

CITY OF FORT COLLINS

ADDENDUM No. 1

September 27, 1999

SPECIFICATIONS AND CONTRACT DOCUMENTS

Description of Bid #5424, SWITCH, PADMOUNT, 2-WAY

OPENING DATE 2 00 p m (our clock) October 13, 1999

To all prospective bidders under the specifications and contract documents described above, the following changes are hereby made

The name of the Bid is changed to - **SWITCH, PADMOUNT, 4-WAY**

A corrected Bid Proposal is attached for use in submitting your bid

**RECEIPT OF THIS ADDENDUM MUST BE ACKNOWLEDGED BY A WRITTEN STATEMENT
ENCLOSED WITH THE BID/QUOTE STATING THAT THIS ADDENDUM HAS BEEN RECEIVED.**

CORRECTED BID PROPOSAL

FIRM NAME _____

CITY OF FORT COLLINS

BID PROPOSAL

BID NO 5424

BID DATE 2 00 p m (our clock) October 13, 1999

WE HEREBY ENTER OUR BID FOR THE CITY OF FORT COLLINS' REQUIREMENTS FOR SWITCH, PADMOUNT, 4-WAY PER THE BID INVITATION AND ANY REFERENCED SPECIFICATIONS

QUANTITY

DESCRIPTION

5 Ea

Switch, padmount, SF6 insulated, 3 phase, 15 5KV, 95KV bil 12 5 KA interrupting rating, two 600A switched ways & two 600A vacuum interrupter protected taps, integral grounds, field selectable single or three phase electronic trip, 600A ANSI/IEEE 386 source & tap bushings, per SPEC NO 367-303, dated 9/23/99

\$ _____ Ea \$ _____ Total

Mfr _____ Mfr # _____

Delivery in weeks _____

Delivery may be a consideration in the award of this bid

Items being bid meet the above specifications without exception
Yes ___ No ___ If not, please list exceptions, specifying paragraph reference number, on a separate sheet and attach to your bid

For purposes of warranty and service ONLY approved manufacturers or distributors authorized by an approved manufacturer to serve the Fort Collins area may bid

BID 5424

SUPPLEMENTAL INSTRUCTIONS

Prices quoted must remain firm for a 30 day period after the opening date

Freight terms F O B destination freight prepaid All freight charges must be included in pricing submitted on proposal and not entered as separate pricing

Any discount allowed by Vendor for prompt payment, etc must be reflected in quoted figure, and not entered as separate pricing

The City reserves the right to accept or reject any and all quotes.

Bidder not responding to the services requested in this bid shall be removed from our automated listing for Not Applicable

Any questions or inquiries regarding this bid should be directed to

Opal F Dick, CPPO, Senior Buyer

SIGNATURE AND TITLE

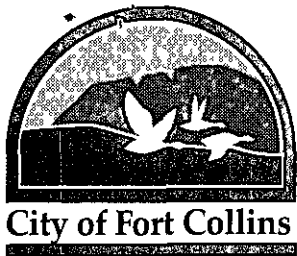
TYPED OR PRINTED NAME AND TITLE

COMPANY NAME

(AREA CODE) TELEPHONE NUMBER/FAX NUMBER

ADDRESS STREET, CITY, STATE, ZIP

DATE



Administrative Services

Purchasing Division

INVITATION TO BID

Sealed bids will be received and publicly opened at the office of The Director of Purchasing and Risk Management, 256 West Mountain Avenue, Fort Collins, Colorado 80521, (P O Box 580, 80522) at the time and date noted on the bid proposal and/or contract documents

Bids must be received at the Office of the Director prior to the opening time (our clock)

SPECIAL INSTRUCTIONS

All bids must be signed by an authorized representative of the company with the legal capacity to bind the company to the agreement. Bids may be withdrawn up to the date and hour set for opening. Once bids have been accepted by the City and opening time has passed, failure to enter into contract or honor the purchase order will be cause for removal of supplier's name from the city of Fort Collins' bidders list for a period of twelve months from the date of the opening. The City may also pursue any remedies available at law or in equity. Bid prices must be held firm for a period of forty-five days after bid openings.

Submission of a bid is deemed as acceptance of all terms, conditions and specifications contained in the City's specifications initially provided to the bidder. Any proposed modification must be accepted in writing by the City prior to award of the bid.

Only bids properly received by the Purchasing Department will be accepted.

No proposal will be accepted from, or any purchase order awarded, to any person, firm or corporation in default on any obligation to the City.

All bids must be labeled with both the project name and bid number indicated on the bid proposal.

Bids must be furnished exclusive of any federal excise tax, wherever applicable.

Bidders must be properly licensed and secure necessary permits wherever applicable.

Vendors not responding to requests for bid shall be removed from our automated listing for the requested commodities/services.

The City may elect where applicable, to award bids on an individual item/group basis or on a total bid basis, whichever is most beneficial to the City. The City reserves the right to accept or reject any and all bids, and to waive any irregularities or informalities.

