

# TABLE OF CONTENTS

## CHAPTER 5 Metering

Paragraph Number	Title	Page Number
5.01	Electric Metering Installation and Ownership .....	5-2
5.02	Electric Meter Locations and Clearances .....	5-2
5.02 a)	General.....	5-3
5.02 b)	Outdoor Metering Locations.....	5-3
5.02 c)	Indoor Metering Locations .....	5-3
5.02 d)	Multiple Outdoor Meters .....	5-4
5.02 e)	Grouped Colorado Springs Utilities Residential Meters .....	5-4
5.03	Primary Metering.....	5-4
5.04	Current Transformer (CTs & VTs) Metering.....	5-4
5.04 a)	General.....	5-4
5.04 b)	Instrument Transformers in Padmount Transformers.....	5-6
5.04 c)	CT Cabinets .....	5-6
5.04 d)	Instrument Transformers (CTs & VTs) in Customer Switchgear.....	5-7
5.04 e)	Instrument Transformer Conduit .....	5-7
5.05	Self-Contained Meter Sockets .....	5-8
5.05 a)	Codes and Standards.....	5-8
5.05 b)	Electrical Ratings.....	5-8
5.05 c)	General Construction .....	5-9
5.05 d)	Covers .....	5-9
5.05 e)	Jaws & Terminal Block .....	5-9
5.05 f)	Bonding Provisions.....	5-9
5.05 g)	Bypass Requirements.....	5-10
5.05 h)	Meter Socket Wiring & Maintenance.....	5-10
5.05 i)	Residential Meter Sockets.....	5-10
5.05 j)	Residential Meter Sockets with Integral Disconnect (All in-One Unit).....	5-11
5.05 k)	Commercial Meter Sockets.....	5-11
5.06	Optional Aesthetic Meter Enclosures .....	5-11
5.06 a)	Ganged Meter Sockets .....	5-12
5.06 b)	Single Meter Sockets .....	5-12
5.07	Converting Existing Apartment Houses with Master Meters to Individual Meters for Each Apartment Unit.....	5-12
5.08	Self-Supporting Meter Mounting.....	5-13
5.09	Moving or Removing Meters and Metering Equipment.....	5-14
5.10	Pulse-Initiating Device to Monitor Electrical Demand .....	5-14
5.11	End of Interval Indicator.....	5-14
5.12	Equipment Ahead of the Meter.....	5-14
5.13	Marking of Multiple Meter Sockets.....	5-14
5.14	Tagging Meters .....	5-15
5.15	Meter Set for Approved Meter Sockets .....	5-15
5.16	Adding Surge Suppression to Meter Sockets.....	5-15
5.17	Electric Meter Testing.....	5-16

## CHAPTER 5

### Metering

#### 5.01 Electric Metering Installation and Ownership:

Only one meter for each rate and/or voltage class under which the customer receives service will be installed and maintained by Colorado Springs Utilities for each customer at each service address.

Additional meters may be used at the sole discretion of Colorado Springs Utilities when the electric requirements to the building exceed the capacity of the largest transformers, the customer has opted for any automatic transfer scheme, or other circumstance where it is required for the convenience of Colorado Springs Utilities.

The customer will provide and maintain without cost to Colorado Springs Utilities sufficient and proper facilities for the installation of residential electric meters including proper meter socket and other electrical apparatus. The equipment will be installed at an easily accessible location on or within the premises to be supplied with service and in accordance with the rules contained herein. The electric meter socket is owned by the customer and all cost to maintain the socket is the owner's responsibility. Residential electric services rated over 400 amps will require a CT (current transformer) rated meter socket and CTs (CTs provided by Colorado Springs Utilities). Secondary wiring of CT to meter socket will be done by Colorado Springs Utilities.

Individual meter sockets, CT cabinets, and CT rated meter sockets for industrial and commercial applications are provided by the customer. The equipment will be installed at an easily accessible location on or within the premises to be supplied with service and in accordance with the rules contained herein. Colorado Springs Utilities will furnish instrument transformers [CTs (current transformers) & VTs (voltage transformers)]. Secondary wiring of instrument transformers (CTs & VTs) to meter socket will be done by Colorado Springs Utilities. The industrial and commercial electric meter sockets are owned by the customer and all cost to maintain the socket is the owner's responsibility. Meter socket stacks designed to house multiple meters in one cabinet, for installation on structures designed for multiple occupancy, must be provided by the customer. No financial reimbursement is made for meter stacks. All meter sockets provided by the customer must meet Appendix E, Material Specification 102-1, and be approved by Colorado Springs Utilities (Appendix C-3).

All meters, service drops, and other electrical facilities installed by Colorado Springs Utilities at its expense upon the customer's premises for the purpose of delivering to and measuring electric energy used by the customer will continue to be the property of Colorado Springs Utilities. Colorado Springs Utilities reserves the right to repair or replace meter sockets at the Utilities expense in order to maintain safe accurate energy usage measurements.

For unmetered load tap service installations, refer to 10.01e(3).

