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LT 1x220 kV CHILOÉ - GAMBOA

PROJECT

TEST REPORT

FOR TOWER TYPE 'S220.SP'

CHINA ELECTRIC POWER RESEARCH INSTITUTE

July 3~5, 2017

PREFACE

This report is in accordance with the contract made between SAESA GROUP (SAESA) and Henan Dingli Pole & Tower Co., Ltd. (DINGLI). It covers the test of tower type 'S220.SP'. It includes statement, preparation of the tower for the test, test cases and their procedures, test results, and conclusions. Relevant appendices are also attached to it.

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<tr><td colspan="2">SAESA GROUP(SAESA)(Client)</td><td>Mr. Franklin Stuardo Alarcón
Mr. Eugenio Munita R.
Ms. Yuan Ping</td><td colspan="2" rowspan="4">CONTENTS:
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Mr.</td></tr>
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<tr><td colspan="2" rowspan="2">CHINA ELECTRIC POWER RESEARCH INSTITUTE (CEPRI) (TEST STATION)</td><td rowspan="2">Mr. Geng Jingdu</td><td>REPORTED</td><td></td></tr>
<tr><td>DATE OF ISSUE:</td><td>July 27, 2017</td></tr>
<tr><td colspan="3">NOTE:</td><td>REV.</td><td>0</td></tr>
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I. INTRODUCTION

Tower type 'S220.SP' is a tower for LT 1x220 kV CHILOÉ – GAMBOA PROJECT. The tower was designed by SIGA and manufactured by Henan Dingli Pole & Tower Co., Ltd（DINGLI）. The test facilities are located in China Electric Power Research Institute (CEPRI) of State Grid Co., Liangxiang, Beijing, P.R.China. The test for tower type 'S220.SP' was carried out according to the requirements of the Test Specification for Tower Type 'S220.SP' and IEC 60652:2002 "Loading tests on overhead line structures". The tower test process was witnessed by representatives from SAESA, REC and DINGLI. The witnesses and participants are listed as follows:

Witnesses:

Mr. Franklin Stuardo Alarcón	(SAESA)
Mr. Eugenio Munita R.	(SAESA)
Mr. Yuan Ping	(SAESA)
Mr. Cristian Rudloff	(REC)
Mr. Geng Minghui	(REC)
Mr. Zhai Jianfeng	(DINGLI)
Mr. Pian Daqiang	(DINGLI)
Mr. Li Qiang	(DINGLI)
Mr. Sun Ting	(DINGLI)

Participants:

Mr. Liu Baogang	(CEPRI)
Mr. Wei Jiameng	(CEPRI)

II. ARRANGEMENT FOR TOWER TEST

The single line drawing of tower 'S220.SP' is shown in Figure 1.

The drawing Nos. & Revisions are given in Page 7. The test procedure was approved by SAESA and REC. The members and bolts of the tower were delivered to the test station on June 26, 2017. The preparation work for the tower test (i.e. calibration of load cells, erection of tower, rigging, etc.) was completed on the afternoon of July 3, 2017. Then the regular test for tower type 'S220.SP' was started on the same day. The weather was good during the test. For more details, see Appendix D.

Preparation of the tower test included:

1. The black tower was assembled in the assembling yard of the tower test station.
2. Bolt tightening was checked as procedure.
3. Before testing, visual inspection of the assembled tower was performed by CEPRI and the Designer. The tower was assembled and erected as per design drawings. Also, the setup of the testing equipment was according to the Testing Procedure. The assembled tower was lifted by a crane and erected on a rigid universal foundation. The foundation covers 24×24m area and has up to 350 tons holding capacity per leg.
4. A hydraulic loading system was used to apply loads through the cable connected to the tower. The arrangements of rigging drawing for test tower are shown in Appendix A. For each loading cable, a load cell was linked in series to monitor the load values applied. Computer system was used to control the loading process automatically.
5. Seven vertical loads (V1~V7, refer to Appendix B-1) were applied step by step by hydraulic loading system through anchors fixed on the foundation. The weight of cable was considered as part of the vertical load.
6. Twelve transverse loads (T1~T7 and WT1~WT5, refer to Appendix B-1) were provided by hydraulic loading system step by step through a transverse reaction tower.
7. Twelve longitudinal loads (L1~L7 and WL1~WL5, refer to Appendix B-1) were applied by hydraulic loading system through a longitudinal reaction tower.
8. All load cells used to measure load values were calibrated on a universal material test machine at the laboratory of CEPRI before the test and the results are given in Appendix C.
9. Deflections of the tower were measured in longitudinal and transverse directions. Each deflection value is recorded at the beginning and at the end of each loading increment by one total station. The arrangement for deflection measuring points is shown in Appendix D-1.

III. TESTING PROCEDURES

1. The test procedures of the test tower 'S220.SP' were as follows:

   Test No.1: Maximum wind cross the Line

   Test No.2: Vertical overhead conductors 4 and 6, cross wind one quarter

   Test No.3: Longitudinal overload. Cut guard wire (0) and Conductor 2, longitudinal wind one quarter

   Test No.4: Longitudinal overload. Cutting of conductors 1 and 2, longitudinal wind one quarter

   Test No.5: Longitudinal overload. Cutting of conductors 2 and 4, longitudinal wind one quarter

   Test No.6: Longitudinal overload. Cutting of conductors 4 and 6, longitudinal wind one quarter

   Test No.7: Longitudinal imbalance, cross wind one quarter.

For Test No.1~ Test No. 7, the loads will be applied by the following steps:
0—50%—75%—90%—95%—100%—0
The load values of each case are shown in Appendix B-2.

2. Deflections of the tower in transverse and longitudinal directions were recorded for each load case. The deflection values are shown in Appendix D-2.
3. Each 100% loading step of Test No.1~ Test No.6 should be maintained for 1minute at least. 100% loading step of Test No.7 should be maintained for 5 minutes at least.

IV. TESTS AND RESULTS

On July 1, 2017, the representatives came to Test Station to witness test preparation of 'S220.SP' tower. Members of the tested tower were checked randomly for size by the representatives and found ok.

Before the beginning of the test, the representatives claimed that each 100% loading step of the cases should be maintained for 5 minutes at least.

On July 3, 2017, the tower was tested for Test No.1 (Maximum wind cross the Line) and Test No.2 (Vertical overhead conductors 4 and 6, cross wind one quarter). The tested tower passed 100% loading step of the cases successfully.

On July 4, 2017, the tower was tested for Test No.3 (Longitudinal overload, Cut guard wire (0) and Conductor 2, longitudinal wind one quarter), Test No.4 (Longitudinal overload. Cutting of conductors 1 and 2,

longitudinal wind one quarter) and Test No.5 (Longitudinal overload, Cutting of conductors 2 and 4, longitudinal wind one quarter). The tested tower passed 100% loading step of the cases successfully.

On July 5, 2017, the tower was tested for Test No.6 (Longitudinal overload. Cutting of conductors 4 and 6, longitudinal wind one quarter) and Test No.7 (Longitudinal imbalance, cross wind one quarter). The tested tower passed 100% loading step of the cases successfully. Then the test was concluded.

V. CONCLUSIONS

1. The record of loads applied is given in Appendix B.
2. Observed tower deflection readings are given in Appendix D.
3. The test of 'S220.SP' tower passed the test successfully.

LT 1x220 kV CHILOÉ – GAMBOA PROJECT
LIST OF DETAILED DRAWINGS TO ASSEMBLY
TOWER TYPE 'S220.SP'

No.	REV	Drawing No.	DESCRIPTION
1	A	4981-10-74-01-01_REVA	ESTRUCTURA DE SUSPENSIÓN ESPECIAL PLANO DE DISEÑO
2	A	4981-10-74-03-02_REVA	TORRE DE SUSPENSIÓN TIPO S220.SP CABLE GUARDIA Y CRUCETAS PLANO DE FABRICACION Y MONTAJE
3	A	4981-10-74-03-03_REVA	TORRE DE SUSPENSIÓN TIPO S220.SP SUPERESTRUCTURA PLANO DE FABRICACION Y MONTAJE
4	A	4981-10-74-03-04_REVA	TORRE DE SUSPENSIÓN TIPO S220.SP CUERPO COMUN 1 Y 2 PLANO DE FABRICACION Y MONTAJE
5	A	4981-10-74-03-05_REVA	TORRE DE SUSPENSIÓN TIPO S220.SP CUERPO COMUN 3 PLANO DE FABRICACION Y MONTAJE
6	A	4981-10-74-03-06_REVA	TORRE DE SUSPENSIÓN TIPO S220.SP BASE H=28 PLANO DE FABRICACION Y MONTAJE
7	A	4981-10-74-03-07_REVA	TORRE DE SUSP. TIPO S220.SP BASE H=28 CORTES PLANO DE FABRICACION Y MONTAJE
8	A	4981-10-74-03-08_REVA	TORRE DE SUSP. TIPO S220.SP PATAS -1, ± 0 y +1 PLANO DE FABRICACION Y MONTAJE
9	A	4981-10-74-03-09_REVA	TORRE DE SUSP. TIPO S220.SP PATA +2 BARRA DE FUNDACION PLANO DE FABRICACION Y MONTAJE
10	A	4981-10-74-03-10_REVA	TORRE DE SUSP. TIPO S220.SP LISTA DE MATERIALES

