

CLEARANCES

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C-24-02.02	1	VERT CLEARANCES ABOVE GROUND (BUILT BETWEEN 1960 & 1975)	D	
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C-24-02.09	1	CLEARANCES FOR SERVICE DROPS	C	
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C-24-02.11	1	CLEARANCES TO FUEL TANKS	B	
C-24-02.12	1	MIN VERT CLEARANCES ABOVE NAVIGABLE WATERWAYS	0	
C-24-02.13	1	GRANARIES & HAY STACKING AREAS & FARM YARD WORKING AREAS	A	
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C-24-02.15	1	MISCELLANEOUS CLEARANCES (BUILT BEFORE 1996)	0	
C-24-02.16	1	CONDUCTOR SWING CALCULATIONS	0	

SaskPower - DISTRIBUTION STANDARDS

APPROVAL	DESIGN CHK	DRN. LM	INDEX	
L MOEN	P. PATEL	CHKD. PP		
		2021-04-16		
DATE OF ISSUE: 2021-08-16		DRAWING NO: C-24-02-INDEX	SHEET 1 of 1	REV. R

CLEARANCES

MINIMUM CLEARANCES FOR THE DESIGN AND CONSTRUCTION OF NEW FACILITIES, AND FOR THE INSPECTION OF EXISTING FACILITIES, SHALL BE TO THIS CSM. EG1 IS A HISTORICAL DOCUMENT.

NO WRITTEN SET OF CLEARANCE GUIDELINES CAN COVER EVERY POSSIBLE CONSTRUCTION SITUATION. THIS SECTION CONTAINS THE DESIGN REQUIREMENTS THAT ARE MOST IMPORTANT FROM THE POINTS OF VIEW OF:

- 1) SAFETY TO THE PUBLIC AND CORPORATION STAFF
- 2) CONTINUITY OF SERVICE; AND
- 3) PROTECTION OF PROPERTY

UNLESS OTHERWISE STATED, CLEARANCES IN THIS SECTION ARE ABSOLUTE MINIMUM WITH CONSIDERATION GIVEN TO THE PREVIOUS POINTS. CLEARANCES ARE BASED ON THE REQUIREMENTS OF THE CANADIAN STANDARDS ASSOCIATION (CSA), AS THEY APPLY TO UTILITIES, AND THIS COMPANY'S PAST EXPERIENCE.

THE DESIGNER/BUILDER MUST DETERMINE IF THE PARTICULAR SITUATION REQUIRES CLEARANCES GREATER THAN TO THOSE GIVEN ON THIS SECTION.

WHERE CLEARANCES TO SAGGED CONDUCTORS ARE INVOLVED, THEY ARE BASED ON MAXIMUM DESIGN SAG, EITHER HEAVY LOADING OR THERMAL CONDITION, WHICHEVER IS GREATER.

SCALE: N.T.S. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED

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DRN.	M.T.S.	DESIGN CHK.	APPROVAL	GENERAL INFORMATION	
CHKD.					
DATE: 97/07/07	DATE	DATE			
DATE OF ISSUE			DRAWING NO. C-24-02.00	SHEET 1 OF 3	REV. B

DEFINITIONS

FARM YARD WORKING AREA – MEANS WORKING SPACE OF SUCH BUILDINGS AS MACHINE SHED, BARN, FEED LOTS, QUONSETS AND GARAGES.

READILY ACCESSIBLE – THAT AN OBJECT IS ACCESSIBLE TO PERSONS WITHOUT THE USE OF SPECIAL MEANS (C22.3 No.1)

INACCESSIBLE – THAT AN OBJECT IS NOT READILY ACCESSIBLE TO PERSONS UNLESS SPECIAL MEANS FOR ACCESS ARE USED (C22.3 No.1)

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SCALE: N.T.S. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED

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DRN. M.T.S.	DESIGN CHK.	APPROVAL	DEFINITIONS	
CHKD.				
DATE: 97/07/07	DATE	DATE		
DATE OF ISSUE		DRAWING NO. C-24-02.00	SHEET 2 OF 3	REV. A

**SUMMARY OF MINIMUM DESIGN CLEARANCES FROM OVERHEAD LINES
OPERATING AT 0-750V AND 2.4-25kV – NEW CONSTRUCTION**

BACK TO INDEX PAGE

FACILITY	MINIMUM DESIGN CLEARANCE		FOR MORE INFORMATION SEE
	VERT.	HORIZ.	
A. ABOVE GROUND TRAVELED BY VEHICLES (ROADS, HIGHWAYS, AND FARMLANDS)	6.35m* 6.68m**	N.A.	C-24-02.03
B. RAILWAY TRACKS	7.6m* 7.9m**	N.A.	C-24-02.04
C. BUILDINGS (EXCEPT THOSE LISTED IN U AND V)	2.5m* 3.0m**	1.9m* 2.4m**	C-24-02.05
D. ABOVE COMMUNICATION LINES	0.3m* 0.6m**	N.A.	C-24-02.06
E. OIL AND GAS WELLS			C-24-02.08
F. SERVICE DROPS			C-24-02.09
G. SWIMMING POOLS	NP	4.6 m* 6.7 m**	C-24-02.10
H. RADIO AND T.V. ANTENNAS	NP	FALL OVER PLUS 3m	C-24-02.10
I. SOLAR PANELS AND WIND TURBINES	NP	FALL OVER PLUS 3m	C-24-02.10
J. IRRIGATION			C-24-02.10 AND SEP No. 7
K. HEIGHTS OF SUPPLY EQUIPMENT FROM GROUND			C-24-02.10
L. JOINT USE SPACE			C-24-02.10
M. STATIONARY PARTS			C-24-02.10
N. ABOVE GROUND ACCESSIBLE TO PEDESTRIANS ONLY	3.4m* 3.7m**	N.A.	C-24-02.10
O. WATER WELLS	NP	15m	C-24-02.10
P. SIGNS, BILLBOARDS, LUMINAIRES AND TRAFFIC LIGHT STANDARDS	3.0m***	3.0m	C-24-02.10
Q. BOAT LAUNCH AND ASSOCIATED AREA	NP	15m	C-24-02.10
R. PARKS, SCHOOL YARDS, SKI LIFTS	CROSSING SHOULD BE AVOIDED WHERE POSSIBLE.		C-24-02.10
S. FUEL TANKS (PROPANE, GASOLINE AND DIESEL)			C-24-02.11
T. NAVIGABLE WATERWAYS			C-24-02.12
U. GRANARIES & HAY STACKING AREAS	NP	15m	C-24-02.13
V. FARM YARD WORKING AREA (SEE DEFINITIONS)	NP	15m	C-24-02.13

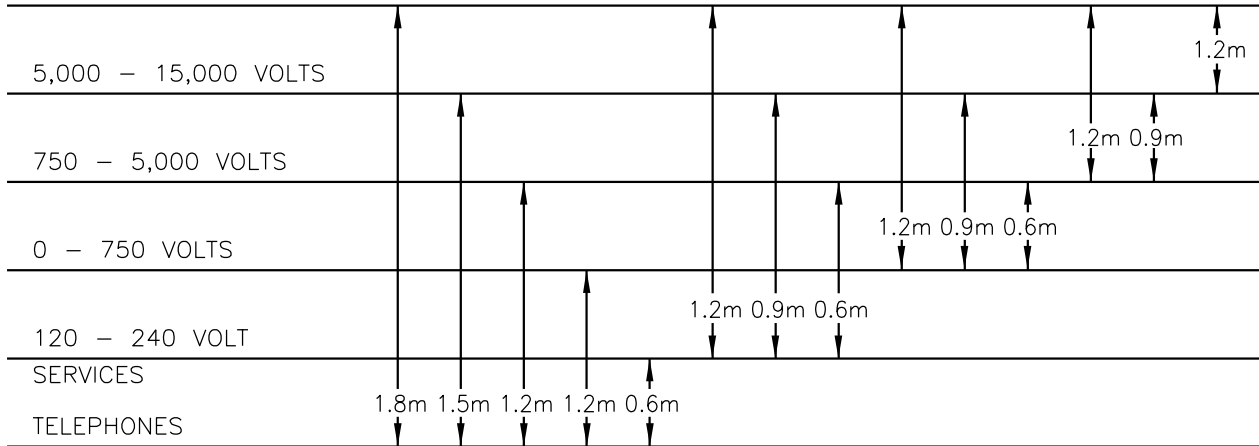
NP – NOT PERMITTED
 NA – NOT APPLICABLE
 * – 1st LINE 0-750V
 ** – 2nd LINE 2.4-25kV (WHERE ONLY ONE LINE IS SHOWN IT APPLIES TO BOTH VOLTAGES)
 *** – CROSSING SHOULD BE AVOIDED WHERE POSSIBLE

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APPROVAL L.MOEN	DESIGN CHK. D.DONAIS	DRN.D.REDEKOPP CHKD. 2018-12-13	SUMMARY OF MINIMUM DESIGN CLEARANCES FROM OVERHEAD LINES – NEW CONSTRUCTION
DATE OF ISSUE	2019-01-02	DRAWING NO. C-24-02.00	SHEET 3 of 3 REV. E

VERTICAL CLEARANCE BETWEEN WIRES

(ONLY APPLIES WHEN CROSSING POINT IS CLOSER TO POWER POLE THAN 5% OF SPAN)

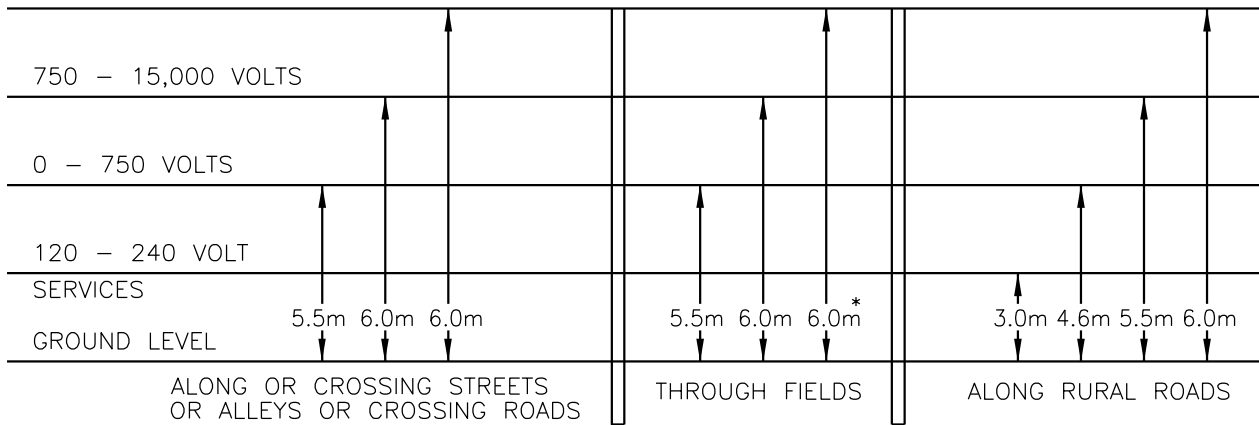
15,000 – 50,000 VOLTS (INCLUDING 14.4kV SINGLE PHASE)