#### 5.02 Electric Meter Location And Clearances:

The location of meters and metering equipment will be designated by Colorado Springs Utilities where they will be readily accessible at all reasonable hours for reading, testing, inspecting, and other maintenance purposes. No wiring dependent upon the meter location should be started until

the location has been definitely assigned. See Appendix D, Drawings 2 and 3 A&B for the following requirements:

**a) General:**

- 1) Meter sockets will be plumb and securely fastened to the building wall (at framing members).
- 2) Meter sockets will be installed where measurement at centerline of meter is 5 to 6 feet above finished grade or permanent platform.
- 3) Meter sockets must NOT be installed under projections lower than 6-1/2 feet to allow for reading and maintenance of equipment.
- 4) A minimum of three feet of clear space must be left in front of the meter for reading.
- 5) A minimum of two feet of clear space measured from any part of the meter socket to all conduits, pipe, walls, etc. must be maintained for servicing.
- 6) Electric meters and CT cabinets will be located at least three feet radially from gas meter regulator vents.
- 7) All above-ground conduit on the line side of the meter will be GRC except as noted in the drawings; in all cases it will be metal of a grade as indicated in the attached drawings and as required by Regional Building Department to meet the NEC.

**b) Outdoor Metering Locations:**

Outdoor meters will not be installed where they will interfere with traffic, sidewalks, driveways, or where they will obstruct the opening of doors or windows, or in any location which may be considered hazardous or cause damage to the metering equipment.

**c) Indoor Metering Locations:**

Indoor meter installations typically are not acceptable. In special cases located in the downtown network area (see section 10.06), where a dedicated meter room and space is furnished for mounting automated meter reading antennas and repeater equipment, the customer may request indoor metering. The additional expenses for the meter room, antenna conduit, antenna hardware, repeater (if required) and power required are to be paid by the customer. Access to these areas must be available at all times to Colorado Springs Utilities for maintenance and reading of the equipment. All the requirements of section 5.07 apply. The CT cabinet and all other equipment ahead of the meter is to be installed in the dedicated meter room.

1. Single Metering

- a. SU will be responsible for meeting with the customer before installation and identifying the location for the antenna equipment. SU will set up a work order number to charge the materials and labor. SU will install the antenna connections on the meter and on the antenna when notified by the contractor.
- b. The contractor will be responsible for installing the conduit, pulling the antenna cable, installing the antenna L bracket, and installing the antenna. The contractor will provide their own conduit (3/4 inch EMT) and they will make

arrangements with SU to pick up the antenna wire, the bracket for the antenna, and the antenna. The contractor will be required to provide access to the antenna for SU to complete the connections (see Drawing D-20).

## 2. Multiple Meters

- a. SU will be responsible for meeting with the customer before installation and identifying the location for the antenna equipment and repeater. SU will set up a work order number to charge the materials and labor. SU will install the antenna connections on the meter and to the repeater when notified by the contractor.
- b. The contractor will be responsible for installing the conduit, pulling the antenna cable, installing the antenna L bracket, installing the antenna and installing the repeater. The contractor will provide their own conduit (3/4 inch EMT) and they will make arrangements with SU to pick up the antenna cable, the L bracket for the antenna, the antenna and the repeater. A repeater is required for more than one meter and the contractor will be required to provide 120V AC power hardwired to the repeater. The contractor will be required to provide access to the antenna for SU to complete the connections (see Drawing D-20).

### **d) Multiple Outdoor Meters:**

Where service is supplied to individual customers located in a structure designed for multiple occupancy, the individual outdoor meters will be grouped at a point nearest the service drop attachment and must be as specified in the excerpts from Article 370 of the National Electrical Code.

The mounting heights for multiple meter stacks will be no lower than 36 inches from final grade to the center of the lowest meters and will be no higher than 72 inches from grade to the center of the highest meters. Any variation from these mounting heights requires prior written approval from the Colorado Springs Utilities Advanced Metering Technologies Group Supervisor (see Phone Section).

### **e) Grouped Colorado Springs Utilities Residential Meters:**

See Appendix F, Construction Standard 19-8 page 7 & 8, for preferred locations to group Colorado Springs Utilities gas/electric/water meters at residential installations to facilitate efficient meter reading and economic joint trench practices in the future.

## **5.03 Primary Metering:**

Refer to Chapter 10, Commercial/Industrial Development.

## **5.04 Instrument Transformer (CTs & VTs) Metering:**

### **a) General:**

- 1) Current transformers (CTs) are required if load (main size) is over 400 amps (single-phase 120/240V), or 200 amps (three-phase). CTs, VTs (voltage transformers) and meter

socket location must be approved by Colorado Springs Utilities before installation. Contact Field Engineering with any questions on suitable locations. All instrument transformers (CTs & VTs) will be furnished by Colorado Springs Utilities for installation by the customer. All CTs 1200 amps or less to be mounted in a customer supplied CT cabinet. Bar-type CTs are required when CTs are mounted in new or upgraded customer-supplied CT cabinets. CT cabinets must not be located on the inside of a structure (see 5.02c for exceptions). The use of window type (donut) CTs is not permitted in padmount transformers, customer gear, or CT cabinets unless service entrance rating exceeds 1200 amps.

- 2) VTs (“VT Pack”) are required on all 277/480 volt instrument transformer rated services. The “VT Pack” is to be installed per Advanced Metering Technologies Group specifications. See Appendix D, Photo 3 for typical 277/480 volt instrument transformer (CT & VT) metering installations.