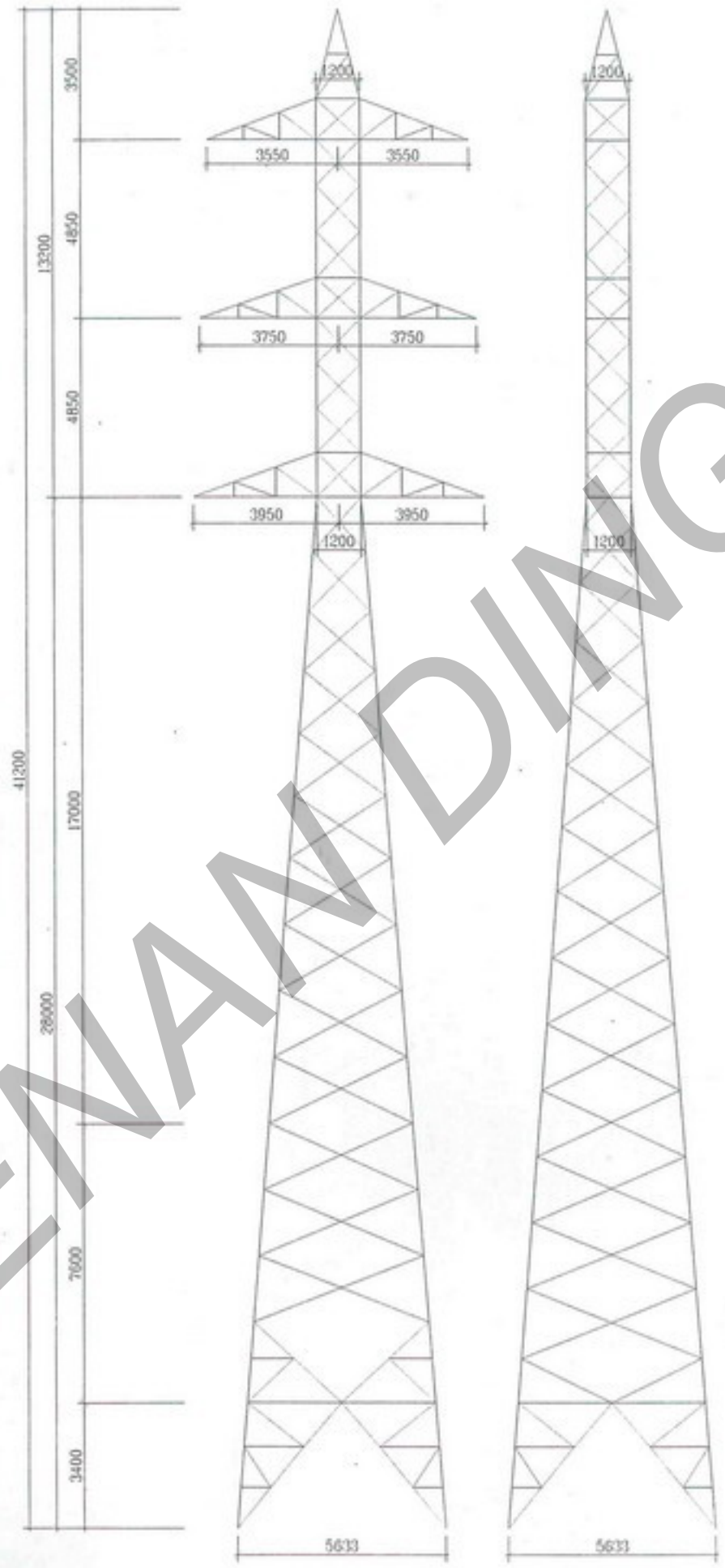
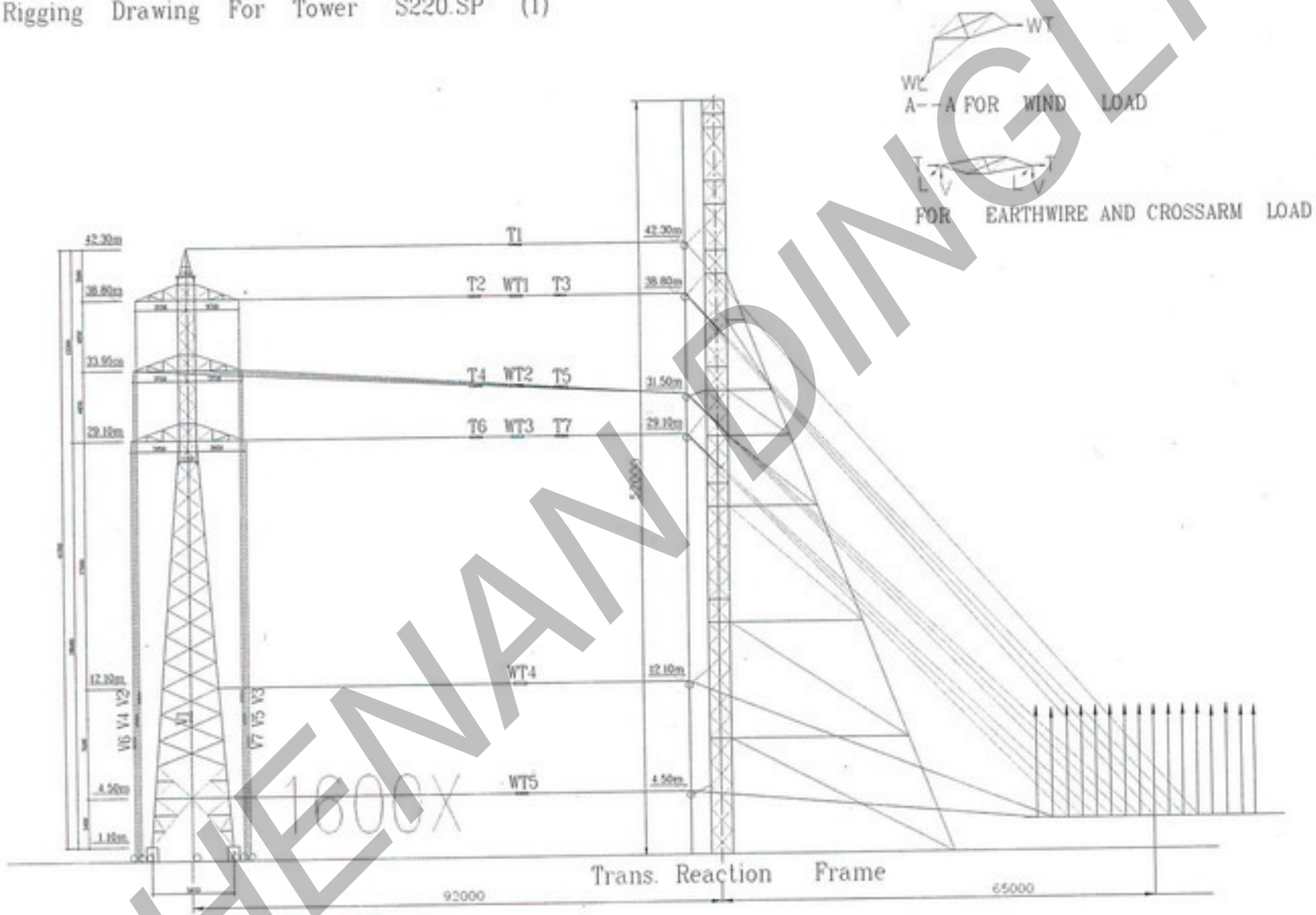


Figure 1: Outline drawing of test tower 'S220.SP'

Picture 1: Tested Tower 'S220.SP' stands on the pad during the test

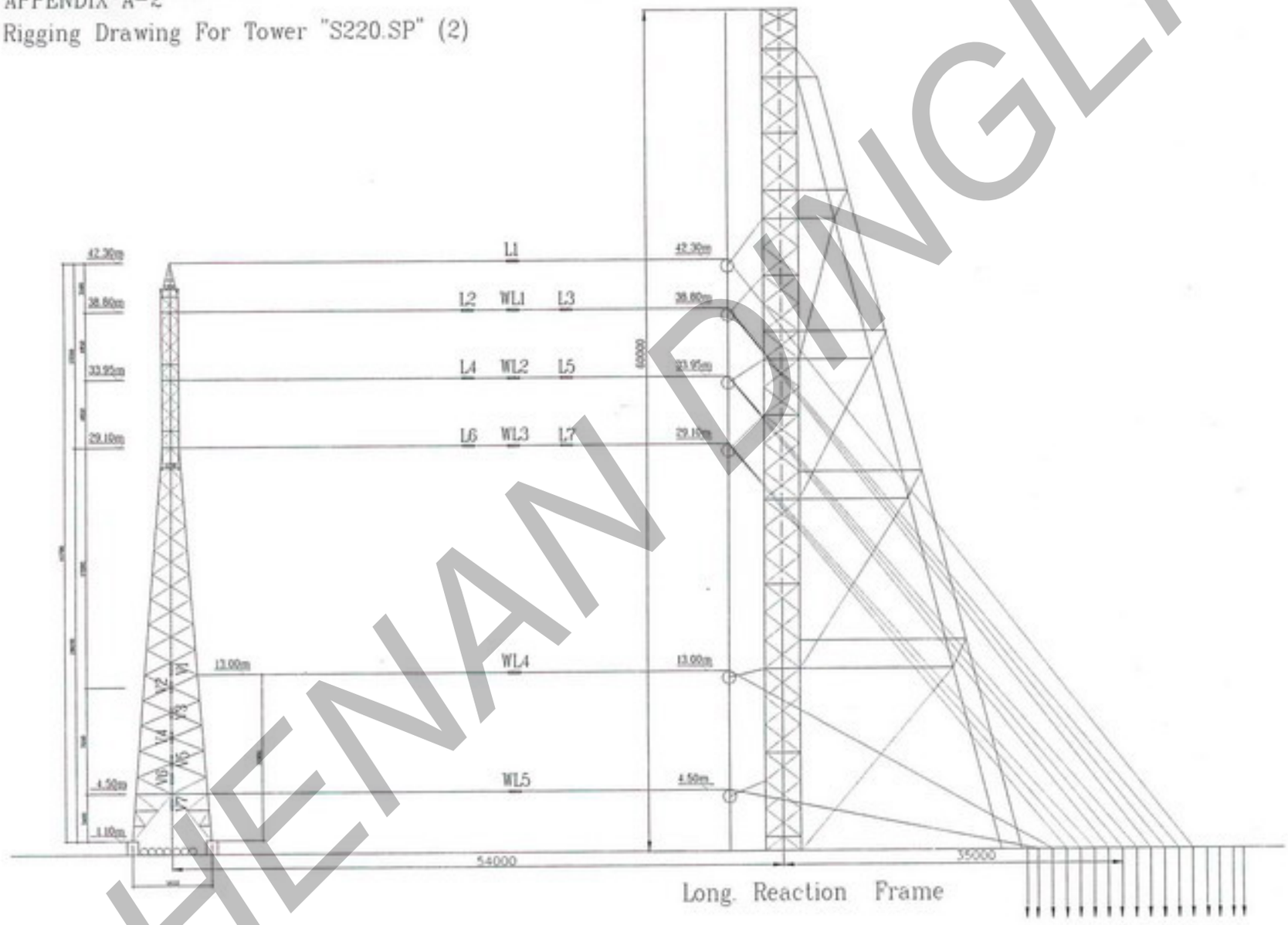
APPENDIX A-1

Rigging Drawing For Tower "S220.SP" (1)



APPENDIX A-2

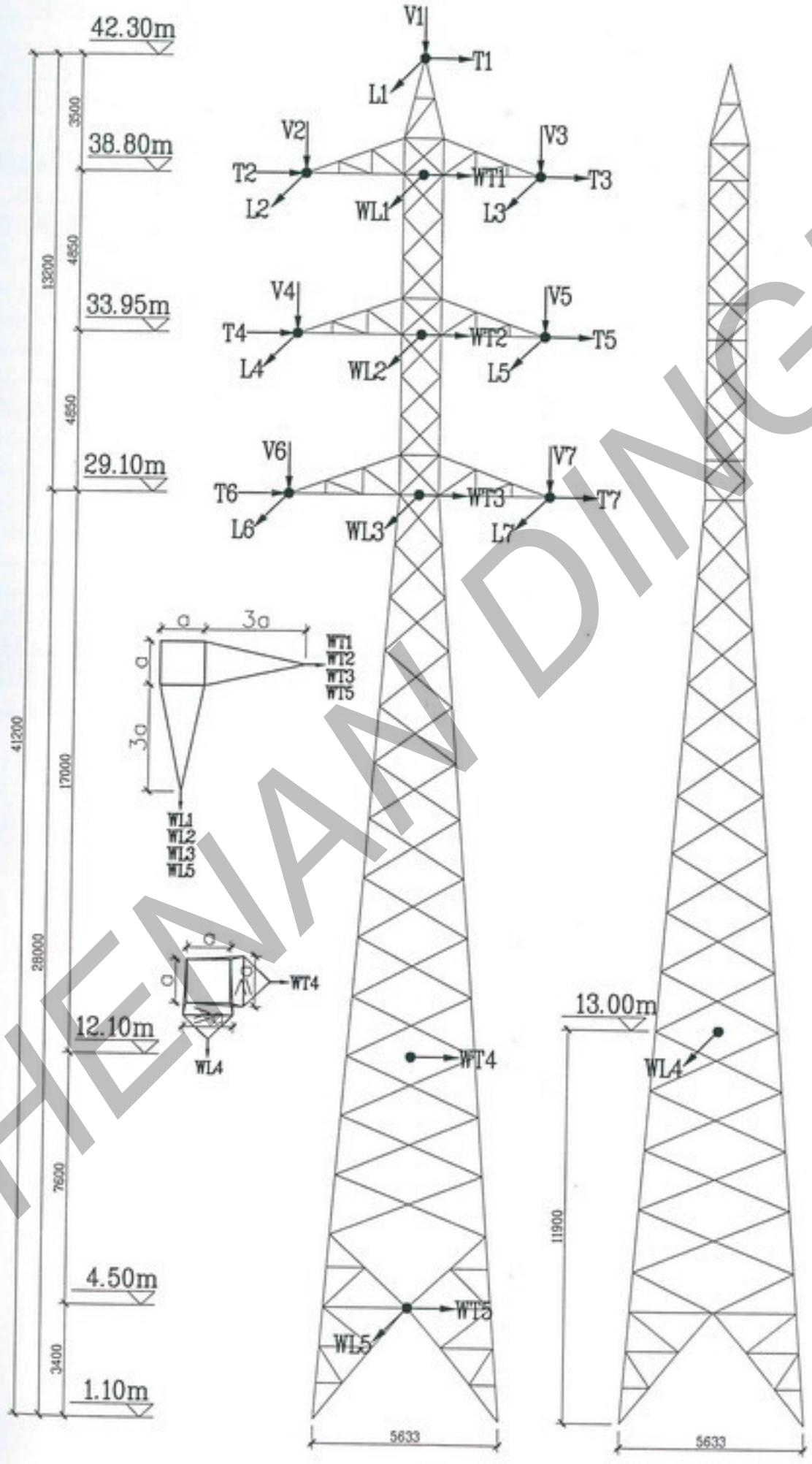
Rigging Drawing For Tower "S220.SP" (2)