(MINIMUM VERTICAL CLEARANCES BETWEEN LINES OF DIFFERENT VOLTAGES CROSSING ONE ANOTHER)

VERTICAL CLEARANCE TO GROUND

15,000 – 50,000 VOLTS (INCLUDING 14.4kV SINGLE PHASE)



CLEARANCE AT 15°C WITH SPANS LESS THAN 53.3m. FOR EVERY 3.0m INCREASE OVER 53.3m ADD .03m TO ABOVE VALUES. EXAMPLE: SPAN = X METRES, REQUIRED CLEARANCE = CLEARANCE SHOWN ABOVE PLUS

$$\frac{X - 53.3m}{3.0m} \times .03m. \text{ USE FINAL } 15^\circ\text{C SAG VALUES.}$$

NOTES:

1. ALL VOLTAGES SHOWN ARE SYSTEM VOLTAGES EG. 14.4kV SINGLE PHASE IS 25kV SYSTEM VOLTAGE. THIS CHART FOR CONSTRUCTION PRIOR TO 1960.
2. TO DETERMINE GROUND CLEARANCE FOR A PARTICULAR SPAN AT OTHER THAN 15°C SAY 25°C, THE DIFFERENCE BETWEEN THE UNLOADED SAGS FROM THE FINAL SAG CHARTS AT 25°C AND 15°C MUST BE SUBTRACTED FROM THE CLEARANCE DETERMINED ABOVE. IF THE TEMPERATURE IS LESS THAN 15°C, SAY 5°C, THEN THE DIFFERENCE BETWEEN THE FINAL UNLOADED SAGS AT 15°C 5°C MUST BE ADDED TO THE CLEARANCE DETERMINED ABOVE.

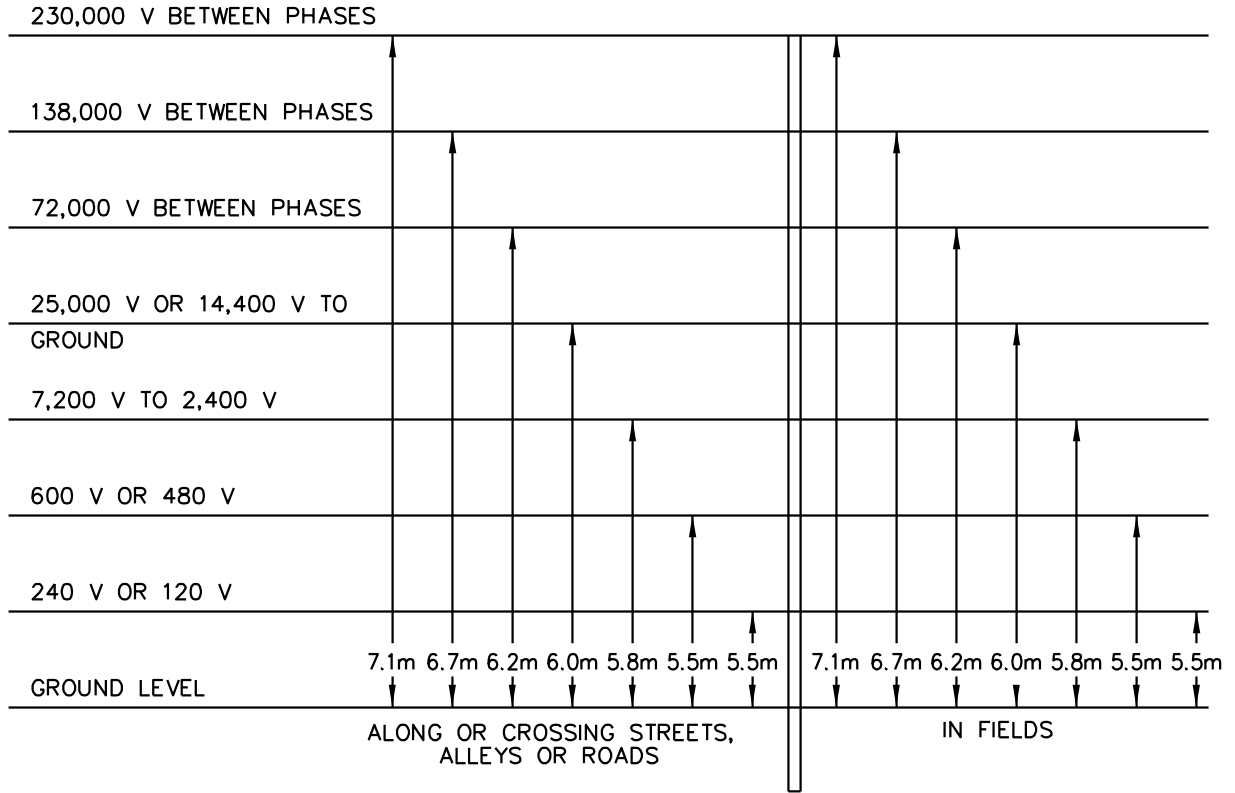
*EXCEPTION: THIS CLEARANCE MAY HAVE BEEN REDUCED TO 17 FEET (5.2M) FOR 14,400 VOLT SINGLE PHASE LINES CONSTRUCTED ACROSS FIELDS PRIOR TO DECEMBER 31, 1959. SINGLE PHASE 14.4kV LINES CONSTRUCTED WITH 30 FOOT POLES MAY BE ASSUMED AS 17 FEET (5.2m) CLEARANCE. NEUTRAL MAY BE CONSIDERED AS 0-750V IF EFFECTIVELY GROUNDED. NEUTRAL MUST HAVE BEEN CONSTRUCTED PRIOR TO DEC. 31, 1959. OTHERWISE LINE SHALL BE CONSIDERED AS BUILT AT THE TIME OF NEUTRAL ADDITION.

SCALE: N.T.S.

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APPROVAL L.MOEN	DESIGN CHK. L.MOEN	DRN.D.REDEKOPP CHKD. 2021-06-15	VERTICAL CLEARANCES ABOVE GROUND (FOR LINES BUILT BEFORE 1960)		
DATE OF ISSUE 2021-08-16		DRAWING NO. C-24-02.01	SHEET 1 of 1	REV. C	



1. FOR 120/240 VOLT SERVICE LEADS OVER GROUND TRAVELLED ONLY BY PEDESTRIANS, THE CLEARANCE MAY BE REDUCED TO 3.7m.
2. THE CHART ABOVE SHOWS CLEARANCE WITH SPANS UP TO 53.3m AT 15°C. FOR EVERY 3.0m INCREASE OVER 53.3m ADD .03m. THIS INCREASE NEED NOT EXCEED 75% OF MAXIMUM SAG INCREASE FOR THE CONDUCTOR CONCERNED.
3. MAXIMUM SAG INCREASE IS ARITHMETIC DIFFERENCE BETWEEN FINAL UNLOADED SAG AT 15°C, NO WIND, AND EITHER THE TOTAL SAG, AT HEAVY LOADING CONDITIONS OR THE FINAL UNLOADED SAG AT 49°C, NO WIND, WHICHEVER IS GREATER.
4. TO DETERMINE GROUND CLEARANCE FOR A PARTICULAR SPAN AT OTHER THAN 15°C SAY 25°C, THE DIFFERENCE BETWEEN THE UNLOADED SAGS FROM THE FINAL SAG CHARTS AT 25°C AND 15°C MUST BE SUBTRACTED FROM THE CLEARANCE DETERMINED ABOVE. IF THE TEMPERATURE IS LESS THAN 15°C, SAY 5°C, THEN THE DIFFERENCE BETWEEN THE FINAL UNLOADED SAGS AT 15°C AND 5°C MUST BE ADDED TO THE CLEARANCE DETERMINED ABOVE.

NOTES:

1. ALL VOLTAGES LINE TO LINE UNLESS OTHER WISE INDICATED.

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APPROVAL L.MOEN	DESIGN CHK. L.MOEN	DRN.D.REDEKOPP CHKD. 2021-03-08	VERTICAL CLEARANCES ABOVE GROUND (FOR LINES BUILT BETWEEN 1960 AND 1975 INCLUSIVE)
DATE OF ISSUE	2021-08-16	DRAWING NO. C-24-02.02	SHEET 1 of 1
			REV. D

VERTICAL CLEARANCES ABOVE GROUND FOR CONSTRUCTION STANDARDS
(APPLIES TO ALL ROADS AND HIGHWAYS AND FARMLAND)

EXAMPLE OF 25/14.4kV SYSTEM CLEARANCES:

4	↑ .33m	ADDITIONAL FOR VOLTAGES 750V TO 22kV TO GROUND	5.78m
3	↑ .27m	ADDITIONAL FOR SAFETY MARGIN OVERVEHICLES	5.45m
2	↑ 1.03m	ADDITIONAL TO MEET MAXIMUM VEHICLE AND LOAD HEIGHT ALLOWED IN SASKATCHEWAN	5.18m
1	↑ 4.15m	BASICVEHICLE CLEARANCE	4.15m

- NOTE: 1. C.S.A. C22.3 NO.1-15 SECTION 5.3 CLAUSE 5.3.1.1. (a).
 2. COMBINED HEIGHT OFVEHICLE AND LOAD ARE ALLOWED TO EXCEED 4.15m UP TO 5.2m UNDER CERTAIN CONDITIONS IN SASKATCHEWAN.
 3. C.S.A. C22.3 NO. 1-15 APPENDIX "A" CLAUSE A5.3.1 (PAGE 118).
 4. C.S.A. C22.3 NO. 1-15 TABLE 2. THE 0.33m IS THE DIFFERENCE BETWEEN COLUMNS I AND IV OR THE ALLOWANCE FOR VOLTAGES 750V TO 22kV.

MINIMUM VERTICAL CLEARANCE ABOVE GROUND IN METRES AT MAXIMUM SAG

	CONDUCTOR VOLTAGE (LINE TO LINE)	
	0-750V	2.4-25 kV
BASIC VEHICLE CLEARANCE (m) (NOTE 4)	5.45	5.45
VOLTAGE CLEARANCE (m)	0	.33
ABSOLUTE MINIMUM CLEARANCE (m)	5.45	5.78

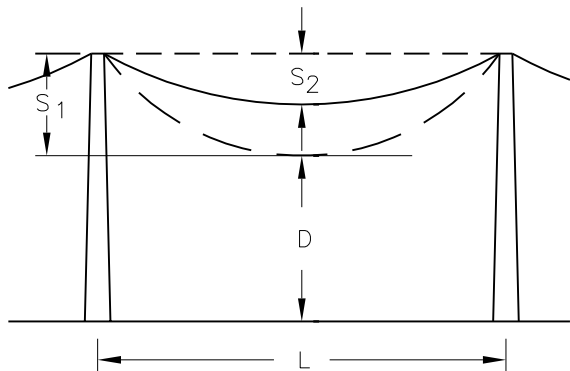
ABSOLUTE MINIMUM CLEARANCE (m)	5.45	5.78
GRADING CLEARANCE (NOTE 5)	.90	.90
DESIGN CLEARANCE (m)	6.35	6.68

- NOTE:
 1) ABSOLUTE MINIMUM CLEARANCE MAY BE USED WHERE DEEMED APPROPRIATE.
 2) REFERENCE TO C.S.A. C22.3 NO.1-15 OVERHEAD SYSTEMS (SECTION 5.3 AND TABLE 2).
 3) CLEARANCES FOR 0-750V APPLY TO SECONDARY CIRCUITS. FOR SERVICE DROPS REFER TO DRAWINGS C-24-02.09.
 4) THIS COMPRISES 4.15m C.S.A. REQUIREMENT PLUS 1.03m FOR ADDITIONAL SASKATCHEWAN VEHICLE CLEARANCE PLUS 0.27m SAFETY ALLOWANCE (C.S.A.)
 5) THIS INCLUDES ALLOWANCE FOR CHANGES TO THE GROUND PROFILE, POSSIBLE ERRORS IN STAKING AND SAGGING, AND POLE SETTING.

