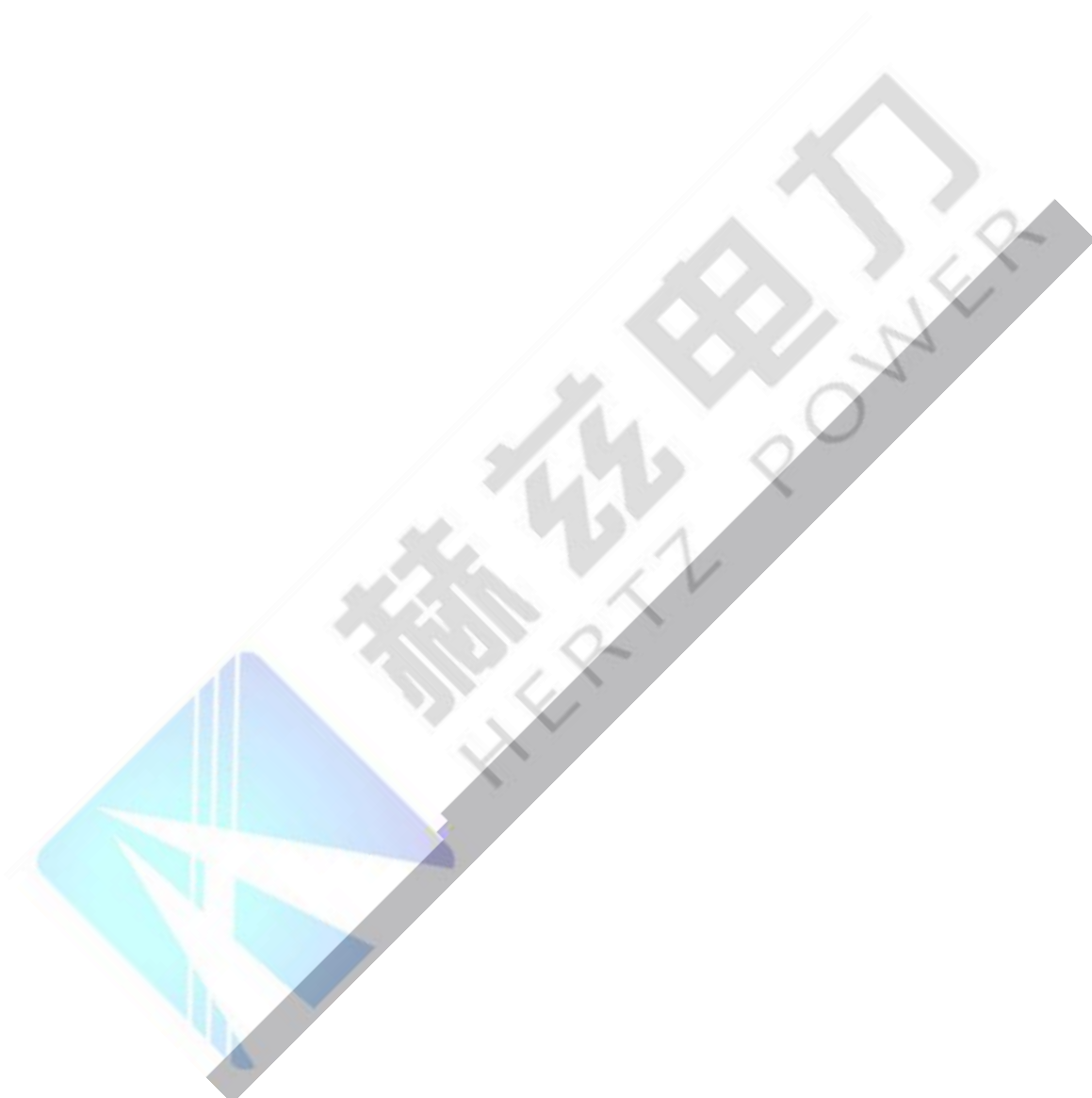


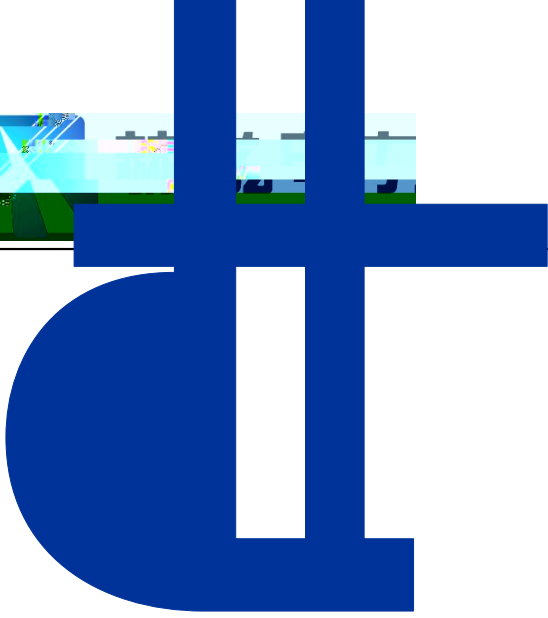


Q/CSG1205019-2018

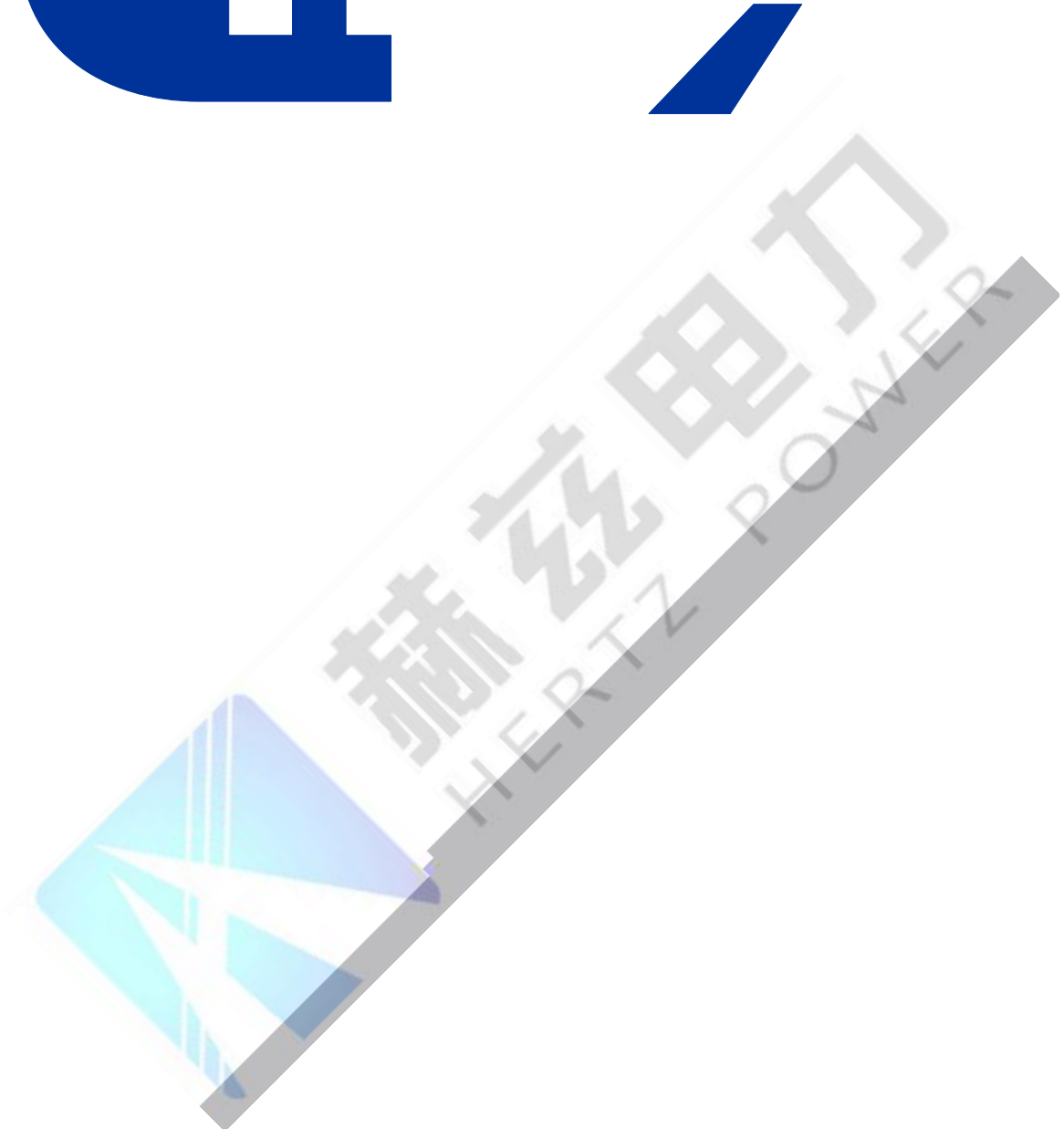
	.....	1
1	.....	3
2	.....	3
3	.....	6
4	.....	8
5	.....	10
6	.....	31
7	.....	44
8	.....	52
9	.....	59
10	.....	68
11 GIS HGIS GIL	.....	70
12	.....	78
13	.....	82
14	.....	87
15	.....	95
16	.....	97
17	.....	101
18	.....	102
19	.....	103
20	.....	106
21	.....	120
22 1KV	.....	123
23 1KV	.....	124
24	.....	124
A	.....	156
B SF ₆	.....	158
C	.....	159



2018 5



Q/CSG1205019-2018



赫兹电力

GB/T	7252		
GB/T	7354		
GB/T	7595		
GB/T	7598		
GB/T	7600		
GB/T	7601		
GB	7674	72.5kV	
GB/T	8349		
GB/T	8905		
GB/T	11022		
GB	11023		
GB/T	11024.1	1000V	1
GB	11032		
GB /T	12022		
GB/T	14542		
GB/T	16927.1~.3		
GB/T	17623		
GB/T	20840.1~.8		
GB/T	26218.1~.3		
GB	50054		
GB	50148		
GB	50149		
GB	50150		
GB	50169		
GB	50204		
GB	50207		
GB	50209		
GB	50210		
GB	50233	110kV~750kV	
GB	50242		



GB 50300

GB 50303

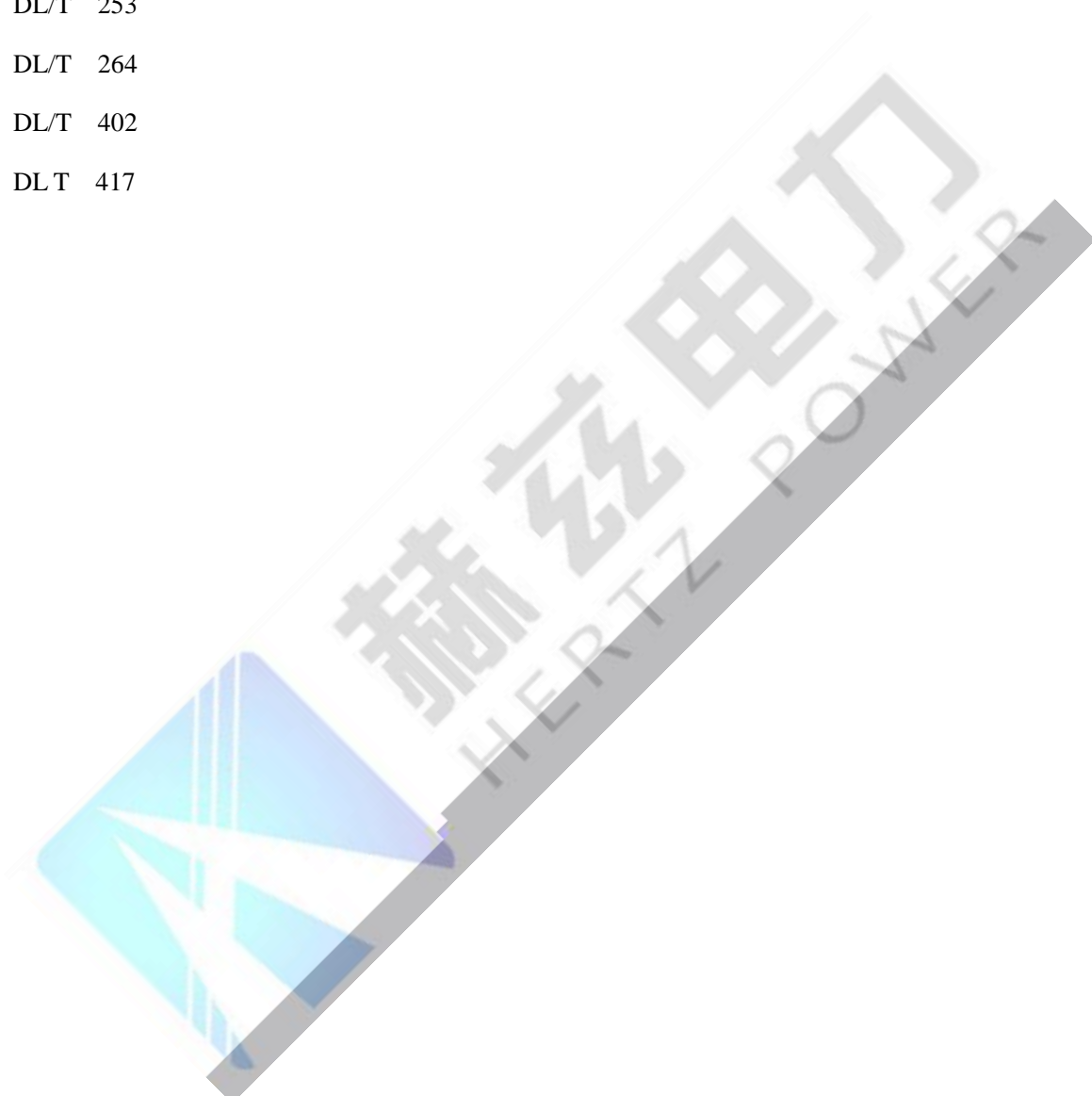
GB 50395
DL/T 4415
GB 50617

DL/T 253

DL/T 264

DL/T 402

DLT 417



DL/T 1093

DL/T 1096

DL/T 1220

DL/T 1250

DL/T 1300

DL/T 1366

DL/T 1378

OPGW

DL/T 1630

DL/T 5390

JGJ 126

JGJ 169

JJG 1021

[2014]161

Q/CSG 1206007

Q/CSG 1205011

Q/CSG 1203004.1 35kV 500kV

Q/CSG 1203004.2 35kV 500kV

Q/CSG 1203004.3 20kV

3

3.1

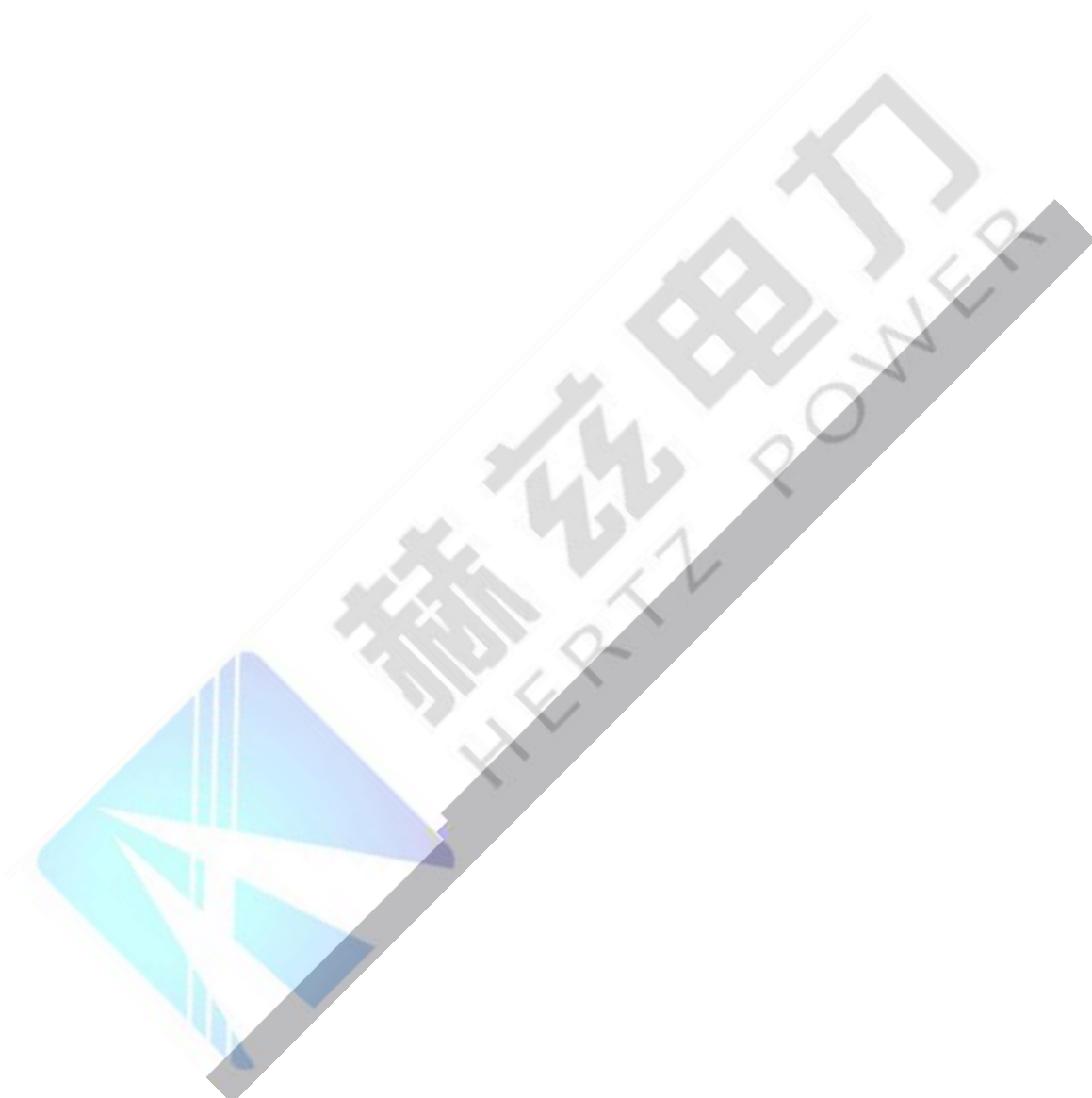
3.2

3.3



3.4

3.5



3.13

3.14

Symbol

U_n

U_m

U_0/U

(U_0

U

)

