser and Supplier will not be liable to each other for loss of profits, loss of use, loss of contracts, or consequential damages arising out of this Contract. This Section will not relieve Supplier of any obligation under GC.36.

GC.39 LIMITATION OF LIABILITY

With the exception of (a) indemnification stated in Article GC.30 and (b) the insurance coverages and limits set forth in Article GC.29, Supplier's total limit of liability on any claim, whether for breach of Contract, breach of warranty, tort, negligence, strict liability, or any other legal theory, for any loss or damage arising out of or connected to, or resulting from this Contract, shall be limited to the purchase price to be paid by Purchaser.

GC.40 CONFIDENTIALITY
"Confidential Information" means the confidential or proprietary designs, know-how, processes, trade secrets, and other information owned or controlled by Purchaser, Engineer, or Supplier respectively. Supplier agrees to hold any Confidential Information received in the strictest confidence, shall only use the Confidential Information as necessary to perform The work. Purchaser agrees to hold any Confidential Information received in the strictest confidence and shall only use the confidential information as necessary for engineering, construction, start-up, commissioning, maintenance, or other purposes related to the project. Each party shall use the same degree of care as is used for its own information of similar importance, but no less than reasonable care.

GC.41 E-Verify The Supplier is required and hereby agrees to use a federal immigration verification system to determine the work eligibility status of new employees physically performing services within the State of Nebraska. A federal immigration verification system means the electronic verification of the work authorization program authorized by the Illegal Immigration Reform and Immigrant Responsibility Act of 1996, 8 U.S.C. 1324a, known as the E-Verify Program, or an equivalent federal program designated by the United States Department of Homeland Security or other federal agency authorized to verify the work eligibility status of a newly hired employee.

GC.42 Non-Discrimination Program Pursuant to the Title VI Non-Discrimination Program of the City of Hastings the Supplier agrees to comply with the provisions below for the CITY's Title VI Non-discrimination Program, if applicable.

During the performance of this contract, the Supplier, for itself, its assignees and successors in interest (hereinafter referred to as the "Supplier") agrees as follows:

(1) Compliance with Regulations: The Supplier shall comply with the Regulation relative to nondiscrimination in Federally-assisted programs of the Department of Transportation (hereinafter, "DOT") Title 49, Code of Federal Regulations, Part 21, and the Federal Highway Administration (hereinafter "FHWA") Title 23, Code of Federal Regulations, Part 200 as they may be amended from time to time, (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.

(2) Nondiscrimination: The Supplier, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, or national origin, sex, age, and disability/handicap in the selection and retention of subsuppliers, including procurements of materials and leases of equipment. The Supplier shall not participate either directly or indirectly in the discrimination prohibited by 49 CFR, section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations.

(3) Solicitations for Subsuppliers, Including Procurements of Materials and Equipment: In all solicitations either by competitive bidding or negotiation made by the Supplier for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subsupplier or supplier shall be notified by the Supplier of the Supplier's obligations under this contract and the Regulations relative to

nondiscrimination on the grounds of race, color, or national origin, sex, age, and disability/handicap.

(4) Information and Reports: The Supplier shall provide all information and reports required by the Regulations or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the (Recipient) or the FHWA to be pertinent to ascertain compliance with such Regulations, orders and instructions. Where any information required of a Supplier is in the exclusive possession of another who fails or refuses to furnish this information the Supplier shall so certify to the (Recipient), or the FHWA as appropriate, and shall set forth what efforts it has made to obtain the information.

(5) Sanctions for Noncompliance: In the event of the supplier's noncompliance with the nondiscrimination provisions of this contract, the (Recipient) shall impose such contract sanctions as it or the FHWA may determine to be appropriate, including, but not limited to:

(a.) withholding of payments to the supplier under the contract until the Supplier complies, and/or
(b.) cancellation, termination or suspension of the contract, in whole or in part.

(6) Incorporation of Provisions: The Supplier shall include the provisions of paragraphs (1) through (6) in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto.

The Supplier shall take such action with respect to any subcontract or procurement as the (Recipient) or the FHWA may direct as a means of enforcing such provisions including sanctions for non-compliance: Provided, however, that, in the event a Supplier becomes involved in, or is threatened with, litigation with a subsupplier or supplier as a result of such direction, the supplier may request the (Recipient) to enter into such litigation to protect the interests of the (Recipient), and, in addition, the Supplier may request the United States to enter into such litigation to protect the interests of the United States.

Hastings Utilities

PDC and Switchgear

425278.63.3600

Issued for Bid
04/06/2026

BLACK & VEATCH

Table of Contents

01100 - Technical Scope and Performance Requirements

01100.1 Technical Scope of Work

The work under these specifications shall include furnishing the following:

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 Nebraska. 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 Nebraska and shall be submitted to the Purchaser.

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.

01100.1.1 Substation site

The total scope of this Purchase Order is for equipment to be used at and delivered at DHPC project site, located in Hastings, NE. It consists of a PDC enclosure with integrated switchgear and all the major scope items in the table below.

The following shall be part of the Purchase Order:

Major Scope Items		
Item	**Description**	**DHPC**
1.	Furnish Power Distribution Center (PDC) with HVAC	✓
2.	Furnish/install 15kV Switchgear (to be installed within PDC)	✓
3.	Furnish/install 120V/240V AC Power Panel (minimum 42 position)	✓
4.	Furnish/install DC Power Panel with ground detection system (minimum 20 two pole breakers, install all breakers in panel)	✓
5.	Install 1 relay panel(shipped to supplier by others)	✓
6.	Install cable terminal block cabinet (shipped to supplier by others)	✓
7.	Furnish/install all panel-to-panel wiring for relay panels, RTU panel, terminal block cabinet and interface wiring from switchgear in accordance with attached Cable Pull and Termination Schedule	✓

Miscellaneous Materials Scope			
Item	**Description**	**Supplier (applies to)**	**Purchaser (applies to)**
1.	All instrument, power, and control wiring and raceway 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	
2.	Electrical and control wiring to connect furnished equipment terminal points to the plant electrical and control systems.		All technical sections
3.	Motor controls and starters for furnished equipment.	All technical sections	
4.	Ground pads and lugs for furnished equipment, skids and structures (minimum of two per skid or structure).	All technical sections	
5.	Permanently attached identification tags for all equipment and devices provided.	All technical sections	
6.	Shop applied coating including but not limited to finish paint on all shop fabricated equipment, ancillary skids, material, structures and ancillary skid systems.	All technical sections	
7.	Finish painting/coating	All technical sections	
8.	Touchup paint for field	All technical sections	
9.	Lifting eyes and lugs for offloading and setting equipment.	All technical sections	
10.	Permanent foundations/tie-down pads		All technical sections
11.	Leveling blocks, soleplates, thrust blocks, matching blocks, and shims.		All technical sections
12.	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, testing, packaging, and delivery of all equipment.	All technical sections	
2.	Shop drawing submittals.	All technical sections	
3.	Shop testing.	All technical sections	

Miscellaneous Engineering/Services Scope			
Item	**Description**	**Supplier (applies to)**	**Purchaser (applies to)**
4.	Shop material inspection and testing.	All technical sections	
5.	Field technical advisor service time.	All technical sections	
6.	Training Manuals including detailed training objectives, equipment overview, major component and support system description, controls, principle of operation, and testing materials.	All technical sections	
7.	Operating personnel for site inspection, startup, and testing.	All technical sections	
8.	Receiving, unloading, storing, and field erection of all equipment.		All technical sections

01100.2 Drawings and 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

The following listed attachments shall be part of the Purchase Order.

Drawing No. or Other Designation	Rev. No.	Title
425278-E9200	A	DON HENRY POWER CENTER CONTROL BUILDING PLAN VIEW
425278- E9453 ONE LINE	C	DON HENRY POWER CENTER 13.8KV SWITCHGEAR RELAY & METERING DIAGRAM
Additional		Drawings listed in individual technical specification sections
		Cable Pull & Termination Estimate

13125 - Pre-Manufactured Metal Equipment Building

13125.1 General

13125.1.1 Scope of Supply

Scope of supply shall include furnishing Pre-Manufactured Metal Equipment Building(s) and appurtenances as specified herein and in the 13125 Pre-Manufactured Metal Equipment Building Specification Sheet included at the end of this section.

13125.1.2 Items Furnished by Others and Interfaces

Items furnished by others and not in this scope of supply include the following:

Foundation
Relay Panels
Terminal Block Cabinet
Stairs and platforming

13125.1.3 Performance and Design Requirements

Performance and design requirements for the equipment to be furnished under these specifications are defined herein.

13125.1.4 Codes and Standards

Work performed under these specifications shall be done in accordance with the following codes and standards. Unless otherwise specified, the applicable governing edition and addenda to be used for all references to codes or standards specified herein shall be interpreted to be the jurisdictionally approved edition and addenda. If a code or standard is not jurisdictionally mandated, then the current edition and addenda in effect at the date of this document shall apply. These references shall govern the work except where they conflict with the Purchaser's specifications. In case of conflict, the latter shall govern to the extent of such difference:

Work	In Accordance With
Pre-Manufactured Metal Equipment Building	The latest revision of the applicable ANSI, AISC, NEMA, IEEE, IBC, MBMA, NFPA, SSPC, OSHA, AISI, ICEA, and ASTM
Pre-Manufactured Metal Equipment Building	The latest revision of the applicable IEC, VDE, and DIN standards

The building supplier shall check all state and local building codes where the building will be installed. All systems and components for the building usage, structure, electrical, HVAC, and fire protection shall be designed and installed to meet applicable codes. Drawings, calculations, and documents shall be certified by registered professionals. Some states and jurisdictions may require inspections and testing. This shall be coordinated and completed by the building supplier.

13125.1.5 Materials

Not used.

13125.1.6 Acceptable Manufacturers of Components

For the following components, the manufacturers listed below provide examples of the quality of workmanship required by these specifications. If the Supplier wants to propose a nonlisted manufacturer that is considered to provide an equivalent level of quality, this manufacturer must be identified and supporting testimony provided. Acceptance of the manufacturer as a substitute is at the discretion of the Purchaser:

Component	Manufacturer
HVAC Units	Mitsubishi Electric
Fire Extinguishers	Potter Romer 3420 (carbon dioxide, 20lbs, 10-B : C or Purchaser approved equal)

13125.1.7 Test Requirements

The following testing shall be conducted in accordance with the specified source. This testing is to be considered part of the defined Scope of Work, and all associated costs are the responsibility of the Supplier unless specifically identified as a Bid Option or Purchaser-conducted. Tests identified as an option are to be priced separately. If identified as Purchaser-conducted, costs for the initial test will be the responsibility of the Purchaser. However, the Supplier is responsible for all costs associated with correcting deficiencies and retesting in the event of a test failure:

Tests	In Accordance With	Conducted By
Switchgear bus bolt torque across shipping splits	Manufacturer recommendations	Supplier

13125.1.8 Technical Attachments

The following attachments accompany these specifications in either paper or electronic format. The information contained in these documents constitutes requirements under the defined Scope of Work:

Document Number/Description	Title	Revision
425278-E9200	DON HENRY POWER CENTER CONTROL BUILDING PLAN VIEW	A

13125.1.9 Supplemental Specifications

Technical supplemental specifications that are applicable to the work covered under this technical specification section are identified and included in Section 21000.

13125.2 Products

13125.2.1 General Description

This technical specification is intended for procurement of the Pre-Manufactured Metal Equipment Building(s). Each Pre-Manufactured Metal Equipment Building shall consist of a coordinated group of electrical and auxiliary equipment as specified in Articles 13125.1.1 to 13125.1.8 within an all-weather enclosure. Each building shall be suitable for shipment to the project site or other designated location. Each building shall be a predesigned, factory assembled and tested unit, so that the field work at the installation is minimized.

13125.2.2 Design Criteria

The Pre-Manufactured Metal Equipment Building shall be designed to meet or exceed the meteorological criteria defined in Technical Supplemental D100.

13125.2.2.1 Base. Each base shall consist of structural steel shapes welded at joints and arranged to not interfere with power and control cables entering the electrical equipment cubicles from below. Two removable lifting lugs shall be provided on each long side for lifting a fully outfitted structure. Lifting lugs shall be attached to floor channels with threaded holes or welded nuts so that they can be removed and attached from the outside of the structure. Deflection during lifting shall not exceed 0.25 inch per 10 feet.

Normal lifting for transportation and installation shall be by means of a crane making a single point lift using suitable rigging.

The base shall be designed to support the structure and equipment on a concrete pad. Concrete slab, crushed rock, or dressed grade foundation may be utilized.

13125.2.2.2 Floor. The floor system (floor plate and intermediate support members attached to the base) shall be designed to support the loads specified. The floor shall be a minimum of 1/4 inch steel plate welded to the perimeter members and cross members of the base. The floor loading shall be rated not less than the requirements listed in the design criteria. The perimeter of the base frame shall be fully closed after installation to prevent entry by animals.

When bottom access is required for electrical equipment, floor cutouts with gasketed removable 12 gauge (minimum 3.25 mm) nonferrous metal cover plates shall be provided.

Each electrical cubicle and each panel that are designed for circuits entering from below shall be provided with a bolted and gasketed nonferrous metal gland plate cover for the appropriate opening under the equipment.

13125.2.2.3 Frame. Framing consisting of structural steel shapes (formed or rolled) shall be used to frame the walls (at floor and ceiling), doors, and roof. Intermediate framing shall be provided as required by the manufacturer's design to meet the conditions specified.

13125.2.2.4 Exterior Wall and Roof Panels. Wall and roof panels shall consist of interlocking steel or aluminum panels. Wall panels shall be single piece from floor to roof and roof panels shall be single piece from wall to ridge or wall to wall if no ridge is provided. Exterior seams shall be sealed with 100 percent, 50 year life silicone sealant (color to match adjoining surface). The inherent design of the seams shall be to keep falling and blowing water out of the building.

13125.2.2.5 Interior Wall and Roof Panels. The interior sides of the walls and roof shall be provided with interlocking panels designed to support wall mounted panels and devices and to provide a finished appearance.

13125.2.2.6 Doors. Two entry doors shall be provided on each structure. The main entry door shall be a single door 36 inches by 84 inches nominal. The opposite end shall be a double door with a removable transom to allow removal and installation of equipment that is 96 inches tall. Panic hardware (aluminum or stainless steel) shall be provided on both doors. Drip shields, weatherstripping, thresholds, astragals, heavy-duty closures, and doorstops shall be provided for both doors.

Building and switchgear shall be coordinated to allow access to the rear of each section of medium voltage switchgear from outside. Any openings to allow this access shall be gasketed or otherwise sealed against the weather. Infrared inspection ports specified in 16101 shall be accessible.

Each building containing any electrical and auxiliary equipment above 600 volts shall be equipped with signs made of weatherproof, UV resistant materials stating "DANGER HIGH VOLTAGE" on all exterior doors (access and entry).

All doors shall open outward and have a minimum swing of 105 degrees.

13125.2.2.7 Platforms and Stairs. Stairs and platforms will be provided by others.

13125.2.2.8 Weatherproofing. All building joints shall be designed to minimize the loss of conditioned or pressurized air and to prevent entry of rain, sleet, snow, or moisture. All wall seams and areas where metal-to-metal contact occurs shall be liberally caulked with butyl rubber caulking. All roof seams shall be sealed with ethylene propylene copolymer tape to ensure water resistance.

13125.2.2.9 Coatings. A complete description of the proposed coating materials and methods (interior and exterior) shall be submitted with the proposal. Data shall include minimum material composition, minimum thickness per coat, number of coats, and surface preparation information:

Interior panels--Wall and ceiling, one coat primer, 3 mils.

Exterior panels--Wall and roof, tie coat high build intermediate epoxy, top coat high build, high gloss polyurethane.

Steel--Steel members and plate that are not galvanized shall have two coats of primer. Exposed steel shall have the same finish as exterior panels. The steel visible from the underneath side of the building shall be coated with black mastic. The top side of the floor plate shall be coated with two applications of skid-resistant alkyd enamel.

Entry doors--Entry doors shall be primed with manufacturer's standard coating and finished with two coats of the same type and color as the wall panels.

Battery area--Acid-resistant paint shall be applied on the floor and wall immediately adjacent to the battery.

13125.2.2.10 Fire Extinguisher. The required quantity and location of the fire extinguisher(s) shall be determined by the Supplier in accordance with the latest revision of NFPA 10 standard. The fire extinguisher(s) shall be securely mounted on the wall and shall be secured for shipping.