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SaskPower – DISTRIBUTION STANDARDS				
APPROVAL L.MOEN	DESIGN CHK. D.DONAIS	DRN. C.BAUTISTA CHKD. 2018-05-28	VERTICAL CLEARANCES ABOVE GROUND (FOR LINES BUILT AFTER 1975)	
DATE OF ISSUE	2018-06-07	DRAWING NO.	C-24-02.03	SHEET 1 of 2
			REV.	A

TO DETERMINE CLEARANCE REQUIREMENTS FOR INSPECTION



WHERE:

- L = SPAN LENGTH
- D = ABSOLUTE MINIMUM CLEARANCE AT MAXIMUM SAG (FROM MINIMUM VERTICAL CLEARANCE AT MAXIMUM SAG TABLE C-24-02.03 SHT. 1)
- S₁ = MAXIMUM FINAL SAG AT SPAN LENGTH 'L' (FROM SAG CHART)
- S₂ = INITIAL OR FINAL SAG AT SPAN LENGTH 'L' AT AMBIENT TEMPERATURE (FROM SAG CHART)

NOTE: MAXIMUM SAG IS THE GREATER OF 1) THERMAL LOADING, OR 2) HEAVY LOADING.

FOLLOW SET EXAMPLE TO DETERMINE VERTICAL CLEARANCE ABOVE GROUND

EXAMPLE FOR INITIAL CLEARANCE (C_I) (INSPECTION IMMEDIATELY FOLLOWING CONSTRUCTION)

CONDUCTOR TYPE: 3/0 ACSR PIGEON
 SPAN DISTANCE: 90m
 TYPE OF SAG: INITIAL
 LINE VOLTAGE: 25 KV
 TEMPERATURE: 20°C

$$C_I = (S_1 - S_2) + D$$

$$C_I = (2.37m - 1.48m) + 5.78m$$

$$C_I = 0.89m + 5.78m$$

$$C_I = 6.67m$$

∴ 6.67m CLEARANCE IS NEEDED FOR THIS 90m SPAN OF 3/0 ACSR PIGEON AT 20°C.

EXAMPLE FOR FINAL CLEARANCE (C_F) (INSPECTION OF IN-SERVICE LINES)

CONDUCTOR TYPE: 3/0 ACSR PIGEON
 SPAN DISTANCE: 90m
 TYPE OF SAG: FINAL
 LINE VOLTAGE: 25 KV
 TEMPERATURE: 20°C

$$C_F = (S_1 - S_2) + D$$

$$C_F = (2.37m - 1.76m) + 5.78m$$

$$C_F = 0.61m + 5.78m$$

$$C_F = 6.39m$$

∴ 6.39m CLEARANCE IS NEEDED FOR THIS 90m SPAN OF 3/0 ACSR PIGEON AT 20°C.

NOTE: S₁ IS FINAL SAG FOR BOTH CALCULATIONS.

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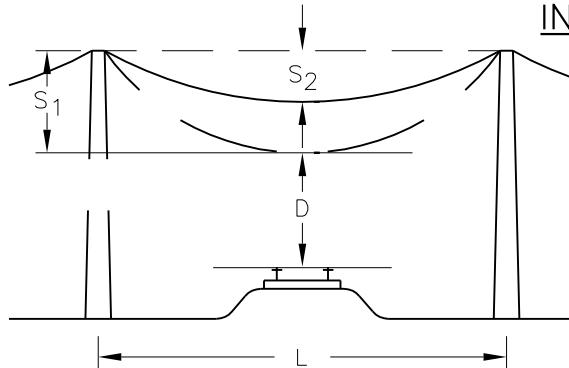
SaskPower – DISTRIBUTION STANDARDS			
APPROVAL L.MOEN	DESIGN CHK. A.UHREN	DRN. N.KIM CHKD. D.REID 2016-02-24	VERTICAL CLEARANCES ABOVE GROUND (FOR LINES BUILT AFTER 1975)
DATE OF ISSUE	2016/05/04	DRAWING NO. C-24-02.03	SHEET 2 of 2 REV. B

MINIMUM VERTICAL CLEARANCE ABOVE RAILS IN METRES AT MAXIMUM SAG (CONSTRUCTION AND INSPECTION)

(CSA C22.3 NO.1-15 OVERHEAD SYSTEMS SECTION 5.3 CLAUSE 5.3.1.1. AND TABLE #2)
CONSTRUCTION

	CONDUCTOR VOLTAGE (LINE TO LINE)			
	0-750 V	2.4-25 KV	72 KV	138 KV
BASIC CLEARANCE (m)	7.3	7.6	8.1	8.4
ADDITIONAL CLEARANCE FOR FUTURE TRACK BALLAST (m)	0.3	0.3	0.3	0.3
DESIGN CLEARANCE (m)	7.6	7.9	8.4	8.7

INSPECTION



WHERE:

- L = SPAN LENGTH
- D = BASIC CLEARANCE AT MAXIMUM SAG (FROM TABLE ABOVE)
- S₁ = MAXIMUM FINAL SAG AT SPAN LENGTH "L" (FROM SAG CHART)
- S₂ = INITIAL OR FINAL SAG AT SPAN LENGTH "L" AT AMBIENT TEMPERATURE (FROM SAG CHART)

NOTE: MAXIMUM SAG IS THE GREATER OF 1) THERMAL LOADING, OR 2) HEAVY LOADING.

FOLLOW SET EXAMPLE TO DETERMINE VERTICAL CLEARANCE ABOVE RAILS

EXAMPLE FOR INITIAL CLEARANCE (C_I)
(INSPECTION IMMEDIATELY FOLLOWING CONSTRUCTION)

CONDUCTOR TYPE: 3/0 ACSR PIGEON
SPAN DISTANCE: 90m
TYPE OF SAG: INITIAL
LINE VOLTAGE: 25 KV
TEMPERATURE: 20°C

$$C_I = (S_1 - S_2) + D$$

$$C_I = (2.37m - 1.48m) + 7.6m$$

$$C_I = 0.89m + 7.6m$$

$$C_I = 8.49m$$

∴ 8.49m CLEARANCE IS NEEDED FOR THIS 90m SPAN OF 3/0 ACSR PIGEON ACROSS THE RAILWAY TRACK.

EXAMPLE FOR FINAL CLEARANCE (C_F)
(INSPECTION OF IN-SERVICE LINES)

CONDUCTOR TYPE: 3/0 ACSR PIGEON
SPAN DISTANCE: 90m
TYPE OF SAG: FINAL
LINE VOLTAGE: 25 KV
TEMPERATURE: 20°C

$$C_F = (S_1 - S_2) + D$$

$$C_F = (2.37m - 1.76m) + 7.6m$$

$$C_F = 0.61m + 7.6m$$

$$C_F = 8.21m$$

∴ 8.21m CLEARANCE IS NEEDED FOR THIS 90m SPAN OF 3/0 ACSR PIGEON ACROSS THE RAILWAY TRACK.

NOTE: S₁ IS FINAL SAG FOR BOTH CALCULATIONS.

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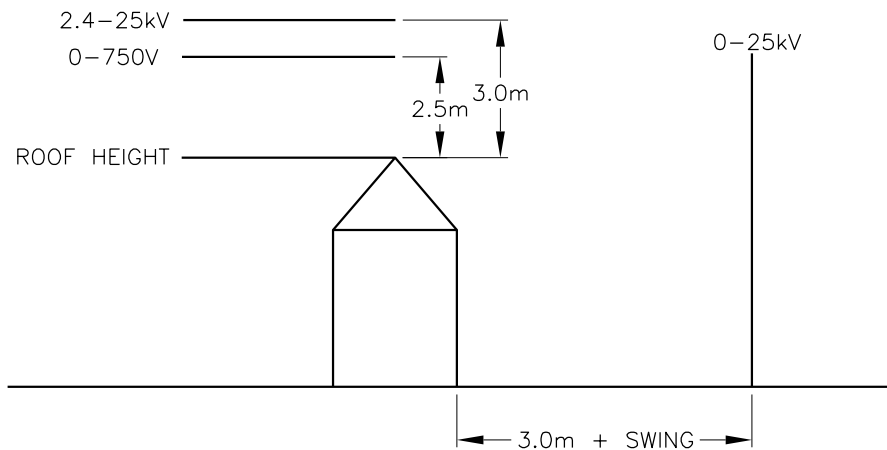
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APPROVAL L.MOEN	DESIGN CHK. A.UHREN	DRN. N.KIM CHKD. D. REID 2016-02-24	VERTICAL CLEARANCES ABOVE RAILS (FOR LINES BUILT AFTER 1975)
DATE OF ISSUE	2016/05/04	DRAWING NO. C-24-02.04	SHEET 1 of 1 REV. B

MINIMUM DESIGN CLEARANCES FROM WIRES AND CONDUCTORS
NOT ATTACHED TO BUILDINGS*

(C.S.A. C22.3 NO. 1-20-16 OVERHEAD SYSTEMS CLAUSE 5.7.3 AND TABLE #9)

MINIMUM CLEARANCE IN METERS FROM WIRE TO BUILDINGS		
VOLTAGE (LINE TO LINE)	HORIZONTAL TO SURFACE	VERTICAL TO SURFACE
0-750V	3.0m + SWING (SEE NOTE 1,7)	2.5m (SEE NOTE 2,4,5)
2.4-25kV	3.0m + SWING (SEE NOTE 1,7)	3.0m (SEE NOTE 3,4,5)



NOTES:

1. REFER TO C-24-02.16 TO CALCULATE CONDUCTOR SWING.
2. MAY BE REDUCED TO 1.0m FOR PORTION OF BUILDING CONSIDERED INACCESSIBLE.
3. AVOID CROSSING WITH THESE VOLTAGES IF OTHER SUITABLE CONSTRUCTION IS AVAILABLE.
4. CLEARANCE OVER GROUND ADJACENT TO BUILDING NORMALLY TRAVERSED BY PEDESTRIANS OR VEHICLES ARE COVERED BY DRAWING C-24-02.03.
5. VERTICAL CLEARANCES ARE AT MAXIMUM SAG CONDITIONS.
6. MAINTAIN VERTICAL OR HORIZONTAL CLEARANCE, BUT NOT BOTH.
7. FOR AREAS THAT ARE INACCESSIBLE, HORIZONTAL CLEARANCE IS 1.5m PLUS CONDUCTOR SWING. STRUCTURES THAT REQUIRE FREQUENT CLEANING OR MAINTENANCE SHOULD BE CONSIDERED ACCESSIBLE.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.