U_{mA}

1 mA

\tan

RTV

Room temperature vulcanized silicone rubber

anti-pollution coating

RTV

DL/T 627

RTV-

RTV-

4

4.1

4.2

4.3

4.4

4.5

4.6

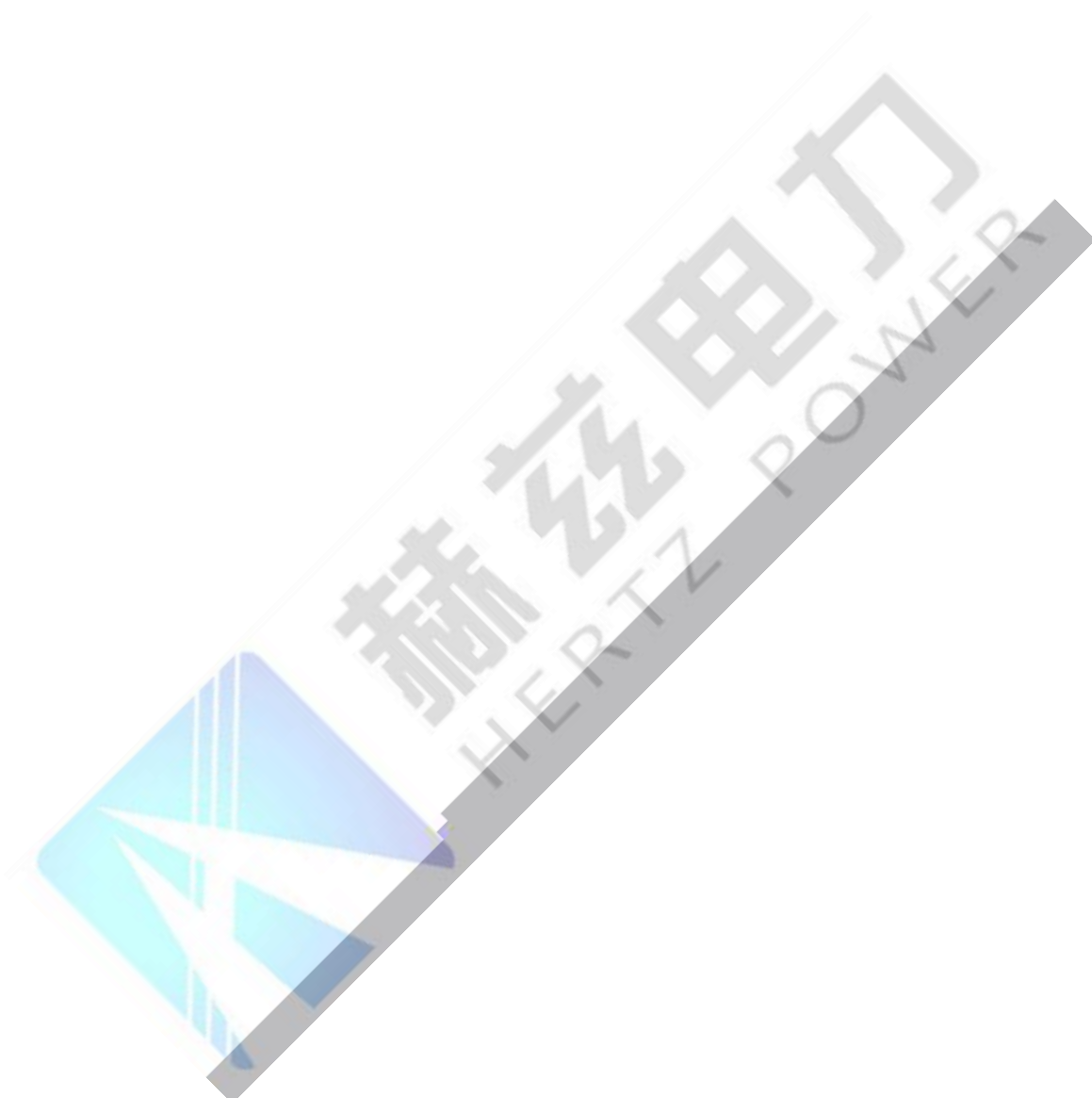
4.7

4.8

8



Q



2mA

1

	V	V	M
1	<100	250	50
2	<500	500	100
3	<3000	1000	2000
4	<10000	2500	10000
5	10000	2500 5000	10000

4. 20

2

2

kV	110 66	220	500
h	24	48	72

4. 21

1

2

3

4

5

5

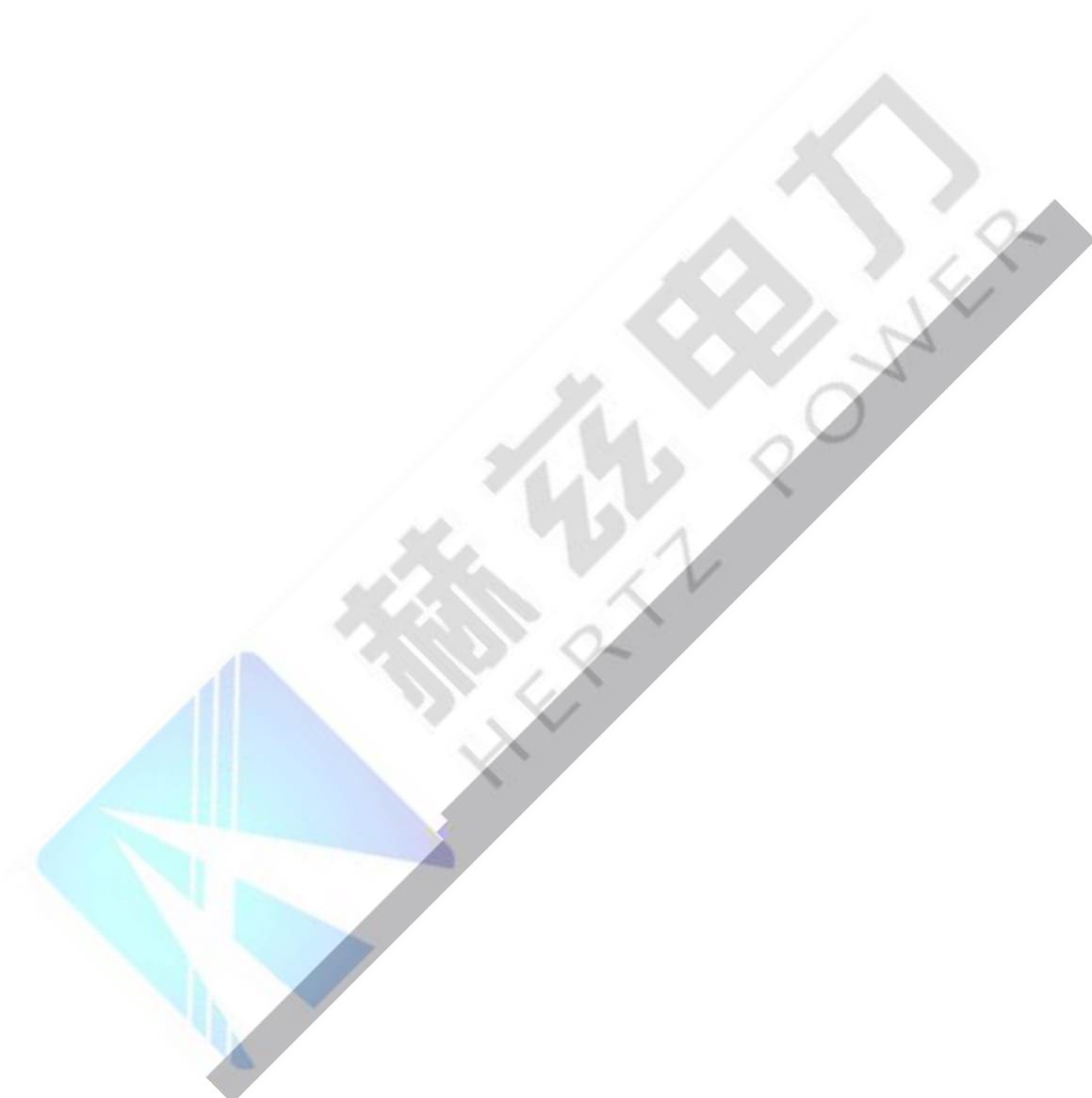
5. 1

3

1		1 a b	pH >5. 4		



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3

2

1

5

2

3

4 2500V

1min

1

70%

10000M

20

2

K	5	10	15	20	25	30	35	40	45	50	55	60
A	1.2	1.5	1.8	2.3	2.8	3.4	4.1	5.1	6.2	7.5	9.2	11.2

a

K

20

b

3

A

$$A = 1.5^{K/10}$$

1

20

6

20

$$R_{20} = AR_t$$

2

20

$$R_{20} = R_t/A$$

3

R_{20}

20

M

R_t

M

4

35kV

4000kVA

1.3

R_{60}

3000M

20

5

220kV

120MVA

5000V

00

3

$$t = 120 \times \frac{f_N}{f_s}$$

4 100pC 66kV 1.5Um/ 3 66kV 300pC 15s

5 110kV

11

n

1 2

12

kV	
110kV	60± 5%
220kV	102± 5%

13

1 10000M
2 1000M 1000M
tan 2%

1

1 10 tan

tan

20kV

2

tan %

14

tan %	
	0.4
	0.5
1.0 35kV	1.5
	0.5
tan	0.5
	1.5
	0.5
	0.5

3

30%
r

2

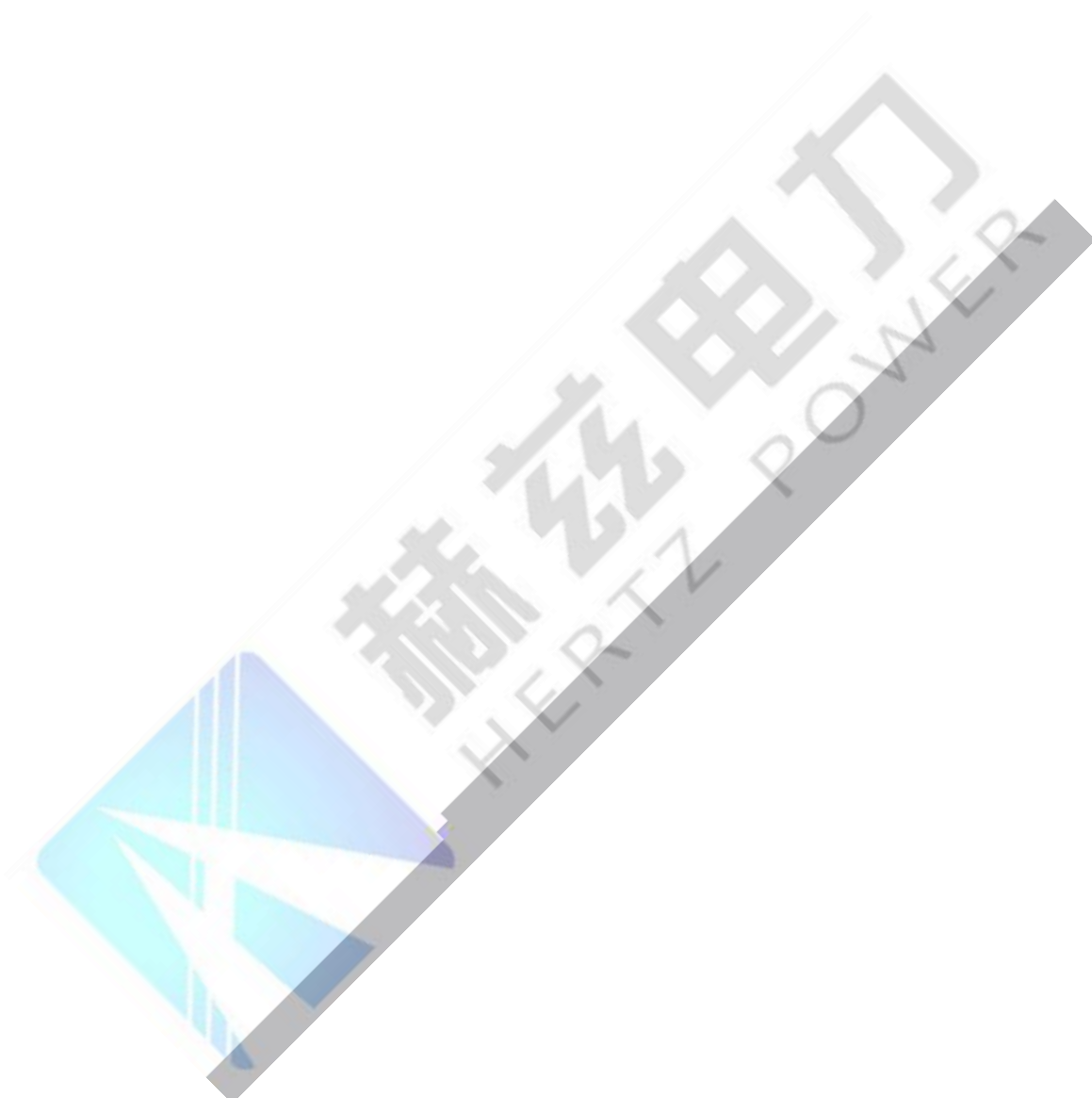
± 5%

3

1000M

tan

2%



			500kV 220kV 2 mg/L 3 kV	10 H ₂ 10 H ₂ 35 110kV	10 C ₂ H ₂ 30 C ₂ H ₂ 45 110kV	0.1 0.1 40
20			1 2	20mi n		
21						
22			1 2 3	1M	/	
23			1 2 3 4 5	1 M	/	
24			1 DL/T 540 2 3 4	1M	/	
25			1 2 3 4	1M	/	
26			1 2 3	5mi n	5	5 3
27			1			



			2		
28			<p>GB/T26218. 2-2010 10.3</p> <p>a P2-P1 20 mm</p> <p>b S P2 0.9</p> <p>c S 70 mm</p> <p>d 500kV 4.7m</p> <p>e 1000m</p> <p>1000-2000m 2000m</p> <p>1.13 2000-2500m 2500m</p> <p>1.20 2500-3000m 3000m</p> <p>1.28 3000m</p> <p>f</p>		
29			<p>Um 40.5kV 400mm 1000m</p> <p>a) 1000-2000m 2000m</p> <p>1.13</p> <p>b) 2000-2500m 2500m</p> <p>1.20</p> <p>c) 2500-3000m 3000m</p> <p>1.28</p> <p>d) 3000m</p>		
30	CT		<p>1</p> <p>2</p>		
31			<p>1</p> <p>2</p> <p>3</p> <p>4</p>	3°	
32					
33			220kV 110kV		

3



34

- 1
- 2
- 1

35

GB 5273

- 2
- 3
- 4 6.0

36

- 1
- 2
- 3
- 4
- 1

37

- 2

38

- 3

39

- 4

4h

30

- 1
- 2
- 3
- 4
- 5
- 6
- 7



3

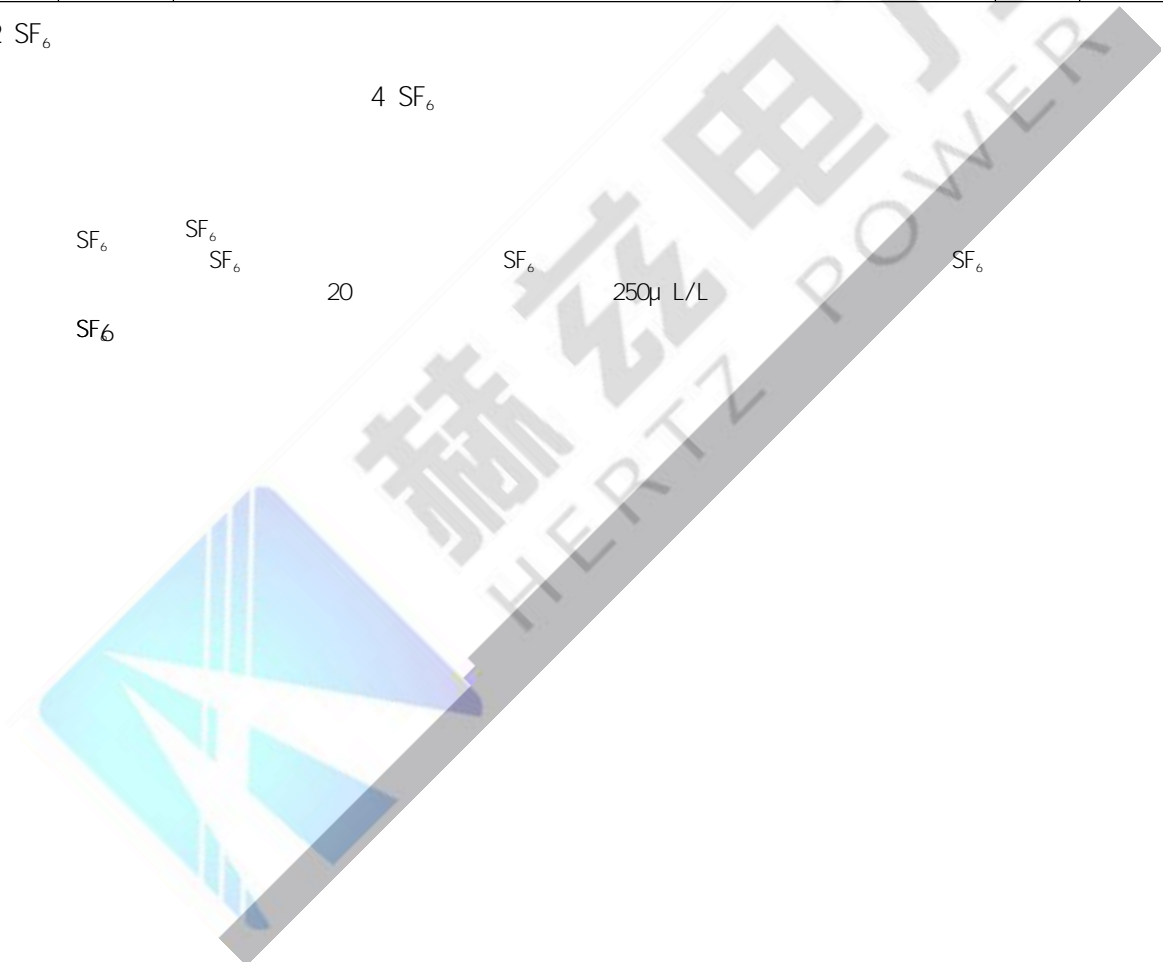
			5		
			6		
			7		
			8		
			9 500kV	240NVA	
			10		