13125.2.2.11 HVAC. The HVAC shall be designed to maintain the temperature range of 60 to 80 degrees F through the range of ambient temperature for the site. The Supplier shall design, procure, install, test, and balance complete HVAC systems prior to delivery of the enclosure to the site. HVAC systems shall include, but not be limited to, air conditioning equipment, heating equipment, pressurization equipment, ductwork and accessories, a complete control system, all instrumentation, instrument wiring, instrument tubing, diffusers and registers, dampers, smoke detectors, refrigerant piping, and condensate piping.

Air conditioning calculations, specifications, and drawings sealed by a registered professional engineer (licensed to practice in the state where the project is located) shall be submitted for approval in accordance with the date shown in the Schedule of Submittals. Air conditioning load calculations, heating load calculations, and pressure drop calculations shall also be submitted for approval in accordance with the date shown in the Schedule of Submittals. Pressure drop calculations shall include midlife conditions for the filters and a 15 percent contingency of the external system static pressure. Air conditioning calculations shall include a 10 percent margin on capacity and airflow. Heating calculations shall include a 15 percent margin on capacity. Air conditioning calculations shall include heat gains from electrical equipment, mechanical equipment, heat transmission, solar heat gains, lighting, people, miscellaneous equipment, and outside air. External heat gain/loss shall be calculated based on gain/loss through external building components such as walls, roofs, slabs, windows, and doors. Heat transfer coefficients (u-values) for building components shall allow for thermal bridging or an actual overall in-place u-value for the building construction system provided.

HVAC equipment shall be Mitsubishi mini-split with supplemental electric heaters and shall be sized and provided by the Supplier. HVAC equipment shall consist of self-contained wall mounted units complete with supply and return grilles, lockable circuit breakers or disconnect switches, manual thermostats, barometric fresh air dampers, and disposable air filters. The following controls shall be supplied: high-pressure control, low-pressure control, low ambient control, compressor anti-cycle relay, and alarm relay.

Location of the HVAC units shall be acceptable to the Purchaser.

13125.2.2.12 Power Supply. Purchaser will supply a 120/240 volt power feed to the DHPC PDC. No transformer and external disconnect switch is required at that location. The distribution panel main breaker shall serve as the incoming disconnect switch.

13125.2.2.13 Grounding. A 2/0 AWG bare copper ground conductor shall be routed around the inside perimeter near the ceiling. This conductor shall be connected to two external 2-hole ground pads (one at each end of the center). Each piece of electrical equipment in the center shall have its ground bus or enclosure (if no ground bus is present) connected to this 2/0 AWG conductor. Electrical switchgear shall be connected to this conductor (using 2/0 AWG stingers) in two places (one at each end of the ground bus).

13125.2.2.14 Power Distribution. A power distribution panel (single-phase, 3 wire) shall be provided as specified in section 16120 of these specifications. (A raceway system shall be provided for external connection of the specified power supply entering from below the center.)

13125.2.2.15 Lighting. Interior lighting shall be provided by LED industrial wrap-around fixtures at locations as shown on the layout drawing provided. The Supplier shall determine the fixture required to obtain the required output lumen value. A minimum horizontal level of 30 foot-candles at 30 inches above the floor shall be provided. A 3-way light switch shall be provided at each door.

Exterior lighting shall consist of a single industrial grade, wall mounted fixture (commonly known as a "wallpack") with a 50 watt equivalent LED fixture mounted above each entry door. Control shall be provided by an integral photoelectric device in each fixture. Each fixture shall be mounted beside rather than above the drip shield so as to prevent the shield from casting a shadow on the door.

Exterior floodlighting shall be provided by one industrial-grade LED floodlight with an integral photoelectric device. The fixture shall be mounted on the exterior wall facing the substation yard to provide general area illumination. The mounting height and aiming angle shall be as required to provide uniform lighting of the designated yard area without producing glare toward adjacent equipment or personnel areas.

Emergency lighting shall consist of one 2-lamp, self-contained, battery backup fixture. The fixture shall be provided with a sealed battery that will provide 90 minutes of rated light output after loss of normal power. A push-to-test button shall be provided for testing the system.

Power for lighting shall be derived from the building power source.

13125.2.2.16 Convenience Receptacles. Four industrial grade, grounded convenience quadplex GFCI receptacles shall be provided. One receptacle shall be mounted at each end of the Pre-Manufactured Metal Equipment Building and two spaced along the wall opposite the battery and switchgear. Power for convenience receptacles shall be derived from the building power source specified.

13125.2.2.17 Wiring. A 4 inch by 4 inch minimum size metal wireway with hinged cover shall be provided around each building perimeter at the junction of the walls and ceiling. This wireway shall contain all of the building wiring.

All building lighting and power wiring shall be in accordance with the Supplemental Specifications in Section 21000. All wiring shall be installed in the perimeter wireway, conduit, or other approved raceway in accordance with the applicable standards.

The ground bus of all electrical equipment within the building shall be connected to the building ground loop cable. The building ground cable shall be connected to the two ground pads on the building base.

13125.2.2.18 Battery Area. In addition to the air-conditioning and heating for the building, exhaust fan rough openings should be installed and covered. Exhaust fans are not to be installed. The proposal shall indicate the details of the HVAC system, including the exhaust fan rough openings.

The battery area floor and wall shall be coated with an acid resistant material appropriate for flooded battery cell sulfuric acid. The floor and wall coating shall be installed in accordance with the coating manufacturer's recommendations.

13125.2.2.19 Cable Segregation and Cable Management. Low voltage power cable, control cable, signal and communications cable shall be segregated to meet the requirements of the National Electric Code ("NEC") and the following. Where banks of cable tray are installed, the highest voltage trench in the bank shall be installed at the top and the lowest voltage tray at the bottom of the bank to maximize separation between voltage levels. The 24Vdc and analog instrumentation cables, thermocouple cables, RTD cables, and other similar low level signal cables shall be installed in cable trays and conduits designated for instrument circuits only. As a minimum, the definition of cable segregation for noise vulnerability level shall be as follows:

Susceptibility Segregation Level	Noise Induction Vulnerability Criteria
Level 1	High Susceptibility- Instrument and Control
Level 2	Medium Susceptibility- Low Voltage Power
Level 3	Low Susceptibility- Medium Voltage Power

The trench levels and segregation shall be as follows:

(a) Low Voltage Power (Level 2):
   a. Low voltage power cables (<600 V operating)
   b. 120 VAC and 125 VDC power cables, less than 50 Amps
   c. 120 VAC and 48 VDC Control cables if physically separated by a solid, fixed barrier.

(b) Control/Instrument (Level 1):
   a. Control cables (< 50 VDC operating)
   b. Includes low voltage power cables <120 VAC if physically separated by a solid fixed barrier.
   c. Electronics cables <50 VDC if physically separated by a solid fixed barrier.
   d. 120 VAC and 48 VDC control and indication circuits if permitted by the control system manufacturer. If not permitted, these shall be routed with level 2.

Fiber optic communications and network cables maybe run in any tray level provided they are physically separated by a solid fixed barrier or if the fiber optic cable is installed in inner duct for protection. Fiber optic cables installed in control/instrument trench may omit the barrier or inter duct, but should be evaluated for compatibility with the other cable constructions and insulation voltages.

Any communications cables that exit the building shall be routed in a dedicated 2.5-inch PVC conduit. This conduit shall be reserved exclusively for communications circuits and shall not contain power, control, or instrumentation cables. The conduit shall be installed to minimize electromagnetic interference and shall be bonded and sealed as required for environmental and security compliance.

All cable tray barrier materials shall be compatible with the tray material and design.

All cable trays, excluding instrumentation trays, shall be provided with external bare ground wire (1/0 minimum) bonded to the tray and connected to the enclosure ground bus at a pre-determined spacing not to exceed 50 feet.

Cable tray shall be aluminum or galvanized steel ladder type with tray covers for the top tray, where mechanical protection is necessary and where required for NERC-CIP compliance. All signal circuit

carrying tray shall be galvanized steel or aluminum solid bottom or ventilated trough trays with tray covers.

13125.2.3 Inspection

Component bills of material shall be checked for proper quantity, description, and part number. Physical dimensions shall be checked against approved drawings. The manufacturer shall have in place a system of recording, correcting, and verifying resolution of discrepancies discovered during the inspection process. Certified reports indicating satisfactory completion of all inspections shall be available upon request. Upon request, the equipment shall be made available for customer inspection prior to shipment.

13125.3 Execution

Not used.

13125 Pre-Manufactured Metal Equipment Building Specification Sheet

Pre-Manufactured Metal Equipment Building General Requirements	
Item	Switchgear PDC
Description	Switchgear enclosure
Standards for manufacturing and testing	ANSI/NEMA
Each Pre-Manufactured Metal Equipment Building shall consist of the following:	
Item	**Details**
Telephone equipment	No
Fire detection/suppression equipment	Wall-mounted portable fire extinguisher, Smoke Detector(s)
Space heater	By Supplier
Convenience receptacles	By Supplier (Qty 4 quadplex), with GFCI protection
Outdoor welding receptacles	No
Battery enclosures	Space within the enclosure
The following power supply will be furnished by the Purchaser for the Supplier's use:	
Voltage	**Details**
Single-phase, 120/240 VAC	By Supplier, with 42 pole panel
125 VDC	By Supplier, see 16120
HVAC	Redundant systems. See 13125.2.2.11
Battery room	No, battery area only
Battery type	None
2 inch diameter floor drain	No
Exhaust ventilation	None – rough openings are to be installed and covered
Floor and wall epoxy coating	Yes

Battery Area Accessories	
Item	**Details**
DC Disconnect Switch (200A)	Yes - fused
Eyewash station	No
Shower	No
Spare Parts	
Item	**Details**
Touch-up paint	1 quart of each type used
Additional Requirements	Hydrogen detection for exhaust fan control
IRIG-B Clock	SEL 2407
IRIG-B Antenna	SEL 9524A

16101 – Medium Voltage Switching Devices Datasheets

Scope of Supply			
1	The Supplier shall furnish the following scope of services as part of the work under this Purchase Order:		
2	All materials, equipment, and accessories as defined herein.		
3	Drawings and design documentation defined herein.		
4	Performance tests and the resulting test data in accordance with the referenced standards herein.		
5	Factory-fabricated building (PDC) as specified in Section 13125 if equipment is specified herein to be furnished installed in a PDC		
6	Installation of equipment in PDC		
7			
8			
9			
10			
Codes, Standards, and Design Conditions			
11	Standards for manufacturing and testing		
12	Medium voltage switchgear		IEEE C37.20.2 and other relevant ANSI and IEEE C37 series standards
13	Medium voltage controllers		
14	Medium voltage power switching centers		
15	High voltage AC circuit breakers		IEEE C.37.04, C37.06, C37.09
16	Arc-resistant construction		Not Applicable
17	Current transformers		IEEE C57.13
18	Voltage transformers		IEEE C57.13
19	High voltage AC disconnectors and grounding switches		N/A
20	Installation location ambient temperature range		-25°C to +40°C
Approved Manufacturers of Components			
21	Medium voltage switchgear		
22	Medium voltage controllers		Not Applicable
23	Medium voltage power switching centers		Not Applicable
24	Protective relays		Schweitzer Engineering Laboratories
Accessories			
25	The following accessories shall be provided:		
26	Quantity	Unit	Item
27	1	LOT	Remote racking device of each type
28	1	EA	Maintenance closing lever for closing the circuit breakers
29	1	EA	Transfer Truck / lifting trolleys to move drawout switching devices into and out of the equipment housings
30	1	LOT	Special tools if required
31	1	EA	Set of test plugs suitable for testing all relays provided
32	1	EA	Spare lockout relay coil
33	1	LOT	Spare protective relay for each type furnished
34			
35			
36			
37			
38			
39			
40			
41			
42			
Supplemental Specifications			
43	Technical supplemental specifications that are applicable to this equipment are identified and included in Section 21000.		
Additional Requirements:			
44	If conflicting specification information is provided, the order in which the conflict will be resolved from first to last is as follows: Typical Breaker Schematics. These datasheets and articles. Supplemental Specifications in Section 21000.		
45	See Definitions, Characteristics and Requirements. Additional Requirements also include: 1**. Programming of Relays, Meters and Devices:** Two sets of cables, signal converters, Microsoft Windows compatible software, and any other equipment/software required for programming each type of relay, meter, or other device furnished by Supplier shall be provided for interfacing with a personal computer serial port (computer furnished by others). The programming cables/converters/equipment/software shall be shipped with the first equipment shipment to the site. A third set of programming software if not available on the internet shall be shipped to the Purchaser for use in providing relay settings to the site.		

Equipment Assembly Details		
46	Equipment Assembly designation	Switchgear Bus 10A
47	Equipment Assembly tag	
48	Install in factory-fabricated building	Power Distribution Center By Supplier
49	Location	Indoor
General Ratings		
50	Nominal operating voltage:	13.8 kV
51	Maximum operating voltage:	15.0 kV
52	Nominal power system frequency:	60 Hz
53	External powersource fault availability	
54	Minimum power-frequency (or short-duration power-frequency) withstand voltage:	As Required by Standards
55	Minimum lightning impulse withstand voltage:	As Required by Standards
56	Minimum rated short-circuit and short-time withstand current:	50 kArms
57	Minimum rated short-circuit duration/permissible tripping delay:	2 seconds
58	Minimum rated peak withstand and closing and latching (making) current:	As Required by Standards
59	Minimum rated continuous (normal) current (Busbar rated current):	2000 Arms
60	Minimum neutral bus rated continuous (normal) current:	Neutral bus not required
61	Medium voltage breakers:	
62	Maximum rated interrupting (break) time:	5 cycles
63	Maximum rated closing time:	Manufacturer's standard
64	Number of trip coils per breaker:	One (1)
65	MV Circuit Breaker Class	Manuf Std.
66	Mechanical Endurance	Manuf Std.
67	Electrical Endurance	Manuf Std.
68	Controllers: maximum rated closing time:	Not applicable
69	Main Breaker Interface	Cable Bus
70	Pole-to-Pole Spacing	Manuf. Std. inches
Configuration/Construction Requirements		
71	Switchgear Type	Metal Clad Air Insulated
72	Configuration:	3-phase, 3-wire, low-impedance grounded
73	Construction:	Two-high construction, drawout
74	Classification:	Metal-clad switchgear
75	Arc-resistant construction:	Not Required
76	Accessibility type:	
77	Minimum rated internal arcing current:	
78	Minimum rated arcing duration:	
79	Busbar material and plating:	Copper with tin plating
80	Busbar Type	Manuf. Std. Select
81	Insulated busbar:	Required
82	Compartment Type	Manuf Std.
83	Surge Suppressor Type	N/A
84	Enclosure Degree of Protection	
85	Medium voltage switchgear:	ANSI Indoor
86	Medium voltage controllers:	Not applicable
87	Medium voltage power switching center:	Not applicable
88	Inside Compartment	Manuf Std.
89	Installation environment:	Not significantly polluted by dust, smoke, corrosive and/or flammable gases, vapors or salt
90	Cable gland plates to be furnished with the equipment:	Not applicable
91	Cable glands to be furnished with the equipment:	Not applicable
92	Mimic bus:	Not Required
93	Equipment Assembly Communication Network:	Data communication network for both control and data collection
94	DCS Data communication network to relays/ meters protocol:	DNP3 over RS-485 cable with DE-9 (DB-9) connector
94a	DCS Data communication network to relays/ meters redundancy:	Not applicable
95	DCS Data communication network to Equipment Assembly protocol:	Not applicable
95a	DCS Data communication network to Equipment Assembly redundancy:	Not applicable
96	Data communication network fail mode:	Fail "in place"
97	DCS Testing/Configuration Support	Not Applicable
98	Field service for startup and testing of DCS-to-Equipment communication Network	Not Applicable