Long. Reaction Frame

APPENDIX B-1

Load applied points of test tower 'S220.SP'



Appendix B-2 No.1

Rigging Calculation for Tower ' S220.SP '

Tower Loading Point	Height (m)					
shield wire	42.30			92	54	42.3
	Height (m)	Distance(m)	Deviation(m)	cos α	cos β	cos γ
TO TRANS. FRAME	42.30	92.00	0	1	0	0
TO LONGI. FRAME	42.30	54.00	0	0	1	0
		Trans. Deviation	Longi. Deviation	0	0	1
VERTICALITY		0.00	0.00			1
	Original Loading Values		(kN)	Modified Values due to Angle Force (kN)		
Loading Cases	X	Y	Z	T	L	V
1	4.410	0.000	3.459	4.410	0.000	3.459
2	1.000	0.000	2.764	1.000	0.000	2.764
3	0.235	11.231	2.764	0.235	11.231	2.764
4	0.118	0.000	2.764	0.118	0.000	2.764
5	0.118	0.000	2.764	0.118	0.000	2.764
6	0.118	0.000	2.764	0.118	0.000	2.764
7	0.882	1.705	2.764	0.882	1.705	2.764
weight of trans. rope			1.196			
weight of longi. rope			0.270			
reducition by rope weight						

Appendix B-2

No.2

Rigging Calculation for Tower ' S220.SP '

Tower Loading Point	Height (m)					
left top conductor	38. 80			95. 55	54	38. 8
	Height (m)	Distance(m)	Deviation(m)	cos α	cos β	cos γ
TO TRANS. FRAME	38. 80	95. 55	0	1	0	0
TO LONGI. FRAME	38. 80	54. 00	0	0	1	0
		Trans. Deviation	Longi. Deviation	0	0	1
VERTICALITY		0.00	0.00			1
	Original Loading Values		(kN)	Modified Values due to Angle Force (kN)		
Loading Cases	X	Y	Z	T	L	V
1	10.074	0.000	10.809	10.074	0.000	10.809
2	2.352	0.000	8.644	2.352	0.000	8.644
3	0.470	0.353	8.644	0.470	0.353	8.644
4	0.235	18.522	8.644	0.235	18.522	8.644
5	0.470	0.353	8.644	0.470	0.353	8.644
6	0.470	0.353	8.644	0.470	0.353	8.644
7	1.882	3.940	8.644	1.882	3.940	8.644
weight of trans. rope			1.242			
weight of longi. rope			0.702			
reducition by rope weight						
Tower Loading Point	Height (m)					
right top conductor	38. 80			88. 45	54	38. 8
	Height (m)	Distance(m)	Deviation(m)	cos α	cos β	cos γ
TO TRANS. FRAME	38. 80	88. 45	0	1	0	0
TO LONGI. FRAME	38. 80	54. 00	0	0	1	0
		Trans. Deviation	Longi. Deviation	0	0	1
VERTICALITY		0.00	0.00			1
	Original Loading Values		(kN)	Modified Values due to Angle Force (kN)		
Loading Cases	X	Y	Z	T	L	V
1	10.074	0.000	10.809	10.074	0.000	10.809
2	2.352	0.000	8.644	2.352	0.000	8.644
3	0.235	18.522	8.644	0.235	18.522	8.644
4	0.235	18.522	8.644	0.235	18.522	8.644
5	0.235	18.522	8.644	0.235	18.522	8.644
6	0.470	0.353	8.644	0.470	0.353	8.644
7	1.882	3.940	8.644	1.882	3.940	8.644
weight of trans. rope			1.150			
weight of longi. rope			0.702			
reducition by rope weight						

Appendix B-2 No.3

Rigging Calculation for Tower ' S220.SP '

Tower Loading Point	Height (m)					
left middle conductor	33.95			95.78133952	54	33.95
	Height (m)	Distance(m)	Deviation(m)	cos α	cos β	cos γ
TO TRANS. FRAME	31.50	95.75	0	0.999672801	0	0
TO LONGI. FRAME	33.95	54.00	0	0	1	0
		Trans. Deviation	Longi. Deviation	0.025579095	0	1
VERTICALITY		0.00	0.00			0.999672801
	Original Loading Values		(kN)	Modified Values due to Angle Force (kN)		
Loading Cases	X	Y	Z	T	L	V
1	10.074	0.000	10.809	10.078	0.000	10.552
2	2.352	0.000	8.644	2.353	0.000	8.583
3	0.470	0.353	8.644	0.471	0.353	8.632
4	0.470	0.353	8.644	0.471	0.353	8.632
5	0.470	0.353	8.644	0.471	0.353	8.632
6	0.470	0.353	8.644	0.471	0.353	8.632
7	1.882	3.940	8.644	1.882	3.940	8.595
weight of trans. rope			1.245			
weight of longi. rope			0.702			
reducition by rope weight						

Tower Loading Point	Height (m)					
right middle conductor	33.95			88.28400195	54	33.95
	Height (m)	Distance(m)	Deviation(m)	cos α	cos β	cos γ
TO TRANS. FRAME	31.50	88.25	0	0.999614857	0	0
TO LONGI. FRAME	33.95	54.00	0	0	1	0
		Trans. Deviation	Longi. Deviation	0.027751347	0	1
VERTICALITY		0.00	0.00			0.999614857
	Original Loading Values		(kN)	Modified Values due to Angle Force (kN)		
Loading Cases	X	Y	Z	T	L	V
1	10.074	0.000	10.809	10.078	0.000	10.530
2	2.352	0.000	15.641	2.353	0.000	15.576
3	0.470	0.353	8.644	0.471	0.353	8.631
4	0.470	0.353	8.644	0.471	0.353	8.631
5	0.235	18.522	8.644	0.235	18.522	8.637
6	0.235	18.522	8.644	0.235	18.522	8.637
7	1.882	3.940	8.644	1.882	3.940	8.591
weight of trans. rope			1.147			
weight of longi. rope			0.702			
reducition by rope weight						

Appendix B-2 No.4

Rigging Calculation for Tower ' S220.SP '

Tower Loading Point	Height (m)					
left bottom conductor	29.10			95.95	54	29.1
	Height (m)	Distance(m)	Deviation(m)	cos α	cos β	cos γ
TO TRANS. FRAME	29.10	95.95	0	1	0	0
TO LONGI. FRAME	29.10	54.00	0	0	1	0
		Trans. Deviation	Longi. Deviation	0	0	1
VERTICALITY		0.00	0.00			1
	Original Loading Values		(kN)	Modified Values due to Angle Force (kN)		
Loading Cases	X	Y	Z	T	L	V
1	10.074	0.000	10.809	10.074	0.000	10.809
2	2.352	0.000	8.644	2.352	0.000	8.644
3	0.470	0.353	8.644	0.470	0.353	8.644
4	0.470	0.353	8.644	0.470	0.353	8.644
5	0.470	0.353	8.644	0.470	0.353	8.644
6	0.470	0.353	8.644	0.470	0.353	8.644
7	1.882	3.940	8.644	1.882	3.940	8.644
weight of trans. rope			1.247			
weight of longi. rope			0.702			
reducition by rope weight						
Tower Loading Point	Height (m)					
right bottom conductor	29.10			88.05	54	29.1
	Height (m)	Distance(m)	Deviation(m)	cos α	cos β	cos γ
TO TRANS. FRAME	29.10	88.05	0	1	0	0
TO LONGI. FRAME	29.10	54.00	0	0	1	0
		Trans. Deviation	Longi. Deviation	0	0	1
VERTICALITY		0.00	0.00			1
	Original Loading Values		(kN)	Modified Values due to Angle Force (kN)		
Loading Cases	X	Y	Z	T	L	V
1	10.074	0.000	10.809	10.074	0.000	10.809
2	2.352	0.000	15.641	2.352	0.000	15.641
3	0.470	0.353	8.644	0.470	0.353	8.644
4	0.470	0.353	8.644	0.470	0.353	8.644
5	0.470	0.353	8.644	0.470	0.353	8.644
6	0.235	18.522	8.644	0.235	18.522	8.644
7	1.882	3.940	8.644	1.882	3.940	8.644
weight of trans. rope			1.145			
weight of longi. rope			0.702			
reducition by rope weight						

Appendix B-2 No.5

Actual loading step Values (unit:kN) "S220. SP"

Case No.	Test No. 1: Maximum wind cross the Line				
Loading point	50%	75%	90%	95%	100%
V1	1. 730	2. 595	3. 113	3. 286	3. 459
V2	5. 405	8. 107	9. 728	10. 269	10. 809
V3	5. 405	8. 107	9. 728	10. 269	10. 809
V4	5. 276	7. 914	9. 496	10. 024	10. 552
V5	5. 265	7. 897	9. 477	10. 003	10. 530
V6	5. 405	8. 107	9. 728	10. 269	10. 809
V7	5. 405	8. 107	9. 728	10. 269	10. 809
L1	0. 000	0. 000	0. 000	0. 000	0. 000
L2	0. 000	0. 000	0. 000	0. 000	0. 000
L3	0. 000	0. 000	0. 000	0. 000	0. 000
L4	0. 000	0. 000	0. 000	0. 000	0. 000
L5	0. 000	0. 000	0. 000	0. 000	0. 000
L6	0. 000	0. 000	0. 000	0. 000	0. 000
L7	0. 000	0. 000	0. 000	0. 000	0. 000
WL1	0. 000	0. 000	0. 000	0. 000	0. 000
WL2	0. 000	0. 000	0. 000	0. 000	0. 000
WL3	0. 000	0. 000	0. 000	0. 000	0. 000
WL4	0. 000	0. 000	0. 000	0. 000	0. 000
WL5	0. 000	0. 000	0. 000	0. 000	0. 000
T1	2. 205	3. 308	3. 969	4. 190	4. 410
T2	5. 037	7. 556	9. 067	9. 571	10. 074
T3	5. 037	7. 556	9. 067	9. 571	10. 074
T4	5. 039	7. 558	9. 070	9. 574	10. 078
T5	5. 039	7. 559	9. 070	9. 574	10. 078
T6	5. 037	7. 556	9. 067	9. 571	10. 074
T7	5. 037	7. 556	9. 067	9. 571	10. 074
WT1	0. 888	1. 332	1. 598	1. 687	1. 776
WT2	1. 751	2. 626	3. 151	3. 326	3. 502
WT3	2. 175	3. 263	3. 915	4. 133	4. 350
WT4	8. 732	13. 098	15. 717	16. 590	17. 464
WT5	10. 462	15. 693	18. 832	19. 878	20. 924

steps: 0-50%-75%-90%-95%-100%-0

(0-50%-75%-90%-95% shall be maintained for 1 minute;100% shall be maintained for 1 minute)

Appendix B-2 No.6

Actual loading step Values (unit:kN) "S220. SP"

Case No.	Test No. 2: Vertical overhead conductors 4 and 6, cross wind one quarter				
Loading point	50%	75%	90%	95%	100%
V1	1.382	2.073	2.487	2.625	2.764
V2	4.322	6.483	7.779	8.211	8.644
V3	4.322	6.483	7.779	8.211	8.644
V4	4.292	6.438	7.725	8.154	8.583
V5	7.788	11.682	14.018	14.797	15.576
V6	4.322	6.483	7.779	8.211	8.644
V7	7.820	11.731	14.077	14.859	15.641
L1	0.000	0.000	0.000	0.000	0.000
L2	0.000	0.000	0.000	0.000	0.000
L3	0.000	0.000	0.000	0.000	0.000
L4	0.000	0.000	0.000	0.000	0.000
L5	0.000	0.000	0.000	0.000	0.000
L6	0.000	0.000	0.000	0.000	0.000
L7	0.000	0.000	0.000	0.000	0.000
WL1	0.000	0.000	0.000	0.000	0.000
WL2	0.000	0.000	0.000	0.000	0.000
WL3	0.000	0.000	0.000	0.000	0.000
WL4	0.000	0.000	0.000	0.000	0.000
WL5	0.000	0.000	0.000	0.000	0.000
T1	0.500	0.750	0.900	0.950	1.000
T2	1.176	1.764	2.117	2.234	2.352
T3	1.176	1.764	2.117	2.234	2.352
T4	1.176	1.765	2.117	2.235	2.353
T5	1.176	1.765	2.118	2.235	2.353
T6	1.176	1.764	2.117	2.234	2.352
T7	1.176	1.764	2.117	2.234	2.352
WT1	0.173	0.259	0.311	0.328	0.345
WT2	0.350	0.525	0.630	0.665	0.700
WT3	0.435	0.652	0.783	0.826	0.870
WT4	1.746	2.620	3.143	3.318	3.493
WT5	2.092	3.139	3.766	3.976	4.185

steps: 0-50%-75%-90%-95%-100%-0

(0-50%-75%-90%-95% shall be maintained for 1 minute;100% shall be maintained for 1 minute)