* THESE CLEARANCES DO NOT APPLY TO GRANARIES, HAY STACKING AREAS, OR IN SITUATIONS IN WHICH FARM YARD WORKING AREAS ARE TO BE APPLIED. REFER TO C-24-02.13 FOR THE APPLICABLE CLEARANCES.

SCALE: N.T.S.

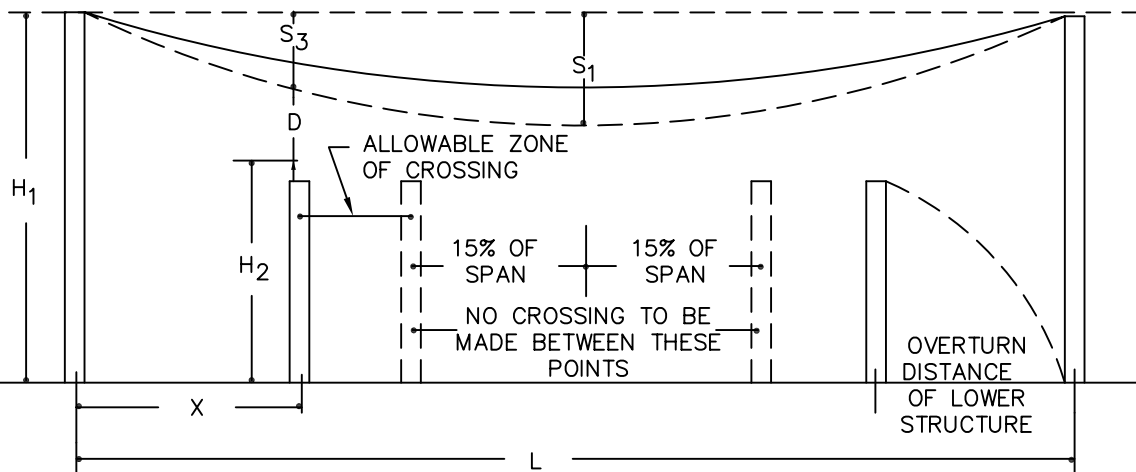
SaskPower – DISTRIBUTION STANDARDS			
APPROVAL L.MOEN	DESIGN CHK. B.GEBHART	DRN.D.REDEKOPP CHKD. 2020-10-26	MINIMUM DESIGN CLEARANCES FROM WIRES AND CONDUCTORS NOT ATTACHED TO BUILDING
DATE OF ISSUE	2020-12-18	DRAWING NO. C-24-02.05	
		SHEET 1 of 1	REV. D

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MINIMUM VERTICAL CLEARANCES IN METRES AT MAXIMUM SAG
BETWEEN WIRES AND CONDUCTORS CROSSING EACH OTHER AND
CARRIED ON DIFFERENT STRUCTURES

LINE WIRE AT LOWER LEVEL	GUY WIRE & COMM. CABLE	LINE WIRE AT UPPER LEVEL (VOLTAGES ARE LINE TO LINE)				
		0 - 750 V	2.4 - 25kv	72kv	138kv	230kv
COMM. CABLE	.2	0.3	0.6	0.9	1.2	1.8
0 - 750 V	-	0.3	0.5	0.8	1.1	1.7
2.4 - 25kv	-	-	0.6	0.9	1.2	1.7
72kv	-	-	-	1.1	1.4	2.0
138kv	-	-	-	-	1.5	2.1

NOTE: - MAXIMUM SAG IS THE GREATER OF 1) THERMAL OVERLOAD OR 2) HEAVY LOADING
 - VERTICAL CLEARANCES ARE BASED ON THE FOLLOWING CONDITIONS:
 a) THE UPPER CONDUCTORS ARE AT THEIR MAXIMUM SAG.
 b) THE LOWER CONDUCTORS ARE ASSUMED TO FORM A STRAIGHT LINE AT THE TOP OF THE SUPPORTS OR POINTS OF ATTACHMENTS (LINE OF SIGHT).



WHERE:
 X = DISTANCE BETWEEN UPPER CONDUCTOR STRUCTURE AND LOWER CONDUCTOR CROSSING STRUCTURE
 L = SPAN LENGTH
 D = MINIMUM VERTICAL CLEARANCE BETWEEN UPPER CONDUCTOR AT MAXIMUM SAG AND THE LINE OF SIGHT OF THE TOP OF THE LOWER SUPPORTS (FROM ABOVE TABLE)
 H₁ = HEIGHT OF UPPER CONDUCTOR ATTACHMENT POINT.
 H₂ = MAXIMUM HEIGHT OF LOWER CONDUCTOR ABOVE GROUND LEVEL
 S₁ = MINIMUM SAG OF UPPER CONDUCTOR AT SPAN LENGTH 'L' (FROM SAG CHART)
 S₃ = DISTANCE BETWEEN THE TOP CONDUCTORS ATTACHMENT POINT TO MAXIMUM SAG OF UPPER CONDUCTOR AT SPAN LENGTH 'L' AT POINT OF CROSSING.

NOTE: FOR WISHBONE AND GULF PORT STRUCTURES, USE THE CONDUCTOR ATTACHMENT POINT HEIGHT OF THE LOWEST CONDUCTOR.

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SASKATCHEWAN POWER CORP. - DISTRIBUTION ENGINEERING STANDARDS

DRN. A.B.W	DESIGN CHK.	SAFETY APP.	APPROVAL	VERTICAL CLEARANCES AT CROSSINGS OF LINE WIRES AND CONDUCTORS CARRIED ON DIFFERENT STRUCTURES.
CHKD. <i>FTK</i>				
DATE 87-05-14	DATE	DATE	DATE	
DATE OF ISSUE 87-06-01	DRAWING NO. C-24-02.06		SHEET 1 OF 2	REV. 0

DESIGN CLEARANCE CALCULATION

TO FIND MAXIMUM HEIGHT OF LOWER CONDUCTOR ABOVE GROUND AT CROSSING

EXAMPLE

72kV CONDUCTOR TYPE: 4/0 ACSR PENGUIN
 SPAN DISTANCE: 200m
 TYPE OF SAG: FINAL
 VOLTAGE: 25kV CROSSING UNDER 72kV
 TEMPERATURE: 100°C (WORST CASE)
 72kV CONDUCTOR ATTACHMENT POINT: 13.2m

1. CALCULATE PERCENTAGE OF CROSSING SPAN TO UPPER SPAN LENGTH.

$$X/L \times 100 = \% \text{ OF SPAN LENGTH}$$

WHERE: X = 60m TO CROSSING STRUCTURE

L = 200m TOTAL SPAN LENGTH

$$60/200 \times 100 = 30\% \text{ OF TOTAL SPAN}$$

THE 25kV CROSSING STRUCTURE IS LOCATED AT 30% THE DISTANCE OF THE 72kV TOTAL SPAN LENGTH (L). USE THIS 30% OF CROSSING SPAN LENGTH ON THE CATENARY CURVE (C-24-02.07) TO FIND THE CROSSINGS PERCENTAGE OF THE 72kV CENTRE SAG. 30% OF CROSSING SPAN LENGTH = 84% OF 72kV CENTRE SAG (FROM CATENARY CURVE C-24-02.07).

2. CALCULATE THE DISTANCE BETWEEN THE 72kV CONDUCTORS LOWEST ATTACHMENT POINT TO MAXIMUM SAG OF THE 72kV CONDUCTOR AT SPAN LENGTH (L) AT POINT OF CROSSING.

$$\% \text{ OF CENTRE SAG} \times S_1 = S_3$$

WHERE: % OF CENTRE SAG = FROM ABOVE CALCULATION

S₁ = MAXIMUM SAG OF 72kV CONDUCTOR

AT SPAN LENGTH (L)

(DESIGN SAG CHART FROM TRANSMISSION DESIGN)

$$.84 \times 6.74\text{m} = S_3$$

$$5.6\text{m} = S_3$$

THE DISTANCE IS 5.6m SAG FROM ATTACHMENT TO MAXIMUM SAG OF THE 72kV CONDUCTOR AT POINT OF CROSSING THE LOWER CIRCUIT.

3. TO FIND THE HEIGHT OF THE LOWER CONDUCTOR FOR DESIGN CLEARANCE.

$$H_1 - S_3 - D = H_2$$

WHERE H₁ = HEIGHT OF 72kV CONDUCTOR ATTACHMENT POINT

S₃ = SAG AT CROSSING POINT (FROM ABOVE CALCULATION)

D = MINIMUM VERTICAL CLEARANCE (FROM TABLE C-24-02.06 SHEET 1)

$$13.2\text{m} - 5.6\text{m} - 0.9\text{m} = H_2$$

$$6.7\text{m} = H_2$$

THE MAXIMUM HEIGHT OF THE LOWER CONDUCTOR ABOVE GROUND LEVEL IS 6.7m.

