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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.

Section B Clearances

ES43 B0

B0-01 Table of Contents

ES43 B1

B1-01 General Notes
B1-02 Standard Vertical Sag Criteria for Wires and Conductors Above Ground and Roads
B1-03 Vertical Design Clearances of Wires and Conductors Above Ground
B1-11 Clearances Above Ground for Low-Voltage Services
B1-12 Clearances Over Railway Crossings
B1-13 Vertical Separation Between Power Conductors and Communication Lines Attached to Same Pole
B1-15.01 Minimum Clearances Buildings and Street Lights
B1-15.02 Canadian Electrical Code Clearance Requirements
B1-16 Vertical Separation Between Conductors Carried on Separate Supports

1. Mandatory Minimum Clearances:

The following pages give the mandatory minimum clearances, separations, and spacing that must be maintained between electric power conductors, communication lines, span guys, foreign objects, and the ground under specified conditions. To ensure that these minimum values are met under maximum specified loading and service conditions, additional day-to-day clearance must be obtained to allow for varying operating, weather, and other conditions on or around the pole. Allowances should also be made for anticipated future changes such as distribution or communication plant additions, changes to road grades, new buildings adjacent to the pole line, etc.

2. Vertical Clearances:

Vertical clearances shown are, in general, those specified in CSA Standard C22.3 No. 1-10, and apply under conditions of maximum specified design sag due to either ice-loading or thermal expansion, whichever is larger. Vertical clearances apply to any point of the span, so allowances must be made for the profile of the terrain. To calculate the clearance of inclined spans, see ES43 Y1-04.

3. Horizontal Clearances:

Horizontal clearances shown are, in general, those specified in CSA Standard C22.3 No. 1-10, and apply under conditions of maximum specified design swing for the conductor or wire. To calculate conductor swing, see ES43 Y1-06.

4. Private Property:

For conductors over private property, clearances must conform with the requirements of the Canadian Electrical Code (CSA Standard C22.1, Canadian Electrical Code Part 1).

5. Highways:

For conductors crossing or alongside highways, clearances shown are those specified in the B.C. Ministry of Transportation & Infrastructure (MoTI) Utility Policy Manual, and apply within MoTI rights-of-way.

6. Navigable Waters:

Clearances over navigable waters are not included in this section. Such clearances are subject to the regulations of Transport Canada and are shown on the individual crossing permits.

R.3- TITLE BLOCK, CSA C22.3 No.1-10. MAY'10 FK

DRAFTER: DM

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ORIGINAL ISSUE DATE: SEPTEMBER 1985

CLEARANCES
GENERAL NOTES

7. Gas / Propane Tanks:

Conductors are not to pass over gasoline pumps or propane tanks over 7600 litres capacity. Primary conductors, including the system neutral, are to be kept 7.6 m horizontal distance from gasoline pumps or propane tanks.

8. Secondary Conductors:

The practical clearance of secondary and neutral conductors may be dictated by pole attachment heights needed to attain required service clearances (see ES43 B1-11).

9. Joint Use Poles:

On joint use poles, minimum clearances and attachment heights of conductors are dictated by Provincial and National Regulations, by the BC Hydro/TELUS Joint Use Agreement, and by variations established from time-to-time by the Joint Use Coordinating Committee (JUCC). (See ES43 C2-01).

10. Over-Height Vehicle Clearances:

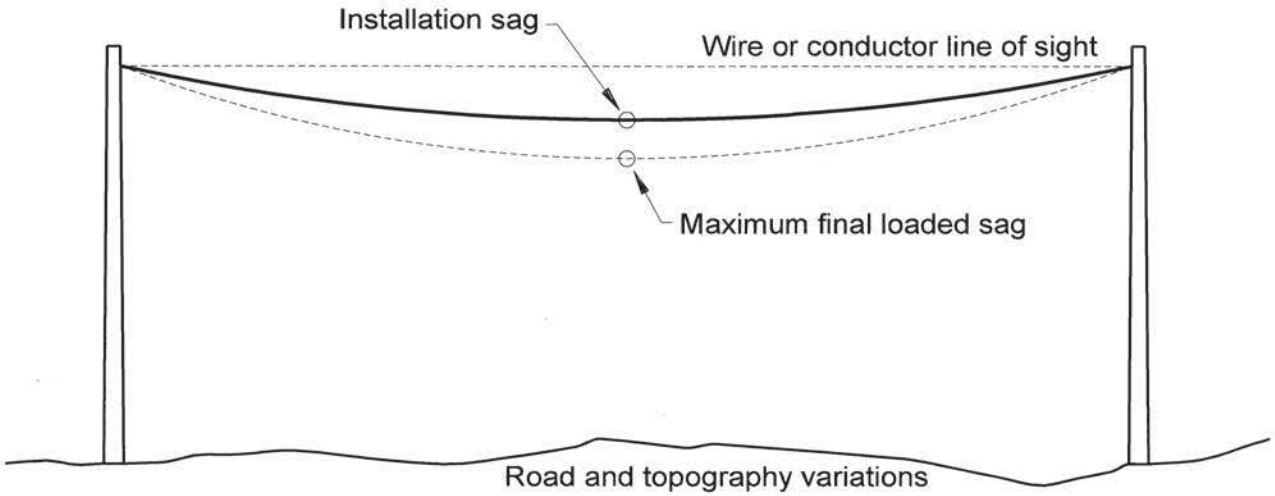
For line construction through farmland, consideration must be given to the likelihood of large farm machinery being moved about. Near machinery depots, dumping areas, and logging areas, additional vertical clearances may be required by local agreement to allow passage of vehicles and machinery in excess of 4.15 m in height. Where combined height of vehicle plus load exceeds 4.15 m, clearances must be increased by the amount by which the height exceeds 4.15 m. (See ES43 B1-03)

