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REVISIONS: UPDATED LEGAL ACKNOWLEDGEMENT FORM. FD MAR '16

DESIGNED J. AGNOLIN	RECOMMENDED  F. DENNERT	ACCEPTED  G. REIMER	ENGINEER OF RECORD 	NOTICE FROM THE EXECUTIVE VICE PRESIDENT TRANSMISSION AND DISTRIBUTION AND CUSTOMER SERVICE	
DISTRIBUTION STANDARDS 		ISSUED: MAR 2016 REPLACES: MAY 2004 ORIGINALLY ISSUED: NOV 1980		PAGE 1 OF 2	ES43/53/54/55/65 A1-01.01 ^R 4

Scope

This manual is one of a series containing standards for construction of the BC Hydro electrical distribution plant within the service area of BC Hydro. A new distribution plant shall be designed, constructed, owned, operated, maintained and repaired to these standards.

Purpose of Standards

BC Hydro objectives require standardization to:

- a) Ensure uniform safety requirements comply with BC statutes and regulations.
- b) Provide uniform system reliability.
- c) Provide uniform operating practices.
- d) Permit economic bulk purchasing of materials.
- e) Achieve optimum life cycle cost of plant construction.
- f) Effect efficient quality assurance.

Responsibility

The Distribution Standards Department prepares these standards and verifies that specified plant and procedures will perform adequately under all normally expected conditions encountered throughout the province of British Columbia. These standards are approved by Professional Engineers. It is the responsibility of BC Hydro Managers to ensure that the standards are followed unless abnormal conditions are encountered that require variations. These variations should be kept to a minimum and their performance shall be the responsibility of the Professional of Record in charge of the project, who will record and seal the variation based on satisfactory qualifications and experience to do so. As per the latest revision of the BC Hydro Distribution Owner's Engineer Guide, these variations must be accepted by BC Hydro's Owner's Engineer.

Use of Stock Materials

The electrical distribution plant covered by these standards is built using stock materials approved by a Professional Engineer as required by law. The use of non-stock materials for special and unusual situations must be approved by Distribution Standards or the BC Hydro Engineer responsible for the project.

Revisions to Manual

These standards are revised from time to time to improve the safety, performance, workability, cost effectiveness or appearance of the plant. The existing plant built to previous standards need not be updated unless so specifically advised by BC Hydro. When maintenance or other work, such as voltage conversion or conductor change is being done, updating plant to current standards is encouraged.

Mailing Addresses

The manual has been issued to a corporation or firm rather than to an individual. The corporation or firm is responsible for the safekeeping of the manual, and for keeping it current. Changes of address or in number of copies required must be reported promptly.

Suggestions for changes in the manual, or required changes of address may be made on the pre-addressed comment sheet included in the Manual and with each issue of revision.

REVISIONS: UPDATED LEGAL ACKNOWLEDGEMENT FORM. FD MAR '16

DESIGNED J. AGNOLIN	RECOMMENDED  F. DENNERT	ACCEPTED  S. REIMER	ENGINEER OF RECORD  F. U. DENNERT PROFESSIONAL ENGINEER BRITISH COLUMBIA	NOTICE FROM THE EXECUTIVE VICE PRESIDENT TRANSMISSION AND DISTRIBUTION AND CUSTOMER SERVICE		
DISTRIBUTION STANDARDS BC Hydro		ISSUED: MAR 2016 REPLACES: MAY 2004 ORIGINALLY ISSUED: NOV 1980		PAGE 2 OF 2	ES43/53/54/55/65 A1-01.02	R 4



Information Bulletin:

Latest Revisions to Grounding Standards and Installation of Precast Grounded Bollards

1.0 Items Covered

- ES54 R1-01 Grounding of Pad-Mounted Equipment in Public Corridors
- ES54 R1-02 Grounding of Pad-Mounted Equipment on Private Property

2.0 Overview

This bulletin contains the latest revisions to the above construction standards for the installation of BC Hydro-owned pad-mounted equipment on private property as well as public corridors. These revisions are the result of BC Hydro's effort to improve HV safety grounding based on equipotential grounding standards and practices.