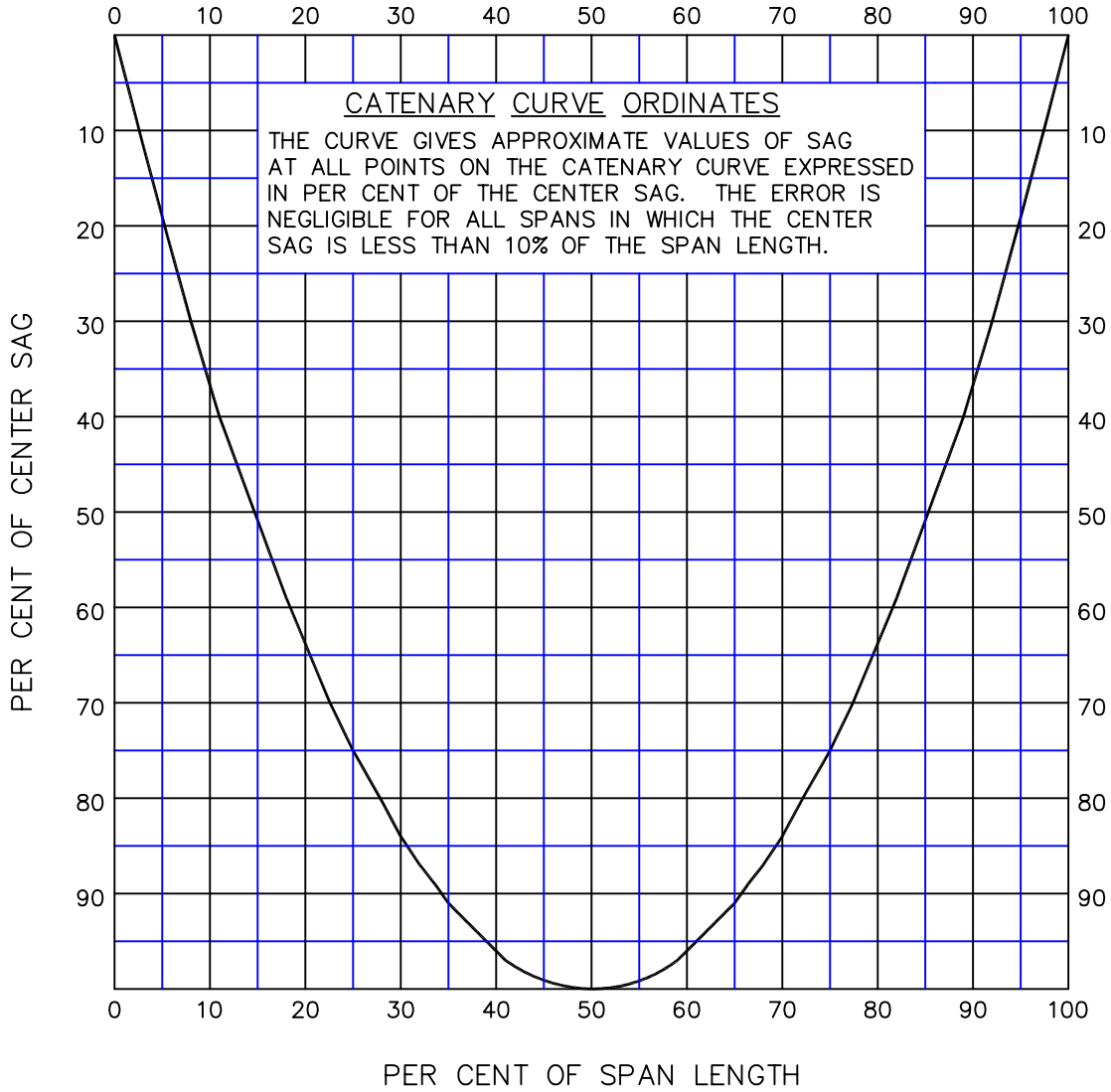
NOTE:

1. FOR CHECKING OF EXISTING CROSSINGS, TAKE DESIGN CALCULATION AND COMPARE TO MEASURED HEIGHT OF LOWER CONDUCTOR.
2. SAGS FOR 72kV AND 138kV TO BE FOUND AT DESIGN SAG CHARTS FOR SPECIFIC LINE.

SASKATCHEWAN POWER CORP. – DISTRIBUTION ENGINEERING STANDARDS

DRN. A.B.W	DESIGN CHK.	SAFETY APP.	APPROVAL	VERTICAL CLEARANCES AT CROSSINGS OF LINE WIRES AND CONDUCTORS CARRIED ON DIFFERENT STRUCTURES
CHKD. <i>FTK</i>				
DATE 87-05-15	DATE	DATE	DATE	
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CATENARY CURVE



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SASKATCHEWAN POWER CORP. – DISTRIBUTION ENGINEERING STANDARDS

DRN. C.D.F.	DESIGN CHK.	SAFETY APP.	APPROVAL	CONDUCTOR CATENARY SAG CURVE
CHKD. <i>FTK</i>				
DATE 87-05-15	DATE	DATE	DATE	
DATE OF ISSUE 87-06-01			DRAWING NO. C-24-02.07	SHEET 1 OF 1 REV. 0

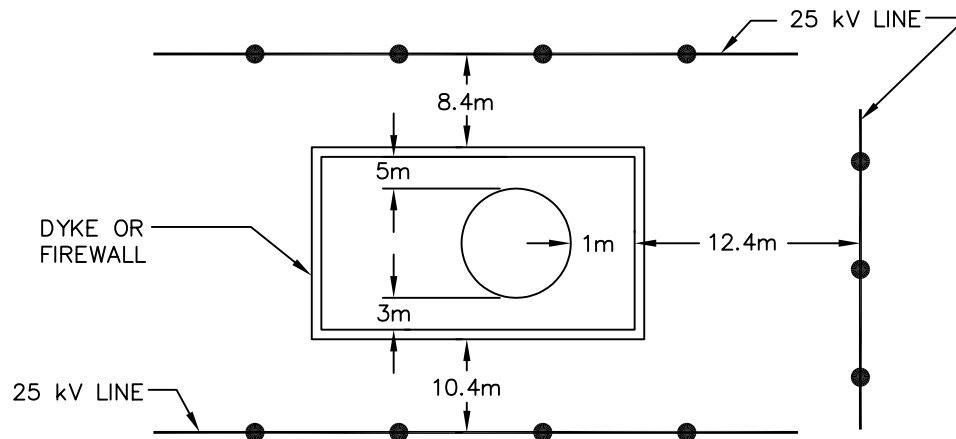
OILFIELD & GAS FIELD CLEARANCE REQUIREMENTS

TYPE OF CONSTRUCTIONS	EQUIPMENT	CLEARANCE IN METRES		
		25kV	14.4kV	0-750V
TANGENT	OIL & GAS WELL	22.5	22.5	22.5 SEE NOTE (1)
DEADEND	OIL & GAS WELL	6	6	6
TANGENT	BATTERY, PIPE LINE, PUMPS AND MANIFOLDS, FLARE PIT, WELL STORAGE TANK	SEE NOTE (4)	SEE NOTE (4)	SEE NOTE (4)
DEADEND	BATTERY, PIPE LINE, PUMPS AND MANIFOLDS, FLARE PIT, WELL STORAGE TANK	6	6	6

NOTE:

1. WITH PERMISSION FROM THE WELL'S OPERATING FIRM AND FROM THE ELECTRICAL INSPECTION DEPARTMENT AND DISTRIBUTION PLANNING & STANDARDS, THIS CLEARANCE MAY BE REDUCED TO 6 METERS PLUS THE STRUCTURE HEIGHT OF THE LINE, OR 6 METERS PROVIDED THE LINE IS GUYED AWAY FROM THE WELL. (SUPPLEMENT-ELECTRICAL INSTALLATION REQUIREMENTS PART 1, FOURTEENTH EDITION, SECTION 90-040)
2. NO DRILLING FIRM SHALL DRILL ANY WELL OR STRUCTURE TEST HOLE WITHIN 75 METRES OF ANY POWER LINE, UNLESS WRITTEN AUTHORIZATION TO DRILL IS OBTAINED FROM SASK. POWER. (THE OIL AND GAS CONSERVATION REGULATIONS, 1985, CHAPTER 0-2 REGULATION 1 PART V CLAUSE 19 (1A)).
3. ALL MEASUREMENTS, FOR TANGENT CONSTRUCTION ARE TO BE MADE FROM THE NEAREST PHASE WIRE, AT RIGHT ANGLES TO THE WIRE.
4. THIS CLEARANCE MAY BE 3m PLUS THE FALL OVER DISTANCE (STRUCTURE HEIGHT). (SUPPLEMENTAL ELECTRICAL INSTALLATION REQUIREMENTS PART 1, FOURTEENTH EDITION, SECTION 90-042, 2(b)(c) & 90-046). SEE EXAMPLE.

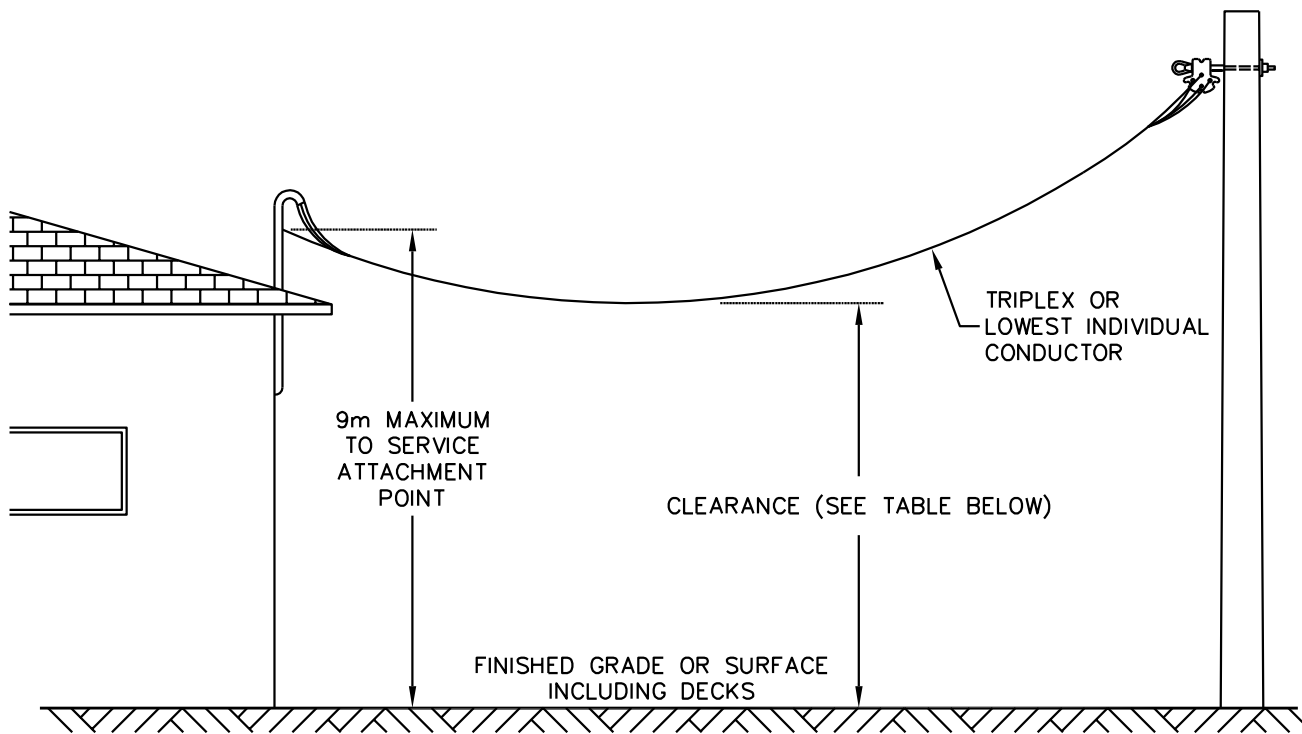
EXAMPLE: 25kV LINE WITH 10.4m STRUCTURE HEIGHT.