11. Transmission Line Clearances:

Transmission Engineering must be consulted for clearances to transmission conductors, as sags may change significantly under extreme operating conditions (see ES43 B1-16).

12. Horizontal Separation from Other Buried Services:

Minimum separation of 0.6 m is required between the edge of the base of a pole and the nearest face of other buried service, in order to permit pole replacement without damage to other services.



NOTES:

1. Minimum wire and conductor clearances above ground and roads are mandated by road authorities and CSA Standards. Minimum vertical clearances are based on maximum final design sag conditions.
2. For service placing heights see ES43 B1-11.
3. For clearances over railway crossings see ES43 B1-12.

ES43 F2-02
ES43 F1-04
ES43 F1-01
REFERENCE DRAWINGS

DRAFTER: DM

DESIGNER	RECOMMENDED	APPROVED
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ORIGINAL ISSUE DATE: NOVEMBER 2012

STANDARD VERTICAL SAG CRITERIA FOR WIRES AND CONDUCTORS ABOVE GROUND AND ROADS

BC hydro DISTRIBUTION STANDARDS | PAGE 1 OF 1 | ES43 B1-02 | R. 0

Vertical Design Clearances of Wires and Conductors Above Ground

ES43 B1-03

Application

This standard provides the vertical clearance required for above ground conductors, communication wires, and span guys.

Revision Notes

Updated flashover and horizontal swing distances in note 10. Changed content is marked by green vertical revision lines in the left margin. This revision released concurrently with Standards and Equipment Advisory Information Bulletin 2023-044 R1 *Revised ES43 B1-03 Vertical Design Clearances of Wires and Conductors Above Ground*.

References

BC Hydro Distribution Standards

ES43 B1-12	Clearances Over Railway Crossings
ES43 Y1-06	Conductor Swing for Horizontal Design Clearance
ES55 B3-03	Conductor Swing for Horizontal Design Clearance

External Documents

British Columbia Ministry of Transportation and Infrastructure (MOTI) Utility Policy Manual