Appendix B-2 No.7

Actual loading step Values (unit:kN) "S220. SP"

Case No.	Test No. 3: Longitudinal overload. Cut guard wire (0) and Conductor 2, longitudinal wind one quarter				
Loading point	50%	75%	90%	95%	100%
V1	1.382	2.073	2.487	2.625	2.764
V2	4.322	6.483	7.779	8.211	8.644
V3	4.322	6.483	7.779	8.211	8.644
V4	4.316	6.474	7.768	8.200	8.632
V5	4.315	6.473	7.767	8.199	8.631
V6	4.322	6.483	7.779	8.211	8.644
V7	4.322	6.483	7.779	8.211	8.644
L1	5.615	8.423	10.108	10.669	11.231
L2	0.176	0.265	0.318	0.335	0.353
L3	9.261	13.892	16.670	17.596	18.522
L4	0.176	0.265	0.318	0.335	0.353
L5	0.176	0.265	0.318	0.335	0.353
L6	0.176	0.265	0.318	0.335	0.353
L7	0.176	0.265	0.318	0.335	0.353
WL1	0.400	0.600	0.720	0.760	0.800
WL2	0.576	0.864	1.037	1.095	1.152
WL3	0.706	1.059	1.271	1.342	1.412
WL4	1.844	2.766	3.319	3.503	3.688
WL5	1.907	2.860	3.432	3.623	3.814
T1	0.118	0.176	0.212	0.223	0.235
T2	0.235	0.353	0.423	0.447	0.470
T3	0.118	0.176	0.212	0.223	0.235
T4	0.235	0.353	0.423	0.447	0.471
T5	0.235	0.353	0.424	0.447	0.471
T6	0.235	0.353	0.423	0.447	0.470
T7	0.235	0.353	0.423	0.447	0.470
WT1	0.000	0.000	0.000	0.000	0.000
WT2	0.000	0.000	0.000	0.000	0.000
WT3	0.000	0.000	0.000	0.000	0.000
WT4	0.000	0.000	0.000	0.000	0.000
WT5	0.000	0.000	0.000	0.000	0.000

steps: 0-50%-75%-90%-95%-100%-0

(0-50%-75%-90%-95% shall be maintained for 1 minute;100% shall be maintained for 1 minute)

Appendix B-2 No.8

Actual loading step Values (unit:kN) "S220. SP"

Case No.	Test No. 4: Longitudinal overload. Cutting of conductors 1 and 2, longitudinal wind one quarter				
Loading point	50%	75%	90%	95%	100%
V1	1.382	2.073	2.487	2.625	2.764
V2	4.322	6.483	7.779	8.211	8.644
V3	4.322	6.483	7.779	8.211	8.644
V4	4.316	6.474	7.768	8.200	8.632
V5	4.315	6.473	7.767	8.199	8.631
V6	4.322	6.483	7.779	8.211	8.644
V7	4.322	6.483	7.779	8.211	8.644
L1	0.000	0.000	0.000	0.000	0.000
L2	9.261	13.892	16.670	17.596	18.522
L3	9.261	13.892	16.670	17.596	18.522
L4	0.176	0.265	0.318	0.335	0.353
L5	0.176	0.265	0.318	0.335	0.353
L6	0.176	0.265	0.318	0.335	0.353
L7	0.176	0.265	0.318	0.335	0.353
WL1	0.400	0.600	0.720	0.760	0.800
WL2	0.576	0.864	1.037	1.095	1.152
WL3	0.706	1.059	1.271	1.342	1.412
WL4	1.844	2.766	3.319	3.503	3.688
WL5	1.907	2.860	3.432	3.623	3.814
T1	0.059	0.088	0.106	0.112	0.118
T2	0.118	0.176	0.212	0.223	0.235
T3	0.118	0.176	0.212	0.223	0.235
T4	0.235	0.353	0.423	0.447	0.471
T5	0.235	0.353	0.424	0.447	0.471
T6	0.235	0.353	0.423	0.447	0.470
T7	0.235	0.353	0.423	0.447	0.470
WT1	0.000	0.000	0.000	0.000	0.000
WT2	0.000	0.000	0.000	0.000	0.000
WT3	0.000	0.000	0.000	0.000	0.000
WT4	0.000	0.000	0.000	0.000	0.000
WT5	0.000	0.000	0.000	0.000	0.000

steps: 0-50%-75%-90%-95%-100%-0

(0-50%-75%-90%-95% shall be maintained for 1 minute;100% shall be maintained for 1 minute)

Appendix B-2 No.9

Actual loading step Values (unit:kN) "S220. SP"

Case No.	Test No. 5: Longitudinal overload. Cutting of conductors 2 and 4, longitudinal wind one quarter				
Loading point	50%	75%	90%	95%	100%
V1	1. 382	2. 073	2. 487	2. 625	2. 764
V2	4. 322	6. 483	7. 779	8. 211	8. 644
V3	4. 322	6. 483	7. 779	8. 211	8. 644
V4	4. 316	6. 474	7. 768	8. 200	8. 632
V5	4. 319	6. 478	7. 773	8. 205	8. 637
V6	4. 322	6. 483	7. 779	8. 211	8. 644
V7	4. 322	6. 483	7. 779	8. 211	8. 644
L1	0. 000	0. 000	0. 000	0. 000	0. 000
L2	0. 176	0. 265	0. 318	0. 335	0. 353
L3	9. 261	13. 892	16. 670	17. 596	18. 522
L4	0. 176	0. 265	0. 318	0. 335	0. 353
L5	9. 261	13. 892	16. 670	17. 596	18. 522
L6	0. 176	0. 265	0. 318	0. 335	0. 353
L7	0. 176	0. 265	0. 318	0. 335	0. 353
WL1	0. 400	0. 600	0. 720	0. 760	0. 800
WL2	0. 576	0. 864	1. 037	1. 095	1. 152
WL3	0. 706	1. 059	1. 271	1. 342	1. 412
WL4	1. 844	2. 766	3. 319	3. 503	3. 688
WL5	1. 907	2. 860	3. 432	3. 623	3. 814
T1	0. 059	0. 088	0. 106	0. 112	0. 118
T2	0. 235	0. 353	0. 423	0. 447	0. 470
T3	0. 118	0. 176	0. 212	0. 223	0. 235
T4	0. 235	0. 353	0. 423	0. 447	0. 471
T5	0. 118	0. 176	0. 212	0. 224	0. 235
T6	0. 235	0. 353	0. 423	0. 447	0. 470
T7	0. 235	0. 353	0. 423	0. 447	0. 470
WT1	0. 000	0. 000	0. 000	0. 000	0. 000
WT2	0. 000	0. 000	0. 000	0. 000	0. 000
WT3	0. 000	0. 000	0. 000	0. 000	0. 000
WT4	0. 000	0. 000	0. 000	0. 000	0. 000
WT5	0. 000	0. 000	0. 000	0. 000	0. 000

steps: 0-50%-75%-90%-95%-100%-0

(0-50%-75%-90%-95% shall be maintained for 1 minute;100% shall be maintained for 1 minute)

Appendix B-2 No.10

Actual loading step Values (unit:kN) "S220. SP"

Case No.	Test No. 6: Longitudinal overload. Cutting of conductors 4 and 6, longitudinal wind one quarter				
Loading point	50%	75%	90%	95%	100%
V1	1.382	2.073	2.487	2.625	2.764
V2	4.322	6.483	7.779	8.211	8.644
V3	4.322	6.483	7.779	8.211	8.644
V4	4.316	6.474	7.768	8.200	8.632
V5	4.319	6.478	7.773	8.205	8.637
V6	4.322	6.483	7.779	8.211	8.644
V7	4.322	6.483	7.779	8.211	8.644
L1	0.000	0.000	0.000	0.000	0.000
L2	0.176	0.265	0.318	0.335	0.353
L3	0.176	0.265	0.318	0.335	0.353
L4	0.176	0.265	0.318	0.335	0.353
L5	9.261	13.892	16.670	17.596	18.522
L6	0.176	0.265	0.318	0.335	0.353
L7	9.261	13.892	16.670	17.596	18.522
WL1	0.400	0.600	0.720	0.760	0.800
WL2	0.576	0.864	1.037	1.095	1.152
WL3	0.706	1.059	1.271	1.342	1.412
WL4	1.844	2.766	3.319	3.503	3.688
WL5	1.907	2.860	3.432	3.623	3.814
T1	0.059	0.088	0.106	0.112	0.118
T2	0.235	0.353	0.423	0.447	0.470
T3	0.235	0.353	0.423	0.447	0.470
T4	0.235	0.353	0.423	0.447	0.471
T5	0.118	0.176	0.212	0.224	0.235
T6	0.235	0.353	0.423	0.447	0.470
T7	0.118	0.176	0.212	0.223	0.235
WT1	0.000	0.000	0.000	0.000	0.000
WT2	0.000	0.000	0.000	0.000	0.000
WT3	0.000	0.000	0.000	0.000	0.000
WT4	0.000	0.000	0.000	0.000	0.000
WT5	0.000	0.000	0.000	0.000	0.000

steps: 0-50%-75%-90%-95%-100%-0

(0-50%-75%-90%-95% shall be maintained for 1 minute;100% shall be maintained for 1 minute)

Appendix B-2

No.11

Actual loading step Values (unit:kN) "S220. SP"

Case No.	Test No. 7: Longitudinal imbalance, cross wind one quarter.				
Loading point	50%	75%	90%	95%	100%
V1	1.382	2.073	2.487	2.625	2.764
V2	4.322	6.483	7.779	8.211	8.644
V3	4.322	6.483	7.779	8.211	8.644
V4	4.298	6.447	7.736	8.166	8.595
V5	4.296	6.444	7.732	8.162	8.591
V6	4.322	6.483	7.779	8.211	8.644
V7	4.322	6.483	7.779	8.211	8.644
L1	0.853	1.279	1.535	1.620	1.705
L2	1.970	2.955	3.546	3.743	3.940
L3	1.970	2.955	3.546	3.743	3.940
L4	1.970	2.955	3.546	3.743	3.940
L5	1.970	2.955	3.546	3.743	3.940
L6	1.970	2.955	3.546	3.743	3.940
L7	1.970	2.955	3.546	3.743	3.940
WL1	0.000	0.000	0.000	0.000	0.000
WL2	0.000	0.000	0.000	0.000	0.000
WL3	0.000	0.000	0.000	0.000	0.000
WL4	0.000	0.000	0.000	0.000	0.000
WL5	0.000	0.000	0.000	0.000	0.000
T1	0.441	0.662	0.794	0.838	0.882
T2	0.941	1.411	1.693	1.788	1.882
T3	0.941	1.411	1.693	1.788	1.882
T4	0.941	1.412	1.694	1.788	1.882
T5	0.941	1.412	1.694	1.788	1.882
T6	0.941	1.411	1.693	1.788	1.882
T7	0.941	1.411	1.693	1.788	1.882
WT1	0.173	0.259	0.311	0.328	0.345
WT2	0.350	0.525	0.630	0.665	0.700
WT3	0.435	0.652	0.783	0.826	0.870
WT4	1.746	2.620	3.143	3.318	3.493
WT5	2.092	3.139	3.766	3.976	4.185

steps: 0-50%-75%-90%-95%-100%-0

(0-50%-75%-90%-95% shall be maintained for 1 minute;100% shall be maintained for 1 minute)