The mounting hardware used shall be (3) 1/4”-20 x 1” tamper-proof bolts or carriage bolts with nuts and split washers. All three mounting holes on “VT Pack” shall be used when mounting the “VT Pack”. The “VT Pack” shall be mounted inside on either side of the CT cabinet with the connection point (plug) accessible for installation of the wiring harness. The “VT Pack” shall **not** be mounted on the top, bottom, back, or cabinet door of the CT cabinet. Any variation requires the approval of the Advanced Metering Technologies Group supervisor. All externally mounted “VT Packs” shall be mounted in an external NEMA 3R enclosure and require written approval from the Colorado Springs Utilities Advanced Metering Technologies Group Supervisor (see Phone Section).

- 3) In the case of commercial-policy underground installations, where the customer is installing secondary cables of the quantity and size to meet NEC requirements, CT cabinets with bus bar connectors shall be used. Since CT bars are designed to operate at 85°C, connectors and insulation on secondary cables connected to bar-type CTs shall be rated for 90°C operation even though conductor size and number of cables per the NEC is based on 75°C ratings.
- 4) Since the CTs are mounted on bus bars, in customer switchgear or CT cabinets, the customer shall provide a suitable terminal for a #12 copper wire on the neutral (and on the line side of each phase conductor in the case of window-type rather than bar-type CTs). Such terminals may consist of any appropriate lug or a #10 screw type terminal. The bolts used to connect bar-type CTs to the bus or to cable terminals shall be 1/2 inch diameter (see EUSERC standards for CT mounting base requirements). All such bolted CT connections shall include spring-type (Belleville) washers, flat washers, nut & bolts as detailed for padmount secondary connections in Appendix F, Construction Standard 7-15.
- 5) Wiring of all instrument transformers (CT & VT) secondaries to the meter socket will be done by Colorado Springs Utilities. On all commercial installations the line side and load side conductors in CT cabinet must be terminated prior to utilities wiring of instrument transformers and sockets.
- 6) Any exception to the instrument transformers (CTs & VTs) metering practices outlined above or below will require written approval of Colorado Springs Utilities Advanced Metering Technologies Group Supervisor prior to installation (see Phone Section).

**b) Instrument Transformers In Padmount Transformers:**

When a three-phase padmount transformer supplies a single-metered customer with service entrance rating over 1200 amps, the metering CTs & VTs must be located in the secondary compartment of the padmount transformer. The customer will install a conduit from the meter socket location to the padmount transformer secondary compartment as noted in 5.04e. Metering conduit shall be installed in front of secondary conduits. A pull line will be provided, for pulling instrument transformer wire. See Appendix D, Drawings 12 & 13 for typical instrument transformer metering in padmount installations. Instrument transformers (CTs & VTs) will not be installed in single-phase padmount transformers. Instrument transformers (CTs & VTs) mounted in padmount transformers will be installed by Colorado Springs Utilities prior to, or at the time of, delivery of the transformer to the job site.

**c) CT Cabinets:**

Where CT cabinets are required, they will be furnished and installed on the outside of an exterior wall by the customer (see 5.02c for exceptions).

All residential single-phase CT metered installations shall be wired using two bar-type CTs. The size of the cabinet shall allow a minimum bending space in accordance with Section 312 of the National Electrical Code. If the service wires enter the cabinet, terminate directly on the CTs and exit on the opposite side, then minimum cabinet dimensions shall be 18"x 24"x 10" deep. This cabinet will accommodate installations with a maximum of two 350-kcmil conductors per phase. The Colorado Springs Utilities Field Engineer will designate a point to which a customer shall install either (1) 3 inch or 4 inch conduit from the CT's at a depth of 36 inches- typically to a j-box or transformer (GRC above ground, PVC below ground).

All commercial and residential CT cabinets shall meet the following requirements:

- 1) CT cabinets requiring three CTs shall measure a minimum of 24"x 30"x 10" deep.
- 2) Rated and factory labeled "NEMA 3R".
- 3) Rated 600 volts maximum and shall have a grounding lug.
- 4) Doors shall be supplied with a hasp to accept a Colorado Springs Utilities padlock (5/16 inch diameter shackle). All raceways and compartments ahead of the entering shall also be sealable.
- 5) Incorporate a provision (lug or terminal) for bonding together line and load side service neutrals with electrical bond to the cabinet. If the CT cabinet is on the load side of the main disconnect, where the neutral is already grounded, do not bond neutral block to the CT cabinet (see Appendix D, Drawing 17). This termination shall also include a terminal for connecting #12 AWG solid or stranded copper wire to the neutral conductor within the enclosure for purpose of providing a secondary neutral to the meter.
- 6) CT cabinets shall be installed immediately adjacent to the associated meter socket(s). A minimum clearance will be provided in front of the CT cabinet to fully open the door and have at least 3 feet of working space. The maximum height to the top of a CT cabinet will not exceed 7 feet above finished grade. Physical location of the CTs must be centered between 48 inches and 72 inches above finished grade. CTs must be installed with the white dot (H-1) facing the line side. The contractor will be required to label the line side

and load side of the CT cabinet. The line and load sides shall be marked accordingly as "LINE" or "LOAD". The "VT Pack" is to be installed per Advanced Metering Technologies Group specifications (see 5.04a2), and that the connection point (plug) is accessible for installation of the wiring harness. No other meter devices or customer equipment will be allowed within the CT cabinet. Any variance requires written approval from the Colorado Springs Utilities Advanced Metering Technologies Group Supervisor (see Phone Section). See Appendix D, Drawing 14 and Photos 1 and 2 for a typical CT cabinet installation.