5. 2 SF₆

4 SF₆

1 SF₆ SF₆ SF₆ 20 SF₆ 250μ L/L SF₆

2 SF₆



0/0 SF₆ 9-2-18

4 SF₆

± 1%

6

1
2

1

7

4

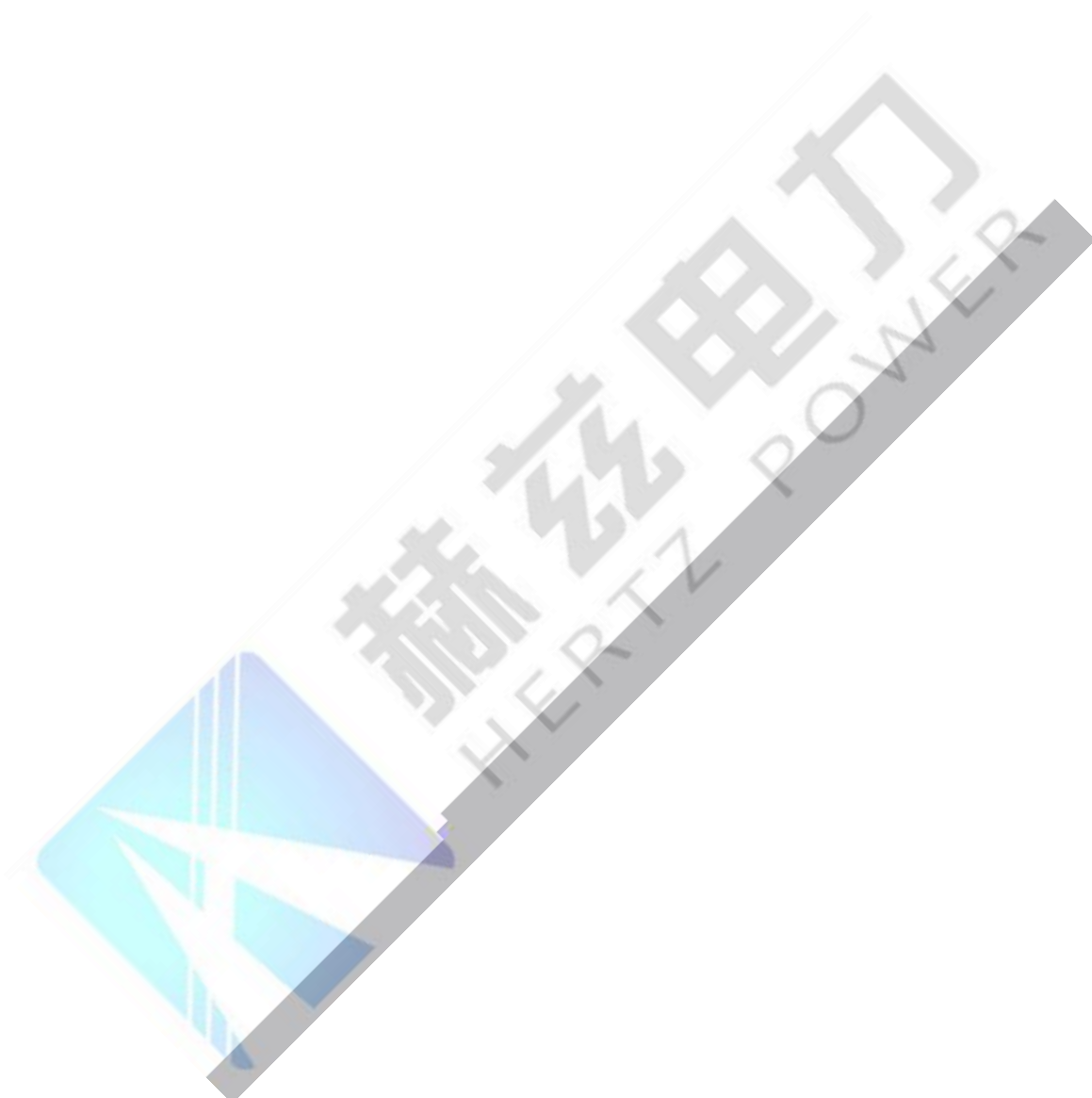
2



4 SF₆

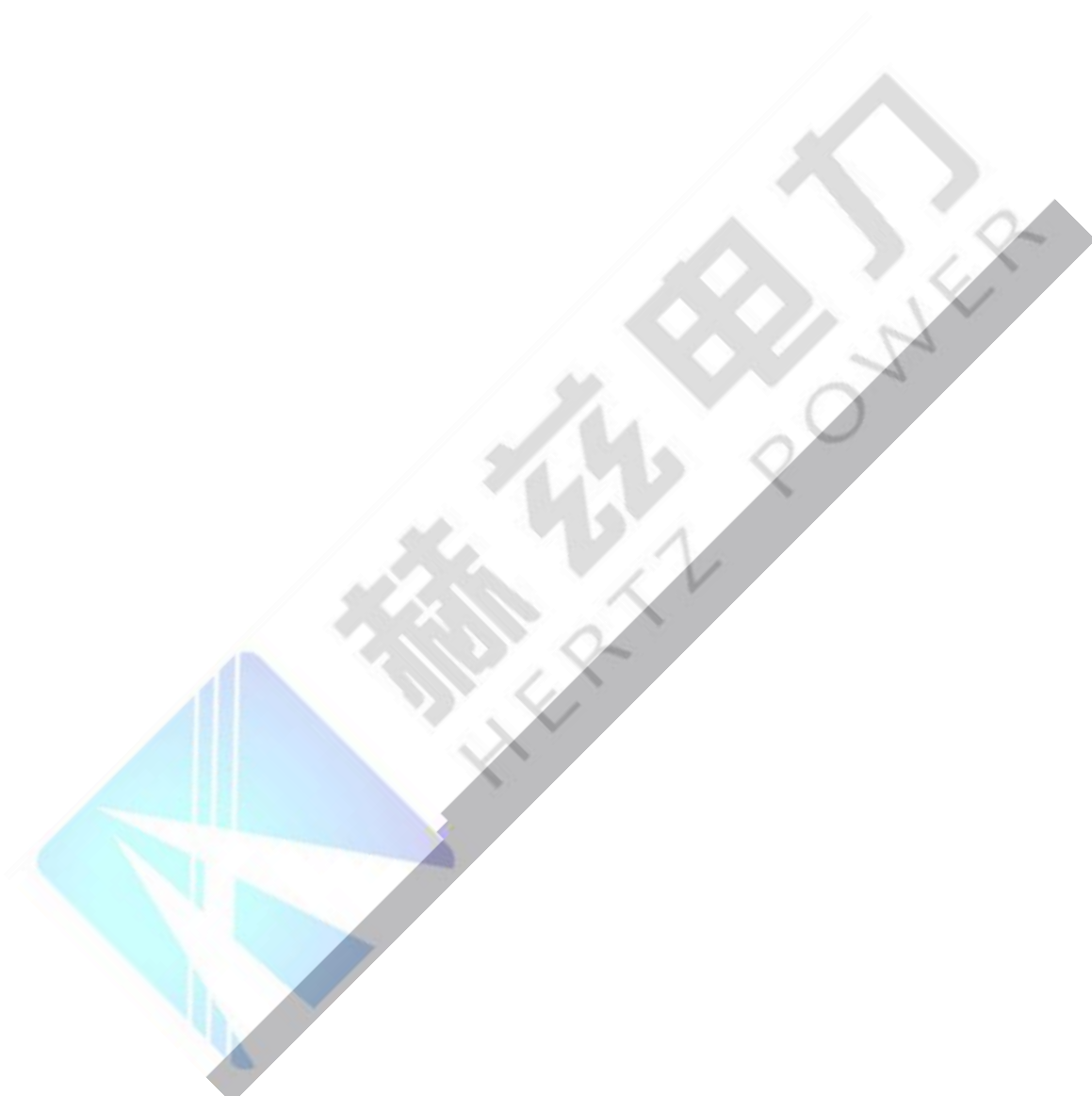
tan

K	5	10	15	20	25	30	35	40	45	50
A	1.15	1.3	1.5	1.7	1.9	2.2	2.5			





4 SF₆



4 SF₆

			2 3 4 5	1M	500V 1000V
24			1 2		
25			a b c d e f	GB/T26218. 2- 2010 10. 3 P2-P1 20 mm S P2 0. 9 S 70 mm 500kV 4. 7m 1000m 1000- 2000m 2000m 1. 13 2000- 2500m 2500m 1. 20 2500- 3000m 3000m 1. 28 3000m	
26			Um a) 1. 13 b) 1. 20 c) 1. 28 d)	40. 5kV 400mm 1000m 1000- 2000m 2000m 2000- 2500m 2500m 2500- 3000m 3000m 3000m	
27		CT			
28					
29				220kV 110kV	
30			1 2		



4 SF₆

1

GB 5273

31

2

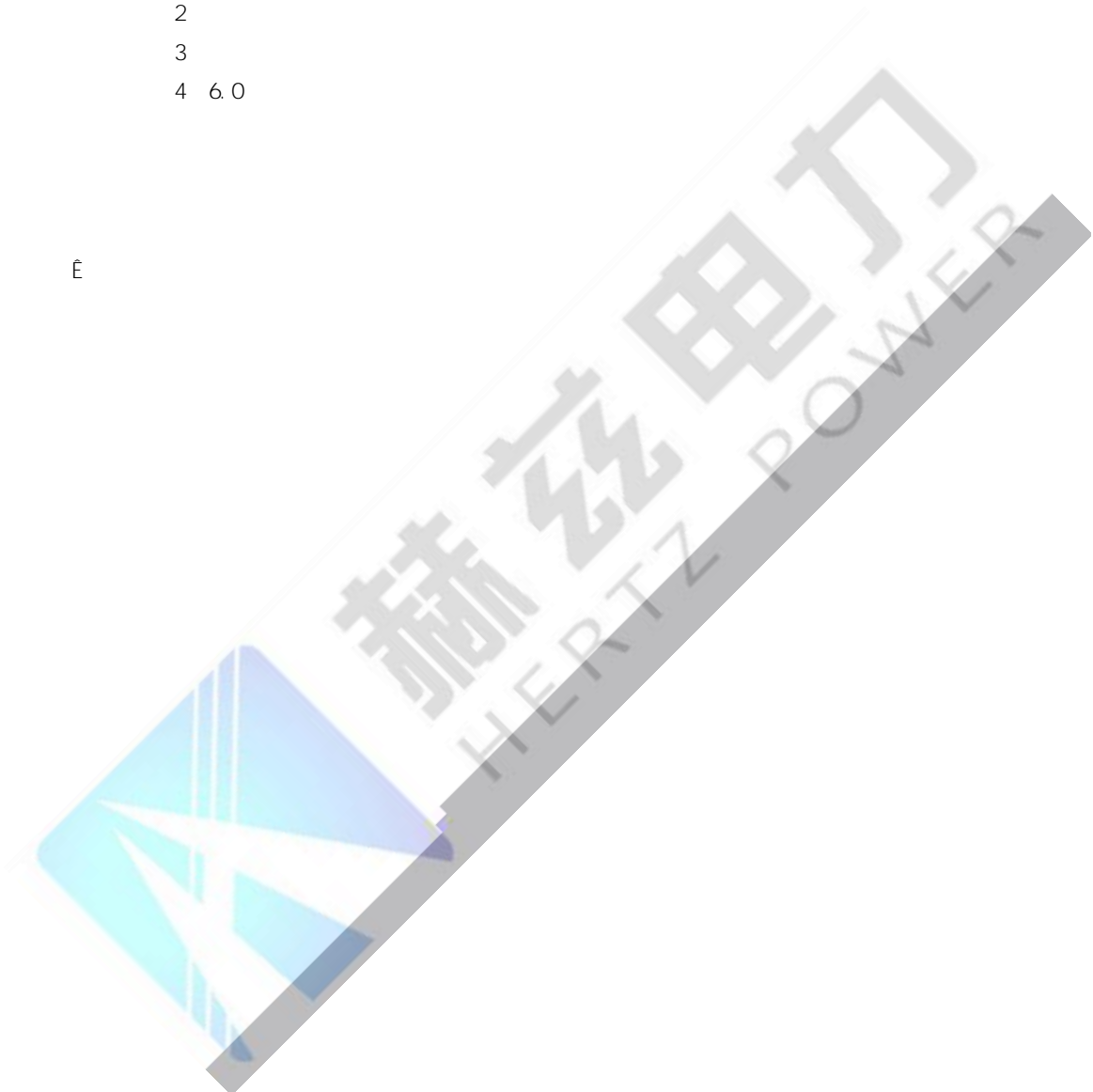
3

4 6.0

32

33

É

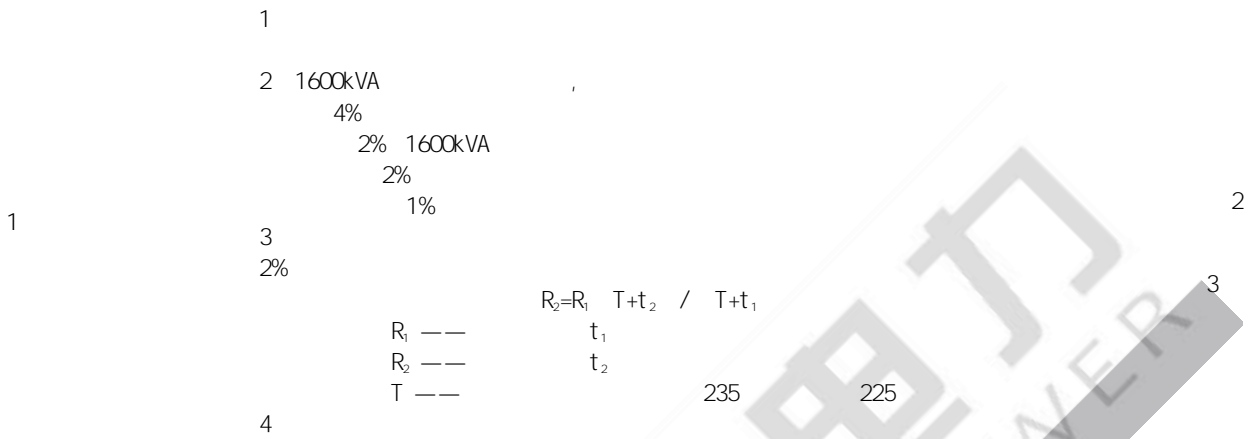


10/18/18



5.3

5



5

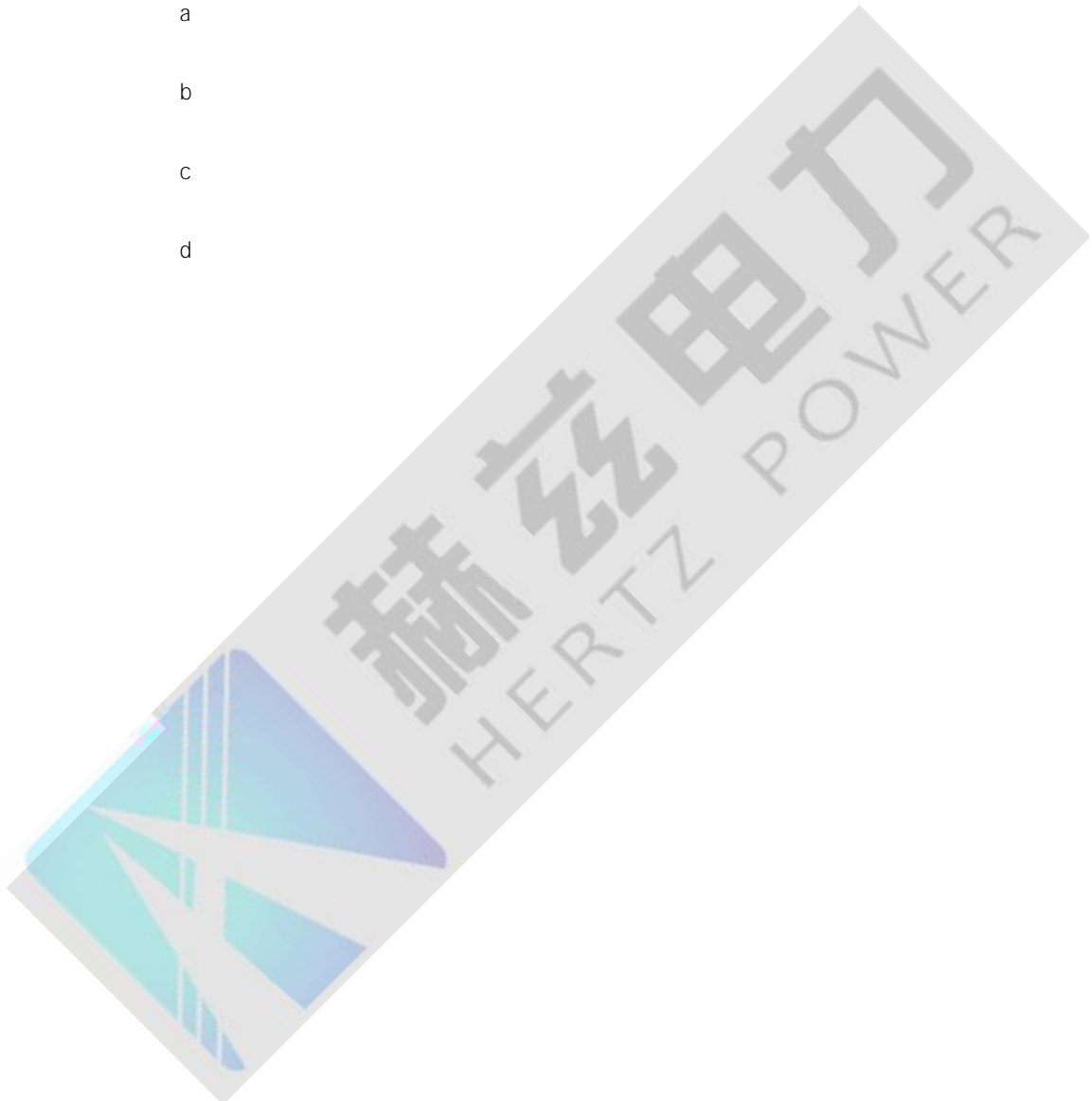
$$A = 1.5^{K/10}$$

3 a K 20 A 1



5

- b 10%
- 3
- 4
- a
- b
- c
- d



GB/T26218.2-2010 10.3

a P2-P1 20 mm

b S



5

21			1 2 3 4 5 6 7 8 9 10	/	

6

6.1 500kV

6 500kV

1			1 a pH >5.4 b mgKOH/g 0.03 c 135 d mg/L 10 e 25 f , mV/m 40 g tan 90 % 0.5 0.7 h kV 65 i 90 ·m 6×10^{10} j % 1.0 k % 0.02 l 100mL 5μ m 2000 2 3 a 72h 24h b 24h DL/T 722 c μ L/L 10 H ₂ 10 C ₂ H ₂ 0.1		
2			1 2 2% 2% $R_2=R_1 \quad T+t_2 / T+t_1$		1

