

PERFORMANCE SPECIFICATION 16440  
LOW VOLTAGE MOTOR CONTROL CENTER  
FOR

**Berry Petroleum Company**

**House Log Tank Facility**

**Project Number: 13041**

Orig./Lead Eng.:	<u>R. Eldridge</u>	Date	<u>8/27/13</u>
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Client Approval:	<u></u>	Date	<u></u>

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A	RE	ISSUED FOR PERMIT		9/19/2013
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## 1.0 SCOPE OF WORK

This specification covers the minimum requirements for the design, materials, fabrication, inspection, testing and supply of the low voltage motor control centers as indicated in this document, the attachments and reference documents.

The equipment is for House Log Tank Facility located in Garfield County, CO.

## 2.0 DESCRIPTION OF EQUIPMENT

<u>Equipment Number</u>	<u>Description</u>
MCC-001	Motor Control Center, 600A
MCC-002	Motor Control Center, 600A

Description of the motor control center is as follows:

- 480V, 42kA, 3-phase, 60Hz
- Continuous amp rating as shown on one lines
- Feeder breakers
- FVNR starters
- Main Circuit Breaker on 600A MCC's

As shown on One Line Diagram EE-100.

Use standard schematics.

## 3.0 DUTY

The Motor Control Center will be located indoors.

## 4.0 OPERATING CONDITIONS AND DESIGN REQUIREMENTS

### General Design

Motor control center assemblies shall be designed, built and tested according to the requirements of these specifications, the Attachments and the drawings indicated.

Accessories not herein specified or mentioned, but required for the satisfactory performance of the motor control centers, shall be provided.

The work included in this specification shall consist of furnishing all labor, materials, and equipment necessary to design, fabricate and deliver the units assembled, equipped, wired, tested and in *operable* condition so that they can be connected and placed in

service with a minimum of work delay. The units shall consist of the necessary sections integrally designed for use as a complete coordinated assembly, and shall be capable of performing continuously at rated capacities.

#### Design and Construction Details

Structures shall be dead front, freestanding NEMA 1 gasketed metal-enclosed assemblies wired to NEMA Class 1 Type B wiring.

Each vertical section of the motor control center shall accommodate a maximum of six size 1, full voltage, non-reversing, combination starter units.

Motor control center sections shall be nominally 90 inches high and in multiples of 20 inches widths. The depth shall be a minimum 20 inches.

Each motor control center assembly shall be provided with common, horizontal, 98% conductivity, copper power and ground buses, of the continuous and fault current ratings as specified in the attachments and drawings.

Vertical buses shall also be of high conductivity (98%) copper, suitably sized and braced. All bussing shall be continuous except as required for shipping splits.

All section parts shall be accessible from front for maintenance and rearrangement.

Each 20 inch section shall have all necessary hardware and bussing for modular plug-in units to be added at any point in section. Unused space shall be covered by hinged blank doors and equipped to accept future units.

Each section shall have top plate and two-piece bottom plate. Each plate shall be removable to cut conduit entry openings.

Each device compartment shall have an individual flange formed pan type door with quick release, quarter turn latches. Door shall be mounted on unit so that an individual unit may be installed or removed without disturbing adjacent units or removing any hardware.

The incoming line compartment shall be front accessible but isolated from the main bus and other compartments. Incoming line entry shall be as indicated on the attachments.

Each unit compartment shall be provided with an individual front door. Vertical wireways shall have a separate full-length hinged door.

Unit operating handle shall be close coupled to unit disconnect for positive indication of disconnect position with unit door open or closed. Handle shall be mechanically interlocked such that the unit cannot be energized with the door opened without intentionally defeating the interlock feature. In addition, the interlock must be

intentionally defeated to open door with device energized. Handle shall be able to be padlocked in OFF position with up to 3 padlocks with door opened or closed. Handle shall have drilling pattern to add padlock in ON position. Circuit breaker handles shall indicate TRIPPED position in addition to ON, OFF and RESET.

Each compartment shall be supplied with an engraved phenolic plastic nameplate showing black letters on a white background.

Unit compartments shall be of the "plug in" type with facilities for connection to the vertical bus, and all external control wiring connected to pull-apart terminal blocks.

Unit compartment devices of the same size and rating shall be readily interchangeable.

A means shall be provided in the stationary structure for supporting and aligning control units during removal or replacement.

Each unit shall be held in place by quick, captive screw fasteners arranged so units can be withdrawn from the vertical section without access to the rear of the structure.

Compartments, wiring troughs and buses shall be completely isolated from each other by means of barriers to minimize transfer of gases and to localize equipment faults. All barriers and baffles shall be easily removable for access to the bus bar bolts requiring occasional torque tightening or for additions to the existing bus.

Equipment finish shall be manufacturer's standard for the service intended.

Where indicated on the One Line Diagrams the main disconnect device in the MCC's shall be a 3-pole main breaker with ratings as indicated on the drawings.