CSA 22.3 No.1 Overhead systems

Notes

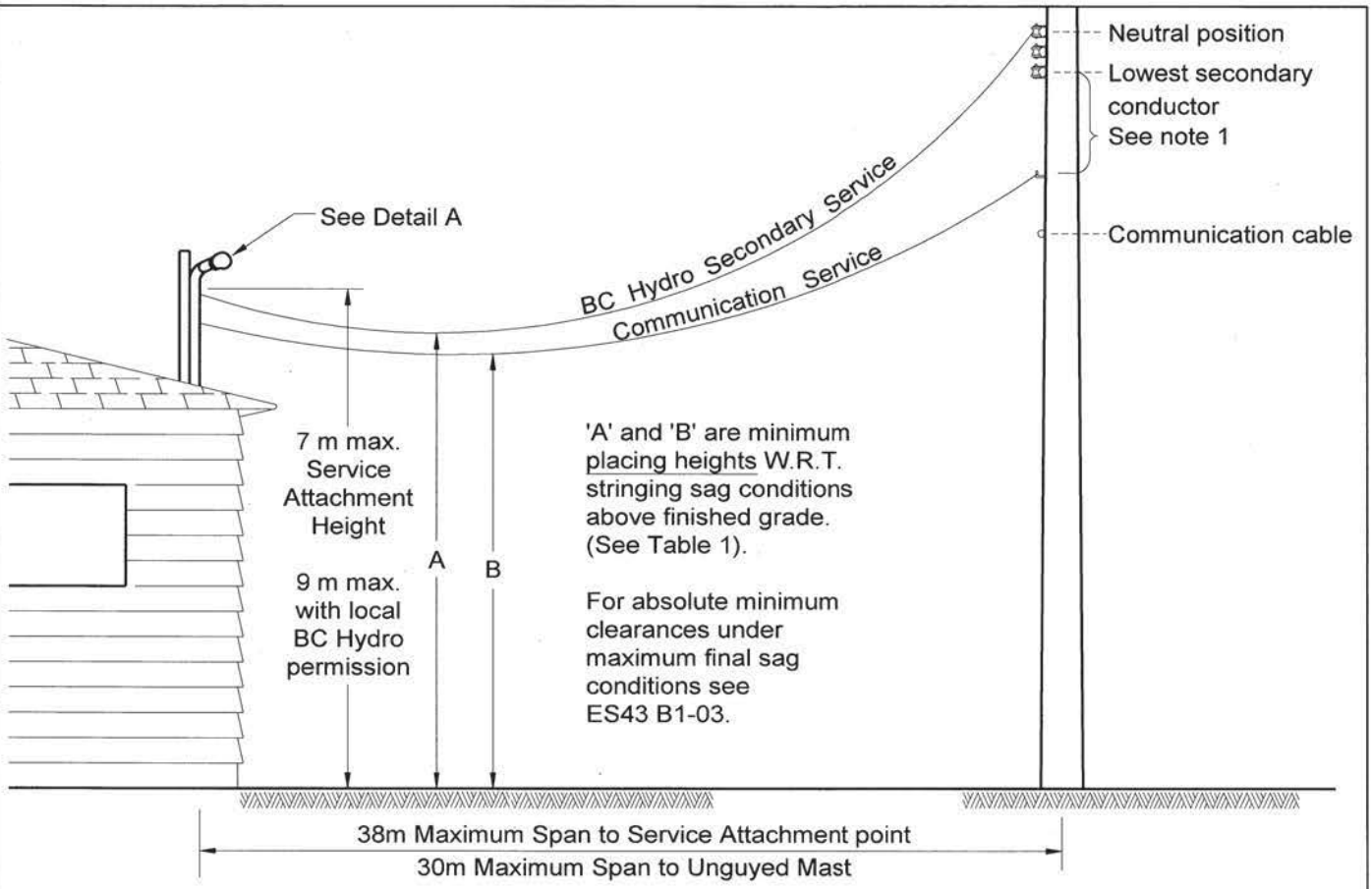
1. Clearances in Table 1 are absolute minimum under maximum final design sag conditions (see note 4). Additional clearance is required over and above the normal ambient operating conditions to ensure Table 1 clearances are met.
2. Add the amount by which vehicle heights (including load), person heights, and equipment heights are permitted to exceed H as defined in Table 1.
3. Vertical ground clearance where snowmobiles travel shall consider local snowfall and add this to the clearance in Table 1 row 8.
4. Maximum sag may occur under ice loading or thermal expansion for primary, neutral, and secondary conductors.
5. The clearance in Table 1 row 3 may be reduced to 4.0 m where communication wires or cables run along alleys and cannot swing out over the area accessible to vehicles (horizontal swing or telecommunications ally arm).
6. The clearance in Table 1 row 3 may be reduced to 4.0 m when crossing residential driveways with communication cables.

Designed: K. Middleton, P. Eng		Professional of Record	Vertical Design Clearances of Wires and Conductors Above Ground
Checked: K. Middleton, P. Eng		PROFESSIONAL ENGINEER, PROVINCE OF BRITISH COLUMBIA, K. D. MIDDLETON # 32387, EGBC PERMIT 1002449, 2024-04-10	
Reviewed: M. Stevens, P. Eng			DISTRIBUTION STANDARDS BC Hydro / ES43 B1-03 R5
Approved: H. Giesbrecht, P. Eng		Issued: 2024-04-09 Effective: 2024-05-02	

7. The clearance in Table 1 row 3 over a residential driveway may be reduced to 3.7 m for service conductors and communication drops to residences or residence garages.
8. The clearance in Table 1 row 4 may be reduced by 0.76 m on farmland where high farm vehicles cannot travel. Examples include steep slopes, hillsides, and rocky ledges. This does not apply to swamps or other areas that can be crossed by vehicles in winter.
9. An additional vertical clearance of 0.3 m has been added to permit normal subsequent ballast adjustments without encroaching on the specified minimum clearance when a line that crosses a railway is constructed or rebuilt, or the crossing structures are subsequently replaced. See ES43 B1-12.
10. Flashover distances do not need to be considered for telecom. Flashover is 8 mm for up to 1 kV conductors, 145 mm for 12 kV conductors, and 218 mm for 25 kV conductors (CSA C22.3 No. 1, Table A.1 *Switching surge values for AC conductors*). Horizontal swing for BC Hydro conductors is available in ES55 B3-03 and ES43 Y1-06. The non-sheltered factor is used to calculate the horizontal swing distance provided below. Calculations can be performed for site-specific conditions (conductor size) to reduce the values. Horizontal swing plus flashover distances for cables up to 1 kV is:
    a. 0.9 m for 50 m ruling span;
    b. 1.4 m for 75 m ruling span; and
    c. 2.5 m for 100 m ruling span.
11. Table 1 rows 1 and 2 are governed by a separate agreement with MOTI, TELUS, and BC Hydro and follow the *Utility Policy Manual*.
12. The minimum clearance for telecommunication cables is 6.1 m where a lower vertical clearance may interfere with highway operations or maintenance as determined by the MOTI district manager (or designate) per the *Utility Policy Manual*.