Voltage Transformer Requirements							
99	Bus voltage transformers						
100	Number of sets:	One (1) three-phase set					
101	Mounting:	Drawout					
102	Ratio:	8000 - 120V					
103	Connection:	Wye-wye					
104	Secondary grounding:	Neutral					
105	Minimum accuracy rating:	1.2 WXYZ,ZZ					
106	Minimum thermal rating:	Equal to maximum rated standard burden					
107	Line-side voltage transformers						
108	Number of sets connected to incoming side of each main breaker:	Not applicable					
109	Mounting:						
110	Ratio:						
111	Connection:						
112	Secondary grounding:						
113	Minimum accuracy rating:						
114	Minimum thermal rating:						
Auxiliary Contacts							
115	As a minimum, the following quantity of spare auxiliary switch contacts shall be provided and wired out to terminal blocks:						
116	**Type**	**Switchgear**	**Controllers**	**Power Switching Centers**			
117	Position status auxiliary switch contacts	2 'a' and 2 'b'					
118	Stationary position status auxiliary switch contacts	4 'a' and 4 'b'					
119	Connection status auxiliary switch contacts	2 N.O. and 2 N.C.					
Miscellaneous Requirements							
120	Provide IRIG-B signal distribution:	Yes					
121	Control cable entrance:	TOP					
122	Infrared inspection ports:	Required: FLIR IRW-3C					
123	Rear doors:	Required					
124	Lockable doors:	Not required					
125	Enclosure space heaters:	Not Required					
126	Enclosure space heater minimum rated voltage:	240 VAC					
127	Exterior paint color:	Manufacturer's Standard					
128	External ground cable size:	#4/0 AWG (19 strand minimum)					
129	Provide channel sills, if required:	No					
Power Sources							
130	**Description**	**Source**	**Circuit Description**	**Code**	**Nominal Voltage**		
131	Enclosure space heaters:	PDC Power panel		LV-1	120 VAC		
132	Motor space heaters:	Not Applicable					
133	Normal control power:	Specified battery system		CP-1	125 VDC		
134	Medium voltage breakers						
135	Spring charging motor:	Specified battery system		DC-1	125 VDC		
136	Trip coil:	Specified battery system		DC-1	125 VDC		
137	Close coil:	Specified battery system		DC-1	125 VDC		
138	Controller control power:	Not Applicable					
139	Disconnect switch control power:	Not Applicable					
This Equipment Assembly shall be provided with all of the following Subassembly Units and all associated equipment:							
140	**Subassembly Unit Tag or Description**	**Quantity**	**Load Type**	**Minimum Switching Device Current Rating**	**Power Conductor**	**Ground Conductor**	**Additional Requirements**
141	**Subassembly Unit Type**	**Position in Assembly**	**Load Size**	**Power Factor**	**Phase CT Ratio**	**Power/Ground Conductor Entry**	
142	Main Breaker	One (1)		2000 Arms	[Later] cable bus	1-1/C 4/0 AWG	
143	MB	1B			See unit details	Bottom	
144	Feeder	Five (5)		1200 Arms	2-1/c 750 kcmil/ph		
145	Fdr-1		1200 A	0.85	See unit details	Bottom	
146	Load Break Breaker	One (1)		2000 Arms	[Later] cable bus		
147	LB	4B			See unit details	Bottom	
148	Bus VTs	One set of 3	Not applicable	Not applicable			
149	BVT	1A					
150							
151							
152							
153							
154							
155							
156							
157							
Reference Drawings and Technical Attachments							
158	This Equipment Assembly shall be designed and wired in accordance with the following Reference Drawings or Attachments:						
159	**Drawing Number**	**Revision**	**Drawing Title**				
160	425278-E9453	2	115/13.8kV Substation - Relaying & Metering Diagram				
161							
162							
163							
164							
Additional Requirements:							
165	See Definitions, Characteristics and Requirements						

Subassembly Unit Type Details				
166	Subassembly Unit Type designation			MB
167	Subassembly Unit Type description			Main Breaker
168	Switching device(s) type			Medium-voltage switchgear breaker
169	Application			Bus switching device
170	Switching device(s) mounting			Drawout
171	Insulating medium for switching device interrupter			Vacuum
Internally-Mounted Equipment				
172	This Subassembly Unit contains the following equipment that shall be furnished, mounted within the Equipment Assembly, and fully connected:			
173	**Quantity**	**Unit**	**Description**	
174	1	LOT	Equipment as shown on Reference Drawings listed below	
175	1	LOT	Phase CTs for protection application, bus side, per phase, 2000:5 multi-ratio, Accuracy C200, for connection to upstream differential protection	
176	1	LOT	Phase CTs for protection application, line side, per phase, 2000:5 multi-ratio, Accuracy C200	
177	1	LOT	Phase CTs for protection application, line side, per phase, 2000:5 multi-ratio, Accuracy C200 for bus differential	
178	1	LOT	Set of shorting type terminal blocks for all current transformer circuits	
179	1	LOT	Set of control power fuses	
179	1	LOT	Set of terminal blocks for all voltage and control circuits	
180	1	EA	Aux closing (AXC) and Aux tripping (AXT) relays	
181	1	LOT	All other devices required and as indicated on the typical schematics referenced below.	
Protective Relays				
182	This Subassembly Unit contains the following protection relays that shall be furnished, mounted, and connected on the front of the Equipment Assembly:			
183	**Quantity**	**Unit**	**Description**	
184	1	EA	SEL 751 model 751101A1A3A0X851B20	
185	1	EA	SEL 587Z model 0587Z0X325322XX	
186				
Front-Mounted Equipment				
187	This Subassembly Unit contains the following equipment that shall be furnished, mounted on the front of the Equipment Assembly, and fully connected:			
188	**Quantity**	**Unit**	**Description**	
189	1	LOT	Equipment as shown on Reference Drawings listed below	
190	1	EA	Control switch, three-position, open-neutral-close, spring return to neutral	
191	1	LOT	Test switches - connected to each relay and meter current and voltage input, each relay trip output, and each	
192	1	LOT	Indicating lamp set	
193	1	LOT	Lockout relay, manual reset, 16 normally-open and 16 normally-closed contacts for Bus Differential	
194	1	LOT	All other devices required for a fully-functioning unit and to meet the specified application	
195				
196				
Reference Drawings				
197	This Subassembly Unit shall be designed and wired in accordance with the following Reference Drawings:			
198	**Drawing Number**		**Revision**	**Drawing Title**
199	425278-DK-02011		A	Typical Schematic Diagram - MV Swgr 1 Main Breaker (52MB1)
200	425278-DK-02011A		A	Typical Schematic Diagram - MV Swgr 1 Main Breaker (52MB1)
201	425278-DK-02011B		A	Typical Schematic Diagram - MV Swgr 1 Main Breaker (52MB1)
202	425278-DK-02011C		A	Typical Schematic Diagram - MV Swgr 1 Main Breaker (52MB1)
203	425278-DK-02011D		A	Typical Schematic Diagram - MV Swgr 1 Main Breaker (52MB1)
204	425278-DK-02011E		A	Typical Schematic Diagram - MV Swgr 1 Main Breaker (52MB1)
205	425278-DK-02011F		A	Typical Schematic Diagram - MV Swgr 1 Main Breaker (52MB1)
Additional Requirements:				
206	See Definitions, Characteristics and Requirements			

Project No./Procurement Package: 425278.63.3600 **Bid Issue**

16101 - Medium Voltage Switching Devices Data Sheets

Subassembly Unit Type Details		
207	Subassembly Unit Type designation	Fdr
208	Subassembly Unit Type description	Feeder Breaker
209	Switching device(s) type	Medium-voltage switchgear breaker
210	Application	Bus switching device
211	Switching device(s) mounting	Drawout
212	Insulating medium for switching device interrupter	Vacuum

Internally-Mounted Equipment

213 This Subassembly Unit contains the following equipment that shall be furnished, mounted within the Equipment Assembly, and fully connected:

	Quantity	Unit	Description
214			
215	1	LOT	Equipment as shown on Reference Drawings listed below
216	1	LOT	Phase CTs for protection application, bus side, per phase, 1200:5 multi-ratio, Accuracy C200
217	1	LOT	Phase CTs for protection application, line side, per phase, 2000:5 multi-ratio, Accuracy C200 for bus differential
218	1	LOT	Set of shorting type terminal blocks for all current transformer circuits
219	1	LOT	Set of control power fuses
220	1	LOT	Set of terminal blocks for all voltage and control circuits
221	1	EA	Aux closing (AXC) and Aux tripping (AXT) relays
222	1	LOT	All other devices required and as indicated on the typical schematics referenced below.

Protective Relays

223 This Subassembly Unit contains the following protection relays that shall be furnished, mounted, and connected on the front of the Equipment Assembly:

	Quantity	Unit	Description
224			
225	1	EA	SEL 751 model 751101A1A3A0X851B20
226			
227			

Front-Mounted Equipment

228 This Subassembly Unit contains the following equipment that shall be furnished, mounted on the front of the Equipment Assembly, and fully connected:

	Quantity	Unit	Description
229			
230	1	LOT	Equipment as shown on Reference Drawings listed below
231	1	EA	Control switch, three-position, open-neutral-close, spring return to neutral
232	1	EA	Maintenance switch scheme arming switch, enabled-disabled, maintained in each position
233	1	LOT	Indicating lamp set
234	1	LOT	Test switches - connected to each relay and meter current and voltage input and each relay trip output
235	1	LOT	All other devices required for a fully-functioning unit and to meet the specified application
236			
237			

Reference Drawings

238 This Subassembly Unit shall be designed and wired in accordance with the following Reference Drawings:

	Drawing Number	Revision	Drawing Title
239			
240	425278-DK-02014	A	Typical Schematic Diagram - MV Swgr Feeder (52FB)
241	425278-DK-02014A	A	Typical Schematic Diagram - MV Swgr Feeder (52FB)
242	425278-DK-02014B	A	Typical Schematic Diagram - MV Swgr Feeder (52FB)
243	425278-DK-02014C	A	Typical Schematic Diagram - MV Swgr Feeder (52FB)
244	425278-DK-02014D	A	Typical Schematic Diagram - MV Swgr Feeder (52FB)
245	425278-DK-02014E	A	Typical Schematic Diagram - MV Swgr Feeder (52FB)
246			

Additional Requirements:

247 See Definitions, Characteristics and Requirements

Subassembly Unit Type Details				
248	Subassembly Unit Type designation			LB
249	Subassembly Unit Type description			Load Break Breaker
250	Switching device(s) type			Medium-voltage switchgear breaker
251	Application			Bus switching device
252	Switching device(s) mounting			Drawout
253	Insulating medium for switching device interrupter			Vacuum
Internally-Mounted Equipment				
254	This Subassembly Unit contains the following equipment that shall be furnished, mounted within the Equipment Assembly, and fully connected:			
255	**Quantity**	**Unit**	**Description**	
256	1	LOT	Equipment as shown on Reference Drawings listed below	
257	1	LOT	Phase CTs for protection application, bus side, per phase, 1200:5 multi-ratio, Accuracy C200	
258	1	LOT	Phase CTs for protection application, line side, per phase, 2000:5 multi-ratio, Accuracy C200 for bus differential	
259	1	LOT	Set of shorting type terminal blocks for all current transformer circuits	
260	1	LOT	Set of control power fuses	
261	1	LOT	Set of terminal blocks for all voltage and control circuits	
262	1	EA	Aux closing (AXC) and Aux tripping (AXT) relays	
263	1	LOT	All other devices required and as indicated on the typical schematics referenced below.	
Protective Relays				
264	This Subassembly Unit contains the following protection relays that shall be furnished, mounted, and connected on the front of the Equipment Assembly:			
265	**Quantity**	**Unit**	**Description**	
266	1	EA	SEL 751 model 751101A1A3A0X851B20	
267				
268				
Front-Mounted Equipment				
269	This Subassembly Unit contains the following equipment that shall be furnished, mounted on the front of the Equipment Assembly, and fully connected:			
270	**Quantity**	**Unit**	**Description**	
271	1	LOT	Equipment as shown on Reference Drawings listed below	
272	1	EA	Control switch, three-position, open-neutral-close, spring return to neutral	
273	1	EA	Maintenance switch scheme arming switch, enabled-disabled, maintained in each position	
274	1	LOT	Indicating lamp set	
275	1	LOT	Test switches - connected to each relay and meter current and voltage input and each relay trip output	
276	1	LOT	All other devices required for a fully-functioning unit and to meet the specified application	
277				
278				
Reference Drawings				
279	This Subassembly Unit shall be designed and wired in accordance with the following Reference Drawings:			
280	**Drawing Number**		**Revision**	**Drawing Title**
281	425278-DK-02014		A	Typical Schematic Diagram - MV Swgr Feeder (52FB)
282	425278-DK-02014A		A	Typical Schematic Diagram - MV Swgr Feeder (52FB)
283	425278-DK-02014B		A	Typical Schematic Diagram - MV Swgr Feeder (52FB)
284	425278-DK-02014C		A	Typical Schematic Diagram - MV Swgr Feeder (52FB)
285	425278-DK-02014D		A	Typical Schematic Diagram - MV Swgr Feeder (52FB)
286	425278-DK-02014E		A	Typical Schematic Diagram - MV Swgr Feeder (52FB)
287				
Additional Requirements:				
288	See Definitions, Characteristics and Requirements			

Definitions, Characteristics and Requirements		
Definitions		
289	Equipment Assembly (Lineup)	One or more contiguous enclosures containing Subassembly Units and associated equipment which may in addition have an overall weatherproof housing
290	Subassembly Unit	A group of equipment, which may include one (for most types of applications) or more (for certain motor starting applications) Switching Devices, that forms part of an Equipment Assembly
291	Switching Device	A device capable of opening and closing one or more electrical power circuits
292	Spare	When used in reference to a Subassembly Unit, it is a fully equipped and fully functional Subassembly Unit of the designated type, including Switching Device, designated for future use. Spare Subassembly Units shall be furnished completely equipped and wired
293	Equipped Space	Identical to a fully-equipped and fully-functional Subassembly Unit of the designated type, excluding the Switching Device. A Switching Device installed in an Equipped Space shall be immediately operable
294	Drawout	When used in reference to a device, it is a device that can be isolated from the supply (and load, if applicable) and removed without the use of tools
Medium Voltage Switchgear		
295	Medium voltage switchgear shall consist of an assembly of medium voltage power circuit breakers and other associated equipment as specified herein	
296	Power Circuit Breakers	3-pole, single-throw, medium voltage power circuit breakers complete with operating mechanisms and other required devices. The breakers shall not be forced cooled when possible. When forced cooling is required to meet the desired ratings, the Supplier shall clearly state this requirement in the proposal. The operating mechanism shall be of the stored energy type with a closing coil and with the number of tripping coils as specified. The closing devices, tripping devices, and charging motor shall be designed and rated for operation on the specified control voltage. The operating mechanism shall be trip-free in any position and shall be anti-pumping. The breaker main contacts shall not touch or arc across into a faulted circuit when a breaker close signal is received while a trip signal is being applied. All secondary device contact surfaces and the primary disconnect contact surfaces shall be silver-to-silver, designed and fabricated to be self-aligning and to resist burning and deterioration. Each breaker shall be furnished with an operations counter that shall be readable from the front of the switchgear unit with the breaker in the connected position. Drawout breakers shall be furnished complete with wheels to provide easy removal from the enclosure. Drawout breaker units of the same type and ampere capacity shall be wired alike and shall be mechanically and electrically interchangeable.
297	Automatic Shutters	Compartments containing drawout breakers shall be furnished with automatically-operated shutters to allow or block access to the stationary primary disconnecting contacts. The shutters shall be automatically opened by the circuit breaker as it moves toward the connected position, allowing access to the stationary primary disconnecting contacts. Access to the primary disconnecting contacts shall automatically be blocked as the circuit breaker is racked away from the connected position.
Enclosures		
298	Each Equipment Assembly shall be furnished with enclosures as specified. The enclosures shall consist of vertical sections that are fabricated of steel and assembled to provide rigid self-supporting structures. Switching devices that are removable shall be removable from the front. Any auxiliary device that may require access, removal, or replacement during normal maintenance or operation shall also be accessible and/or removable from the front. Each compartment shall be furnished with a hinged front door. Doors shall be designed and adequately constructed for rigidity for the mounting of instruments, meters, relays, switches, indicating lights, and other specified devices, as required. Stops and latches shall be provided to hold each door in the open or closed position. If specified, doors shall be lockable. If rear doors are specified all accessible rear compartments shall be provided with doors. All compartments within an Equipment Assembly not furnished with functional devices or designated as blank space shall be furnished as a blank space complete with front door and barriers isolating the inside of the compartment from the bus, and a backplane for mounting future devices.	
Arc-Resistant Equipment		
299	Where specified, arc-resistant equipment shall be supplied that meets the requirements of the latest revision of the standard specified, for the accessibility type specified, with a rated internal arcing short circuit current and rated arcing duration that meet or exceed the values specified. The use of a device that intentionally creates a three-phase short-circuit is not acceptable. The Supplier shall furnish all vents, chutes/ductwork, and supports required to vent material and gasses associated with arcing faults away from the equipment and away from locations where personnel may be present.	
Main and Tap Bus		
300	The main and tap buses shall be constructed of solid busbar in accordance with the material and plating as specified and shall be capable of continuously carrying the current specified under the ambient temperature conditions specified without exceeding the temperature requirements specified in the applicable standards. The bus shall be installed with rigid, non-tracking, fire-resistant, and non-hygroscopic insulating supports that are capable of withstanding the mechanical forces imposed by short-circuit currents equal to the close and latch and short-time current ratings (short-circuit making current and short-time withstand current ratings) of the equipment. The main bus shall be arranged Phase A(1), Phase B(2), Phase C(3) from left to right, from front to back, and from top to bottom when facing the front (operating side) of the equipment. All power current carrying connections shall be bolted connections with minimum contact resistance. The Supplier shall furnish all material required for field connections of equipment bus and terminals. Provisions shall be made for bus expansion to prevent undesirable or destructive mechanical strains in the bus supports and connections, through the full ambient temperature range specified. Expansion joints shall be furnished where required. If insulated busbars are specified, buses shall be coated with epoxy type insulating material or acceptable equal molded around and bonded to the bus. All bolted joints; expansion joints; bus connections, factory or field; and all terminals, cable connectors, or bus connectors for attachment of conductors of instrument transformer circuits and external circuits shall be insulated with removable boots. Removable boots shall be designed to overlap permanent bus or cable insulation a minimum of 1 inch (25 mm) upon each conductor in the connection insulated by the boot. Removable boots shall also be supplied for all medium voltage feeder cables entering or exiting the equipment. The insulation rating of bus, joint, connection, and termination insulation shall be not less than the voltage rating of the equipment. Any materials required for insulation of field connections shall be provided.	
Ground Bus		
301	An uninsulated copper ground bus shall be furnished through the entire length of each Equipment Assembly. All equipment requiring grounding shall be connected to this grounding bus. The minimum bus size shall be suitable for carrying the maximum ground fault current for the rated short-circuit duration but shall not be smaller than 0.25 inch (6 mm) by 2 inches (51 mm).	

