NSP/004/042/001 - Conductor Sag Charts for Wood Pole Lines up to and including 33kV

1. Purpose

The purpose of this document is to provide a series of sag charts for use with NSP/004/042

This document supersedes the following documents, all copies of which should be destroyed.

Ref	Version	Title
NSP/004/042/001	1.0	Conductor Sag Charts For Wood Pole Lines up to and including 33kV
DSS/004/042	1.0	Specification for Yorkshire Electricity Overhead Lines to ESI 43-40
O.309	March 1996	High Voltage Single Circuit Lines on Wood Poles for Voltages up to and Including 33kV
TS 71-01 to TS 7113	Initial Version	Erection sag and tension tables for lines designed formally to DSS/004/042 version 1.0

2. Scope

This document contains sag charts for the erection of 3-phase and single-phase overhead lines on wood poles up to and including 33kV. It has been designed to be in accordance with ENA TS 43-40: Issue 2

Additionally this document contains sag charts to be used for the renovation of existing HV lines using various historical conductor types

2.1 Contents

3. Technical specification

3.1 Sag Charts

Each conductor type has two pages of information specific to a particular conductor and the altitude in which it is constructed.

Sheet 1
Describes the conductor technical data and applied weather loads applicable in the selected environment. This information is used to derive the applicable conductor MCT that is then used to create the sag charts.

Additionally this sheet contains the MCW, MCP and FPT loading values, which together with the MCT are used in the main specification to determine the structure, stay and crossarm requirements.

Sheet 2
The erection chart shall be used to determine the appropriate sags and tension for new conductors only, as it contains additional factors that increase the conductor tensions. These factors are designed to compensate for long term creep.

Design charts contain no additional factors, they shall be used for the re-sagging of existing conductors or to review the likely sags or tensions in existing overhead lines. This chart shall be used for any clearance enquiries.

Appendix 2 to 15 - New construction
Appendix 16 to 47 - Renovation or modification to existing lines

3.2 Pre-Stress Tensions for conductor erection

Conductor Type	Pre-stress Erection Tension
50mm2 AAAC	5884N (600kgf)
100mm2 AAAC	12258N (1250kgf)
175mm2 AAAC	14,710N (1500kgf)
200mm2 AAAC	14,710N (1500kgf)

4. References

4.1 External Documentation

Reference	Title
ENA TS 43-40	High voltage single circuit overhead lines on wood poles

4.2 Internal documentation

Reference	Title
NSP/004/042	Specification for High Voltage Single Circuit Lines on Wood Poles for Voltages upto and including 33kV

4.3 Summary Of Changes

Clause	Changes or amendments
2.1	Table of contents inserted
4.3	Summary of changes table inserted
Appendix 1	Simplified list of allowable sag charts
Appendix 2 – 15	Revised sag charts to incorporate higher tension limits for the 175mm AAAC and 200mm AAAC conductors and revisions to the % reduction used in all ordinate tables.
Appendix 16 – 47	Revised Over tension and ordinate values applied to charts

5 Definitions

Term	Definition
Basic Span	The span length adopted for sag/tension calculations
Everyday Tension (EDT)	The design stress in an unloaded conductor at 5°C. Used in sag / tension calculations to limit harmful conductor vibrations
Freezing Point Tension (FPT)	The design tension of an unloaded conductor at 0°C in still air.
Maximum Conductor Pressure (MCP)	The maximum transverse component of applied conductor load when subjected to a wind load.
Maximum Conductor Weight (MCW	The maximum vertical component of applied conductor load, including the weight of accreted ice, if present.
MCT	The maximum conductor tension under design loading conditions
Maximum Span	The maximum permitted length of any span
Maximum Working Tension (MWT)	The absolute maximum conductor tension assessed at -5.6°C with wind and ice loading.
Rated Breaking Strength (RBS)	The rating assigned t a component (usually conductors) that defines the maximum mechanical load that the component will withstand without damage.
Recommended Span	The average span length in any section to which the line shall be planned. Individual spans will normally be within +/- 20% of the chosen basic span.
Sag	The vertical distance, under any system of conductor loading, between the conductor and a straight line joining adjacent supporting points, measured at mid-span
Span	The horizontal distance between adjacent supports. Individual spans will normally be within 20% of the chosen basic span

6. Authority for issue

6.1 Author

I sign to confirm that I have completed and checked this document and I am satisfied with its content and submit it for approval and authorisation.

		Sign	Date
G Hammel	Overhead Line Standards Manager	G Hammel	02/09/2010

6.2 Policy Sponsor

I sign to confirm that I am satisfied with all aspects of the content and preparation of this document and submit it for approval and authorisation.

		Sign	Date
A Bilclough	Overhead Programme Manager	A Bilclough	09/09/2010

6.3 Technical Assurance

I sign to confirm that I am satisfied with all aspects of the content and preparation of this document and submit it for approval and authorisation.

		Sign	Date
A Bilclough	Overhead Programme Manager	A Bilclough	09/09/2010

6.4 DBD Assurance

I sign to confirm that this document has been assured for issue on to the DBD system

		Sign	Date
S Johnson	DBD Administrator	S Johnson	01/11/2010

6.5 Approval

Approval is given for the content of this document

		Sign	Date
C Holdsworth	Standards and Assessment Manager	C Holdsworth	02/09/2010

6.6 Authorisation

Authorisation is granted for publication of this document

		Sign	Date
M Nicholson	Head of System Strategy	M Nicholson	07/09/2010

Appendix 1 - Schedule of sag charts

Section 1 - Sag charts for new construction

Conductor Type	Basic Span	Altitude or Loading	Appendix No.
50mm^2 AAAC	90m	Normal	2
	120m		3
100mm^2 AAAC	110m		4
175m^2 AAAC	110m		5
200m^2 AAAC	120m		6
50mm^2 AAAC	75m	High	7
	80m		8
	100m		9
100mm^2 AAAC	80m		10
	90m		11
175m^2 AAAC	90m		12
	100m		13
200m^2 AAAC	90m		14
	100m		15

Note:

See Appendix 16 for details of historical renovation conductors

Appendix 2 - 50mm AAAC (Hazel) - (90m Basic) Normal altitude

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	HAZEL
Greased Conductor Weight (kg/m)	0.1648
Cross Sectional Area of Conductor (mm²)	59.9
Conductor Overall Diameter (mm)	9.9
Coefficient of Linear Expansion (/Degree C)	2.3E-05
Modulus of Elasticity (kg/mm²)	6016.33
Rated Breaking Strength of Conductor (kgf)	1800.8
Basic / Recommended Span (m)	90
Wind Pressure on Conductor (N/m²)	380
Radial Ice Thickness (mm)	5
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	720.3
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	360.2
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	641.0
Maximum Conductor Weight (MCW) (kg/m)			0.378
Maximum Conductor Pressure (MCP) (kg/m)			0.771
Freezing Point Tension (FPT) (kgf)	at	0°C	397.1

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: HAZEL

Temperature Shift (Deg. C) 0
Tension Reduction at 15°C (%) 5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.07	0.25	0.27	0.29	0.31	0.33	0.34
80	0.30	1.00	1.08	1.16	1.23	1.31	1.38
120	0.67	2.24	2.43	2.60	2.77	2.94	3.10
160	1.20	3.99	4.31	4.62	4.93	5.22	5.51
200	1.87	6.24	6.74	7.23	7.70	8.16	8.60
240	2.70	8.98	9.70	10.40	11.09	11.75	12.39
280	3.67	12.22	13.20	14.16	15.09	15.99	16.86
320	4.80	15.96	17.25	18.50	19.71	20.89	22.02
360	6.07	20.20	21.83	23.41	24.95	26.43	27.87
400	7.50	24.94	26.95	28.90	30.80	32.63	34.41
440	9.07	30.18	32.61	34.97	37.27	39.49	41.64
480	10.80	35.92	38.80	41.62	44.35	46.99	49.55
520	12.67	42.16	45.54	48.84	52.05	55.15	58.15

Appendix 2a - 50mm AAAC (Hazel) - (90m Basic) Normal altitude

Common Design & Erection table

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		HAZEL	
Basic / Recommended Span (m)		90	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	439.6	0.17	0.23	0.30	0.38	0.47	0.57	0.67	0.79	1.52
0	397.1	0.19	0.25	0.33	0.42	0.52	0.63	0.75	0.88	1.68
5	360.2	0.21	0.28	0.37	0.46	0.57	0.69	0.82	0.97	1.85
10	324.6	0.23	0.31	0.41	0.51	0.63	0.77	0.91	1.07	2.06
15	290.9	0.25	0.35	0.45	0.57	0.71	0.86	1.02	1.20	2.29
20	259.4	0.29	0.39	0.51	0.64	0.79	0.96	1.14	1.34	2.57
25	230.9	0.32	0.44	0.57	0.72	0.89	1.08	1.28	1.51	2.89
30	205.6	0.36	0.49	0.64	0.81	1.00	1.21	1.44	1.69	3.25
35	183.8	0.40	0.55	0.72	0.91	1.12	1.36	1.61	1.89	3.63
40	165.4	0.45	0.61	0.80	1.01	1.25	1.51	1.79	2.11	4.04
45	150.0	0.49	0.67	0.88	1.11	1.37	1.66	1.98	2.32	4.45
50	137.2	0.54	0.74	0.96	1.22	1.50	1.82	2.16	2.54	4.86
55	126.5	0.59	0.80	1.04	1.32	1.63	1.97	2.34	2.75	5.27
60	117.6	0.63	0.86	1.12	1.42	1.75	2.12	2.52	2.96	5.67
65	110.1	0.67	0.92	1.20	1.52	1.87	2.26	2.70	3.16	6.06
70	103.6	0.72	0.97	1.27	1.61	1.99	2.41	2.86	3.36	6.44
75	98.1	0.76	1.03	1.34	1.70	2.10	2.54	3.03	3.55	6.81
80	93.2	0.80	1.08	1.41	1.79	2.21	2.67	3.18	3.73	7.16

Appendix 3 - 50mm AAAC (Hazel) - (120m Basic) Normal altitude

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	HAZEL
Greased Conductor Weight (kg/m)	0.1648
Cross Sectional Area of Conductor (mm²)	59.9
Conductor Overall Diameter (mm)	9.9
Coefficient of Linear Expansion (/Degree C)	2.3E-05
Modulus of Elasticity (kg/mm²)	6016.33
Rated Breaking Strength of Conductor (kgf)	1800.8
Basic / Recommended Span (m)	120
Wind Pressure on Conductor (N/m²)	380
Radial Ice Thickness (mm)	5
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	720.3
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	360.2
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	1288.7
Maximum Conductor Weight (MCW) (kg/m)			0.968
Maximum Conductor Pressure (MCP) (kg/m)			1.279
Freezing Point Tension (FPT) (kgf)	at	0°C	786.7

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: HAZEL

Temperature Shift (Deg. C)	0
Tension Reduction at 15°C (%)	5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.08	0.21	0.22	0.24	0.25	0.26	0.27
80	0.30	0.84	0.89	0.95	1.00	1.05	1.10
120	0.68	1.89	2.01	2.13	2.25	2.36	2.47
160	1.22	3.35	3.57	3.78	3.99	4.20	4.39
200	1.90	5.24	5.58	5.91	6.24	6.55	6.86
240	2.73	7.54	8.03	8.51	8.98	9.44	9.88
280	3.72	10.27	10.94	11.59	12.23	12.85	13.45
320	4.86	13.41	14.28	15.14	15.97	16.78	17.57
360	6.15	16.98	18.08	19.16	20.21	21.24	22.24
400	7.60	20.96	22.32	23.65	24.95	26.22	27.45
440	9.19	25.36	27.01	28.62	30.19	31.73	33.22
480	10.94	30.18	32.14	34.06	35.93	37.76	39.53
520	12.84	35.42	37.72	39.97	42.17	44.31	46.40

Appendix 3a - 50mm AAAC (Hazel) - (120m Basic) Normal altitude

Common Design and erection Tables

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		HAZEL	
Basic / Recommended Span (m)		120	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m)								
		60	70	80	90	100	110	120	130	140
-5.6	433.9	0.17	0.23	0.30	0.38	0.47	0.57	0.68	0.80	0.93
0	394.1	0.19	0.26	0.33	0.42	0.52	0.63	0.75	0.88	1.02
5	360.2	0.21	0.28	0.37	0.46	0.57	0.69	0.82	0.97	1.12
10	328.0	0.23	0.31	0.40	0.51	0.63	0.76	0.90	1.06	1.23
15	298.1	0.25	0.34	0.44	0.56	0.69	0.84	1.00	1.17	1.35
20	270.7	0.27	0.37	0.49	0.62	0.76	0.92	1.10	1.29	1.49
25	246.1	0.30	0.41	0.54	0.68	0.84	1.01	1.21	1.41	1.64
30	224.3	0.33	0.45	0.59	0.74	0.92	1.11	1.32	1.55	1.80
35	205.4	0.36	0.49	0.64	0.81	1.00	1.21	1.44	1.69	1.97
40	189.1	0.39	0.53	0.70	0.88	1.09	1.32	1.57	1.84	2.14
45	175.0	0.42	0.58	0.75	0.95	1.18	1.42	1.69	1.99	2.31
50	163.0	0.46	0.62	0.81	1.02	1.26	1.53	1.82	2.14	2.48
55	152.6	0.49	0.66	0.86	1.09	1.35	1.63	1.94	2.28	2.65
60	143.6	0.52	0.70	0.92	1.16	1.43	1.74	2.07	2.42	2.81
65	135.8	0.55	0.74	0.97	1.23	1.52	1.83	2.18	2.56	2.97
70	129.0	0.57	0.78	1.02	1.29	1.60	1.93	2.30	2.70	3.13
75	123.0	0.60	0.82	1.07	1.36	1.68	2.03	2.41	2.83	3.28
80	117.6	0.63	0.86	1.12	1.42	1.75	2.12	2.52	2.96	3.43

Appendix 4 - 100mm AAAC (Oak) - (110m Basic) Normal altitude

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	OAK
Greased Conductor Weight (kg/m)	0.3273
Cross Sectional Area of Conductor (mm²)	118.9
Conductor Overall Diameter (mm)	14
Coefficient of Linear Expansion (/Degree C)	2.3E-05
Modulus of Elasticity (kg/mm²)	6016.33
Rated Breaking Strength of Conductor (kgf)	3576.1
Basic / Recommended Span (m)	110
Wind Pressure on Conductor (N/m²)	380
Radial Ice Thickness (mm)	9.5
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	1788.1
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	715.2
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	714.9
Maximum Conductor Weight (MCW) (kg/m)			0.378
Maximum Conductor Pressure (MCP) (kg/m)			0.771
Freezing Point Tension (FPT) (kgf)	at	0°C	394.1

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: OAK

Temperature Shift (Deg. C) 0
Tension Reduction at 15°C (%) 10

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.08	0.23	0.24	0.26	0.27	0.29	0.30
80	0.30	0.92	0.98	1.03	1.09	1.15	1.20
120	0.68	2.06	2.20	2.33	2.46	2.58	2.71
160	1.21	3.66	3.90	4.14	4.37	4.59	4.81
200	1.89	5.72	6.10	6.47	6.83	7.18	7.52
240	2.72	8.24	8.78	9.31	9.83	10.33	10.82
280	3.71	11.21	11.95	12.67	13.38	14.06	14.73
320	4.84	14.64	15.61	16.55	17.48	18.37	19.24
360	6.13	18.53	19.76	20.95	22.12	23.25	24.35
400	7.56	22.88	24.39	25.87	27.30	28.70	30.06
440	9.15	27.68	29.51	31.30	33.04	34.73	36.37
480	10.89	32.94	35.12	37.25	39.32	41.33	43.29
520	12.78	38.66	41.22	43.71	46.15	48.51	50.80

Appendix 4a - 100mm AAAC (Oak) - (110m Basic) Normal altitude

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		OAK	
Basic / Recommended Span (m)		110	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	140
-5.6	865.7	0.17	0.23	0.30	0.38	0.47	0.57	0.68	0.80	0.93
0	784.7	0.19	0.26	0.33	0.42	0.52	0.63	0.75	0.88	1.02
5	715.2	0.21	0.28	0.37	0.46	0.57	0.69	0.82	0.97	1.12
10	649.1	0.23	0.31	0.40	0.51	0.63	0.76	0.91	1.07	1.24
15	587.2	0.25	0.34	0.45	0.56	0.70	0.84	1.00	1.18	1.37
20	530.3	0.28	0.38	0.49	0.62	0.77	0.93	1.11	1.30	1.51
25	479.0	0.31	0.42	0.55	0.69	0.85	1.03	1.23	1.44	1.67
30	433.7	0.34	0.46	0.60	0.76	0.94	1.14	1.36	1.59	1.85
35	394.4	0.37	0.51	0.66	0.84	1.04	1.26	1.49	1.75	2.03
40	360.7	0.41	0.56	0.73	0.92	1.13	1.37	1.63	1.92	2.22
45	332.0	0.44	0.60	0.79	1.00	1.23	1.49	1.77	2.08	2.42
50	307.6	0.48	0.65	0.85	1.08	1.33	1.61	1.92	2.25	2.61
55	286.8	0.51	0.70	0.91	1.16	1.43	1.73	2.05	2.41	2.80
60	268.9	0.55	0.75	0.97	1.23	1.52	1.84	2.19	2.57	2.98
65	253.5	0.58	0.79	1.03	1.31	1.61	1.95	2.32	2.73	3.16
70	240.2	0.61	0.83	1.09	1.38	1.70	2.06	2.45	2.88	3.34
75	228.4	0.64	0.88	1.15	1.45	1.79	2.17	2.58	3.03	3.51
80	218.1	0.68	0.92	1.20	1.52	1.88	2.27	2.70	3.17	3.68

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		OAK	
Basic / Recommended Span (m)		110	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		10.0	at 15°C
Required Percentage Increase in Tension (%)		10	at 15°C

Temp. (Deg. C)	Tension (kgf)	ERECTION TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	140
-5.6	936.3	0.16	0.21	0.28	0.35	0.44	0.53	0.63	0.74	0.86
0	853.2	0.17	0.23	0.31	0.39	0.48	0.58	0.69	0.81	0.94
5	781.2	0.19	0.26	0.34	0.42	0.52	0.63	0.75	0.89	1.03
10	711.9	0.21	0.28	0.37	0.47	0.57	0.70	0.83	0.97	1.13
15	645.9	0.23	0.31	0.41	0.51	0.63	0.77	0.91	1.07	1.24
20	584.3	0.25	0.34	0.45	0.57	0.70	0.85	1.01	1.18	1.37
25	527.6	0.28	0.38	0.50	0.63	0.78	0.94	1.12	1.31	1.52
30	476.6	0.31	0.42	0.55	0.70	0.86	1.04	1.24	1.45	1.68
35	431.6	0.34	0.46	0.61	0.77	0.95	1.15	1.36	1.60	1.86
40	392.6	0.38	0.51	0.67	0.84	1.04	1.26	1.50	1.76	2.04
45	359.2	0.41	0.56	0.73	0.92	1.14	1.38	1.64	1.92	2.23
50	330.7	0.45	0.61	0.79	1.00	1.24	1.50	1.78	2.09	2.42
55	306.5	0.48	0.65	0.85	1.08	1.33	1.62	1.92	2.26	2.62
60	285.8	0.52	0.70	0.92	1.16	1.43	1.73	2.06	2.42	2.81
65	268.1	0.55	0.75	0.98	1.24	1.53	1.85	2.20	2.58	2.99
70	252.8	0.58	0.79	1.04	1.31	1.62	1.96	2.33	2.73	3.17
75	239.5	0.61	0.84	1.09	1.38	1.71	2.07	2.46	2.89	3.35
80	227.9	0.65	0.88	1.15	1.45	1.80	2.17	2.59	3.03	3.52

Appendix 5 - 175mm AAAC (Elm) - (110m Basic) Normal altitude

Conductor Code Name (if any)	ELM
Greased Conductor Weight (kg/m)	0.5922
Cross Sectional Area of Conductor (mm^2)	211
Conductor Overall Diameter (mm)	18.8
Coefficient of Linear Expansion (/Degree C)	2.3E-05
Modulus of Elasticity (kg/mm^2)	5710.41
Rated Breaking Strength of Conductor (kgf)	6346.7
Basic / Recommended Span (m)	110
Wind Pressure on Conductor (N/m^2)	380
Radial Ice Thickness (mm)	9.5
Ice Density (kg/m^3)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	2379.3
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	1269.3
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	2024.4
Maximum Conductor Weight (MCW) (kg/m)			1.363
Maximum Conductor Pressure (MCP) (kg/m)			1.465
Freezing Point Tension (FPT) (kgf)	at	0°C	1386.5

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: ELM

Temperature Shift (Deg. C) 0
Tension Reduction at 15°C (%) 10

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.08	0.23	0.24	0.26	0.27	0.28	0.30
80	0.31	0.91	0.97	1.03	1.08	1.14	1.19
120	0.70	2.04	2.18	2.31	2.44	2.56	2.68
160	1.24	3.63	3.87	4.10	4.33	4.55	4.77
200	1.94	5.67	6.05	6.41	6.77	7.12	7.45
240	2.80	8.17	8.71	9.23	9.75	10.25	10.73
280	3.81	11.12	11.85	12.57	13.27	13.95	14.61
320	4.98	14.52	15.48	16.42	17.33	18.22	19.08
360	6.30	18.38	19.59	20.78	21.93	23.06	24.15
400	7.78	22.69	24.19	25.65	27.08	28.47	29.82
440	9.41	27.46	29.27	31.04	32.76	34.44	36.08
480	11.20	32.68	34.83	36.94	38.99	40.99	42.94
520	13.14	38.35	40.88	43.35	45.76	48.11	50.39

Appendix 5a - 175mm AAAC (Elm) - (110m Basic) Normal altitude

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		ELM	
Basic / Recommended Span (m)		110	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m)								
		60	70	80	90	100	110	120	130	140
-5.6	1522.8	0.18	0.24	0.31	0.39	0.49	0.59	0.70	0.82	0.95
0	1386.5	0.19	0.26	0.34	0.43	0.53	0.65	0.77	0.90	1.05
5	1269.3	0.21	0.29	0.37	0.47	0.58	0.71	0.84	0.99	1.14
10	1157.6	0.23	0.31	0.41	0.52	0.64	0.77	0.92	1.08	1.25
15	1052.4	0.25	0.34	0.45	0.57	0.70	0.85	1.01	1.19	1.38
20	955.0	0.28	0.38	0.50	0.63	0.78	0.94	1.12	1.31	1.52
25	866.6	0.31	0.42	0.55	0.69	0.85	1.03	1.23	1.44	1.67
30	787.7	0.34	0.46	0.60	0.76	0.94	1.14	1.35	1.59	1.84
35	718.5	0.37	0.50	0.66	0.83	1.03	1.25	1.48	1.74	2.02
40	658.5	0.40	0.55	0.72	0.91	1.12	1.36	1.62	1.90	2.20
45	606.9	0.44	0.60	0.78	0.99	1.22	1.48	1.76	2.06	2.39
50	562.8	0.47	0.64	0.84	1.07	1.32	1.59	1.89	2.22	2.58
55	524.9	0.51	0.69	0.90	1.14	1.41	1.71	2.03	2.38	2.76
60	492.2	0.54	0.74	0.96	1.22	1.50	1.82	2.17	2.54	2.95
65	464.0	0.57	0.78	1.02	1.29	1.60	1.93	2.30	2.70	3.13
70	439.4	0.61	0.83	1.08	1.36	1.68	2.04	2.43	2.85	3.30
75	417.8	0.64	0.87	1.13	1.44	1.77	2.14	2.55	2.99	3.47
80	398.7	0.67	0.91	1.19	1.50	1.86	2.25	2.67	3.14	3.64

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		ELM	
Basic / Recommended Span	(m)	110	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		10.0	at 15°C
Required Percentage Increase in Tension (%)		10	at 15°C

Temp. (Deg. C)	Tension (kgf)	ERECTION TABLE Sag (m) for Span Length (m)								
		60	70	80	90	100	110	120	130	140
-5.6	1647.9	0.16	0.22	0.29	0.36	0.45	0.54	0.65	0.76	0.88
0	1508.0	0.18	0.24	0.31	0.40	0.49	0.59	0.71	0.83	0.96
5	1386.6	0.19	0.26	0.34	0.43	0.53	0.65	0.77	0.90	1.05
10	1269.4	0.21	0.29	0.37	0.47	0.58	0.71	0.84	0.99	1.14
15	1157.6	0.23	0.31	0.41	0.52	0.64	0.77	0.92	1.08	1.25
20	1052.4	0.25	0.34	0.45	0.57	0.70	0.85	1.01	1.19	1.38
25	955.1	0.28	0.38	0.50	0.63	0.78	0.94	1.12	1.31	1.52
30	866.6	0.31	0.42	0.55	0.69	0.85	1.03	1.23	1.44	1.67
35	787.7	0.34	0.46	0.60	0.76	0.94	1.14	1.35	1.59	1.84
40	718.5	0.37	0.50	0.66	0.83	1.03	1.25	1.48	1.74	2.02
45	658.5	0.40	0.55	0.72	0.91	1.12	1.36	1.62	1.90	2.20
50	607.0	0.44	0.60	0.78	0.99	1.22	1.48	1.76	2.06	2.39
55	562.8	0.47	0.64	0.84	1.07	1.32	1.59	1.89	2.22	2.58
60	524.9	0.51	0.69	0.90	1.14	1.41	1.71	2.03	2.38	2.76
65	492.2	0.54	0.74	0.96	1.22	1.50	1.82	2.17	2.54	2.95
70	464.0	0.57	0.78	1.02	1.29	1.60	1.93	2.30	2.70	3.13
75	439.4	0.61	0.83	1.08	1.36	1.68	2.04	2.43	2.85	3.30
80	417.8	0.64	0.87	1.13	1.44	1.77	2.14	2.55	2.99	3.47