Figure 1 – Commercial Installation



Figure 2 – Municipal Installation

Figures 1 and 2 illustrate dangerous installations of customer-owned and exposed conductive structures, such as metal fences, light posts, metal benches, metal

boxes, bollards, etc., placed in the vicinity of BC Hydro HV pad-mounted equipment enclosures. In order to comply with applicable BC Electrical Code rules on private property and BC Hydro grounding standards, these types of customer-owned exposed metal structures shall be bonded to ensure equipotential grounding. Bonding of all exposed conductive structures to the ground bus (inside BC Hydro pad-mounted equipment) eliminates dangerous touch potentials and ensures public safety. However, BC Hydro Work Methods preclude bonding of customer grounding conductors directly to the BC Hydro-owned counterpoise. Accordingly, the customer shall install a separate ground loop around BC Hydro pad-mounted equipment on private property for bonding customer metal structures located less than 3 metres away from the enclosure.

For many retrofit and upgrade installations with less than 1 metre clearance to the existing structures, BC Hydro requires installation of additional ground electrodes to expand the zone of influence for deficient counterpoise, per ES54 R1-01.02.

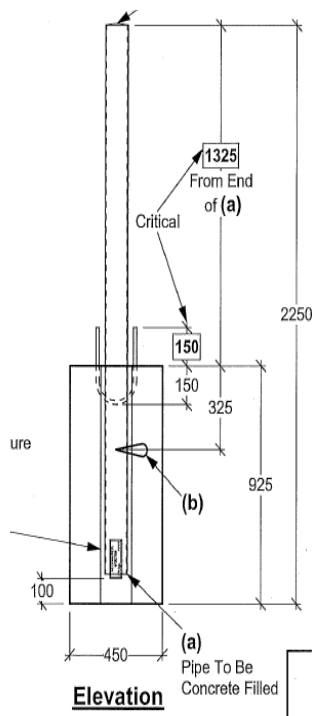


Figure 3 – Cat. 97002788



Figure 4 - Precast Bollard Grounding Mock-up

Recently, Distribution Standards has developed precast grounded bollards, shown in Figure 3, to eliminate the danger of touch potentials. Precast grounded bollards protect BC Hydro equipment and shall be bonded to the BC Hydro counterpoise according to the ES54 R1-01 and R1-02 standards. For more information on physical connections and Catalogue IDs, refer to Figure 4 above.

Concrete precast grounded bollards reduce construction time as well as the overall cost of construction. A U-shaped ground rod is welded to the galvanized metal pipe inside the concrete base to protect the weld from accelerated corrosion when buried directly in the ground.

3.0 Action

The newly revised standards for the installation of BC Hydro-owned equipment on public corridors, ES54 R1-01 R6, and installation on private property away from buildings, ES54 R1-02 R2, shall be in effect immediately.

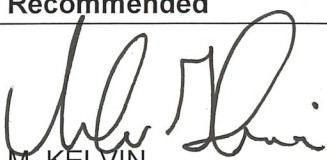
All new grounding installations for BC Hydro pad-mounted equipment shall be completed with the following equipment changes:

- 1) Installation of the "Mastic Compound Pad", Cat ID 394-0296, detailed in ES54 R2-01.02 (2004 revision), has been deleted. Mastic compound has been found to trap moisture, causing accelerated corrosion of connectors, ground rods and ground conductors.
- 2) New concrete precast grounded bollards on private property and public corridors shall be bonded to the BC Hydro counterpoise, according to the revised ES54 R1-01 (Revision 6) and ES54 R1-02 (Revision 2) standards.
- 3) For those installations with reduced clearance of the BC Hydro counterpoise to the existing structures, BC Hydro requires the installation of additional ground electrodes, as shown on ES54 R1-01.02, for improved safety by extending the "zone of influence" of the additional ground rods.
- 4) For private property installations more than 3 metres away from a customer building structure, the customer shall install an additional ground loop for bonding all customer-owned conductive structures, such as metallic fences, light poles, rebar reinforced retaining walls, etc. located within 3 metres of the BC Hydro HV pad-mounted equipment.
- 5) For private property installations located within 3 metres of a customer building, the HV safety grounding installation shall comply with the ES54 F3-07 standard.

4.0 Distribution Standards Contact

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5.0 Approval

Recommended		Reviewed		Approved	
					
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Date:	2017-09-19	Date:	2017-09-19	Date:	2017-09-19