Table 1 – Minimum vertical clearance at maximum design sag

Row	Short description	Wire or conductor location, where H is the expected maximum person, vehicle including load, and equipment height	Minimum vertical clearance at maximum design sag (m)		
			Span guys and telecom wires	System voltage	
				0 to 1 kV phase to ground	>1 to 22 kV phase to ground
1	Over MOTI expressways and freeways Over MOTI signalized intersections	Over BC freeways, expressways, and signalized intersections as approved under MOTI jurisdiction. See note 11.	5.5	5.5	6.1
2	Over or alongside MOTI highways	Over or alongside MOTI highways and within the highway right-of-way. Greater clearance may be required for highway maintenance and construction equipment as determined by the district highways manager. See notes 11 and 12.	5.0	5.0	6.1
3	Road surface	Alongside or adjacent to a road surface within the maximum horizontal swing plus flashover distance (see note 10) likely to be travelled by road vehicles (including roadways, streets, lanes, alleys, residential and commercial driveways and entrances). H = 4.15 m.	4.42 (see notes 5, 6, 7)	4.42 (see note 7)	4.75
4	Farmland	Over land likely to be travelled by agricultural or other equipment, including farm field access roads and farmyard entrances. H = 4.15 m.	4.42 (see note 8)	4.42	4.75
5	Underground pipeline right-of-way	Over underground pipeline right-of-way. H = 4.15 m.	4.42	4.42	4.75
6	Land used by off-road vehicles	Over land likely to be travelled by off-road vehicles, riders on horses, or other large animals. H = 3.6 m.	3.7	3.7	4.75
7	Road right-of-way inaccessible to road vehicles	Over land within the road right-of-way inaccessible to road vehicles other than as described in row 3. H = 2.9 m.	3.0	3.4	4.15
8	All-terrain vehicles Pedestrian walkways	Over walkways or land normally accessible only to pedestrians alone, snowmobiles (see note 3), and personal use all-terrain vehicles. H = 2.4 m.	2.5	3.1	3.4
9	Railway crossings	Above top of rails at railway crossings. H = 6.7 m. See note 9.	7.6	7.6	7.9



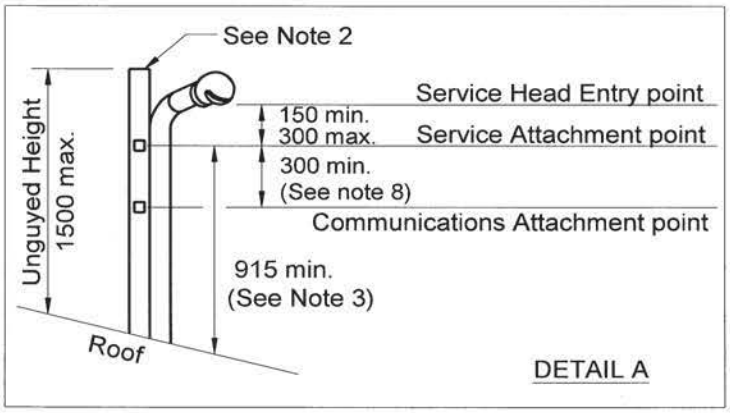


TABLE 1		
LOCATION	A (Hydro)	B (TELUS)
Across MoTI Freeways, Expressways	7.1 m	6.4 m
Across MoTI Highways	7.1 m	5.9 m
Across Streets, Lanes, Pipeline Row	5.5 m	5.3 m
Across Residential Driveways	4.5 m	4.3 m
Across Commercial and Industrial Driveways	5.5 m	5.3 m
Across Ground only Accessible to Pedestrians	3.5 m	3.0 m

NOTES:

1. For Joint Use spacing on Pole see ES43 C2-01.
2. Mast and Service Head to comply with clause 6-112 and 6-116 of the Canadian Electrical Code, Part 1, 2009.
3. Drip Loop clearance to roof 600 mm minimum.
4. Services must also meet the requirements of Distribution Instruction S10-2.
5. All clearances shown apply to services attached directly to the side of buildings. See ES43 N2-02, N2-05 and N2-06.
6. On Joint Poles ensure that sufficient clearance is available to allow for communication service placing height.
7. All dimensions in mm except where noted.
8. Telus requires 600 mm separation on commercial buildings.