Appendix 6 - 200mm AAAC (Poplar) - (120m Basic) Normal altitude

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	POPLAR
Greased Conductor Weight (kg/m)	0.68992
Cross Sectional Area of Conductor (mm²)	239.4
Conductor Overall Diameter (mm)	20.1
Coefficient of Linear Expansion (/Degree C)	2.3E-05
Modulus of Elasticity (kg/mm²)	5700
Rated Breaking Strength of Conductor (kgf)	7200.2
Basic / Recommended Span (m)	120
Wind Pressure on Conductor (N/m²)	380
Radial Ice Thickness (mm)	9.5
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	2379.3
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	1440.04
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	2291.7
Maximum Conductor Weight (MCW) (kg/m)			1.496
Maximum Conductor Pressure (MCP) (kg/m)			1.515
Freezing Point Tension (FPT) (kgf)	at	0°C	1567.6

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: POPLAR

Temperature Shift (Deg. C) 0

Tension Reduction at 15°C (%) 10

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.08	0.22	0.23	0.24	0.26	0.27	0.28
80	0.32	0.87	0.93	0.98	1.03	1.08	1.12
120	0.72	1.96	2.08	2.20	2.31	2.42	2.53
160	1.29	3.49	3.70	3.91	4.11	4.31	4.50
200	2.01	5.46	5.79	6.11	6.42	6.73	7.03
240	2.89	7.86	8.33	8.80	9.25	9.69	10.12
280	3.94	10.70	11.34	11.97	12.59	13.19	13.78
320	5.14	13.97	14.81	15.64	16.45	17.23	18.00
360	6.51	17.68	18.75	19.79	20.81	21.81	22.78
400	8.04	21.83	23.15	24.44	25.70	26.92	28.12
440	9.72	26.42	28.01	29.57	31.09	32.58	34.03
480	11.57	31.44	33.33	35.19	37.00	38.77	40.50
520	13.58	36.90	39.12	41.30	43.43	45.50	47.53

Appendix 6a - 200mm AAAC (Poplar) - (120m Basic) Normal altitude

Conductor Code Name	POPLAR	
Basic / Recommended Span (m)	120	
Temperature Shift for Creep (Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)	0.0	at 15°C
Required Percentage Increase in Tension (%)	0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	140
-5.6	1717.0	0.18	0.25	0.32	0.41	0.50	0.61	0.72	0.85	0.98
0	1567.6	0.20	0.27	0.35	0.45	0.55	0.67	0.79	0.93	1.08
5	1440.0	0.22	0.29	0.38	0.49	0.60	0.72	0.86	1.01	1.17
10	1319.1	0.24	0.32	0.42	0.53	0.65	0.79	0.94	1.10	1.28
15	1206.1	0.26	0.35	0.46	0.58	0.72	0.87	1.03	1.21	1.40
20	1102.2	0.28	0.38	0.50	0.63	0.78	0.95	1.13	1.32	1.53
25	1008.0	0.31	0.42	0.55	0.69	0.86	1.04	1.23	1.45	1.68
30	924.0	0.34	0.46	0.60	0.76	0.93	1.13	1.34	1.58	1.83
35	850.0	0.37	0.50	0.65	0.82	1.01	1.23	1.46	1.71	1.99
40	785.4	0.40	0.54	0.70	0.89	1.10	1.33	1.58	1.86	2.15
45	729.3	0.43	0.58	0.76	0.96	1.18	1.43	1.70	2.00	2.32
50	680.7	0.46	0.62	0.81	1.03	1.27	1.53	1.82	2.14	2.48
55	638.6	0.49	0.66	0.86	1.09	1.35	1.63	1.94	2.28	2.65
60	601.8	0.52	0.70	0.92	1.16	1.43	1.73	2.06	2.42	2.81
65	569.7	0.54	0.74	0.97	1.23	1.51	1.83	2.18	2.56	2.97
70	541.4	0.57	0.78	1.02	1.29	1.59	1.93	2.29	2.69	3.12
75	516.4	0.60	0.82	1.07	1.35	1.67	2.02	2.40	2.82	3.27
80	494.2	0.63	0.86	1.12	1.41	1.75	2.11	2.51	2.95	3.42

Conductor Code Name	POPLAR	
Basic / Recommended Span (m)	120	
Temperature Shift for Creep (Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)	10.0	at 15°C
Required Percentage Increase in Tension (%)	10	at 15°C

Temp. (Deg. C)	Tension (kgf)	ERECTION TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	140
-5.6	1864.1	0.17	0.23	0.30	0.37	0.46	0.56	0.67	0.78	0.91
0	1709.5	0.18	0.25	0.32	0.41	0.50	0.61	0.73	0.85	0.99
5	1576.1	0.20	0.27	0.35	0.44	0.55	0.66	0.79	0.92	1.07
10	1448.1	0.21	0.29	0.38	0.48	0.60	0.72	0.86	1.01	1.17
15	1326.8	0.23	0.32	0.42	0.53	0.65	0.79	0.94	1.10	1.27
20	1213.2	0.26	0.35	0.45	0.58	0.71	0.86	1.02	1.20	1.39
25	1108.6	0.28	0.38	0.50	0.63	0.78	0.94	1.12	1.31	1.52
30	1013.8	0.31	0.42	0.54	0.69	0.85	1.03	1.22	1.44	1.67
35	929.1	0.33	0.45	0.59	0.75	0.93	1.12	1.34	1.57	1.82
40	854.5	0.36	0.49	0.65	0.82	1.01	1.22	1.45	1.71	1.98
45	789.3	0.39	0.54	0.70	0.88	1.09	1.32	1.57	1.85	2.14
50	732.7	0.42	0.58	0.75	0.95	1.18	1.42	1.69	1.99	2.31
55	683.7	0.45	0.62	0.81	1.02	1.26	1.53	1.82	2.13	2.47
60	641.1	0.48	0.66	0.86	1.09	1.35	1.63	1.94	2.27	2.64
65	604.1	0.51	0.70	0.91	1.16	1.43	1.73	2.06	2.41	2.80
70	571.7	0.54	0.74	0.97	1.22	1.51	1.83	2.17	2.55	2.96
75	543.2	0.57	0.78	1.02	1.29	1.59	1.92	2.29	2.68	3.11
80	518.0	0.60	0.82	1.07	1.35	1.67	2.01	2.40	2.81	3.26

Appendix 7 - 50mm AAAC (Hazel) - (75m Basic) High altitude

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	HAZEL
Greased Conductor Weight (kg/m)	0.1648
Cross Sectional Area of Conductor (mm²)	59.9
Conductor Overall Diameter (mm)	9.9
Coefficient of Linear Expansion (/Degree C)	2.3E-05
Modulus of Elasticity (kg/mm²)	6016.33
Rated Breaking Strength of Conductor (kgf)	1800.8
Basic / Recommended Span (m)	75
Wind Pressure on Conductor (N/m²)	380
Radial Ice Thickness (mm)	5
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	720.3
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	360.2
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	602.2
Maximum Conductor Weight (MCW) (kg/m)			0.378
Maximum Conductor Pressure (MCP) (kg/m)			0.771
Freezing Point Tension (FPT) (kgf)	at	0°C	398.4

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: HAZEL

Temperature Shift (Deg. C) 0
Tension Reduction at 15°C (%) 0

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.07	0.27	0.29	0.32	0.34	0.37	0.39
80	0.30	1.08	1.18	1.28	1.38	1.47	1.56
120	0.67	2.42	2.65	2.88	3.10	3.31	3.52
160	1.19	4.31	4.72	5.12	5.51	5.89	6.25
200	1.86	6.73	7.37	8.00	8.61	9.20	9.76
240	2.68	9.69	10.62	11.52	12.40	13.25	14.06
280	3.65	13.19	14.45	15.69	16.88	18.03	19.14
320	4.77	17.23	18.88	20.49	22.04	23.55	25.00
360	6.04	21.80	23.89	25.93	27.90	29.80	31.64
400	7.46	26.92	29.50	32.01	34.44	36.79	39.06
440	9.02	32.57	35.69	38.73	41.68	44.52	47.26
480	10.74	38.76	42.47	46.09	49.60	52.98	56.24
520	12.60	45.49	49.85	54.10	58.21	62.18	66.01

Appendix 7a - 50mm AAAC (Hazel) - (75m Basic) - High altitude

Common Design & Erection Table

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		HAZEL	
Basic / Recommended Span (m)		75	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		5.0	at 15°C
Required Percentage Increase in Tension (%)		5	at 15°C

Temp. (Deg. C)	Tension (kgf)	ERECTION TABLE Sag (m) for Span Length (m)								
		60	70	80	90	100	110	120	130	140
-5.6	458.2	0.16	0.22	0.29	0.36	0.45	0.54	0.65	0.76	0.88
0	414.2	0.18	0.24	0.32	0.40	0.50	0.60	0.72	0.84	0.97
5	375.7	0.20	0.27	0.35	0.44	0.55	0.66	0.79	0.93	1.07
10	338.1	0.22	0.30	0.39	0.49	0.61	0.74	0.88	1.03	1.19
15	301.7	0.25	0.33	0.44	0.55	0.68	0.83	0.98	1.15	1.34
20	267.2	0.28	0.38	0.49	0.62	0.77	0.93	1.11	1.30	1.51
25	235.1	0.32	0.43	0.56	0.71	0.88	1.06	1.26	1.48	1.72
30	206.2	0.36	0.49	0.64	0.81	1.00	1.21	1.44	1.69	1.96
35	180.9	0.41	0.56	0.73	0.92	1.14	1.38	1.64	1.92	2.23
40	159.5	0.46	0.63	0.83	1.05	1.29	1.56	1.86	2.18	2.53
45	141.9	0.52	0.71	0.93	1.18	1.45	1.76	2.09	2.45	2.85
50	127.5	0.58	0.79	1.03	1.31	1.62	1.95	2.33	2.73	3.17
55	115.9	0.64	0.87	1.14	1.44	1.78	2.15	2.56	3.00	3.48
60	106.4	0.70	0.95	1.24	1.57	1.94	2.34	2.79	3.27	3.80
65	98.5	0.75	1.02	1.34	1.69	2.09	2.53	3.01	3.53	4.10
70	92.0	0.81	1.10	1.43	1.81	2.24	2.71	3.23	3.79	4.39
75	86.4	0.86	1.17	1.53	1.93	2.38	2.88	3.43	4.03	4.67
80	81.7	0.91	1.24	1.61	2.04	2.52	3.05	3.63	4.26	4.94

Appendix 8 - 50mm AAAC (Hazel) - (80m Basic) High altitude

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	HAZEL
Greased Conductor Weight (kg/m)	0.1648
Cross Sectional Area of Conductor (mm^2)	59.9
Conductor Overall Diameter (mm)	9.9
Coefficient of Linear Expansion (/Degree C)	2.3E-05
Modulus of Elasticity (kg/mm^2)	6016.33
Rated Breaking Strength of Conductor (kgf)	1800.8
Basic / Recommended Span (m)	80
Wind Pressure on Conductor (N/m^2)	380
Radial Ice Thickness (mm)	5
Ice Density (kg/m^3)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	720.3
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	360.2
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	615.2
Maximum Conductor Weight (MCW) (kg/m)			0.378
Maximum Conductor Pressure (MCP) (kg/m)			0.771
Freezing Point Tension (FPT) (kgf)	at	0°C	398.0

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: HAZEL

Temperature Shift (Deg. C) 0
Tension Reduction at 15°C (%) 0

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.07	0.26	0.28	0.31	0.33	0.35	0.37
80	0.30	1.03	1.13	1.22	1.31	1.40	1.48
120	0.67	2.33	2.54	2.75	2.95	3.14	3.33
160	1.20	4.14	4.51	4.88	5.24	5.59	5.92
200	1.87	6.46	7.05	7.63	8.19	8.73	9.25
240	2.69	9.30	10.16	10.99	11.79	12.57	13.33
280	3.66	12.66	13.82	14.96	16.05	17.11	18.14
320	4.78	16.54	18.06	19.53	20.97	22.35	23.69
360	6.05	20.93	22.85	24.72	26.54	28.29	29.98
400	7.47	25.84	28.21	30.52	32.76	34.93	37.02
440	9.04	31.27	34.14	36.93	39.64	42.26	44.79
480	10.76	37.22	40.63	43.95	47.18	50.30	53.30
520	12.62	43.68	47.68	51.58	55.37	59.03	62.56

Appendix 8a - 50mm AAAC (Hazel) - (80m Basic) High altitude

Common Design & Erection Table

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		HAZEL	
Basic / Recommended Span (m)		80	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		5.0	at 15°C
Required Percentage Increase in Tension (%)		5	at 15°C

Temp. (Deg. C)	Tension (kgf)	ERECTION TABLE Sag (m) for Span Length (m)								
		60	70	80	90	100	110	120	130	140
-5.6	457.7	0.16	0.22	0.29	0.36	0.45	0.54	0.65	0.76	0.88
0	414.1	0.18	0.24	0.32	0.40	0.50	0.60	0.72	0.84	0.98
5	375.9	0.20	0.27	0.35	0.44	0.55	0.66	0.79	0.93	1.07
10	338.7	0.22	0.30	0.39	0.49	0.61	0.74	0.88	1.03	1.19
15	302.9	0.24	0.33	0.44	0.55	0.68	0.82	0.98	1.15	1.33
20	269.1	0.28	0.38	0.49	0.62	0.77	0.93	1.10	1.29	1.50
25	237.8	0.31	0.42	0.55	0.70	0.87	1.05	1.25	1.46	1.70
30	209.6	0.35	0.48	0.63	0.80	0.98	1.19	1.42	1.66	1.93
35	185.0	0.40	0.55	0.71	0.90	1.11	1.35	1.60	1.88	2.18
40	164.1	0.45	0.61	0.80	1.02	1.25	1.52	1.81	2.12	2.46
45	146.9	0.50	0.69	0.90	1.14	1.40	1.70	2.02	2.37	2.75
50	132.7	0.56	0.76	0.99	1.26	1.55	1.88	2.24	2.62	3.04
55	121.1	0.61	0.83	1.09	1.38	1.70	2.06	2.45	2.88	3.34
60	111.5	0.67	0.91	1.18	1.50	1.85	2.24	2.66	3.12	3.62
65	103.5	0.72	0.97	1.27	1.61	1.99	2.41	2.87	3.36	3.90
70	96.9	0.77	1.04	1.36	1.72	2.13	2.57	3.06	3.59	4.17
75	91.2	0.81	1.11	1.45	1.83	2.26	2.73	3.25	3.82	4.43
80	86.3	0.86	1.17	1.53	1.93	2.39	2.89	3.44	4.03	4.68

Appendix 9 - 50mm AAAC (Hazel) - (100m Basic) High altitude

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	HAZEL
Greased Conductor Weight (kg/m)	0.1648
Cross Sectional Area of Conductor (mm²)	59.9
Conductor Overall Diameter (mm)	9.9
Coefficient of Linear Expansion (/Degree C)	2.3E-05
Modulus of Elasticity (kg/mm²)	6016.33
Rated Breaking Strength of Conductor (kgf)	1800.8
Basic / Recommended Span (m)	100
Wind Pressure on Conductor (N/m²)	380
Radial Ice Thickness (mm)	5
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	720.3
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	360.2
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	666.2
Maximum Conductor Weight (MCW) (kg/m)			0.378
Maximum Conductor Pressure (MCP) (kg/m)			0.771
Freezing Point Tension (FPT) (kgf)	at	0°C	396.2

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: HAZEL

Temperature Shift (Deg. C)	0
Tension Reduction at 15°C (%)	0

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.08	0.23	0.24	0.26	0.28	0.29	0.31
80	0.30	0.90	0.97	1.04	1.11	1.17	1.24
120	0.68	2.03	2.19	2.34	2.49	2.64	2.78
160	1.20	3.60	3.89	4.16	4.43	4.69	4.94
200	1.88	5.63	6.07	6.50	6.92	7.33	7.72
240	2.71	8.11	8.74	9.36	9.97	10.55	11.12
280	3.69	11.04	11.90	12.74	13.56	14.36	15.14
320	4.82	14.42	15.54	16.64	17.72	18.76	19.77
360	6.10	18.25	19.67	21.07	22.42	23.74	25.02
400	7.53	22.53	24.29	26.01	27.68	29.31	30.89
440	9.11	27.26	29.39	31.47	33.50	35.47	37.38
480	10.84	32.44	34.97	37.45	39.86	42.21	44.48
520	12.72	38.08	41.04	43.95	46.78	49.53	52.20

Appendix 9a - 50mm AAAC (Hazel) - (100m Basic) High altitude

Common Design & Erection Table

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		HAZEL	
Basic / Recommended Span (m)		100	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		5.0	at 15°C
Required Percentage Increase in Tension (%)		5	at 15°C

Temp. (Deg. C)	Tension (kgf)	ERECTION TABLE Sag (m) for Span Length (m)								
		60	70	80	90	100	110	120	130	140
-5.6	455.3	0.16	0.22	0.29	0.37	0.45	0.55	0.65	0.76	0.89
0	413.1	0.18	0.24	0.32	0.40	0.50	0.60	0.72	0.84	0.98
5	376.6	0.20	0.27	0.35	0.44	0.55	0.66	0.79	0.92	1.07
10	341.4	0.22	0.30	0.39	0.49	0.60	0.73	0.87	1.02	1.18
15	307.9	0.24	0.33	0.43	0.54	0.67	0.81	0.96	1.13	1.31
20	276.7	0.27	0.36	0.48	0.60	0.74	0.90	1.07	1.26	1.46
25	248.2	0.30	0.41	0.53	0.67	0.83	1.00	1.20	1.40	1.63
30	222.8	0.33	0.45	0.59	0.75	0.92	1.12	1.33	1.56	1.81
35	200.5	0.37	0.50	0.66	0.83	1.03	1.24	1.48	1.74	2.01
40	181.5	0.41	0.56	0.73	0.92	1.14	1.37	1.63	1.92	2.22
45	165.4	0.45	0.61	0.80	1.01	1.25	1.51	1.79	2.11	2.44
50	151.8	0.49	0.66	0.87	1.10	1.36	1.64	1.95	2.29	2.66
55	140.4	0.53	0.72	0.94	1.19	1.47	1.78	2.11	2.48	2.88
60	130.7	0.57	0.77	1.01	1.28	1.58	1.91	2.27	2.66	3.09
65	122.5	0.61	0.82	1.08	1.36	1.68	2.04	2.42	2.84	3.30
70	115.4	0.64	0.87	1.14	1.45	1.79	2.16	2.57	3.02	3.50
75	109.3	0.68	0.92	1.21	1.53	1.89	2.28	2.72	3.19	3.70
80	103.9	0.71	0.97	1.27	1.61	1.98	2.40	2.85	3.35	3.89

Appendix 10 - 100mm AAAC (Oak) -(80m Basic) High altitude

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	OAK
Greased Conductor Weight (kg/m)	0.3273
Cross Sectional Area of Conductor (mm^2)	118.9
Conductor Overall Diameter (mm)	14
Coefficient of Linear Expansion (/Degree C)	2.3E-05
Modulus of Elasticity (kg/mm^2)	6016.33
Rated Breaking Strength of Conductor (kgf)	3576.1
Basic / Recommended Span (m)	80
Wind Pressure on Conductor (N/m^2)	380
Radial Ice Thickness (mm)	9.5
Ice Density (kg/m^3)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	1788.1
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	715.2
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	1193.8
Maximum Conductor Weight (MCW) (kg/m)			0.968
Maximum Conductor Pressure (MCP) (kg/m)			1.279
Freezing Point Tension (FPT) (kgf)	at	0°C	790.3

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: OAK

Temperature Shift (Deg. C) 0
Tension Reduction at 15°C (%) 10

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.07	0.28	0.30	0.32	0.35	0.37	0.39
80	0.30	1.12	1.21	1.30	1.39	1.47	1.55
120	0.67	2.51	2.72	2.92	3.12	3.31	3.49
160	1.20	4.47	4.84	5.20	5.54	5.88	6.20
200	1.87	6.98	7.56	8.12	8.66	9.19	9.69
240	2.69	10.05	10.88	11.69	12.48	13.23	13.96
280	3.66	13.68	14.81	15.91	16.98	18.01	19.00
320	4.78	17.86	19.35	20.79	22.18	23.52	24.82
360	6.05	22.61	24.49	26.31	28.07	29.77	31.41
400	7.47	27.91	30.23	32.48	34.65	36.75	38.78
440	9.04	33.77	36.58	39.30	41.93	44.47	46.92
480	10.76	40.19	43.53	46.77	49.90	52.92	55.84
520	12.62	47.17	51.09	54.89	58.56	62.11	65.53

Appendix 10a - 100mm AAAC (Oak) - (80m Basic) High altitude

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		OAK	
Basic / Recommended Span (m)		80	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	140
-5.6	876.3	0.17	0.23	0.30	0.38	0.47	0.56	0.67	0.79	0.92
0	790.3	0.19	0.25	0.33	0.42	0.52	0.63	0.75	0.87	1.01
5	715.2	0.21	0.28	0.37	0.46	0.57	0.69	0.82	0.97	1.12
10	642.5	0.23	0.31	0.41	0.52	0.64	0.77	0.92	1.08	1.25
15	573.0	0.26	0.35	0.46	0.58	0.71	0.86	1.03	1.21	1.40
20	507.8	0.29	0.39	0.52	0.65	0.81	0.97	1.16	1.36	1.58
25	448.0	0.33	0.45	0.58	0.74	0.91	1.10	1.31	1.54	1.79
30	395.0	0.37	0.51	0.66	0.84	1.04	1.25	1.49	1.75	2.03
35	349.2	0.42	0.57	0.75	0.95	1.17	1.42	1.69	1.98	2.30
40	310.9	0.47	0.64	0.84	1.07	1.32	1.59	1.90	2.22	2.58
45	279.2	0.53	0.72	0.94	1.19	1.47	1.77	2.11	2.48	2.87
50	253.3	0.58	0.79	1.03	1.31	1.61	1.95	2.33	2.73	3.17
55	232.1	0.63	0.86	1.13	1.43	1.76	2.13	2.54	2.98	3.46
60	214.5	0.69	0.93	1.22	1.54	1.91	2.31	2.75	3.22	3.74
65	199.8	0.74	1.00	1.31	1.66	2.05	2.48	2.95	3.46	4.01
70	187.4	0.79	1.07	1.40	1.77	2.18	2.64	3.14	3.69	4.28
75	176.9	0.83	1.13	1.48	1.87	2.31	2.80	3.33	3.91	4.53
80	167.7	0.88	1.20	1.56	1.98	2.44	2.95	3.51	4.12	4.78

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		OAK	
Basic / Recommended Span (m)		80	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		10.0	at 15°C
Required Percentage Increase in Tension (%)		10	at 15°C

Temp. (Deg. C)	Tension (kgf)	ERECTION TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	140
-5.6	940.9	0.16	0.21	0.28	0.35	0.43	0.53	0.63	0.73	0.85
0	853.7	0.17	0.23	0.31	0.39	0.48	0.58	0.69	0.81	0.94
5	777.2	0.19	0.26	0.34	0.43	0.53	0.64	0.76	0.89	1.03
10	702.5	0.21	0.29	0.37	0.47	0.58	0.70	0.84	0.98	1.14
15	630.3	0.23	0.32	0.42	0.53	0.65	0.79	0.93	1.10	1.27
20	561.4	0.26	0.36	0.47	0.59	0.73	0.88	1.05	1.23	1.43
25	497.0	0.30	0.40	0.53	0.67	0.82	1.00	1.19	1.39	1.61
30	438.4	0.34	0.46	0.60	0.76	0.93	1.13	1.34	1.58	1.83
35	386.6	0.38	0.52	0.68	0.86	1.06	1.28	1.52	1.79	2.07
40	342.1	0.43	0.59	0.77	0.97	1.20	1.45	1.72	2.02	2.34
45	305.0	0.48	0.66	0.86	1.09	1.34	1.62	1.93	2.27	2.63
50	274.4	0.54	0.73	0.95	1.21	1.49	1.80	2.15	2.52	2.92
55	249.4	0.59	0.80	1.05	1.33	1.64	1.99	2.36	2.77	3.22
60	228.8	0.64	0.88	1.14	1.45	1.79	2.16	2.57	3.02	3.50
65	211.8	0.70	0.95	1.24	1.56	1.93	2.34	2.78	3.26	3.79
70	197.6	0.75	1.01	1.33	1.68	2.07	2.51	2.98	3.50	4.06
75	185.5	0.79	1.08	1.41	1.79	2.21	2.67	3.18	3.73	4.32
80	175.2	0.84	1.14	1.49	1.89	2.34	2.83	3.36	3.95	4.58

Appendix 11 - 100mm AAAC (Oak) -(90m Basic) High altitude

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	OAK
Greased Conductor Weight (kg/m)	0.3273
Cross Sectional Area of Conductor (mm²)	118.9
Conductor Overall Diameter (mm)	14
Coefficient of Linear Expansion (/Degree C)	2.3E-05
Modulus of Elasticity (kg/mm²)	6016.33
Rated Breaking Strength of Conductor (kgf)	3576.1
Basic / Recommended Span (m)	90
Wind Pressure on Conductor (N/m²)	570
Radial Ice Thickness (mm)	12.5
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	1788.1
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	715.2
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	1533.8
Maximum Conductor Weight (MCW) (kg/m)			1.277
Maximum Conductor Pressure (MCP) (kg/m)			2.267
Freezing Point Tension (FPT) (kgf)	at	0°C	788.5

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: OAK

Temperature Shift (Deg. C) 0
Tension Reduction at 15°C (%) 10

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.07	0.26	0.28	0.30	0.32	0.33	0.35
80	0.30	1.04	1.11	1.19	1.27	1.34	1.41
120	0.67	2.33	2.51	2.68	2.85	3.01	3.17
160	1.20	4.14	4.46	4.77	5.07	5.36	5.64
200	1.87	6.47	6.97	7.45	7.92	8.37	8.81
240	2.70	9.32	10.03	10.73	11.40	12.05	12.68
280	3.67	12.69	13.66	14.60	15.52	16.40	17.26
320	4.80	16.57	17.84	19.07	20.27	21.42	22.54
360	6.07	20.97	22.57	24.14	25.65	27.11	28.53
400	7.50	25.89	27.87	29.80	31.66	33.47	35.22
440	9.07	31.32	33.72	36.05	38.31	40.50	42.62
480	10.80	37.28	40.13	42.91	45.60	48.20	50.72
520	12.67	43.75	47.10	50.36	53.51	56.57	59.53