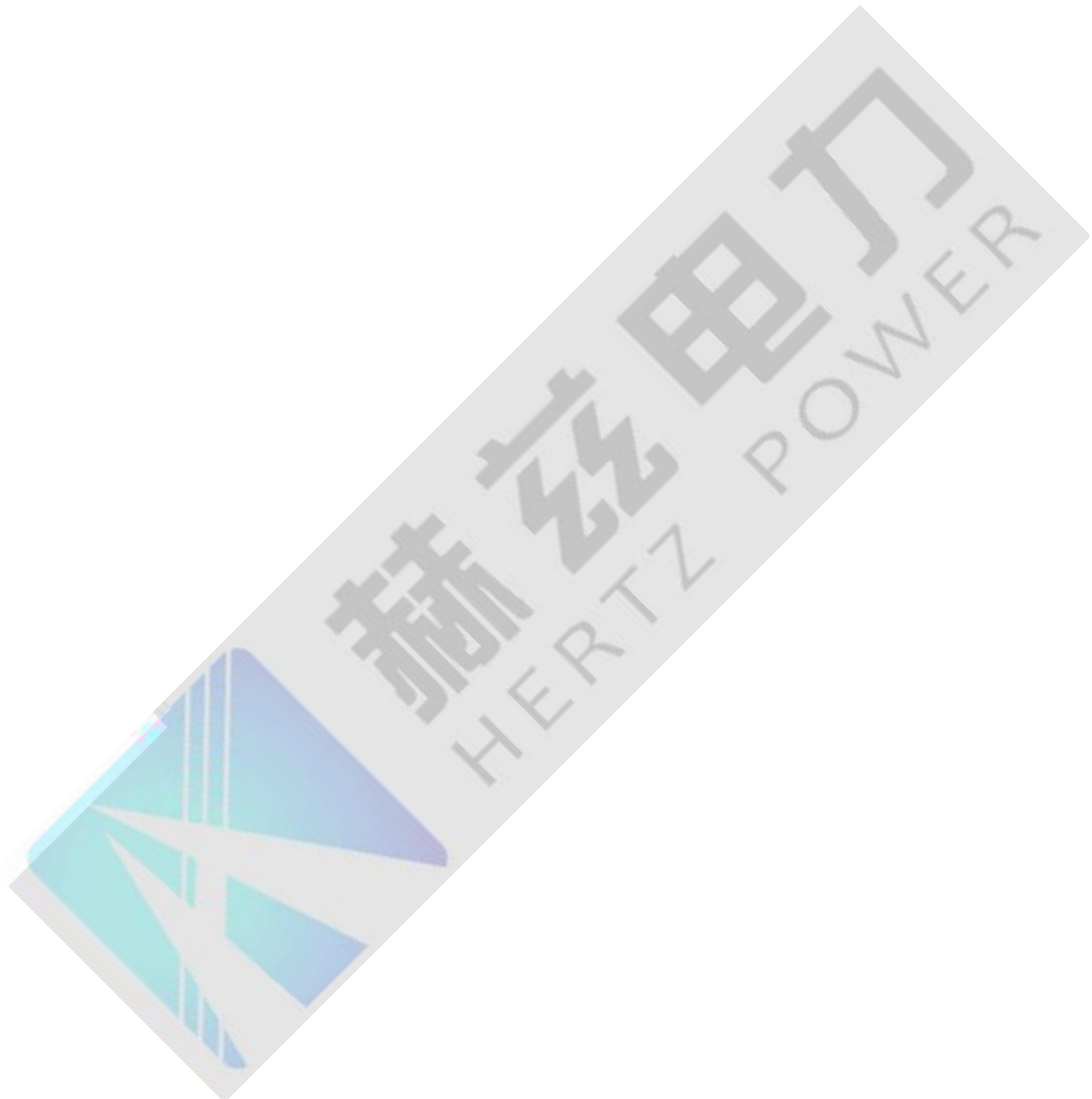
6 500kV

R_1 — t_1

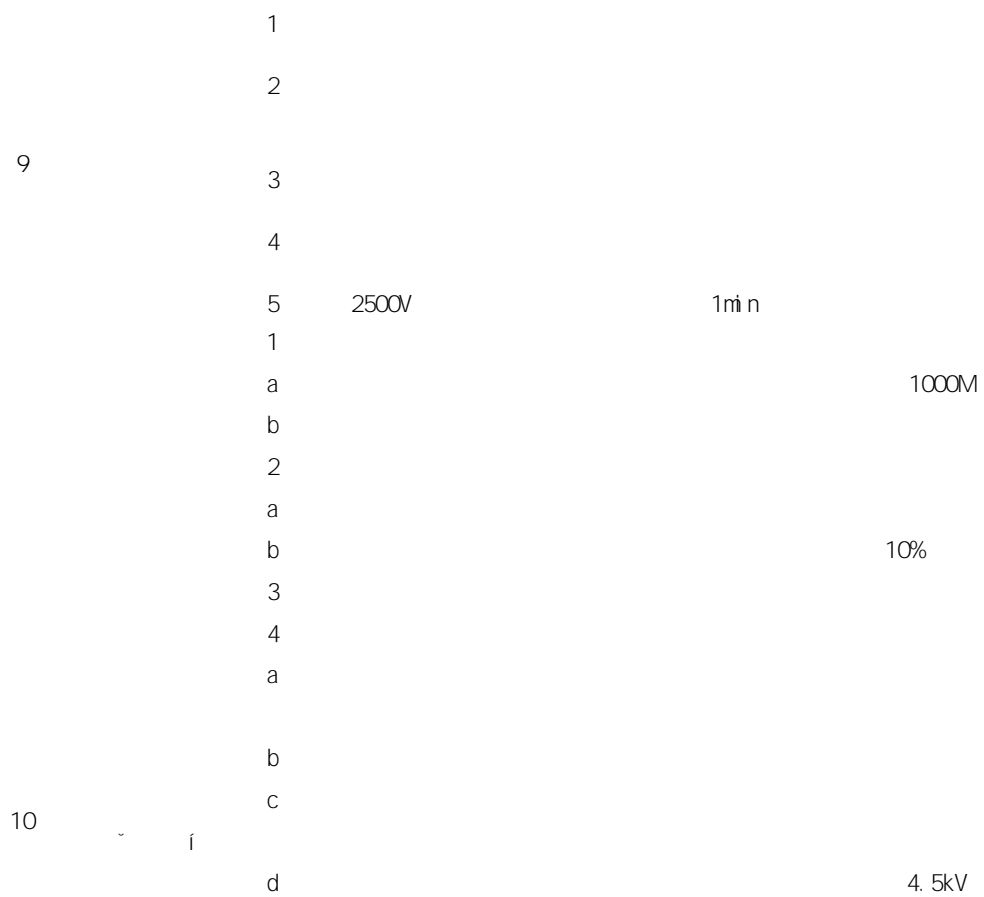


6 500kV

K 5 10 15 20 25 3



6 500kV





6 500kV

			2		/	
13			1 2 3 4 5 6 7	1M	3°	/
14			1 2 3 4	1M		/
15			24h	500kV DL/T 264	0.035MPa	
16			5	5min		
17					65° C	24h
18					100μ m	24h
19			1 2			
20				GB/T26218.2-2010 10.3 a P2-P1 20 mm		

6 500kV

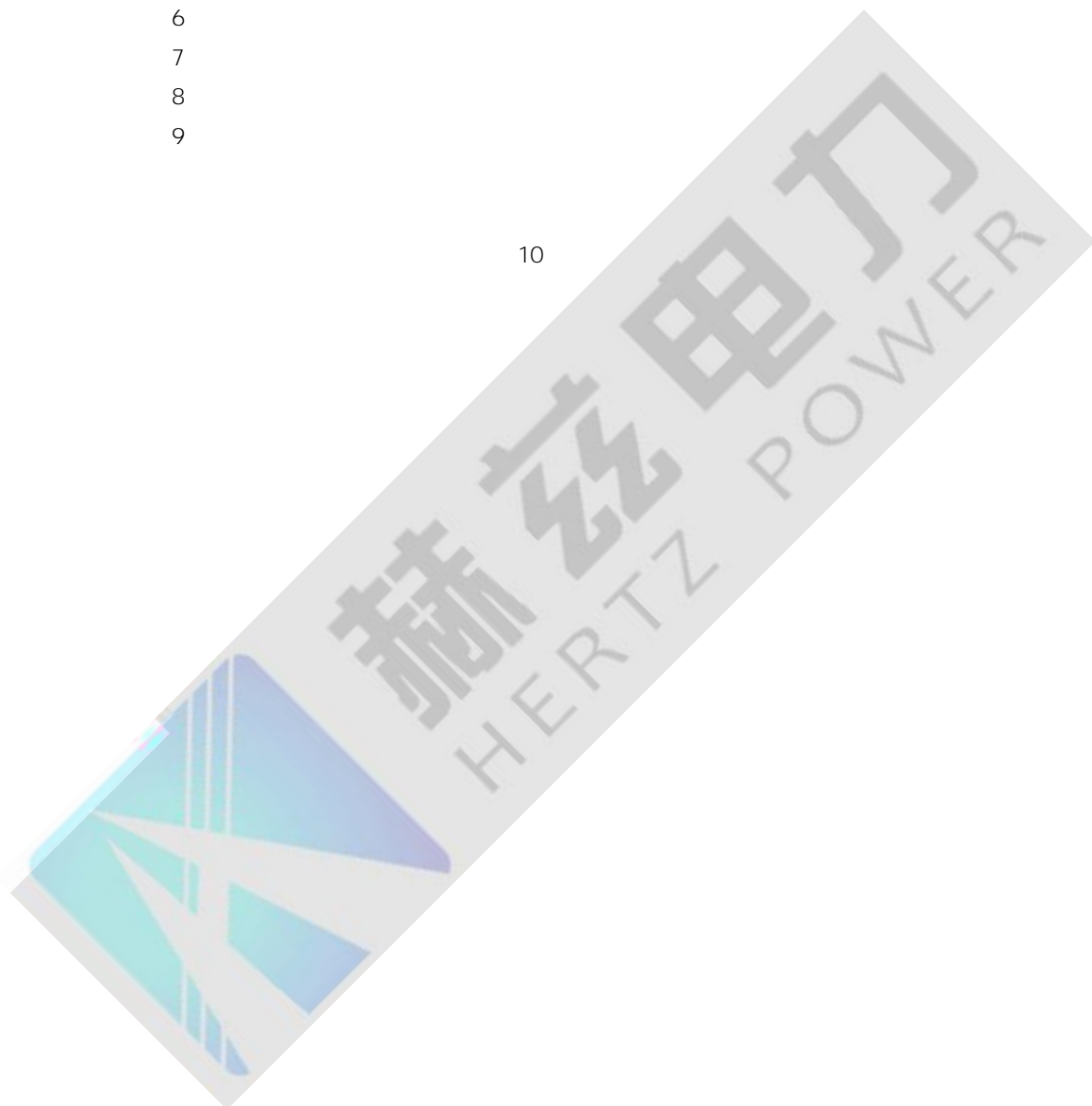
	b	S	P2	0.9
	c	S 70 mm		
	d	500kV	4.7m	
	e	1000m		
		1000-2000m	2000m	
	1.13	2000-2500m	2500m	
		1.20	2500-3000m	3000m
		1.28	3000m	
	f			
	1		3°	
21	2			
	3			
22				
	1		-	
23	2			
	1			
24	2			
	1			
	2			
25	3			
	4	6.0		
	1			
26	2	è	è	



6 500kV

- 3
- 4
- 5
- 6
- 7
- 8
- 9

10

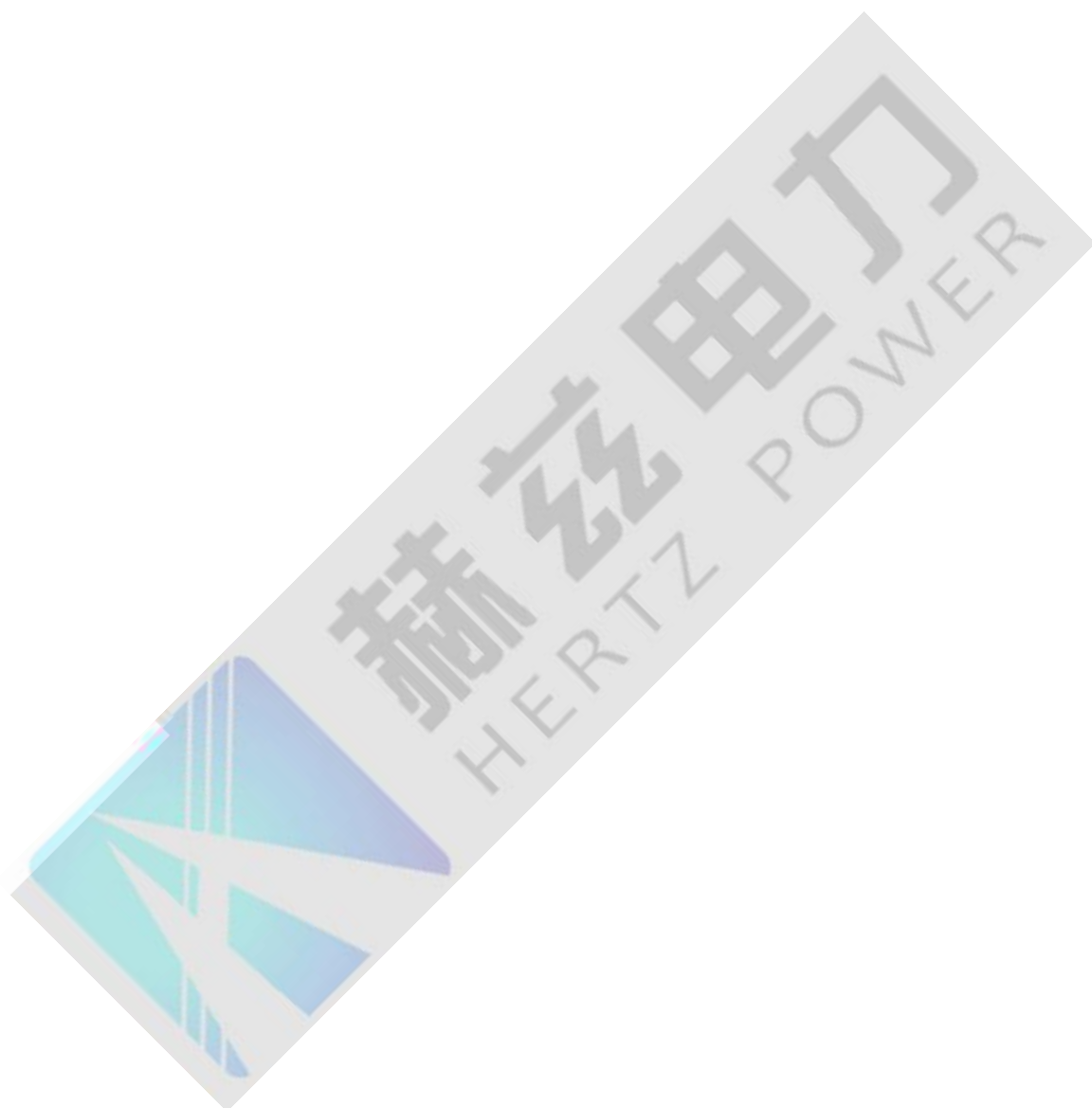


7 35kV

i 90 .m V



7 35kV



7 35kV

	2		/
	3	1M	
	4		
	1		
12	2	1M	
	3		
13			
	1		5
14	5min		
	2		
	1		3°
15	2		
	3	°	



7 35kV

			4 6.0		
22			1 2 3		
23			1 2 3 4		
24					
25			1 2 3 4 5 6 7 8 9 10	10	80% 2-5mm
26					/
27			1 2 3 4 5 6		/

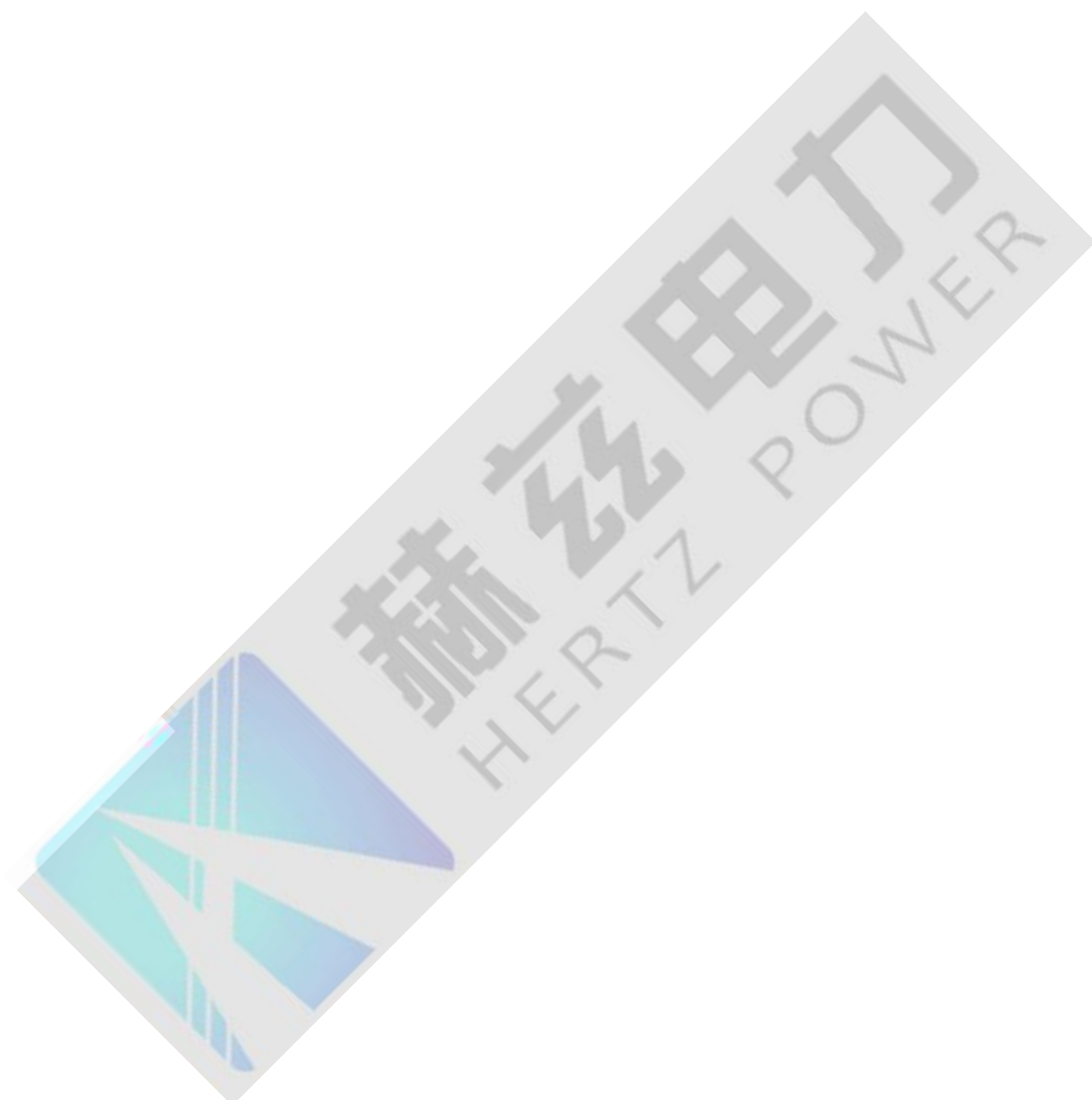
7 35kV

			7		
			8		
			9		

6.3 35kV

8 35kV

1			<p>1 1%</p> <p>2 1%</p> $R_2 = R_1 \frac{T+t_2}{T+t_1}$ <p> R_1 t_1 R_2 t_2 T— 235 225 </p>		1 2				
2			± 5%		1 35kV 2				
3			<p>1 1min</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>kV</td> <td>kV</td> </tr> <tr> <td>128</td> <td>96</td> </tr> </table> <p>2 100kHz 3000</p> <p>3</p> <p>4 20%</p> <p>5 5%</p> <p>6</p>	kV	kV	128	96		1 35kV 2 3 35kV
kV	kV								
128	96								
4			5min	5					
5					1 2 GB/T 1094.10				
6			1		1 35kV				