**d) Instrument Transformers (CTs & VTs) In Customer Switchgear:**

**1) General:**

Under unique circumstances, approval to install instrument transformers (CTs & VTs) in a customer's switchgear may be granted by the Colorado Springs Utilities Advanced Metering Technologies Group Supervisor. Such approval will be provided in writing for each individual installation in the comments area on the customer reply sheet of the load data form. Approval will depend on whether or not routine work, e.g. shunting and replacing of CTs, can be accomplished in a safe manner consistent with Colorado Springs Utilities safe work practices, as well as on accessibility for routine maintenance and inspection. Such instrument transformer (CT & VT) installations will be outdoors in a location considered readily accessible during normal working hours, e.g. in a public parking garage. If a "VT Pack" is needed, it is to be installed so that the connection point (plug) is accessible for installation of the wiring harness (see 5.04a2). Rigid conduit will be run from the instrument transformer (CT & VT) compartment or section to the meter socket location as noted below. All raceways and compartments ahead of the metering will be sealable by Colorado Springs Utilities, including the CT section. See Appendix D, Drawings 12 & 13 for typical instrument transformer (CT & VT) metering installations.

**2) Outdoor Commercial Switchgear (EUSERC) Metering Option:**

Commercially available EUSERC multi-meter switchgear meeting Colorado Springs Utilities requirements in Appendix D, Drawing 19 is approved for optional use in the Colorado Springs Utilities Electric Distribution System for commercial services. Metering switchgear is an option to be provided, installed and maintained by the customer at an outdoor location that is readily accessible by Colorado Springs Utilities. The metering switchgear shall include mounting provisions for instrument transformers (CTs & VTs) and metering equipment with phase/neutral terminals for a #12 copper potential connection.

**e) Instrument Transformer Conduit:**

In all instrument transformer metering cases, the customer will furnish and install a minimum 1-1/4 inch conduit between the meter socket and the instrument transformer (CT & VT) location for use by Colorado Springs Utilities. All such conduit above ground and accessible to pedestrians will be galvanized rigid steel conduit (GRC). The maximum distance (total length of conduit run) will be 50 feet with no more than three 90-degree bends in a single pull section. Colorado Springs Utilities will install and terminate conductors from the instrument transformer (CT & VT) secondary to the meter socket using the customer-furnished conduit; the customer will not install any conductors or ground wires in this conduit. The customer shall install a pull line for pulling instrument transformer (CT & VT) wire.

## 5.05 Self-Contained Meter Sockets:

### a) Codes and Standards:

- 1) All meter sockets, meter stacks, and modular metering systems will be manufactured in accordance with the latest revision of the following:  
ANSI C.12.7, ANSI/UL 50, ANSI/UL 414, and NEMA 250, as well as all other applicable code and Standards, with revisions and modification as contained in this specification.
- 2) All meter sockets used on the Colorado Springs Utilities electric system shall conform to the following requirements. Colorado Springs Utilities personnel have been instructed not to install a meter at a location where the meter socket does not comply with ALL of the following criteria. See also Chapter 5, 5.15 “Meter Sets for Approved Meter Sockets”.
- 3) For questions regarding these requirements, contact the Advanced Metering Technologies Group Supervisor (see Phone Section).

### b) Electrical Ratings:

- 1) All sockets/housings shall be rated 300V or 600V as detailed in ANSI C.12.7.
- 2) Minimum socket ampacity rating:

<b>Continuous Socket Application</b>	<b>Continuous Ampacity Rating</b>
Residential (single residence overhead service)	100
Residential (single residence underground service)***	200***
Residential (Class 320 Self Contained)	320
Commercial – Single Phase*	100*
Commercial – Three Phase	200
<b>Ganged meters/stacks (multi-unit dwelling):</b>	
Main “house” socket - single phase**	100
Socket feeding individual dwelling unit	100

\*125 amp sockets with horn bypass are acceptable for maximum commercial single phase service ratings of 125 amps; examples of such would include telemetering installations, cablevision pedestals, sprinkler system pedestals, telephone pedestals, and site lighting at or under 125 amps. The disconnect/breaker size will be limited to 125 amps and rating based on NEC requirements.

\*\*The main “house” socket for apartment or residential complexes shall have a minimum continuous rating of 100 amps. Loads metered off this socket are typically, but not limited to common areas, offices, recreational areas, and laundry rooms and billed to the owner under an appropriate commercial tariff. In ganged sockets, the disconnect/breaker size for the house socket shall not exceed manufacturer’s ampacity rating; for example, the disconnect/breaker shall be limited to 125 amps for a socket rated 125 amps continuous.

\*\*\*The 200 amp meter socket rating is the minimum rating required on all single residence with underground service entrance so that Colorado Springs Utilities service wire #4/0 (or 350 kcmil) fits terminals and has adequate training space.