SCALE: N.T.S. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED

SaskPower - DISTRIBUTION STANDARDS

DRN. <i>DC</i>	DESIGN CHK.	SAFETY APP.	APPROVAL	OILFIELD & GAS FIELD CLEARANCE REQUIREMENTS
CHKD. <i>FTK</i>				
DATE 87-11-13	DATE	DATE	DATE	
DATE OF ISSUE	DRAWING NO. C-24-02.08		SHEET 1 of 1	REV. B



CLEARANCE AT TIME OF INSTALLATION

LOCATION	CLEARANCE
ACROSS HIGHWAYS, STREETS, ALLEYS, LANES	5.5m
ACROSS DRIVEWAYS TO COMMERCIAL AND INDUSTRIAL PREMISES	5.0m
ACROSS DRIVEWAYS TO RESIDENTIAL GARAGES	4.0m
ACROSS SURFACES NORMALLY ACCESSIBLE TO PEDESTRIANS ONLY	3.7m

NOTES:

1. RESIDENTIAL SERVICE SHOWN FOR EXAMPLE ONLY. THE TABLE APPLIES TO COMMERCIAL AND INDUSTRIAL SERVICES ALSO.
2. THE POINT OF ATTACHMENT (BY THE CUSTOMER) MUST BE SUFFICIENT TO ALLOW FOR ABOVE CLEARANCE AT TIME OF INSTALLATION.
3. THESE CLEARANCES ARE IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE PART 1 (CSA C22.1) 2002, SECTION 6-112. THESE CLEARANCES ACCOMMODATE SNOW DEPTH 0.6m AS PER C22.3 NO.1 - 2001.
4. FOR ADDITIONAL CONNECTION DETAILS, REFER TO THE ELECTRICAL SERVICE REQUIREMENTS (ESR).

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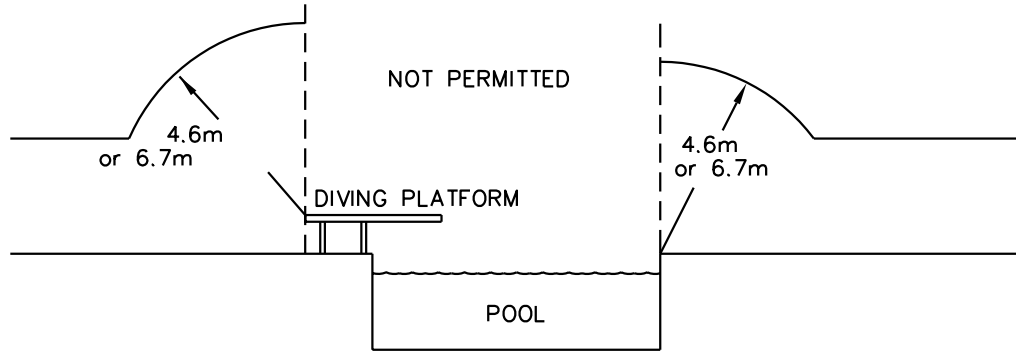
SaskPower – DISTRIBUTION STANDARDS

APPROVAL L.MOEN	DESIGN CHK. A.UHREN	DRN. Y.HAO CHKD. A.UHREN 2017-01-03	CLEARANCES FOR SERVICE DROPS
DATE OF ISSUE	2017/05/03	DRAWING NO. C-24-02.09	
		SHEET 1 of 1	REV. C

MISCELLANEOUS CLEARANCES

SWIMMING POOLS

CONDUCTORS OVER SWIMMING POOLS ARE NOT PERMITTED. THE MINIMUM CLEARANCE FOR THE CONDUCTORS IS 4.6m AT 0-750V AND 6.7m AT 2.4-25kV MEASURED RADIALLY AWAY FROM THE EDGE OF POOL AND DIVING PLATFORM.



- A SWIMMING POOL SHALL BE DEEMED TO INCLUDE:
- (a) PERMANENTLY INSTALLED AND STORABLE SWIMMING POOLS; AND
 - (b) HYDROMASSAGE BATHTUBS; AND
 - (c) SPAS AND HOT TUBS; AND
 - (d) WADING POOLS; AND
 - (e) BAPTISMAL POOLS; AND
 - (f) DECORATIVE POOLS.

RADIO AND T.V. ANTENNAS

IT IS IMPRACTICAL TO STATE THE SEPARATION WHICH SHOULD BE PROVIDED BETWEEN THE ANTENNAS AND SUPPLY LINE TO PROVIDE MINIMUM INTERFERENCE WITH RECEPTION. CONDUCTORS OVER OR UNDER THE GUY WIRES OF ANTENNAS ARE NOT PERMITTED. THE PREFERRED CLEARANCE FROM THE ANTENNA OR ITS SUPPORTING STRUCTURE OR GUY WIRES IS THE FALL OVER HEIGHT OF THE POWER LINE PLUS 3m. IF THIS IS NOT OBTAINABLE, THE MINIMUM HORIZONTAL ACCESSIBLE BUILDING CLEARANCE IN C-24-02.05 SHALL APPLY.

IRRIGATION

REFER TO STANDARD ENGINEERING PRACTICES MANUAL, SECTION SEVEN (7) FOR CLEARANCES AND CONSIDERATIONS TO BE MADE FOR SUPPLY LINES NEAR IRRIGATION EQUIPMENT.

SCALE: N.T.S. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED

SaskPower – DISTRIBUTION STANDARDS

DRN. <i>B</i>	DESIGN CHK.	APPROVAL	MISCELLANEOUS CLEARANCES	
CHKD.				
DATE	DATE	DATE		
DATE OF ISSUE		DRAWING NO. C-24-02.10	SHEET 1 of 3	REV. D

MINIMUM HEIGHTS OF SUPPLY EQUIPMENT FROM GROUND

	PEDESTRIAN AREAS		VEHICLE AREAS	
	0-750 V	2.4-25kV	0-750 V	2.4-25kV
LIVE OR EXPOSED CURRENT CARRYING PARTS AND NON-GROUNDED EQUIPMENT CASES	3.0m	4.4m	4.4m	4.7m
GROUNDED EQUIPMENT CASES	3.0m	3.0m	4.4m	4.4m

THERE IS NO VERTICAL SEPARATION REQUIREMENT FOR SUPPLY SWITCH HANDLES, CONTROL EQUIPMENT ENCLOSURES, ETC., THAT ARE EFFECTIVELY GROUNDED.

VERTICAL SEPARATIONS FROM THE JOINT USE SPACE

ALL CONDUCTORS SHALL MEET SEPARATIONS IN SECTION A-28 AND CLEARANCES BETWEEN CONDUCTORS AS SHOWN IN DRAWING C-24-02.06 SHEET 1 OF 2. WHEN BRACKETS ARE EFFECTIVELY GROUNDED THE SEPARATION MAY BE 100mm. IF UNGROUNDED IT MUST BE 1.0m FROM THE JOINT USE SPACE. ENSURE THAT CLEARANCES ARE SUFFICIENT TO ALLOW FOR MAINTENANCE OF OUR EQUIPMENT AND THAT OF COMMUNICATION CIRCUITS.

MINIMUM CLEARANCE OF STATIONARY PARTS

	0-750 V	2.4/4.16 KV	14.4/25 KV
LINE TO LINE	50mm	280mm	380mm
LINE TO GROUND	50mm	230mm	250mm

THESE DIMENSIONS ARE BETWEEN LIVE PARTS FOR LINE TO LINE VALUES, AND LIVE PARTS TO THE NEAREST GROUNDED SURFACE FOR LINE TO GROUND VALUES.

THESE DIMENSIONS APPLY TO FIELD CONSTRUCTION, BUT THE DIMENSIONS ON THE MANUFACTURE'S EQUIPMENT MAY BE LESS IN ACCORDANCE WITH C.S.A. TESTING OF THIS EQUIPMENT.

EXAMPLES OF THESE CLEARANCE DIMENSIONS ARE:

- CLEARANCES BETWEEN SWITCHES OF DIFFERENT PHASES.
- CLEARANCES BETWEEN SWITCHES AND ANY LIVE OR GROUNDED PARTS IN ITS PROXIMITY.
- CLEARANCES BETWEEN TERMINAL POINTS OF BUSHINGS OF DIFFERENT PHASES.
- CLEARANCES BETWEEN TERMINAL POINTS OF BUSHINGS AND ANY LIVE OR GROUNDED PARTS IN ITS PROXIMITY.
- CLEARANCES BETWEEN TERMINALS OF EQUIPMENT OR APPARATUS AND CONDUCTORS (MAXIMUM SAG OR SWING).

SaskPower – DISTRIBUTION STANDARDS

DRN.	C.D.F.	DESIGN CHK.	APPROVAL	MISCELLANEOUS CLEARANCES	
CHKD.					
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ABOVE GROUND ACCESSIBLE TO PEDESTRIANS ONLY

AS PER CSA C22.3 NO. 1, TABLE 2:

VOLTAGE (LINE TO LINE)	MINIMUM CLEARANCE (INCLUDES ADDITIONAL CLEARANCE FOR SNOW COVER)
0 – 750 V	3.7m
2.4 – 25 KV	4.0m

THESE VERTICAL CLEARANCES ARE BASED ON MAXIMUM DESIGN SAG, EITHER HEAVY LOADING OR THERMAL CONDITION, WHICHEVER IS GREATER. THESE CLEARANCES ACCOMMODATE SNOW DEPTH OF 0.6m AS PER CSA C22.3 NO. 1.

WATER WELLS

CONDUCTORS OVER WATER WELLS ARE NOT PERMITTED. IN RURAL AREAS THE MINIMUM HORIZONTAL CLEARANCE SHALL BE 15m. IN URBAN AREAS THIS HORIZONTAL CLEARANCE SHALL BE 15m, OR FOR CONGESTED AREAS 3m.

SIGNS, BILLBOARDS, LUMINAIRES, AND TRAFFIC LIGHT STANDARDS

CONDUCTORS OVER SIGNS, BILLBOARDS, LUMINAIRES, AND TRAFFIC LIGHT STANDARDS SHALL BE AVOIDED WHERE POSSIBLE. IF THIS IS UNAVOIDABLE, A MINIMUM VERTICAL CLEARANCE OF 3m SHALL APPLY. THE MINIMUM HORIZONTAL CLEARANCE SHALL BE 3m. THESE CLEARANCES ARE FAR SUPERIOR TO CSA C22.3 NO. 1 AND COMPLY WITH THE OCCUPATIONAL HEALTH AND SAFETY ACT REQUIREMENT OF 3m CLEARANCE (FOR PHASE TO PHASE VOLTAGES UP TO AND INCLUDING 25KV) FOR UNQUALIFIED WORKPERSONS FROM OVERHEAD POWERLINES. THE CLEARANCES ARE AT MAXIMUM DESIGN SAG AND DO NOT APPLY TO SERVICE DROPS.

THE MINIMUM VERTICAL AND HORIZONTAL CLEARANCES AS PER THE OH&S IS 4.6m FOR 72KV AND 138KV, AND 6.1m FOR 230KV (ALL PHASE TO PHASE VOLTAGES).

BOAT LAUNCH AND ASSOCIATED AREA

POWERLINES ARE NOT PERMITTED TO CROSS A BOAT LAUNCH AND ASSOCIATED AREAS, LIKE PARKING AREAS. A HORIZONTAL CLEARANCE OF 15m SHALL BE MAINTAINED.

PARKS, SCHOOL YARDS, AND SKI LIFTS

CROSSING SHOULD BE AVOIDED WHERE POSSIBLE.

LINE CLEARANCES IN DISTRIBUTION SUBSTATIONS

REFERENCE DRAWINGS F000.00007.006 AND F000.00007.008. CONTACT STATIONS ENGINEERING FOR DRAWINGS.