8 35k

			8 9 10 11 35k	SF ₆	F	C2

7



1 tan 10kV tan %

tan % 20

kV	20 35	66 110	220	500
	2.5	0.8	0.6	0.5
	2			

20kV

2 0.5 1

3

$U_m/\sqrt{3}$

U_m

tan

tan

0.2%

0.5%

3

tan

4

5%

5

tan

2%

tan

1000M

2kV

1

80%

2

2

66kV

110kV

4

3

2kV

2500V

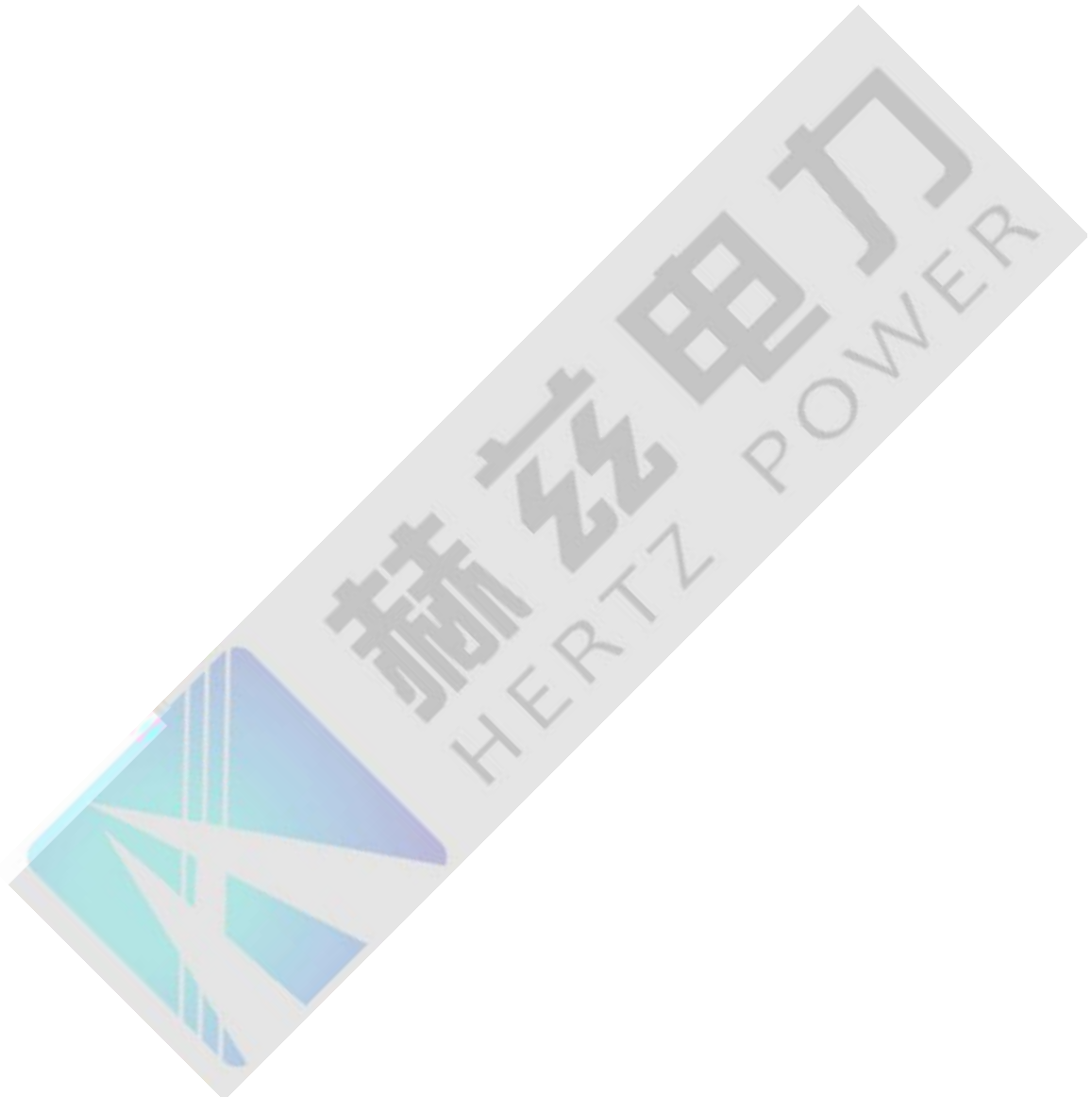
4

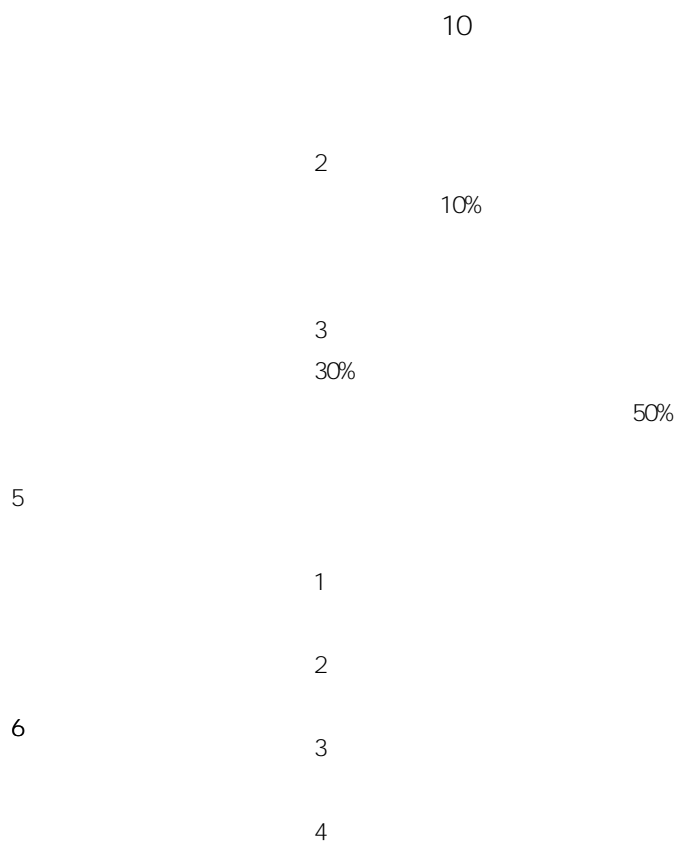
110kV

2kV

2500V

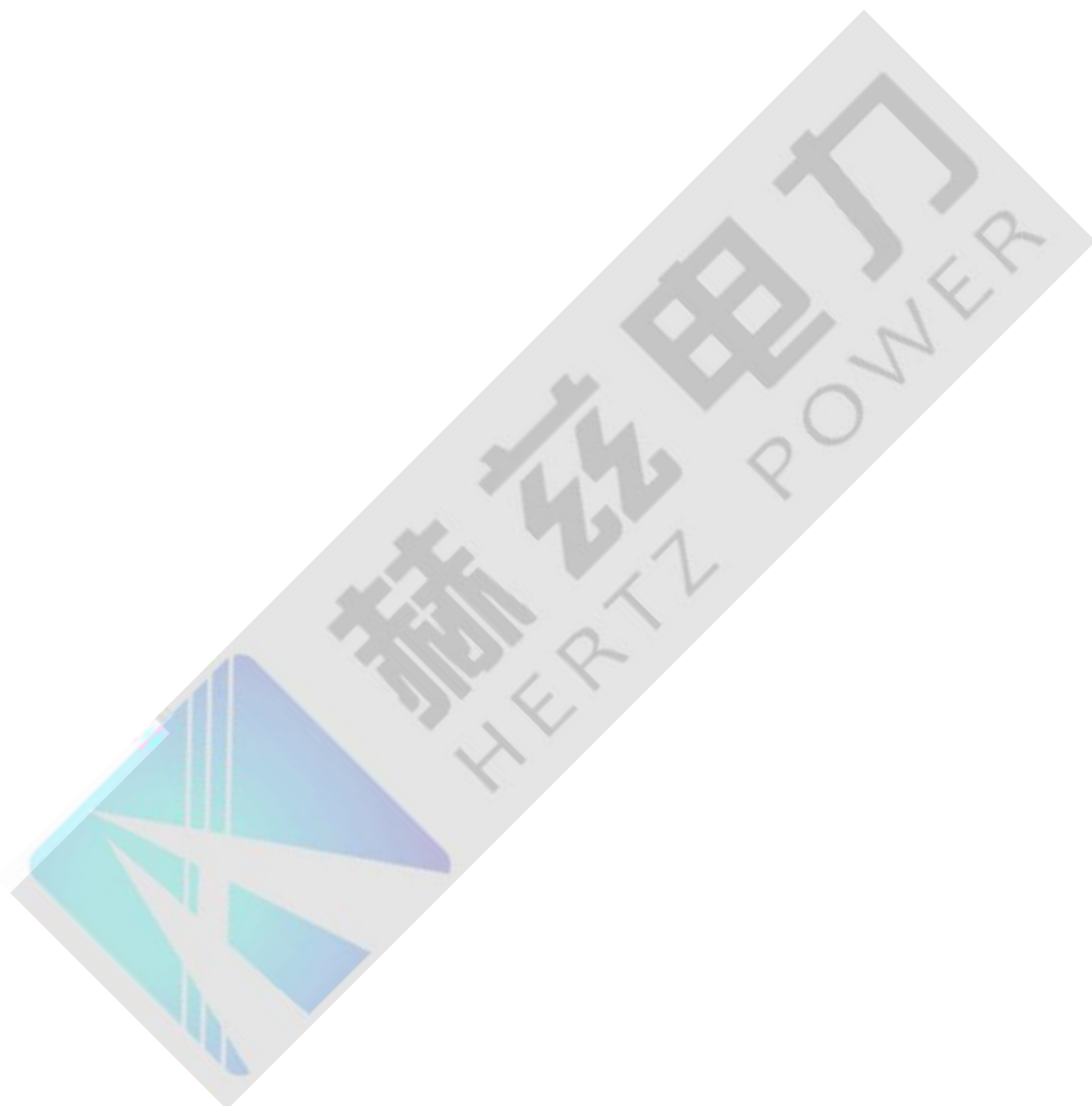
5







Q/CSG1205019-2018



11 SF₆

2 220kV

3
2500V

2kV

4 110kV
2500V

2kV

4

SF₆

1
2

20
SF₆

99.9% CF₄ 0.01% Air 0.03%

250μ L/L



11 SF₆

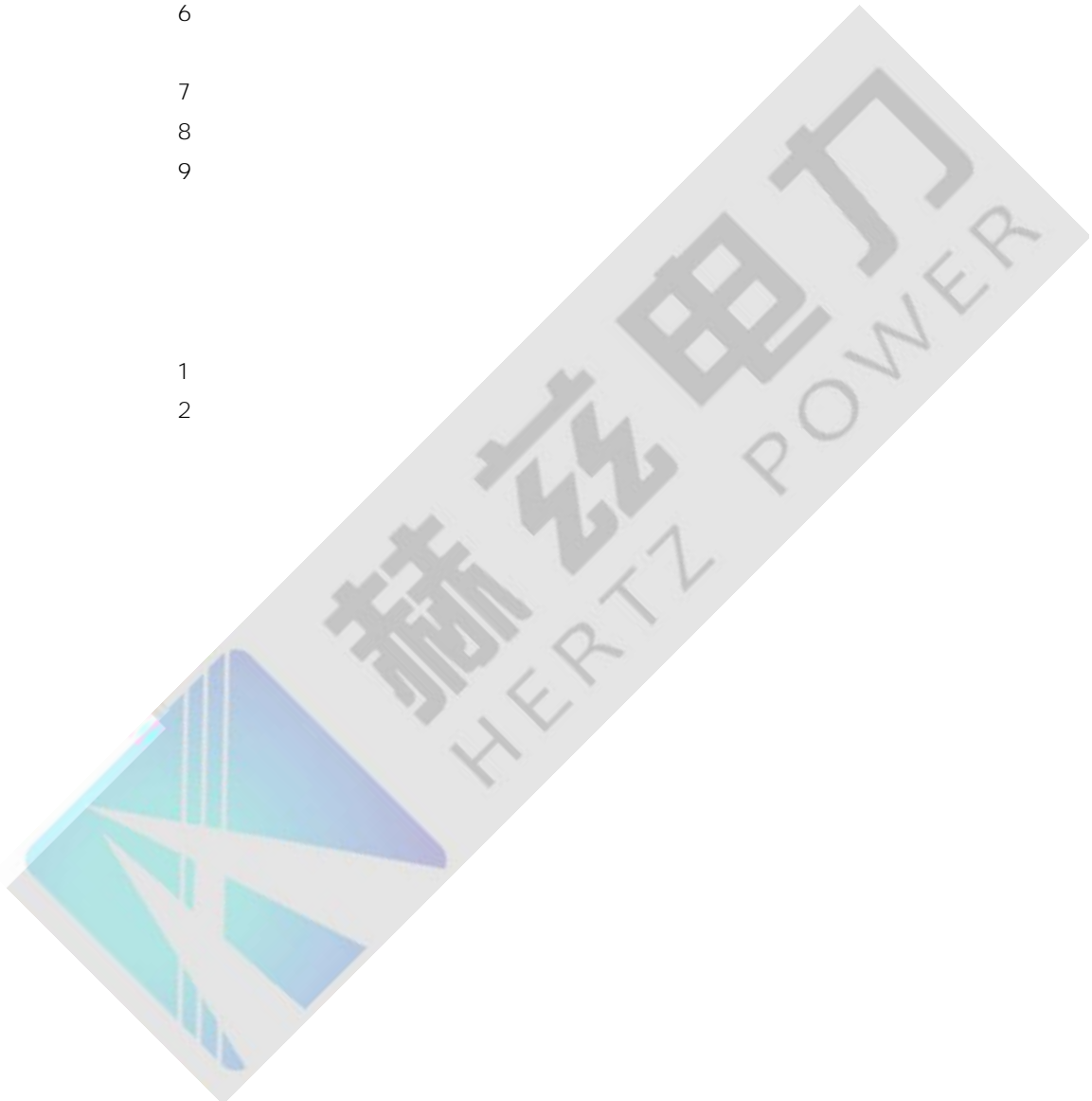
3
4
5
6
7
8
9

/

11

1
2

12



11 SF₆

			JJG1021-2007		



			<p>t --- 15s</p> <p>4 66kV</p>		
5			<p>1 10%</p> <p>2 15%</p> <p>3</p> <p>$R_2=R_1 \quad T+t_2 / T+t_1$</p> <p>$R_1$ --- t_1</p> <p>R_2 --- t_2</p> <p>T --- 235 225</p>		
6					
7			<p>1 30%</p> <p>2 20% 50% 80% 100% 120%</p> <p>3 150%</p> <p>4 190%</p> <p>120%</p> <p>190%</p> <p>120%</p>		
8			<p>1</p> <p>2 5%</p> <p>3</p> <p>4</p>		
9			<p>1</p> <p>2</p> <p>3</p> <p>4</p>	/	