- 3) All ratings are at 75°C maximum continuous operating temperature.

- 4) All meter housings shall be UL listed and labeled. They shall be installed and used in accordance with their rating and labeling.

**c) General Construction:**

- 1) Meter sockets shall meet the requirements of the Colorado Springs Utilities, Material Specification no. 102-1 (see Appendix E).
- 2) Every line side compartment shall accommodate a Colorado Springs Utilities seal whether or not the compartment is designed to house a meter.
- 3) A temporary meter cover plate is required. It shall be as a minimum, waxed cardboard. No metallic material is acceptable.
- 4) All meter sockets shall be outdoor weather resistant type.

**d) Covers:**

- 1) Each socket in a multi-socket stack shall have an individual cover and sealing provision.
- 2) Only one-piece ringless covers are acceptable.
- 3) Covers shall be designed for sealing with a padlock type seal and removable without removing any screws, bolts or nuts.
- 4) Covers shall be designed to prevent removal of any portion without first removing the seal.

**e) Jaws & Terminal Block:**

Jaws shall be constructed of tin plated copper.

- 1) Any tension springs shall be permanently captive.
- 2) Lugs/terminals shall be suitable for use with copper or aluminum conductors.
- 3) Lug size shall not exceed the wire range as a specified in the manufacturer's label.
- 4) Lugs shall be hex head type with captive bolts.
- 5) The terminal block shall have a fifth 'stinger' terminal in the nine o'clock position if single-phase 3 wire (network) service is supplied from a 208 wye/120 volt 3-phase secondary system.

**f) Bonding Provisions:**

Service equipment and enclosures would be called on to carry heavy fault currents in the event of a ground-fault. For this reason, it is imperative that meter sockets and conduits be adequately bonded to neutral and to the ground. Bonding is to be done by threaded couplings and threaded bosses in a rigid metal conduit system where the joints will be made up wrench tight. Locknuts and bushings do not fulfill the requirement of bonding at service equipment. Grounding bushing (with bonding jumpers), bonding locknuts, threaded conduit hubs, or other means approved by the Regional Building Department are required. See Appendix D, Drawings 16 & 17 for typical grounding and bonding details.

- 1) A combination neutral/bonding terminal shall be provided in the center of the terminal block.

- 2) This terminal shall be mechanically and electrically bonded to the enclosure.
- 3) There shall be two separate lugs on the combination terminal for landing neutral conductors to one and ground bonding wires, when needed, to the other.
- 4) The neutral lug shall be capable of accepting conductors as large as the phase conductors.
- 5) The ground lug shall be capable of accepting up to a #4 solid copper wire for 100 amp sockets, up to a #2 copper wire for 200 amp sockets, and up to #1/0 for 320 amp meter sockets.

**g) Bypass Requirements:**

Socket Application	Maximum Ampacity Rating Continuous		
	125 Amp	200 Amp	320 Amp
Residential (Single Residence)	H	H	L
Single-Phase Meter Pedestals (Mobile Home & Permanent Commercial)	H	H	L
Commercial – Three Phase	L	L	N/A
Commercial – Single Phase	L*	L	L
<b>Ganged (Multi-Unit Dwelling):</b>			
Main “house” socket	H	L	L
Socket Feeding individual dwelling	H	H	L
L= Lever Bypass/ H= “Horn” Bypass			

Note: Lever operated, jaw release bypass mechanisms shall be equivalent to the Duncan HQ-5 or HQ-7.

\*125 amp sockets with horn bypass are acceptable for maximum commercial single phase service ratings of 125 amps; examples of such would include telemetering installations, cablevision pedestals, sprinkler system pedestals, telephone pedestals, and site lighting at or under 125 amps. The disconnect/breaker size will be limited to 125 amps and rating based on NEC requirements.

**h) Meter Socket Wiring & Maintenance:**

- 1) Customers will wire all self-contained meter sockets (up to 400-amp rating) in accordance with the appropriate wiring diagram in Appendix F, Construction Standard 14-12.
- 2) The owner of the facility being served is responsible for the repair and maintenance of ganged meter sockets.

**i) Residential Meter Sockets:**

- 1) Effective August 1, 2001, Colorado Springs Utilities will no longer furnish self contained residential meter sockets nor reimburse for metering sockets or residential services of 400 amps or less. Effective January 1, 2008, Colorado Springs Utilities will no longer furnish current transformer meter sockets (see Appendix C-3 for approved sockets).
- 2) All meter sockets will be purchased and installed by the electrical contractor from suppliers (see Appendix C, Table 3 for approved electrical materials).

- 3) Residential meter sockets (housings) installed in the Colorado Springs Utilities Electric Distribution System shall meet the requirements in Appendix E, Material Specification 102-1 titled “100, 200 & 320 Amp Self-Contained Residential Electric Meter Sockets”, dated and effective January 1, 2008.