Appendix C

REPORT OF LOAD CELL CALIBRATION
FOR
TEST TOWER TYPE 'S220.SP'

Model	BK--3
Manufacturer	No.701 Research Inst.
Date of Cal.	June 31, 2017
Temperature	15°C to 25°C
Cal. Method	Tension
Standard for Deviation	IEC 60652-2002

RECORD OF LOAD CELL CALIBRATION

Project name 智利S220. SP塔

Testing station | Means name 64通道加荷测控装置 | According to rules JJG455—2000

Humidity 67. 0 RH% | Temperature 24.0 ℃ | Control No. CEPRI-D-JS1-JS-021-2017-T033

Measure channel V01 | Cell No:14-01-03 | Capacity 5. 0kN

Times \ Load value	0	5				NOTE	
Increment 1	0. 0006	1. 4000				V1	
Increment 2	0. 0042	1. 4057					
Increment 3	0. 0041	1. 4067					
Average value Xi	0. 0030	1. 4041					
Cali. Factor	0. 0000	0. 2802				CaliResult	Yes √
Repeatability (%)	0	0. 48					No

Measure channel V02 | Cell No:14-02-28 | Capacity 15. 0kN

Times \ Load value	0	5	10	15		NOTE	
Increment 1	0. 0173	0. 7283	1. 4488	2. 1726		V2	
Increment 2	0. 0171	0. 7274	1. 4518	2. 1728			
Increment 3	0. 0179	0. 7279	1. 4526	2. 1672			
Average value Xi	0. 0174	0. 7278	1. 4511	2. 1709			
Cali. Factor	0. 0000	0. 1421	0. 1446	0. 1440		CaliResult	Yes √
Repeatability (%)	0	0. 12	0. 26	0. 26			No

Measure channel V03 | Cell No:14-02-17 | Capacity 15. 0kN

Times \ Load value	0	5	10	15		NOTE	
Increment 1	-0. 0038	0. 6709	1. 3630	2. 0553		V3	
Increment 2	-0. 0016	0. 6727	1. 3632	2. 0513			
Increment 3	-0. 0003	0. 6713	1. 3646	2. 0492			
Average value Xi	-0. 0019	0. 6717	1. 3636	2. 0519			
Cali. Factor	0. 0000	0. 1347	0. 1384	0. 1377		CaliResult	Yes √
Repeatability (%)	0	0. 27	0. 12	0. 3			No

Measure channel V04 | Cell No:14-02-43 | Capacity 15. 0kN

Times \ Load value	0	5	10	15		NOTE	
Increment 1	-0. 0039	0. 6910	1. 3861	2. 0906		V1	
Increment 2	-0. 0032	0. 6923	1. 3907	2. 0901			
Increment 3	-0. 0028	0. 6890	1. 3913	2. 0903			
Average value Xi	-0. 0033	0. 6907	1. 3894	2. 0903			
Cali. Factor	0. 0000	0. 1388	0. 1397	0. 1402		CaliResult	Yes √
Repeatability (%)	0	0. 48	0. 37	0. 03			No

Inspector [signature] Checker [signature] 2017-7-5

RECORD OF LOAD CELL CALIBRATION

Project name 智利S220. SP塔

Testing station Means name 64通道加荷测控装置 According to rules JJG455—2000

Humidity 67.0 RH% Temperature 24.0 ℃ Control No. CEPRI-D-JS1-JS-021-2017-T033

Measure channel V05 Cell No:14-02-31 Capacity 18.0kN

Times \ Load value	0	6	12	18		NOTE	
Increment 1	-0.0089	0.7826	1.6032	2.3978		V5	
Increment 2	-0.0068	0.7856	1.6059	2.3937			
Increment 3	-0.0079	0.7850	1.6055	2.3947			
Average value Xi	-0.0079	0.7844	1.6049	2.3954			
Cali. Factor	0.0000	0.1320	0.1367	0.1317		CaliResult	Yes √
Repeatability (%)	0	0.39	0.16	0.17			No

Measure channel V06 Cell No:14-02-47 Capacity 15.0kN

Times \ Load value	0	5	10	15		NOTE	
Increment 1	0.0399	0.7123	1.3807	2.0872		V6	
Increment 2	0.0400	0.7134	1.3856	2.0808			
Increment 3	0.0399	0.7111	1.3856	2.0819			
Average value Xi	0.0399	0.7122	1.3840	2.0833			
Cali. Factor	0.0000	0.1345	0.1344	0.1399		CaliResult	Yes √
Repeatability (%)	0	0.33	0.35	0.31			No

Measure channel V07 Cell No:14-02-39 Capacity 18.0kN

Times \ Load value	0	6	12	18		NOTE	
Increment 1	0.0048	0.8173	1.6335	2.4543		V7	
Increment 2	0.0054	0.8180	1.6360	2.4624			
Increment 3	0.0042	0.8184	1.6393	2.4572			
Average value Xi	0.0048	0.8179	1.6363	2.4580			
Cali. Factor	0.0000	0.1355	0.1364	0.1370		CaliResult	Yes √
Repeatability (%)	0	0.13	0.35	0.33			No

Measure channel L01 Cell No:14-02-24 Capacity 15.0kN

Times \ Load value	0	5	10	15		NOTE	
Increment 1	-0.0026	0.6619	1.2900	1.9667		L1	
Increment 2	-0.0017	0.6615	1.2902	1.9656			
Increment 3	-0.0024	0.6625	1.2912	1.9664			
Average value Xi	-0.0022	0.6620	1.2905	1.9662			
Cali. Factor	0.0000	0.1328	0.1257	0.1352		CaliResult	Yes √
Repeatability (%)	0	0.14	0.09	0.06			No

Inspector Checker 2017-7-5

RECORD OF LOAD CELL CALIBRATION

Project name 智利S220. SP塔

Testing station

Means name 64通道加荷测控装置 According to rules JJG455—2000

Humidity 67. 0 RH% Temperature 24.0 ℃ Control No. CEPRI-D-JS1-JS-021-2017-T033

Measure channel L02 Cell No:14-02-23 Capacity 20. 0kN

Times \ Load value	0	6	12	20		NOTE	
Increment 1	-0. 0367	0. 7598	1. 5376	2. 5794		L2	
Increment 2	-0. 0363	0. 7579	1. 5364	2. 5798			
Increment 3	-0. 0377	0. 7611	1. 5366	2. 5798			
Average value Xi	-0. 0369	0. 7596	1. 5369	2. 5797			
Cali. Factor	0. 0000	0. 1327	0. 1295	0. 1303		CaliResult	Yes √
Repeatability (%)	0	0. 43	0. 07	0. 01			No

Measure channel L03 Cell No:14-02-20 Capacity 20. 0kN

Times \ Load value	0	6	12	20		NOTE	
Increment 1	0. 0076	0. 8150	1. 6130	2. 6591		L3	
Increment 2	0. 0072	0. 8144	1. 6113	2. 6603			
Increment 3	0. 0077	0. 8144	1. 6113	2. 6588			
Average value Xi	0. 0075	0. 8146	1. 6119	2. 6594			
Cali. Factor	0. 0000	0. 1345	0. 1329	0. 1309		CaliResult	Yes √
Repeatability (%)	0	0. 07	0. 11	0. 06			No

Measure channel L04 Cell No:14-01-15 Capacity 5. 0kN

Times \ Load value	0	5				NOTE	
Increment 1	-0. 0031	1. 5213				L4	
Increment 2	-0. 0013	1. 5242					
Increment 3	-0. 0008	1. 5222					
Average value Xi	-0. 0017	1. 5226					
Cali. Factor	0. 0000	0. 3049				CaliResult	Yes √
Repeatability (%)	0	0. 19					No

Measure channel L05 Cell No:14-02-08 Capacity 20. 0kN

Times \ Load value	0	6	12	20		NOTE	
Increment 1	0. 0029	0. 8324	1. 6443	2. 7180		L5	
Increment 2	0. 0038	0. 8321	1. 6471	2. 7171			
Increment 3	0. 0041	0. 8330	1. 6477	2. 7170			
Average value Xi	0. 0036	0. 8325	1. 6464	2. 7174			
Cali. Factor	0. 0000	0. 1382	0. 1356	0. 1339		CaliResult	Yes √
Repeatability (%)	0	0. 11	0. 21	0. 04			No

Inspector Checker 2017-7-5

RECORD OF LOAD CELL CALIBRATION

Project name 智利S220. SP塔

Testing station | Means name 64通道加荷测控装置 | According to rules JJG455—2000

Humidity 67. 0 RH% | Temperature 24.0 ℃ | Control No. CEPRI-D-JS1-JS-021-2017-T033

Measure channel L06 | Cell No:14-02-34 | Capacity 5. 0kN

Times \ Load value	0	5				NOTE	
Increment 1	0. 0144	1. 4514				L6	
Increment 2	0. 0172	1. 4530					
Increment 3	0. 0174	1. 4514					
Average value Xi	0. 0163	1. 4520					
Cali. Factor	0. 0000	0. 2871				CaliResult	Yes √
Repeatability (%)	0	0. 11					No

Measure channel L07 | Cell No:14-02-46 | Capacity 20. 0kN

Times \ Load value	0	6	12	20		NOTE	
Increment 1	0. 0118	0. 8445	1. 6903	2. 8176		L7	
Increment 2	0. 0129	0. 8438	1. 6890	2. 8207			
Increment 3	0. 0134	0. 8439	1. 6920	2. 8212			
Average value Xi	0. 0127	0. 8440	1. 6905	2. 8198			
Cali. Factor	0. 0000	0. 1386	0. 1411	0. 1412		CaliResult	Yes √
Repeatability (%)	0	0. 09	0. 18	0. 13			No

Measure channel L08 | Cell No:14-01-38 | Capacity 5. 0kN

Times \ Load value	0	5				NOTE	
Increment 1	0. 0146	1. 5447				WL1	
Increment 2	0. 0179	1. 5443					
Increment 3	0. 0180	1. 5444					
Average value Xi	0. 0168	1. 5445					
Cali. Factor	0. 0000	0. 3055				CaliResult	Yes √
Repeatability (%)	0	0. 02					No

Measure channel L09 | Cell No:04-1-8 | Capacity 5. 0kN

Times \ Load value	0	5				NOTE	
Increment 1	0. 0703	1. 1362				WL2	
Increment 2	0. 0706	1. 1347					
Increment 3	0. 0685	1. 1375					
Average value Xi	0. 0698	1. 1361					
Cali. Factor	0. 0000	0. 2133				CaliResult	Yes √
Repeatability (%)	0	0. 24					No

Inspector | Checker | 2017-7-5

RECORD OF LOAD CELL CALIBRATION

oject name 智利S220. SP塔

sting station

Means name 64通道加荷测控装置 According to rules JJG455—2000

midity 67. 0 RH% Temperature 24.0 ℃ Control No. CEPRI-D-JS1-JS-021-2017-T033

easure channel L10 Cell No:14-01-33 Capacity 5. 0kN

mes \ Load value	0	5				NOTE	
Increment 1	0. 0055	1. 4677				WL3	
Increment 2	0. 0085	1. 4709					
Increment 3	0. 0087	1. 4696					
Average value Xi	0. 0076	1. 4694				CaliResult	Yes √
Cali. Factor	0. 0000	0. 2924					No
Repeatability (%)	0	0. 22					

easure channel L11 Cell No:14-01-43 Capacity 5. 0kN

imes \ Load value	0	5				NOTE	
Increment 1	0. 0132	1. 4118				WL4	
Increment 2	0. 0151	1. 4129					
Increment 3	0. 0158	1. 4148					
Average value Xi	0. 0147	1. 4131				CaliResult	Yes √
Cali. Factor	0. 0000	0. 2797					No
Repeatability (%)	0	0. 21					

Measure channel L12 Cell No:14-01-50 Capacity 5. 0kN

Times \ Load value	0	5				NOTE	
Increment 1	0. 0214	1. 3315				WL5	
Increment 2	0. 0226	1. 3298					
Increment 3	0. 0222	1. 3271					
Average value Xi	0. 0221	1. 3295				CaliResult	Yes √
Cali. Factor	0. 0000	0. 2615					No
Repeatability (%)	0	0. 33					