Sales Prohibited/Conflict of Interest No officer, employee, or member of City Council, shall have a financial interest in the sale to the City of any real or personal property, equipment, material, supplies or services where such officer or employee exercises directly or indirectly any decision-making authority concerning such sale or any supervisory authority over the services to be rendered. This rule also applies to subcontracts with the City. Soliciting or accepting any gift, gratuity favor, entertainment, kickback or any items of monetary value from any person who has or is seeking to do business with the City of Fort Collins is prohibited.


Freight Terms Unless otherwise noted, all freight is F O B destination, freight prepaid All freight charges must be included in prices submitted on proposal

Discounts Any discounts allowed for prompt payment, etc , must be reflected in bid figures and not entered as separate pricing on the proposal form

Purchasing Restrictions Your authorized signature of this bid assures your firm's compliance with the City's purchasing restrictions on cement A copy of the Resolution 91-121 is available for review in the Purchasing Division or the City Clerk's office

Collusive or Sham Bids Any bid deemed to be collusive or a sham bid will be rejected and reported to authorities as such Your authorized signature of this bid assures that such bid is genuine and is not a collusive or sham bid

Bid Results For information regarding results for individual bids send a self-addressed, self-stamped envelope and a bid tally will be mailed to you


James B O'Neill, II, CPPO
Director of Purchasing & Risk Management

FIRM NAME _____

**CITY OF FORT COLLINS
BID PROPOSAL
BID NO 5424
BID DATE 2 00 p m (our clock) October 13, 1999**

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BID 5424

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Opal F Dick, CPPO, Senior Buyer

SIGNATURE AND TITLE	TYPED OR PRINTED NAME AND TITLE
COMPANY NAME	(AREA CODE) TELEPHONE NUMBER/FAX NUMBER
ADDRESS	STREET, CITY, STATE, ZIP
	DATE

1 COMMERCIAL DETAILS

Invoice Address To ensure prompt Payment mail invoices in duplicate to
City of Fort Collins Accounting Division
P O Box 580
Fort Collins, CO 80522

Tax exemptions By statute the City of Fort Collins is exempt from state and local taxes Our Exemption Number is 98-04502 Federal Excise Tax Exemption Certificate of Registry 84-6000587 is registered with the Collector of Internal Revenue, Denver Colorado (Ref Colorado Revised Statutes 1973, Chapter 39-26, 114 (a))

Goods Rejected GOODS REJECTED due to failure to meet specifications, either when shipped or due to defects of damage in transit, may be returned to you for credit and are not to be replaced except upon receipt of written instructions from the City of Fort Collins

Inspection GOODS are subject to the City of Fort Collins inspection on arrival

Final Acceptance Receipt of the merchandise, services or equipment in response to this order can result in authorized payment on the part of the City of Fort Collins However, it is to be understood that FINAL ACCEPTANCE is dependent upon completion of all applicable required inspection procedures

Freight Terms Shipments must be F O B , City of Fort Collins, 700 Wood St , Fort Collins, CO 80522, unless otherwise specified on this order If permission is given to prepay freight and charge separately, the original freight bill must accompany invoice Additional charges for packing will not be accepted

Shipment Distance Where manufacturers have distributing points in various parts of the country, shipment is expected from the nearest distribution point to destination and excess freight will be deducted from Invoice when shipments are made from greater distance

Permits Seller shall procure at sellers sole cost all necessary permits, certificates and licenses required by all applicable laws, regulations, ordinances and rules of the state, municipality, territory or political subdivision where the work is performed, or required by any other duly constituted public authority having jurisdiction over the work of vendor Seller further agrees to hold the City of Fort Collins harmless from and against all liability and loss incurred by them by reason of an asserted or established violation of any such laws, regulations, ordinances, rules and requirements

Authorization All parties to this contract agree that the representatives are, in fact, bona fide and possess full and complete authority to bind said parties
LIMITATION OF TERMS This Purchase Order expressly limits acceptance to the terms and conditions stated herein set forth and any supplementary or additional terms and conditions annexed hereto or incorporated herein by reference Any additional or different terms and conditions proposed by seller are objected to and hereby rejected

2 DELIVERY

PLEASE ADVISE PURCHASING AGENT immediately if you cannot make complete shipment to arrive on your promised delivery date as noted Time is of the essence Delivery and performance must be effected within the time stated on the purchase order and the documents attached hereto No acts of the Purchasers including, without limitation, acceptance of partial late deliveries, shall operate as a waiver of this provision In the event of any delay, the Purchaser shall have, in addition to other legal and equitable remedies, the option of placing this order elsewhere and holding the Seller liable for damages However, the Seller shall not be liable for damages as a result of delays due to causes not reasonably foreseeable which are beyond its reasonable control and without its fault of negligence, such acts of God, acts of civil or military authorities, governmental priorities, fires, strikes, flood, epidemics, wars or riots provided that notice of the conditions causing such delay is given to the Purchaser within five (5) days of the time when the Seller first received knowledge thereof In the event of any such delay, the date of delivery shall be extended for the period equal to the time actually lost by reason of the delay