12

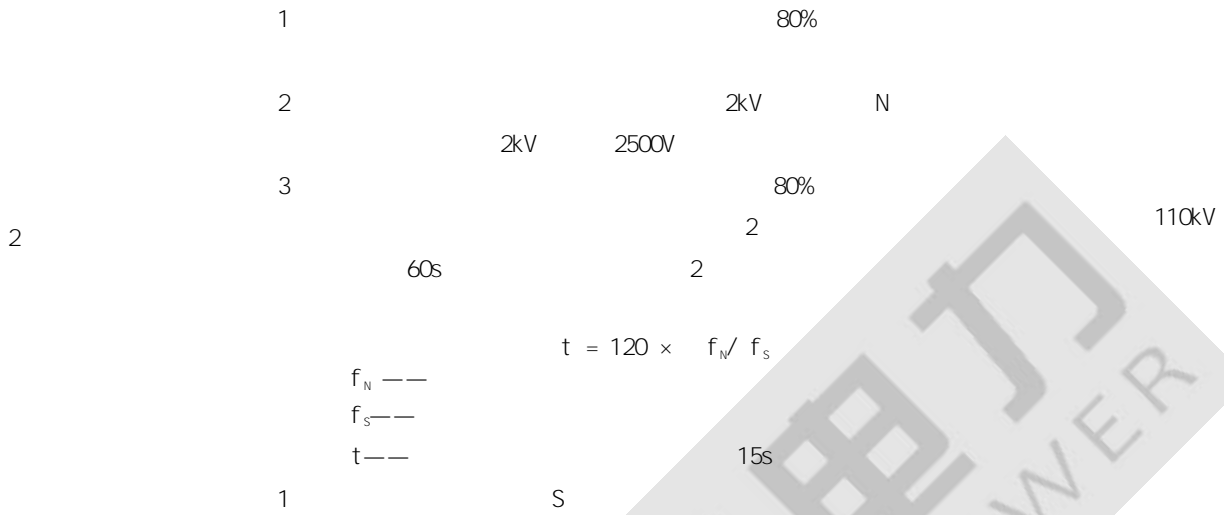
5

6

7



13



13

4

1

2

3

4

7

5

/

6

7

8

1

2

3

4

5

6

8

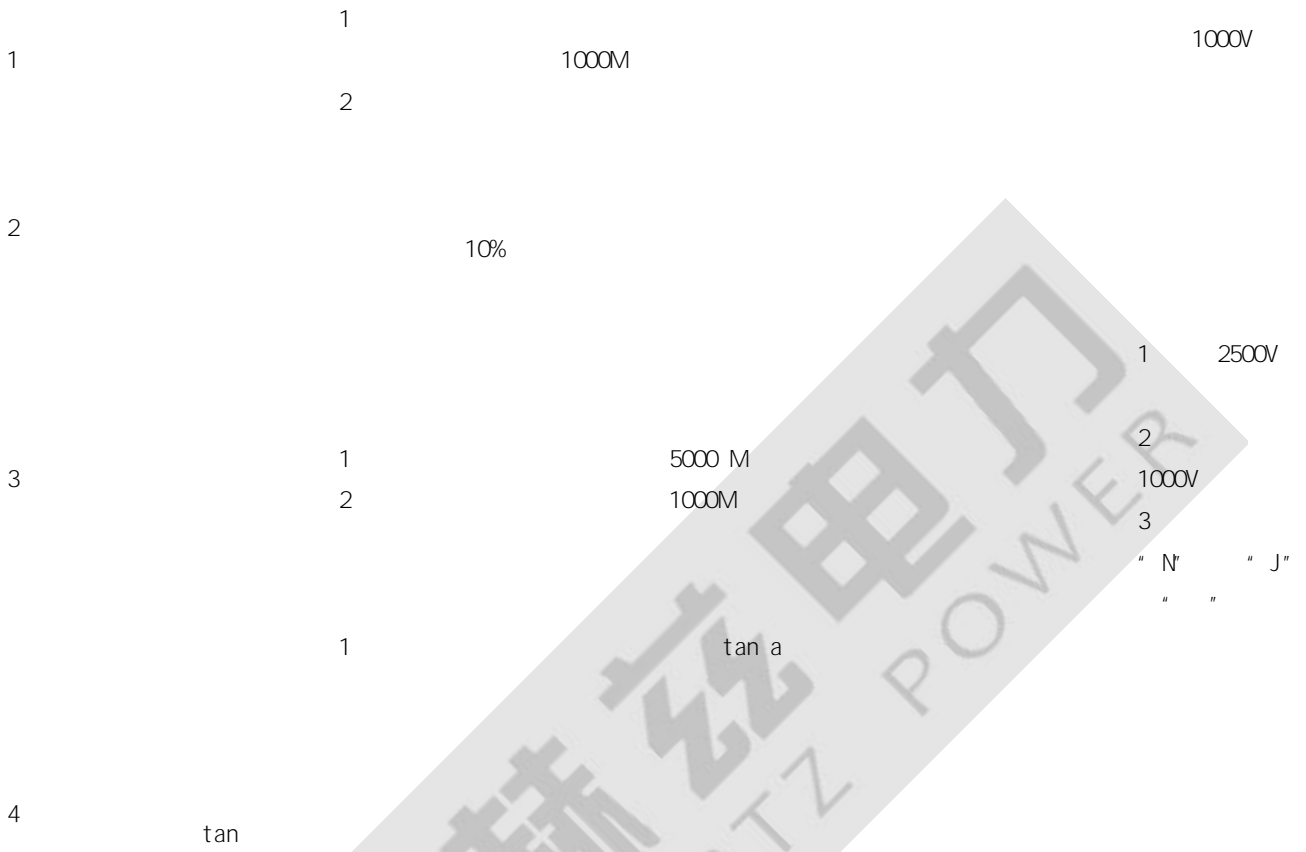
7

8

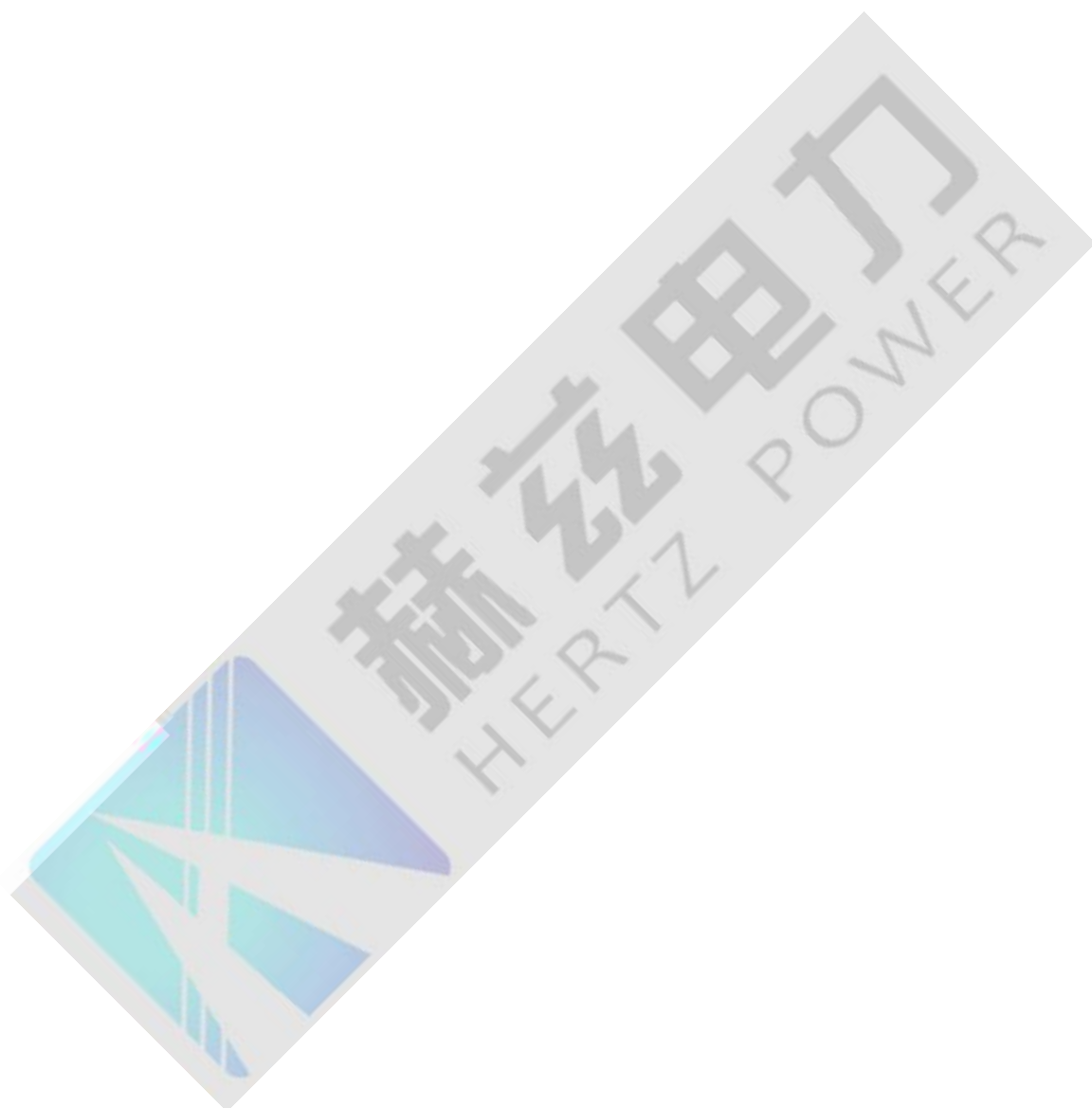
9

10

80







15 SF₆

1			1 2 2500V		
2			1 100A 2		
3			1 SF ₆ 2 a) 0.8 b) 110kV 500kV 110kV c) 3 a) 500kV 0.9 b) 220kV c d) 1.2U _r / 3	1 110kV 2 20 20	
4			1 5000M 2 ± 5% 10kV tan 0.5% tan % 0.2% 3 tan 4		
5			1 2 3 - 4 — 5ns — 3ns — 3ns — 2ns		
6			1 35kV SF ₆ 2 3		
7			1 ± 5%		



15 SF₆

			2		
8			1 2	10M	
9			1 2 3 4	85% 110% 30% 65% 110% 80% 50kA 85%	
10			1000M		1 2 2500V 1000V
11					
12			1 2 3	5%	
13			1		

15 SF₆

2

3



15 SF₆

22					
23				/	
24				/	
25					
26				/	
27					
28			1 2 3 4 5 6 7 10mm	10 20mm	
29					
30			1 2		

15 SF₆

31			1 2 3		
32			1 2 3 4 " "		
33	SF ₆		1 SF ₆ SF ₆ 2 SF ₆ 3 SF ₆ 4 SF ₆ 5 SF ₆ 6 7 8		
34					
35					
36			1 2 3 4 5 6 " / " " " 7 8 9 10		



15 SF₆

11

12

13

80%

10

2-5mm

14

1

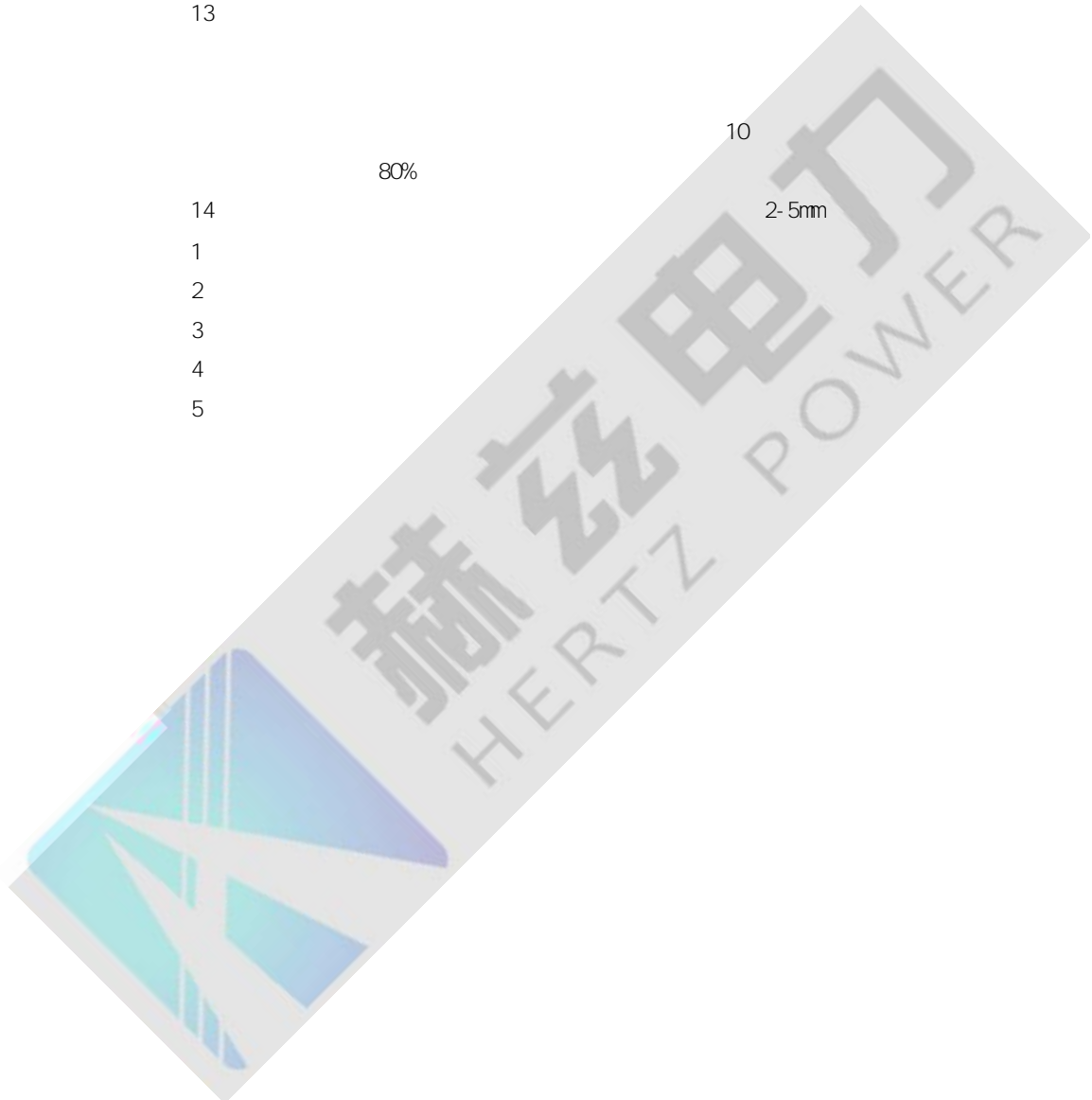
2

3

4

5

37



			<table border="1"> <tr> <td>3.6</td> <td>25/18</td> <td>25/18</td> <td>25/18</td> <td>27/20</td> </tr> <tr> <td>7.2</td> <td>30/23</td> <td>30/23</td> <td>30/23</td> <td>34/27</td> </tr> <tr> <td>12</td> <td>42/30</td> <td>42/30</td> <td>42/30</td> <td>48/36</td> </tr> <tr> <td>24</td> <td>65/50</td> <td>65/50</td> <td>65/50</td> <td>79/64</td> </tr> <tr> <td>40.5</td> <td>95/80</td> <td>95/80</td> <td>95/80</td> <td>118/103</td> </tr> <tr> <td rowspan="2">72.5</td> <td>140</td> <td>140</td> <td>140</td> <td>180</td> </tr> <tr> <td>160</td> <td>160</td> <td>160</td> <td>200</td> </tr> </table>	3.6	25/18	25/18	25/18	27/20	7.2	30/23	30/23	30/23	34/27	12	42/30	42/30	42/30	48/36	24	65/50	65/50	65/50	79/64	40.5	95/80	95/80	95/80	118/103	72.5	140	140	140	180	160	160	160	200				
3.6	25/18	25/18	25/18	27/20																																					
7.2	30/23	30/23	30/23	34/27																																					
12	42/30	42/30	42/30	48/36																																					
24	65/50	65/50	65/50	79/64																																					
40.5	95/80	95/80	95/80	118/103																																					
72.5	140	140	140	180																																					
	160	160	160	200																																					
			4																																						
4																																									
			<p>1</p> <p>2</p> <p>2ms 40.5kV 10kV</p> <p>3ms 3kA</p> <p>2ms</p> <p>3</p>	40.5kV																																					
5																																									
6			20%																																						
			<p>1</p> <p>2</p>	10M																																					
7																																									
			<p>1</p> <p>2</p> <p>85% 110%</p> <p>30%</p> <p>3</p> <p>80%</p> <p>4</p>	85% 110%	30%	65% 110%	50kA 85%																																		
8																																									
9			2M																																						



10	2kV	1min	2500V
11			
12			
13	1		
	2		
	3		
	4		
	5		



2

1

2

3

4

5

6



	1			100A	
	2				GIS
1	120%				GIS
	3				
	4				SF ₆
	1			1*10 ⁶ ()	
2	SF ₆	2	5h	SF ₆	15μ L/L
	3			GIS	24h
	1	SF ₆		20	GB7674
				72.5kV	GB/T8905 SF6
3	SF ₆	2			150μ L/L
		3			250μ L/L
		4		GIS	24h
4	SF ₆	1	SF ₆ 99.9% CF ₄ 0.01% Air 0.03%		
		2	SF ₆		24h
5					