Measure channel T01 Cell No:14-01-41 Capacity 5. 0kN

Times \ Load value	0	5				NOTE	
Increment 1	-0. 0009	1. 4324				T1	
Increment 2	0. 0015	1. 4275					
Increment 3	0. 0015	1. 4272					
Average value Xi	0. 0007	1. 4290				CaliResult	Yes √
Cali. Factor	0. 0000	0. 2857					No
Repeatability (%)	0	0. 36					

Inspector Checker 2017-7-5

RECORD OF LOAD CELL CALIBRATION

Project name 智利S220. SP塔

Testing station Means name 64通道加荷测控装置 According to rules JJG455—2000

Humidity 67. 0 RH% Temperature 24.0 ℃ Control No. CEPRI-D-JS1-JS-021-2017-T033

Measure channel T02 Cell No:14-02-27 Capacity 15. 0kN

Times \ Load value	0	5	10	15		NOTE	
Increment 1	0. 0162	0. 6793	1. 3442	2. 0094		T2	
Increment 2	0. 0159	0. 6807	1. 3439	2. 0111			
Increment 3	0. 0162	0. 6799	1. 3412	2. 0110			
Average value Xi	0. 0161	0. 6800	1. 3431	2. 0105			
Cali. Factor	0. 0000	0. 1328	0. 1326	0. 1335		CaliResult	Yes √
Repeatability (%)	0	0. 22	0. 22	0. 09			No

Measure channel T03 Cell No:14-02-37 Capacity 15. 0kN

Times \ Load value	0	5	10	15		NOTE	
Increment 1	-0. 0153	0. 7466	1. 5031	2. 2698		T3	
Increment 2	-0. 0161	0. 7459	1. 4972	2. 2708			
Increment 3	-0. 0166	0. 7489	1. 5011	2. 2711			
Average value Xi	-0. 0160	0. 7472	1. 5004	2. 2706			
Cali. Factor	0. 0000	0. 1526	0. 1507	0. 1540		CaliResult	Yes √
Repeatability (%)	0	0. 4	0. 39	0. 06			No

Measure channel T04 Cell No:14-02-35 Capacity 15. 0kN

Times \ Load value	0	5	10	15		NOTE	
Increment 1	0. 0225	0. 6953	1. 3795	2. 0684		T4	
Increment 2	0. 0230	0. 6956	1. 3829	2. 0603			
Increment 3	0. 0234	0. 6944	1. 3823	2. 0679			
Average value Xi	0. 0229	0. 6951	1. 3816	2. 0655			
Cali. Factor	0. 0000	0. 1344	0. 1373	0. 1368		CaliResult	Yes √
Repeatability (%)	0	0. 18	0. 25	0. 39			No

Measure channel T05 Cell No:14-02-18 Capacity 15. 0kN

Times \ Load value	0	5	10	15		NOTE	
Increment 1	0. 0223	0. 6885	1. 3787	2. 0568		T5	
Increment 2	0. 0224	0. 6863	1. 3798	2. 0583			
Increment 3	0. 0223	0. 6897	1. 3805	2. 0576			
Average value Xi	0. 0223	0. 6882	1. 3797	2. 0576			
Cali. Factor	0. 0000	0. 1332	0. 1383	0. 1356		CaliResult	Yes √
Repeatability (%)	0	0. 49	0. 13	0. 07			No

Inspector Checker 2017-7-5

RECORD OF LOAD CELL CALIBRATION

Project name 智利S220. SP塔

Testing station

Means name 64通道加荷测控装置 According to rules JJG455—2000

Humidity 67.0 RH% Temperature 24.0 ℃ Control No. CEPRI-D-JS1-JS-021-2017-T033

Measure channel T06 Cell No:14-02-38 Capacity 15.0kN

Times \ Load value	0	5	10	15		NOTE	
Increment 1	-0.0168	0.6425	1.3135	1.9871		T6	
Increment 2	-0.0122	0.6434	1.3132	1.9830			
Increment 3	-0.0117	0.6438	1.3179	1.9880			
Average value Xi	-0.0136	0.6432	1.3149	1.9861		CaliResult	Yes √
Cali. Factor	0.0000	0.1314	0.1343	0.1342			No
Repeatability (%)	0	0.21	0.36	0.25			

Measure channel T08 Cell No:14-01-23 Capacity 5.0kN

Times \ Load value	0	5				NOTE	
Increment 1	0.0074	1.3936				WT1	
Increment 2	0.0056	1.3937					
Increment 3	0.0088	1.3964					
Average value Xi	0.0073	1.3946				CaliResult	Yes √
Cali. Factor	0.0000	0.2775					No
Repeatability (%)	0	0.2					

Measure channel T09 Cell No:14-01-32 Capacity 5.0kN

Times \ Load value	0	5				NOTE	
Increment 1	0.0146	1.5089				WT2	
Increment 2	0.0157	1.5134					
Increment 3	0.0173	1.5119					
Average value Xi	0.0159	1.5114				CaliResult	Yes √
Cali. Factor	0.0000	0.2991					No
Repeatability (%)	0	0.3					

Measure channel T10 Cell No:14-01-48 Capacity 5.0kN

Times \ Load value	0	5				NOTE	
Increment 1	-0.0024	1.4515				WT3	
Increment 2	-0.0024	1.4497					
Increment 3	-0.0008	1.4520					
Average value Xi	-0.0019	1.4510				CaliResult	Yes √
Cali. Factor	0.0000	0.2906					No
Repeatability (%)	0	0.16					

2017-7-5

Inspector Checker

RECORD OF LOAD CELL CALIBRATION

Project name 智利S220. SP塔

Means name 64通道加荷测控装置 According to rules JJG455—2000

Testing station

Humidity 67.0 RH% Temperature 24.0 ℃ Control No. CEPRI-D-JS1-JS-021-2017-T033

Measure channel T11 Cell No:04-2-7 Capacity 18.0kN

Times \ Load value	0	6	12	18		NOTE	
Increment 1	0.0513	0.8673	1.7189	2.5527		WT4	
Increment 2	0.0522	0.8711	1.7244	2.5517			
Increment 3	0.0537	0.8705	1.7176	2.5521			
Average value Xi	0.0524	0.8696	1.7203	2.5522			
Cali. Factor	0.0000	0.1362	0.1418	0.1386		CaliResult	Yes √
Repeatability (%)	0	0.44	0.4	0.04			No

Measure channel T12 Cell No:14-03-18 Capacity 30.0kN

Times \ Load value	0	10	20	30		NOTE	
Increment 1	0.0038	0.9635	1.9200	2.8747		WT5	
Increment 2	0.0043	0.9600	1.9200	2.8777			
Increment 3	0.0052	0.9621	1.9196	2.8774			
Average value Xi	0.0044	0.9619	1.9199	2.8766			
Cali. Factor	0.0000	0.0957	0.0958	0.0957		CaliResult	Yes √
Repeatability (%)	0	0.36	0.02	0.11			No

Measure channel T07 Cell No:14-02-44 Capacity 15.0kN

Times \ Load value	0	5	10	15		NOTE	
Increment 1	0.0063	0.6835	1.3828	2.0463		T7	
Increment 2	0.0070	0.6863	1.3873	2.0472			
Increment 3	0.0065	0.6845	1.3854	2.0497			
Average value Xi	0.0066	0.6848	1.3851	2.0477			
Cali. Factor	0.0000	0.1356	0.1401	0.1325		CaliResult	Yes √
Repeatability (%)	0	0.41	0.33	0.17			No

Measure channel Capacity

Times \ Load value						NOTE	
Increment 1						WT3	
Increment 2							
Increment 3							
Average value Xi							
Cali. Factor						CaliResult	合格
Repeatability (%)							No

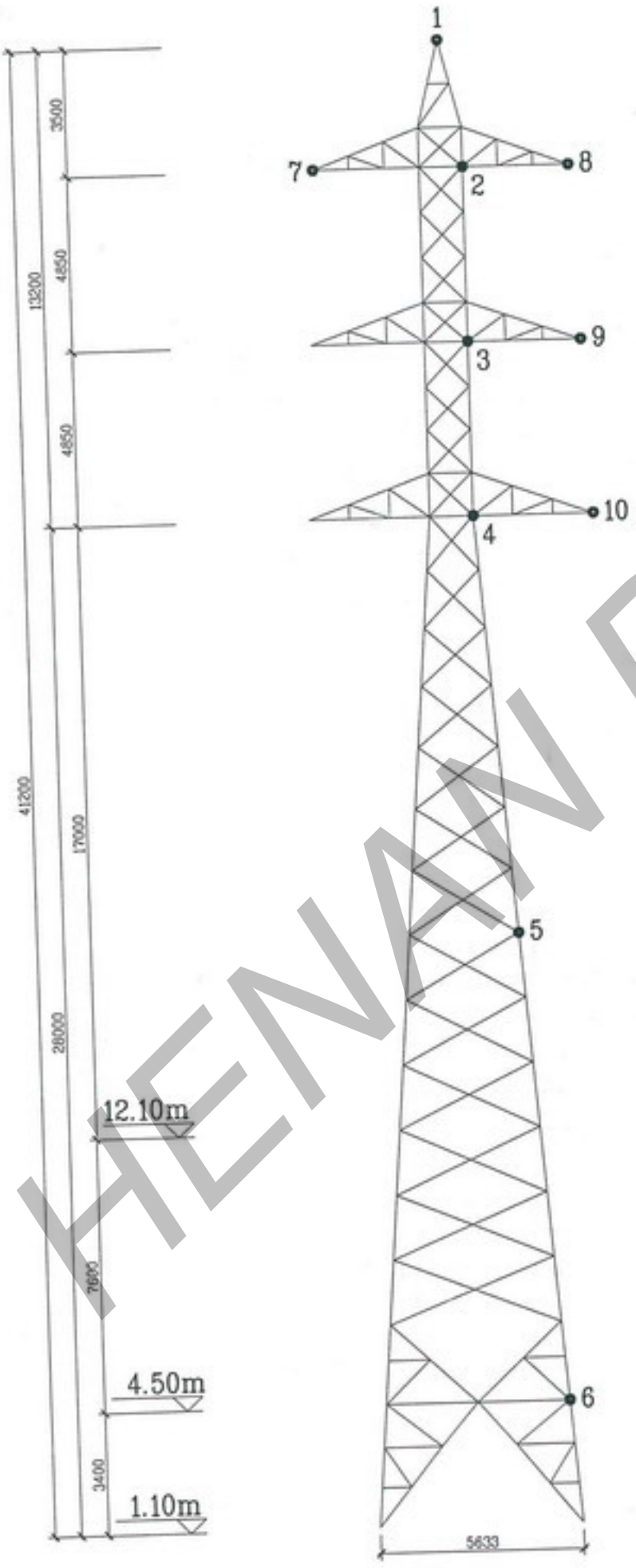
Inspector 王[illegible] Checker [illegible] 2017-7-5

Appendix D

REPORT OF DEFLECTIONS
FOR
TEST TOWER TYPE 'S220.SP'

Measuring Means	total station
Date of Measuring	July 3~5, 2017
Weather	sunny
Temperature	25°C to 32°C
Wind condition	July 3, 2017 no wind
	July 4, 2017 no wind
	July 5, 2017 no wind

APPENDIX D-1
The arrangement for deflection measuring points 'S220.SP'



位移观测记录表(全站仪)

THE RECORD OF DEFLECTION MEASUREMENT （total station）

仪器设备名称: 全站仪 TCR802 POWER　　设备编号: JSI-0005　　表: 1
Instrument model:　　Instrument No.:　　NO.