R.3- TITLE BLOCK, NOTES REVISED. MAR'10 FK

DRAFTER: DM

DESIGNER	RECOMMENDED	APPROVED
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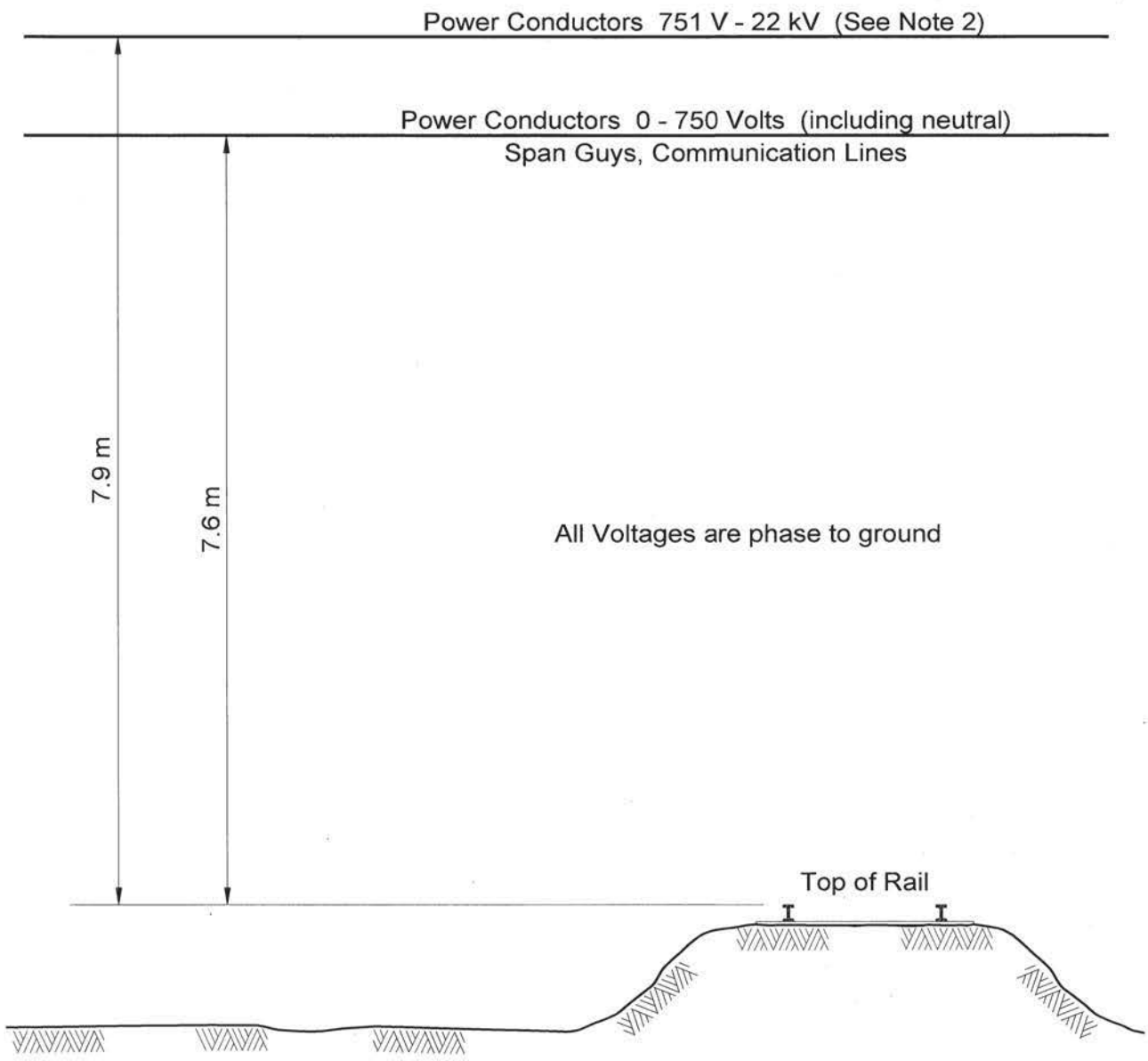
ORIGINAL ISSUE DATE: SEPTEMBER 1985

CLEARANCES ABOVE GROUND FOR LOW VOLTAGE SERVICES



NOTES:

1. Clearances shown are absolute minimum under any and all conditions of sag and loading as specified in CSA C22.3, No.1-10.
2. Clearances include 0.3 m allowance for future ballast lift.
3. Clearances are measured from the top of the rail to the sag point directly over the rail.
4. Transmission Engineering must be consulted for clearances to transmission conductors, as sags may change significantly under extreme operating conditions.