3 WARRANTY

The Seller warrants that all goods, articles, materials and work covered by this order will conform with applicable drawings, specifications, samples and/or other descriptions given, will be fit for the purposes intended, and performed with the highest degree of care and competence in accordance with accepted standards for work of a similar nature The Seller agrees to hold the purchaser harmless from any loss, damage or expense which the Purchaser may suffer or incur on account of the Sellers breach of warranty The Seller shall replace, repair or make good, without cost to the purchaser, any defects or faults arising within one (1) year or within such longer period of time as may be prescribed by law or by the terms of any applicable warranty provided by the Seller after the date of acceptance of the goods furnished hereunder (acceptance not to be unreasonably delayed) resulting from imperfect or defective work done or materials furnished

by the Seller Acceptance or use of goods by the Purchaser shall not constitute a waiver of any claim under this warranty Except as otherwise provided in this purchase order, the Sellers liability hereunder shall extend to all damages proximately caused by the breach of any of the foregoing warranties or guarantees, but such liability shall in no event include loss of profits or loss of use NO IMPLIED WARRANTY OR MERCHANTABILITY OR OF FITNESS FOR PURPOSES SHALL APPLY

4 CHANGES IN LEGAL TERMS

The Purchaser may make changes to legal terms by written change order

5 CHANGES IN COMMERCIAL TERMS

The Purchaser may make any changes to the terms, other than legal terms, including additions to or deletions from the quantities originally ordered in the specifications or drawings, by verbal or written change order If any such change affects the amount due or the time of performance hereunder, an equitable adjustment shall be made

6 TERMINATIONS

The Purchaser may at any time by written change order, terminate this agreement as to any or all portions of the goods then not shipped, subject to any equitable adjustment between the parties as to any work or materials then in progress provided that the Purchaser shall not be liable for any claims for anticipated profit on the uncompleted portion of the goods and/or work, for incidental or consequential damages, and that no such adjustment be made in favor of the Seller with respect to any goods which are the Sellers standard stock No such termination shall relieve the Purchaser or the Seller of any of their obligations as to any goods delivered hereunder

7 CLAIMS FOR ADJUSTMENT

Any claim for adjustment must be asserted within thirty (30) days from the date the change or termination is ordered

8 COMPLIANCE WITH LAW

The Seller warrants that all goods sold hereunder shall have been produced, sold delivered and furnished in strict compliance with all applicable laws and regulations to which the goods are subject The Seller shall execute and deliver such documents as may be required to effect or evidence compliance All laws and regulations required to be incorporated in agreements of this character are hereby incorporated herein by this reference The Seller agrees to indemnify and hold the Purchaser harmless from all costs and damages suffered by the Purchaser as a result of the Sellers failure to comply with such law

9 ASSIGNMENT

Neither party shall assign, transfer, or convey this order, or any monies due or to become due hereunder without the prior written consent of the other party

10 TITLE

The Seller warrants full, clear and unrestricted title to the Purchaser for all equipment, materials, and items furnished in performance of this agreement, free and clear of any and all liens, restrictions, reservations, security interest encumbrances and claims of others

11 NONWAIVER

Failure of the Purchaser to insist upon strict performance of the terms and conditions hereof, failure or delay to exercise any rights or remedies provided herein or by law, failure to promptly notify the Seller in the event of a breach, the acceptance of or payment for goods hereunder or approval of the design, shall not release the Seller of any of the warranties or obligations of this purchase order and shall not be deemed a waiver of any right of the purchaser to insist upon strict performance hereof or any of its rights or remedies as to any such goods, regardless of when shipped, received or accepted, as to any prior or subsequent default hereunder, nor shall any purported oral modification or rescission of this purchase order by the Purchaser operate as a waiver of any of the terms hereof

12 ASSIGNMENT OF ANTITRUST CLAIMS

Seller and the Purchaser recognize that in actual economic practice, overcharges resulting from antitrust violations are in fact borne by the Purchaser. Therefore for good cause and as consideration for executing this purchase order, the Seller hereby assigns to the Purchaser any and all claims it may now have or hereafter acquired under federal or state antitrust laws for such overcharges relating to the particular goods or services purchased or acquired by the Purchaser pursuant to this purchase order.

13 PURCHASERS PERFORMANCE OF SELLERS OBLIGATIONS

If the Purchaser directs the Seller to correct nonconforming or defective goods by a date to be agreed upon by the Purchaser and the Seller, and the Seller thereafter indicates its inability or unwillingness to comply, the Purchaser may cause the work to be performed by the most expeditious means available to it, and the Seller shall pay all costs associated with such work.

The Seller shall release the Purchaser and its contractors of any tier from all liability and claims of any nature resulting from the performance of such work.