控制编号：CEPRI-D-JS1-JS-073-2017-T033

项目名称 (Project)	智利S220. SP塔		记录日期 (Date)	2017-7-3		
试验工况 (Load Case)	1.Maximum wind cross the Line		仪器状态 (Instr. Status)	√	仪器检查	√

测点 measuring point	荷载级别 loading step / 方向 direction	位移 (单位：毫米) deflection （unit: mm）					
		50%	75%	90%	95%	100%	0%
1	横向（X）	91	189	268	278	309	5
	纵向（Y）	-4	-3	-9	2	-3	-8
	垂直（Z）	-7	-8	-8	-15	-14	7
2	横向（X）	73	158	219	240	258	3
	纵向（Y）	1	-5	0	-13	-12	-9
	垂直（Z）	-4	0	-2	-24	-18	3
3	横向（X）	52	117	157	173	186	4
	纵向（Y）	-1	-9	-9	-10	-9	-8
	垂直（Z）	-8	0	-14	-9	-17	-1
4	横向（X）	36	79	107	111	126	8
	纵向（Y）	-6	-7	-7	-3	-6	-9
	垂直（Z）	-16	-9	-18	-16	-14	-6
5	横向（X）	8	20	31	33	37	-7
	纵向（Y）	3	6	3	6	6	9
	垂直（Z）	-6	-12	-6	-9	-9	3
6	横向（X）	3	1	1	2	-1	0
	纵向（Y）	-7	6	9	0	0	-1
	垂直（Z）	0	-3	0	-2	12	7
7	横向（X）	77	165	233	245	265	4
	纵向（Y）	-10	-6	-16	-9	-6	-6
	垂直（Z）	2	17	29	33	39	-3
8	横向（X）	72	158	215	235	259	-1
	纵向（Y）	4	3	3	5	-8	3
	垂直（Z）	-11	-31	-49	-52	-58	7
9	横向（X）	55	118	163	184	188	2
	纵向（Y）	-1	-4	-6	-12	-1	-3
	垂直（Z）	-21	-54	-45	-63	-61	9

天气（Weather）：sunny　　观测人（Observed）：彭振

位移观测记录表(全站仪)

THE RECORD OF DEFLECTION MEASUREMENT （total station）

仪器设备名称: Instrument model: 全站仪 TCR802 POWER

设备编号: Instrument No.: JSI-0005

表: NO. 1

控制编号: CEPRI-D-JS1-JS-073-2017-T033

项目名称 (Project)	智利S220. SP塔		记录日期 (Date)		2017-7-3		
试验工况 (Load Case)	1.Maximum wind cross the Line		仪器状态 (Instr. Status)		√	仪器检查	√

测点 measuring point	荷载级别 loading step / 方向 direction	位移 (单位: 毫米) deflection (unit: mm)					
		50%	75%	90%	95%	100%	0%
10	横向 (X)	31	81	112	112	127	3
	纵向 (Y)	7	-2	-11	3	-3	-4
	垂直 (Z)	-22	-34	-43	-50	-54	3
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						

观测人 (Observed): 彭博

天气 (Weather): sunny

位移观测记录表(全站仪)

THE RECORD OF DEFLECTION MEASUREMENT （total station）

仪器设备名称: 全站仪 TCR802 POWER　　设备编号: JSI-0005　　表: 2
Instrument model:　　Instrument No.:　　NO.

控制编号：CEPRI-D-JS1-JS-073-2017-T033

项目名称（Project）	智利S220. SP塔	记录日期（Date）	2017-7-3		
试验工况（Load Case）	2.Vertical overhead conductors 4 and 6,cross wind one quarter	仪器状态（Instr. Status）	√	仪器检查	√

测点 measuring point	荷载级别 loading step / 方向 direction	位移 （单位：毫米） deflection （unit: mm）					
		50%	75%	90%	95%	100%	0%
1	横向（X）	12	17	25	26	33	-3
	纵向（Y）	1	2	-2	0	-5	1
	垂直（Z）	4	1	2	4	-3	9
2	横向（X）	18	18	21	24	31	-1
	纵向（Y）	-10	-6	-2	-5	-11	1
	垂直（Z）	-3	-2	1	3	-2	7
3	横向（X）	5	10	10	14	14	-1
	纵向（Y）	5	-1	0	-4	-4	-2
	垂直（Z）	-4	-2	-9	-8	-7	3
4	横向（X）	2	4	4	4	6	-2
	纵向（Y）	-4	-9	-3	-5	-8	-7
	垂直（Z）	10	11	17	5	6	14
5	横向（X）	-4	-5	-5	-3	-3	-3
	纵向（Y）	5	3	5	5	0	-2
	垂直（Z）	4	7	14	-1	9	8
6	横向（X）	-2	-4	0	-1	-1	1
	纵向（Y）	0	-1	-8	-3	-4	-5
	垂直（Z）	-3	5	-6	0	-3	-9
7	横向（X）	2	5	14	20	21	-6
	纵向（Y）	8	14	3	-2	-3	7
	垂直（Z）	6	-5	2	-4	5	-5
8	横向（X）	11	19	25	18	25	-1
	纵向（Y）	-5	-9	-16	-1	-12	-1
	垂直（Z）	3	-10	-14	0	-9	8
9	横向（X）	0	4	9	10	13	-11
	纵向（Y）	5	2	-1	-1	-9	10
	垂直（Z）	-6	-12	-11	-26	-29	1

天气（Weather）：sunny　　观测人（Observed）：彭博

位移观测记录表(全站仪)

THE RECORD OF DEFLECTION MEASUREMENT （total station）

仪器设备名称: Instrument model: 全站仪 TCR802 POWER

设备编号: Instrument No.: JSI-0005

表: NO. 2

控制编号: CEPRI-D-JS1-JS-073-2017-T033

项目名称（Project）	智利S220. SP塔	记录日期（Date）	2017-7-3		
试验工况（Load Case）	2.Vertical overhead conductors 4 and 6,cross wind one quarter	仪器状态（Instr. Status）	√	仪器检查	√

测点 measuring point	荷载级别 loading step / 方向 direction	位移 （单位: 毫米） deflection （unit: mm）					
		50%	75%	90%	95%	100%	0%
10	横向（X）	2	4	8	5	3	-1
	纵向（Y）	1	-4	-10	-6	-2	-1
	垂直（Z）	-9	-23	-27	-28	-23	-11
	横向（X）						
	纵向（Y）						
	垂直（Z）						
	横向（X）						
	纵向（Y）						
	垂直（Z）						
	横向（X）						
	纵向（Y）						
	垂直（Z）						
	横向（X）						
	纵向（Y）						
	垂直（Z）						
	横向（X）						
	纵向（Y）						
	垂直（Z）						
	横向（X）						
	纵向（Y）						
	垂直（Z）						
	横向（X）						
	纵向（Y）						
	垂直（Z）						
	横向（X）						
	纵向（Y）						
	垂直（Z）						

观测人（Observed）: 彭博

天气（Weather）: sunny

位移观测记录表(全站仪)

THE RECORD OF DEFLECTION MEASUREMENT （total station）

仪器设备名称: 全站仪 TCR802 POWER　　设备编号: JSI-0005　　表: 3
Instrument model:　　Instrument No.:　　NO.

控制编号：CEPRI-D-JS1-JS-073-2017-T033

项目名称 (Project)	智利S220. SP塔	记录日期 (Date)	2017-7-4		
试验工况 (Load Case)	3.Longitudinal overload.Cut guard wire(0) and Conductor 2,longitudinal wind one quarter	仪器状态 (Instr. Status)	√	仪器检查	√

测点 measuring point	荷载级别 loading step / 方向 direction	位移 (单位：毫米) deflection (unit: mm)					
		50%	75%	90%	95%	100%	0%
1	横向（X）	-189	-271	-303	-305	-311	-288
	纵向（Y）	340	520	609	629	656	373
	垂直（Z）	-8	-7	-6	-10	-15	0
2	横向（X）	-195	-278	-314	-321	-329	-287
	纵向（Y）	317	466	534	555	585	341
	垂直（Z）	-6	-16	-12	-12	-18	0
3	横向（X）	-123	-179	-205	-209	-219	-189
	纵向（Y）	179	268	312	322	340	190
	垂直（Z）	-7	-10	-19	-12	-28	-1
4	横向（X）	-77	-116	-130	-129	-134	-120
	纵向（Y）	118	174	196	193	208	119
	垂直（Z）	1	-8	-7	-9	-10	5
5	横向（X）	-31	-50	-57	-57	-62	-48
	纵向（Y）	26	54	64	68	64	33
	垂直（Z）	-4	5	-7	1	10	4
6	横向（X）	0	2	-3	0	-1	2
	纵向（Y）	-5	-5	3	0	2	-2
	垂直（Z）	5	0	9	1	2	-6
7	横向（X）	-176	-250	-280	-290	-294	-264
	纵向（Y）	108	139	164	180	180	62
	垂直（Z）	-39	-50	-59	-55	-65	-56
8	横向（X）	-168	-246	-277	-284	-287	-253
	纵向（Y）	437	677	791	827	856	526
	垂直（Z）	29	39	30	30	34	37
9	横向（X）	-122	-169	-190	-197	-198	-183
	纵向（Y）	255	389	464	488	505	291
	垂直（Z）	14	19	35	32	19	37

观测人（Observed）：彭博

天气（Weather）：sunny

第　页共　页
page　of

位移观测记录表(全站仪)

THE RECORD OF DEFLECTION MEASUREMENT (total station)

仪器设备名称: Instrument model: 全站仪 TCR802 POWER

设备编号: Instrument No.: JSI-0005

表: NO. 3

控制编号: CEPRI-D-JS1-JS-073-2017-T033

项目名称 (Project)	智利S220. SP塔	记录日期 (Date)	2017-7-4		
试验工况 (Load Case)	3.Longitudinal overload.Cut guard wire(0) and Conductor 2,longitudinal wind one quarter	仪器状态 (Instr. Status)	√	仪器检查	√

测点 measuring point	荷载级别 loading step / 方向 direction	位移 (单位: 毫米) deflection (unit: mm) 50%	75%	90%	95%	100%	0%
10	横向 (X)	-78	-119	-130	-139	-135	-128
	纵向 (Y)	151	237	277	297	302	182
	垂直 (Z)	19	41	34	37	31	29
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						

观测人 (Observed): 彭博

天气 (Weather): sunny

位移观测记录表(全站仪)

THE RECORD OF DEFLECTION MEASUREMENT （total station）

仪器设备名称: 全站仪 TCR802 POWER　　设备编号: JSI-0005　　表: 4
Instrument model:　　Instrument No.:　　NO.

控制编号：CEPRI-D-JS1-JS-073-2017-T033

项目名称 (Project)	智利S220.SP塔	记录日期 (Date)	2017-7-4		
试验工况 (Load Case)	4.Longitudinal overload.Cutting of conductors 1 and 2,longitudinal wind one quarter	仪器状态 (Instr. Status)	√	仪器检查	√

测点 measuring point	荷载级别 loading step / 方向 direction	位移 (单位：毫米) deflection (unit: mm)					
		50%	75%	90%	95%	100%	0%
1	横向（X）	-7	-8	-23	-23	-26	-4
	纵向（Y）	145	226	300	318	341	34
	垂直（Z）	-2	1	-7	3	-7	4
2	横向（X）	-2	-3	-14	-13	-21	-4
	纵向（Y）	116	178	236	250	272	39
	垂直（Z）	-8	-10	-11	-12	-18	1
3	横向（X）	-5	-9	-9	-14	-19	-6
	纵向（Y）	69	121	146	162	174	24
	垂直（Z）	-4	-10	-5	-2	-11	6
4	横向（X）	-1	-5	-7	-11	-14	-3
	纵向（Y）	46	72	91	105	113	8
	垂直（Z）	0	3	-7	-4	-1	5
5	横向（X）	0	-1	-1	-1	-6	2
	纵向（Y）	16	27	30	34	46	-1
	垂直（Z）	-3	-5	-6	0	-1	5
6	横向（X）	-3	-3	-2	-1	-3	-4
	纵向（Y）	9	5	11	5	5	11
	垂直（Z）	-1	4	-3	0	5	-2
7	横向（X）	-2	-3	-15	-15	-23	-1
	纵向（Y）	133	194	263	279	302	61
	垂直（Z）	24	30	39	54	50	30
8	横向（X）	-11	-6	-24	-22	-31	-12
	纵向（Y）	106	174	231	233	266	12
	垂直（Z）	-4	6	1	-3	7	6
9	横向（X）	-11	-5	-15	-13	-23	-1
	纵向（Y）	77	115	149	152	175	1
	垂直（Z）	5	2	4	-3	-1	1

天气（Weather）：sunny　　观测人（Observed）：彭博

位移观测记录表(全站仪)