Appendix 11a - 100mm AAAC - (Oak) - (90m Basic) High altitude

Conductor Code Name		OAK	
Basic / Recommended Span (m)		90	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	873.0	0.17	0.23	0.30	0.38	0.47	0.57	0.67	0.79	1.52
0	788.5	0.19	0.25	0.33	0.42	0.52	0.63	0.75	0.88	1.68
5	715.2	0.21	0.28	0.37	0.46	0.57	0.69	0.82	0.97	1.85
10	644.6	0.23	0.31	0.41	0.51	0.63	0.77	0.91	1.07	2.06
15	577.7	0.25	0.35	0.45	0.57	0.71	0.86	1.02	1.20	2.29
20	515.3	0.29	0.39	0.51	0.64	0.79	0.96	1.14	1.34	2.57
25	458.6	0.32	0.44	0.57	0.72	0.89	1.08	1.28	1.51	2.89
30	408.4	0.36	0.49	0.64	0.81	1.00	1.21	1.44	1.69	3.25
35	365.1	0.40	0.55	0.72	0.91	1.12	1.36	1.61	1.89	3.63
40	328.5	0.45	0.61	0.80	1.01	1.25	1.51	1.79	2.10	4.04
45	297.9	0.49	0.67	0.88	1.11	1.37	1.66	1.98	2.32	4.45
50	272.5	0.54	0.74	0.96	1.22	1.50	1.82	2.16	2.54	4.86
55	251.4	0.59	0.80	1.04	1.32	1.63	1.97	2.34	2.75	5.27
60	233.6	0.63	0.86	1.12	1.42	1.75	2.12	2.52	2.96	5.67
65	218.6	0.67	0.92	1.20	1.52	1.87	2.26	2.69	3.16	6.06
70	205.8	0.72	0.97	1.27	1.61	1.99	2.41	2.86	3.36	6.44
75	194.8	0.76	1.03	1.34	1.70	2.10	2.54	3.02	3.55	6.81
80	185.2	0.80	1.08	1.41	1.79	2.21	2.67	3.18	3.73	7.16

Conductor Code Name		OAK	
Basic / Recommended Span (m)		90	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		10.0	at 15°C
Required Percentage Increase in Tension (%)		10	at 15°C

Temp. (Deg. C)	Tension (kgf)	ERECTION TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	939.6	0.16	0.21	0.28	0.35	0.44	0.53	0.63	0.74	1.41
0	853.6	0.17	0.23	0.31	0.39	0.48	0.58	0.69	0.81	1.55
5	778.6	0.19	0.26	0.34	0.43	0.53	0.64	0.76	0.89	1.70
10	705.6	0.21	0.28	0.37	0.47	0.58	0.70	0.83	0.98	1.88
15	635.4	0.23	0.32	0.41	0.52	0.64	0.78	0.93	1.09	2.09
20	569.0	0.26	0.35	0.46	0.58	0.72	0.87	1.04	1.22	2.33
25	507.3	0.29	0.40	0.52	0.65	0.81	0.98	1.16	1.36	2.61
30	451.5	0.33	0.44	0.58	0.73	0.91	1.10	1.30	1.53	2.94
35	402.2	0.37	0.50	0.65	0.82	1.02	1.23	1.46	1.72	3.30
40	359.8	0.41	0.56	0.73	0.92	1.14	1.38	1.64	1.92	3.68
45	324.1	0.45	0.62	0.81	1.02	1.26	1.53	1.82	2.13	4.09
50	294.2	0.50	0.68	0.89	1.13	1.39	1.68	2.00	2.35	4.51
55	269.5	0.55	0.74	0.97	1.23	1.52	1.84	2.19	2.57	4.92
60	248.8	0.59	0.81	1.05	1.33	1.64	1.99	2.37	2.78	5.33
65	231.5	0.64	0.87	1.13	1.43	1.77	2.14	2.55	2.99	5.73
70	216.8	0.68	0.92	1.21	1.53	1.89	2.28	2.72	3.19	6.11
75	204.2	0.72	0.98	1.28	1.62	2.00	2.42	2.88	3.39	6.49
80	193.4	0.76	1.04	1.35	1.71	2.12	2.56	3.05	3.58	6.85

Appendix 12 - 175mm AAAC (Elm) - (90m Basic)- High altitude

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	ELM
Greased Conductor Weight (kg/m)	0.5922
Cross Sectional Area of Conductor (mm²)	211
Conductor Overall Diameter (mm)	18.8
Coefficient of Linear Expansion (/Degree C)	2.3E-05
Modulus of Elasticity (kg/mm²)	5710.41
Rated Breaking Strength of Conductor (kgf)	6346.7
Basic / Recommended Span (m)	90
Wind Pressure on Conductor (N/m²)	570
Radial Ice Thickness (mm)	12.5
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	1814.4
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	1269.3
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	1814.4
Maximum Conductor Weight (MCW) (kg/m)			1.714
Maximum Conductor Pressure (MCP) (kg/m)			2.546
Freezing Point Tension (FPT) (kgf)	at	0°C	749.5

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: ELM

Temperature Shift (Deg. C) 0

Tension Reduction at 15°C (%) 10

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.14	0.37	0.38	0.40	0.42	0.43	0.45
80	0.56	1.47	1.54	1.60	1.66	1.72	1.78
120	1.26	3.31	3.46	3.60	3.74	3.88	4.01
160	2.23	5.89	6.15	6.40	6.65	6.89	7.12
200	3.49	9.20	9.61	10.01	10.39	10.76	11.13
240	5.02	13.25	13.84	14.41	14.96	15.50	16.02
280	6.84	18.04	18.84	19.61	20.37	21.10	21.81
320	8.93	23.56	24.60	25.62	26.60	27.56	28.49
360	11.30	29.81	31.14	32.42	33.67	34.88	36.06
400	13.96	36.81	38.44	40.02	41.56	43.06	44.51
440	16.89	44.54	46.51	48.43	50.29	52.10	53.86
480	20.10	53.00	55.35	57.63	59.85	62.00	64.10
520	23.58	62.20	64.96	67.64	70.24	72.77	75.23

Appendix 12a - 175mm AAAC (Elm) - (90m Basic) High altitude

Conductor Code Name		ELM	
Basic / Recommended Span (m)		90	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	848.7	0.31	0.43	0.56	0.71	0.87	1.06	1.26	1.47	2.83
0	749.5	0.36	0.48	0.63	0.80	0.99	1.20	1.42	1.67	3.20
5	672.4	0.40	0.54	0.70	0.89	1.10	1.33	1.59	1.86	3.57
10	606.3	0.44	0.60	0.78	0.99	1.22	1.48	1.76	2.06	3.96
15	550.5	0.48	0.66	0.86	1.09	1.34	1.63	1.94	2.27	4.36
20	503.6	0.53	0.72	0.94	1.19	1.47	1.78	2.12	2.48	4.76
25	464.3	0.57	0.78	1.02	1.29	1.59	1.93	2.30	2.69	5.17
30	431.2	0.62	0.84	1.10	1.39	1.72	2.08	2.47	2.90	5.56
35	403.1	0.66	0.90	1.18	1.49	1.84	2.22	2.64	3.10	5.95
40	379.1	0.70	0.96	1.25	1.58	1.95	2.36	2.81	3.30	6.33
45	358.4	0.74	1.01	1.32	1.67	2.07	2.50	2.97	3.49	6.69
50	340.4	0.78	1.07	1.39	1.76	2.17	2.63	3.13	3.67	7.05
55	324.6	0.82	1.12	1.46	1.85	2.28	2.76	3.28	3.85	7.39
60	310.6	0.86	1.17	1.53	1.93	2.38	2.88	3.43	4.03	7.72
65	298.2	0.89	1.22	1.59	2.01	2.48	3.00	3.57	4.20	8.04
70	287.0	0.93	1.26	1.65	2.09	2.58	3.12	3.71	4.36	8.36
75	276.9	0.96	1.31	1.71	2.17	2.67	3.23	3.85	4.52	8.66
80	267.8	1.00	1.35	1.77	2.24	2.76	3.35	3.98	4.67	8.96

Conductor Code Name		ELM	
Basic / Recommended Span (m)		90	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		10.0	at 15°C
Required Percentage Increase in Tension (%)		10	at 15°C

Temp. (Deg. C)	Tension (kgf)	ERECTION TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	946.6	0.28	0.38	0.50	0.63	0.78	0.95	1.13	1.32	2.53
0	836.2	0.32	0.43	0.57	0.72	0.89	1.07	1.27	1.50	2.87
5	748.4	0.36	0.48	0.63	0.80	0.99	1.20	1.42	1.67	3.20
10	671.5	0.40	0.54	0.71	0.89	1.10	1.33	1.59	1.86	3.57
15	605.5	0.44	0.60	0.78	0.99	1.22	1.48	1.76	2.07	3.96
20	549.8	0.48	0.66	0.86	1.09	1.35	1.63	1.94	2.28	4.36
25	503.0	0.53	0.72	0.94	1.19	1.47	1.78	2.12	2.49	4.77
30	463.8	0.57	0.78	1.02	1.29	1.60	1.93	2.30	2.70	5.17
35	430.8	0.62	0.84	1.10	1.39	1.72	2.08	2.47	2.90	5.57
40	402.8	0.66	0.90	1.18	1.49	1.84	2.22	2.65	3.11	5.95
45	378.8	0.70	0.96	1.25	1.58	1.95	2.36	2.81	3.30	6.33
50	358.2	0.74	1.01	1.32	1.67	2.07	2.50	2.98	3.49	6.70
55	340.2	0.78	1.07	1.39	1.76	2.18	2.63	3.13	3.68	7.05
60	324.4	0.82	1.12	1.46	1.85	2.28	2.76	3.29	3.86	7.39
65	310.5	0.86	1.17	1.53	1.93	2.38	2.88	3.43	4.03	7.73
70	298.0	0.89	1.22	1.59	2.01	2.48	3.01	3.58	4.20	8.05
75	286.9	0.93	1.26	1.65	2.09	2.58	3.12	3.72	4.36	8.36
80	276.8	0.96	1.31	1.71	2.17	2.67	3.24	3.85	4.52	8.67

Appendix 13 - 175mm AAAC (Elm)- (100m Basic) - High altitude

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	ELM
Greased Conductor Weight (kg/m)	0.5922
Cross Sectional Area of Conductor (mm²)	211
Conductor Overall Diameter (mm)	18.8
Coefficient of Linear Expansion (/Degree C)	2.3E-05
Modulus of Elasticity (kg/mm²)	5710.41
Rated Breaking Strength of Conductor (kgf)	6346.7
Basic / Recommended Span (m)	100
Wind Pressure on Conductor (N/m²)	380
Radial Ice Thickness (mm)	9.5
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	2379.3
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	1269.3
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	1971.2
Maximum Conductor Weight (MCW) (kg/m)			1.363
Maximum Conductor Pressure (MCP) (kg/m)			1.465
Freezing Point Tension (FPT) (kgf)	at	0°C	1389.8

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: ELM

Temperature Shift (Deg. C)	0
Tension Reduction at 15°C (%)	10

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.08	0.24	0.26	0.27	0.29	0.31	0.32
80	0.31	0.96	1.03	1.09	1.16	1.22	1.28
120	0.70	2.16	2.31	2.46	2.61	2.75	2.89
160	1.24	3.84	4.11	4.38	4.64	4.89	5.13
200	1.94	6.00	6.42	6.84	7.24	7.64	8.02
240	2.79	8.64	9.25	9.85	10.43	11.00	11.55
280	3.80	11.76	12.59	13.41	14.20	14.97	15.72
320	4.96	15.36	16.45	17.51	18.54	19.55	20.53
360	6.27	19.44	20.81	22.16	23.47	24.74	25.98
400	7.75	24.00	25.70	27.36	28.98	30.55	32.08
440	9.37	29.04	31.09	33.10	35.06	36.96	38.81
480	11.15	34.56	37.00	39.39	41.72	43.99	46.19
520	13.09	40.56	43.43	46.23	48.97	51.63	54.21

Appendix 13a - 175mm AAAC (Elm)- (100m Basic) Severe altitude

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		ELM	
Basic / Recommended Span (m)		100	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	140
-5.6	1529.1	0.17	0.24	0.31	0.39	0.48	0.59	0.70	0.82	0.95
0	1389.8	0.19	0.26	0.34	0.43	0.53	0.64	0.77	0.90	1.04
5	1269.3	0.21	0.29	0.37	0.47	0.58	0.71	0.84	0.99	1.14
10	1153.8	0.23	0.31	0.41	0.52	0.64	0.78	0.92	1.08	1.26
15	1044.4	0.26	0.35	0.45	0.57	0.71	0.86	1.02	1.20	1.39
20	942.6	0.28	0.38	0.50	0.64	0.79	0.95	1.13	1.33	1.54
25	849.7	0.31	0.43	0.56	0.71	0.87	1.05	1.25	1.47	1.71
30	766.7	0.35	0.47	0.62	0.78	0.97	1.17	1.39	1.63	1.89
35	694.1	0.38	0.52	0.68	0.86	1.07	1.29	1.54	1.80	2.09
40	631.6	0.42	0.57	0.75	0.95	1.17	1.42	1.69	1.98	2.30
45	578.2	0.46	0.63	0.82	1.04	1.28	1.55	1.84	2.16	2.51
50	532.9	0.50	0.68	0.89	1.13	1.39	1.68	2.00	2.35	2.72
55	494.5	0.54	0.73	0.96	1.21	1.50	1.81	2.16	2.53	2.93
60	461.7	0.58	0.79	1.03	1.30	1.60	1.94	2.31	2.71	3.14
65	433.6	0.61	0.84	1.09	1.38	1.71	2.07	2.46	2.88	3.35
70	409.4	0.65	0.89	1.16	1.46	1.81	2.19	2.60	3.06	3.54
75	388.2	0.69	0.93	1.22	1.54	1.91	2.31	2.75	3.22	3.74
80	369.7	0.72	0.98	1.28	1.62	2.00	2.42	2.88	3.38	3.92

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		ELM	
Basic / Recommended Span (m)		100	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		10.0	at 15°C
Required Percentage Increase in Tension (%)		10	at 15°C

Temp. (Deg. C)	Tension (kgf)	ERECTION TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	140
-5.6	1650.9	0.16	0.22	0.29	0.36	0.45	0.54	0.65	0.76	0.88
0	1508.5	0.18	0.24	0.31	0.40	0.49	0.59	0.71	0.83	0.96
5	1384.4	0.19	0.26	0.34	0.43	0.53	0.65	0.77	0.90	1.05
10	1264.1	0.21	0.29	0.37	0.47	0.59	0.71	0.84	0.99	1.15
15	1148.8	0.23	0.32	0.41	0.52	0.64	0.78	0.93	1.09	1.26
20	1039.7	0.26	0.35	0.46	0.58	0.71	0.86	1.03	1.20	1.40
25	938.3	0.28	0.39	0.50	0.64	0.79	0.95	1.14	1.33	1.55
30	845.8	0.32	0.43	0.56	0.71	0.88	1.06	1.26	1.48	1.72
35	763.3	0.35	0.48	0.62	0.79	0.97	1.17	1.40	1.64	1.90
40	691.2	0.39	0.52	0.69	0.87	1.07	1.30	1.54	1.81	2.10
45	629.0	0.42	0.58	0.75	0.95	1.18	1.42	1.69	1.99	2.31
50	576.0	0.46	0.63	0.82	1.04	1.29	1.55	1.85	2.17	2.52
55	531.1	0.50	0.68	0.89	1.13	1.39	1.69	2.01	2.36	2.73
60	492.9	0.54	0.74	0.96	1.22	1.50	1.82	2.16	2.54	2.94
65	460.4	0.58	0.79	1.03	1.30	1.61	1.95	2.32	2.72	3.15
70	432.5	0.62	0.84	1.10	1.39	1.71	2.07	2.46	2.89	3.35
75	408.4	0.65	0.89	1.16	1.47	1.81	2.19	2.61	3.06	3.55
80	387.4	0.69	0.94	1.22	1.55	1.91	2.31	2.75	3.23	3.75

Appendix 14 - 200mm AAAC (Poplar) - (90m Basic)- High altitude

Conductor Code Name (if any)	POPLAR
Greased Conductor Weight (kg/m)	0.68992
Cross Sectional Area of Conductor (mm²)	239.4
Conductor Overall Diameter (mm)	20.1
Coefficient of Linear Expansion (/Degree C)	2.3E-05
Modulus of Elasticity (kg/mm²)	5700
Rated Breaking Strength of Conductor (kgf)	7200.2
Basic / Recommended Span (m)	90
Wind Pressure on Conductor (N/m²)	570
Radial Ice Thickness (mm)	12.5
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	1814.4
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	1440.04
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	1814.4
Maximum Conductor Weight (MCW) (kg/m)			1.859
Maximum Conductor Pressure (MCP) (kg/m)			2.621
Freezing Point Tension (FPT) (kgf)	at	0°C	675.0

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: POPLAR

Temperature Shift (Deg. C) 0
Tension Reduction at 15°C (%) 10

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.18	0.41	0.43	0.44	0.46	0.47	0.48
80	0.73	1.65	1.71	1.77	1.82	1.88	1.93
120	1.65	3.70	3.84	3.97	4.10	4.22	4.35
160	2.93	6.59	6.83	7.06	7.29	7.51	7.73
200	4.57	10.29	10.67	11.03	11.39	11.74	12.07
240	6.58	14.82	15.36	15.89	16.40	16.90	17.39
280	8.96	20.17	20.91	21.62	22.32	23.00	23.67
320	11.70	26.34	27.30	28.24	29.15	30.04	30.91
360	14.81	33.34	34.56	35.74	36.90	38.02	39.12
400	18.28	41.16	42.66	44.13	45.55	46.94	48.30
440	22.12	49.80	51.62	53.39	55.12	56.80	58.44
480	26.33	59.27	61.44	63.54	65.59	67.59	69.55
520	30.90	69.56	72.10	74.57	76.98	79.33	81.62

Appendix 14a - 200mm AAAC (Poplar) - (90m Basic)- High altitude

Conductor Code Name		POPLAR	
Basic / Recommended Span (m)		90	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	754.7	0.41	0.56	0.73	0.93	1.14	1.38	1.65	1.93	3.70
0	675.0	0.46	0.63	0.82	1.03	1.28	1.55	1.84	2.16	4.14
5	615.6	0.50	0.69	0.90	1.13	1.40	1.70	2.02	2.37	4.54
10	565.5	0.55	0.75	0.98	1.24	1.52	1.85	2.20	2.58	4.94
15	523.4	0.59	0.81	1.05	1.33	1.65	1.99	2.37	2.78	5.34
20	487.7	0.64	0.87	1.13	1.43	1.77	2.14	2.55	2.99	5.73
25	457.4	0.68	0.92	1.21	1.53	1.89	2.28	2.72	3.19	6.11
30	431.2	0.72	0.98	1.28	1.62	2.00	2.42	2.88	3.38	6.48
35	408.6	0.76	1.03	1.35	1.71	2.11	2.55	3.04	3.57	6.84
40	388.8	0.80	1.09	1.42	1.80	2.22	2.68	3.19	3.75	7.19
45	371.3	0.84	1.14	1.49	1.88	2.32	2.81	3.34	3.92	7.52
50	355.9	0.87	1.19	1.55	1.96	2.42	2.93	3.49	4.10	7.85
55	342.0	0.91	1.24	1.61	2.04	2.52	3.05	3.63	4.26	8.17
60	329.5	0.94	1.28	1.67	2.12	2.62	3.17	3.77	4.42	8.48
65	318.3	0.98	1.33	1.73	2.19	2.71	3.28	3.90	4.58	8.78
70	308.0	1.01	1.37	1.79	2.27	2.80	3.39	4.03	4.73	9.07
75	298.6	1.04	1.42	1.85	2.34	2.89	3.49	4.16	4.88	9.36
80	290.0	1.07	1.46	1.90	2.41	2.97	3.60	4.28	5.03	9.64

Conductor Code Name		POPLAR	
Basic / Recommended Span (m)		90	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		10.0	at 15°C
Required Percentage Increase in Tension (%)		10	at 15°C

Temp. (Deg. C)	Tension (kgf)	ERECTION TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	858.4	0.36	0.49	0.64	0.81	1.00	1.22	1.45	1.70	3.25
0	762.4	0.41	0.55	0.72	0.92	1.13	1.37	1.63	1.91	3.67
5	689.5	0.45	0.61	0.80	1.01	1.25	1.51	1.80	2.11	4.05
10	627.7	0.49	0.67	0.88	1.11	1.37	1.66	1.98	2.32	4.45
15	575.7	0.54	0.73	0.96	1.21	1.50	1.81	2.16	2.53	4.85
20	532.0	0.58	0.79	1.04	1.31	1.62	1.96	2.33	2.74	5.25
25	495.1	0.63	0.85	1.11	1.41	1.74	2.11	2.51	2.94	5.64
30	463.6	0.67	0.91	1.19	1.51	1.86	2.25	2.68	3.14	6.03
35	436.6	0.71	0.97	1.26	1.60	1.98	2.39	2.84	3.34	6.40
40	413.3	0.75	1.02	1.34	1.69	2.09	2.52	3.00	3.53	6.76
45	392.9	0.79	1.08	1.40	1.78	2.19	2.66	3.16	3.71	7.11
50	375.0	0.83	1.13	1.47	1.86	2.30	2.78	3.31	3.89	7.45
55	359.1	0.86	1.18	1.54	1.95	2.40	2.91	3.46	4.06	7.78
60	344.9	0.90	1.23	1.60	2.03	2.50	3.03	3.60	4.23	8.10
65	332.2	0.93	1.27	1.66	2.10	2.60	3.14	3.74	4.39	8.41
70	320.6	0.97	1.32	1.72	2.18	2.69	3.25	3.87	4.55	8.71
75	310.2	1.00	1.36	1.78	2.25	2.78	3.36	4.00	4.70	9.01
80	300.6	1.03	1.41	1.84	2.32	2.87	3.47	4.13	4.85	9.30

Appendix 15 - 200mm AAAC (Poplar) - (100m Basic)- High altitude

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	POPLAR
Greased Conductor Weight (kg/m)	0.68992
Cross Sectional Area of Conductor (mm^2)	239.4
Conductor Overall Diameter (mm)	20.1
Coefficient of Linear Expansion (/Degree C)	2.3E-05
Modulus of Elasticity (kg/mm^2)	5700
Rated Breaking Strength of Conductor (kgf)	7200.2
Basic / Recommended Span (m)	100
Wind Pressure on Conductor (N/m^2)	380
Radial Ice Thickness (mm)	9.5
Ice Density (kg/m^3)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	2379.3
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	1440.04
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	2183.2
Maximum Conductor Weight (MCW) (kg/m)			1.496
Maximum Conductor Pressure (MCP) (kg/m)			1.515
Freezing Point Tension (FPT) (kgf)	at	0°C	1575.5

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: POPLAR

Temperature Shift (Deg. C) 0
Tension Reduction at 15°C (%) 10

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.08	0.24	0.26	0.28	0.29	0.31	0.32
80	0.32	0.97	1.04	1.10	1.17	1.23	1.29
120	0.72	2.18	2.33	2.48	2.63	2.77	2.90
160	1.27	3.88	4.15	4.41	4.67	4.92	5.16
200	1.99	6.06	6.48	6.89	7.29	7.68	8.06
240	2.87	8.73	9.33	9.93	10.50	11.07	11.61
280	3.90	11.88	12.71	13.51	14.30	15.06	15.81
320	5.10	15.52	16.59	17.65	18.67	19.67	20.64
360	6.45	19.64	21.00	22.34	23.64	24.90	26.13
400	7.96	24.25	25.93	27.57	29.18	30.74	32.26
440	9.64	29.34	31.37	33.37	35.31	37.20	39.03
480	11.47	34.92	37.34	39.71	42.02	44.27	46.45
520	13.46	40.98	43.82	46.60	49.31	51.95	54.51

Appendix 15a - 200mm AAAC (Poplar) - (100m Basic)- High altitude

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		POPLAR	
Basic / Recommended Span (m)		100	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	140
-5.6	1732.4	0.18	0.24	0.32	0.40	0.50	0.60	0.72	0.84	0.98
0	1575.5	0.20	0.27	0.35	0.44	0.55	0.66	0.79	0.93	1.07
5	1440.0	0.22	0.29	0.38	0.49	0.60	0.72	0.86	1.01	1.17
10	1310.2	0.24	0.32	0.42	0.53	0.66	0.80	0.95	1.11	1.29
15	1187.6	0.26	0.36	0.46	0.59	0.73	0.88	1.05	1.23	1.42
20	1073.6	0.29	0.39	0.51	0.65	0.80	0.97	1.16	1.36	1.57
25	969.7	0.32	0.44	0.57	0.72	0.89	1.08	1.28	1.50	1.74
30	876.9	0.35	0.48	0.63	0.80	0.98	1.19	1.42	1.66	1.93
35	795.6	0.39	0.53	0.69	0.88	1.08	1.31	1.56	1.83	2.12
40	725.4	0.43	0.58	0.76	0.96	1.19	1.44	1.71	2.01	2.33
45	665.4	0.47	0.64	0.83	1.05	1.30	1.57	1.87	2.19	2.54
50	614.3	0.51	0.69	0.90	1.14	1.40	1.70	2.02	2.37	2.75
55	570.8	0.54	0.74	0.97	1.22	1.51	1.83	2.18	2.55	2.96
60	533.7	0.58	0.79	1.03	1.31	1.62	1.96	2.33	2.73	3.17
65	501.7	0.62	0.84	1.10	1.39	1.72	2.08	2.48	2.91	3.37
70	474.0	0.65	0.89	1.16	1.47	1.82	2.20	2.62	3.07	3.57
75	449.9	0.69	0.94	1.23	1.55	1.92	2.32	2.76	3.24	3.76
80	428.6	0.72	0.99	1.29	1.63	2.01	2.43	2.90	3.40	3.94

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		POPLAR	
Basic / Recommended Span	(m)	100	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		10.0	at 15°C
Required Percentage Increase in Tension (%)		10	at 15°C