SOLAR PANELS AND WIND TURBINES

POWERLINES ARE NOT PERMITTED TO CROSS SOLAR PANELS AND WIND TURBINES. IF FALL OVER DISTANCE PLUS 3m IS NOT ACHIEVEABLE, AN ABSOLUTE MINIMUM HORIZONTAL CLEARANCE OF 5m IS REQUIRED.

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APPROVAL	DESIGN CHK	DRN. LM	MISCELLANEOUS CLEARANCES	
L MOEN	L MOEN	CHKD. LM		
		2020-01-17		
DATE OF ISSUE:	2020-12-18	DRAWING NO:	C-24-02.10	SHEET 3 of 3
				REV. F

CLEARANCES TO FUEL TANKS FOR O/H CONDUCTORS

TANK SIZE (AGGREGATE)	MINIMUM VERTICAL CLEARANCE METER (FEET)	MINIMUM HORIZONTAL CLEARANCE METER (FEET)
LESS THAN 7,600 L	4.75M (15.5 FT) – NOTES 1, 2, 3	NOT APPLICABLE
7,600 TO 38,000 L – NOTE 4	NOT ALLOWED	NOTE 5 & 6

NOTES:

1. SHOULD AVOID CROSSING OVER IF OTHER SUITABLE CONSTRUCTION IS POSSIBLE.
2. VERTICAL CLEARANCES SHALL BE APPLIED AT MAXIMUM CONDUCTOR SAG.
3. ONLY CIRCUITS UP TO 22KV (L-G) ARE PERMITTED OVER TOP OF TANK.
4. FOR CAPACITIES OVER 38,000 L CONTACT GAS INSPECTOR.
5. CIRCUITS UP TO 22KV (L-G) SHALL HAVE A HORIZONTAL CLEARANCE AT REST OF 7.6M FOR AN AGGREGATE TANK SIZE OF 7,600 L OR GREATER.

PUBLICATIONS REFERENCED:

1. CANADIAN ELECTRICAL CODE, PART I 2015, SECTION 20
2. CSA C22.3 NO. 1-15
3. CSA B149.2-15

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APPROVAL	DESIGN CHK	DRN. QS	CLEARANCES TO FUEL TANKS
L. MOEN	Q. SUN	CHKD.	
		2018-03-27	
DATE OF ISSUE:	2018-06-07	DRAWING NO: C-24-02.11	SHEET 1 of 1 REV. B

MINIMUM VERTICAL CLEARANCES ABOVE NAVIGABLE WATERWAYS* ALTERNATING AND DIRECT CURRENTS †

(SEE CLAUSE 4.3.3, CSA-C22.3 No. 1-M87 OVERHEAD SYSTEMS)

TYPE OF WATERWAYS CROSSED WATER AREAS, A REFERENCE VESSEL HEIGHT ‡, H	GUYS; MESSENGERS; COMMUNICATION, SPAN AND LIGHTNING PRO- TECTION WIRES; COMMUNICATION CABLES	OPEN SUPPLY CONDUCTORS AND SERVICE CONDUCTORS, ALTERNATING AND DIRECT CURRENT, MINIMUM CLEARANCES IN METRES ABOVE ORDINARY HIGH WATER MARK (VOLTAGE MEANS RMS VOLTAGE-TO-GROUND)				
		0 TO 22 kV	OVER 22 TO 50 kV	OVER 50 TO 90 kV	OVER 90 TO 150 kV	OVER 150 kV
FEDERALLY MAINTAINED COMMERCIAL CHANNELS, RIVERS, HARBOURS, OR HERITAGE CANALS	COL.I	COL.II	COL.III	COL.IV	COL.V	COL.VI
CLEARANCES IN THIS SECTION SHALL BE SPECIFIED BY THE FEDERAL MINISTRY OF TRANSPORT FOR THE COASTAL REGIONS§. GREAT LAKES SYSTEM, RED RIVER-LAKE WINNIPEG SYSTEM, MACKENZIE RIVER§ AND INTERIOR LAKES OF BRITISH COLUMBIA.						
MAIN LAKES ON MAIN NAVIGATION ROUTES AND MARINAS	15.0	16.0	16.3	16.7	17.3	17.3 PLUS 0.1m FOR EACH KILOVOLT OVER 150 kV
A > 800 ha H = 14.0m						
LARGE LAKES, MAIN RIVERS IN RESORT AREAS	13.0	14.0	14.3	14.7	15.3	15.3 PLUS 0.01m FOR EACH KILOVOLT OVER 150 kV
80 < A < 800 ha H = 12.0m						
SMALL RESORT LAKES, RIVERS CONNECTING LAKES, CROSSINGS ADJACENT TO BRIDGES AND ROADS	11.0	12.0	12.3	12.7	13.3	13.3 PLUS 0.01m FOR EACH KILOVOLT OVER 150 kV
8 < A < 80 ha H = 10.0m						
VERY SMALL ISOLATED LAKES AND RIVERS	9.0	10.0	10.3	10.7	11.3	11.3 PLUS 0.01m FOR EACH KILOVOLT OVER 150 kV
A < 8 ha H = 8.0m						

* THE CLEARANCE OVER A CANAL, RIVER, OR STREAM NORMALLY USED TO PROVIDE ACCESS FOR SAILBOATS TO A LARGER BODY OF WATER SHALL BE THE SAME AS THAT REQUIRED FOR THE LARGER BODY OF WATER.

† THE CLEARANCES ARE APPLICABLE TO BOTH ALTERNATING AND DIRECT CIRCUITS. FOR DIRECT CURRENT CIRCUITS, THE CLEARANCE REQUIREMENTS SHALL BE THE SAME AS THOSE FOR ALTERNATING CURRENT CIRCUITS HAVING THE SAME CREST VOLTAGE TO GROUND.

‡ OVERALL HEIGHT OF THE VESSEL: THIS INCLUDES THE HEIGHTS OF ANTENNA OR OTHER ATTACHMENTS.

§ WHERE TIDE WATER HAS AN EFFECT ON A BODY OF WATER BEING CROSSED, THE VERTICAL DESIGN CLEARANCE SHALL BE INCREASED BY AN AMOUNT THAT TAKES IN ACCOUNT PEAK TIDE.

NOTE: FORMULA USED TO DERIVE MINIMUM CLEARANCES:

MINIMUM VERTICAL CLEARANCE = REF. VESSEL HEIGHT (INCLUDES ANTENNA) + 1.0m BUFFER + SAFE ELECTRICAL CLEARANCE

SAFE ELECTRICAL CLEARANCE = SAFETY MARGIN + AIR GAP FLASHOVER DISTANCE BASED ON SWITCHING SURGE = .78m + [.01m/kV x MAX. kV IN EACH COLUMN]

1.0m BUFFER ALLOWS FOR A VARIATION IN BOAT HEIGHT ABOVE WATER (LOADED-UNLOADED) AND FOR WAVE ACTION.

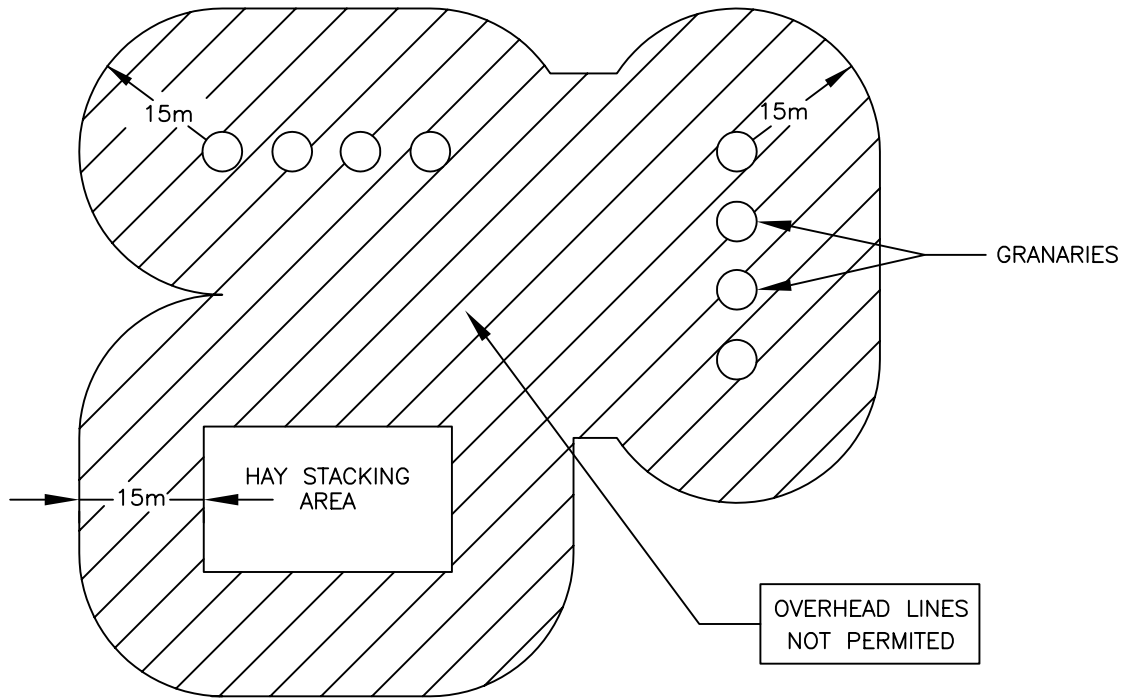
RENUMBERED, PREVIOUS DRAWING C-24-22.04

SaskPower - DISTRIBUTION STANDARDS

DRN. <i>DC</i>	DESIGN CHK.	APPROVAL	MINIMUM VERTICAL CLEARANCES ABOVE NAVIGABLE WATERWAYS
CHKD.			
DATE	DATE	DATE	
DATE OF ISSUE		DRAWING NO. C-24-02.12	SHEET 1 of 1
			REV. 0

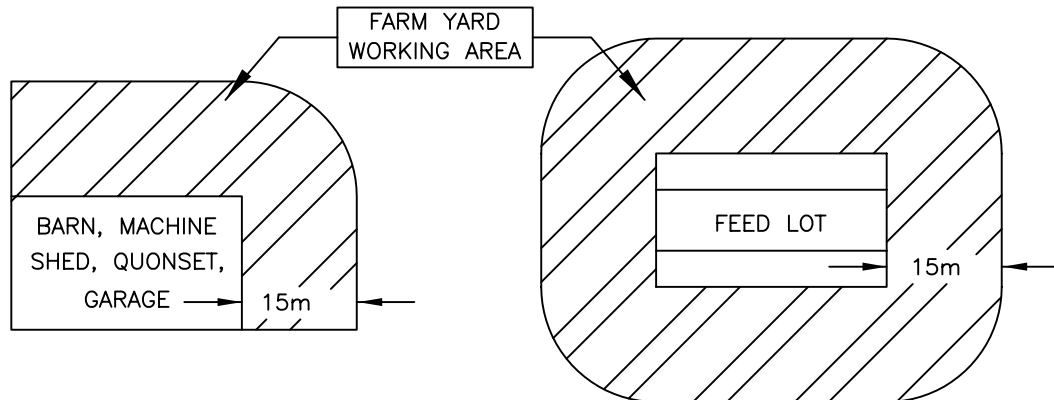
GRANARIES & HAY STACKING AREAS

CONDUCTORS OVER GRANARIES & HAY STACKING AREAS ARE NOT PERMITTED. LINES ARE NOT PERMITTED BETWEEN GRANARIES, NOR BETWEEN ROWS OF GRANARIES. THE MINIMUM HORIZONTAL CLEARANCE SHALL BE 15m (MEASURED AT RIGHT ANGLES TO THE LINE).