This release shall apply even in the event of fault or negligence of the party released and shall extend to the directors, officers and employees of such party.

The Seller's contractual obligations, including warranty, shall not be deemed to be reduced, in any way, because such work is performed or caused to be performed by the Purchaser.

14 PATENTS

Whenever the Seller is required to use any design, device, material or process covered by letter, patent, trademark or copyright, the Seller shall indemnify and save harmless the Purchaser from any and all claims for infringement by reason of the use of such patented design, device, material or process in connection with the contract, and shall indemnify the Purchaser for any cost, expense or damage which it may be obliged to pay by reason of such infringement at any time during the prosecution or after the completion of the work. In case said equipment, or any part thereof or the intended use of the goods, is in such suit held to constitute infringement and the use of said equipment or part is enjoined, the Seller shall, at its own expense and at its option, either procure for the Purchaser the right to continue using said equipment or parts, replace the same with substantially equal but non-infringing equipment, or modify it so it becomes non-infringing.

15 INSOLVENCY

If the Seller shall become insolvent or bankrupt, make an assignment for the benefit of creditors, appoint a receiver or trustee for any of the Seller's property or business, this order may forthwith be canceled by the Purchaser without liability.

16 GOVERNING LAW

The definitions of terms used or the interpretation of the agreement and the rights of all parties hereunder shall be construed under and governed by the laws of the State of Colorado, USA.

The following Additional Conditions apply only in cases where the Seller is to perform work hereunder, including the services of Seller's Representative(s), on the premises of others:

17 SELLERS RESPONSIBILITY

The Seller shall carry on said work at Seller's own risk until the same is fully completed and accepted, and shall, in case of any accident, destruction or injury to the work and/or materials before Seller's final completion and acceptance, complete the work at Seller's own expense and to the satisfaction of the Purchaser. When materials and equipment are furnished by others for installation or erection by the Seller, the Seller shall receive, unload, store and handle same at the site and become responsible therefor as though such materials and/or equipment were being furnished by the Seller under the order.

18 INSURANCE

The Seller shall, at his own expense, provide for the payment of workers compensation, including occupational disease benefits, to its employees employed on or in connection with the work covered by this purchase order, and/or to their dependents in accordance with the laws of the state in which the work is to be done. The Seller shall also carry comprehensive general liability including, but not limited to, contractual and automobile public liability insurance with bodily injury and death limits of at least \$300,000 for any one person, \$500,000 for any one accident and property damage limit per accident of \$400,000. The Seller shall likewise require his contractors, if any, to provide for such compensation and insurance. Before any of the Seller's or his contractors employees shall do any work upon the premises of others, the Seller shall furnish the Purchaser with a certificate that such compensation and insurance have been provided. Such certificates shall specify the date when such compensation and insurance have been provided. Such certificates shall specify the date when such compensation and insurance expires. The Seller agrees that such compensation and insurance shall be maintained until after the entire work is completed and accepted.

19 PROTECTION AGAINST ACCIDENTS AND DAMAGES

The Seller hereby assumes the entire responsibility and liability for any and all damage, loss or injury of any kind or nature whatsoever to persons or property caused by or resulting from the execution of the work provided for in this purchase order or in connection herewith. The Seller will indemnify and hold harmless the Purchaser and any or all of the Purchaser's officers, agents and employees from and against any and all claims, losses, damages, charges or expenses, whether direct or indirect, and whether to persons or property to which the Purchaser may be put or subject by reason of any act, action, neglect, omission or default on the part of the Seller, any of his contractors, or any of the Seller's or contractors officers, agents or employees. In case any suit or other proceedings shall be brought against the Purchaser, or its officers, agents or employees at any time on account or by reason of any act, action, neglect, omission or default of the Seller or any of his contractors or any of its or their officers, agents or employees as aforesaid, the Seller hereby agrees to assume the defense thereof and to defend the same at the Seller's own expense, to pay any and all costs, charges, attorneys fees and other expenses, any and all judgment that may be incurred by or obtained against the Purchaser or any of its or their officers, agents or employees in such suits or other proceedings, and in case judgment or other lien be placed upon or obtained against the property of the Purchaser, or said parties in or as a result of such suits or other proceedings, the Seller will at once cause the same to be dissolved and discharged by giving bond or otherwise. The Seller and his contractors shall take all safety precautions, furnish and install all guards necessary for the prevention of accidents, comply with all laws and regulations with regard to safety including, but without limitation, the Occupational Safety and Health Act of 1970 and all rules and regulations issued pursuant thereto.