External Connections

302 **Entrance.** Adequate openings shall be furnished for all conductors entering the equipment from top or bottom, as specified.
Terminal Connectors. Terminal connectors for power cable and grounding cable entering the equipment shall be furnished and shall be as listed in the following table, or an acceptable equal. Solder type terminals are not acceptable. The size of power cable, if not specified, will be furnished by the Purchaser during detailed design:

		Burndy Terminal Connector for Copper Conductors	
	Cable Size	**Bolted Clamp Type, Grounding Cable**	**Compression Type, Power Cable**
	8 AWG (10 mm2) and smaller	N/A	YAV
	6 AWG (16 mm2) through 1/0 AWG (50 mm2)	VA-2N	YA-2N
	2/0 AWG (70 mm2) and larger	VVA-2N	YA-2N

308 **Stress Cones.** Unless power conductors entering equipment are indicated as not cable, adequate space and supporting facilities shall be furnished for flaring of power cables, for field installation of stress cones, and for support of the cable. Cable termination points and current transformers shall be arranged for convenient routing of the power conductors from the direction specified to the terminal point. Proper clearances and bending space shall be provided.

309 **Bus Duct.** When bus duct is specified for power conductors, the Supplier shall coordinate with the bus duct vendor to ensure that all materials required to complete the interface are provided by the bus duct vendor.

310 **Ground Bus Connections**. Ground cable connectors shall be furnished for the attachment of stranded copper cable to the grounding bus for external connection to the station grounding system. Connectors shall be furnished at each end of the Equipment Assembly grounding bus. Connectors shall be furnished for attaching all power cable shields directly to the Equipment Assembly grounding bus. Provisions shall be made for connecting the bus duct grounding bus to the Equipment Assembly grounding bus.

311 **Cable Gland Plates.** When cable gland plates are specified to be supplied with the equipment, the Supplier shall provide nonferrous metal, gasketed, cable gland plates and shall cut cable gland holes in the plates during manufacturing and install removable plugs. The size and quantity of holes to be cut in the gland plate will be furnished by the Purchaser during detailed design. When cable glands are specified to be supplied with the equipment, the Supplier shall provide cable glands for all cables terminating at the Equipment Assembly.

Current Transformers

312 Current transformers shall be supplied as specified herein, as shown on drawings provided by the Purchaser, and in accordance with the following requirements. Current transformer mechanical and thermal limits shall be coordinated with the momentary and short-time ratings of the Switching Device with which they are used. The thermal ratings shall be based on a short-circuit duration of 1 second or greater. Window type current transformers shall have a sufficient diameter circular window, or the oval equivalent, to accommodate the cable indicated herein or as provided by the Purchaser during detailed design. Window current transformers shall be mechanically braced to withstand the same momentary current as the Switching Device with which they are used. When a window current transformer braced for the same momentary current as the Switching Device is unavailable with the ratio specified, the Supplier shall furnish a combination of a window current transformer braced for the momentary current of the Switching Device and an associated auxiliary transformer. The product of the ratios of the window current transformer and the auxiliary current transformer shall be equal to the specified ratio. Zero sequence current transformers shall be sized to accommodate all power conductors entering the cubicle or 5.25 inches (133 mm) in diameter, whichever is greater.

313 **Current Transformers used in Relaying Applications.** Unless otherwise specified, the accuracy ratings of current transformers used in relaying applications shall meet the following minimum requirements for the specific application as listed below. As an alternative to meeting these requirements for a particular current transformer, the Supplier may provide, with their bid, specific guidance published by the manufacturer(s) of relay(s) connected to that particular current transformer providing minimum current transformer performance requirements that assure no delay in relay operation, and provide current transformers that meet or exceed those published recommendations.

Standard	**IEEE C57.13**	**IEC 61869-2**
Application	**Minimum Equivalent "C" Class Rating**	**Minimum 5P20 VA Rating**
Current transformers measuring phase current used with Switching Devices that have fuses for fault current protection	$\frac{2 \cdot I_L \cdot Z_{Btot}}{CTR}$	$\frac{I_L \cdot Z_{Btot} \cdot I_{CTsec}}{10 \cdot CTR}$
All zero-sequence current transformers, and current transformers measuring phase current used with Switching Devices without fuses for fault current protection	$\frac{2 \cdot I_{Fsym} \cdot Z_{Btot}}{CTR}$	$\frac{I_{Fsym} \cdot Z_{Btot} \cdot I_{CTsec}}{10 \cdot CTR}$

where:

CTR:	CT Ratio
I_L:	Twice maximum locked-rotor current for motor loads; twice maximum load current for other loads
I_{Fsym}:	Maximum symmetrical three-phase fault current for current transformers used for phase protection; maximum symmetrical ground-fault current for zero-sequence current transformers (provided by Purchaser)
Z_{Btol}:	Total applied burden (including total internal CT resistance, two times one-way lead impedance, and sum of the burden of all connected devices)
I_{CTsec}:	CT secondary current rating (e.g. 1 A or 5 A)

323 All current transformers used in a bus differential scheme shall be identical to each other and shall have the highest relaying accuracy available that physically can be installed in the equipment.

324 Unless otherwise specified or directed by the Purchaser to maximize current transformer performance, the Supplier shall provide current transformers with the largest ratio available that still allows suitable protective relay settings to be chosen. Single ratio current transformers shall be provided unless otherwise specified by the Purchaser to be multi-ratio (such as those denoted with an "MR" next to ratio).

325 **Current Transformers used in Metering Applications.** Unless otherwise specified, the accuracy ratings of current transformers used in metering applications shall have an accuracy class of 0.6 or better (for IEEE C57.13 current transformers) or 0.5 or better (for IEC 61869-2 current transformers) with a minimum burden rating equal to a minimum of 150% of the connected burden. Unless otherwise specified, the ratio of current transformers used solely for metering purposes shall be approximately equal to the load current with a minimum continuous thermal rating equal to 150% of rated current.

Voltage Transformers	
326	Voltage transformers shall be provided as specified herein, and on drawings provided by the Purchaser. Unless otherwise specified, voltage transformers shall have a rating of not less than 200 volt-amperes on a thermal basis and a capability of withstanding a secondary short-circuit for not less than 1 second. The voltage transformers shall be rated for 100 percent of rated primary voltage across the primary winding when connected line-to-line or line-to-ground. The voltage ratings shall be suitable for the type of system grounding employed and shall, at a minimum, be capable of operating at 110% of rated voltage continuously and 125% of rated voltage on a short-time basis without loss of life. The voltage transformer BIL or Lightning Impulse Withstand voltage shall meet or exceed the equipment rated BIL or Lightning Impulse Withstand Voltage. Unless otherwise specified, the voltage transformer accuracy at the applied burden shall be 0.6 or better (for IEEE C57.13 voltage transformers) or 0.5 or better (for IEC 61869-3 voltage transformers). Each voltage transformer shall be provided with current limiting primary fuses and secondary fuses. The primary fuses shall be adequately rated for the voltage transformer inrush and load current, and shall have an interrupting capacity equal to or greater than the maximum short-circuit momentary current rating of the Equipment Assembly. The connections from the main buses to the primary of each voltage transformer shall be capable of carrying the rated short-circuit current of the equipment for a minimum of 1 second. If mounting for voltage transformer is specified as “drawout”, the voltage transformers and primary fuses shall be mounted on a drawout-type removable unit designed to isolate and ground the secondary potential circuits when the unit is in the fully withdrawn position. Provisions shall be made to prevent an arc on the primary disconnecting contacts of each voltage transformer by arranging to open the secondary circuits before the primary disconnecting contacts part. Provisions shall be made to prevent personnel from coming into contact with the voltage transformer primary fuses until after the primary disconnecting devices are separated by a safe distance and grounded. Bus voltage transformers shall be provided with a switch (VTCI) to monitor the position of the voltage transformer’s drawout type removable unit (carriage). The bus VTCI contacts shall be configured and wired as shown on the typical schematics provided by the Purchaser.
Protective Relays	
327	Protective relays shall be furnished as specified herein and on drawings provided by the Purchaser. Unless otherwise specified, protective relays shall be microprocessor-based, have trip indication on the front of the relay, have an alarm contact that provides relay health status, be flush-mounted on the front of the Equipment Assembly, and be operable from the specified control power source. Protective relays shall be furnished with the latest firmware available at the time of equipment shipment. Immediately following installation of the protective relays in the Equipment Assembly, the Supplier shall submit a list to the Purchaser showing the firmware revision number for each relay.
Meters	
328	Meters shall be furnished as specified herein and on drawings provided by the Purchaser. Unless otherwise specified, meters shall be microprocessor-based, capable of providing local indication of metered quantities, and capable of remote communication for all functions using the specified protocol.
Test Switches	
329	Test switches shall be furnished as specified herein and on drawings provided by the Purchaser. Unless otherwise specified, test switches shall be ABB Type FT-1 or States Type FMS.
Equipment Assembly Communication Networks	
330	The Supplier shall provide each Equipment Assembly with the equipment, wiring, and accessories necessary to implement the means of data exchange with the facility DCS, as specified.
331	**General Requirements.** The following minimum requirements apply to each of the equipment assembly communication methods described below: Power Supply. The equipment utilized for data exchange between the Purchaser’s DCS and the Supplier’s Equipment Assembly shall be provided with the same highly reliable source of power (e.g., plant inverter, plant batteries, or redundant auxiliary ac/dc source) used for the protective relays. Power supply conversion devices, if required by the data exchange equipment, shall be provided by the Supplier. This requirement extends to all necessary components, converters, communication gateways, etc. required to implement a fully operable communication network.
332	**Electromagnetic Interference Immunity.** The physical layer implementation of the data communication network between the Purchaser’s DCS and the Supplier’s Equipment Assembly shall take into consideration the electromagnetic interference that is possible due to the nature of the Supplier’s Equipment Assembly operation. The communication network between the Purchaser’s DCS and the Supplier’s Equipment Assembly shall be unaffected by the electromagnetic interference generated within the Equipment Assembly. The communication network between the Purchaser’s DCS and Supplier’s Equipment Assembly shall not induce any undesirable voltages, current, or other undesirable signal conditioning beyond the boundary of the Equipment Assembly.
333	**Data Communication Network Fail Mode.** Where a communication network is used for control purposes, the devices shall be configured to fail “off” (e.g., trip) or fail “in-place” (e.g., in current position) as defined herein upon total loss of communication. The communication network shall be designed to generate a loss of communication alarm upon loss of individual communication components.
334	**Single Point of Failure.** Where a series-wired communication network such as Profibus or Modbus over RS-485 is utilized, the devices (e.g., relays/meters/controllers) connected to that communication network shall be designed such that removing a device from service does not disrupt communication between the other devices and the DCS. Wiring hardware/connectors shall include provisions for input and output circuits, as well as built-in segment terminators that can be field activated.
335	**Special Hardware and Software.** All special equipment (hardware) and software, required to program communication networks, shall be provided.
336	**Programming.** Not applicable.
337	**DCS Testing/Configuration Support.** Not applicable.
338	**Equipment Assembly Testing.** During the factory acceptance testing, each Equipment Assembly shall be fully assembled. All of the equipment may be functionally tested (at the option of the Purchaser), including the use of externally-connected data communication networks. The Supplier shall provide all personnel, equipment, software, etc. required for this testing.
339	**Field Service for DCS.** Not applicable.
340	**Hardwired External DCS I/O Equipment Provided and Installed by Purchaser**. Not applicable.

341	**Hardwired DCS I/O Equipment Provided by Purchaser and Installed by Supplier**. Not applicable.
342	**Data Communication Network for both Control and Data Collection**. Not applicable.
IRIG-B Signal Distribution	
343	If an IRIG-B signal is specified to be provided to an Equipment Assembly for distribution, the Supplier shall furnish all equipment and cable necessary to distribute a single IRIG-B signal to all of the devices accepting an IRIG-B signal input in the Equipment Assembly.
Electrical Accessory Devices	
344	Electrical accessory devices, such as control switches, auxiliary relays, pushbuttons, fuses, fuse blocks, indicating lights shall be in accordance with the requirements of the Supplemental Specifications in Section 21000 (including E530, Electrical Accessory Devices), the typical schematics provided by the Purchaser, and as specified herein. Unless otherwise explicitly specified, control devices mounted on the Equipment Assembly with the Switching Device shall not control the Switching Device when the Switching Device is in the “connected” position. Indicating lights shall be provided for status of each Switching Device.
Maintenance Switch Schemes for Arc-Flash Hazard Reduction	
345	Maintenance Switch schemes shall be furnished as shown on the drawings provided by the Purchaser and as specified herein. Each Maintenance Switch scheme shall include an arming switch that is capable of being locked in the armed position. An indicating light shall be furnished adjacent to each arming switch used to activate a particular Maintenance Switch scheme to provide positive indication that the Maintenance Switch scheme is armed. The light shall be driven by an output contact from the relay containing the overcurrent protection for the Maintenance Switch scheme and powered by the same control power source supplying the relay. A contact from each arming switch shall be wired to an input on that same relay to arm the overcurrent protection for the scheme. The arming switch contacts and lights shall be wired to terminal blocks to allow paralleling of switches and lights. If the overcurrent protection is located external to the equipment then the Maintenance Switch and indicating light shall be wired to terminal blocks for external connection. Unless otherwise specified, a normally-open contact (closed when armed) from each arming switch shall be wired out to terminal blocks
Remote Racking Devices	
346	Where remote racking devices are available for a switching device, either from the manufacturer of the switching device or from a different manufacturer, the Supplier shall provide each Equipment Assembly containing that switching device with a remote racking system in accordance with the following requirements. The system shall either be an integral part of the Equipment Assembly or an externally attached device that can be moved from switching device to switching device. The remote racking mechanism shall be capable of being connected and operating with the switching device enclosure door closed at all times. Any power required for the remote racking devices shall be supplied from the Equipment Assembly. The remote racking devices shall include a racking mechanism and a control pendant with cords of sufficient length to allow the operator to stand with the pendant outside of the room or outside of the Flash Protection Boundary. The racking operation shall be controlled from the control pendant and the control pendant shall include visual indication of the racking position of the switching device. The remote racking mechanism and the control pendant shall be provided with a storage bracket attached to one end of the equipment lineup. Alternatively, at the direction or consent of the Purchaser, the storage bracket may be wall mounted.
Enclosure Space Heaters	
347	If specified herein, each vertical section shall be furnished with space heaters to prevent condensation of moisture within the equipment. The heaters shall be located and thermally insulated so that no painted surface will be damaged or discolored. The space heater supply buses shall all be connected together and factory wired through each continuous assembly (including, for example, medium voltage controllers and switchgear located in a common Equipment Assembly). Where the power source is provided externally by the Purchaser, the space heater supply buses shall all be connected to one common power feed connection point for external connection. The Supplier shall furnish contactors, all required internal wiring, suitable branch circuit protection for each space heater circuit, and space heater power bus conductor through the Equipment Assembly. The Supplier shall balance the current loading on multiphase space heater buses. Space heater capacity shall be as required to maintain the enclosure internal temperature above the dew point. Space heaters shall be controlled by an adjustable thermostat or a fixed humidistat. Space heater sheaths shall be of a corrosion-resistant, nonoxidizing material.
Power Feeds for Motor Space Heaters	
348	Unless otherwise specified herein, the Supplier shall furnish motor space heater power buses to each motor feeder in the equipment, including all motor space heater bus wiring integral to the Equipment Assembly and suitable branch circuit protection for each motor space heater feed. Unless specified otherwise, these motor space heater supply buses shall all be connected together and factory wired through each continuous assembly (including, for example, medium voltage controllers and switchgear located in a common Equipment Assembly). Where the power source is provided externally by Purchaser, the motor space heater supply buses shall all be connected to one common power feed connection point for external connection. Each motor space heater circuit shall include auxiliary contacts from the Switching Device(s) to turn motor space heaters on when main power is not being provided to the motor, individual molded case circuit breakers, and connections to terminal blocks for external connections as shown on the typical schematics for motor feeders provided by the Purchaser. For withdrawable Switching Devices, unless otherwise specified, the ability of the supply circuit to provide power to the motor space heater shall not be dependent upon the Switching Device being in the connected position. The Supplier shall balance the current loading on multiphase space heater buses.