THE RECORD OF DEFLECTION MEASUREMENT （total station）

仪器设备名称: Instrument model: 全站仪 TCR802 POWER

设备编号: Instrument No.: JSI-0005

表: NO. 4

控制编号: CEPRI-D-JS1-JS-073-2017-T033

项目名称 (Project)	智利S220.SP塔	记录日期 (Date)	2017-7-4		
试验工况 (Load Case)	4.Longitudinal overload.Cutting of conductors 1 and 2,longitudinal wind one quarter	仪器状态 (Instr. Status)	√	仪器检查	√

测点 measuring point	荷载级别 loading step / 方向 direction	位移 (单位：毫米) deflection (unit: mm)					
		50%	75%	90%	95%	100%	0%
10	横向 (X)	-7	-7	-13	-20	-16	-1
	纵向 (Y)	45	71	93	106	103	-4
	垂直 (Z)	0	4	2	1	7	-3
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						

天气 (Weather): sunny

观测人 (Observed): 彭[illegible]

位移观测记录表(全站仪)

THE RECORD OF DEFLECTION MEASUREMENT （total station）

仪器设备名称: 全站仪 TCR802 POWER　　设备编号: JSI-0005　　表: NO. 5

Instrument model:　　Instrument No.:

控制编号：CEPRI-D-JS1-JS-073-2017-T033

项目名称（Project）	智利S220.SP塔	记录日期（Date）	2017-7-4		
试验工况（Load Case）	5.Longitudinal overload.Cutting of conductors 2 and 4,longitudinal wind one quarter	仪器状态（Instr. Status）	√	仪器检查	√

测点 measuring point	荷载级别 loading step / 方向 direction	位移 （单位：毫米） deflection （unit: mm）					
		50%	75%	90%	95%	100%	0%
1	横向（X）	-17	-33	-34	-36	-34	1
	纵向（Y）	112	181	224	243	251	-17
	垂直（Z）	-17	-17	-19	-12	-17	-3
2	横向（X）	-37	-70	-85	-91	-90	-35
	纵向（Y）	121	190	228	246	258	26
	垂直（Z）	1	-7	-20	-10	-10	3
3	横向（X）	-21	-49	-63	-62	-69	-26
	纵向（Y）	73	134	165	172	186	22
	垂直（Z）	-9	-3	-16	-17	-19	-1
4	横向（X）	-12	-26	-36	-38	-42	-16
	纵向（Y）	47	92	116	119	133	26
	垂直（Z）	-7	-13	-14	-13	-10	-6
5	横向（X）	-4	-9	-10	-16	-17	-4
	纵向（Y）	12	30	38	46	45	5
	垂直（Z）	-9	-10	-5	-6	-7	-6
6	横向（X）	-4	0	-4	-3	2	1
	纵向（Y）	9	2	9	6	2	3
	垂直（Z）	9	-2	-1	6	-13	-3
7	横向（X）	-19	-42	-36	-41	-45	-4
	纵向（Y）	-22	-86	-139	-140	-159	-180
	垂直（Z）	-6	-2	-5	1	-2	9
8	横向（X）	-20	-52	-66	-67	-71	-5
	纵向（Y）	184	370	473	509	544	116
	垂直（Z）	-2	-8	-20	-10	-17	-10
9	横向（X）	-3	-24	-37	-39	-42	-6
	纵向（Y）	150	302	393	422	458	143
	垂直（Z）	-2	-5	-8	-5	-10	0

天气（Weather）：sunny　　观测人（Observed）：彭博

位移观测记录表(全站仪)

THE RECORD OF DEFLECTION MEASUREMENT （total station）

仪器设备名称: Instrument model: 全站仪 TCR802 POWER

设备编号: Instrument No.: JSI-0005

表: NO. 5

控制编号: CEPRI-D-JS1-JS-073-2017-T033

项目名称 (Project)	智利S220. SP塔	记录日期 (Date)	2017-7-4
试验工况 (Load Case)	5.Longitudinal overload.Cutting of conductors 2 and 4,longitudinal wind one quarter	仪器状态 (Instr. Status)	√ / 仪器检查 √

测点 measuring point	荷载级别 loading step / 方向 direction	位移 (单位：毫米) deflection (unit: mm) 50%	75%	90%	95%	100%	0%
10	横向 (X)	0	-16	-28	-25	-34	-4
	纵向 (Y)	98	188	251	265	297	109
	垂直 (Z)	-10	-6	-11	-16	-18	-9
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						
	横向 (X)						
	纵向 (Y)						
	垂直 (Z)						

天气 (Weather): sunny

观测人 (Observed): 彭博

位移观测记录表(全站仪)

THE RECORD OF DEFLECTION MEASUREMENT （total station）

仪器设备名称: 全站仪 TCR802 POWER　　设备编号: JSI-0005　　表: 6
Instrument model:　　Instrument No.:　　NO.

控制编号：CEPRI-D-JS1-JS-073-2017-T033

项目名称 (Project)	智利S220. SP塔		记录日期 (Date)	2017-7-5		
试验工况 (Load Case)	6.Longitudinal overload.Cutting of conductors 4 and 6,longitudinal wind one quarter		仪器状态 (Instr. Status)	√	仪器检查	√

测点 measuring point	荷载级别 loading step / 方向 direction	位移 (单位：毫米) deflection (unit: mm)					
		50%	75%	90%	95%	100%	0%
1	横向（X）	5	-12	-21	-21	-24	16
	纵向（Y）	71	126	159	167	176	-19
	垂直（Z）	7	1	6	9	6	4
2	横向（X）	-8	-21	-36	-35	-38	6
	纵向（Y）	73	113	146	150	159	-11
	垂直（Z）	9	7	-2	12	2	0
3	横向（X）	-10	-21	-38	-40	-44	1
	纵向（Y）	57	86	120	128	140	-5
	垂直（Z）	7	-10	-9	-8	-12	1
4	横向（X）	-6	-17	-25	-26	-25	-1
	纵向（Y）	33	71	88	88	90	2
	垂直（Z）	-8	-6	-9	-4	-9	-6
5	横向（X）	-6	-12	-13	-9	-16	-2
	纵向（Y）	23	37	43	36	39	5
	垂直（Z）	9	6	6	3	16	7
6	横向（X）	-5	-6	-8	-6	-6	-4
	纵向（Y）	6	6	14	5	2	2
	垂直（Z）	8	14	17	15	10	-3
7	横向（X）	-4	-13	-18	-22	-21	6
	纵向（Y）	22	29	24	31	25	-13
	垂直（Z）	5	-1	-12	-4	5	2
8	横向（X）	-4	-25	-26	-35	-36	2
	纵向（Y）	99	187	220	245	259	3
	垂直（Z）	0	-8	-8	-14	-11	5
9	横向（X）	5	-6	-22	-19	-25	12
	纵向（Y）	84	153	210	221	241	-4
	垂直（Z）	1	-8	2	-11	-3	-1

天气（Weather）：sunny　　观测人（Observed）：彭博

位移观测记录表(全站仪)

THE RECORD OF DEFLECTION MEASUREMENT （total station）

仪器设备名称: Instrument model: 全站仪 TCR802 POWER　　设备编号: Instrument No.: JSI-0005　　表: NO. 6

控制编号：CEPRI-D-JS1-JS-073-2017-T033

项目名称（Project）	智利S220. SP塔			记录日期（Date）		2017-7-5	
试验工况（Load Case）	6.Longitudinal overload.Cutting of conductors 4 and 6,longitudinal wind one quarter			仪器状态（Instr. Status）	√	仪器检查	√
测点 measuring point	荷载级别 loading step / 方向 direction	位移 （单位：毫米） deflection （unit: mm）					
		50%	75%	90%	95%	100%	0%
10	横向（X）	-3	-18	-27	-20	-27	-1
	纵向（Y）	77	134	173	175	193	20
	垂直（Z）	4	-2	-2	-6	3	0
	横向（X）						
	纵向（Y）						
	垂直（Z）						
	横向（X）						
	纵向（Y）						
	垂直（Z）						
	横向（X）						
	纵向（Y）						
	垂直（Z）						
	横向（X）						
	纵向（Y）						
	垂直（Z）						
	横向（X）						
	纵向（Y）						
	垂直（Z）						
	横向（X）						
	纵向（Y）						
	垂直（Z）						
	横向（X）						
	纵向（Y）						
	垂直（Z）						

天气（Weather）：sunny　　观测人（Observed）：彭博

位移观测记录表(全站仪)

THE RECORD OF DEFLECTION MEASUREMENT （total station）

仪器设备名称: 全站仪 TCR802 POWER　　设备编号: JSI-0005　　表: 7
Instrument model:　　Instrument No.:　　NO.

控制编号：CEPRI-D-JS1-JS-073-2017-T033

项目名称（Project）	智利S220. SP塔	记录日期（Date）	2017-7-5		
试验工况（Load Case）	7.Longitudinal imbalance,cross wind one quarter.	仪器状态（Instr. Status）	√	仪器检查	√

测点 measuring point	荷载级别 loading step / 方向 direction	位移 (单位：毫米) deflection （unit: mm）					
		50%	75%	90%	95%	100%	0%
1	横向（X）	6	5	4	1	2	8
	纵向（Y）	1	31	55	62	72	-8
	垂直（Z）	10	6	12	8	9	14
2	横向（X）	3	-1	-9	-8	-3	4
	纵向（Y）	2	34	60	66	62	-3
	垂直（Z）	-5	-3	-14	-14	-16	2
3	横向（X）	13	1	-3	-4	-2	6
	纵向（Y）	-8	20	37	42	44	-4
	垂直（Z）	-4	-5	-3	-7	-5	-2
4	横向（X）	1	2	-5	-5	-5	4
	纵向（Y）	10	11	29	29	36	-6
	垂直（Z）	4	10	-2	6	6	2
5	横向（X）	-8	-11	-12	-7	-10	-1
	纵向（Y）	8	10	10	10	7	-9
	垂直（Z）	5	7	10	13	10	6
6	横向（X）	0	0	-4	0	-3	2
	纵向（Y）	3	-2	11	-1	-2	-4
	垂直（Z）	1	7	0	4	17	-2
7	横向（X）	11	5	-1	-5	-1	5
	纵向（Y）	-7	18	45	55	57	-2
	垂直（Z）	-2	1	0	-3	-7	3
8	横向（X）	11	1	-3	3	-7	8
	纵向（Y）	-6	33	53	55	77	-17
	垂直（Z）	3	5	-4	-3	3	-6
9	横向（X）	14	7	-1	2	-2	16
	纵向（Y）	-7	21	43	42	53	-21
	垂直（Z）	-5	-3	-7	-13	-7	1

天气（Weather）：sunny　　观测人（Observed）：郭博

位移观测记录表(全站仪)

THE RECORD OF DEFLECTION MEASUREMENT （total station）

仪器设备名称: Instrument model:	全站仪 TCR802 POWER	设备编号: Instrument No.:	JSI-0005	表: NO.	7

控制编号：CEPRI-D-JS1-JS-073-2017-T033

项目名称 (Project)	智利S220. SP塔	记录日期 (Date)	2017-7-5		
试验工况 (Load Case)	7.Longitudinal imbalance,cross wind one quarter.	仪器状态 (Instr. Status)	√	仪器检查	√

测点 measuring point	荷载级别 loading step / 方向 direction	位移 (单位：毫米) deflection （unit: mm）					
		50%	75%	90%	95%	100%	0%
10	横向（X）	10	-3	-7	-1	2	12
	纵向（Y）	-9	20	31	26	29	-20
	垂直（Z）	5	-2	1	-6	-6	6
	横向（X）						
	纵向（Y）						
	垂直（Z）						
	横向（X）						
	纵向（Y）						
	垂直（Z）						
	横向（X）						
	纵向（Y）						
	垂直（Z）						
	横向（X）						
	纵向（Y）						
	垂直（Z）						
	横向（X）						
	纵向（Y）						
	垂直（Z）						
	横向（X）						
	纵向（Y）						
	垂直（Z）						
	横向（X）						
	纵向（Y）						
	垂直（Z）						
	横向（X）						
	纵向（Y）						
	垂直（Z）						

天气（Weather）：sunny

观测人（Observed）：彭博