9/90
Revised 11/91

CITY OF FORT COLLINS
LIGHT AND POWER DEPARTMENT
P O BOX 580
FORT COLLINS, CO 80521

SPECIFICATION NO 367-303

TITLE THREE PHASE DEADFRONT PAD-MOUNTED
 SF₆ INSULATED SWITCHGEAR WITH TWO
 SWITCHED WAYS AND TWO VACUUM
 INTERRUPTER PROTECTED TAPS

APPROVED BY



Tim M Sagen
Standards Engineering Manager

DATE 9/23/99
REVISED 9/23/99

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I. General

1 01 General Description

The switchgear shall conform to this specification and shall consist of a *gas-tight tank containing SF₆ gas, load-interrupter switches and resettable vacuum fault interrupters with visible open gaps and integral visible grounds, and a microprocessor-based overcurrent control* Construction shall be *deadfront* Load-interrupter switch terminals and fault-interrupter terminals shall be equipped with 600 amp ANSI/IEEE 386 bushings to interface with conventional elbow style connectors Manual operating mechanisms and viewing windows shall be located on the opposite side of the tank from the bushings and bushing wells so that operating personnel will not be required to perform any routine operations in close proximity to high-voltage elbows and cables Switch shall be shipped factory filled with SF₆ gas conforming to ASTM D2472

1 02 Switch Configuration

Each switch shall be in accordance with Figure 1 and shall have two three phase load switch ways and two vacuum interrupter tapped ways with *field selectable single or three phase electronic trip*

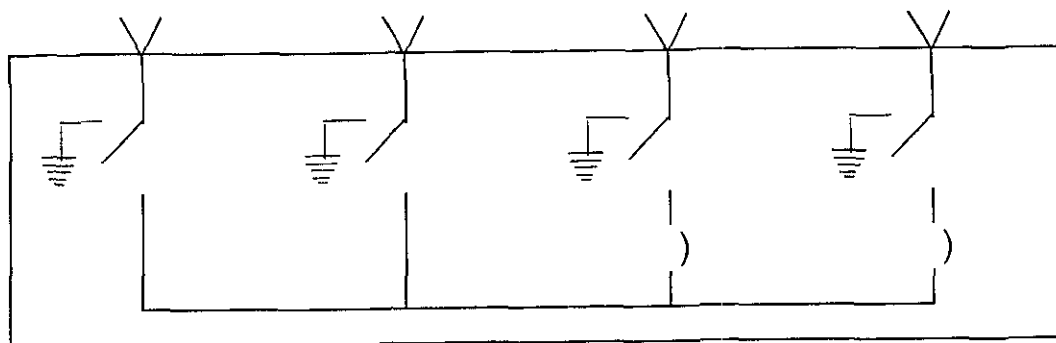


Figure 1 One-line Diagram

1 03 Ratings

The ratings for the integrated switchgear shall be as designated below

Frequency, Hz	60
kV, Maximum	15.5
kV, BIL	95
Main Bus Continuous, Amperes	600

Three-Pole Load-Interrupter Switches	
Continuous, Amperes	600
Load Dropping, Amperes	600
Ten-Time Duty-Cycle Fault-Closing, Amperes RMS Symmetrical	12,500
Amperes, Peak	32,500
Fault Interrupters	
Continuous, Amperes	600
Load Dropping, Amperes	600
Ten-Time Duty-Cycle Fault Interrupting, Amperes RMS Symmetrical	12,500
Ten-Time Duty-Cycle Fault-Closing, Amperes RMS Symmetrical	12,500
Amperes, Peak	32,500
Short-Circuit Rating	.
Amperes, RMS Symmetrical	12,500

1 04 Certification of Ratings

- (a) The manufacturer of the switchgear shall be completely and solely responsible for the performance of the load-interrupter switch and fault interrupter as well as the complete integrated assembly as rated
- (b) The manufacturer shall furnish certification of ratings of the load-interrupter switch, fault interrupter, and the integrated switchgear assembly consisting of switches and fault interrupters in combination with the gas-tight tank

1 05 Compliance with Standards and Codes

The switchgear shall conform to or exceed the applicable requirements of the following standards and codes

- (a) The applicable portions of ANSI C57 12 28, covering enclosure integrity for pad-mounted equipment
- (b) The applicable portions of ANSI C37 71, ANSI C37 72, ANSI C37 73, IEC 56, and IEC 265-1 (Class A), which specify test procedures and sequences for the load-interrupter switches, fault interrupters, and the complete switchgear assembly

II. Construction

2 01 SF₆-Gas Insulation

- (a) The SF₆ gas shall conform to ASTM D2472
- (b) The switchgear shall be filled with SF₆ gas to a pressure of 7 psig at 68° F
- (c) The gas-tight tank shall be evacuated prior to filling with SF₆ gas to minimize moisture in the tank
- (d) The switchgear shall withstand system voltage at a gas pressure of 0 psig at 68° F
- (e) A gas-fill valve shall be provided
- (f) A temperature-compensated pressure gauge shall be provided that is color coded to show the operating range. The gauge shall be mounted inside the gas-tight tank (visible through a large viewing window) to provide consistent pressure readings regardless of the altitude at the installation site

2 02 Gas-Tight Tank

- (a) The tank shall be submersible and shall be capable of withstanding a minimum of 15 psig internal pressure, 14 psig external pressure and 10 feet of water over the base.
- (b) The tank shall be of welded construction and shall be made of 7-gauge mild steel
- (c) A means of lifting the tank shall be provided