#### Starter Details

Motor starters in the MCC's and the individual starters shall be three pole, single throw, motor circuit protector (MCP) consisting of a molded case circuit breaker rated to correspond to standard NEMA starter sizes with an instantaneous trip rated in accordance with motor characteristics.

All individual motor starters shall also be equipped with the following:

- Eutectic Alloy overloads are acceptable
- Isolated 2 NO and 2 NC auxiliary contact
- Manual or automatic option reset
- Manual trip
- Self-powered

- Three field adjustable, ambient compensated, thermal overload relays
- Visual trip indication

Each motor starter shall be equipped with a 480 – 120V control power transformer (CPT). These transformers shall be sized with the following volt-amp capacities.

<u>Starter Size</u>	<u>CPT Size</u>
1 and 2	130VA
3 and 4	250VA
5 and 6	500VA

Every transformer secondary shall be protected by a fuse in the “X1” lead. The “X2” lead shall be solidly grounded. The H1 and H2 primary connections shall both be fused.

Push buttons and pilot lights, where specified shall be heavy duty, oil tight type. Pilot lights shall be the transformer type.

The quantity of extra auxiliary contacts, in addition to those furnished as standard, shall be two Normally Open (NO) and two Normally Closed (NC) contacts for non-reversing starters and four Normally Open (NO) and four Normally Closed (NC) contacts for reversing and 2 speed starters.

NEMA 1 size starters shall be the minimum size provided.

Starter sizes shall be as follows:

NEMA Size 1	1/2 to 10hp (0.37kW to 7.5kW )
NEMA Size 2	15 to 25hp (11kW to 18.5kW )
NEMA Size 3	30 to 40hp (22kW to 30kW )
NEMA Size 4	50 to 75hp (37.5kW to 55kW )
NEMA Size 5	100 to 200hp (75kW to 150kW )
NEMA Size 6	210 to 500hp (155kW to 373kW )

NEMA size 6 starters shall be the largest size provided.

All NEMA size 5 and 6 starters shall be supplied with a starter powered 4-20 mA output corresponding to motor current.

Starters shall be full voltage starting, non-reversing or reversing, as specified. Contactors shall be heavy duty, 3-pole, single throw, suitable for repetitive operation in compliance with NEMA standards. Operating coils shall be rated 120V, 60Hz for sizes 1 through 4

starters and 480V, 60Hz for sized 5 and 6. Size 5 starters shall be provided with a 2-pole interposing relay (CR) for starter switching.

Feeder circuit breakers shall be 3-pole, 600V nominal class, molded case thermal-magnetic trip.

## **5.0 MATERIALS OF CONSTRUCTION**

All materials of construction for this equipment, components and accessories shall be new and of a type and grade suitable for the duty and requirements indicated in this document.

There shall be no substitution of materials without prior written approval from Engineer.

## **6.0 NOISE CONTROL REQUIREMENTS**

The noise level of the equipment shall not exceed 85dBA as measured at any point 1 meter from the equipment.

If it is impractical to reduce the noise level to 85dBA, Vendor shall specify the operating noise level.

If noise levels higher than 85dBA can be reduced by additional measures, Vendor shall include a description and cost of the additional measures and specify the original noise level and the resulting reduced noise level.

## **7.0 CODES AND REGULATIONS**

All assembled equipment furnished by Vendor shall comply with all state or country, county or province, and local statutes, regulations and codes applicable at the plant site for the type of equipment specified. Applicable codes and standards in effect on the date of this specification shall govern the design, fabrication and testing of the specified equipment.

If the equipment does not comply with these standards, the Vendor shall so state, fully describe each exception taken, and indicate what standards equipment will meet.

## **8.0 QUALITY STANDARDS**

Vendor shall provide quality control as applicable to codes and standards. If quality control is less than applicable standards, Vendor shall supply details of specific requirements needed to meet the standards.

Vendor shall be responsible for the testing and inspection of all material and work in accordance with this specification and all applicable codes, laws and regulations.

A copy of test reports and material inspection reports shall be available upon request by Engineer or Owner's Quality Control Representative.

Engineer and Owner representatives shall have reasonable access to the work whether it is in preparation or progress. Vendor shall provide proper facilities for such access and for inspection.

## **9.0 MECHANICAL AND ELECTRICAL REQUIREMENTS**

Per manufacturer standard

## **10.0 INSTRUMENTATION REQUIREMENTS**

Per manufacturer standard

## **11.0 PAINTING REQUIREMENTS**

The proposed paint system shall be submitted to Engineer for review and approval. The paint system documents shall include the surface preparation specification, the brand and the specification number for the VOC compliant paint and the proposed color.

Vendor shall supply one quart of touch-up paint with the equipment for field brush-applied touch-ups. The paint container shall include the manufacturer's label and a date or code indicating date of manufacture.