R.3- TITLE BLOCK, CSA C22.3 NO.1-10. MAR.'10 FK

DRAFTER: DM

DESIGNER	RECOMMENDED	APPROVED
R. YANG	C. PICASSI	F. DENNERT

ORIGINAL ISSUE DATE: SEPTEMBER 1985

CLEARANCES OVER RAILWAY CROSSINGS

BChydro DISTRIBUTION STANDARDS | PAGE 1 OF 1 | ES43 B1-12 | R. 3

Vertical Separation Between Power Conductors and Communication Lines Attached to Same Pole

ES43 B1-13

Application

This standard provides the vertical separation required between conductors and communication lines attached to the same pole.

Revision Notes

Added *Application*, *Revision Notes*, and *References* sections. Edited Table 1 column headings for clarity, to more closely match CSA 22.3 Table 23. Deleted “with WP covering” and changed 2 mm to 75 mm in note 4a. Added note 5. Added reference to ES43 C2-02 to note 6. Changed content is marked by green vertical revision lines in the left margin. This revision released concurrently with Standards and Equipment Advisory Information Bulletin 2023-037 *Revised ES43 B1-13 Distance Between Supply and Communication Conductors*.

References

BC Hydro Distribution Standards

ES43 C2-01	Spacing and Separation Wire Spacing on Joint Use Pole Below the Neutral
ES43 C2-02	Spacing and Separation In-Span Separation Between Secondary/Neutral Conductors and Communication Wires
ES43 G3-10	Single-Phase Flat Tangent
ES43 G3-11	Single-Phase Flat Angle 5° - 45°
ES43 G3-12	Single-Phase Flat Dead-End
ES43 G3-13	Single-Phase Flat Double Dead-End

External Documents

CSA 22.3 No.1	Overhead systems

Notes

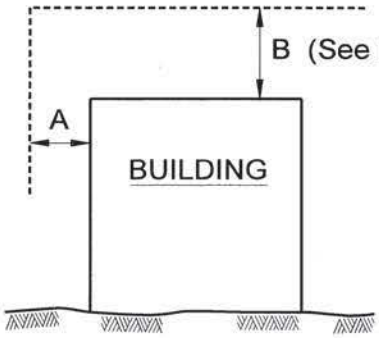
Table 1 – Minimum vertical separation (all voltages are phase to ground)

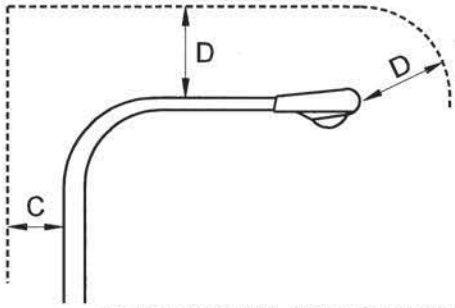
	Minimum vertical separation for power conductor voltages	
Between	**0 V to 750 V**	**751 V to 22 kV**
Power conductors and communication lines at the pole	1.0 m (see note 2)	1.2 m (see note 3)

1. Table 1 spacings at the pole conform with CSA C22.3 No.1, Table 23 *Minimum vertical separations at a joint-use structure*, but may in some cases be less than the framing dimensions shown in the ES43 standards. Standard framing dimensions, if larger, supersede the spacings in Table 1.

Designed: A. Kehoe	A. Kehoe	Professional of Record PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA K. D. MIDDLETON # 32387 EGBC PERMIT 1002449 2023-11-14	Vertical Separation Between Power Conductors and Communication Lines Attached to Same Pole
Checked: K. Middleton, P. Eng	K. Middleton		
Reviewed: K. Middleton, P. Eng	K. Middleton		
Approved: H. Giesbrecht, P. Eng	H. Giesbrecht	Issued: 2023-11-07 Effective: 2023-11-07	DISTRIBUTION STANDARDS BC Hydro ES43 B1-13 R4

2. Separation for communication service drops at the pole may be reduced to 0.6 m (see ES43 C2-01).
3. A multi-grounded neutral is considered to be 0 to 750 volts. See ES43 G3-10, 11, 12, and 13 for single-phase flat construction communication spacing.
4. Per CSA C22.3 No.1, Table 24 *Minimum in-span vertical clearances between supply and communication conductors*, minimum in-span vertical clearances between supply and communications conductors are measured from the line of sight of the highest communication wire or cable as follows:
    a. 0 V to 750 V: 75 mm
    b. 751 V to 15 kV: 300 mm
    c. 15 kV to 22 kV: 380 mm
5. Conductors are considered bare even when covered by weatherproof coverings, as coverings can fail before the end of the conductor's lifespan.
6. The neutral for spans over 75 m may sag below the line-of-sight of the communication attachments, but not lower than 300 mm above the communication line in the span (per ES43 C2-02 and CSA C22.3 No.1, clause 5.10.3.3).