Temp. (Deg. C)	Tension (kgf)	ERECTION TABLE Sag (m) for Span Length (m)								
		60	70	80	90	100	110	120	130	140
-5.6	1871.5	0.17	0.23	0.29	0.37	0.46	0.56	0.66	0.78	0.90
0	1711.0	0.18	0.25	0.32	0.41	0.50	0.61	0.73	0.85	0.99
5	1571.2	0.20	0.27	0.35	0.44	0.55	0.66	0.79	0.93	1.08
10	1435.9	0.22	0.29	0.38	0.49	0.60	0.73	0.86	1.01	1.18
15	1306.3	0.24	0.32	0.42	0.53	0.66	0.80	0.95	1.12	1.29
20	1183.9	0.26	0.36	0.47	0.59	0.73	0.88	1.05	1.23	1.43
25	1070.2	0.29	0.39	0.52	0.65	0.81	0.98	1.16	1.36	1.58
30	966.6	0.32	0.44	0.57	0.72	0.89	1.08	1.28	1.51	1.75
35	874.2	0.36	0.48	0.63	0.80	0.99	1.19	1.42	1.67	1.93
40	793.2	0.39	0.53	0.70	0.88	1.09	1.32	1.57	1.84	2.13
45	723.4	0.43	0.58	0.76	0.97	1.19	1.44	1.72	2.01	2.34
50	663.7	0.47	0.64	0.83	1.05	1.30	1.57	1.87	2.20	2.55
55	612.9	0.51	0.69	0.90	1.14	1.41	1.70	2.03	2.38	2.76
60	569.6	0.55	0.74	0.97	1.23	1.51	1.83	2.18	2.56	2.97
65	532.6	0.58	0.79	1.04	1.31	1.62	1.96	2.33	2.74	3.17
70	500.8	0.62	0.84	1.10	1.39	1.72	2.08	2.48	2.91	3.38
75	473.2	0.66	0.89	1.17	1.48	1.82	2.21	2.62	3.08	3.57
80	449.2	0.69	0.94	1.23	1.56	1.92	2.32	2.76	3.24	3.76

Appendix 16 - Section 2 - Sag charts for the renovation of existing overhead lines

Conductor Type	Basic Span	Altitude or Loading	Appendix No.
.017" / 13mm HDBC	80	All Altitudes Wind = 760(N/m²), Ice = 0mm	17
	90		18
	100		19
	120		20
.05" / 32mm HDBC	80		21
	90		22
	100		23
	120		24
.05" / 50mm AAAC	80		25
	100		26
	120		27
.25" / 16mm HDBC	90		28
	100		29
3 swg HDBC	90		30
	100		31
5 swg HDBC	90		32
	100		33
6 swg HDBC	90		34
	100		35
7swg HDBC	90		36
	100		37
.175" / 175mm ACSR (CE/C/36)	76.2 (250ft)	Normal Altitude Wind = 380(N/m²), Ice = 19mm (Dia.)	38
.1" / 100mm ACSR	90		39
.1" / 100mm ACSR	100		40
.1" / 70mm HDBC	90		41
.15" / 100mm HDBC	90		42
.2" / 125mm HDBC	100		43
.1" / 100mm ACSR	90	High Altitude Wind = 570(N/m²), Ice = 25mm (Dia.)	44
.1" / 70mm HDBC	90		45
.15" / 100mm HDBC	90		46
.2" / 125mm HDBC	100		47

Appendix 17 - .017" or 13mm^2 CACU - (All altitudes) - 80m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	13mm CACU
Greased Conductor Weight (kg/m)	0.11856
Cross Sectional Area of Conductor (mm²)	13.1475
Conductor Overall Diameter (mm)	5.08
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.3
Rated Breaking Strength of Conductor (kgf)	807.4
Basic / Recommended Span (m)	80
Wind Pressure on Conductor (N/m²)	760
Radial Ice Thickness (mm)	0
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	323.0
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	269.1
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	323.0
Maximum Conductor Weight (MCW) (kg/m)			0.119
Maximum Conductor Pressure (MCP) (kg/m)			0.394
Freezing Point Tension (FPT) (kgf)	at	0°C	245.6

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: 13mm CACU

Temperature Shift (Deg. C)	0
Tension Reduction at 15°C (%)	5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.09	0.19	0.21	0.22	0.24	0.25	0.27
80	0.36	0.77	0.83	0.88	0.94	1.00	1.06
120	0.82	1.73	1.86	1.98	2.12	2.25	2.39
160	1.46	3.08	3.30	3.53	3.76	4.00	4.25
200	2.28	4.82	5.16	5.51	5.88	6.26	6.64
240	3.28	6.94	7.43	7.94	8.47	9.01	9.56
280	4.46	9.44	10.11	10.81	11.53	12.26	13.01
320	5.83	12.33	13.20	14.11	15.06	16.02	16.99
360	7.38	15.61	16.71	17.86	19.05	20.27	21.50
400	9.11	19.27	20.63	22.05	23.52	25.03	26.55
440	11.02	23.32	24.97	26.69	28.46	30.28	32.12
480	13.12	27.75	29.71	31.76	33.87	36.04	38.23
520	15.40	32.57	34.87	37.27	39.76	42.29	44.87

Appendix 17a - .017" or 13mm^2 CACU - (All altitudes) - 80m Basic

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		13mm CACU	
Basic / Recommended Span (m)		80	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	260.3	0.20	0.28	0.36	0.46	0.57	0.69	0.82	0.96	1.84
0	245.6	0.22	0.30	0.39	0.49	0.60	0.73	0.87	1.02	1.96
5	232.6	0.23	0.31	0.41	0.52	0.64	0.77	0.92	1.08	2.06
10	219.8	0.24	0.33	0.43	0.55	0.67	0.82	0.97	1.14	2.18
15	207.3	0.26	0.35	0.46	0.58	0.71	0.87	1.03	1.21	2.32
20	195.0	0.27	0.37	0.49	0.62	0.76	0.92	1.09	1.28	2.46
25	183.1	0.29	0.40	0.52	0.66	0.81	0.98	1.17	1.37	2.62
30	171.5	0.31	0.42	0.55	0.70	0.86	1.05	1.24	1.46	2.80
35	160.4	0.33	0.45	0.59	0.75	0.92	1.12	1.33	1.56	2.99
40	149.8	0.36	0.48	0.63	0.80	0.99	1.20	1.42	1.67	3.20
45	139.8	0.38	0.52	0.68	0.86	1.06	1.28	1.53	1.79	3.43
50	130.4	0.41	0.56	0.73	0.92	1.14	1.37	1.64	1.92	3.68
55	121.7	0.44	0.60	0.78	0.99	1.22	1.47	1.75	2.06	3.94
60	113.7	0.47	0.64	0.83	1.06	1.30	1.58	1.88	2.20	4.22
65	106.4	0.50	0.68	0.89	1.13	1.39	1.69	2.01	2.35	4.51
70	99.8	0.53	0.73	0.95	1.20	1.48	1.80	2.14	2.51	4.81
75	93.9	0.57	0.77	1.01	1.28	1.58	1.91	2.27	2.67	5.12
80	88.5	0.60	0.82	1.07	1.36	1.67	2.03	2.41	2.83	5.42

Appendix 18 - .017" or 13mm^2 CACU - (All altitudes) - 90m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	13mm CACU
Greased Conductor Weight (kg/m)	0.11856
Cross Sectional Area of Conductor (mm²)	13.1475
Conductor Overall Diameter (mm)	5.08
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.3
Rated Breaking Strength of Conductor (kgf)	807.4
Basic / Recommended Span (m)	90
Wind Pressure on Conductor (N/m²)	760
Radial Ice Thickness (mm)	0
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	323.0
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	269.1
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	323.0
Maximum Conductor Weight (MCW) (kg/m)			0.119
Maximum Conductor Pressure (MCP) (kg/m)			0.394
Freezing Point Tension (FPT) (kgf)	at	0°C	230.9

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: 13mm CACU

Temperature Shift (Deg. C)	0
Tension Reduction at 15°C (%)	5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.10	0.20	0.21	0.22	0.24	0.25	0.26
80	0.39	0.80	0.85	0.90	0.95	1.00	1.06
120	0.87	1.80	1.91	2.02	2.14	2.26	2.38
160	1.55	3.20	3.39	3.60	3.81	4.01	4.22
200	2.42	4.99	5.30	5.62	5.95	6.27	6.60
240	3.48	7.19	7.64	8.10	8.56	9.03	9.50
280	4.74	9.79	10.40	11.02	11.65	12.29	12.94
320	6.19	12.78	13.58	14.39	15.22	16.06	16.90
360	7.84	16.18	17.19	18.22	19.27	20.32	21.38
400	9.67	19.97	21.22	22.49	23.79	25.09	26.40
440	11.71	24.17	25.67	27.21	28.78	30.36	31.94
480	13.93	28.76	30.55	32.39	34.25	36.13	38.01
520	16.35	33.76	35.86	38.01	40.20	42.40	44.61

Appendix 18a - .017" or 13mm^2 CACU - (All altitudes) - 90m Basic

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		13mm CACU	
Basic / Recommended Span (m)		90	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	245.1	0.22	0.30	0.39	0.49	0.60	0.73	0.87	1.02	1.96
0	230.9	0.23	0.31	0.41	0.52	0.64	0.78	0.92	1.08	2.08
5	218.5	0.24	0.33	0.43	0.55	0.68	0.82	0.98	1.15	2.20
10	206.4	0.26	0.35	0.46	0.58	0.72	0.87	1.03	1.21	2.33
15	194.5	0.27	0.37	0.49	0.62	0.76	0.92	1.10	1.29	2.47
20	183.1	0.29	0.40	0.52	0.66	0.81	0.98	1.17	1.37	2.62
25	172.1	0.31	0.42	0.55	0.70	0.86	1.04	1.24	1.46	2.79
30	161.5	0.33	0.45	0.59	0.74	0.92	1.11	1.32	1.55	2.97
35	151.5	0.35	0.48	0.63	0.79	0.98	1.18	1.41	1.65	3.17
40	142.1	0.38	0.51	0.67	0.84	1.04	1.26	1.50	1.76	3.38
45	133.3	0.40	0.54	0.71	0.90	1.11	1.35	1.60	1.88	3.60
50	125.1	0.43	0.58	0.76	0.96	1.18	1.43	1.71	2.00	3.84
55	117.6	0.45	0.62	0.81	1.02	1.26	1.52	1.81	2.13	4.08
60	110.7	0.48	0.66	0.86	1.08	1.34	1.62	1.93	2.26	4.34
65	104.5	0.51	0.69	0.91	1.15	1.42	1.72	2.04	2.40	4.59
70	98.9	0.54	0.73	0.96	1.21	1.50	1.81	2.16	2.53	4.86
75	93.8	0.57	0.77	1.01	1.28	1.58	1.91	2.28	2.67	5.12
80	89.1	0.60	0.81	1.06	1.35	1.66	2.01	2.39	2.81	5.39

Appendix 19 - .017" or 13mm^2 CACU - (All altitudes) - 100m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	13mm CACU
Greased Conductor Weight (kg/m)	0.11856
Cross Sectional Area of Conductor (mm²)	13.1475
Conductor Overall Diameter (mm)	5.08
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.3
Rated Breaking Strength of Conductor (kgf)	807.4
Basic / Recommended Span (m)	100
Wind Pressure on Conductor (N/m²)	760
Radial Ice Thickness (mm)	0
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	323.0
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	269.1
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	323.0
Maximum Conductor Weight (MCW) (kg/m)			0.119
Maximum Conductor Pressure (MCP) (kg/m)			0.394
Freezing Point Tension (FPT) (kgf)	at	0°C	215.7

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: 13mm CACU

Temperature Shift (Deg. C)	0
Tension Reduction at 15°C (%)	5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.10	0.21	0.22	0.23	0.24	0.25	0.26
80	0.41	0.83	0.87	0.92	0.96	1.01	1.05
120	0.93	1.86	1.96	2.06	2.16	2.26	2.37
160	1.66	3.30	3.48	3.66	3.84	4.03	4.21
200	2.59	5.16	5.44	5.72	6.01	6.29	6.57
240	3.73	7.43	7.83	8.24	8.65	9.06	9.47
280	5.07	10.11	10.66	11.22	11.77	12.33	12.88
320	6.62	13.21	13.93	14.65	15.38	16.10	16.83
360	8.38	16.72	17.63	18.54	19.46	20.38	21.30
400	10.35	20.64	21.76	22.89	24.03	25.16	26.29
440	12.52	24.97	26.33	27.70	29.07	30.45	31.82
480	14.90	29.72	31.33	32.96	34.60	36.24	37.86
520	17.49	34.88	36.77	38.69	40.61	42.53	44.44

Appendix 19a - .017" or 13mm^2 CACU - (All altitudes) - 100m Basic

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		13mm CACU	
Basic / Recommended Span (m)		100	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	229.2	0.23	0.32	0.41	0.52	0.65	0.78	0.93	1.09	2.10
0	215.7	0.25	0.34	0.44	0.56	0.69	0.83	0.99	1.16	2.23
5	204.0	0.26	0.36	0.46	0.59	0.73	0.88	1.05	1.23	2.35
10	192.7	0.28	0.38	0.49	0.62	0.77	0.93	1.11	1.30	2.49
15	181.8	0.29	0.40	0.52	0.66	0.82	0.99	1.17	1.38	2.64
20	171.4	0.31	0.42	0.55	0.70	0.86	1.05	1.25	1.46	2.80
25	161.4	0.33	0.45	0.59	0.74	0.92	1.11	1.32	1.55	2.97
30	152.1	0.35	0.48	0.62	0.79	0.97	1.18	1.40	1.65	3.16
35	143.2	0.37	0.51	0.66	0.84	1.03	1.25	1.49	1.75	3.35
40	135.0	0.40	0.54	0.70	0.89	1.10	1.33	1.58	1.85	3.56
45	127.5	0.42	0.57	0.74	0.94	1.16	1.41	1.67	1.97	3.77
50	120.5	0.44	0.60	0.79	1.00	1.23	1.49	1.77	2.08	3.99
55	114.1	0.47	0.64	0.83	1.05	1.30	1.57	1.87	2.20	4.21
60	108.2	0.49	0.67	0.88	1.11	1.37	1.66	1.97	2.31	4.44
65	102.9	0.52	0.71	0.92	1.17	1.44	1.74	2.07	2.43	4.67
70	98.1	0.54	0.74	0.97	1.22	1.51	1.83	2.18	2.55	4.90
75	93.7	0.57	0.78	1.01	1.28	1.58	1.91	2.28	2.67	5.13
80	89.7	0.59	0.81	1.06	1.34	1.65	2.00	2.38	2.79	5.35

Appendix 20 - .017" or 13mm^2 CACU - (All altitudes) - 120m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	13mm CACU
Greased Conductor Weight (kg/m)	0.11856
Cross Sectional Area of Conductor (mm²)	13.1475
Conductor Overall Diameter (mm)	5.08
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.3
Rated Breaking Strength of Conductor (kgf)	807.4
Basic / Recommended Span (m)	120
Wind Pressure on Conductor (N/m²)	760
Radial Ice Thickness (mm)	0
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	323.0
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	269.1
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	323.0
Maximum Conductor Weight (MCW) (kg/m)			0.119
Maximum Conductor Pressure (MCP) (kg/m)			0.394
Freezing Point Tension (FPT) (kgf)	at	0°C	185.9

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: 13mm CACU

Temperature Shift (Deg. C) 0
Tension Reduction at 15°C (%) 5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.12	0.22	0.23	0.24	0.24	0.25	0.26
80	0.48	0.87	0.91	0.94	0.98	1.01	1.05
120	1.08	1.96	2.04	2.12	2.20	2.28	2.36
160	1.92	3.49	3.63	3.77	3.91	4.05	4.19
200	3.01	5.45	5.68	5.90	6.12	6.33	6.55
240	4.33	7.85	8.17	8.49	8.81	9.12	9.43
280	5.89	10.69	11.12	11.56	11.99	12.42	12.84
320	7.69	13.96	14.53	15.10	15.66	16.22	16.77
360	9.74	17.67	18.39	19.11	19.82	20.52	21.22
400	12.02	21.81	22.70	23.59	24.47	25.34	26.20
440	14.55	26.40	27.47	28.54	29.61	30.66	31.70
480	17.31	31.41	32.69	33.97	35.23	36.49	37.72
520	20.32	36.87	38.37	39.87	41.35	42.82	44.27

Appendix 20a - .017" or 13mm^2 CACU - (All altitudes) - 120m Basic

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		13mm CACU	
Basic / Recommended Span (m)		120	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m)								
		60	70	80	90	100	110	120	130	180
-5.6	197.2	0.27	0.37	0.48	0.61	0.75	0.91	1.08	1.27	2.43
0	185.9	0.29	0.39	0.51	0.65	0.80	0.96	1.15	1.35	2.58
5	176.3	0.30	0.41	0.54	0.68	0.84	1.02	1.21	1.42	2.72
10	167.2	0.32	0.43	0.57	0.72	0.89	1.07	1.28	1.50	2.87
15	158.6	0.34	0.46	0.60	0.76	0.93	1.13	1.35	1.58	3.03
20	150.6	0.35	0.48	0.63	0.80	0.98	1.19	1.42	1.66	3.19
25	143.1	0.37	0.51	0.66	0.84	1.04	1.25	1.49	1.75	3.36
30	136.2	0.39	0.53	0.70	0.88	1.09	1.32	1.57	1.84	3.53
35	129.7	0.41	0.56	0.73	0.93	1.14	1.38	1.65	1.93	3.70
40	123.8	0.43	0.59	0.77	0.97	1.20	1.45	1.72	2.02	3.88
45	118.3	0.45	0.61	0.80	1.01	1.25	1.52	1.80	2.12	4.06
50	113.3	0.47	0.64	0.84	1.06	1.31	1.58	1.88	2.21	4.24
55	108.6	0.49	0.67	0.87	1.10	1.36	1.65	1.96	2.31	4.42
60	104.4	0.51	0.70	0.91	1.15	1.42	1.72	2.04	2.40	4.60
65	100.5	0.53	0.72	0.94	1.19	1.48	1.78	2.12	2.49	4.78
70	96.9	0.55	0.75	0.98	1.24	1.53	1.85	2.20	2.59	4.96
75	93.5	0.57	0.78	1.01	1.28	1.58	1.92	2.28	2.68	5.13
80	90.5	0.59	0.80	1.05	1.33	1.64	1.98	2.36	2.77	5.31

Appendix 21 - .05" or 32mm^2 HDBC - (All altitudes) - 80m Basic

Conductor Code Name (if any)	32mm HDBC
Greased Conductor Weight (kg/m)	0.2969
Cross Sectional Area of Conductor (mm²)	33.134
Conductor Overall Diameter (mm)	8.05
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.3
Rated Breaking Strength of Conductor (kgf)	1296.05
Basic / Recommended Span (m)	80
Wind Pressure on Conductor (N/m²)	760
Radial Ice Thickness (mm)	0
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	518.4
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	432.0
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	518.4
Maximum Conductor Weight (MCW) (kg/m)			0.297
Maximum Conductor Pressure (MCP) (kg/m)			0.624
Freezing Point Tension (FPT) (kgf)	at	0°C	357.2

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: 32mm HDBC

Temperature Shift (Deg. C) 0

Tension Reduction at 15°C (%) 5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.15	0.32	0.34	0.35	0.37	0.38	0.39
80	0.62	1.29	1.34	1.40	1.46	1.52	1.57
120	1.38	2.89	3.03	3.16	3.29	3.42	3.54
160	2.46	5.14	5.38	5.61	5.85	6.07	6.30
200	3.85	8.03	8.40	8.77	9.13	9.49	9.84
240	5.54	11.57	12.10	12.63	13.15	13.66	14.17
280	7.54	15.74	16.47	17.19	17.90	18.60	19.28
320	9.85	20.56	21.52	22.46	23.38	24.29	25.18
360	12.46	26.02	27.23	28.42	29.59	30.74	31.87
400	15.38	32.13	33.62	35.09	36.54	37.95	39.35
440	18.62	38.87	40.68	42.46	44.21	45.93	47.61
480	22.15	46.26	48.41	50.53	52.61	54.65	56.66
520	26.00	54.29	56.82	59.30	61.74	64.14	66.50

Appendix 21a - .05" or 32mm^2 HDBC - (All altitudes) - 80m Basic

Common Design & Erection Tables

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		32mm HDBC	
Basic / Recommended Span	(m)	80	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m)								
		60	70	80	90	100	110	120	130	180
-5.6	386.0	0.35	0.47	0.62	0.78	0.96	1.16	1.38	1.62	3.12
0	357.2	0.37	0.51	0.67	0.84	1.04	1.26	1.50	1.76	3.37
5	333.1	0.40	0.55	0.71	0.90	1.11	1.35	1.60	1.88	3.61
10	310.7	0.43	0.59	0.76	0.97	1.19	1.45	1.72	2.02	3.87
15	290.1	0.46	0.63	0.82	1.04	1.28	1.55	1.84	2.16	4.15
20	271.3	0.49	0.67	0.88	1.11	1.37	1.66	1.97	2.31	4.43
25	254.2	0.53	0.72	0.93	1.18	1.46	1.77	2.10	2.47	4.73
30	238.8	0.56	0.76	0.99	1.26	1.55	1.88	2.24	2.63	5.03
35	225.0	0.59	0.81	1.06	1.34	1.65	2.00	2.37	2.79	5.34
40	212.7	0.63	0.86	1.12	1.41	1.75	2.11	2.51	2.95	5.65
45	201.6	0.66	0.90	1.18	1.49	1.84	2.23	2.65	3.11	5.96
50	191.7	0.70	0.95	1.24	1.57	1.94	2.34	2.79	3.27	6.27
55	182.8	0.73	0.99	1.30	1.64	2.03	2.46	2.92	3.43	6.58
60	174.8	0.76	1.04	1.36	1.72	2.12	2.57	3.06	3.59	6.88
65	167.6	0.80	1.09	1.42	1.79	2.21	2.68	3.19	3.74	7.18
70	161.0	0.83	1.13	1.48	1.87	2.30	2.79	3.32	3.89	7.47
75	155.1	0.86	1.17	1.53	1.94	2.39	2.90	3.45	4.04	7.75
80	149.7	0.89	1.22	1.59	2.01	2.48	3.00	3.57	4.19	8.03

Appendix 22 - .05" or 32mm^2 HDBC - (All altitudes) - 90m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	32mm HDBC
Greased Conductor Weight (kg/m)	0.2969
Cross Sectional Area of Conductor (mm²)	33.134
Conductor Overall Diameter (mm)	8.05
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.3
Rated Breaking Strength of Conductor (kgf)	1296.05
Basic / Recommended Span (m)	90
Wind Pressure on Conductor (N/m²)	760
Radial Ice Thickness (mm)	0
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	518.4
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	432.0
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	518.4
Maximum Conductor Weight (MCW) (kg/m)			0.297
Maximum Conductor Pressure (MCP) (kg/m)			0.624
Freezing Point Tension (FPT) (kgf)	at	0°C	337.0

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: 32mm HDBC

Temperature Shift (Deg. C)	0
Tension Reduction at 15°C (%)	5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.16	0.31	0.33	0.34	0.35	0.36	0.37
80	0.66	1.26	1.31	1.36	1.40	1.45	1.50
120	1.48	2.83	2.94	3.05	3.16	3.27	3.37
160	2.62	5.03	5.23	5.43	5.62	5.81	6.00
200	4.10	7.86	8.17	8.48	8.78	9.08	9.37
240	5.90	11.31	11.76	12.21	12.64	13.07	13.49
280	8.03	15.40	16.01	16.62	17.21	17.79	18.37
320	10.49	20.11	20.91	21.70	22.48	23.24	23.99
360	13.28	25.46	26.47	27.47	28.45	29.41	30.36
400	16.40	31.43	32.68	33.91	35.12	36.31	37.48
440	19.84	38.03	39.54	41.03	42.50	43.94	45.36
480	23.61	45.26	47.06	48.83	50.58	52.29	53.98
520	27.71	53.11	55.23	57.31	59.36	61.37	63.35

Appendix 22a - .05" or 32mm^2 HDBC - (All altitudes) - 90m Basic

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		32mm HDBC	
Basic / Recommended Span (m)		90	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	362.2	0.37	0.50	0.66	0.83	1.02	1.24	1.48	1.73	3.32
0	337.0	0.40	0.54	0.70	0.89	1.10	1.33	1.59	1.86	3.57
5	316.2	0.42	0.58	0.75	0.95	1.17	1.42	1.69	1.98	3.80
10	297.1	0.45	0.61	0.80	1.01	1.25	1.51	1.80	2.11	4.05
15	279.7	0.48	0.65	0.85	1.07	1.33	1.61	1.91	2.24	4.30
20	263.8	0.51	0.69	0.90	1.14	1.41	1.70	2.03	2.38	4.56
25	249.4	0.54	0.73	0.95	1.21	1.49	1.80	2.14	2.51	4.82
30	236.4	0.57	0.77	1.00	1.27	1.57	1.90	2.26	2.65	5.09
35	224.7	0.59	0.81	1.06	1.34	1.65	2.00	2.38	2.79	5.35
40	214.1	0.62	0.85	1.11	1.40	1.73	2.10	2.50	2.93	5.62
45	204.5	0.65	0.89	1.16	1.47	1.81	2.20	2.61	3.07	5.88
50	195.9	0.68	0.93	1.21	1.53	1.89	2.29	2.73	3.20	6.14
55	188.0	0.71	0.97	1.26	1.60	1.97	2.39	2.84	3.34	6.40
60	180.9	0.74	1.01	1.31	1.66	2.05	2.48	2.96	3.47	6.65
65	174.3	0.77	1.04	1.36	1.72	2.13	2.58	3.07	3.60	6.90
70	168.3	0.79	1.08	1.41	1.79	2.20	2.67	3.17	3.73	7.14
75	162.9	0.82	1.12	1.46	1.85	2.28	2.76	3.28	3.85	7.38
80	157.8	0.85	1.15	1.51	1.90	2.35	2.85	3.39	3.97	7.62