2 03 Gas-Tight Tank Finish

- (a) To remove oils and dirt, to form a chemically and anodically neutral conversion coating to improve the finish-to-metal bond, and to retard underfilm propagation of corrosion, mild-steel surfaces shall undergo a thorough pretreatment process comprised of a fully automated system of cleaning, rinsing, phosphatizing, sealing, drying, and cooling, before any protective coatings are applied. By utilizing an automated pretreatment process, the mild-steel surfaces of the gas-tight tank shall receive a highly consistent thorough treatment, eliminating fluctuations in reaction time, reaction temperature, and chemical concentrations
- (b) After pretreatment, protective coatings shall be applied that shall help resist corrosion and protect the mild-steel surfaces of the gas-tight tank. To establish the capability to resist corrosion and protect the mild steel, representative test specimens coated by the manufacturer's finishing system shall satisfactorily pass the following tests
 - (1) 1500 hours of exposure to salt-spray testing per ASTM B 117 with
 - (i) Underfilm corrosion not to extend more than 1/32" from the scribe as evaluated per ASTM D 1645, Procedure A, Method 2 (scraping), and
 - (ii) Loss of adhesion from bare metal not to extend more than 1/8" from the scribe

- (2) 1000 hours of humidity testing per ASTM D 4585 using the Cleveland Condensing Type Humidity Cabinet with no blistering as evaluated per ASTM D 714
- (3) Crosshatch adhesion testing per ASTM D 3359 Method B with no loss of finish
Certified test abstracts substantiating the above capabilities shall be furnished upon request
- (c) The finish shall be inspected for scuffs and scratches. Blemishes shall be touched up by hand to restore the protective integrity of the finish
- (d) The finish shall be indoor light gray, satisfying the requirements of ANSI Standard Z55.1 for No. 61

2.04 Viewing Windows

- (a) Each load-interrupter switch shall be provided with a large viewing window at least 6 inches by 12 inches to allow visual verification of the switch-blade position (open, closed, and grounded) while shining a flashlight on the blades
- (b) Each fault interrupter shall be provided with a large viewing window at least 6 inches by 12 inches to allow visual verification of the disconnect-blade position (open, closed, and grounded) while shining a flashlight on the blades
- (c) Viewing windows shall be located on the opposite side of the gear from the bushings and bushing wells so that operating personnel shall not be required to perform any routine operations in close proximity to high-voltage elbows and cables
- (d) A cover shall be provided for each viewing window to prevent operating personnel from viewing the flash which may occur during switching operations

2.05 High-Voltage Bus

- (a) Bus and interconnections shall withstand the stresses associated with short-circuit currents up through the maximum rating of the switchgear
- (b) Before installation of bus, all electrical contact surfaces shall first be prepared by machine abrading to remove any oxide film. Immediately after this operation, the electrical contact surfaces shall be coated with a uniform coating of an oxide inhibitor and sealant

2.06 Provisions for Grounding

- (a) One ½-13 ground-connection per way plus one ½-13 tank ground shall be provided on the gas-tight tank of the switchgear
- (b) The ground shall be constructed of stainless steel and welded to the gas-tight tank, and shall have a short-circuit rating equal to that of the switchgear

2 07 Terminations

- (a) Terminals for load-interrupter switches shall have 600-ampere bushings
- (b) Terminals for fault interrupters shall be equipped with 600-ampere bushings
- (c) Bushings rated 600 amperes continuous shall be provided with a threaded stud
- (d) Bushings shall be located on one side of the gear to reduce the required operating clearance

2 08 Bushings and Bushing Wells

- (a) Bushings and bushing wells shall conform to ANSI/IEEE Standard 386 (ANSI Standard C119 2)
- (b) Bushings and bushing wells shall include a semiconductive coating
- (c) Bushings and bushing wells shall be mounted in such a way that the semiconductive coating is solidly grounded to the gas-tight tank

III. Basic Components

3 01 Load-Interrupter Switches

- (a) The three-phase, gang-operated load-interrupter switches shall have a ten-time duty-cycle fault-closing rating equal to or exceeding the short-circuit rating of the switchgear. This rating defines the ability to close the switch ten times against a three-phase fault with asymmetrical (peak) current in at least one phase equal to the rated value, with the switch remaining operable and able to carry and interrupt rated current. Certified test abstracts establishing such ratings shall be furnished upon request.
- (b) The switch shall be provided with an integral ground position that is readily visible through the viewing window to eliminate the need for cable handling and exposure to high voltage to ground the equipment.
- (c) The ground position shall have a ten-time duty-cycle fault-closing rating.
- (d) The switch shall be provided with an open position that is readily visible through the viewing window to eliminate the need for cable handling and exposure to high voltage to establish a visible gap.
- (e) The open gaps of the switch shall be sized to allow cable testing through a feedthru bushing or the back of the elbow.