Hazard Warning Labels	
308	The Supplier shall furnish, on each accessible side of each vertical section, generic labels warning of arc flash and shock hazard and requiring that appropriate PPE be worn. The labels shall meet ANSI Z535 requirements for warning labels, or other national requirements that may govern.
Equipment Uses as a Fire Pump Feeder	
309	The following requirements apply for equipment used as a fire pump feeder: If the Switching Device is a disconnect switch, the disconnect switch shall be lockable in the closed position. If the Switching Device is not a disconnect switch, then the following requirements apply: Any mechanical tripping means shall be lockable. The doors to compartments containing control wiring shall be lockable. A lockable control switch shall be provided that, when locked out, prevents local and remote opening of the Switching Device. The equipment shall have a label with the words “Fire Pump Disconnecting Means” in minimum 25 mm (1 inch) high letters visible without opening enclosure doors or covers. The equipment shall be sized to carry a minimum of the sum of the locked-rotor currents of all supplied motors and the continuous current of all supplied non-motor loads. Overcurrent protection shall allow continuous flow of the fire pump locked-rotor current.
Power Sources	
310	Electrical power for control, instrumentation, and space heaters shall be furnished as indicated on the drawings and as specified herein. The Supplier shall furnish all internal devices and wiring required to distribute power to each Subassembly Unit as required. The power used in each individual Subassembly Unit shall be furnished with a disconnecting and protective device for each individual power circuit (including separate devices for the closing circuit and one for each tripping circuit). The disconnecting and protective devices shall be as shown on the typical schematics provided by the Purchaser.
311	**External Purchaser-Provided power source.** When the power source is specified as being external by Purchaser, the Supplier shall provide one set of terminals for external connection of that power source. The terminals shall be on a terminal block in an accessible location within the Equipment Assembly. The Supplier shall then wire from that set of terminals to all equipment within the Equipment Assembly that is specified to use that power source. The wiring shall extend, if necessary, through the entire length of the Equipment Assembly. This includes, for example, extension from medium voltage switchgear to attached medium voltage controllers in a common Equipment Assembly.
312	**Internal Control Power Transformer.** Where internal control power transformers are specified, the Supplier shall provide a control power transformer with a continuous rating of at least the maximum expected loading requirements plus 100 volt-amperes of extra capacity. Each control power transformer shall be located within the Equipment Assembly and receive power from the main bus of the Equipment Assembly. Each control power transformer shall be provided with primary and secondary fuses for all ungrounded conductors. The continuous rating of each control power transformer shall be clearly indicated on each section schematic and wiring diagram submitted for review. Control power interlocking provisions shall be provided to allow for testing of the control operation of each controller from an external source of control power with the contactor disconnected and isolated from the main bus. The control power interlocking provisions shall prevent the control power transformer of the controller from being energized during such testing. Unless otherwise specified, each controller specified as receiving control power from a control power transformer shall have an individual control power transformer for control and instrumentation associated with that controller only. Where protection relays used to trip breakers are supplied by ac control power from a control power transformer, a stored energy device or system shall be provided to allow the protection relays to trip the circuit breaker up to 5 seconds during or following a voltage dip or following loss of voltage to the control power transformer.
313	**Internal Battery System.** Where a power source is specified as an internal battery system, the Supplier shall include in that Equipment Assembly a battery system, including a filtered battery charger, with an output voltage equal to the voltage specified herein. Unless otherwise specified, the battery charger shall be fed from a Supplier-provided control power transformer , supplied in accordance with the control power transformer requirements listed above. Each battery system shall have a minimum capacity to serve 125% of the connected loads for a minimum of 8 hours, including operation of the Switching Devices at the beginning and end of that 8 hour period. The battery shall be sealed maintenance-free type. The battery charger shall be sized to fully recharge the battery within 8 hours with the battery fully discharged, while simultaneously providing power to all continuous dc loads. A distribution panel with suitably-rated breakers shall be provided to distribute the dc load from the battery. Ventilation and conditioning shall be provided if necessary to meet code requirements and the equipment manufacturer's recommendations. Form-C contacts shall be provided for remote indication of, as a minimum, charger malfunction and low battery voltage.
Internal Wiring	
314	All low voltage wiring shall conform to the requirements of the Technical Supplemental Specification E100, Wiring Methods, Cable, and Raceway, and the requirements herein. All wiring between devices in the same Equipment Assembly (including those that cross shipping splits) shall be installed by the Supplier and tested at the factory. All wiring that crosses shipping splits shall be terminated on terminal blocks at one side of each shipping split. Wiring that crosses a shipping split shall be de-terminated from the terminal blocks and coiled in the adjacent cabinet for shipping. All wires shall be one continuous length from terminal to terminal. Splicing is not permitted. All interior wiring shall be neatly and carefully installed in wiring gutters or conduit and shall be terminated at terminal blocks plainly lettered or marked in accordance with the Supplier's connection diagrams. Tie wrapping is considered an acceptable alternate to wiring gutters and conduit as long as it manages the wiring in a neat manner. Extra flexible wire shall be furnished at hinge points and suitably covered and protected to prevent wear. All wiring leaving an enclosure shall leave from terminal blocks, located for convenient connection of external circuits, and not from other devices within the enclosure. Unless otherwise specified, all relay inputs and outputs shall be wired to terminal blocks, including voltage transformer input circuits, current transformer input circuits (through shorting-type terminal blocks), relay output contacts, relay inputs, relay trouble alarms, RTD inputs, analog outputs, and communication cabling. Unless otherwise specified, all spare contacts on control switches, limit switches, or similar devices shall be wired to accessible terminal blocks for the Purchaser's future connections. All instrument transformer secondary leads shall be wired out to terminal blocks. Terminal blocks shall not be mounted in compartments containing cable or bus operating at voltages above 600 volts. Each terminal block, conductor, relay, circuit breaker, fuse block, and other auxiliary devices and terminals shall be permanently labeled to coincide with the identification indicated on the drawings. The Supplier shall install heat-shrinkable wire markers in accordance with supplemental E100. Internal wire markings shall be approved by Purchaser.
Auxiliary Switches	
315	A sufficient quantity of auxiliary switches and contacts shall be provided as specified herein and on the typical schematics provided by the Purchaser.
316	**Position Status Auxiliary Switches (52 draw-out).** These auxiliary switches are mounted on the Switching Device mechanism to provide ‘a’ contacts (contacts are closed when the Switching Device is closed, and open when the Switching Device is open) and ‘b’ contacts (contacts are closed when the Switching Device is open, and open when the Switching Device is closed). For drawout Switching Devices, the electrical connection between the switches on the Switching Device mechanism and the secondary connections in the Equipment Assembly enclosure shall be such that external indication of open or closed status from these switches is active when the Switching Device is in both the “connected” and “test” positions. The Supplier shall furnish each Switching Device with a sufficient number of position status auxiliary switch contacts to meet all control and status indication requirements plus the quantity of spare position status auxiliary switch contacts as specified on the 16101 Specification Sheets or shown on the typical schematics furnished by the Purchaser.
317	**Stationary Position Status Auxiliary Switches (52S MOC).** These auxiliary switches are not mounted on the Switching Device mechanism but are mounted in the Equipment Assembly enclosure and operated by linkage to the Switching Device mechanism. These auxiliary switches provide ‘a’ contacts (contacts are closed when the Switching Device is closed, and open when the Switching Device is open) and ‘b’ contacts (contacts are closed when the Switching Device is open, and open when the Switching Device is closed). For drawout Switching Devices, these switches shall be actuated only when the Switching Device is in the “connected” position. When a drawout Switching Device is not in the “connected” position, these contacts shall indicate that the Switching Device is in the “open” state. The Supplier shall furnish each Switching Device with a sufficient number of stationary position status auxiliary switch contacts to meet all control and status indication requirements plus the quantity of spare stationary position status auxiliary switch contacts as specified on the 16101 Specification Sheets or shown on the typical schematics furnished by the Purchaser. If stationary position status auxiliary switches are not available for the switching device type, then an equivalent arrangement shall be provided by wiring connection status auxiliary switches in series or parallel, as appropriate, with position status auxiliary switches to provide the required quantity of equivalent stationary position status auxiliary switches. If interposing relays must be used to achieve that equivalency, the method used by the Supplier to achieve this equivalency shall be subject to the Purchaser's approval. The connection status auxiliary switches and position status auxiliary switches used in this arrangement shall not count toward the quantity of spare contacts required for each of those types.

318	**Connection Status Auxiliary Switches (52H TOC).** These auxiliary switches are mounted in the Equipment Assembly enclosure to provide indication that a drawout Switching Device is in the "connected" ("in-service") or not in the "connected" ("test" or "disconnected") position. These auxiliary switches provide normally open or N.O. contacts (that are closed when the switching device is in the connected position and open when not in the connected position) and normally closed or N.C. contacts (that are open when the switching devices is in the connected position and closed when not in the connected position). The Supplier shall furnish each Switching Device with a sufficient number of connection status auxiliary switch contacts to meet all control and indication requirements plus the quantity of spare connection status auxiliary switch contacts as specified on the 16101 Specification Sheets or shown on the typical schematics furnished by the Purchaser. Because these contacts are utilized as permissives for closing control of the drawout Switching Devices, the Supplier shall ensure, either by mechanical interlocks or the design of the connection status position auxiliary switch, that the Switching Device cannot be closed unless the Switching Device is in the fully-connected position or it is sufficiently racked out that closure of the Switching Device will not cause arcing.
Supplier-Furnished Drawings	
319	The Supplier shall furnish a complete set of drawings to fully document the equipment provided. These drawings shall be in accordance with the Supplemental Requirements listed in Section 21000, including Q500 (Shop Drawings and Instruction Manuals), Q502 (Electrical Data), and shall meet the requirements below. **One-Line and Three-Line Diagrams.** The Supplier shall submit one-line diagrams for acceptance by the Purchaser. The Supplier shall submit three-line diagrams after receiving back one-line diagrams accepted by the Purchaser. **Schematic and Wiring Diagrams.** Equipment schematic and wiring diagrams shall be provided by the Supplier. These drawings shall be based on, and identical in function to, schematic (elementary) diagrams and connection diagrams furnished by the Purchaser. After receiving the Purchaser's diagrams, the Supplier shall prepare their schematic (elementary), connection, and wiring diagrams, which shall indicate the same terminal designations and the same terminal arrangement as indicated on the Purchaser's diagrams. Information on each wiring diagram sheet shall include all point-to-point wiring of the entire unit as it would appear to a person wiring the equipment unit, including wiring on the Switching Device itself. Each item of equipment shall be identified by item designation and name. Each schematic and wiring diagram from the Supplier shall clearly indicate the Equipment Assembly tag number and switching device by name and tag number, as shown on the drawings provided by the Purchaser. When the Supplier's standard terminal designations differ from those required by the schematic and connection diagrams furnished by the Purchaser, or from those marked on the Supplier's connection drawings submitted for acceptance and returned by the Purchaser, the Supplier shall revise terminal designations in accordance with the Purchaser's requirements on both the Supplier's drawings and the terminal blocks.
320	When the Supplier's connection drawings are submitted for review, the Purchaser may mark thereon all external circuit and wire designations required, and such designations shall be added to the connection drawings by the Supplier. Except as marked on the drawings submitted by the Supplier and returned by the Purchaser, no external circuit and wire designations shall be indicated on the Supplier's drawings.
Infrared Inspection Ports	
321	When specified herein, infrared inspection ports shall be permanently installed to allow thermographic inspection of all medium voltage busbar and cable connections without removal of covers. Each port shall have a reinforced lens suitable for application with the thermography means being used and capable of withstanding the pressures produced by an arcing fault without allowing passage of hot gasses or material. Each port shall have a cover that can be put in place when the port is not in use.
Nameplates	
322	Engraved nameplates shall be furnished for the front and rear of each Equipment Assembly and front and rear (where accessible) of each cubicle. An Equipment Assembly nameplate shall be located on the front top center of each Equipment Assembly. In the case of a double-ended Equipment Assembly, each half section of the double-ended Equipment Assembly shall be provided with an engraved nameplate mounted on the front top center of the Equipment Assembly half section. That nameplate shall be engraved with the Purchaser's half section nametag and list the range of the cubicles that the equipment half section spans (e.g., Cubicles 1A through 5B). In addition, each cubicle shall be identified with its function designation engraved on laminated plastic tags of at least 1.5 inches (40 mm) by 4 inches (100 mm). Each device installed in the cubicles, each plug assembly and terminal strip, and each indicating and operating element shall be identified with permanently attached nameplates. Unless otherwise specified, nameplates shall be white plastic laminate with black engraved letters. All nameplates shall be clearly visible. Inscriptions on these nameplates shall coincide with those used on the drawings approved by the Purchaser. Unless otherwise indicated or modified by the Purchaser during formal review of the vendor shop drawings, all nameplate inscriptions shall match the Purchaser's one-line and schematic drawings, descriptions, or lists, and the nameplates and tags shall meet the Technical Supplemental Specifications Q400 General Equipment Requirements.
Channel Sills	
323	Where specified herein, channel sills shall be furnished with specified equipment. These sills shall be arranged to provide for track welding to the equipment base on the inside of the units, and shall be shipped sufficiently in advance to the project site for installation in the concrete base which will support the equipment.
Mimic Bus	
324	If specified herein, provide a mimic diagram on the front of each Equipment Assembly that depict the interconnection of equipment within that Equipment Assembly and equipment feeding and being fed by that Equipment Assembly. Mimic diagrams shall be submitted to the Purchaser for approval.
Tightening of Connections	
325	On the erection and assembly drawings, the Supplier shall include complete information for the tightening of all electrical connections secured with bolts or studs. The information furnished shall include torque wrench settings or complete details of other tightening procedures recommended for bus joints, connector attachments, and contact attachments. All access openings for electrical connections shall include protective isolation barriers.
Outsourcing of Components	
326	The Supplier shall include a list of all equipment components that will be sourced from outside the final assembly plant with lead times longer than 30 days with the proposal. This list shall give a detailed description of the component, its manufacturer, and the location it will be shipped from.
Test Requirements	
327	For Switchgear required to meet IEEE/ANSI requirements: After the equipment has been completely fabricated, it shall be tested in accordance with the manufacturer's standard tests. The production (routine) tests shall include the following items as minimum in accordance with all applicable standards: High Voltage tests for all main and control circuits Mechanical operation and interlocks. Circuit breaker operation tests, including local and remote trip/close. Current transformer and voltage transformer ratio and polarity check Complete wiring check. Full operational tests of the control schemes and equipment to verify correct operation shall be performed at the Purchaser's discretion. Overall fit and finish Accuracy of calibrated pickup and dropoff levels over the range of relay settings.