Appendix 23 - .05" or 32mm^2 HDBC - (All altitudes) - 100m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	32mm HDBC
Greased Conductor Weight (kg/m)	0.2969
Cross Sectional Area of Conductor (mm²)	33.134
Conductor Overall Diameter (mm)	8.05
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.3
Rated Breaking Strength of Conductor (kgf)	1296.05
Basic / Recommended Span (m)	100
Wind Pressure on Conductor (N/m²)	760
Radial Ice Thickness (mm)	0
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	518.4
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	432.0
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	518.4
Maximum Conductor Weight (MCW) (kg/m)			0.297
Maximum Conductor Pressure (MCP) (kg/m)			0.624
Freezing Point Tension (FPT) (kgf)	at	0°C	319.3

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: 32mm HDBC

Temperature Shift (Deg. C)	0
Tension Reduction at 15°C (%)	5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.17	0.31	0.32	0.33	0.34	0.35	0.36
80	0.70	1.24	1.28	1.32	1.36	1.40	1.44
120	1.57	2.78	2.88	2.97	3.06	3.15	3.24
160	2.79	4.94	5.11	5.28	5.45	5.61	5.77
200	4.36	7.72	7.99	8.25	8.51	8.76	9.01
240	6.27	11.12	11.50	11.88	12.25	12.62	12.98
280	8.54	15.13	15.66	16.17	16.68	17.17	17.66
320	11.15	19.77	20.45	21.12	21.78	22.43	23.07
360	14.12	25.02	25.88	26.73	27.57	28.39	29.19
400	17.43	30.89	31.95	33.00	34.03	35.05	36.04
440	21.09	37.37	38.66	39.93	41.18	42.40	43.61
480	25.09	44.48	46.01	47.52	49.01	50.47	51.90
520	29.45	52.20	54.00	55.77	57.51	59.23	60.91

Appendix 23a - .05" or 32mm^2 HDBC - (All altitudes) - 100m Basic

Common Design & Erection Tables

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		32mm HDBC	
Basic / Recommended Span	(m)	100	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m)								
		60	70	80	90	100	110	120	130	180
-5.6	340.7	0.39	0.53	0.70	0.88	1.09	1.32	1.57	1.84	3.53
0	319.3	0.42	0.57	0.74	0.94	1.16	1.41	1.67	1.96	3.77
5	301.7	0.44	0.60	0.79	1.00	1.23	1.49	1.77	2.08	3.99
10	285.6	0.47	0.64	0.83	1.05	1.30	1.57	1.87	2.20	4.21
15	271.0	0.49	0.67	0.88	1.11	1.37	1.66	1.97	2.31	4.44
20	257.6	0.52	0.71	0.92	1.17	1.44	1.74	2.07	2.43	4.67
25	245.5	0.54	0.74	0.97	1.22	1.51	1.83	2.18	2.55	4.90
30	234.5	0.57	0.78	1.01	1.28	1.58	1.92	2.28	2.67	5.13
35	224.4	0.60	0.81	1.06	1.34	1.65	2.00	2.38	2.79	5.36
40	215.3	0.62	0.84	1.10	1.40	1.72	2.09	2.48	2.91	5.59
45	207.0	0.65	0.88	1.15	1.45	1.79	2.17	2.58	3.03	5.81
50	199.3	0.67	0.91	1.19	1.51	1.86	2.25	2.68	3.15	6.03
55	192.4	0.69	0.95	1.23	1.56	1.93	2.33	2.78	3.26	6.25
60	185.9	0.72	0.98	1.28	1.62	2.00	2.42	2.87	3.37	6.47
65	180.0	0.74	1.01	1.32	1.67	2.06	2.49	2.97	3.48	6.68
70	174.6	0.77	1.04	1.36	1.72	2.13	2.57	3.06	3.59	6.89
75	169.5	0.79	1.07	1.40	1.77	2.19	2.65	3.15	3.70	7.09
80	164.8	0.81	1.10	1.44	1.82	2.25	2.72	3.24	3.81	7.30

Appendix 24 - .05" or 32mm^2 HDBC - (All altitudes) - 120m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	32mm HDBC
Greased Conductor Weight (kg/m)	0.2969
Cross Sectional Area of Conductor (mm²)	33.134
Conductor Overall Diameter (mm)	8.05
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.3
Rated Breaking Strength of Conductor (kgf)	1296.05
Basic / Recommended Span (m)	120
Wind Pressure on Conductor (N/m²)	760
Radial Ice Thickness (mm)	0
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	518.4
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	432.0
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	518.4
Maximum Conductor Weight (MCW) (kg/m)			0.297
Maximum Conductor Pressure (MCP) (kg/m)			0.624
Freezing Point Tension (FPT) (kgf)	at	0°C	291.9

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: 32mm HDBC

Temperature Shift (Deg. C)	0
Tension Reduction at 15°C (%)	5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.19	0.30	0.31	0.32	0.32	0.33	0.34
80	0.77	1.20	1.24	1.27	1.30	1.33	1.36
120	1.74	2.71	2.78	2.85	2.92	2.99	3.06
160	3.10	4.82	4.95	5.07	5.20	5.32	5.44
200	4.84	7.53	7.73	7.93	8.12	8.31	8.50
240	6.96	10.84	11.13	11.41	11.69	11.97	12.24
280	9.48	14.76	15.15	15.54	15.91	16.29	16.65
320	12.38	19.28	19.79	20.29	20.79	21.27	21.75
360	15.67	24.40	25.05	25.68	26.31	26.92	27.53
400	19.35	30.12	30.92	31.71	32.48	33.24	33.99
440	23.41	36.45	37.41	38.36	39.30	40.22	41.13
480	27.86	43.38	44.53	45.66	46.77	47.86	48.94
520	32.69	50.91	52.26	53.58	54.89	56.17	57.44

Appendix 24a - .05" or 32mm^2 HDBC - (All altitudes) - 120m Basic

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		32mm HDBC	
Basic / Recommended Span (m)		120	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m)								
		60	70	80	90	100	110	120	130	180
-5.6	306.9	0.44	0.59	0.77	0.98	1.21	1.46	1.74	2.04	3.92
0	291.9	0.46	0.62	0.81	1.03	1.27	1.54	1.83	2.15	4.12
5	279.6	0.48	0.65	0.85	1.08	1.33	1.61	1.91	2.24	4.30
10	268.3	0.50	0.68	0.89	1.12	1.38	1.67	1.99	2.34	4.48
15	258.0	0.52	0.70	0.92	1.17	1.44	1.74	2.07	2.43	4.66
20	248.4	0.54	0.73	0.96	1.21	1.49	1.81	2.15	2.52	4.84
25	239.6	0.56	0.76	0.99	1.25	1.55	1.87	2.23	2.62	5.02
30	231.5	0.58	0.79	1.03	1.30	1.60	1.94	2.31	2.71	5.19
35	224.0	0.60	0.81	1.06	1.34	1.66	2.00	2.39	2.80	5.37
40	217.1	0.62	0.84	1.09	1.38	1.71	2.07	2.46	2.89	5.54
45	210.7	0.63	0.86	1.13	1.43	1.76	2.13	2.54	2.98	5.71
50	204.7	0.65	0.89	1.16	1.47	1.81	2.19	2.61	3.06	5.88
55	199.1	0.67	0.91	1.19	1.51	1.86	2.26	2.68	3.15	6.04
60	193.9	0.69	0.94	1.23	1.55	1.91	2.32	2.76	3.23	6.20
65	189.0	0.71	0.96	1.26	1.59	1.96	2.38	2.83	3.32	6.36
70	184.5	0.72	0.99	1.29	1.63	2.01	2.43	2.90	3.40	6.52
75	180.2	0.74	1.01	1.32	1.67	2.06	2.49	2.97	3.48	6.67
80	176.1	0.76	1.03	1.35	1.71	2.11	2.55	3.03	3.56	6.83

Appendix 25 - .05" or 50mm^2 AAAC - (All altitudes) - 80m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	HAZEL
Greased Conductor Weight (kg/m)	0.1648
Cross Sectional Area of Conductor (mm²)	59.9
Conductor Overall Diameter (mm)	9.9
Coefficient of Linear Expansion (/Degree C)	2.3E-05
Modulus of Elasticity (kg/mm²)	6016.33
Rated Breaking Strength of Conductor (kgf)	1800.8
Basic / Recommended Span (m)	80
Wind Pressure on Conductor (N/m²)	760
Radial Ice Thickness (mm)	0
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	720.3
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	360.2
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	595.0
Maximum Conductor Weight (MCW) (kg/m)			0.165
Maximum Conductor Pressure (MCP) (kg/m)			0.767
Freezing Point Tension (FPT) (kgf)	at	0°C	398.0

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: HAZEL

Temperature Shift (Deg. C) 0
Tension Reduction at 15°C (%) 5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.07	0.27	0.29	0.31	0.34	0.36	0.38
80	0.30	1.07	1.17	1.26	1.35	1.43	1.52
120	0.67	2.42	2.63	2.83	3.03	3.23	3.41
160	1.20	4.30	4.67	5.04	5.39	5.73	6.06
200	1.87	6.72	7.30	7.87	8.43	8.96	9.47
240	2.69	9.67	10.52	11.34	12.13	12.90	13.64
280	3.66	13.17	14.31	15.43	16.51	17.56	18.57
320	4.78	17.20	18.70	20.16	21.57	22.93	24.25
360	6.05	21.76	23.66	25.51	27.30	29.03	30.69
400	7.47	26.87	29.21	31.49	33.70	35.83	37.89
440	9.04	32.51	35.35	38.11	40.78	43.36	45.85
480	10.76	38.69	42.07	45.35	48.53	51.60	54.57
520	12.62	45.41	49.37	53.23	56.96	60.56	64.04

Appendix 25a - .05" or 50mm^2 AAAC - (All altitudes) - 80m Basic

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		HAZEL	
Basic / Recommended Span (m)		80	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	441.3	0.17	0.23	0.30	0.38	0.47	0.56	0.67	0.79	1.51
0	398.0	0.19	0.25	0.33	0.42	0.52	0.63	0.75	0.87	1.68
5	360.2	0.21	0.28	0.37	0.46	0.57	0.69	0.82	0.97	1.85
10	323.5	0.23	0.31	0.41	0.52	0.64	0.77	0.92	1.08	2.06
15	288.5	0.26	0.35	0.46	0.58	0.71	0.86	1.03	1.21	2.31
20	255.6	0.29	0.39	0.52	0.65	0.81	0.98	1.16	1.36	2.61
25	225.6	0.33	0.45	0.58	0.74	0.91	1.11	1.32	1.54	2.96
30	198.8	0.37	0.51	0.66	0.84	1.04	1.25	1.49	1.75	3.36
35	175.8	0.42	0.57	0.75	0.95	1.17	1.42	1.69	1.98	3.80
40	156.5	0.47	0.64	0.84	1.07	1.32	1.59	1.90	2.22	4.26
45	140.6	0.53	0.72	0.94	1.19	1.47	1.77	2.11	2.48	4.75
50	127.5	0.58	0.79	1.03	1.31	1.62	1.95	2.33	2.73	5.23
55	116.8	0.63	0.86	1.13	1.43	1.76	2.13	2.54	2.98	5.71
60	108.0	0.69	0.93	1.22	1.55	1.91	2.31	2.75	3.22	6.18
65	100.6	0.74	1.00	1.31	1.66	2.05	2.48	2.95	3.46	6.63
70	94.4	0.79	1.07	1.40	1.77	2.18	2.64	3.14	3.69	7.07
75	89.0	0.83	1.13	1.48	1.87	2.31	2.80	3.33	3.91	7.50
80	84.4	0.88	1.20	1.56	1.98	2.44	2.95	3.51	4.12	7.90

Appendix 26 - .05" or 50mm^2 AAAC - (All altitudes) - 100m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	HAZEL
Greased Conductor Weight (kg/m)	0.1648
Cross Sectional Area of Conductor (mm²)	59.9
Conductor Overall Diameter (mm)	9.9
Coefficient of Linear Expansion (/Degree C)	2.3E-05
Modulus of Elasticity (kg/mm²)	6016.33
Rated Breaking Strength of Conductor (kgf)	1800.8
Basic / Recommended Span (m)	100
Wind Pressure on Conductor (N/m²)	760
Radial Ice Thickness (mm)	0
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	720.3
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	360.2
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	641.4
Maximum Conductor Weight (MCW) (kg/m)			0.165
Maximum Conductor Pressure (MCP) (kg/m)			0.767
Freezing Point Tension (FPT) (kgf)	at	0°C	396.2

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: HAZEL

Temperature Shift (Deg. C) 0
Tension Reduction at 15°C (%) 5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.08	0.23	0.25	0.27	0.28	0.30	0.32
80	0.30	0.93	1.00	1.07	1.14	1.20	1.27
120	0.68	2.10	2.26	2.41	2.56	2.71	2.85
160	1.20	3.74	4.02	4.29	4.55	4.81	5.06
200	1.88	5.84	6.28	6.70	7.12	7.52	7.91
240	2.71	8.41	9.04	9.65	10.25	10.83	11.39
280	3.69	11.45	12.31	13.14	13.95	14.73	15.50
320	4.82	14.96	16.07	17.16	18.22	19.24	20.24
360	6.10	18.93	20.34	21.72	23.06	24.36	25.62
400	7.53	23.37	25.11	26.81	28.47	30.07	31.63
440	9.11	28.28	30.39	32.44	34.44	36.38	38.27
480	10.84	33.66	36.16	38.61	40.99	43.30	45.54
520	12.72	39.50	42.44	45.31	48.11	50.82	53.45

Appendix 26a - .05" or 50mm^2 AAAC - (All altitudes) - 100m Basic

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		HAZEL	
Basic / Recommended Span (m)		100	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	437.9	0.17	0.23	0.30	0.38	0.47	0.57	0.68	0.80	1.52
0	396.2	0.19	0.25	0.33	0.42	0.52	0.63	0.75	0.88	1.68
5	360.2	0.21	0.28	0.37	0.46	0.57	0.69	0.82	0.97	1.85
10	325.7	0.23	0.31	0.40	0.51	0.63	0.77	0.91	1.07	2.05
15	293.3	0.25	0.34	0.45	0.57	0.70	0.85	1.01	1.19	2.28
20	263.2	0.28	0.38	0.50	0.63	0.78	0.95	1.13	1.32	2.54
25	236.1	0.31	0.43	0.56	0.71	0.87	1.06	1.26	1.47	2.83
30	212.1	0.35	0.48	0.62	0.79	0.97	1.18	1.40	1.64	3.15
35	191.4	0.39	0.53	0.69	0.87	1.08	1.30	1.55	1.82	3.49
40	173.7	0.43	0.58	0.76	0.96	1.19	1.43	1.71	2.00	3.84
45	158.8	0.47	0.64	0.83	1.05	1.30	1.57	1.87	2.19	4.20
50	146.3	0.51	0.69	0.90	1.14	1.41	1.70	2.03	2.38	4.56
55	135.7	0.55	0.74	0.97	1.23	1.52	1.84	2.19	2.57	4.92
60	126.7	0.59	0.80	1.04	1.32	1.63	1.97	2.34	2.75	5.27
65	119.1	0.62	0.85	1.11	1.40	1.73	2.09	2.49	2.92	5.61
70	112.5	0.66	0.90	1.17	1.48	1.83	2.22	2.64	3.10	5.94
75	106.7	0.70	0.95	1.24	1.56	1.93	2.34	2.78	3.26	6.26
80	101.7	0.73	0.99	1.30	1.64	2.03	2.45	2.92	3.42	6.57

Appendix 27 - .05" or 50mm^2 AAAC - (All altitudes) - 120m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	HAZEL
Greased Conductor Weight (kg/m)	0.1648
Cross Sectional Area of Conductor (mm²)	59.9
Conductor Overall Diameter (mm)	9.9
Coefficient of Linear Expansion (/Degree C)	2.3E-05
Modulus of Elasticity (kg/mm²)	6016.33
Rated Breaking Strength of Conductor (kgf)	1800.8
Basic / Recommended Span (m)	120
Wind Pressure on Conductor (N/m²)	760
Radial Ice Thickness (mm)	0
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	720.3
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	360.2
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	685.8
Maximum Conductor Weight (MCW) (kg/m)			0.165
Maximum Conductor Pressure (MCP) (kg/m)			0.767
Freezing Point Tension (FPT) (kgf)	at	0°C	394.1

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: HAZEL

Temperature Shift (Deg. C) 0
Tension Reduction at 15°C (%) 5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.08	0.21	0.22	0.24	0.25	0.26	0.27
80	0.30	0.84	0.89	0.95	1.00	1.05	1.10
120	0.68	1.89	2.01	2.13	2.25	2.36	2.47
160	1.22	3.35	3.57	3.78	3.99	4.20	4.39
200	1.90	5.24	5.58	5.91	6.24	6.55	6.86
240	2.73	7.54	8.03	8.51	8.98	9.44	9.88
280	3.72	10.27	10.94	11.59	12.23	12.85	13.45
320	4.86	13.41	14.28	15.14	15.97	16.78	17.57
360	6.15	16.98	18.08	19.16	20.21	21.24	22.24
400	7.60	20.96	22.32	23.65	24.95	26.22	27.45
440	9.19	25.36	27.01	28.62	30.19	31.73	33.22
480	10.94	30.18	32.14	34.06	35.93	37.76	39.53
520	12.84	35.42	37.72	39.97	42.17	44.31	46.40

Appendix 27a - .05" or 50mm^2 AAAC - (All altitudes) - 120m Basic

Conductor Code Name		HAZEL	
Basic / Recommended Span (m)		120	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m)								
		60	70	80	90	100	110	120	130	180
-5.6	433.9	0.17	0.23	0.30	0.38	0.47	0.57	0.68	0.80	1.54
0	394.1	0.19	0.26	0.33	0.42	0.52	0.63	0.75	0.88	1.69
5	360.2	0.21	0.28	0.37	0.46	0.57	0.69	0.82	0.97	1.85
10	328.0	0.23	0.31	0.40	0.51	0.63	0.76	0.90	1.06	2.03
15	298.1	0.25	0.34	0.44	0.56	0.69	0.84	1.00	1.17	2.24
20	270.7	0.27	0.37	0.49	0.62	0.76	0.92	1.10	1.29	2.47
25	246.1	0.30	0.41	0.54	0.68	0.84	1.01	1.21	1.41	2.71
30	224.3	0.33	0.45	0.59	0.74	0.92	1.11	1.32	1.55	2.98
35	205.4	0.36	0.49	0.64	0.81	1.00	1.21	1.44	1.69	3.25
40	189.1	0.39	0.53	0.70	0.88	1.09	1.32	1.57	1.84	3.53
45	175.0	0.42	0.58	0.75	0.95	1.18	1.42	1.69	1.99	3.81
50	163.0	0.46	0.62	0.81	1.02	1.26	1.53	1.82	2.14	4.10
55	152.6	0.49	0.66	0.86	1.09	1.35	1.63	1.94	2.28	4.37
60	143.6	0.52	0.70	0.92	1.16	1.43	1.74	2.07	2.42	4.65
65	135.8	0.55	0.74	0.97	1.23	1.52	1.83	2.18	2.56	4.91
70	129.0	0.57	0.78	1.02	1.29	1.60	1.93	2.30	2.70	5.17
75	123.0	0.60	0.82	1.07	1.36	1.68	2.03	2.41	2.83	5.43
80	117.6	0.63	0.86	1.12	1.42	1.75	2.12	2.52	2.96	5.67

Appendix 28 - .025" or 16mm^2 HDBC - (All altitudes) - 90m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	.025" HDBC
Greased Conductor Weight (kg/m)	0.1473
Cross Sectional Area of Conductor (mm²)	16.4416
Conductor Overall Diameter (mm)	5.689
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.3
Rated Breaking Strength of Conductor (kgf)	689.4
Basic / Recommended Span (m)	90
Wind Pressure on Conductor (N/m²)	760
Radial Ice Thickness (mm)	0
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	275.8
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	229.8
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	275.8
Maximum Conductor Weight (MCW) (kg/m)			0.147
Maximum Conductor Pressure (MCP) (kg/m)			0.441
Freezing Point Tension (FPT) (kgf)	at	0°C	137.3

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: .025" HDBC

Temperature Shift (Deg. C) 0
Tension Reduction at 15°C (%) 5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.20	0.36	0.37	0.38	0.39	0.40	0.41
80	0.80	1.42	1.47	1.51	1.56	1.60	1.65
120	1.81	3.20	3.30	3.41	3.51	3.61	3.71
160	3.21	5.68	5.87	6.06	6.24	6.42	6.60
200	5.01	8.88	9.17	9.46	9.75	10.03	10.31
240	7.22	12.78	13.21	13.63	14.04	14.44	14.84
280	9.83	17.40	17.98	18.55	19.11	19.66	20.20
320	12.84	22.73	23.49	24.23	24.96	25.68	26.38
360	16.25	28.77	29.72	30.67	31.59	32.50	33.39
400	20.06	35.51	36.70	37.86	39.00	40.12	41.22
440	24.27	42.97	44.40	45.81	47.19	48.55	49.88
480	28.89	51.14	52.84	54.52	56.16	57.78	59.36
520	33.90	60.02	62.02	63.98	65.91	67.81	69.67

Appendix 28a - .025" or 16mm HDBC - (All altitudes) - 90m Basic

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		.025" HDBC	
Basic / Recommended Span (m)		90	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	146.9	0.45	0.61	0.80	1.02	1.25	1.52	1.81	2.12	4.06
0	137.3	0.48	0.66	0.86	1.09	1.34	1.62	1.93	2.27	4.35
5	129.5	0.51	0.70	0.91	1.15	1.42	1.72	2.05	2.40	4.61
10	122.5	0.54	0.74	0.96	1.22	1.50	1.82	2.16	2.54	4.87
15	116.2	0.57	0.78	1.01	1.28	1.58	1.92	2.28	2.68	5.13
20	110.5	0.60	0.82	1.07	1.35	1.67	2.02	2.40	2.82	5.40
25	105.3	0.63	0.86	1.12	1.42	1.75	2.12	2.52	2.95	5.66
30	100.7	0.66	0.90	1.17	1.48	1.83	2.21	2.63	3.09	5.93
35	96.4	0.69	0.94	1.22	1.55	1.91	2.31	2.75	3.23	6.19
40	92.6	0.72	0.97	1.27	1.61	1.99	2.41	2.86	3.36	6.44
45	89.1	0.74	1.01	1.32	1.67	2.07	2.50	2.98	3.49	6.69
50	85.9	0.77	1.05	1.37	1.74	2.14	2.59	3.09	3.62	6.94
55	83.0	0.80	1.09	1.42	1.80	2.22	2.68	3.19	3.75	7.19
60	80.3	0.83	1.12	1.47	1.86	2.29	2.77	3.30	3.87	7.43
65	77.9	0.85	1.16	1.51	1.92	2.36	2.86	3.41	4.00	7.66
70	75.6	0.88	1.19	1.56	1.97	2.44	2.95	3.51	4.12	7.89
75	73.5	0.90	1.23	1.60	2.03	2.51	3.03	3.61	4.24	8.12
80	71.5	0.93	1.26	1.65	2.09	2.58	3.12	3.71	4.35	8.34

Appendix 29 - .025" or 16mm^2 HDBC - (All altitudes) - 100m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	.025" HDBC
Greased Conductor Weight (kg/m)	0.1473
Cross Sectional Area of Conductor (mm²)	16.4416
Conductor Overall Diameter (mm)	5.689
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.3
Rated Breaking Strength of Conductor (kgf)	689.4
Basic / Recommended Span (m)	100
Wind Pressure on Conductor (N/m²)	760
Radial Ice Thickness (mm)	0
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	275.8
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	229.8
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	275.8
Maximum Conductor Weight (MCW) (kg/m)			0.147
Maximum Conductor Pressure (MCP) (kg/m)			0.441
Freezing Point Tension (FPT) (kgf)	at	0°C	126.7

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: .025" HDBC

Temperature Shift (Deg. C) 0
Tension Reduction at 15°C (%) 5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.22	0.35	0.36	0.37	0.38	0.39	0.40
80	0.88	1.42	1.46	1.50	1.54	1.57	1.61
120	1.98	3.19	3.28	3.37	3.45	3.54	3.62
160	3.52	5.67	5.83	5.99	6.14	6.29	6.44
200	5.49	8.86	9.11	9.36	9.59	9.83	10.06
240	7.91	12.76	13.12	13.47	13.82	14.16	14.49
280	10.77	17.37	17.86	18.34	18.81	19.27	19.72
320	14.06	22.69	23.33	23.95	24.56	25.16	25.76
360	17.80	28.72	29.52	30.31	31.09	31.85	32.60
400	21.97	35.46	36.45	37.42	38.38	39.32	40.25
440	26.59	42.90	44.10	45.28	46.44	47.58	48.70
480	31.64	51.06	52.49	53.89	55.27	56.62	57.95
520	37.14	59.92	61.60	63.24	64.86	66.45	68.01

Appendix 29a - .025" or 16mm^2 HDBC - (All altitudes) - 100m Basic

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		.025" HDBC	
Basic / Recommended Span (m)		100	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	134.1	0.49	0.67	0.88	1.11	1.37	1.66	1.98	2.32	4.45
0	126.7	0.52	0.71	0.93	1.18	1.45	1.76	2.09	2.46	4.71
5	120.8	0.55	0.75	0.98	1.23	1.52	1.84	2.19	2.58	4.94
10	115.4	0.57	0.78	1.02	1.29	1.60	1.93	2.30	2.70	5.17
15	110.5	0.60	0.82	1.07	1.35	1.67	2.02	2.40	2.82	5.40
20	106.1	0.62	0.85	1.11	1.41	1.74	2.10	2.50	2.93	5.62
25	102.0	0.65	0.88	1.16	1.46	1.81	2.18	2.60	3.05	5.85
30	98.3	0.67	0.92	1.20	1.52	1.87	2.27	2.70	3.17	6.07
35	94.9	0.70	0.95	1.24	1.57	1.94	2.35	2.80	3.28	6.29
40	91.7	0.72	0.98	1.28	1.63	2.01	2.43	2.89	3.39	6.50
45	88.8	0.75	1.02	1.33	1.68	2.07	2.51	2.98	3.50	6.72
50	86.2	0.77	1.05	1.37	1.73	2.14	2.59	3.08	3.61	6.92
55	83.7	0.79	1.08	1.41	1.78	2.20	2.66	3.17	3.72	7.13
60	81.4	0.81	1.11	1.45	1.83	2.26	2.74	3.26	3.82	7.33
65	79.2	0.84	1.14	1.49	1.88	2.32	2.81	3.35	3.93	7.53
70	77.2	0.86	1.17	1.53	1.93	2.38	2.88	3.43	4.03	7.72
75	75.4	0.88	1.20	1.56	1.98	2.44	2.96	3.52	4.13	7.91
80	73.6	0.90	1.23	1.60	2.03	2.50	3.03	3.60	4.23	8.10