**j) Residential Meter Sockets with Integral Disconnect (All-in-One Unit):**

- 1) The integral disconnect socket enclosure will be acceptable for overhead and underground residential services of 200 amps or less using self-contained watt-hour meters. This service equipment shall be a combination unit consisting of a ringless type meter socket and the customer's disconnect (circuit breakers).
- 2) The enclosure shall have two separate compartments; factory bussed from the load side meter section to the line side circuit breaker section. Each compartment shall have a one-piece cover and equipped with a suitable device for closing and sealing with a Colorado Springs Utilities padlock type seal. A barrier between the meter section (load side) and the circuit breaker section (line side) will separate the compartments.
- 3) The meter section of an integral disconnect socket shall contain a 4 terminal meter mounting block, with horn bypass, capable of accepting a fifth (“stinger”) terminal and supplied with a grounding provision (neutral) and auxiliary (“triplex”) ground electrically bonded to the socket.
- 4) The breaker section of an integral disconnect socket shall have provisions for a maximum of 6 main, “plug-in” style circuit breakers and shall be “Dead Front”.
- 5) Knockouts of load carrying cable shall be concentric type ranging from 1 inch to 2-1/2 inches. For overhead service the enclosure shall have a hub opening supplied with a closing plate if used for underground service. Cable lugs shall be suitable for use with either copper or aluminum conductors and will accept up to 2/0 for 100 amp service, 350 MCM for 200 amp service.

**k) Commercial Meter Sockets:**

- 1) Commercial meter sockets will be purchased and installed by the electrical contractor from suppliers (see Appendix C, Table 3 for approved electrical materials and socket distributors).
- 2) Meter socket stacks designed to house multiple meters in one cabinet, for installation on structures designed for multiple occupancy, must be provided by the customer. No financial reimbursement is made for meter stacks. All meter sockets provided by the customer must meet Appendix E, Material Specification 102-1, and be approved by Colorado Springs Utilities.

**5.06 Optional Aesthetic Meter Enclosures:**

New installations of meter enclosures are not permitted with the use of AMR meter devices, as they significantly impede the transmission signal. Existing structures will be evaluated on a case-by-case basis as to whether they will continue to be allowed. The following guidelines refer to existing meter socket enclosures only. These guidelines are in addition to and in no way preclude

or lessen any other requirements stated in the meter section, i.e., tagging, general construction requirements, locks, accessibility, etc.

**a) Ganged Meter Sockets:**

- 1) When enclosed, the enclosure will be hinged on the outside of the enclosure allowing for easy removal, not permanently mounted. The bottom will be left open.
- 2) When enclosed, there will be a minimum clearance of 12 inches in front, and 24 inches on the sides, the top, and the bottom of the meter socket or meter stack from the enclosure. In addition, there will be a minimum of 36 inches of clear working space in front of meters when the doors of the enclosure are open. There will not be any locks on these enclosures.
- 3) Locking of the meter enclosure cabinet will be permitted only if the following guidelines are met:
  - (a) The customer may place an enclosure key in a “lock box” with a Colorado Springs Utilities lock on the box. The box must be clearly marked “meter key” and be in a readily accessible area as close to the enclosure lock as practical.
  - (b) A dual locking method may be used if both the customer and the Colorado Springs Utilities lock can be independently operated to gain access to the enclosure.

**b) Single Meter Sockets:**

- 1) The enclosure will have an access hole either round or square, which is a minimum of five inches in diameter, centered over the meter. The bottom will be left open.
- 2) The cover will be hung, using hooks, allowing for easy removal, not permanently mounted.
- 3) There will be a minimum clearance of 5 inches from the socket to the inside front of the cover. If a special meter is required, more clearance may be needed.
- 4) Colorado Springs Utilities will not be held liable for damage to the cover incurred while performing work to the meter.

**5.07 Converting Existing Apartment Houses With Master Meters to Individual Meters for Each Apartment Unit:**

NOTE: This does not apply to new apartment units to be constructed. Colorado Springs Utilities will consider requests from apartment owners to place electric meters inside an apartment building when converting from master metering to individual apartment metering. These requests will be evaluated on an individual basis. It is not always an economical advantage to the apartment owner to place meters inside. Caution should be used in selecting a conversion method. A request to place meters inside must be made in writing to Field Engineering Section (see Phone Section). If permission is granted to place meters inside, it will be done in accordance with the following stipulations:

- a) The meter location must meet all requirements of the applicable City Code, National Electrical Safety Code, and the National Electrical Code.

- b) All doors leading to the meter locations will have all locking devices removed and will remain open at all times for access by Colorado Springs Utilities personnel.
- c) All conduit and cable work from the secondary terminals on the transformer or weatherhead will be done in accordance with Regional Building Department code requirements. The Regional Building Department will be responsible for inspection and acceptance.
- d) On padmount transformer installations, the customer will provide and install all secondary cable and cable connectors and make connections to the secondary terminals of the transformer as specified by Colorado Springs Utilities.
- e) On transformer vault installations, the customer will provide and install all secondary conduit and cable but Colorado Springs Utilities will make the connections to the transformers. The customer is to leave enough slack cable to make the connections.
- f) The customer may elect to use Colorado Springs Utilities approved, individual meter sockets or ganged meter panel. In some cases when electric load is of a certain magnitude, current transformer metering may be required.
- g) It will be the responsibility of the owner to correct any errors in tagging. Installations of this type will be subject to inspection by Colorado Springs Utilities service personnel to ensure proper tagging. See marking of multiple meter sockets for details (see paragraphs 5.13 and 5.14).
- h) The apartment owner and/or manager will notify each tenant that the metering is being changed to individual metering and that they, the tenants, must make arrangements with Colorado Springs Utilities Customer Service, either by telephone, or in person, to have a meter contract initiated in their name (see Phone Section). Until all contracts have been negotiated and meters set, the billing will continue on the master meter.
- i) During construction, flattened or jumpering of the meter sockets will not be allowed.