ORNAMENTAL STREETLIGHT STRUCTURE

VOLTAGE PHASE TO GROUND	BUILDING SURFACE		SIGNS, BILLBOARDS, LAMP & TRAFFIC STRUCTURES	
	A Horizontal (See Note 3)	B Vertical (See Note 2)	C Horizontal (See Note 3)	D Vertical (See Note 2)
0 - 750 V	1.0 m (See Note 4)	2.5 m	1.0 m	1.0 m
0.75 - 22 kV	2.0 m	3.0 m	3.0 m	3.0 m

NOTES:

1. Clearances apply to any part of the building or streetlight standard.
2. Vertical clearances for conductors are absolute minimum under maximum design loading conditions. Conductors over 750 volts should not pass over buildings.
3. Horizontal clearances for conductors are in addition to maximum conductor design swing.
4. Conductor clearance shall be increased to 1.5 m where conductors pass in front of windows or other openings, unless satisfactorily guarded.
5. All clearances meet or exceed CSA Standard C22.3 No. 1-10, Table 9 where applicable.
6. Where practical, clearances greater than the minimum specified values should be provided for enhanced safety to persons in or on buildings, workers maintaining streetlights, and firefighters.
7. Refer to ES43 B1-15.02 for Canadian Electrical Code requirements of supply plant.

R.3- TITLE BLOCK, CSA C22.3 No. 1-10, PAGE 2 ADDED. MAR. '10 FK

DRAFTER: DM

DESIGNER	RECOMMENDED	APPROVED
P. YANG	C. PICASSI	F. DENNERT

ORIGINAL ISSUE DATE: SEPTEMBER 1985

MINIMUM CLEARANCES
BUILDINGS AND STREETLIGHTS

NOTES, cont.

Verbatim Rules from the 2012 Edition of the Canadian Electrical Code, Part 1 are listed below. Compliance with the Code edition adopted in the Province of British Columbia is required.

8. Rule 26-014 Dielectric liquid-filled equipment - Outdoors (see Appendix B)

   (1) Except as permitted by Subrule (3), dielectric liquid-filled electrical equipment containing more than 46 L in one tank, or 137 L in a group of tanks, and installed outdoors shall not be located within 6m of:

      (a) any combustible surfaces or material on a building

      (b) any door or window

      (c) any ventilation inlet or outlet

   (2) The dimension referred to in Subrule (1) shall be the shortest line-of-sight distance from the face of the container containing the liquid to the building or part of the building in question.

   (3) Notwithstanding the requirements of Subrule (1), the equipment shall be permitted to be installed within 6m of any item listed in Subrule (1) (a), (b), and (c), provided that a wall or barrier with non-combustible surfaces or material is constructed between the equipment and that item.

   (4) Where dielectric liquid-filled electrical equipment containing more than 46 L in one tank, or 137 L in a group of tanks, is installed outdoors it shall

      (a) be inaccessible to unauthorized persons;

      (b) not obstruct firefighting operations;

      (c) if installed at ground level, be located on a concrete pad draining away from structures or be in a curbed area filled with coarse crushed stone; and

      (d) not have open drains for the disposal of the liquid in the proximity of combustible constructions or materials.

9. Rule 12-310 Clearance of conductors

   The conductors shall be located or guarded so that they cannot be reached by a person standing on a fire escape, flat roof, or other portion of a building, and they shall be at least 2.5 m above the highest point of a flat roof or roof that can be readily walked upon and at least 1 m above peaked roofs or the highest point of roofs that cannot be readily walked upon, except that where a deviation has been allowed in accordance with Rule 2-030, they shall be permitted to be less than 2.5 m but not less than 2 m above the highest point of a flat roof or roofs that can be readily walked upon.

Vertical Separation Between Conductors Carried on Separate Supports

ES43 B1-16

Application

This standard provides the vertical separation required between conductors carried on separate supports.

Revision Notes

Added *Application*, *Revision Notes*, and *References* sections. Updated transmission engineering standard reference in note 4. Added note 6. Changed content is marked by green vertical revision lines in the left margin. This revision released concurrently with Standards and Equipment Advisory Information Bulletin 2023-023 *Revised ES43 B1-14 and ES55 B3-06 Vertical Separation of Conductors on Separate Supports*.