Appendix 30 - 3 SWG HDBC - (All altitudes) - 90m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	3SWG
Greased Conductor Weight (kg/m)	0.2861
Cross Sectional Area of Conductor (mm²)	32.18
Conductor Overall Diameter (mm)	6.4
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.3
Rated Breaking Strength of Conductor (kgf)	1301.9
Basic / Recommended Span (m)	90
Wind Pressure on Conductor (N/m²)	760
Radial Ice Thickness (mm)	0
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	520.8
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	434.0
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	520.8
Maximum Conductor Weight (MCW) (kg/m)			0.286
Maximum Conductor Pressure (MCP) (kg/m)			0.496
Freezing Point Tension (FPT) (kgf)	at	0°C	389.8

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: 3SWG

Temperature Shift (Deg. C)	0
Tension Reduction at 15°C (%)	5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.14	0.28	0.29	0.30	0.32	0.33	0.34
80	0.55	1.11	1.16	1.21	1.26	1.31	1.36
120	1.23	2.50	2.61	2.73	2.84	2.96	3.07
160	2.19	4.44	4.65	4.85	5.06	5.26	5.45
200	3.42	6.94	7.26	7.58	7.90	8.21	8.52
240	4.92	9.99	10.46	10.92	11.38	11.83	12.27
280	6.70	13.59	14.23	14.86	15.48	16.10	16.70
320	8.75	17.75	18.59	19.41	20.22	21.02	21.81
360	11.07	22.47	23.52	24.57	25.60	26.61	27.61
400	13.66	27.74	29.04	30.33	31.60	32.85	34.08
440	16.53	33.57	35.14	36.70	38.24	39.75	41.24
480	19.68	39.95	41.82	43.67	45.50	47.31	49.08
520	23.09	46.88	49.08	51.26	53.40	55.52	57.60

Appendix 30a - 3 SWG HDBC - (All altitudes) - 90m Basic

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		3SWG	
Basic / Recommended Span (m)		90	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	418.8	0.31	0.42	0.55	0.69	0.85	1.03	1.23	1.44	2.77
0	389.8	0.33	0.45	0.59	0.74	0.92	1.11	1.32	1.55	2.97
5	365.4	0.35	0.48	0.63	0.79	0.98	1.18	1.41	1.65	3.17
10	342.5	0.38	0.51	0.67	0.85	1.04	1.26	1.50	1.76	3.38
15	321.1	0.40	0.55	0.71	0.90	1.11	1.35	1.60	1.88	3.61
20	301.3	0.43	0.58	0.76	0.96	1.19	1.44	1.71	2.01	3.85
25	283.1	0.45	0.62	0.81	1.02	1.26	1.53	1.82	2.13	4.09
30	266.5	0.48	0.66	0.86	1.09	1.34	1.62	1.93	2.27	4.35
35	251.4	0.51	0.70	0.91	1.15	1.42	1.72	2.05	2.40	4.61
40	237.8	0.54	0.74	0.96	1.22	1.50	1.82	2.17	2.54	4.87
45	225.5	0.57	0.78	1.01	1.28	1.59	1.92	2.28	2.68	5.14
50	214.4	0.60	0.82	1.07	1.35	1.67	2.02	2.40	2.82	5.40
55	204.4	0.63	0.86	1.12	1.42	1.75	2.12	2.52	2.96	5.67
60	195.3	0.66	0.90	1.17	1.48	1.83	2.22	2.64	3.09	5.93
65	187.1	0.69	0.94	1.22	1.55	1.91	2.31	2.75	3.23	6.19
70	179.7	0.72	0.98	1.27	1.61	1.99	2.41	2.87	3.36	6.45
75	172.9	0.74	1.01	1.32	1.68	2.07	2.50	2.98	3.50	6.70
80	166.7	0.77	1.05	1.37	1.74	2.15	2.60	3.09	3.63	6.95

Appendix 31 - 3 SWG HDBC - (All altitude) - 100m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	3SWG
Greased Conductor Weight (kg/m)	0.2861
Cross Sectional Area of Conductor (mm²)	32.18
Conductor Overall Diameter (mm)	6.4
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.3
Rated Breaking Strength of Conductor (kgf)	1301.9
Basic / Recommended Span (m)	100
Wind Pressure on Conductor (N/m²)	760
Radial Ice Thickness (mm)	0
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	520.8
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	434.0
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	520.8
Maximum Conductor Weight (MCW) (kg/m)			0.286
Maximum Conductor Pressure (MCP) (kg/m)			0.496
Freezing Point Tension (FPT) (kgf)	at	0°C	375.4

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: 3SWG

Temperature Shift (Deg. C)	0
Tension Reduction at 15°C (%)	5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.14	0.27	0.28	0.29	0.30	0.31	0.33
80	0.57	1.08	1.13	1.17	1.22	1.26	1.30
120	1.28	2.44	2.54	2.64	2.74	2.83	2.93
160	2.28	4.34	4.51	4.69	4.87	5.04	5.21
200	3.56	6.77	7.05	7.33	7.60	7.87	8.13
240	5.13	9.75	10.16	10.55	10.95	11.33	11.71
280	6.98	13.28	13.82	14.37	14.90	15.43	15.94
320	9.12	17.34	18.06	18.76	19.46	20.15	20.83
360	11.54	21.95	22.85	23.75	24.63	25.50	26.36
400	14.24	27.09	28.21	29.32	30.41	31.48	32.54
440	17.24	32.78	34.14	35.48	36.79	38.09	39.37
480	20.51	39.02	40.63	42.22	43.79	45.33	46.86
520	24.07	45.79	47.68	49.55	51.39	53.20	54.99

Appendix 31 - a3 SWG HDBC - (All altitudes) - 100m Basic

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		3SWG	
Basic / Recommended Span (m)		100	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	401.7	0.32	0.44	0.57	0.72	0.89	1.08	1.28	1.50	2.88
0	375.4	0.34	0.47	0.61	0.77	0.95	1.15	1.37	1.61	3.09
5	353.4	0.36	0.50	0.65	0.82	1.01	1.22	1.46	1.71	3.28
10	332.9	0.39	0.53	0.69	0.87	1.07	1.30	1.55	1.82	3.48
15	313.9	0.41	0.56	0.73	0.92	1.14	1.38	1.64	1.93	3.69
20	296.4	0.43	0.59	0.77	0.98	1.21	1.46	1.74	2.04	3.91
25	280.4	0.46	0.62	0.82	1.03	1.28	1.54	1.84	2.16	4.13
30	265.8	0.48	0.66	0.86	1.09	1.35	1.63	1.94	2.27	4.36
35	252.5	0.51	0.69	0.91	1.15	1.42	1.71	2.04	2.39	4.59
40	240.4	0.54	0.73	0.95	1.21	1.49	1.80	2.14	2.51	4.82
45	229.4	0.56	0.76	1.00	1.26	1.56	1.89	2.25	2.64	5.05
50	219.4	0.59	0.80	1.04	1.32	1.63	1.97	2.35	2.76	5.28
55	210.3	0.61	0.83	1.09	1.38	1.70	2.06	2.45	2.87	5.51
60	202.0	0.64	0.87	1.13	1.43	1.77	2.14	2.55	2.99	5.74
65	194.4	0.66	0.90	1.18	1.49	1.84	2.23	2.65	3.11	5.96
70	187.5	0.69	0.93	1.22	1.55	1.91	2.31	2.75	3.22	6.18
75	181.1	0.71	0.97	1.26	1.60	1.97	2.39	2.84	3.34	6.40
80	175.2	0.73	1.00	1.31	1.65	2.04	2.47	2.94	3.45	6.61

Appendix 32 - 5SWG HDBC - (All altitudes) - 90m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	5SWG
Greased Conductor Weight (kg/m)	0.2024
Cross Sectional Area of Conductor (mm²)	22.77
Conductor Overall Diameter (mm)	5.38
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.3
Rated Breaking Strength of Conductor (kgf)	945
Basic / Recommended Span (m)	90
Wind Pressure on Conductor (N/m²)	760
Radial Ice Thickness (mm)	0
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	378.0
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	315.0
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	378.0
Maximum Conductor Weight (MCW) (kg/m)			0.202
Maximum Conductor Pressure (MCP) (kg/m)			0.417
Freezing Point Tension (FPT) (kgf)	at	0°C	262.3

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: 5SWG

Temperature Shift (Deg. C) 0
Tension Reduction at 15°C (%) 5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.14	0.29	0.30	0.31	0.33	0.34	0.35
80	0.57	1.15	1.20	1.25	1.30	1.35	1.40
120	1.29	2.59	2.71	2.82	2.93	3.04	3.15
160	2.30	4.60	4.81	5.01	5.21	5.41	5.61
200	3.59	7.19	7.52	7.83	8.15	8.46	8.76
240	5.17	10.36	10.82	11.28	11.73	12.18	12.62
280	7.04	14.10	14.73	15.36	15.97	16.58	17.17
320	9.19	18.41	19.24	20.06	20.86	21.65	22.43
360	11.63	23.31	24.35	25.38	26.40	27.40	28.39
400	14.36	28.77	30.06	31.34	32.59	33.83	35.04
440	17.37	34.82	36.38	37.92	39.44	40.93	42.40
480	20.68	41.43	43.29	45.13	46.93	48.71	50.46
520	24.27	48.63	50.81	52.96	55.08	57.17	59.22

Appendix 32a - 5SWG HDBC - (All altitudes) - 90m Basic

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		5SWG	
Basic / Recommended Span (m)		90	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	281.9	0.32	0.44	0.57	0.73	0.90	1.09	1.29	1.52	2.91
0	262.3	0.35	0.47	0.62	0.78	0.96	1.17	1.39	1.63	3.13
5	245.8	0.37	0.50	0.66	0.83	1.03	1.25	1.48	1.74	3.33
10	230.4	0.40	0.54	0.70	0.89	1.10	1.33	1.58	1.86	3.56
15	216.2	0.42	0.57	0.75	0.95	1.17	1.42	1.69	1.98	3.79
20	203.0	0.45	0.61	0.80	1.01	1.25	1.51	1.79	2.11	4.04
25	191.0	0.48	0.65	0.85	1.07	1.32	1.60	1.91	2.24	4.29
30	180.2	0.51	0.69	0.90	1.14	1.40	1.70	2.02	2.37	4.55
35	170.3	0.53	0.73	0.95	1.20	1.49	1.80	2.14	2.51	4.81
40	161.4	0.56	0.77	1.00	1.27	1.57	1.90	2.26	2.65	5.08
45	153.3	0.59	0.81	1.06	1.34	1.65	2.00	2.38	2.79	5.35
50	146.1	0.62	0.85	1.11	1.40	1.73	2.10	2.49	2.93	5.61
55	139.5	0.65	0.89	1.16	1.47	1.81	2.19	2.61	3.06	5.87
60	133.6	0.68	0.93	1.21	1.53	1.89	2.29	2.73	3.20	6.14
65	128.2	0.71	0.97	1.26	1.60	1.97	2.39	2.84	3.33	6.39
70	123.3	0.74	1.01	1.31	1.66	2.05	2.48	2.95	3.47	6.65
75	118.9	0.77	1.04	1.36	1.72	2.13	2.58	3.06	3.60	6.90
80	114.8	0.79	1.08	1.41	1.79	2.20	2.67	3.17	3.72	7.14

Appendix 33 - 5SWG HDBC - (All altitude) - 100m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	5SWG
Greased Conductor Weight (kg/m)	0.2024
Cross Sectional Area of Conductor (mm²)	22.77
Conductor Overall Diameter (mm)	5.38
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.3
Rated Breaking Strength of Conductor (kgf)	945
Basic / Recommended Span (m)	100
Wind Pressure on Conductor (N/m²)	760
Radial Ice Thickness (mm)	0
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	378.0
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	315.0
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	378.0
Maximum Conductor Weight (MCW) (kg/m)			0.202
Maximum Conductor Pressure (MCP) (kg/m)			0.417
Freezing Point Tension (FPT) (kgf)	at	0°C	249.2

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: 5SWG

Temperature Shift (Deg. C) 0
Tension Reduction at 15°C (%) 5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.15	0.28	0.29	0.30	0.32	0.33	0.34
80	0.61	1.13	1.18	1.22	1.26	1.31	1.35
120	1.37	2.55	2.65	2.74	2.84	2.94	3.03
160	2.43	4.53	4.71	4.88	5.05	5.22	5.39
200	3.80	7.08	7.35	7.62	7.89	8.16	8.42
240	5.46	10.19	10.59	10.98	11.37	11.75	12.12
280	7.44	13.87	14.41	14.94	15.47	15.99	16.50
320	9.72	18.12	18.82	19.52	20.21	20.88	21.55
360	12.30	22.93	23.82	24.70	25.57	26.43	27.27
400	15.18	28.31	29.41	30.50	31.57	32.63	33.67
440	18.37	34.25	35.59	36.90	38.20	39.48	40.73
480	21.86	40.76	42.35	43.92	45.46	46.98	48.48
520	25.65	47.84	49.70	51.54	53.35	55.14	56.89

Appendix 33a - 5SWG HDBC - (All altitudes) - 100m Basic

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		5SWG	
Basic / Recommended Span (m)		100	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m)								
		60	70	80	90	100	110	120	130	180
-5.6	266.7	0.34	0.46	0.61	0.77	0.95	1.15	1.37	1.60	3.07
0	249.2	0.37	0.50	0.65	0.82	1.02	1.23	1.46	1.72	3.29
5	234.8	0.39	0.53	0.69	0.87	1.08	1.30	1.55	1.82	3.49
10	221.4	0.41	0.56	0.73	0.93	1.14	1.38	1.65	1.93	3.70
15	209.1	0.44	0.59	0.77	0.98	1.21	1.46	1.74	2.04	3.92
20	197.8	0.46	0.63	0.82	1.04	1.28	1.55	1.84	2.16	4.14
25	187.5	0.49	0.66	0.86	1.09	1.35	1.63	1.94	2.28	4.37
30	178.1	0.51	0.70	0.91	1.15	1.42	1.72	2.05	2.40	4.60
35	169.6	0.54	0.73	0.95	1.21	1.49	1.80	2.15	2.52	4.83
40	161.9	0.56	0.77	1.00	1.27	1.56	1.89	2.25	2.64	5.06
45	154.8	0.59	0.80	1.05	1.32	1.63	1.98	2.35	2.76	5.29
50	148.4	0.61	0.84	1.09	1.38	1.70	2.06	2.45	2.88	5.52
55	142.6	0.64	0.87	1.14	1.44	1.77	2.15	2.56	3.00	5.75
60	137.2	0.66	0.90	1.18	1.49	1.84	2.23	2.65	3.12	5.97
65	132.4	0.69	0.94	1.22	1.55	1.91	2.31	2.75	3.23	6.19
70	127.9	0.71	0.97	1.27	1.60	1.98	2.39	2.85	3.34	6.41
75	123.8	0.74	1.00	1.31	1.66	2.04	2.47	2.94	3.45	6.62
80	120.0	0.76	1.03	1.35	1.71	2.11	2.55	3.04	3.56	6.83

Appendix 34 - 6SWG HDBC - (All altitudes) - 90m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	6SWG
Greased Conductor Weight (kg/m)	0.16606
Cross Sectional Area of Conductor (mm²)	18.68
Conductor Overall Diameter (mm)	4.88
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.29
Rated Breaking Strength of Conductor (kgf)	787
Basic / Recommended Span (m)	90
Wind Pressure on Conductor (N/m²)	760
Radial Ice Thickness (mm)	0
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	314.8
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	262.3
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	314.8
Maximum Conductor Weight (MCW) (kg/m)			0.166
Maximum Conductor Pressure (MCP) (kg/m)			0.378
Freezing Point Tension (FPT) (kgf)	at	0°C	206.5

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: 6SWG

Temperature Shift (Deg. C)	0
Tension Reduction at 15°C (%)	5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.15	0.30	0.31	0.32	0.33	0.35	0.36
80	0.60	1.18	1.24	1.29	1.34	1.38	1.43
120	1.35	2.66	2.78	2.89	3.01	3.12	3.22
160	2.39	4.74	4.94	5.14	5.34	5.54	5.73
200	3.74	7.40	7.72	8.04	8.35	8.65	8.95
240	5.38	10.66	11.12	11.57	12.02	12.46	12.89
280	7.33	14.51	15.14	15.75	16.36	16.96	17.55
320	9.57	18.95	19.77	20.58	21.37	22.15	22.92
360	12.11	23.98	25.02	26.04	27.05	28.04	29.01
400	14.96	29.61	30.89	32.15	33.39	34.62	35.82
440	18.10	35.83	37.38	38.90	40.41	41.89	43.34
480	21.54	42.64	44.48	46.30	48.09	49.85	51.58
520	25.28	50.04	52.20	54.34	56.44	58.50	60.53

Appendix 34a - 6SWG HDBC - (All altitudes) - 90m Basic

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		6SWG	
Basic / Recommended Span (m)		90	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	222.1	0.34	0.46	0.60	0.76	0.93	1.13	1.35	1.58	3.03
0	206.5	0.36	0.49	0.64	0.81	1.01	1.22	1.45	1.70	3.26
5	193.6	0.39	0.53	0.69	0.87	1.07	1.30	1.54	1.81	3.47
10	181.5	0.41	0.56	0.73	0.93	1.14	1.38	1.65	1.93	3.71
15	170.4	0.44	0.60	0.78	0.99	1.22	1.47	1.75	2.06	3.95
20	160.2	0.47	0.63	0.83	1.05	1.30	1.57	1.87	2.19	4.20
25	151.0	0.49	0.67	0.88	1.11	1.37	1.66	1.98	2.32	4.45
30	142.6	0.52	0.71	0.93	1.18	1.46	1.76	2.10	2.46	4.72
35	135.0	0.55	0.75	0.98	1.25	1.54	1.86	2.21	2.60	4.98
40	128.2	0.58	0.79	1.04	1.31	1.62	1.96	2.33	2.74	5.25
45	122.0	0.61	0.83	1.09	1.38	1.70	2.06	2.45	2.88	5.51
50	116.4	0.64	0.87	1.14	1.44	1.78	2.16	2.57	3.01	5.78
55	111.4	0.67	0.91	1.19	1.51	1.86	2.26	2.68	3.15	6.04
60	106.8	0.70	0.95	1.24	1.57	1.94	2.35	2.80	3.29	6.30
65	102.6	0.73	0.99	1.29	1.64	2.02	2.45	2.91	3.42	6.55
70	98.8	0.76	1.03	1.34	1.70	2.10	2.54	3.02	3.55	6.80
75	95.4	0.78	1.07	1.39	1.76	2.18	2.63	3.13	3.68	7.05
80	92.2	0.81	1.10	1.44	1.82	2.25	2.72	3.24	3.80	7.29

Appendix 35 - 6SWG HDBC - (All altitudes) - 100m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	6SWG
Greased Conductor Weight (kg/m)	0.16606
Cross Sectional Area of Conductor (mm²)	18.68
Conductor Overall Diameter (mm)	4.88
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.29
Rated Breaking Strength of Conductor (kgf)	787
Basic / Recommended Span (m)	100
Wind Pressure on Conductor (N/m²)	760
Radial Ice Thickness (mm)	0
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	314.8
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	262.3
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	314.8
Maximum Conductor Weight (MCW) (kg/m)			0.166
Maximum Conductor Pressure (MCP) (kg/m)			0.378
Freezing Point Tension (FPT) (kgf)	at	0°C	194.5

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: 6SWG

Temperature Shift (Deg. C)	0
Tension Reduction at 15°C (%)	5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.16	0.29	0.30	0.31	0.32	0.34	0.35
80	0.64	1.17	1.21	1.26	1.30	1.34	1.38
120	1.44	2.63	2.73	2.83	2.92	3.02	3.11
160	2.55	4.68	4.86	5.03	5.20	5.36	5.53
200	3.99	7.32	7.59	7.86	8.12	8.38	8.64
240	5.75	10.53	10.93	11.31	11.69	12.07	12.44
280	7.82	14.34	14.87	15.40	15.92	16.43	16.93
320	10.22	18.73	19.43	20.11	20.79	21.46	22.11
360	12.93	23.70	24.59	25.46	26.31	27.16	27.99
400	15.97	29.26	30.35	31.43	32.49	33.53	34.55
440	19.32	35.41	36.73	38.03	39.31	40.57	41.81
480	22.99	42.14	43.71	45.26	46.78	48.28	49.75
520	26.98	49.45	51.30	53.11	54.90	56.66	58.39

Appendix 35a - 6SWG HDBC - (All altitudes) - 100m Basic

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		6SWG	
Basic / Recommended Span (m)		100	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m)								
		60	70	80	90	100	110	120	130	180
-5.6	208.0	0.36	0.49	0.64	0.81	1.00	1.21	1.44	1.69	3.23
0	194.5	0.38	0.52	0.68	0.86	1.07	1.29	1.54	1.80	3.46
5	183.4	0.41	0.55	0.72	0.92	1.13	1.37	1.63	1.91	3.67
10	173.1	0.43	0.59	0.77	0.97	1.20	1.45	1.73	2.03	3.88
15	163.7	0.46	0.62	0.81	1.03	1.27	1.53	1.83	2.14	4.11
20	155.2	0.48	0.66	0.86	1.08	1.34	1.62	1.93	2.26	4.33
25	147.4	0.51	0.69	0.90	1.14	1.41	1.70	2.03	2.38	4.56
30	140.2	0.53	0.73	0.95	1.20	1.48	1.79	2.13	2.50	4.80
35	133.8	0.56	0.76	0.99	1.26	1.55	1.88	2.23	2.62	5.03
40	127.9	0.58	0.80	1.04	1.31	1.62	1.96	2.34	2.74	5.26
45	122.6	0.61	0.83	1.08	1.37	1.69	2.05	2.44	2.86	5.49
50	117.7	0.63	0.86	1.13	1.43	1.76	2.13	2.54	2.98	5.71
55	113.3	0.66	0.90	1.17	1.48	1.83	2.22	2.64	3.10	5.94
60	109.2	0.68	0.93	1.22	1.54	1.90	2.30	2.74	3.21	6.16
65	105.5	0.71	0.96	1.26	1.59	1.97	2.38	2.83	3.32	6.37
70	102.1	0.73	1.00	1.30	1.65	2.03	2.46	2.93	3.44	6.59
75	98.9	0.76	1.03	1.34	1.70	2.10	2.54	3.02	3.55	6.80
80	96.0	0.78	1.06	1.38	1.75	2.16	2.62	3.11	3.65	7.01

Appendix 36 - 7SWG HDBC - (All altitudes) - 90m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	7SWG
Greased Conductor Weight (kg/m)	0.13953
Cross Sectional Area of Conductor (mm²)	15.7
Conductor Overall Diameter (mm)	4.47
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.3
Rated Breaking Strength of Conductor (kgf)	671
Basic / Recommended Span (m)	90
Wind Pressure on Conductor (N/m²)	760
Radial Ice Thickness (mm)	0
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	268.4
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	223.7
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	268.4
Maximum Conductor Weight (MCW) (kg/m)			0.140
Maximum Conductor Pressure (MCP) (kg/m)			0.346
Freezing Point Tension (FPT) (kgf)	at	0°C	166.7

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: 7SWG

Temperature Shift (Deg. C) 0

Tension Reduction at 15°C (%) 5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.16	0.30	0.32	0.33	0.34	0.35	0.37
80	0.62	1.22	1.27	1.32	1.37	1.42	1.46
120	1.40	2.74	2.85	2.97	3.08	3.19	3.29
160	2.49	4.87	5.07	5.27	5.47	5.66	5.85
200	3.89	7.61	7.93	8.24	8.55	8.85	9.14
240	5.61	10.96	11.41	11.86	12.30	12.74	13.17
280	7.63	14.91	15.53	16.15	16.75	17.34	17.92
320	9.97	19.48	20.29	21.09	21.88	22.65	23.41
360	12.61	24.65	25.68	26.69	27.69	28.67	29.63
400	15.57	30.43	31.70	32.95	34.18	35.39	36.58
440	18.84	36.82	38.36	39.87	41.36	42.82	44.26
480	22.42	43.82	45.65	47.45	49.22	50.96	52.67
520	26.32	51.43	53.57	55.69	57.76	59.81	61.82

Appendix 36a - 7SWG HDBC - (All altitudes) - 90m Basic

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		7SWG	
Basic / Recommended Span (m)		90	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	179.2	0.35	0.48	0.62	0.79	0.97	1.18	1.40	1.64	3.15
0	166.7	0.38	0.51	0.67	0.85	1.05	1.27	1.51	1.77	3.39
5	156.2	0.40	0.55	0.71	0.90	1.12	1.35	1.61	1.89	3.62
10	146.6	0.43	0.58	0.76	0.96	1.19	1.44	1.71	2.01	3.85
15	137.8	0.46	0.62	0.81	1.03	1.27	1.53	1.82	2.14	4.10
20	129.7	0.48	0.66	0.86	1.09	1.34	1.63	1.94	2.27	4.36
25	122.4	0.51	0.70	0.91	1.15	1.43	1.72	2.05	2.41	4.62
30	115.8	0.54	0.74	0.96	1.22	1.51	1.82	2.17	2.55	4.88
35	109.8	0.57	0.78	1.02	1.29	1.59	1.92	2.29	2.69	5.15
40	104.4	0.60	0.82	1.07	1.35	1.67	2.02	2.41	2.82	5.41
45	99.5	0.63	0.86	1.12	1.42	1.75	2.12	2.52	2.96	5.68
50	95.1	0.66	0.90	1.17	1.49	1.83	2.22	2.64	3.10	5.94
55	91.1	0.69	0.94	1.23	1.55	1.91	2.32	2.76	3.23	6.20
60	87.5	0.72	0.98	1.28	1.61	1.99	2.41	2.87	3.37	6.46
65	84.2	0.75	1.01	1.33	1.68	2.07	2.51	2.98	3.50	6.71
70	81.2	0.77	1.05	1.37	1.74	2.15	2.60	3.09	3.63	6.96
75	78.5	0.80	1.09	1.42	1.80	2.22	2.69	3.20	3.76	7.20
80	75.9	0.83	1.13	1.47	1.86	2.30	2.78	3.31	3.88	7.44