### **5.08 Self-Supporting Meter Mounting:**

- a) Self-supporting meter sockets will only be allowed to be mounted on approved utility structures (see Appendix D, Drawings 5 & 10). Approved utility structures include:
  - 1) Utility grade pole
  - 2) 6"x 6" pressure-treated post
  - 3) 3"x 3"x 3/16" angle iron
  - 4) 2 " minimum diameter GRC post
- b) When pedestal mounting is necessary, the minimum requirements are as follows:
  - 1) Posts are to be 2 inch diameter GRC set in 18 inches of concrete.
  - 2) Cross bars are to be 2"x 3/16" strap iron or material of equal rigidity (2 inch wide unistrut type channels will be acceptable).

### **5.09 Moving or Removing Meters and Metering Equipment:**

No person shall tamper, connect, disconnect, move, remove or otherwise interfere with the proper operation of Colorado Springs Utilities meter or other equipment, or in any way interfere with the proper meter registration of the electric energy used. Only authorized Colorado Springs Utilities employees are permitted to connect, disconnect, move, or remove meters. Contact a Colorado Springs Utilities Customer Service representative (see Phone Section) to schedule these activities.

### **5.10 Pulse-Initiating Device to Monitor Electrical Demand:**

Upon the customer's request, Colorado Springs Utilities will install a pulse-initiating device on a customer's existing meter socket for an additional fee. To initiate a request for a pulse-initiating device, the customer shall contact a Colorado Springs Utilities Energy and Water Service's Contract Analyst (see Phone Section). The customer should submit, in writing, all technical information concerning the customer's load-monitoring equipment to the Colorado Springs Utilities Energy and Water Service's Contract Analyst (see Phone Section). Colorado Springs Utilities will determine what type of pulse and the amount of pulses available in a given time interval.

To get the pulse-initiating device installed, the customer will furnish and install a 3/4 inch galvanized rigid conduit from the meter socket to an outside weatherproof box, install a 5 position terminal block, and install conduit and wire from the customer's monitoring equipment. This wiring will be in accordance with the requirements of the electrical code governing such installation with Colorado Springs Utilities stipulation that one-amp current-limiting fuses be installed on the load side of the terminal block (see Appendix D, Drawing 18).

Colorado Springs Utilities will then install pulse-initiating device and wiring from the meter socket to the terminal block. Note: Colorado Springs Utilities responsibility and liability ends at the line side of the terminal block.

### **5.11 End of Interval Indicator:**

Colorado Springs Utilities will not supply or install an end of interval indicator on meters of any type.

### **5.12 Equipment Ahead of the Meter:**

If there is equipment ahead of the meter(s), it is to be designed in such a manner that it can be sealed in an acceptable manner, with padlock or wire seals, depending on the situation. No disconnects shall be installed on the source side of residential meters. Disconnects are allowed on the source side of commercial meters and shall include sealing provisions as stated above and include locking provisions for lock out tag out. Gutters on the source side of meters shall be installed on the outside of buildings.

### **5.13 Marking of Multiple Meter Sockets:**

The electrical contractor who installs the wiring will plainly mark each meter of a multiple meter socket and all individual meter pedestals with a permanent brass tag showing which apartment, office, or room is metered by each meter. Brass tags may be obtained from the Colorado Springs

Utilities free of charge. If the electrical contractor provides the brass tags, the following requirements will apply:

- a) The tag will be round and 1-1/4 inch in diameter.
- b) The tag will have a 3/16 inch diameter hole near the edge.
- c) Letters or numbers must be a stamped impression in the tag and must be at least 3/16 inch in height.

The contractor may also permanently stamp the bottom right corner of the meter socket front panel in lieu of using brass tag. Letters or numbers must be a stamped impression and be at least 3/16 inch in height.

#### **5.14 Tagging Meters:**

The property owner and electrical contractor shall be responsible for assuring that all sockets are tagged correctly. Meters will not be installed until all sockets are tagged correctly. When internal numbering and/or lettering schemes are changed or incorrect tagging creates inaccurate information in Colorado Springs Utilities records, the owner of such premises will be responsible for actual time and material charges incurred by the Colorado Springs Utilities to correct the situation.

#### **5.15 Meter Sets For Approved Meter Sockets:**

All meter sockets provided by the customer must meet Appendix E, Material Specification 102-1 and be approved by Colorado Springs Utilities (see Appendix C-3). Please contact the Advanced Metering Technologies Group Supervisor if you have any questions regarding Colorado Springs Utilities-approved sockets (see Phone Section). Meters will not be set on non-approved sockets. The meter sockets must meet the following guidelines:

- a) Approved socket type (see Appendix E, Material Specification 102-1; and C, table C-3).
- b) Proper tagging.
- c) Legitimate addresses.
- d) Proper covers.
- e) Proper heights.
- f) No unsafe conditions such as holes cut in the electrical equipment and not covered properly.