3 02 Fault Interrupters

- (a) Fault interrupters shall have a ten-time duty-cycle fault-closing and fault interrupting rating equal to or exceeding the short-circuit rating of the switchgear. This rating defines the fault interrupter's ability to close ten times against a three-phase fault with asymmetrical (peak) current in at least one phase equal to the rated value and clear the resulting fault current, with the interrupter remaining operable and able to carry and interrupt rated current. Certified test abstracts establishing such ratings shall be furnished.
- (b) The fault interrupter shall be provided with a disconnect with an integral ground position that is readily visible through the viewing window to eliminate the need for cable handling and exposure to high voltage to ground the equipment.
- (c) The ground position shall have a ten-time duty-cycle fault-closing rating.
- (d) The disconnect shall be provided with an open position that is readily visible through the viewing window to eliminate the need for cable handling and exposure to high voltage to establish a visible gap.
- (e) The open gaps of the disconnect shall be sized to allow cable testing through a feedthru bushing or the back of the elbow.
- (f) An internal indicator shall be provided for each fault interrupter to show when it is in the tripped condition. The indicator shall be clearly visible through the viewing window.

3 03 Operating Mechanisms

- (a) Load-interrupter switches and fault interrupters shall be operated by means of a quick-make, quick-break mechanism.
- (b) The manual handle shall charge the operating mechanism for opening, closing, and grounding of the switches and fault interrupters.
- (c) Operating mechanisms shall be equipped with an operation selector to prevent inadvertent operation from the closed position directly to the grounded position, or from the grounded position directly to the closed position. The operation selector shall require physical movement to the proper position to permit the next operation.
- (d) Operating shafts shall be padlockable in any position to prevent operation.
- (e) The operation selector shall be padlockable to prevent operation to the grounded position.
- (f) The operating mechanism shall indicate switch position, which shall be clearly visible from the normal operating position.

3 04 Overcurrent Control

- (a) A microprocessor-based overcurrent control shall be provided to initiate fault interruption
- (b) The control shall function correctly at temperatures of - 40°C to + 80°C
- (c) The control shall be capable of single-pole or three-pole tripping of each fault interrupter
- (d) Control settings shall be field programmable using a personal computer connected via a data port to the control. Manual electronic tripping shall also be possible using a personal computer. The data port shall be accessible from the exterior of the enclosure.
- (e) The control shall be mounted in a watertight enclosure and shall be removable in the field without taking the gear out of service.
- (f) Power and sensing for the control shall be supplied by integral current transformers.
- (g) The minimum total clearing time (from initiation of the fault to total clearing) for fault interruption shall be 40 milliseconds (2.4 cycles) at 60 hertz or 44 milliseconds (2.2 cycles) at 50 hertz.
- (h) The control shall feature time-current characteristic (TCC) curves including standard E-speed, coordinating-speed tap, and coordinating-speed main curves. Coordinating-speed tap curves shall optimize coordination with load-side weak-link/backup current-limiting fuse combinations, and coordinating-speed main curves shall optimize coordination with tap-interrupter curves.
- (i) The standard E-speed curve shall have phase-overcurrent settings ranging from 25E through 200E. The coordinating-speed tap curve shall have phase-overcurrent and independent ground-overcurrent settings ranging from 50 amperes through 400 amperes. The coordinating-speed main curve shall have phase-overcurrent and independent ground-overcurrent settings ranging from 100 amperes through 800 amperes.
- (j) The control shall have instantaneous-trip (1 kA through 8 kA) and definite-time delay (32 ms through 96 ms) settings to allow tailoring of the coordinating-speed tap and coordinating-speed main curves to the application.

3 05 Voltage indication with provisions for low-voltage phasing

- (a) Voltage indication with provisions for low-voltage phasing for each load-interrupter switch and fault interrupter by means of capacitive taps on the bushings shall be provided to eliminate the need for cable handling and exposure to high voltage to test the cables for voltage and phasing. This feature shall include a flashing LCD display to indicate the presence of voltage for each phase, and a solar panel to supply power for testing of the complete voltage-indication circuit and phasing circuit.
- (b) The voltage-indication feature shall be mounted on the covers for the viewing windows on the opposite side of the gear from the bushings and bushing wells so that operating personnel shall not be required to perform any routine operations in close proximity to high-voltage elbows and cables.