Appendix 37 - 7SWG HDBC - (All altitude) - 100m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	7SWG
Greased Conductor Weight (kg/m)	0.13953
Cross Sectional Area of Conductor (mm²)	15.7
Conductor Overall Diameter (mm)	4.47
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.3
Rated Breaking Strength of Conductor (kgf)	671
Basic / Recommended Span (m)	100
Wind Pressure on Conductor (N/m²)	760
Radial Ice Thickness (mm)	0
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	268.4
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	223.7
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	268.4
Maximum Conductor Weight (MCW) (kg/m)			0.140
Maximum Conductor Pressure (MCP) (kg/m)			0.346
Freezing Point Tension (FPT) (kgf)	at	0°C	155.7

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: 7SWG

Temperature Shift (Deg. C) 0
Tension Reduction at 15°C (%) 5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.17	0.30	0.31	0.32	0.33	0.34	0.35
80	0.67	1.21	1.25	1.29	1.34	1.38	1.42
120	1.51	2.72	2.81	2.91	3.00	3.10	3.19
160	2.68	4.83	5.00	5.17	5.34	5.50	5.67
200	4.19	7.55	7.82	8.08	8.34	8.60	8.85
240	6.04	10.87	11.26	11.64	12.02	12.39	12.75
280	8.22	14.80	15.32	15.84	16.36	16.86	17.35
320	10.74	19.33	20.02	20.69	21.36	22.02	22.66
360	13.59	24.46	25.33	26.19	27.04	27.87	28.68
400	16.77	30.20	31.27	32.34	33.38	34.40	35.41
440	20.30	36.54	37.84	39.13	40.39	41.63	42.85
480	24.16	43.48	45.04	46.56	48.07	49.54	51.00
520	28.35	51.03	52.85	54.65	56.41	58.14	59.85

Appendix 37a - 7SWG HDBC - (All altitude) - 100m Basic

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		7SWG	
Basic / Recommended Span (m)		100	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	166.4	0.38	0.51	0.67	0.85	1.05	1.27	1.51	1.77	3.40
0	155.7	0.40	0.55	0.72	0.91	1.12	1.36	1.61	1.89	3.63
5	147.0	0.43	0.58	0.76	0.96	1.19	1.44	1.71	2.01	3.85
10	138.9	0.45	0.62	0.80	1.02	1.26	1.52	1.81	2.12	4.07
15	131.6	0.48	0.65	0.85	1.07	1.33	1.60	1.91	2.24	4.29
20	124.9	0.50	0.68	0.89	1.13	1.40	1.69	2.01	2.36	4.52
25	118.9	0.53	0.72	0.94	1.19	1.47	1.78	2.11	2.48	4.75
30	113.3	0.55	0.75	0.98	1.25	1.54	1.86	2.22	2.60	4.99
35	108.3	0.58	0.79	1.03	1.30	1.61	1.95	2.32	2.72	5.22
40	103.8	0.61	0.82	1.08	1.36	1.68	2.03	2.42	2.84	5.45
45	99.6	0.63	0.86	1.12	1.42	1.75	2.12	2.52	2.96	5.67
50	95.8	0.66	0.89	1.16	1.47	1.82	2.20	2.62	3.08	5.90
55	92.4	0.68	0.93	1.21	1.53	1.89	2.28	2.72	3.19	6.12
60	89.2	0.70	0.96	1.25	1.58	1.96	2.37	2.82	3.31	6.34
65	86.3	0.73	0.99	1.29	1.64	2.02	2.45	2.91	3.42	6.55
70	83.6	0.75	1.02	1.34	1.69	2.09	2.53	3.01	3.53	6.76
75	81.1	0.77	1.05	1.38	1.74	2.15	2.60	3.10	3.64	6.97
80	78.8	0.80	1.09	1.42	1.79	2.21	2.68	3.19	3.74	7.17

Appendix 38 - .175" ACSR / 175mm ACSR (Lynx) - (All altitudes) - 76.2mm Basic Matched to Table 5 & 6 of CE/C/36 Specification.

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	LYNX
Greased Conductor Weight (kg/m)	0.8626
Cross Sectional Area of Conductor (mm^2)	226.2
Conductor Overall Diameter (mm)	19.5
Coefficient of Linear Expansion (/Degree C)	1.8E-05
Modulus of Elasticity (kg/mm^2)	8157.73
Rated Breaking Strength of Conductor (kgf)	8137.3
Basic / Recommended Span (m)	76.2
Wind Pressure on Conductor (N/m^2)	380
Radial Ice Thickness (mm)	9.5
Ice Density (kg/m^3)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	2312.8
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	1627.5
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	2277.1
Maximum Conductor Weight (MCW) (kg/m)			1.653
Maximum Conductor Pressure (MCP) (kg/m)			1.492
Freezing Point Tension (FPT) (kgf)	at	0°C	1772.1

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: LYNX

Temperature Shift (Deg. C) 0
Tension Reduction at 15°C (%) 10

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.09	0.27	0.29	0.31	0.32	0.34	0.36
80	0.36	1.07	1.15	1.22	1.30	1.37	1.44
120	0.80	2.41	2.58	2.76	2.92	3.09	3.25
160	1.42	4.28	4.59	4.90	5.20	5.49	5.77
200	2.22	6.69	7.17	7.65	8.12	8.58	9.02
240	3.20	9.63	10.33	11.02	11.69	12.35	12.99
280	4.36	13.11	14.06	15.00	15.92	16.81	17.68
320	5.70	17.12	18.37	19.59	20.79	21.96	23.09
360	7.21	21.67	23.25	24.80	26.31	27.79	29.23
400	8.90	26.75	28.70	30.61	32.48	34.31	36.08
440	10.77	32.37	34.73	37.04	39.31	41.51	43.66
480	12.81	38.52	41.33	44.08	46.78	49.40	51.96
520	15.04	45.21	48.50	51.74	54.90	57.98	60.98

Appendix 38a - .175" ACSR / 175mm ACSR (Lynx) - (All altitudes) - 76.2mm Basic Matched to Table 5 & 6 of CE/C/36 Specification.

Table 6 - Existing conductors re-sagged

Conductor Code Name		LYNX	
Basic / Recommended Span (m)		76.2	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	75	80	90	100	110	120	130	180
-5.6	1938.6	0.20	0.31	0.36	0.45	0.56	0.67	0.80	0.94	1.80
0	1772.1	0.22	0.34	0.39	0.49	0.61	0.74	0.88	1.03	1.97
5	1627.5	0.24	0.37	0.42	0.54	0.66	0.80	0.95	1.12	2.15
10	1487.9	0.26	0.41	0.46	0.59	0.72	0.88	1.04	1.22	2.35
15	1354.6	0.29	0.45	0.51	0.64	0.80	0.96	1.15	1.35	2.58
20	1229.2	0.32	0.49	0.56	0.71	0.88	1.06	1.26	1.48	2.84
25	1113.2	0.35	0.54	0.62	0.78	0.97	1.17	1.39	1.64	3.14
30	1007.9	0.39	0.60	0.68	0.87	1.07	1.29	1.54	1.81	3.47
35	914.2	0.42	0.66	0.75	0.96	1.18	1.43	1.70	1.99	3.82
40	832.1	0.47	0.73	0.83	1.05	1.30	1.57	1.87	2.19	4.20
45	761.3	0.51	0.80	0.91	1.15	1.42	1.71	2.04	2.39	4.59
50	700.7	0.55	0.87	0.98	1.25	1.54	1.86	2.22	2.60	4.99
55	648.8	0.60	0.93	1.06	1.35	1.66	2.01	2.39	2.81	5.38
60	604.5	0.64	1.00	1.14	1.44	1.78	2.16	2.57	3.01	5.78
65	566.5	0.69	1.07	1.22	1.54	1.90	2.30	2.74	3.22	6.17
70	533.6	0.73	1.14	1.29	1.64	2.02	2.44	2.91	3.41	6.55
75	505.1	0.77	1.20	1.37	1.73	2.13	2.58	3.07	3.61	6.92
80	480.1	0.81	1.26	1.44	1.82	2.25	2.72	3.23	3.80	7.28

Table 5 - New conductors with 8% overtension

Conductor Code Name		LYNX	
Basic / Recommended Span (m)		76.2	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		8.0	at 15°C
Required Percentage Increase in Tension (%)		8	at 15°C

Temp. (Deg. C)	Tension (kgf)	ERECTION TABLE Sag (m) for Span Length (m) 60	75	80	90	100	110	120	130	180
-5.6	2062.5	0.19	0.29	0.33	0.42	0.52	0.63	0.75	0.88	1.69
0	1893.2	0.21	0.32	0.36	0.46	0.57	0.69	0.82	0.96	1.85
5	1745.3	0.22	0.35	0.40	0.50	0.62	0.75	0.89	1.04	2.00
10	1601.5	0.24	0.38	0.43	0.55	0.67	0.81	0.97	1.14	2.18
15	1463.0	0.27	0.41	0.47	0.60	0.74	0.89	1.06	1.25	2.39
20	1331.1	0.29	0.46	0.52	0.66	0.81	0.98	1.17	1.37	2.62
25	1207.2	0.32	0.50	0.57	0.72	0.89	1.08	1.29	1.51	2.89
30	1093.1	0.36	0.55	0.63	0.80	0.99	1.19	1.42	1.67	3.20
35	989.9	0.39	0.61	0.70	0.88	1.09	1.32	1.57	1.84	3.53
40	898.3	0.43	0.68	0.77	0.97	1.20	1.45	1.73	2.03	3.89
45	818.4	0.47	0.74	0.84	1.07	1.32	1.59	1.90	2.23	4.27
50	749.5	0.52	0.81	0.92	1.17	1.44	1.74	2.07	2.43	4.66
55	690.6	0.56	0.88	1.00	1.26	1.56	1.89	2.25	2.64	5.06
60	640.2	0.61	0.95	1.08	1.36	1.68	2.04	2.43	2.85	5.46
65	597.1	0.65	1.02	1.16	1.46	1.81	2.18	2.60	3.05	5.85
70	560.1	0.69	1.08	1.23	1.56	1.93	2.33	2.77	3.25	6.24
75	528.1	0.74	1.15	1.31	1.65	2.04	2.47	2.94	3.45	6.62
80	500.2	0.78	1.21	1.38	1.75	2.16	2.61	3.10	3.64	6.98

Appendix 39 - .1" / 100mm^2 ACSR (Normal altitude) - 90m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	DOG
Greased Conductor Weight (kg/m)	0.3962
Cross Sectional Area of Conductor (mm²)	118.5
Conductor Overall Diameter (mm)	14.2
Coefficient of Linear Expansion (/Degree C)	2E-05
Modulus of Elasticity (kg/mm²)	7699
Rated Breaking Strength of Conductor (kgf)	3329.4
Basic / Recommended Span (m)	90
Wind Pressure on Conductor (N/m²)	380
Radial Ice Thickness (mm)	9.5
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	1664.7
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	665.9
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	1270.9
Maximum Conductor Weight (MCW) (kg/m)			1.042
Maximum Conductor Pressure (MCP) (kg/m)			1.286
Freezing Point Tension (FPT) (kgf)	at	0°C	736.3

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: DOG

Temperature Shift (Deg. C) 0
Tension Reduction at 15°C (%) 10

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.10	0.29	0.30	0.32	0.33	0.35	0.36
80	0.39	1.14	1.21	1.27	1.33	1.40	1.45
120	0.87	2.57	2.72	2.86	3.00	3.14	3.27
160	1.55	4.56	4.83	5.09	5.34	5.58	5.82
200	2.42	7.13	7.55	7.95	8.34	8.72	9.09
240	3.48	10.27	10.87	11.45	12.01	12.56	13.09
280	4.73	13.98	14.79	15.58	16.35	17.10	17.82
320	6.18	18.26	19.32	20.35	21.36	22.33	23.28
360	7.83	23.11	24.45	25.76	27.03	28.26	29.46
400	9.66	28.53	30.19	31.80	33.37	34.89	36.37
440	11.69	34.52	36.53	38.48	40.38	42.22	44.01
480	13.91	41.08	43.47	45.80	48.05	50.25	52.37
520	16.33	48.22	51.02	53.75	56.40	58.97	61.47

Appendix 39a - .1" / 100mm2 ACSR (Normal altitude) - 90m Basic

Conductor Code Name		DOG	
Basic / Recommended Span (m)		90	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	820.2	0.22	0.30	0.39	0.49	0.60	0.73	0.87	1.02	1.96
0	736.3	0.24	0.33	0.43	0.54	0.67	0.81	0.97	1.14	2.18
5	665.9	0.27	0.36	0.48	0.60	0.74	0.90	1.07	1.26	2.41
10	600.6	0.30	0.40	0.53	0.67	0.82	1.00	1.19	1.39	2.67
15	541.2	0.33	0.45	0.59	0.74	0.92	1.11	1.32	1.55	2.96
20	488.5	0.36	0.50	0.65	0.82	1.01	1.23	1.46	1.71	3.28
25	442.5	0.40	0.55	0.72	0.91	1.12	1.35	1.61	1.89	3.63
30	402.9	0.44	0.60	0.79	1.00	1.23	1.49	1.77	2.08	3.98
35	369.3	0.48	0.66	0.86	1.09	1.34	1.62	1.93	2.27	4.34
40	340.8	0.52	0.71	0.93	1.18	1.45	1.76	2.09	2.46	4.71
45	316.6	0.56	0.77	1.00	1.27	1.56	1.89	2.25	2.64	5.07
50	295.9	0.60	0.82	1.07	1.36	1.67	2.03	2.41	2.83	5.42
55	278.2	0.64	0.87	1.14	1.44	1.78	2.15	2.56	3.01	5.77
60	262.9	0.68	0.92	1.21	1.53	1.88	2.28	2.71	3.18	6.10
65	249.5	0.71	0.97	1.27	1.61	1.99	2.40	2.86	3.35	6.43
70	237.8	0.75	1.02	1.33	1.69	2.08	2.52	3.00	3.52	6.75
75	227.4	0.78	1.07	1.39	1.76	2.18	2.64	3.14	3.68	7.06
80	218.1	0.82	1.11	1.45	1.84	2.27	2.75	3.27	3.84	7.36

Conductor Code Name		DOG	
Basic / Recommended Span (m)		90	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		10.0	at 15°C
Required Percentage Increase in Tension (%)		10	at 15°C

Temp. (Deg. C)	Tension (kgf)	ERECTION TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	891.9	0.20	0.27	0.36	0.45	0.56	0.67	0.80	0.94	1.80
0	804.6	0.22	0.30	0.39	0.50	0.62	0.74	0.89	1.04	1.99
5	730.3	0.24	0.33	0.43	0.55	0.68	0.82	0.98	1.15	2.20
10	660.2	0.27	0.37	0.48	0.61	0.75	0.91	1.08	1.27	2.43
15	595.3	0.30	0.41	0.53	0.67	0.83	1.01	1.20	1.41	2.70
20	536.6	0.33	0.45	0.59	0.75	0.92	1.12	1.33	1.56	2.99
25	484.4	0.37	0.50	0.65	0.83	1.02	1.24	1.47	1.73	3.31
30	438.9	0.41	0.55	0.72	0.91	1.13	1.37	1.62	1.91	3.66
35	399.9	0.45	0.61	0.79	1.00	1.24	1.50	1.78	2.09	4.01
40	366.7	0.49	0.66	0.86	1.09	1.35	1.63	1.94	2.28	4.38
45	338.6	0.53	0.72	0.94	1.18	1.46	1.77	2.11	2.47	4.74
50	314.7	0.57	0.77	1.01	1.27	1.57	1.90	2.27	2.66	5.10
55	294.3	0.61	0.82	1.08	1.36	1.68	2.04	2.42	2.84	5.45
60	276.8	0.64	0.88	1.14	1.45	1.79	2.16	2.58	3.02	5.80
65	261.7	0.68	0.93	1.21	1.53	1.89	2.29	2.73	3.20	6.13
70	248.5	0.72	0.98	1.28	1.61	1.99	2.41	2.87	3.37	6.46
75	236.8	0.75	1.02	1.34	1.69	2.09	2.53	3.01	3.53	6.78
80	226.5	0.79	1.07	1.40	1.77	2.19	2.65	3.15	3.69	7.08

Appendix 40 - .1" / 100mm2 ACSR (Normal altitude) - 100m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	DOG
Greased Conductor Weight (kg/m)	0.3962
Cross Sectional Area of Conductor (mm^2)	118.5
Conductor Overall Diameter (mm)	14.2
Coefficient of Linear Expansion (/Degree C)	2E-05
Modulus of Elasticity (kg/mm^2)	7699
Rated Breaking Strength of Conductor (kgf)	3329.4
Basic / Recommended Span (m)	100
Wind Pressure on Conductor (N/m^2)	380
Radial Ice Thickness (mm)	9.5
Ice Density (kg/m^3)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	1664.7
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	665.9
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	1320.4
Maximum Conductor Weight (MCW) (kg/m)			1.042
Maximum Conductor Pressure (MCP) (kg/m)			1.286
Freezing Point Tension (FPT) (kgf)	at	0°C	732.8

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: DOG

Temperature Shift (Deg. C) 0
Tension Reduction at 15°C (%) 10

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.10	0.27	0.28	0.30	0.31	0.32	0.34
80	0.39	1.07	1.13	1.18	1.24	1.29	1.34
120	0.88	2.41	2.54	2.66	2.78	2.90	3.02
160	1.56	4.28	4.51	4.73	4.95	5.16	5.37
200	2.44	6.68	7.04	7.39	7.74	8.07	8.39
240	3.51	9.63	10.14	10.65	11.14	11.62	12.08
280	4.78	13.10	13.81	14.49	15.16	15.81	16.45
320	6.24	17.11	18.03	18.93	19.80	20.65	21.48
360	7.89	21.66	22.82	23.96	25.06	26.14	27.19
400	9.75	26.74	28.18	29.58	30.94	32.27	33.56
440	11.79	32.35	34.09	35.79	37.44	39.05	40.61
480	14.03	38.50	40.57	42.59	44.56	46.47	48.33
520	16.47	45.18	47.62	49.99	52.30	54.54	56.72

Appendix 40a - .1" / 100mm2 ACSR (Normal altitude) - 100m Basic

Conductor Code Name		DOG	
Basic / Recommended Span (m)		100	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	813.0	0.22	0.30	0.39	0.49	0.61	0.74	0.88	1.03	1.97
0	732.8	0.24	0.33	0.43	0.55	0.68	0.82	0.97	1.14	2.19
5	665.9	0.27	0.36	0.48	0.60	0.74	0.90	1.07	1.26	2.41
10	604.4	0.30	0.40	0.52	0.66	0.82	0.99	1.18	1.38	2.66
15	548.8	0.32	0.44	0.58	0.73	0.90	1.09	1.30	1.53	2.92
20	499.5	0.36	0.49	0.63	0.80	0.99	1.20	1.43	1.68	3.21
25	456.4	0.39	0.53	0.69	0.88	1.09	1.31	1.56	1.83	3.52
30	419.2	0.43	0.58	0.76	0.96	1.18	1.43	1.70	2.00	3.83
35	387.3	0.46	0.63	0.82	1.04	1.28	1.55	1.84	2.16	4.14
40	359.9	0.50	0.67	0.88	1.11	1.38	1.67	1.98	2.33	4.46
45	336.3	0.53	0.72	0.94	1.19	1.47	1.78	2.12	2.49	4.77
50	316.0	0.56	0.77	1.00	1.27	1.57	1.90	2.26	2.65	5.08
55	298.4	0.60	0.81	1.06	1.34	1.66	2.01	2.39	2.81	5.38
60	283.0	0.63	0.86	1.12	1.42	1.75	2.12	2.52	2.96	5.67
65	269.4	0.66	0.90	1.18	1.49	1.84	2.22	2.65	3.11	5.96
70	257.4	0.69	0.94	1.23	1.56	1.92	2.33	2.77	3.25	6.23
75	246.8	0.72	0.98	1.28	1.63	2.01	2.43	2.89	3.39	6.50
80	237.2	0.75	1.02	1.34	1.69	2.09	2.53	3.01	3.53	6.77

Conductor Code Name		DOG	
Basic / Recommended Span (m)		100	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		10.0	at 15°C
Required Percentage Increase in Tension (%)		10	at 15°C

Temp. (Deg. C)	Tension (kgf)	ERECTION TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	887.8	0.20	0.27	0.36	0.45	0.56	0.68	0.80	0.94	1.81
0	803.3	0.22	0.30	0.39	0.50	0.62	0.75	0.89	1.04	2.00
5	731.9	0.24	0.33	0.43	0.55	0.68	0.82	0.97	1.14	2.19
10	665.1	0.27	0.36	0.48	0.60	0.74	0.90	1.07	1.26	2.41
15	603.7	0.30	0.40	0.53	0.66	0.82	0.99	1.18	1.39	2.66
20	548.2	0.33	0.44	0.58	0.73	0.90	1.09	1.30	1.53	2.93
25	499.0	0.36	0.49	0.64	0.80	0.99	1.20	1.43	1.68	3.22
30	456.0	0.39	0.53	0.70	0.88	1.09	1.31	1.56	1.84	3.52
35	418.8	0.43	0.58	0.76	0.96	1.18	1.43	1.70	2.00	3.83
40	386.9	0.46	0.63	0.82	1.04	1.28	1.55	1.84	2.16	4.15
45	359.6	0.50	0.67	0.88	1.12	1.38	1.67	1.98	2.33	4.46
50	336.1	0.53	0.72	0.94	1.19	1.47	1.78	2.12	2.49	4.77
55	315.8	0.56	0.77	1.00	1.27	1.57	1.90	2.26	2.65	5.08
60	298.2	0.60	0.81	1.06	1.35	1.66	2.01	2.39	2.81	5.38
65	282.8	0.63	0.86	1.12	1.42	1.75	2.12	2.52	2.96	5.67
70	269.3	0.66	0.90	1.18	1.49	1.84	2.23	2.65	3.11	5.96
75	257.3	0.69	0.94	1.23	1.56	1.92	2.33	2.77	3.25	6.24
80	246.6	0.72	0.98	1.29	1.63	2.01	2.43	2.89	3.39	6.51

Appendix 41 - .1" / 70mm^2 HDBC (Normal altitude) - 90m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	COPPER 70
Greased Conductor Weight (kg/m)	0.621
Cross Sectional Area of Conductor (mm²)	69.28
Conductor Overall Diameter (mm)	10.65
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.3
Rated Breaking Strength of Conductor (kgf)	2740.9
Basic / Recommended Span (m)	90
Wind Pressure on Conductor (N/m²)	380
Radial Ice Thickness (mm)	9.5
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	1370.5
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	913.6
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	1363.1
Maximum Conductor Weight (MCW) (kg/m)			1.170
Maximum Conductor Pressure (MCP) (kg/m)			1.149
Freezing Point Tension (FPT) (kgf)	at	0°C	972.2

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: COPPER 70

Temperature Shift (Deg. C)	0
Tension Reduction at 15°C (%)	5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.12	0.25	0.26	0.27	0.29	0.30	0.31
80	0.48	0.99	1.04	1.10	1.15	1.20	1.25
120	1.07	2.23	2.35	2.47	2.58	2.70	2.81
160	1.91	3.96	4.17	4.38	4.59	4.80	5.00
200	2.98	6.20	6.52	6.85	7.18	7.50	7.82
240	4.30	8.92	9.39	9.86	10.33	10.80	11.25
280	5.85	12.14	12.78	13.43	14.06	14.69	15.32
320	7.64	15.86	16.70	17.54	18.37	19.19	20.01
360	9.67	20.07	21.13	22.19	23.25	24.29	25.32
400	11.94	24.78	26.09	27.40	28.70	29.99	31.26
440	14.45	29.98	31.57	33.15	34.73	36.29	37.83
480	17.19	35.68	37.57	39.46	41.33	43.18	45.02
520	20.18	41.88	44.09	46.31	48.50	50.68	52.83

Appendix 41a - .1" / 70mm^2 HDBC (Normal altitude) - 90m Basic

Common Design & Erection Chart

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		COPPER 70	
Basic / Recommended Span (m)		90	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	1040.4	0.27	0.37	0.48	0.60	0.75	0.90	1.07	1.26	2.42
0	972.2	0.29	0.39	0.51	0.65	0.80	0.97	1.15	1.35	2.59
5	913.6	0.31	0.42	0.54	0.69	0.85	1.03	1.22	1.44	2.75
10	857.6	0.33	0.44	0.58	0.73	0.91	1.10	1.30	1.53	2.93
15	804.3	0.35	0.47	0.62	0.78	0.97	1.17	1.39	1.63	3.13
20	754.0	0.37	0.50	0.66	0.83	1.03	1.25	1.48	1.74	3.34
25	707.1	0.40	0.54	0.70	0.89	1.10	1.33	1.58	1.86	3.56
30	663.5	0.42	0.57	0.75	0.95	1.17	1.42	1.68	1.98	3.79
35	623.4	0.45	0.61	0.80	1.01	1.25	1.51	1.79	2.10	4.03
40	586.7	0.48	0.65	0.85	1.07	1.32	1.60	1.91	2.24	4.29
45	553.4	0.50	0.69	0.90	1.14	1.40	1.70	2.02	2.37	4.54
50	523.2	0.53	0.73	0.95	1.20	1.48	1.80	2.14	2.51	4.81
55	495.8	0.56	0.77	1.00	1.27	1.57	1.89	2.25	2.65	5.07
60	471.2	0.59	0.81	1.05	1.33	1.65	1.99	2.37	2.78	5.34
65	448.9	0.62	0.85	1.11	1.40	1.73	2.09	2.49	2.92	5.60
70	428.8	0.65	0.89	1.16	1.47	1.81	2.19	2.61	3.06	5.87
75	410.6	0.68	0.93	1.21	1.53	1.89	2.29	2.72	3.20	6.13
80	394.0	0.71	0.97	1.26	1.60	1.97	2.38	2.84	3.33	6.38