#### **5.16 Adding Surge Suppression to Meter Sockets:**

- a) Until 2006, Colorado Springs Utilities provided 3-point surge protection service to its customers for an additional fee. This protection was installed on the electric, telephone, and cable television service entrances to customer-owned residences. Existing HomeVantage® Surge Protection customers were given the opportunity to sign a Transfer of Ownership document in order to maintain the surge equipment after the program was discontinued. Customers that did not sign the Transfer of Ownership will eventually have the surge device removed when Colorado Springs Utilities' work is scheduled on their residence.
- b) Colorado Springs Utilities does allow home and business owners to install or contract the installation of surge suppression devices on self-contained electric meter sockets. All such

devices shall be UL listed for that purpose and the installation work shall be done only by licensed electricians or others qualified to safely perform the work. Colorado Springs Utilities in no way accepts responsibility for compensatory or consequential damages resulting from the installation of said devices by others.

- 1) Installation of a surge suppressor to a meter socket must be coordinated with Colorado Springs Utilities personnel, as meter removal, re-installation and re-sealing is required. There will be a time and material charge for this service. To schedule your installation, call the Colorado Springs Utilities Advanced Metering Technologies Group Supervisor (see Phone Section).
  - 2) Plug-in devices designed to fit between the meter and socket are not allowed on sockets equipped with a lever bypass without customer approval. This type of surge protector will compromise the bypass safety features incorporated into all self-contained sockets used by Colorado Springs Utilities, which results in a future requirement to temporarily shut off service for periodic meter testing.
  - 3) Surge protectors that are designed to be mounted to the exterior of a meter socket shall be weather resistant and shall not be installed inside the socket. Surge suppressors that fail when mounted inside a socket can damage the electric meter and/or internal wiring. The wiring connections of such arresters shall be made to the load side terminals of the socket.
- c) The most effective way of protecting your home from lightning surges is to cascade protective devices. A heavy duty “lightning arrester” at your service panel will divert the bulk of an electrical surge. Any remaining surge, as well as those generated inside the building, can be diverted by lighter-duty power strip or outlet surge protectors installed on appliances or sensitive electronics. All electric power and communications (cablevision and phone), grounded conductors, and metallic cable sheaths entering the same building should be connected to the same grounding electrode system in accordance with NEC requirements for proper surge protection.

## **5.17 Electric Meter Testing**

### **a) Acceptance testing for new electric meters:**

- 1) All new electric meters received by Colorado Springs Utilities are certified and tested by the manufacture for accuracy.
- 2) Colorado Springs Utilities performs a sample test of 5% of all new residential electric meters, Forms 1S & 2S, to verify accuracy. Colorado Springs Utilities performs a sample test of 25 percent of all new residential and commercial meters, Forms 12S & 16S, to verify accuracy. Residential electric meters must be plus or minus .5 percent accurate to pass the acceptance testing.
- 3) Colorado Springs Utilities performs a sample test of 100 percent of all new transformer rated commercial and industrial electric meters to verify accuracy. Commercial and industrial electric meters must be plus or minus .5 percent accurate to pass the acceptance testing.

- 4) All rebuilt or repaired electric meters will follow the same accuracy limits as denoted in 5.17(a) & (b) before being placed in service.

**b) Electric Meter Periodic Test Schedule:**

- 1) Electric meters not tested since original acceptance test will be periodically tested. Electric meters must be plus or minus 2 percent accurate to pass the periodic test.

**Note:** Colorado Springs Utilities is currently implementing an automated meter reading system. During this implementation all the residential electric meters and commercial electric meters up through the E2C rate class within Colorado Springs Utilities service territory, are being replaced with new electronic meters. Therefore the periodic testing program for residential and commercial electric meters up through the E2C rate class will be suspended until the AMR project is complete.

- 2) Electric meters are periodically tested according to the following test schedule:

**a) Self-contained single phase and three-wire network meters:**

- 1) A 10 percent sample test on meters not tested since original acceptance test every 4, 12, and 20 years.
- 2) A 100 percent test of meters that have not been tested for 25 years.

**b) Self-Contained Polyphase Meters:**

- 1) A 10 percent sample test on meters not tested since original acceptance test every 4 and 8 years.
- 2) A 100 percent test of meters that have not been tested for 12 years.

**c) Instrument transformer rated, single-phase meters:**

- 1) A 10 percent sample test at the following intervals on meters not tested since original acceptance test every 4 and 8 years.
- 2) A 100 percent test of meters that have not been tested for 12 years.

**d) Instrument transformer rated, polyphase meters:**

- 1) A 10 percent sample test on meters not tested since original acceptance test every 2 and 4 years.
- 2) A 100 percent test of meters that have not been tested for 6 years.
- 3) A 100 percent test of meters that have not been tested for 2 years for meters with loads of 500 kW, or greater, for 2 out of 12 consecutive billing periods.

e) Special service contracts: test as determined by contract if specified or used appropriate meter test schedule.

f) Integrated (block interval) demand meters including demand registers and associated control devices: test schedule is the same as for the associated watt-hour meters, but not to exceed 12 years.