References

Other BC Hydro Documents

ES41 K 1.1 Electrical Clearances for Overhead Transmission Lines

External Documents

CSA 22.3 No.1 Overhead systems

Notes

1. Obtain agreement from Transmission Engineering before distribution lines are designed or constructed, or clearances are altered beneath transmission lines, as sags may change significantly under extreme operating conditions. Obtain transmission line elevations at maximum sag from Transmission Engineering, as normal survey methods will not determine maximum sag conditions.
2. These minimum separations meet or exceed CSA C22.3 No.1, Table 13, and apply when the top conductors are at maximum sag.
3. A multigrounded neutral is less than 750 volts.
4. Minimum separations to conductors above 25 kV meet or exceed ES41 K 1.1, Table 3.
5. Increase clearance to meet the specified clearance in the de-wired position if the trolley pick-up arm is not prevented from de-wiring.
6. Attach BC Hydro and telecommunications plant to a common pole at crossing locations when practicable when installing new or modifying existing telecommunications cable or BC Hydro conductors.

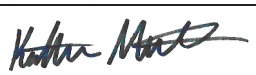
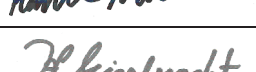
Designed: K. Middleton, P. Eng		Professional of Record  EGBC PERMIT 1002449 2023-07-06	Vertical Separation Between Conductors Carried on Separate Supports
Checked: K. Middleton, P. Eng			
Reviewed: H. Giesbrecht, P. Eng			DISTRIBUTION STANDARDS BC Hydro / ES43 B1-16 R4
Approved: H. Giesbrecht, P. Eng		Issued: 2023-07-07 Effective: 2023-07-07	

Table 1 – Required vertical separation between conductors

Conductors and span guys at lower level (phase to ground)	Conductors at upper level (phase to phase) (m)							
			(see Notes 1 and 4)					
	750 V	25 kV	60 kV	138 kV	230 kV	287 kV	360 kV	500 kV
Communication	0.3	2.1	2.1	2.1	2.6	3.1	3.5	4.2
Span guys	0.2	0.5	1.4	2.0	2.6	3.1	3.5	4.2
0 V to 750 V AC	0.3	0.5	1.4	2.0	2.6	3.1	3.5	4.2
751 V to 22 kV AC	–	0.6	1.4	2.0	2.6	3.1	3.5	4.2
Trolley 0 V to 750 V DC (see Note 5)	0.6	0.9	1.4	2.0	2.6	3.1	3.5	4.2

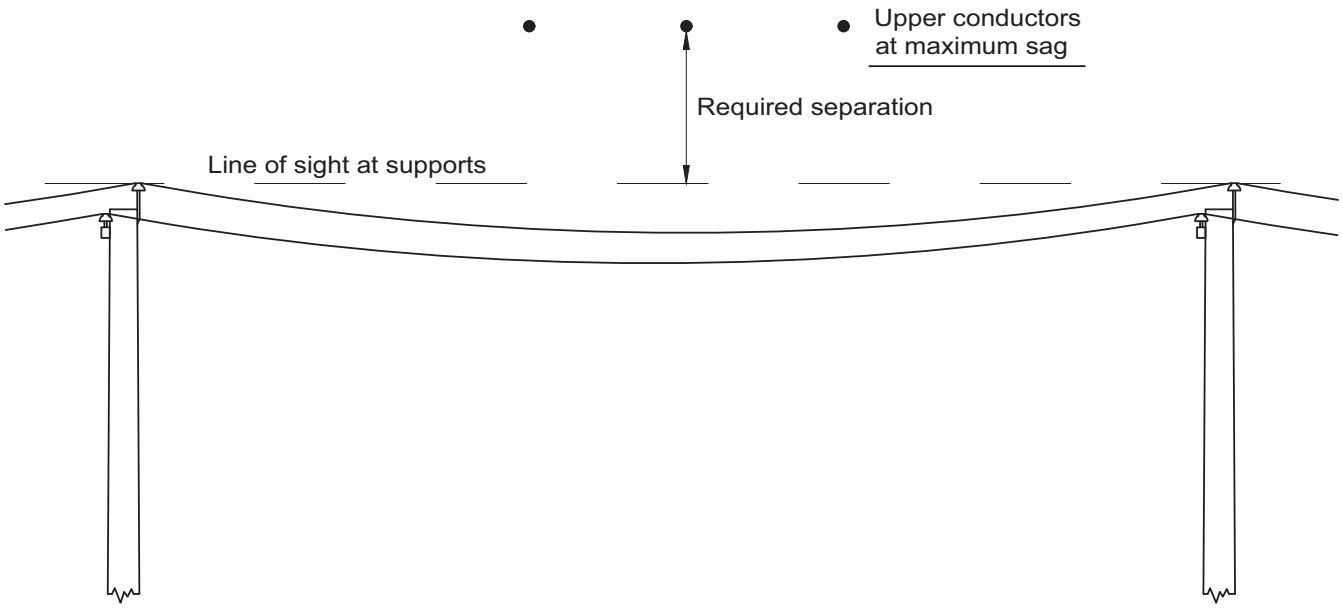


Figure 1 – Vertical separation