FARM YARD WORKING AREAS (SEE C-24-02.00 SHT. 2 FOR DEFINITIONS)

CONDUCTORS OVER FARM YARD WORK AREAS ARE NOT PERMITTED. THE MINIMUM HORIZONTAL CLEARANCE SHALL BE 15m (MEASURED AT RIGHT ANGLES TO THE LINE). IF THIS 15m IS NOT OBTAINABLE FOR SERVICE DROPS, THE MINIMUM HORIZONTAL ACCESSIBLE BUILDING CLEARANCES IN C-24-02.05 SHALL APPLY.



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DRN. <i>R</i>	DESIGN CHK.	APPROVAL	GRANARIES & HAY STACKING AREAS AND FARM YARD WORKING AREAS
CHKD.			
DATE: 97/07/08	DATE	DATE	
DATE OF ISSUE		DRAWING NO. C-24-02.13	SHEET 1 of 1 REV. A

**LINES BUILT BETWEEN 1987 JUNE AND 1996 JULY INCLUSIVE, OR
SPECIAL WORKING AREAS OR GRANARIES LOCATED NEAR SASKPOWER
LINES BETWEEN 1987 JUNE AND 1996 JULY INCLUSIVE**

FACILITY	VERTICAL	HORIZONTAL	NOTES
SPECIAL WORKING AREAS (EXCL. GRANARIES) 0 – 600 VOLTS 2400 – 7200 VOLTS 14400 – 25000 VOLTS	8.23 m 9.14 m 9.14 m	8.23 m 8.53 m 9.14 m	1, 2
GRANARIES	NOT PERMITTED	15 m	3

**LINES BUILT PRIOR TO 1987 JUNE, OR SPECIAL WORKING AREAS
LOCATED NEAR SASKPOWER LINES PRIOR TO 1987 JUNE**

FACILITY	VERTICAL	HORIZONTAL	NOTES
SPECIAL WORKING AREAS (EXCL. GRANARIES) 0 – 600 VOLTS 2400 – 7200 VOLTS 14400 – 25000 VOLTS	8.23 m 9.14 m 9.14 m	8.23 m 8.53 m 9.14 m	2, 4

FACILITY	WHERE VERTICAL CLEARANCE ABOVE GRANARY IS:	HORIZONTAL CLEARANCE FROM GRANARY MUST BE:	NOTES
GRANARIES 4.27 m HEIGHT	6.10 m 4.57 m 3.35 m	3.05 m OR LESS 3.05 m TO 4.57 m 4.57 m TO 6.40 m	5
5.18 m HEIGHT	7.01 m 5.18 m 3.66 m 2.44 m	2.44 m OR LESS 2.44 m TO 4.57 m 4.57 m TO 6.71 m 6.71 m TO 8.53 m	
6.40 m HEIGHT	8.23 m 6.71 m 5.18 m 3.96 m 2.74 m	1.83 m OR LESS 1.83 m TO 3.66 m 3.66 m TO 5.49 m 5.49 m TO 6.40 m 6.40 m TO 9.14 m	
OVER 6.40 m HEIGHT	–	OVER 9.14 m	

NOTES:

1. SPECIAL WORKING AREAS – MEANS FRONTAL WORKING SPACE OF A MACHINE SHED; AREA IN FRONT OF A TWO-STORY BARN WITH A HAYLOFT SLING; GRANARIES SUBJECT TO GRAIN LOADING OPERATIONS; AND FEED LOTS AND HAY-STACKING AREAS. (NOTE THAT, FOR THIS PERIOD OF CONSTRUCTION, CLEARANCES TO GRANARIES ARE SPECIFIED SEPARATELY.)
2. THE VERTICAL OR HORIZONTAL CLEARANCE MUST BE MAINTAINED, BUT NOT BOTH.
3. HORIZONTAL CLEARANCE TO BE MEASURED AT RIGHT ANGLE TO THE LINE.
4. SPECIAL WORKING AREA – MEANS FRONTAL WORKING SPACE OF A MACHINE SHED; AREA IN FRONT OF A TWO-STORY BARN WITH A HAYLOFT SLING; GRANARIES SUBJECT TO GRAIN LOADING OPERATIONS; AND FEED LOTS AND HAY-STACKING AREAS. (NOTE THAT, FOR THIS PERIOD OF CONSTRUCTION, CLEARANCES TO GRANARIES ARE SPECIFIED SEPARATELY.)
5. THE CLEARANCES TO GRANARIES ARE FROM 14.4 KV AND 25 KV LINES, HAVING SPANS OF 117.3 m OR LESS.

SaskPower – DISTRIBUTION STANDARDS

DRN. <i>AP</i>	DESIGN CHK.	APPROVAL	SPECIAL WORKING AREAS GRANARIES & HAY STACKING AREAS (FOR INSPECTION OF LINES BUILT, OR FACILITY LOCATED, IN AND PRIOR TO 1996 JULY)
CHKD.			
DATE 97-07-15	DATE	DATE	
DATE OF ISSUE	DRAWING NO.	C-24-02.14	SHEET 1 OF 1
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LINES BUILT IN AND PRIOR TO 1996 JULY, OR FACILITY LOCATED NEAR SASKPOWER LINES IN AND PRIOR TO 1996 JULY

FACILITY	VERTICAL CLEARANCE	HORIZONTAL CLEARANCE	NOTES
WATER WELLS 0 – 600 VOLTS 2400 – 7200 VOLTS 14400 – 25000 VOLTS	NOT PERMITTED NOT PERMITTED NOT PERMITTED	8.23 m 9.14 m 9.14 m	1, 2 1, 2 1, 2
SWIMMING POOLS 0 – 750 VOLTS 750 VOLTS – 25000 VOLTS	4.6 m 6.7 m	3.0 m 3.0 m	3, 4
SIGNS, BILLBOARDS, LUMINAIRES, TRAFFIC LIGHT STANDARDS AND SIMILAR PLANT 0 – 600 VOLTS 2400 – 7200 VOLTS 14400 – 25000 VOLTS	2.44 m 3.05 m 3.66 m	0.91 m 1.83 m 3.05 m	4 5

NOTES:

- WHERE A WINDMILL TOWER EXISTS OVER A WELL, THESE CLEARANCES MAY BE REDUCED TO 3.05 M FOR SUPPLY LINES OF 14400 VOLTS OR LESS.
- THESE CLEARANCES APPLY ONLY IN RURAL AREAS. NO MINIMUM CLEARANCE FROM WELLS HAS BEEN ESTABLISHED FOR SUPPLY LINES IN URBAN AREAS BECAUSE OF RESTRICTED RIGHTS OF WAY.
- FOR CONSTRUCTION PRIOR TO 1976 AUGUST, REFER TO THE APPLICABLE ISSUE OF CSA STANDARD C22.3 NO. 1.
- THE VERTICAL OR HORIZONTAL CLEARANCE MUST BE MAINTAINED, BUT NOT BOTH.
- FOR CLEARANCES TO 14400 – 25000 VOLT LINES, CURRENT STANDARDS MAY BE SUBSTITUTED.

LINES BUILT BETWEEN 1987 JUNE AND 1995 JULY INCLUSIVE, OR PROPANE TANKS LOCATED NEAR SASKPOWER LINES BETWEEN 1987 JUNE AND 1995 JULY INCLUSIVE

FACILITY	VERTICAL CLEARANCE	HORIZONTAL CLEARANCE	NOTES
PROPANE TANKS < 7600 LITRES CAPACITY ≥ 7600 LITRES CAPACITY	NOT PERMITTED NOT PERMITTED	7.6 m 15 m	–

LINES BUILT BETWEEN 1979 APRIL AND 1987 MAY INCLUSIVE, OR PROPANE TANKS LOCATED NEAR SASKPOWER LINES BETWEEN 1979 APRIL AND 1987 MAY INCLUSIVE

FACILITY	VERTICAL CLEARANCE	HORIZONTAL CLEARANCE	NOTES
PROPANE TANKS ALL SIZES	NOT PERMITTED	7.6 m	–

SaskPower – DISTRIBUTION STANDARDS

DRN. <i>AP</i>	DESIGN CHK.	APPROVAL	WATER WELLS; SWIMMING POOLS; SIGNS, BILLBOARDS, LUMINAIRES, TRAFFIC LIGHT STANDARDS & SIMILAR PLANT; AND PROPANE TANKS (FOR INSPECTION OF LINES BUILT, OR FACILITY LOCATED, IN AND PRIOR TO 1996 JULY)
CHKD.			
DATE 97-07-15	DATE	DATE	
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CONDUCTOR SWING CALCULATIONS

(C.S.A. C22.3 NO. 1 TABLE #1)

<u>CONDUCTOR</u>	<u>SWING FACTOR</u>
1/0 ACSR RAVEN	0.737
3/0 ACSR PIGEON	0.568
4/0 ACSR PENGUIN	0.6125
266.8 kcmil ACSR PARTRIDGE	0.573
477 kcmil ACSR PELICAN	0.5315
266.8 kcmil AL DAISY	0.685
336.4 kcmil AL TULIP	0.645
477 kcmil AL COSMOS	0.577
#6 AL DUPLEX	0.973
#4 AL TRIPLEX	0.850
1/0 AL TRIPLEX	0.686
3/0 AL TRIPLEX	0.632
1/0 AL QUADRUPLEX	0.682
3/0 AL QUADRUPLEX	0.588

CONDUCTOR SWING = CONDUCTOR SAG (C-24-05) X CONDUCTOR SWING FACTOR

EXAMPLE – CONDUCTOR SWING FOR TULIP AT 38m RS

FROM TABLE ON C-24-05.12, MAX. SAG FOR TULIP 38m RS IS 1.22m.

FROM TABLE ABOVE, SWING FACTOR FOR TULIP IS 0.645.

CONDUCTOR SWING = 1.22m X 0.645

CONDUCTOR SWING FOR TULIP 38m RS = 0.7869m

NOTE: THIS IS THE SWING VALUE. MINIMUM CLEARANCE VALUE MUST STILL BE ADDED TO THIS. SEE C-24-02.05.

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APPROVAL

L. MOEN

DESIGN CHK

B. GEBHART

DRN. **BG**

CHKD.

CONDUCTOR SWING CALCULATIONS

DATE OF ISSUE: **2020-12-18**

DRAWING NO: **C-24-02.16**

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REV. **0**