18 GIS HGIS GL

2 /
3

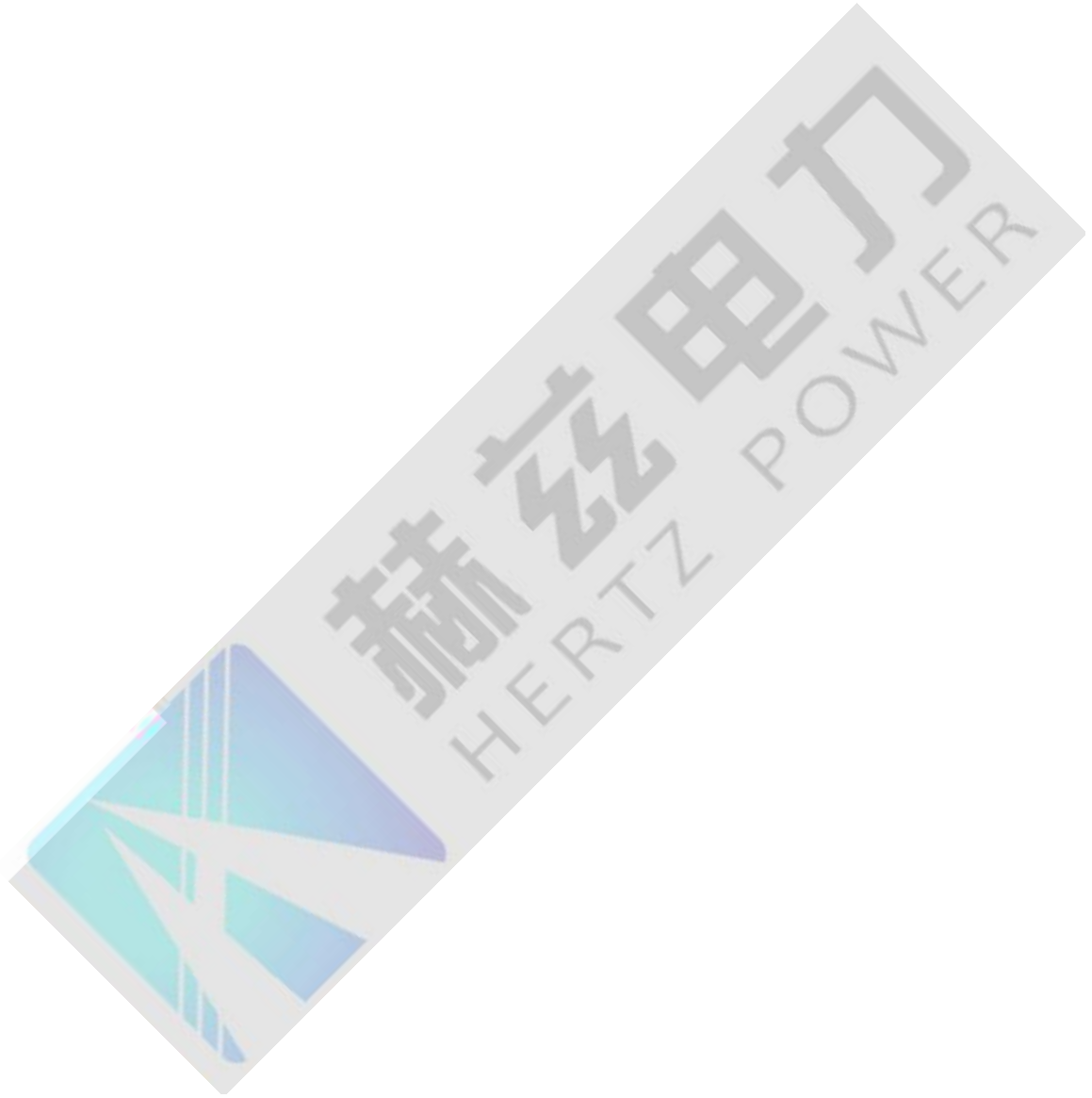
8 2M 500V 1000V

9 2kV 1min 2500V

10

tan

11



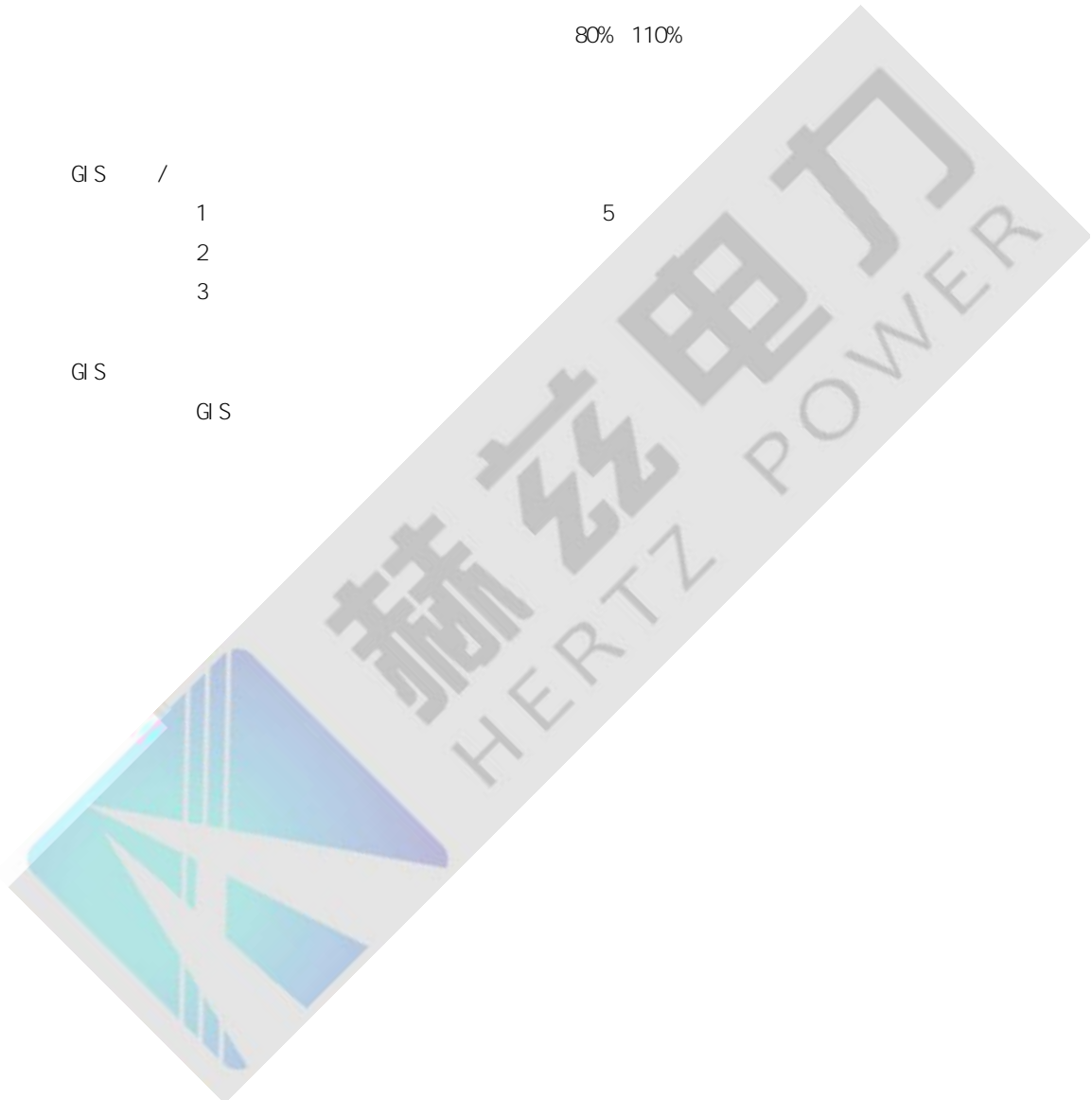


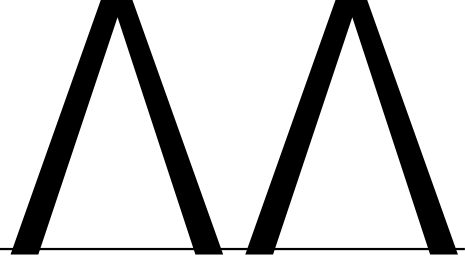
18 GS HGS GL

GS /
32 80% 110%

GS /
33 1 5
2
3

GS
34 GS

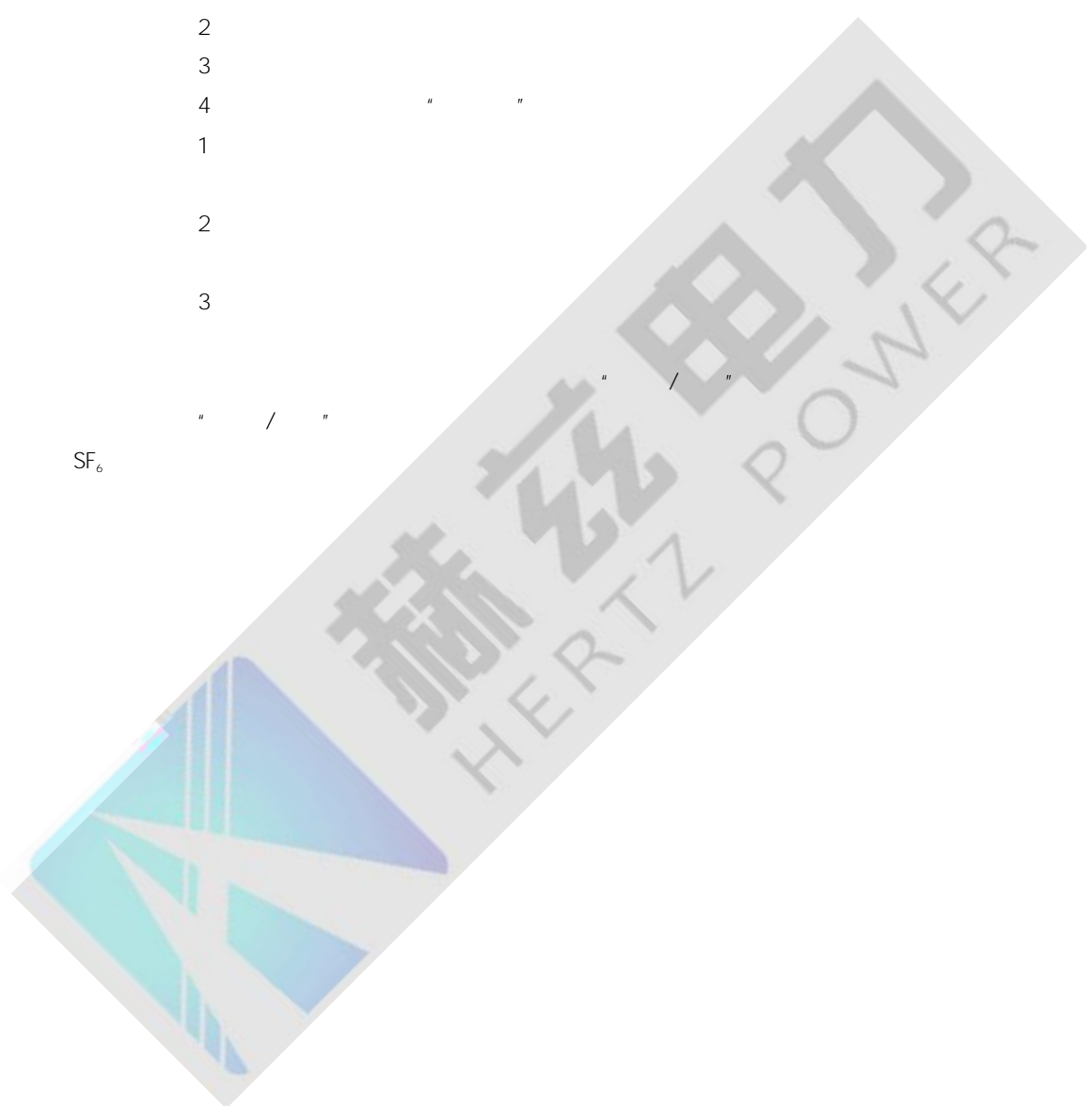




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18 GIS HGIS GL

	4	
	1	
45	2	
	3	
	4	" "
	1	
46	2	
	3	
47		" / "
		SF ₆
48		



1			1 2500V 2										
2			1 2										
3			2kV 1min		2500V								
4			1 100A 2										
5			1 2 3 4 5	<table border="1"> <tr> <td>kV</td> <td>7.2</td> <td>12</td> <td>40.5</td> </tr> <tr> <td>kV</td> <td>30</td> <td>42</td> <td>95</td> </tr> </table>	kV	7.2	12	40.5	kV	30	42	95	
kV	7.2	12	40.5										
kV	30	42	95										
6			1 SF ₆ a b c d — 5ms — 3ms 2 a b 2ms 40.5kV 10kV 3ms 40.5kV 3kA 2ms c d 2ms										
7			20%										
8			1	85% 110% 30%									



			2 85% 110% 30% 3 80% 4 50kA 85%	65% 110%	
9			1 1000V 2 3	10M	
10					
11	SF ₆		1 SF ₆ 20 2 SF ₆ 150μ L/L 24h		SF ₆
12	SF ₆		SF ₆ 99.9% CF ₄ 0.01% Air 0.03%		SF ₆
13	SF ₆		1 GB 11023 2 1× 10 ⁻⁶ 3 24h 4 0.5% 24h		SF ₆
14			1 2	1000M	2500V 1000V
15			1	80% TV	

19

2
1

2kV

16



			2		
25					
26			1000M		2500V
27	1nA U_{1nA} $0.75U_{1nA}$	1 2 U_{1nA} 3 $0.75U_{1nA}$ 4	GB11032 50 μ A	$\pm 5\%$	
28					
29			1 2 3 4		
30			1 2 3		
31			1 2 3 4 5		
32					
33					

34			1 2 3		
35			1 2		
36			1 2		
37			1 2		
38					
39			1 2 3 4 5		
40			1 2 3		
41			1 2 3 4 5 6 7 8 9	/	

13

13.1



1			2500M		1 1000V 2500V 2																											
2			GB/T 11024.1 1 3Mvar ± 5% 2 3Mvar 0~5% 3 4 1.08 1.02 5																													
3			1 kV <table border="1" style="margin-left: 20px;"> <tr> <td></td> <td>1</td> <td>1</td> <td>3</td> <td>6</td> <td>10</td> <td>15</td> <td>20</td> <td>35</td> </tr> <tr> <td></td> <td>3</td> <td>6</td> <td>18/25</td> <td>23/32</td> <td>30/42</td> <td>40/55</td> <td>50/65</td> <td>80/95</td> </tr> <tr> <td></td> <td>2.3</td> <td>4.5</td> <td>18.8</td> <td>24</td> <td>31.5</td> <td>41.3</td> <td>48.8</td> <td>71.3</td> </tr> </table> 2 3 75% 10 s		1	1	3	6	10	15	20	35		3	6	18/25	23/32	30/42	40/55	50/65	80/95		2.3	4.5	18.8	24	31.5	41.3	48.8	71.3		
	1	1	3	6	10	15	20	35																								
	3	6	18/25	23/32	30/42	40/55	50/65	80/95																								
	2.3	4.5	18.8	24	31.5	41.3	48.8	71.3																								
4			3																													
5			1 2 3 4																													
6			1 2 3 4 5	/																												

20

			6		
			7		
			8		
			9		

13.2

21

1 2500V

1 2500M

2

GB/T 11024.1

1 3Mar ± 5%

2 3Mar 0~5%

2

3

4

1.02

5



- 3
- 4
- 7
- 1
- 2
- 3
- 4
- 8
- 5
- 6
- 7
- 8
- 9



			4		
			5		
			6		
			7		
6			1		
			2		
			3		
			4	N J	
7			1		
			2		
8			1		
			2		
			3		
			4		
			5		/
			6		
			7		
			8		
			9		