16120 – AC/DC Panelboards Datasheet(s)

General				
1.	**Site Conditions**			
2.	Site Location	Hastings, Nebraska		
3.	Ambient Design Temperature Range	Minimum: 60 °F	Maximum: 100 °F	
4.	Design Altitude Above Sea Level	See D100		
5.	**Applicable Standards**			
6.	AC/DC Panelboards	ANSI, IEEE, NEMA, UL		
Testing Requirements				
7.	Purchaser Witness Test		No	
8.	Standard Factory testing to be performed in accordance with		ANSI, IEEE, NEMA, UL	
Technical Attachments				
9.				
10.				
11.				
12.				

Applicability		
13.	**Panel Tag**	**Panel Description**
14.		PDC 120/240V AC Power Panel
15.		
16.		
17.		

Breakers and Accessories		
18.		**Quantity**
19.	20A single-pole MCCB	6
20.	20A two-pole MCCB	2
21.	30A single-pole MCCB	6
22.	30A two-pole MCCB	2
23.	50A single-pole MCCB	2
24.	Breakers as required for PDC loads	By Supplier
25.		

Ratings				
26.	**Panel**			
27.	Operating Voltage	240 VAC	Frequency	60 Hz
28.	Bus Configuration	1-Ph, 3-wire, w/ neutral	Rating	200 A
29.	Bus Material	Copper		
30.	Incoming Main Protective Device	Circuit Breaker	Rating	200 A

31.	Circuit breaker positions	Quantity 42		
32.	Interrupting Capacity	22 kA		
33.	Branch circuit protective devices	Molded Case Circuit Breaker		
34.	Enclosure Type	NEMA 1	Form of Separation	Not Applicable
35.	Enclosure Finish	Painted	Color	Mfr's Standard
36.	Enclosure Material	Manufacturer's Std	Mounting Method	Surface or Free-Standing
37.	Enclosure Cable Entry	Bottom	Location	Indoor-Air Conditioned
38.	Enclosure Hazardous Area	Not Applicable		

Additional Requirements	
39.	Each panelboard cabinet shall consist of a box with a removable front, complete with hinged door, latch, and master keying lock. The panelboard interior shall be equipped with a dead-front shield separate from the cabinet front and a circuit directory cardholder and card with a clear plastic covering shall be provided on the inside cabinet door. The directory card shall have a space to identify each circuit in the panelboard. An engraved nameplate shall be provided on the front of the panelboard door.
40.	All main and branch circuit devices shall be bolt-on. Branch circuit devices shall be individually front replaceable type, and shall indicate ON, OFF, and TRIPPED. Circuit breakers indicated as multiple-pole shall be common trip. Branch circuit breakers installed in the panelboard shall be identified with odd numbers on the left and even numbers on the right.
41.	All AC panelboards shall have neutral and ground busses. The neutral bus shall be insulated from the cabinet with provisions for grounding and have solderless connectors, numbered to agree with the branch circuits. The equipment grounding bus shall have a main lug and solderless connectors, numbered to agree with the branch circuits.
42.	Line 33 – When Circuit Breakers are specified, they shall be thermal magnetic type suitable for the voltage and interrupting capacity specified. Circuit Breakers shall be Ground Fault Circuit Interrupter (GFCI) type where shown on Quantity list.
43.	The Supplier shall perform the type tests for major components if required. Type test certificates from identified components are acceptable in lieu of the individual type test. Type test certificates shall be made available to the Purchaser at no extra charge upon request.
44.	The Supplier is responsible for all costs associated with correcting deficiencies and retesting in the event of a test failure.
45.	

DC Panelboard Datasheet

Applicability				
1.	**Panel Tag**	**Panel Description**		
2.		PDC 125V DC Power Panel		
3.				
4.				
5.				
Accessories and Options				
6.			**Provided by Supplier**	
7.	Convenience receptacle internal to panel		No	
8.	Ground Detection System Arga Controls #25-489 or equal		Yes	
9.	Ground circuit pulsing / tracing system		No	
10.	Voltage dropping diode system		No	
11.				
Ratings				
12.	**Panel**			
13.	Operating Voltage	125 VDC	Frequency	60 Hz
14.	Bus Configuration	2-wire, ungrounded	Rating	200 A
15.	Bus Material	Copper		
16.	Incoming Main Protective Device	None - Lugs Only	Rating	200 A
17.	Interrupting Capacity	10 kA		
18.	Branch circuit protective devices	Molded Case Circuit Breaker, Minimum 20 two pole breakers, install all breakers in panel		
19.	Panel Type	Manufacturer's Standard		
20.	Enclosure Type	NEMA 1	Form of Separation	Not Applicable
21.	Enclosure Finish	Painted	Color	Mfr's Standard
22.	Enclosure Material	Manufacturer's Std	Mounting Method	Free-Standing or Wall-mounted
23.	Enclosure Cable Entry	Select	Location	Indoor-Air Conditioned
24.	Enclosure Hazardous Area	Not Applicable		
25.	Hazardous Area Compliance Method	N/A	Viewing Window	No

Additional Requirements	
26.	Each panelboard cabinet shall consist of a box with a removable front, complete with hinged door, latch, and master keying lock. The panelboard interior shall be equipped with a dead-front shield separate from the cabinet front and a circuit directory cardholder and card with a clear plastic covering shall be provided on the inside cabinet door. The directory card shall have a space to identify each

	circuit in the panelboard. An engraved nameplate shall be provided on the front of the panelboard door.
27.	All main and branch circuit devices shall be bolt-on. Branch circuit devices shall be individually front replaceable type, and shall indicate ON, OFF, and TRIPPED. Circuit breakers indicated as multiple-pole shall be common trip. Branch circuit breakers installed in the panelboard shall be identified with odd numbers on the left and even numbers on the right.
28.	All DC panelboards designated as main battery panelboards shall have insulated buses and a non-conductive barrier between the positive and negative line terminals.
29.	Line 8 - When a ground detection system is provided by the Supplier, it shall detect under/over voltages and +/- ground faults for each battery. All of the output contacts shall be wired out to terminal blocks within the panel for wiring to the Purchaser's RTU.
30.	Line 18 – When Circuit Breakers are specified, they shall be thermal magnetic type suitable for the voltage and interrupting capacity specified.
31.	When a battery disconnect switch or breaker is shown on the load list, it shall be furnished with a contact that opens to alarm when the disconnect switch or breaker is not closed (battery disconnected from the DC bus). When fuses are specified with the battery disconnect switch on the load list, the fuses shall be furnished with a contact opens to alarm when the fuses are blown. When a battery charger circuit breaker is shown on the load list, it shall be furnished with a contact that opens to alarm when the circuit breaker is not closed.
32.	The Supplier shall perform the type tests for major components if required. Type test certificates from identified components are acceptable in lieu of the individual type test. Type test certificates shall be made available to the Purchaser at no extra charge upon request.
33.	The Supplier is responsible for all costs associated with correcting deficiencies and retesting in the event of a test failure.
34.	A fused disconnect switch may be provided in lieu of a main breaker on the DC panel. Supplier shall wire from the battery to the disconnect switch and to the battery.

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 the Purchaser 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 the Purchaser'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 the Purchaser.

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 the Purchaser as specified in the contract documents prior to starting fabrication, site installation/erection or commissioning activities as applicable by scope. The Purchaser 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 the Purchaser. 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 the Purchaser informed of the progress of the work. When shop inspection and test points have been designated by the Purchaser as witness, in-process and/or hold points, the Supplier shall notify the Purchaser 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 the Purchaser 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 the Purchaser 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 the Purchaser but the Purchaser 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 the Purchaser'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 the Purchaser, unless prior written authorization is obtained from the Purchaser.

- 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 the Purchaser but the Purchaser 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.

The Purchaser 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 the Purchaser 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 the Purchaser.

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

Surveillance Type	Task
Inspect	Pre-shipment inspection

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.

The Purchaser 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

The Purchaser may elect to perform assessments, quality audits, or witness testing at any time during the manufacturing process. The Purchaser may designate an authorized agent for assessments, witness testing, or quality audits. Authorized agent may be an employee of the Purchaser or an outside agency. When an outside agency is designated as an authorized agent for the Purchaser, such designation will be in writing with a copy provided to the Supplier. When the term "Purchaser's representative" is used, it may mean the Purchaser 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. The Purchaser'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 the Purchaser's representative unless waived in writing by the Purchaser's representative. The Supplier shall bear all costs for such tests, except the compensation and expense of the Purchaser'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, the Purchaser 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 the Purchaser for review and approval. During witness and hold point activities, if the Purchaser's representative identifies a noncompliance issue, the Supplier shall document

the noncompliance issue and provide a copy of the documentation to the Purchaser's representative. If the Supplier disagrees and does not document the noncompliance, the Purchaser'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 the Purchaser 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 the Purchaser 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. The Purchaser 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 the Purchaser 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, the Purchaser 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 technical supplementals applicable to each technical section are indicated below.

	Technical Section Number	Technical Section Name	Applicable Technical Supplementals
1	01100	Scope of Work	D100, E000, E100, Q301, Q400, Q500, Q502, S100, S400
2	13125	Pre-Manufactured Metal Equipment Building	D100, E530, Q301, Q400, Q500, Q502, S100
3	16101	Medium Voltage Switching Devices	Q500, Q502
4	16120	AC-DC Panelboards	Q400, Q500
5	16125	Dry Type Transformers	D100, Q301, Q500, Q502, S100
6	16176	Batteries	D100, Q301, Q500, Q502, S100
7	16177	Battery Chargers	D100, E530, Q301, Q400, Q500, Q502, S100
8	19000	Quality System Requirements	

21000.2 Technical Supplemental Specifications

The technical supplemental specifications follow.

D100 Site Meteorological and Seismic Data (Revised by Project: 12Nov21)

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

General Design Data:	
Building Code	International Building Code (IBC) 2018
Risk Category	I
Site Elevation (Mean Sea Level), ft (m)	1925 ft
Rainfall – 24 Hour, 25 Year event, inches (mm)	5.08 inches
Frost Depth, inches (mm)	42 inches
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 (m/s)	106 mph
Exposure Category	C
Topographic Factor, Kzt	1.0
Directionality Factor, K_d	0.85
Velocity Pressure Exposure Factor, K_z	1.0
Snow Design Data:	
Ground Snow Load, P_g, lb/ft^2 (kN/m^2)	25 lb/ft^2
Importance Factor (Snow Loads), I	0.80
Snow Exposure Factor, C_e	0.90
Ice Design Data:	
Nominal Ice Thickness, t, Due to freezing rain at a height of 33 ft (10 m), inches (mm)	1 inch
Concurrent Wind Speed, V_c, mph (m/s)	50 mph
Importance Factor (Ice Loads – Ice Thickness), I_i	0.80
Importance Factor (Ice Loads – Concurrent Wind), I_w	1.00
Seismic Design Data:	
0.2 Second Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration , S_s	0.077
One Second Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration, S_1	0.041
Site Class	D
Seismic Design Category	A
Importance Factor (Seismic Loads), I_e	1.00

E000 Electrical Equipment and System Voltages (Revised by Project: 17Dec21)

Power Supply Code	Continuous Voltage (Volts)	Momentary Voltage Dip to X% of Nominal	Frequency (Hz)	Configuration	System Grounding	Transfer to Alternate Source	Max Sym Short-Circuit Amps
MV-3 Medium Voltage	13800 Nom 14520 Max 12420 Min	80	60 Nom 61.5 Max 58.5 Min	3-Phase, 3 Wire, Wye (3/PE)	Resistance (IT)	Manual	50,000 (3-Ph) 1,500 (L-G)
LV-1 Low Voltage	240/120 Nom 252/127 Max 228/108 Min	80	60 Nom 61.5 Max 58.5 Min	1-Phase, 3 Wire	Solidly Grounded (TN-S)	N/A	22,000
DC-1 DC Power	125 Nom 140 Max 105 Min	70	N/A	Two-Pole	Ungrounded	N/A	20,000 (P-P)
CP-1 Control Power (AC)	120 Nom 127 Max 108 Min	80	60 Nom 61.5 Max 58.5 Min	Single-Phase, 2 Wire (1/N/PE)	Solidly Grounded (TN-S)	N/A	22,000

Definitions: N – neutral; PE – protective earth conductor; IT - unearthed transformer neutral; TN-S - transformer neutral earthed, separate neutral and earth conductors

E100 Wiring Methods, Cable, and Raceway (Revised by Project: 17Dec21)

E100.1 General Requirements

Auxiliary equipment such as terminal blocks, auxiliary relays, or contactors shall be located in compartments, enclosures, or junction boxes in a manner that allows service personnel direct access to the equipment without removal of barriers, cover plates, or wiring.

A shorting type terminal block shall be provided for each set of current transformers supplied. The shorting terminal blocks shall be the nearest to the current transformers.

Current transformers shall be grounded only at the shorting terminal blocks. The grounding conductor shall be identified so that it may be disconnected in the field as required.

Materials containing asbestos shall not be used.

Each terminal block, terminal, conductor, relay, breaker, fuse block, and other auxiliary devices shall be permanently labeled to match the identification on the Supplier drawings. All terminals provided for termination of external circuits shall be identified by inscribing permanent terminal designations on the terminal block. All internal wiring terminations shall be labeled, marked or otherwise uniquely identified at each end of the conductor using the Supplier's standard method. Conductor identification shall be permanent, unaffected by age, heat, or solvents and not easily dislodged.

Reference to NEC means codes and standards as defined by the USA National Electrical Code, ANSI/NFPA 70.

E100.2 Equipment Safety Grounding (Earthing)

An integral shipping unit or assembly shall be furnished with a grounding pad suitable for field connection to the station ground grid by others. All equipment on an integral shipping unit or assembly shall be grounded to a common point on the shipping unit or assembly. Control devices such as solenoids, or pressure and limit switches (unless such devices require grounding for proper operation) are not required to be grounded.

Isolated logic system or single-point ground connections required for proper operation of electronic equipment shall be insulated from the equipment safety ground. Such connections will be extended, using insulated cable, to a single termination point suitable for field connections to the appropriate ground system by others.

The raceway and tray system shall not be considered to be a ground conductor except for itself. All metal conduits containing power circuits shall be provided with grounding type bushings and be wired together inside enclosures and connected internally to the enclosure ground pad bus. Ground conductor shall be sized in accordance with NEC or IEC 60364 but shall not be less than 8 AWG (10 mm2) bare copper conductor.

Ground conductors shall be soft drawn, stranded copper Class B (per NEMA WC 3) or Class II (per IEC 60228).

E100.3 Wiring Methods

All electrical wiring interconnections between motors, devices, panels, and boxes shall use one of the following wiring methods.

Non-armored cable supported and protected by raceway or cable tray in accordance with the NEC.

The material, sizing and installation of the cable and raceway system shall meet the requirements of NEMA and the NEC and be suitable for the environment in which it will be installed.

All raceway and cable entries into equipment that will be installed outdoors or in wet environments shall be from the bottom or side and be raintight.

All cable tray and raceway for Supplier's wiring shall not interfere with raceway or cable entry by the Purchaser. Supplier shall submit raceway plan drawings for review and approval by the Purchaser and shall modify the raceway design as required to eliminate interferences for no additional cost.

Conduit shall be rigid galvanized steel, aluminum or intermediate metallic conduit (RMC or IMC) rated for heavy resistance to impact and compression in accordance with the NEC.

All conduit connections shall be of the threaded type, and all conduit, couplings, and fittings shall be hot-dipped galvanized steel or aluminum. Conduit fittings used on outdoor equipment shall be gasket type.

Moisture pockets shall be eliminated from the conduit raceway system.

Liquidtight flexible metallic conduit (LFMC) may be used where it is not subject to physical damage and is supported in accordance with the NEC. Jacket shall be sunlight resistant.

Cable tray systems furnished and installed by the Supplier shall include cable tray, fittings, supports, accessories, and hardware required for a complete system.

Cable tray shall be aluminum, hot dipped galvanized steel or fiberglass. Cable trays and associated component materials shall conform to the requirements of NEMA.

Hardware for aluminum cable tray shall be case hardened galvanized steel suitable for indoor and outdoor use. Hardware for aluminum cable tray in corrosive areas shall be Type 316 stainless steel.

Cable tray and all fittings shall be supported in accordance with NEMA VE-2 for metal tray or cable tray manufacturer's recommendation.

Cable tray covers shall be of the same manufacturer and material as the cable tray. All covers shall be securely fastened to withstand the wind loads specified.

Cable tray covers shall be installed on all cable trays containing insulated (non-armored) cables for all pre-manufactured skids.