IV. Switchgear Style

4 01 Pad-Mounted Style

- (a) The gas-tight tank shall be made of 7-gauge minimum mild-steel
- (b) Enclosure
 - (1) The switchgear shall be provided with a tamper resistant weatherproof pad-mounted enclosure suitable for installation of the gear on a concrete pad
 - (2) The pad-mounted enclosure shall be separable from the switchgear to allow clear access to the bushings and bushing wells for cable termination
 - (3) The basic material shall be 14-gauge minimum hot-rolled, pickled, and oiled steel sheet
 - (4) The enclosure shall be provided with removable front and back panels, and hinged lift-up roof sections for access to the operating and termination compartments. Each roof section shall have a retainer to hold it in the open position. Hinge pins shall be stainless steel
 - (5) Lift-up roof sections shall overlap the panels and shall have pentahead bolts and provisions for padlocking that incorporate a means to protect the padlock shackle from tampering
 - (6) The base shall consist of continuous 90-degree flanges, turned inward and welded at the corners, for bolting to the concrete pad
 - (7) Panel openings shall have 90-degree flanges, facing outward, that shall provide strength and rigidity as well as deep overlapping between panels and panel openings to guard against water entry
 - (8) For bushings rated 600 amperes continuous, the termination compartment shall be of an adequate depth to accommodate 200 ampere loadbreak elbows or encapsulated surge arresters mounted on 600-ampere elbows having 200-ampere interfaces
 - (9) An instruction manual holder shall be provided
 - (10) Non-removable lifting tabs shall be provided

(c) Enclosure Finish

- (1) All exterior welded seams shall be filled and sanded smooth for neat appearance
- (2) To remove oils and dirt, to form a chemically and anodically neutral conversion coating to improve the finish-to-metal bond, and to retard underfilm propagation of corrosion, all surfaces shall undergo a thorough pretreatment process comprised of a fully automated system of cleaning, rinsing, phosphatizing, sealing, drying, and cooling, before any protective coatings are applied. By utilizing an automated pretreatment process, the enclosure shall receive a highly consistent thorough treatment, eliminating fluctuations in reaction time, reaction temperature, and chemical concentrations
- (3) After pretreatment, protective coatings shall be applied that shall help resist corrosion and protect the steel enclosure. To establish the capability to resist corrosion and protect the enclosure, representative test specimens coated by the manufacturer's finishing system shall satisfactorily pass the following tests:
 - (i) 4000 hours of exposure to salt-spray testing per ASTM B 117 with
 - (a) Underfilm corrosion not to extend more than 1/32" from the scribe as evaluated per ASTM D 1645, Procedure A, Method 2 (scraping), and
 - (b) Loss of adhesion from bare metal not to extend more than 1/8" from the scribe
 - (ii) 1000 hours of humidity testing per ASTM D 4585 using the Cleveland Condensing Type Humidity Cabinet with no blistering as evaluated per ASTM D 714
 - (iii) 500 hours of accelerated weathering testing per ASTM G 53 using lamp UVB-313 with no chalking as evaluated per ASTM D 659, and no more than 10% reduction of gloss as evaluated per ASTM D 523
 - (iv) Crosshatch adhesion testing per ASTM D 3359 Method B with no loss of finish
 - (v) 160-inch-pound impact adhesion testing per ASTM D 2794 with no chipping or cracking
 - (vi) Oil resistance testing consisting of a 72-hour immersion bath in mineral oil with no shift in color, no streaking, no blistering, and no loss of hardness
 - (vii) 3000 cycles of abrasion testing per ASTM 4060 with no penetration to the substrate

Certified test abstracts substantiating the above capabilities shall be furnished upon request
- (4) The finish shall be inspected for scuffs and scratches. Blemishes shall be touched up by hand to restore the protective integrity of the finish
- (5) The finish shall be olive green, Munsell 7GY3 29/1.5

V. Labeling

5 01 Hazard-Alerting Signs

- (a) The exterior of the pad-mounted enclosure (if furnished) shall be provided with “Warning—Keep Out—Hazardous Voltage Inside—Can Shock, Burn, or Cause Death” signs
- (b) Each unit of switchgear shall be provided with a “Danger—Hazardous Voltage—Failure to Follow These Instructions Will Likely Cause Shock, Burns, or Death” sign. The text shall further indicate that operating personnel must know and obey the employer’s work rules, know the hazards involved, and use proper protective equipment and tools to work on this equipment
- (c) Each unit of switchgear shall be provided with a “Danger—Keep Away—Hazardous Voltage—Will Shock, Burn, or Cause Death” sign

5 02 Nameplates, Ratings Labels, and Connection Diagrams

- (a) Each unit of switchgear shall be provided with a nameplate indicating the manufacturer’s name, catalog number, model number, date of manufacture, and serial number
- (b) Each unit of switchgear shall be provided with a ratings label indicating the following voltage rating, main bus continuous rating, short-circuit rating, fault-interrupter ratings including interrupting and duty-cycle fault-closing, and load-interrupter switch ratings including duty-cycle fault-closing and short-time
- (c) The pad-mounted enclosure (if furnished) shall be provided with a connection diagram showing load-interrupter switches, fault interrupters with integral disconnects, and bus along with the manufacturer’s model number

VI. Accessories

6 01 Adapter Cable

An adapter cable for connecting an overcurrent control to a user-furnished personal computer (having a 25-pin or 9-pin serial communication port) in the field shall be provided

6 02 Software

Software necessary for programming the microprocessor-based overcurrent control shall be provided