## **12.0 WORK BY OTHERS**

Off-loading, placing and installing motor control center

Structural supports below the motor control center

Supply, installation and termination of power, instrumentation and control wiring external to the motor control center

## **13.0 INFORMATION REQUIREMENTS**

The Vendor shall complete Attachment B, Technical Data Sheet, for each piece of equipment, or the package will not be considered complete.

Drawings and Vendor information shall be supplied as indicated on the Vendor Drawing and Data Requirements.

Where applicable, Vendor shall provide, but not be limited to, the following:

- Center of gravity
- Moving parts and weights
- Dead loads
- Operating weight including impact

- Direction of motion
- Drive details
- Frequency, magnitude and direction of vibratory forces
- Live loads
- Overturn or seismic moments
- Points of support and anchorage
- Vibration information including frequency, amplitude and harmonics
- Weight of equipment

Vendor shall supply all loads necessary for design of supports and foundations.

Vendor shall supply anchor bolt size, bolt locations, bolt projections and any special grouting requirements.



#### 14.0 ATTACHMENTS AND REFERENCE DOCUMENTS

Attachments:

Attachment A	Specific Duty, Design and Service Requirements
Attachment B	Technical Data Sheet

Reference Documents:

Specification No. 00100	Site Conditions
VDDR	Vendor Drawing and Data Requirements Form

One-Line Diagrams:

EE-100	One Line Diagram
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**ATTACHMENT A – SPECIFIC DUTY, DESIGN AND SERVICE REQUIREMENT**

Application: Low Voltage Motor Control Center

Equipment No.: See Section 2.0 for detailed list of Equipment Numbers

**DESCRIPTION OF OPERATING CONDITIONS**

Motor control center application will be for distribution of power for House Log Tank Facility. The project site is in Garfield County, CO. Plant site elevation is 8100 ft. Maximum summer temperature is 100°F. Minimum winter temperature is -30°F. Snow load is 75 psf. Maximum wind speed is 90 mph. Frost penetration below grade is 42". IBC 2003 seismic design category is C, Group II.

**DUTY CYCLE**

The equipment provided under this specification shall be designed for continuous operation, 24 hrs./day, and 365 days/year with allowance for routine maintenance.

**DESIGN REQUIREMENTS**

Located in a non-hazardous area of a classified area plant

**INSTRUMENT AND CONTROL FEATURES**

Manufacturer's recommendation

**AVAILABLE UTILITIES**

Primary power distribution is 480V, 3-phase, 60Hz via padmount generator.

**TECHNICAL REQUIREMENTS**

Per Section 2.0 and 4.0

**OTHER**

The Vendor shall complete a Technical Data Sheet, Attachment B, for each piece of equipment, or the package will not be considered complete.

**ATTACHMENT B – TECHNICAL DATA SHEET**

The following information shall be supplied for each motor control center:

<u>GENERAL</u>	<u>DESIGN</u>	<u>VENDOR</u>
Manufacturer		
Model Number/Size		
Enclosure Type	NEMA 1	
NEMA Class	NEMA B	
Nameplate Type and Material	Engraved Phenolic Plastic, Black Letters on White	
<u>SYSTEM CHARACTERISTICS</u>		
Voltage, Wire, Phase and Frequency	480V, 3-wire, 3 $\phi$ , 60 Hz	
<u>BUSWORK</u>		
Main Bus Amps (Type and Rating)	600 A	
Bus Bracing Symmetrical Amps	42 kAIC	
Ground Bus (Type and Rating)		
Neutral Bus (Type and Rating)		
Vertical Bus Amps (Type and Rating)		
Future Bus Extension Capability?		
<u>INCOMING METHOD</u>		
Cable Entry	Top Entry	
Main Lug or Circuit Breaker	Circuit Breaker	
Max # of Cables		
All Other Section Top Entry		
<u>MAIN DISCONNECT</u>		
Main Lug Only Section		
Size	600 A	
<u>STARTERS</u>		
Manufacturer		
Type		
Overload type		
Overload Alarm Contact Rating		
Minimum Interrupting Capacity		

Voltage	480 V	
Running Indication Pilot Lamp		
Terminal Block Type		
Surge Suppressor Type		
Overload Reset Button on Door, (y/n)		
Size of Control Power Transformer Provided with:		
Size 1	480/120, 130 VA	
Size 2	480/120, 130 VA	
Size 3		
Size 4		
Size 5		
<u>FEEDER BREAKERS (as required)</u>		
Manufacturer		
Type		
Circuit Breaker Frame Size	400 A	
Interrupting capacity		
Trip Rating	400 A	
GFI Provided?		
<u>WEIGHTS AND DIMENSIONS</u>		
Shipping Dimensions		
Length		
Width		
Height		
Shipping Weight, (lb.)		
Maximum Lifted Weight, (lb.)		
<u>DELIVERY</u>		
FOB Point	Jobsite	
Freight		
Approval Drawings		
Client Review		
Manufacturing Time		
Shipping		
Total		

END OF SPECIFICATION 16440