Tray covers in pre-manufactured enclosures shall be installed on the first six feet of any cable tray extending vertically from floor penetrations.

Raceway for enclosure and building wiring for lights and convenience receptacles, may be the Supplier's standard as long as it meets the requirements of the NEC or IEC 60364.

E100.4 Cable

Splices in cable are not allowed.

Wires or cables used for internal wiring of control panels or cabinets may be supplied and installed according to the Supplier's standard as to wire size and insulation, except that all single conductor wires and cables shall meet the IEC 60332-1 flame test, the UL 1581 VW-1 flame test, or the CSA FT1 flame test.

All single-conductor or multi-conductor cables external to control panels or cabinets, and all multi-conductor cables internal to control panels or cabinets provided and/or installed by the Supplier shall pass the IEC 60332-3-24 Category C flame test, the IEEE 1202 flame test, or the CSA FT4 flame test.

All cable shall meet the following requirements:

All cable except thermocouple cable shall be stranded copper conductors

Power cable shall have flame retardant cross-linked polyethylene (FR-XLPE) or ethylene propylene rubber (FR-EPR) insulation with a minimum 600V rating, a PVC, CPE, or CSPE jacket, and a minimum size of 14 AWG. Single-conductor, non-armored cable may be un-jacketed.

Control cable shall have flame retardant cross-linked polyethylene (FR-XLPE) or ethylene propylene rubber (FR-EPR) insulation with a minimum 600V rating, a PVC, CPE, or CSPE jacket, and a minimum size of 16 AWG.

Cable for current and potential transformers shall have a minimum size of 12 AWG.

Instrument cable shall be twisted pairs or triads with individual shields, XLPE or PVC insulation with a minimum 300V rating, a PVC jacket, and a minimum size of 20 AWG. Multi-pair or triad cables shall also have an overall shield.

Thermocouple cable shall be solid conductor, twisted pairs with individual shields, XLPE or PVC insulation with a minimum 300V rating, a PVC jacket, and a minimum size of 20 AWG. Insulation shall be color coded in accordance with ASTM E-230/E230M. Multi-pair cables shall also have an overall shield.

Shielding of thermocouple and instrument cables shall consist of aluminum-polyester tape and copper drain wire.

Armored cables shall have an extruded PVC jacket over the armor.

E100.5 Cable Glands
Not used.

E100.6 Terminations
Internal wiring of factory prewired electronic system cabinets may be terminated using the manufacturer's standard method, except as noted herein.

Conductors for current transformer circuits shall be terminated with preinsulated ring type terminal connectors.

Control conductors 8 AWG and smaller for circuits that leave an enclosure, cabinet, or skid shall be terminated in a manner consistent with the type of terminal block used. Terminal block requirements are given in the E100.8 Terminal Blocks article below.

E100.7 Electrical Enclosures
Junction boxes and pull boxes shall be provided without knockouts.

All junction boxes or pull boxes 4 inch trade size or smaller in any dimension shall be galvanized malleable iron or acceptable equal. Galvanized steel boxes may be used with electrical metallic tubing.

All enclosures shall be manufactured from materials that will not degrade when subjected to sunlight.

Where single conductor power cables enter an enclosure using cable glands, sufficiently sized, non-magnetic glanding plates shall be provided.

Junction boxes, electrical control panels, and cabinets shall be provided with an identification nameplate mounted on the front of the enclosure. The nameplate inscription shall be acceptable to the Purchaser.

The size and number of conduit entrances and terminal enclosures for terminating the Purchaser's cable shall be coordinated with and acceptable to the Purchaser.

Enclosures for non-hazardous areas shall meet the requirements in the following table:

Location	NEMA	IEC	Material
Indoor Dry	Type 12	IP52	Mfr's Standard
Indoor Wet or Outdoor	Type 4	IP55	Mfr's Standard
Indoor Wet or Outdoor	Type 3R	IP43	Mfr's Standard

E100.7.1 Electrical Enclosure Heating

When electrical enclosure heating is provided by the Supplier, the space heaters, adjustable thermostat, and fuse/fuse block or circuit breaker or other means of disconnect shall be pre-wired in the enclosure. Use of space heaters shall not change or discolor any painted surface.

Space heater capacity shall be as required to maintain the enclosure internal temperature above the dew point under the specified site conditions. Space heaters shall be rated and operated at the voltages shown below.

Rated Voltage	240 VAC	
Operating Voltage	120 or 240 VAC	1-phase, 2-wire

E100.7.2 Electrical Panel Lighting

When electrical panel lighting is provided by the Supplier, the lights, light switch and fuse/fuse block or circuit breaker or other means of disconnect shall be pre-wired in the enclosure.

Lights shall meet the requirements in the table below.

Fixture	Ballast	Rated Voltage	Frequency	Illumination
LED	Electronic	120 VAC, 1-phase, 2-wire	60 Hz	30-fc

E100.8 Terminal Blocks

Terminal blocks shall be furnished for all wiring leaving an enclosure, for internal circuits crossing shipping splits, and where equipment parts replacement and maintenance will be facilitated.

Terminal blocks for external connections shall be grouped in the instrument and control compartment for easy accessibility, without interference from structural members or instruments. 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. For terminal blocks interfacing with the Purchaser's field cabling, one side of the terminal block shall be used by the equipment manufacturer for factory wiring and the other side of the terminal block shall be reserved for the Purchaser's field cabling terminations.

Terminal blocks shall not be mounted in compartments containing uninsulated conductors operating at voltages above 1000 volts.

The arrangement of connections on terminal blocks shall be acceptable to the Purchaser.

Self-stripping terminal blocks are not acceptable. Angled terminal blocks and multiple deck terminal blocks shall only be used where approved by the Purchaser. Multiple deck blocks shall not exceed three decks/layers in construction.

Each terminal block shall be provided with a unique identifier. All terminal points shall be uniquely identified on the terminal block and, where permitted by the safety codes and standards, shall be without covers. Spare points shall be provided with blank strips that can be permanently marked in the field.

Twenty percent (20%) spare (unused) terminals shall be furnished evenly distributed on the terminal blocks.

Terminal blocks shall be manufactured from materials rated Inflammability Class V0 in accordance with UL 94.

Terminal blocks not used for internal, factory prewired electronic systems or for thermocouple extension wire, shall be rated for 600 volts or greater unless approved by the Purchaser.

No more than two conductors shall be terminated at one connection point.

For installations requiring "Increased Safety" terminal blocks, the terminal blocks shall have a CENELEC Certification Code marked on the terminal block.

For installations requiring voltage interface of 50V and greater, the terminal block shall be designed so that incidental contact with bare metal screws, straps, jumpers, or conductors is not possible (finger safe design). If this is not practical, clear plexiglass or polycarbonate barriers shall be installed so that incidental contact with energized materials is not possible.

Rails for modular terminal blocks not used as a grounding conductor shall be corrosion-resistant steel. Rails used as a grounding conductor shall be copper. Modular terminal blocks shall be designed to be removed from the mounting rails independent of adjacent terminal blocks.

When knife disconnect terminal blocks are provided, they shall be have test ports on both sides of the knife disconnect. The knife disconnect shall be permanently attached to the block.

Terminal blocks for field terminations shall accept solid or stranded copper conductors with any wire preparation method, such as crimps, ferrules, tinning, or no preparation. Clamping shall ensure mechanical and electrical integrity without damage to the conductors. Current carrying terminal parts shall be coated or plated to prevent corrosion.

The current carrying parts of thermocouple terminal block shall be of the same materials as the thermocouple extension wire. Termination points for extending the shield wire of the thermocouple extension cable shall be provided adjacent to the block or shall be integral to the block.

Terminal blocks shall meet the requirements in the following table.

Terminal Block Type	Applications	Acceptable Termination Methods	Acceptable Construction	Acceptable Manufacturers
Feed-Through	Thermocouple Extension Wire	Strap Screw Compression	Manufacturer's Standard	Strap Screw - Manufacturer's Standard Compression - Allen-Bradley, Phoenix Contact, Wago, Weidmuller, or Purchaser-Approved Equal

Terminal Block Type	Applications	Acceptable Termination Methods	Acceptable Construction	Acceptable Manufacturers
Feed-Through	DCS and PLC I/O,	Compression Strap Screw Cage/Spring/ Tension Clamp	Modular Rail Grouped Block Bolted	Strap Screw - Manufacturer's Standard Cage/Spring/Tension Clamp – Allen Bradley 1492 Series, Phoenix Contact ST 4 Series, Wago 282 Series, Weidmuller Z Series, or Purchaser-Approved Equal
Feed-Through	General Purpose Control	Strap Screw, Cage/Spring/ Tension Clamp	Grouped Block, Bolted, Modular, Rail	Strap Screw - Marathon 1500 Series or Purchaser-Approved Equal Cage/Spring/Tension Clamp – Allen Bradley 1492-L Series, Phoenix Contact ST 4 Series, Wago 282 Series, Weidmuller Z Series, or Purchaser-Approved Equal
Shorting	Current Transformer	Strap Screw	Grouped Block Bolted	Marathon 1500 Series or Purchaser-Approved Equal
Power	600 Volt Power (8 AWG through 4/0 AWG [10 mm^2 through 95 mm^2])	Screw, Compression, Stud	Grouped Block Bolted	Manufacturer's Standard
Power	600 Volt Power (6 AWG [16 mm^2] and smaller)	Cage/Spring/ Tension Clamp	Bolted, Modular, Rail	Allen Bradley 1492-L Series, Phoenix Contact ST Series, Wago 283 Series, Weidmuller Z Series, or Purchaser-Approved Equal

E100.9 Hazard Warning Labels

The Supplier shall furnish arc flash and shock hazard warning labels in accordance with National Electrical Code (NEC) 110.16 Arc Flash Hazard Warning. Labels shall be furnished for all medium and low voltage switchgear, panel boards, control panels, and motor control centers. The labels shall be located in a clearly visible area at each point of access to the equipment. Equipment access includes but is not limited to breaker, starter, rear access, panel board, and auxiliary compartment doors. Labels shall be in accordance with ANSI Z535.4 and either one of the examples below:

E530 Electrical Accessories (Revised by Project: 17Dec21)

E530.1 General Requirements

One spare normally open and one spare normally closed contact on each control switch and lockout relay shall be wired out to terminal blocks.

All devices shall be heavy-duty and oil-tight.

E530.2 Electrical Indicating Instruments

Metering devices shall be flush mounted. Displays shall be analog with black markings on a white background or a digital LCD.

Instrumentation with current elements shall be capable of 10 times the rated end scale overload values for a period of 1/2 second duration for a minimum of nine successive overloads with 1 minute between overloads without exceeding the deviations defined in the specified standard. Switchboard meters shall not open the circuit when subjected to 30 times the rated secondary current of the associated current transformer circuit for a period of 2 seconds.

Electrical indicating instruments shall be as listed in the table below.

Input Range					
Voltage Element	**Current Element**	**Transducer**	**Manufacturer**	**Accuracy Class (% of Full Scale Value)**	**Display**
0-150 V		0 – 1 mA	Yokogawa Weschler Electric Corporation Crompton Instruments Purchaser Approved Equal	1	Analog or Digital LCD
	0 ± 5A	0 ± 1 mA	Yokogawa Weschler Electric Corporation Crompton Instruments Purchaser Approved Equal	1	Analog or Digital LCD

E530.3 Control Relays

General service auxiliary relays shall be Allen-Bradley Bulletin 700 Type P or Purchaser approved equal. Where current carrying requirements exceed the capacity of the general service auxiliary relays, auxiliary relays shall be Allen-Bradley Bulletin 700 Type PK, General Electric Type HFA or HGA, Westinghouse Type MG-6, or Purchaser approved equal.

Timing relays shall be solid-state as manufactured by Agastat or Purchaser approved equal.

DC relays that interface with the Purchaser's control system shall have a diode surge suppressor installed across the relay coil.

E530.4 Electrical Switches

Control switches shall be 600 volt, 20 ampere, multistage, rotary type, with black, pistol grip type handles and engraved black plastic escutcheon plates with targets.

Electrical switches shall be as specified in the below table.

Electrical Switches		
Application	**Description**	**Manufacturer/Style**
Control Switches	Control Panel	General Electric Type 95, SB-1, or SB-10 with large cover Electro-Switch Type 24, W, or 20K Purchaser Approved Equal
Push Buttons and Selector Switches	Control Panel or Local	Honeywell Micro Switch Type PT Square D Class 9001 Type K Purchaser Approved Equal
Toggle Switches	Control Panel	Honeywell Micro Switch Type TL Purchaser Approved Equal

E530.5 Indicating Lights

Indicating lights for local control stations shall be LEDs and shall permit light changing from the front.

E530.6 Contacts

Contact ratings for all electrical accessory devices shall be suitable for interrogation voltages up to 250 V AC or DC and for switching currents in the milliamp range.

All contacts that interface with the Purchaser's control system shall be electrically "dry." Solid-state switches or triac outputs are not acceptable. All contacts shall allow the Purchaser's I/O cards to distinguish between a normally open and a normally closed contact.

Alarm contacts shall include one normally open and one normally closed contact.

E530.7 Colors of Indicating Devices and Actuators

If words or abbreviations are required to describe the function of the indicating device or actuator, they shall be English. Indicating lights shall be energized when the condition described in the following table exists, and shall be de-energized when the condition does not exist. Colors shall be as specified in the below tables.

Colors of Indicating Devices		
Color	**Explanation**	**Examples**
Green	Normal off condition requiring no action by the operator	Motor stopped; valve (damper) closed; breaker open, contactor de-energized
Red	Normal running condition requiring no action by the operator	Motor running; valve (damper) open; breaker closed, contactor energized; process within normal limits; cabinet/panel power available
White	Abnormal condition requiring monitoring and/or intervention by the operator	Motor trip; breaker trip, contactor trip; tripping by a protective device or interlock; electrical lockout relay tripped; position change from normal; pressure or temperature beyond normal limits; overload
Blue	Indication of a condition which requires action by the operator	Instruction to enter a value; paralleled electrical power sources to bus causing bus rating to be exceeded
Amber	Equipment start permissive; equipment protective relay reset	General information; electrical lockout relay reset

Colors of Actuators		
Color	**Meaning**	**Examples**
Red	Emergency	Emergency-stop/off
Black	Normal stop/off	Normal stop; open breaker, contactor de-energized
Black	Normal start/on	Normal start; closed breaker, energize contactor

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 including aluminum iso-phase bus duct. 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.

Q170.1.1 Aluminum Iso-Phase Bus Duct

Aluminum iso-phase bus duct shall be fabricated in accordance with the manufacturer's standard practice and the requirements of this technical supplemental.

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 3/16 inch (5 mm) 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.

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 made available for review, when requested.

The supplier shall be responsible for review and acceptance of all subsuppliers WPSs.

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 made available for review when requested.

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: N/A)

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 ISO 12944, Paints and Varnishes – Corrosion Protection of Steel Structures by Protective Paint Systems, for the intended service environment. Surfaces that will be inaccessible after assembly shall be protected for the life of the equipment.

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 (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.

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 Purchaser for verification.

Q400 General Equipment Requirements (Revised by Project: N/A)

Q400.1 Miscellaneous Materials and Services

Miscellaneous materials and services not otherwise specifically called for shall be furnished by the Supplier in accordance with the following, as applicable:

All nuts, bolts, gaskets, special fasteners, backing rings, etc., between components and equipment furnished under these specifications.

All piping integral to or between any equipment furnished under these specifications, except as otherwise specified.

All necessary connections for the Purchaser's piping and instruments.

All necessary instrument, power, and control wiring and raceways integral to any equipment furnished under these specifications. This shall include terminal blocks and internal wiring to these terminal blocks for equipment requiring external connection.

Coupling guards for all exposed shafts and couplings.

Leveling blocks, soleplates, thrust blocks, matching blocks, and shims.

Field office furnishings, supplies, telephone service, and equipment for the manufacturer's technical service representatives.

Erection drawings, prints, information, instructions, and other data for use by the Purchaser's erection contractor.

Detailed storage requirements and lubrication requirements (including frequencies) for use by the Purchaser's erection contractor.

All special tools or lifting beams.

Lifting eyes and lugs for offloading and setting equipment.

The use of all special tools required for erection of the equipment, exclusive of the maintenance tools furnished. Erection tools shall remain the property of the Supplier, and all shipping costs to and from the jobsite shall be at the Supplier's expense.

Q400.2 Fabrication Restrictions

Unless specifically provided otherwise in each case, all materials and equipment furnished for permanent installation in the work shall conform to applicable standard specifications and shall be new, unused, and undamaged.