Appendix 42 - .15" / 100mm^2 HDBC (Normal altitude) - 90m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	HDBC 100
Greased Conductor Weight (kg/m)	0.911
Cross Sectional Area of Conductor (mm²)	101.654
Conductor Overall Diameter (mm)	12.9
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.3
Rated Breaking Strength of Conductor (kgf)	3838.2
Basic / Recommended Span (m)	90
Wind Pressure on Conductor (N/m²)	380
Radial Ice Thickness (mm)	9.5
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	1814.4
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	1279.4
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	1803.8
Maximum Conductor Weight (MCW) (kg/m)			1.522
Maximum Conductor Pressure (MCP) (kg/m)			1.236
Freezing Point Tension (FPT) (kgf)	at	0°C	1362.7

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: HDBC 100

Temperature Shift (Deg. C)	0
Tension Reduction at 15°C (%)	5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.12	0.26	0.27	0.28	0.30	0.31	0.32
80	0.50	1.03	1.08	1.13	1.19	1.24	1.29
120	1.12	2.32	2.44	2.55	2.67	2.78	2.90
160	2.00	4.12	4.33	4.54	4.74	4.95	5.15
200	3.12	6.44	6.76	7.09	7.41	7.73	8.05
240	4.49	9.27	9.74	10.21	10.68	11.14	11.59
280	6.12	12.62	13.26	13.90	14.53	15.16	15.77
320	7.99	16.48	17.32	18.15	18.98	19.80	20.60
360	10.11	20.86	21.92	22.97	24.02	25.05	26.08
400	12.48	25.75	27.06	28.36	29.66	30.93	32.19
440	15.10	31.16	32.74	34.32	35.88	37.43	38.95
480	17.97	37.08	38.97	40.84	42.70	44.54	46.36
520	21.09	43.52	45.73	47.93	50.12	52.28	54.40

Appendix 42a - .15" / 100mm^2 HDBC (Normal altitude) - 90m Basic

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		HDBC 100	
Basic / Recommended Span (m)		90	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	1460.1	0.28	0.38	0.50	0.63	0.78	0.94	1.12	1.32	2.53
0	1362.7	0.30	0.41	0.53	0.68	0.84	1.01	1.20	1.41	2.71
5	1279.4	0.32	0.44	0.57	0.72	0.89	1.08	1.28	1.50	2.88
10	1200.1	0.34	0.47	0.61	0.77	0.95	1.15	1.37	1.60	3.08
15	1125.2	0.36	0.50	0.65	0.82	1.01	1.22	1.46	1.71	3.28
20	1055.0	0.39	0.53	0.69	0.87	1.08	1.31	1.55	1.82	3.50
25	989.8	0.41	0.56	0.74	0.93	1.15	1.39	1.66	1.94	3.73
30	929.6	0.44	0.60	0.78	0.99	1.23	1.48	1.76	2.07	3.97
35	874.5	0.47	0.64	0.83	1.06	1.30	1.58	1.88	2.20	4.22
40	824.3	0.50	0.68	0.88	1.12	1.38	1.67	1.99	2.34	4.48
45	778.8	0.53	0.72	0.94	1.18	1.46	1.77	2.11	2.47	4.74
50	737.6	0.56	0.76	0.99	1.25	1.54	1.87	2.22	2.61	5.00
55	700.4	0.59	0.80	1.04	1.32	1.63	1.97	2.34	2.75	5.27
60	666.9	0.61	0.84	1.09	1.38	1.71	2.07	2.46	2.89	5.53
65	636.6	0.64	0.88	1.15	1.45	1.79	2.16	2.58	3.02	5.80
70	609.1	0.67	0.92	1.20	1.51	1.87	2.26	2.69	3.16	6.06
75	584.3	0.70	0.96	1.25	1.58	1.95	2.36	2.81	3.29	6.32
80	561.7	0.73	0.99	1.30	1.64	2.03	2.45	2.92	3.43	6.57

Appendix 43 - .2" / 125mm^2 HDBC (Normal altitude) - 100m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	HDBC 125
Greased Conductor Weight (kg/m)	1.130
Cross Sectional Area of Conductor (mm²)	125.499
Conductor Overall Diameter (mm)	14.5
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.29
Rated Breaking Strength of Conductor (kgf)	4929.3
Basic / Recommended Span (m)	100
Wind Pressure on Conductor (N/m²)	380
Radial Ice Thickness (mm)	9.5
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	1814.4
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	1643.1
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	1814.4
Maximum Conductor Weight (MCW) (kg/m)			1.784
Maximum Conductor Pressure (MCP) (kg/m)			1.298
Freezing Point Tension (FPT) (kgf)	at	0°C	1237.0

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: HDBC 125

Temperature Shift (Deg. C)	0
Tension Reduction at 15°C (%)	5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.17	0.31	0.32	0.33	0.34	0.35	0.36
80	0.68	1.22	1.26	1.31	1.35	1.39	1.43
120	1.54	2.75	2.84	2.94	3.03	3.12	3.21
160	2.74	4.88	5.05	5.22	5.39	5.55	5.71
200	4.28	7.63	7.90	8.16	8.42	8.68	8.93
240	6.16	10.99	11.37	11.75	12.13	12.49	12.85
280	8.39	14.96	15.48	16.00	16.50	17.00	17.49
320	10.95	19.53	20.22	20.89	21.56	22.21	22.85
360	13.86	24.72	25.59	26.44	27.28	28.11	28.92
400	17.11	30.52	31.59	32.64	33.68	34.70	35.70
440	20.71	36.93	38.23	39.50	40.75	41.99	43.20
480	24.65	43.95	45.49	47.01	48.50	49.97	51.41
520	28.92	51.58	53.39	55.17	56.92	58.64	60.34

Appendix 43a - .2" / 125mm^2 HDBC (Normal altitude) - 100m Basic

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		HDBC 125	
Basic / Recommended Span (m)		100	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	1320.5	0.39	0.52	0.68	0.87	1.07	1.29	1.54	1.81	3.47
0	1237.0	0.41	0.56	0.73	0.92	1.14	1.38	1.64	1.93	3.70
5	1168.5	0.44	0.59	0.77	0.98	1.21	1.46	1.74	2.04	3.92
10	1105.8	0.46	0.63	0.82	1.03	1.28	1.55	1.84	2.16	4.14
15	1048.4	0.49	0.66	0.86	1.09	1.35	1.63	1.94	2.28	4.37
20	996.2	0.51	0.69	0.91	1.15	1.42	1.72	2.04	2.40	4.59
25	948.6	0.54	0.73	0.95	1.21	1.49	1.80	2.14	2.52	4.82
30	905.4	0.56	0.76	1.00	1.26	1.56	1.89	2.25	2.64	5.05
35	866.1	0.59	0.80	1.04	1.32	1.63	1.97	2.35	2.76	5.28
40	830.3	0.61	0.83	1.09	1.38	1.70	2.06	2.45	2.87	5.51
45	797.7	0.64	0.87	1.13	1.43	1.77	2.14	2.55	2.99	5.74
50	767.9	0.66	0.90	1.18	1.49	1.84	2.23	2.65	3.11	5.96
55	740.5	0.69	0.93	1.22	1.54	1.91	2.31	2.75	3.22	6.18
60	715.5	0.71	0.97	1.26	1.60	1.97	2.39	2.84	3.34	6.40
65	692.4	0.73	1.00	1.31	1.65	2.04	2.47	2.94	3.45	6.61
70	671.1	0.76	1.03	1.35	1.70	2.10	2.55	3.03	3.56	6.82
75	651.4	0.78	1.06	1.39	1.76	2.17	2.62	3.12	3.66	7.03
80	633.1	0.80	1.09	1.43	1.81	2.23	2.70	3.21	3.77	7.23

Appendix 44 - .1" / 100mm^2 ACSR (High altitude) - 90m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	DOG
Greased Conductor Weight (kg/m)	0.3962
Cross Sectional Area of Conductor (mm²)	118.5
Conductor Overall Diameter (mm)	14.2
Coefficient of Linear Expansion (/Degree C)	2E-05
Modulus of Elasticity (kg/mm²)	7699
Rated Breaking Strength of Conductor (kgf)	3329.4
Basic / Recommended Span (m)	90
Wind Pressure on Conductor (N/m²)	570
Radial Ice Thickness (mm)	12.5
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	1664.7
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	665.9
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	1596.6
Maximum Conductor Weight (MCW) (kg/m)			1.353
Maximum Conductor Pressure (MCP) (kg/m)			2.278
Freezing Point Tension (FPT) (kgf)	at	0°C	736.3

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: DOG

Temperature Shift (Deg. C) 0
Tension Reduction at 15°C (%) 10

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.10	0.29	0.30	0.32	0.33	0.35	0.36
80	0.39	1.14	1.21	1.27	1.33	1.40	1.45
120	0.87	2.57	2.72	2.86	3.00	3.14	3.27
160	1.55	4.56	4.83	5.09	5.34	5.58	5.82
200	2.42	7.13	7.55	7.95	8.34	8.72	9.09
240	3.48	10.27	10.87	11.45	12.01	12.56	13.09
280	4.73	13.98	14.79	15.58	16.35	17.10	17.82
320	6.18	18.26	19.32	20.35	21.36	22.33	23.28
360	7.83	23.11	24.45	25.76	27.03	28.26	29.46
400	9.66	28.53	30.19	31.80	33.37	34.89	36.37
440	11.69	34.52	36.53	38.48	40.38	42.22	44.01
480	13.91	41.08	43.47	45.80	48.05	50.25	52.37
520	16.33	48.22	51.02	53.75	56.40	58.97	61.47

Appendix 44a - .1" / 100mm2 ACSR (High altitude) - 90m Basic

Conductor Code Name		DOG	
Basic / Recommended Span (m)		90	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	820.2	0.22	0.30	0.39	0.49	0.60	0.73	0.87	1.02	1.96
0	736.3	0.24	0.33	0.43	0.54	0.67	0.81	0.97	1.14	2.18
5	665.9	0.27	0.36	0.48	0.60	0.74	0.90	1.07	1.26	2.41
10	600.6	0.30	0.40	0.53	0.67	0.82	1.00	1.19	1.39	2.67
15	541.2	0.33	0.45	0.59	0.74	0.92	1.11	1.32	1.55	2.96
20	488.5	0.36	0.50	0.65	0.82	1.01	1.23	1.46	1.71	3.28
25	442.5	0.40	0.55	0.72	0.91	1.12	1.35	1.61	1.89	3.63
30	402.9	0.44	0.60	0.79	1.00	1.23	1.49	1.77	2.08	3.98
35	369.3	0.48	0.66	0.86	1.09	1.34	1.62	1.93	2.27	4.34
40	340.8	0.52	0.71	0.93	1.18	1.45	1.76	2.09	2.46	4.71
45	316.6	0.56	0.77	1.00	1.27	1.56	1.89	2.25	2.64	5.07
50	295.9	0.60	0.82	1.07	1.36	1.67	2.03	2.41	2.83	5.42
55	278.2	0.64	0.87	1.14	1.44	1.78	2.15	2.56	3.01	5.77
60	262.9	0.68	0.92	1.21	1.53	1.88	2.28	2.71	3.18	6.10
65	249.5	0.71	0.97	1.27	1.61	1.99	2.40	2.86	3.35	6.43
70	237.8	0.75	1.02	1.33	1.69	2.08	2.52	3.00	3.52	6.75
75	227.4	0.78	1.07	1.39	1.76	2.18	2.64	3.14	3.68	7.06
80	218.1	0.82	1.11	1.45	1.84	2.27	2.75	3.27	3.84	7.36

Conductor Code Name		DOG	
Basic / Recommended Span (m)		90	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		10.0	at 15°C
Required Percentage Increase in Tension (%)		10	at 15°C

Temp. (Deg. C)	Tension (kgf)	ERECTION TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	891.9	0.20	0.27	0.36	0.45	0.56	0.67	0.80	0.94	1.80
0	804.6	0.22	0.30	0.39	0.50	0.62	0.74	0.89	1.04	1.99
5	730.3	0.24	0.33	0.43	0.55	0.68	0.82	0.98	1.15	2.20
10	660.2	0.27	0.37	0.48	0.61	0.75	0.91	1.08	1.27	2.43
15	595.3	0.30	0.41	0.53	0.67	0.83	1.01	1.20	1.41	2.70
20	536.6	0.33	0.45	0.59	0.75	0.92	1.12	1.33	1.56	2.99
25	484.4	0.37	0.50	0.65	0.83	1.02	1.24	1.47	1.73	3.31
30	438.9	0.41	0.55	0.72	0.91	1.13	1.37	1.62	1.91	3.66
35	399.9	0.45	0.61	0.79	1.00	1.24	1.50	1.78	2.09	4.01
40	366.7	0.49	0.66	0.86	1.09	1.35	1.63	1.94	2.28	4.38
45	338.6	0.53	0.72	0.94	1.18	1.46	1.77	2.11	2.47	4.74
50	314.7	0.57	0.77	1.01	1.27	1.57	1.90	2.27	2.66	5.10
55	294.3	0.61	0.82	1.08	1.36	1.68	2.04	2.42	2.84	5.45
60	276.8	0.64	0.88	1.14	1.45	1.79	2.16	2.58	3.02	5.80
65	261.7	0.68	0.93	1.21	1.53	1.89	2.29	2.73	3.20	6.13
70	248.5	0.72	0.98	1.28	1.61	1.99	2.41	2.87	3.37	6.46
75	236.8	0.75	1.02	1.34	1.69	2.09	2.53	3.01	3.53	6.78
80	226.5	0.79	1.07	1.40	1.77	2.19	2.65	3.15	3.69	7.08

Appendix 45 - .1" / 70mm^2 HDBC (High altitude) - 90m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	COPPER 70
Greased Conductor Weight (kg/m)	0.621
Cross Sectional Area of Conductor (mm²)	69.28
Conductor Overall Diameter (mm)	10.65
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.3
Rated Breaking Strength of Conductor (kgf)	2740.9
Basic / Recommended Span (m)	90
Wind Pressure on Conductor (N/m²)	570
Radial Ice Thickness (mm)	12.5
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	1370.5
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	913.6
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	1370.5
Maximum Conductor Weight (MCW) (kg/m)			1.451
Maximum Conductor Pressure (MCP) (kg/m)			2.072
Freezing Point Tension (FPT) (kgf)	at	0°C	597.9

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: COPPER 70

Temperature Shift (Deg. C)	0
Tension Reduction at 15°C (%)	5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.19	0.35	0.36	0.37	0.38	0.39	0.41
80	0.78	1.39	1.44	1.49	1.53	1.58	1.62
120	1.75	3.13	3.24	3.35	3.45	3.55	3.65
160	3.10	5.57	5.76	5.95	6.14	6.32	6.49
200	4.85	8.70	9.00	9.30	9.59	9.87	10.15
240	6.98	12.53	12.97	13.39	13.80	14.21	14.61
280	9.50	17.06	17.65	18.22	18.79	19.34	19.89
320	12.41	22.28	23.05	23.80	24.54	25.27	25.98
360	15.71	28.20	29.17	30.12	31.06	31.98	32.88
400	19.39	34.82	36.02	37.19	38.34	39.48	40.59
440	23.46	42.13	43.58	45.00	46.40	47.77	49.11
480	27.93	50.14	51.86	53.55	55.22	56.85	58.45
520	32.77	58.84	60.87	62.85	64.80	66.72	68.60

Appendix 45a - .1" / 70mm^2 HDBC (High altitude) - 90m Basic

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		COPPER 70	
Basic / Recommended Span (m)		90	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	640.5	0.44	0.59	0.78	0.98	1.21	1.47	1.75	2.05	3.93
0	597.9	0.47	0.64	0.83	1.05	1.30	1.57	1.87	2.19	4.21
5	563.6	0.50	0.67	0.88	1.12	1.38	1.67	1.98	2.33	4.46
10	532.4	0.52	0.71	0.93	1.18	1.46	1.76	2.10	2.46	4.72
15	504.2	0.55	0.75	0.99	1.25	1.54	1.86	2.22	2.60	4.99
20	478.7	0.58	0.79	1.04	1.31	1.62	1.96	2.34	2.74	5.25
25	455.7	0.61	0.83	1.09	1.38	1.70	2.06	2.45	2.88	5.52
30	434.9	0.64	0.87	1.14	1.45	1.78	2.16	2.57	3.02	5.78
35	416.1	0.67	0.91	1.19	1.51	1.87	2.26	2.69	3.15	6.04
40	399.1	0.70	0.95	1.24	1.58	1.95	2.35	2.80	3.29	6.30
45	383.6	0.73	0.99	1.30	1.64	2.02	2.45	2.91	3.42	6.56
50	369.5	0.76	1.03	1.34	1.70	2.10	2.54	3.03	3.55	6.81
55	356.6	0.78	1.07	1.39	1.76	2.18	2.63	3.13	3.68	7.05
60	344.7	0.81	1.10	1.44	1.82	2.25	2.72	3.24	3.81	7.30
65	333.8	0.84	1.14	1.49	1.88	2.33	2.81	3.35	3.93	7.53
70	323.8	0.86	1.17	1.53	1.94	2.40	2.90	3.45	4.05	7.77
75	314.5	0.89	1.21	1.58	2.00	2.47	2.99	3.55	4.17	8.00
80	305.9	0.91	1.24	1.62	2.06	2.54	3.07	3.65	4.29	8.22

Appendix 46 - .15" / 100mm^2 HDBC (High altitude) - 90m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	HDBC 100
Greased Conductor Weight (kg/m)	0.911
Cross Sectional Area of Conductor (mm²)	101.654
Conductor Overall Diameter (mm)	12.9
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.3
Rated Breaking Strength of Conductor (kgf)	3838.2
Basic / Recommended Span (m)	90
Wind Pressure on Conductor (N/m²)	570
Radial Ice Thickness (mm)	12.5
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	1814.4
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	1279.4
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	1814.4
Maximum Conductor Weight (MCW) (kg/m)			1.822
Maximum Conductor Pressure (MCP) (kg/m)			2.203
Freezing Point Tension (FPT) (kgf)	at	0°C	985.4

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: HDBC 100

Temperature Shift (Deg. C)	0
Tension Reduction at 15°C (%)	5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.17	0.32	0.34	0.35	0.36	0.37	0.38
80	0.69	1.30	1.35	1.39	1.44	1.49	1.54
120	1.55	2.92	3.03	3.14	3.25	3.35	3.46
160	2.75	5.19	5.38	5.58	5.77	5.96	6.14
200	4.30	8.10	8.41	8.72	9.02	9.31	9.60
240	6.20	11.67	12.11	12.55	12.98	13.41	13.82
280	8.44	15.88	16.49	17.08	17.67	18.25	18.81
320	11.02	20.74	21.54	22.31	23.08	23.83	24.57
360	13.95	26.26	27.26	28.24	29.21	30.16	31.10
400	17.22	32.41	33.65	34.87	36.06	37.24	38.39
440	20.83	39.22	40.72	42.19	43.64	45.06	46.45
480	24.79	46.68	48.46	50.21	51.93	53.62	55.28
520	29.10	54.78	56.87	58.93	60.95	62.93	64.88

Appendix 46a - .15" / 100mm^2 HDBC (High altitude) - 90m Basic

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		HDBC 100	
Basic / Recommended Span (m)		90	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	1058.4	0.39	0.53	0.69	0.87	1.08	1.30	1.55	1.82	3.49
0	985.4	0.42	0.57	0.74	0.94	1.16	1.40	1.66	1.95	3.75
5	925.6	0.44	0.60	0.79	1.00	1.23	1.49	1.77	2.08	3.99
10	870.8	0.47	0.64	0.84	1.06	1.31	1.58	1.88	2.21	4.24
15	820.9	0.50	0.68	0.89	1.12	1.39	1.68	2.00	2.34	4.50
20	775.7	0.53	0.72	0.94	1.19	1.47	1.78	2.11	2.48	4.76
25	734.9	0.56	0.76	0.99	1.26	1.55	1.88	2.23	2.62	5.02
30	698.0	0.59	0.80	1.04	1.32	1.63	1.97	2.35	2.76	5.29
35	664.7	0.62	0.84	1.10	1.39	1.71	2.07	2.47	2.90	5.55
40	634.6	0.65	0.88	1.15	1.45	1.79	2.17	2.58	3.03	5.82
45	607.3	0.68	0.92	1.20	1.52	1.88	2.27	2.70	3.17	6.08
50	582.6	0.70	0.96	1.25	1.58	1.95	2.37	2.82	3.30	6.33
55	560.2	0.73	1.00	1.30	1.65	2.03	2.46	2.93	3.44	6.59
60	539.7	0.76	1.03	1.35	1.71	2.11	2.55	3.04	3.57	6.84
65	520.9	0.79	1.07	1.40	1.77	2.19	2.65	3.15	3.70	7.08
70	503.8	0.81	1.11	1.45	1.83	2.26	2.74	3.26	3.82	7.33
75	487.9	0.84	1.14	1.49	1.89	2.33	2.82	3.36	3.94	7.56
80	473.4	0.87	1.18	1.54	1.95	2.41	2.91	3.46	4.07	7.80

Appendix 47 - .2" / 125mm^2 HDBC (High altitude) - 100m Basic

CONDUCTOR SAG/TENSION PARAMETERS for DESIGN

Conductor Code Name (if any)	HDBC 125
Greased Conductor Weight (kg/m)	1.130
Cross Sectional Area of Conductor (mm²)	125.499
Conductor Overall Diameter (mm)	14.5
Coefficient of Linear Expansion (/Degree C)	1.70E-05
Modulus of Elasticity (kg/mm²)	12655.29
Rated Breaking Strength of Conductor (kgf)	4929.3
Basic / Recommended Span (m)	100
Wind Pressure on Conductor (N/m²)	570
Radial Ice Thickness (mm)	12.5
Ice Density (kg/m³)	913
Absolute Maximum Working Tension (MWT) Limit (kgf)	1814.4
Temperature at MWT Limit (Degrees C)	-5.6
Maximum "Everyday" Tension (EDT) Limit (kgf)	1643.1
Temperature at EDT Limit (Degrees C)	5

Maximum Conductor Tension (MCT) (kgf)	at	-5.6°C	1814.4
Maximum Conductor Weight (MCW) (kg/m)			2.098
Maximum Conductor Pressure (MCP) (kg/m)			2.296
Freezing Point Tension (FPT) (kgf)	at	0°C	860.3

ORDINATES FOR PLOTTING UPLIFT AND GROUND CLEARANCE CURVES

Conductor: HDBC 125

Temperature Shift (Deg. C)	0
Tension Reduction at 15°C (%)	5

2X Span (m)	Sag (m) for Cold Curve -5.6	Sag (m) for Range of Hot Curve Temperatures					
		50	55	60	65	70	75
40	0.25	0.38	0.39	0.40	0.41	0.42	0.43
80	1.00	1.53	1.57	1.60	1.64	1.68	1.71
120	2.25	3.44	3.53	3.61	3.69	3.77	3.85
160	4.00	6.12	6.27	6.42	6.56	6.71	6.85
200	6.25	9.56	9.79	10.02	10.25	10.48	10.70
240	9.00	13.76	14.10	14.43	14.76	15.09	15.40
280	12.25	18.73	19.19	19.65	20.09	20.53	20.97
320	16.00	24.46	25.07	25.66	26.25	26.82	27.39
360	20.25	30.96	31.73	32.48	33.22	33.94	34.66
400	25.00	38.22	39.17	40.10	41.01	41.91	42.79
440	30.25	46.25	47.39	48.52	49.62	50.71	51.78
480	36.00	55.04	56.40	57.74	59.05	60.35	61.62
520	42.25	64.60	66.19	67.76	69.30	70.82	72.32

Appendix 47a - .2" / 125mm^2 HDBC (High altitude) - 100m Basic

DESIGN and ERECTION SAG/ TENSION TABLE

Conductor Code Name		HDBC 125	
Basic / Recommended Span (m)		100	
Temperature Shift for Creep	(Deg. C)	0	Insert minus sign as necessary
Equivalent Percentage Increase in Tension (%)		0.0	at 15°C
Required Percentage Increase in Tension (%)		0	at 15°C

Temp. (Deg. C)	Tension (kgf)	DESIGN TABLE Sag (m) for Span Length (m) 60	70	80	90	100	110	120	130	180
-5.6	904.0	0.56	0.77	1.00	1.27	1.56	1.89	2.25	2.64	5.06
0	860.3	0.59	0.80	1.05	1.33	1.64	1.99	2.36	2.77	5.32
5	825.1	0.62	0.84	1.10	1.39	1.71	2.07	2.47	2.89	5.55
10	792.9	0.64	0.87	1.14	1.44	1.78	2.16	2.57	3.01	5.77
15	763.5	0.67	0.91	1.18	1.50	1.85	2.24	2.66	3.13	5.99
20	736.5	0.69	0.94	1.23	1.55	1.92	2.32	2.76	3.24	6.21
25	711.7	0.71	0.97	1.27	1.61	1.98	2.40	2.86	3.35	6.43
30	689.0	0.74	1.00	1.31	1.66	2.05	2.48	2.95	3.46	6.64
35	667.9	0.76	1.04	1.35	1.71	2.11	2.56	3.05	3.57	6.85
40	648.4	0.78	1.07	1.39	1.76	2.18	2.64	3.14	3.68	7.06
45	630.4	0.81	1.10	1.43	1.82	2.24	2.71	3.23	3.79	7.26
50	613.5	0.83	1.13	1.47	1.86	2.30	2.79	3.32	3.89	7.46
55	597.9	0.85	1.16	1.51	1.91	2.36	2.86	3.40	3.99	7.65
60	583.2	0.87	1.19	1.55	1.96	2.42	2.93	3.49	4.09	7.85
65	569.5	0.89	1.22	1.59	2.01	2.48	3.00	3.57	4.19	8.04
70	556.6	0.91	1.24	1.62	2.06	2.54	3.07	3.65	4.29	8.22
75	544.4	0.93	1.27	1.66	2.10	2.59	3.14	3.74	4.38	8.41
80	533.0	0.95	1.30	1.70	2.15	2.65	3.21	3.82	4.48	8.59