Asbestos containing materials will not be allowed.

Flanges, fittings, and valves manufactured in the People's Republic of China shall meet following requirements.

Manufacturer’s quality system shall be in accordance with ISO 9001 and the manufacturer shall hold a valid ISO 9001 certificate issued by the certified ISO 9000 certification organization.

Manufacturer shall hold a manufacturer's license issued by the China Special Equipment Inspection & Research Center (CSEI) under General Administration of Quality

Supervision, Inspection and Quarantine of the People's Republic of China (AQSIQ) or an acceptable equivalent in accordance with Purchaser's Engineer.

Products shall have markings as required by ASME B16.1, ASME B16.5, ASME B16.9, ASME B16.10, ASME B16.11, ASME B16.25, or ASME B16.34 as applicable.

The final quality certificate and quality inspection documents shall bear the official stamp of CSEI or AQSIQ or its branches.

Individual parts shall be manufactured to standard sizes and gauges so that repair parts furnished at any time can be installed in the field. Like parts of duplicate units shall be interchangeable.

Q400.3 Nameplates and Tags

Nameplates and tags shall be furnished and shop installed for all equipment with a Purchaser's identification number based upon the guidelines provided herein. The Purchaser will annotate the Supplier's drawings on initial submittals of technical drawings of the equipment. The information will include the nameplate description, tag number, physical size, and lettering height. The type of nameplate will vary because of size constraints, equipment location and/or orientation, or the environment in which the equipment is located.

In general, nameplates shall be furnished for major equipment, including all operator interfaces, control and electrical panels, cabinets, and instrument racks. The nameplates shall be beveled, laminated white phenolic plastic engraving stock with black core or beveled, two-ply vinyl white with reverse engraved black fill. These nameplates shall be 2 inches by 8 inches (50 mm by 200 mm) with three lines of text. The top two lines of text shall be a brief description of the equipment. These lines of text shall be 3/8 inch (10 mm) high. The bottom line of text shall be the Purchaser's identification number of the equipment. This line of text shall be 3/16 inch (5 mm) high. Nameplates that are to be mounted on equipment to be installed in nonair-conditioned areas shall be attached with stainless steel panhead screws, rivets, drive screws, or epoxy glue. Nameplates that are to be mounted on equipment to be installed in heated and air-conditioned areas shall be attached with high performance adhesive tape. Nameplates shall be 1/16 to 1/8 inch (2 mm to 4 mm) thick.

Stainless steel tags shall be furnished for field instrumentation, process valves, and other small devices that a plant operator is not likely to have any direct interface with, as directed by the Purchaser. These stainless steel tags shall be permanently attached to the equipment with stainless steel panhead screws, rivets, drive screws, or, with the Purchaser's acceptance, stainless steel wire. The size of these tags shall be a minimum of 1-1/4 inch by 2-1/2 inches (30 mm by 65 mm) 18 Ga thickness and include the Purchaser's identification number. Lettering shall be electro/laser etched, stamped, or engraved on a polished plate, with text at least 3/16 inch (5 mm) in height. Text shall be sized as large as possible within the size constraints of the tag.

Separate nameplates are not required for pressure indicators. They may be provided instead with nameplate information, as described above, permanently engraved on the faces. Face engraving text size and layout shall be readable without magnification.

Q400.4 Factory Assembly

Equipment shall be shipped completely factory assembled, except when the physical size, arrangement or configuration of the equipment, or shipping and handling limitations make the shipment of completely assembled equipment impracticable, in which case the equipment shall be assembled and shipped as stated in the Supplier's proposal. Any deviations after Purchase Order award could result in Supplier's performance of some assembly at the site or backcharges to the Supplier for others required to perform such assembly. When proposals are submitted without statements describing sectional shipments, it will be understood that no field assembly of the equipment will be required and the Supplier shall be responsible for all costs encountered in the field for assembly of sections, accessories, or appurtenances not listed in the Proposal as requiring field assembly.

When indicated in the Schedule of Submittals, the Supplier shall submit a Shipping Plan confirming and detailing the field assembly requirements as stated in the proposal.

All separately packaged accessory items and parts shall be shipped with the equipment. Containers for separately packaged items shall be marked so that they are identified with the main equipment. An itemized packing slip indicating what is in that container only shall be attached to the outside of each container used for packaging. A similar list shall be inside each container. A master packing slip covering all accessory items for a given piece of equipment which are shipped in separate containers shall be attached to one container.

Q400.5 Tools

The Supplier shall furnish and ship with each piece of equipment one set of all special tools required for dismantling, maintenance, and overhaul of the equipment. The tools shall be shipped in separate, heavily constructed wooden boxes provided with hinged covers and padlock hasps.

Maintenance tools for each piece of equipment shall be boxed separately and the boxes shall be marked with the name of the project and the name of the equipment.

The maintenance tools shall include all special handling rigs, bars, slings, and cable. All maintenance tools shall be in new and unused condition and shall become the property of the Purchaser. The bidder's proposal shall include the list of maintenance tools which shall be furnished with the equipment.

In addition to the tools for maintenance and dismantling, the Supplier shall furnish the use of all special tools required for erection of the equipment. Erection tools shall remain the property of the Supplier and all shipping costs to and from the jobsite shall be at the Supplier's expense. Erection tools for each piece of equipment shall be boxed separately. Erection tools shall not be boxed with maintenance tools.

Q500 Shop Drawings and Instruction Manuals (Revised by Project: 11Nov21)

This section, in conjunction with the Schedule of Submittals, stipulates the requirements for engineering data that Supplier 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 Supplier does not already have Project Central transmittal capability, the Purchaser will provide the required credentials for access upon Purchase Order award.

Notification to Purchaser 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 Purchaser. It may be acceptable to have the BOQ detail in other means or media, if approved in advance by Purchaser.

Supplier 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, Purchaser’s Purchase Order title, Purchaser’s Purchase Order file number, project equipment or structure nomenclature, component identification numbers, and Purchaser's name. Equipment, instrumentation, and other components requiring Purchaser-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 the Purchaser’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, Supplier's drawing number, and Purchaser'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
Drawings shall be submitted electronically in unlocked[1] (i.e., no document restrictions or password protection) Portable Document Format (PDF) as well as in native AutoCAD or MicroStation format. If Supplier does not have the capability to provide Portable Document Format (PDF), an alternative submittal format shall be used as mutually agreed between Purchaser and Supplier.

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

Unless this Purchase Order indicates that a drawing or engineering data submittal by Supplier is to be for Purchaser's information only, Purchaser, upon receipt of submittals, shall review and return same to Supplier, marked "No Exceptions Noted," "Exceptions Noted," "Received for Distribution," "Returned for Corrections," "Release for Record," "Void," "Superseded" or "Hold" The timing of Supplier's submittals and Purchaser'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 Supplier to Purchaser under this Purchase Order will be certification by Supplier 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," Supplier may proceed with its Work to the extent of and in accordance with the submittal. Supplier 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 Supplier concurs with Purchaser's comments, Supplier shall incorporate same and may proceed with its Work to the extent of and in accordance with the annotated submittal. Supplier shall submit to Purchaser within fourteen calendar days a revision to the original submittal in which Purchaser's comments have been incorporated. If Supplier determines that it cannot incorporate Purchaser's comments without prejudice to Supplier's warranty or other obligations under this Purchase Order, Supplier shall so advise Purchaser in writing within seven calendar days of its receipt of Purchaser's comments, stating the reasons therefore. Supplier may proceed with its Work to the extent of and in accordance with the annotated submittal only upon Purchaser and Supplier resolving Purchaser's comments.

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

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 the Purchaser's document management system may have been added electronically to the drawing

[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.

and provided to Supplier for the record. Supplier shall not resubmit the drawing or document unless revisions to the design are required. If revisions are required, Supplier shall incorporate Purchaser's information and resubmit as a new revision. Purchaser'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 Supplier. “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 the Purchaser, or the Supplier may have "Holds" on the submitted drawing.

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

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

Q500.4.2.7 Resubmittals. If during or subsequent to the completion of the submittal process, Supplier makes further changes to the equipment and materials shown on submittals that have been reviewed by Purchaser, the changes shall be clearly marked on the submittal by Supplier and the submittal process shall be repeated. If changes are made by Supplier after delivery to the Jobsite, drawings conforming to construction records indicating the changes shall be prepared by Supplier and submitted to Purchaser 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 Supplier shall put the Black & Veatch drawing number on the transmittal letter and submit a complete document.

Q500.4.2.8 Purchaser’s Review. Purchaser'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. Purchaser'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 Purchaser of Supplier's Drawings or other submittals shall not relieve Supplier 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 Supplier. The Project Central **or** project-specific web service will be used by Purchaser to return PDF files to Supplier.

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

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

Files returned to Supplier 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.

Q501 Instruction Manuals (Revised by Project: 11Nov21)

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 Supplier 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	3
Final Copies	5

Q501.2 Instruction Manuals

Supplier 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 Purchaser'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 the Purchaser 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 Purchaser'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.

Supplier 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.

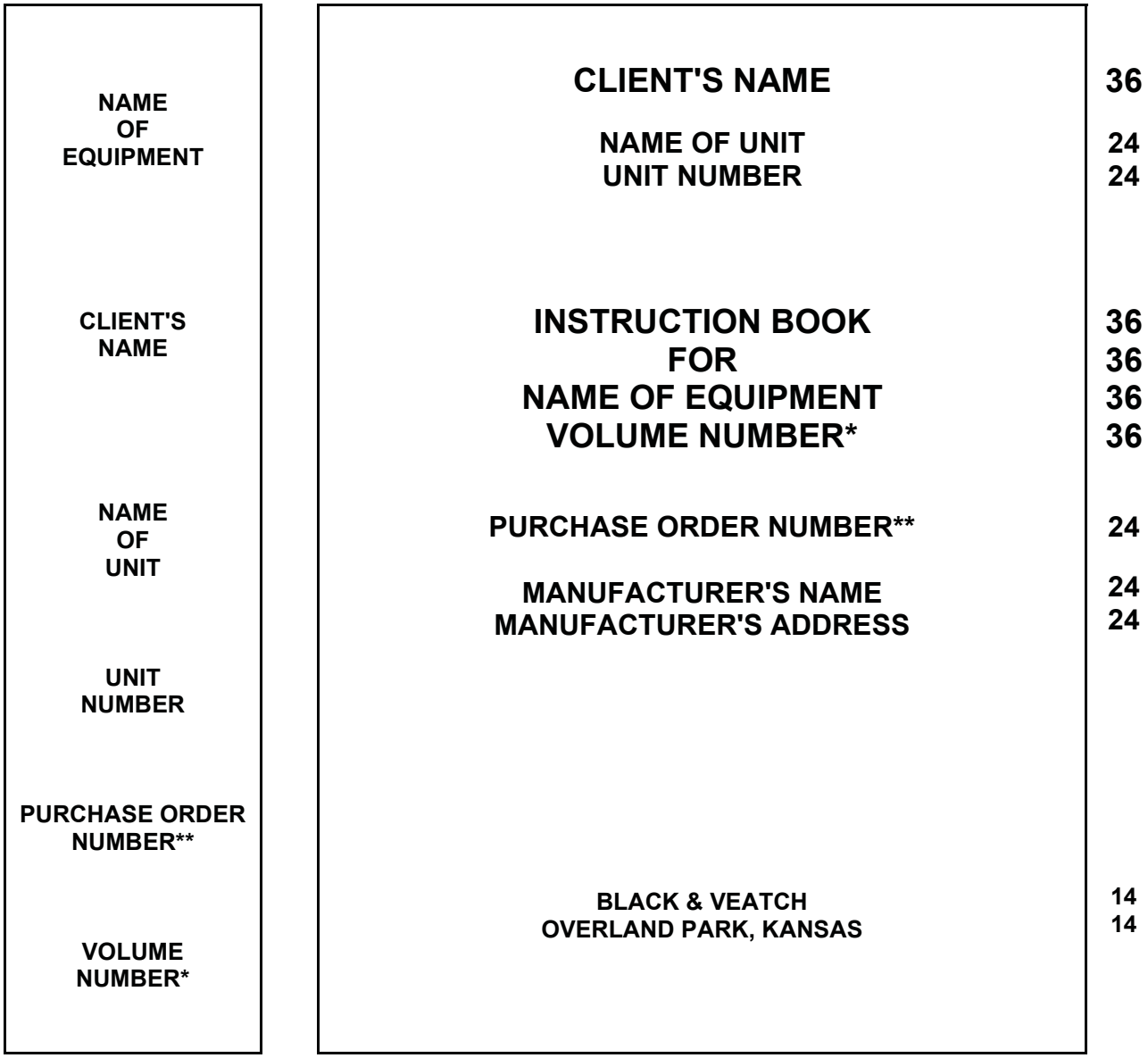
List of maintenance tools furnished with the equipment.

The above listed requirements are the minimum requirements; however, requirements that are clearly not applicable to the equipment may be deleted with Purchaser'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)

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. **Purchaser assigned Purchase Order number.

Q502 Electrical Data (Revised by Project: 11Nov21)

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 Supplier 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
Supplier Cable Data	Electronic
Supplier Circuit List	Electronic

Q502.2 Motor and Electric Actuator Information

Electronic copies of these information sheets shall be downloaded from the following websites (no password required), electronically completed by filling in the requested data, and submitted by the dates shown in the Schedule of Submittals.

http://bv.com/sites/default/files/docs/specifications/MotorInfoSheet.dochttps://www.bv.com/sites/default/files/2020-02/MotorInfoSheet.doc

https://www.bv.com/sites/default/files/2020-02/ElecActuatorInfoSheet.doc

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 Supplier 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 Purchaser, termination schedules identifying field terminations may be substituted for wiring diagrams for connections external to equipment.

When the equipment furnished by the Supplier 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 Supplier 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 Purchaser.

Information indicated on Supplier'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 Purchaser. 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 Purchaser in native AutoCAD format, unlocked (i.e., no document restrictions or password protection).

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

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

Copies of Supplier Cable Data and Circuit List are included at the end of this section. Electronic copies of these information sheets shall be downloaded from the following websites (no password required), electronically completed by filling in the requested data, and submitted by the dates shown in the Schedule of Submittals.

https://www.bv.com/sites/default/files/2020-02/SUPPLIER%20CABLE%20DATA.xlsx

https://www.bv.com/sites/default/files/2020-02/SUPPLIER%20CIRCUIT%20LIST.xlsx

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

S100 Seismic Design (Revised by Project: 12Nov21)

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 furnished by the Supplier shall be designed so that seismic forces are positively transferred to the Purchaser's supporting structure or foundation. The transfer method shall be acceptable to the Purchaser 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, substation structures, transformers, breakers, etc. 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 Not Used.

S100.3.4 Not Used.

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 requiring incorporation by the Purchaser into the Purchaser’s 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 the Purchaser, design calculations shall be submitted for all structures, equipment, or components which are designed in accordance with this Supplemental Specification. If requested by the Purchaser, 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 Supplier Loads for Structures, Equipment, and Components (Revised by Project: N/A)

S400.1 General

This article specifies the Supplier 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 the Purchaser's 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 Supplier and Purchaser must be consistent and inherently clear.

S400.2 Load Table Requirements

Loads provided by the Supplier 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 Supplier's name, structure/equipment/component name, purchase order number, and revision number.

S400.2.1 Load Classifications

S400.2.1.1 Not-To-Exceed (NTE) Loads. NTE loads are defined as loads that may be used for detailed design by the Purchaser but are not classified as final or certified loads. NTE loads are generally submitted by the Supplier when certified load information is not available but the Purchaser 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 Supplier 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 Supplier shall notify the Purchaser as soon as they are aware of this situation and re-submit the load tables with the updated NTE loads soon thereafter.

S400.2.1.2 Final (Certified) Loads. Certified loads are defined as loads that have been verified as final and accurate by the Supplier and which may be used for detailed design by the Purchaser. Certified loads shall be submitted by the Supplier 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 Supplier 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: N/A)

The near-field noise emissions for each equipment component 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 component. Normal operation includes all operating conditions up to the equipment rated capacity exclusive of start-up, shut-down, 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.

Supplier shall identify any equipment which may not comply with the 85 dBA criteria and shall obtain Purchaser’s written approval for each such deviation based on Supplier’s predicted noise emissions level.

Compliance with the near-field noise emissions requirement shall be determined in accordance with industry standard ASME PTC-36. Compliance shall be based on not exceeding the allowable sound pressure level including background sound level corrections and excluding any correction for measurement uncertainties.