13.4

1

20%

2

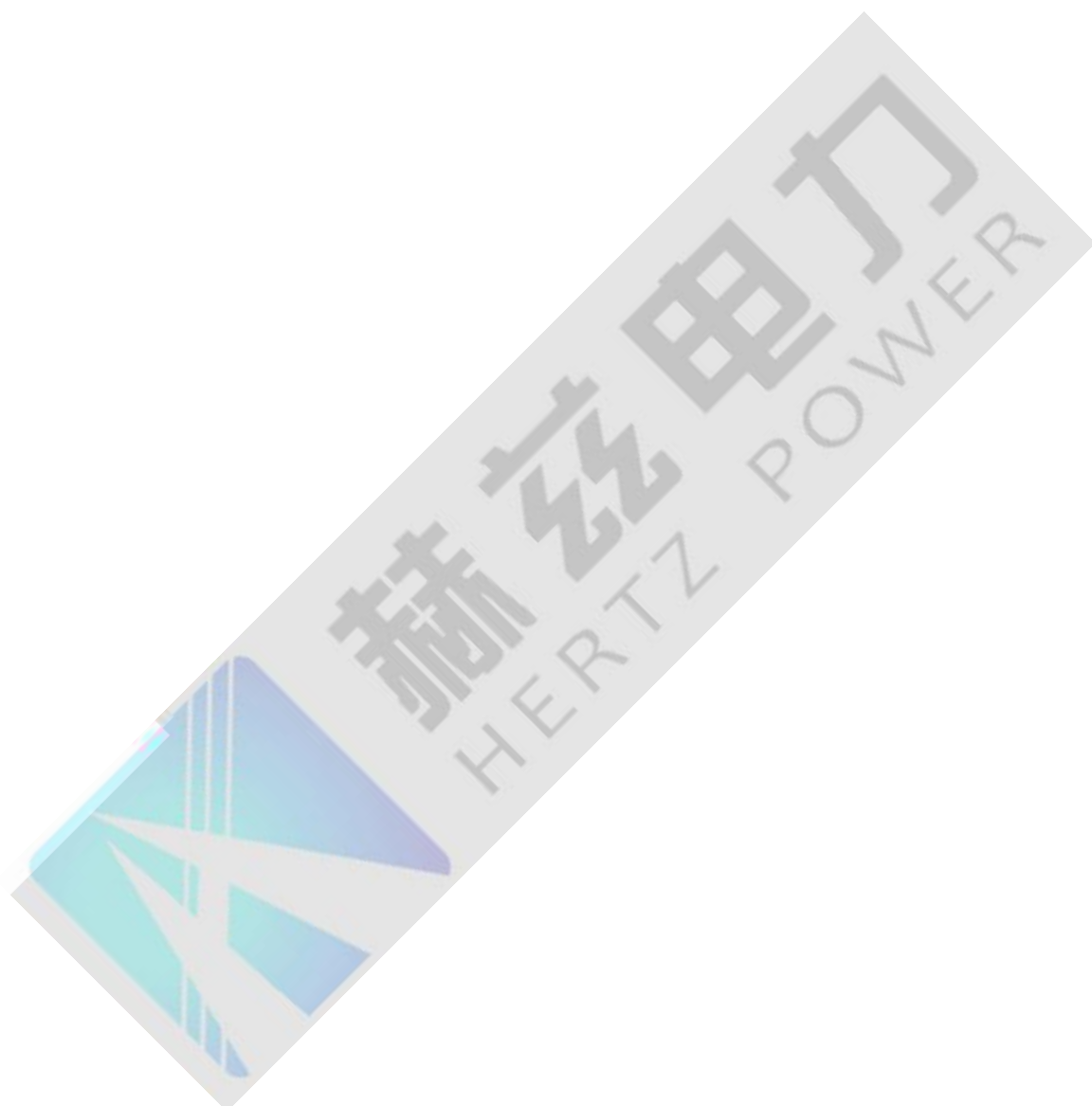
3

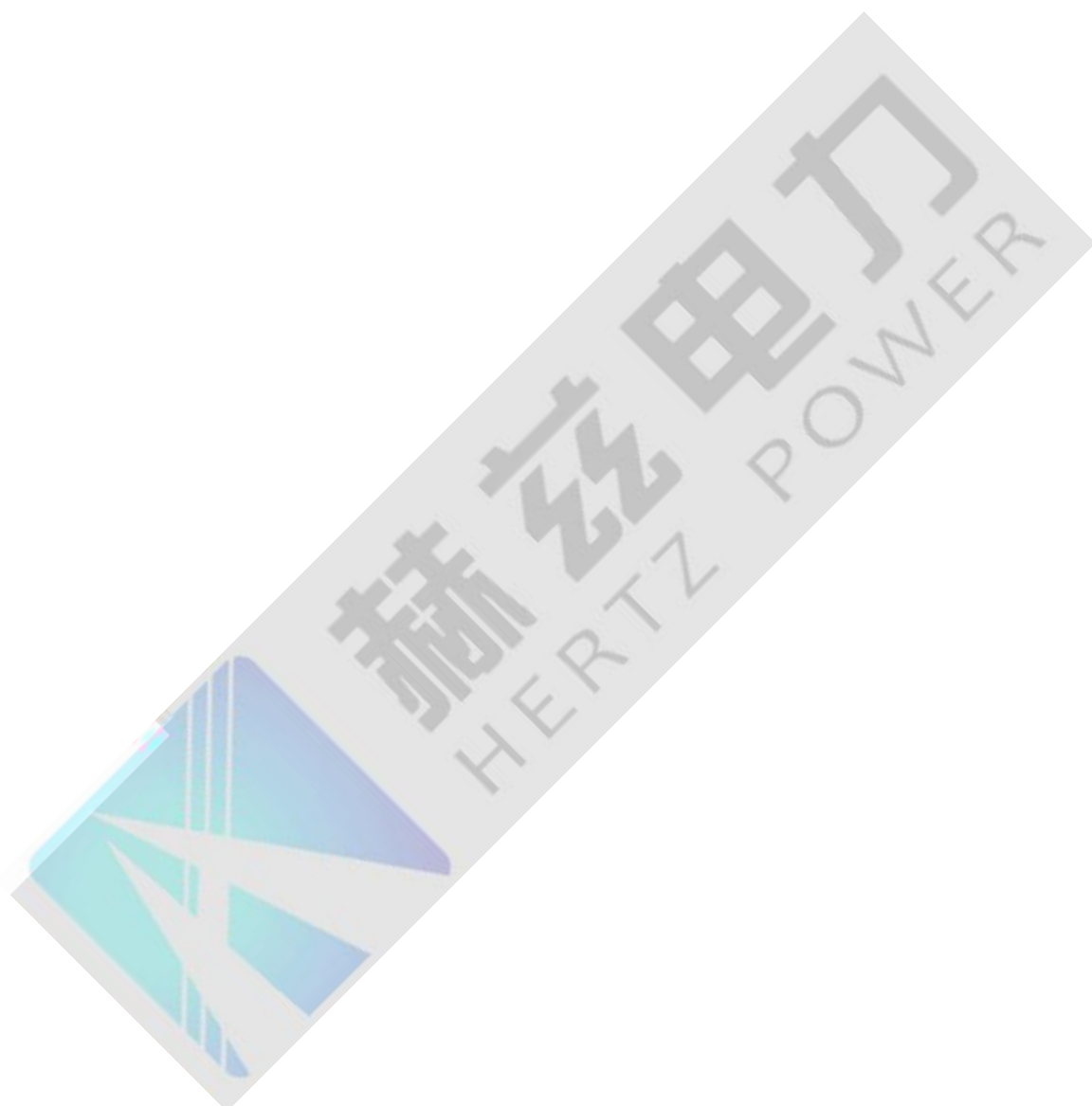
4

n



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24 35kV

13



24 35kV

			3		
			4		
			5		
			6		
			7		
			8		
			9		

14.2 35kV

25 35kV

1			<p>1</p> <p>a</p> <p>b pH >5.4</p> <p>c mgKOH/g 0.03</p> <p>d 135</p> <p>e mg/L 20</p> <p>f 25 , mV/m 40</p> <p>g tan 90 % 1.0</p> <p>h kV 40</p> <p>i 90 ·m 6×10^0</p> <p>j % 0.02</p> <p>2</p> <p>3</p> <p>a 24h 24h</p> <p>b GB/T 7252</p> <p>c μ L/L</p> <p>20 H₂ 10 C₂H₂ 0.1</p>		
2			<p>1 1600kVA , 2%</p> <p>1%</p> <p>2 2%</p> <p>$R_2=R_1 \quad T+t_2 / T+t_1$</p> <p>R₁ --- t₁</p> <p>R₂ --- t₂</p> <p>T --- 235 225</p>		
3			<p>1 70% 10000 M</p> <p>20</p> <p>2 50</p>	1	2500V
					2



25 35kV

3

4

5 2500V

1min

7

\bar{e}



25 35kV



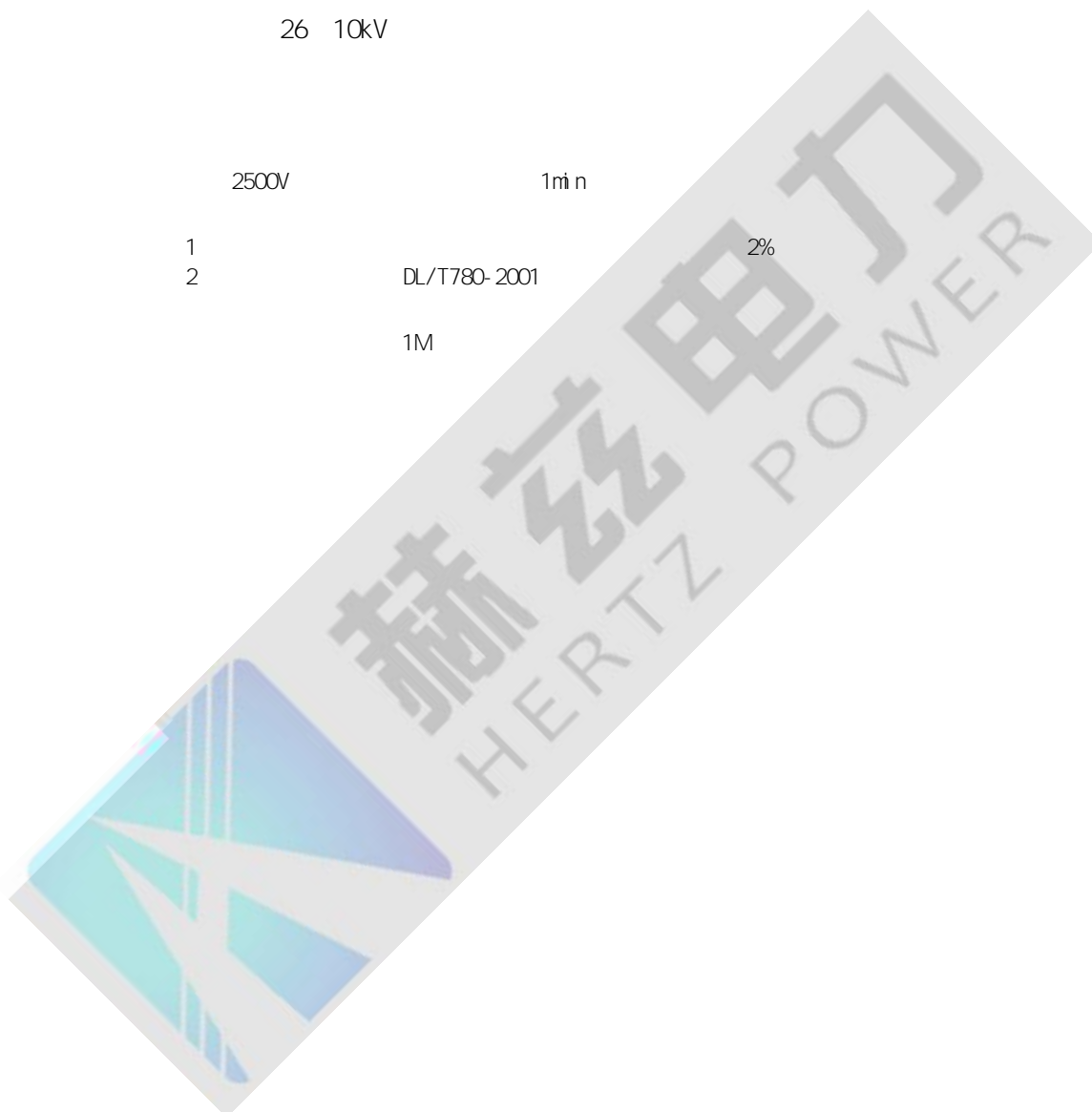
25 35kV

			8		
			9		

14.3 10kV

26 10kV

1	2500V	1min	
2	1 2	DL/T780-2001	2%
3		1M	



1

GB11032

1 35kV

5000V

2500M

2 35kV

2500V

2

1000M

3 1kV

500V

2M

4

5M

500V

1

GB 11032

3

2

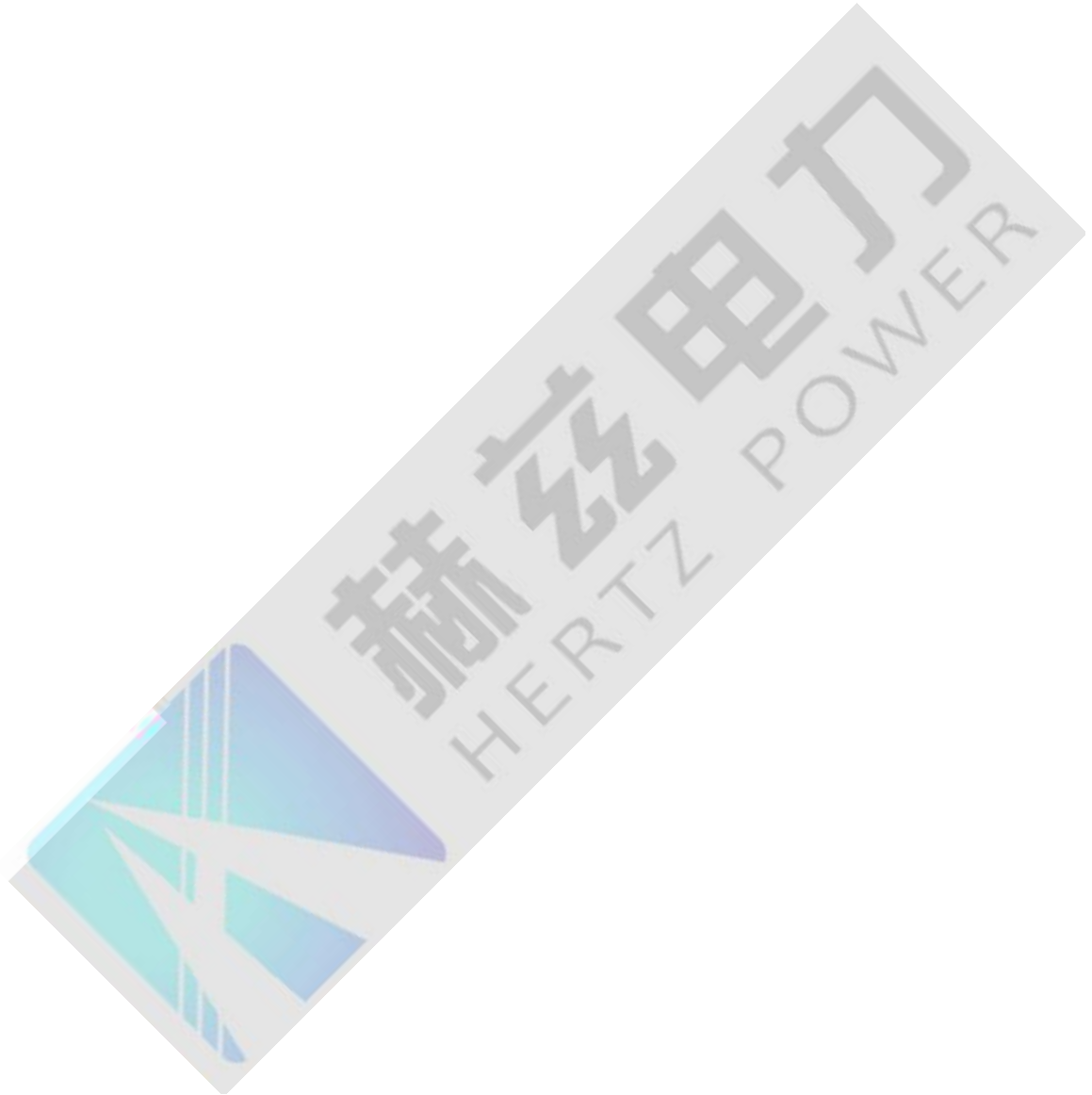
3

4

0.75



Q-





1			<p>1 1000M</p> <p>2 1000M tan 1000M 2%</p>		<p>1 2500V</p> <p>2 1000V</p>																																												
2	20kV		<p>1 tan</p> <p>2 ± 5%</p> <p>3 1000M tan</p> <p>2%</p>																																														
3			<p>1 1min</p> <table border="1"> <thead> <tr> <th rowspan="2">kV</th> <th rowspan="2">kV</th> <th colspan="2">kV</th> </tr> <tr> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>3</td> <td>3.6</td> <td>18/25</td> <td>15/20</td> </tr> <tr> <td>6</td> <td>7.2</td> <td>23/30</td> <td>18/26</td> </tr> <tr> <td>10</td> <td>12</td> <td>30/42</td> <td>26/36</td> </tr> <tr> <td>20</td> <td>24</td> <td>50/65</td> <td>43/55</td> </tr> <tr> <td>35</td> <td>40.5</td> <td>80/95</td> <td>68/81</td> </tr> <tr> <td>66</td> <td>72.5</td> <td>140/160</td> <td>119/136</td> </tr> <tr> <td>110</td> <td>126</td> <td>185/200</td> <td>160/184</td> </tr> <tr> <td>220</td> <td>252</td> <td>360/395</td> <td>306/336</td> </tr> <tr> <td>500</td> <td>550</td> <td>630/680/740</td> <td>536/578/592</td> </tr> </tbody> </table>	kV	kV	kV				3	3.6	18/25	15/20	6	7.2	23/30	18/26	10	12	30/42	26/36	20	24	50/65	43/55	35	40.5	80/95	68/81	66	72.5	140/160	119/136	110	126	185/200	160/184	220	252	360/395	306/336	500	550	630/680/740	536/578/592	/			
kV	kV	kV																																															
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6	7.2	23/30	18/26																																														
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4			<p>1)</p> <table border="1"> <thead> <tr> <th colspan="4">tan %</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td>0.4</td> </tr> <tr> <td></td> <td></td> <td></td> <td>0.5</td> </tr> <tr> <td></td> <td>1.0</td> <td>35kV</td> <td>0.5</td> </tr> <tr> <td></td> <td></td> <td></td> <td>0.5</td> </tr> <tr> <td></td> <td></td> <td></td> <td>0.5</td> </tr> <tr> <td></td> <td>1.5</td> <td>U_m=500kV</td> <td>0.5</td> </tr> <tr> <td></td> <td></td> <td></td> <td>0.5</td> </tr> <tr> <td></td> <td></td> <td></td> <td>0.5</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>2)</p> <p>3)</p> <p>2.</p> <p>A</p>	tan %							0.4				0.5		1.0	35kV	0.5				0.5				0.5		1.5	U _m =500kV	0.5				0.5				0.5									/	
tan %																																																	
			0.4																																														
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	1.5	U _m =500kV	0.5																																														
			0.5																																														
			0.5																																														

5			1.05uL/ 3					
		20pC						
		1	SF ₆			24h		
				250uL/L				
6	SF ₆	2			SF ₆			SF ₆
						1%		
		3	SF ₆	24h		SF ₆		
			SF ₆ 99.9% CF ₄ 0.01% Air 0.03%					
7							/	SF ₆
8								

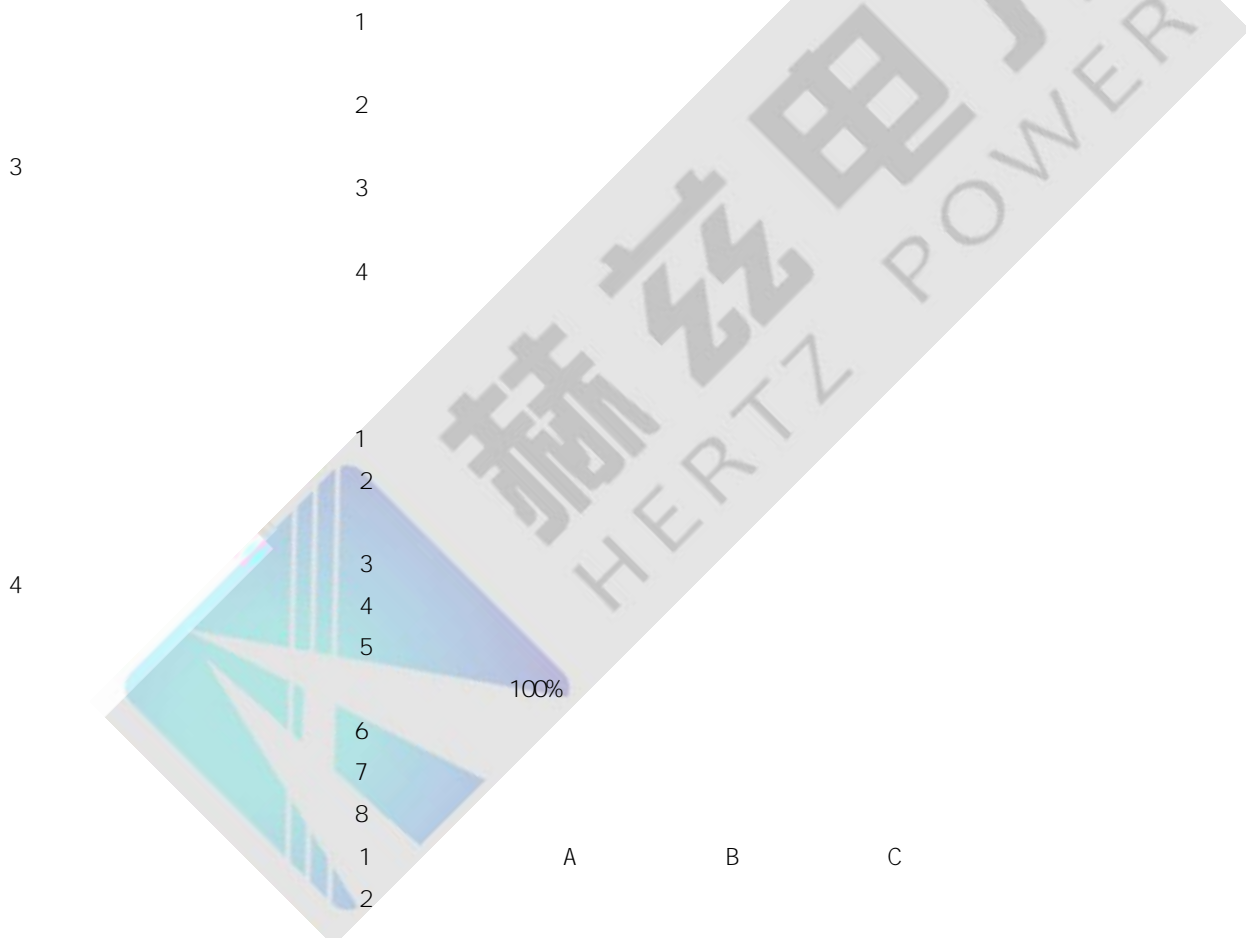


17

30

1 15kV 2500V
 50M
 1M /kV

kV	kV	1m n	kV
10	12	42	
35	40.5	100	



5

30

			3		/
			4		
			5		
			6		
			7		
			8		
			9		

18

31

1 1 1000M
 2 0.6/1kV 1000V 0.6/1kV 2500V
 6/6kV 5000V

2 1 500V
 2 0.5M /km 50M

3 1 110kV
 10kV 1min

2
 1 20~300Hz

U _r /U kV		min
18/30	2U ₀	15 60
21/35-64/110	2U ₀	60
127/220	1.7U ₀ 1.4U ₀	60
190/330	1.7U ₀ 1.3U ₀	60
290/500	1.7U ₀ 1.1U ₀	60

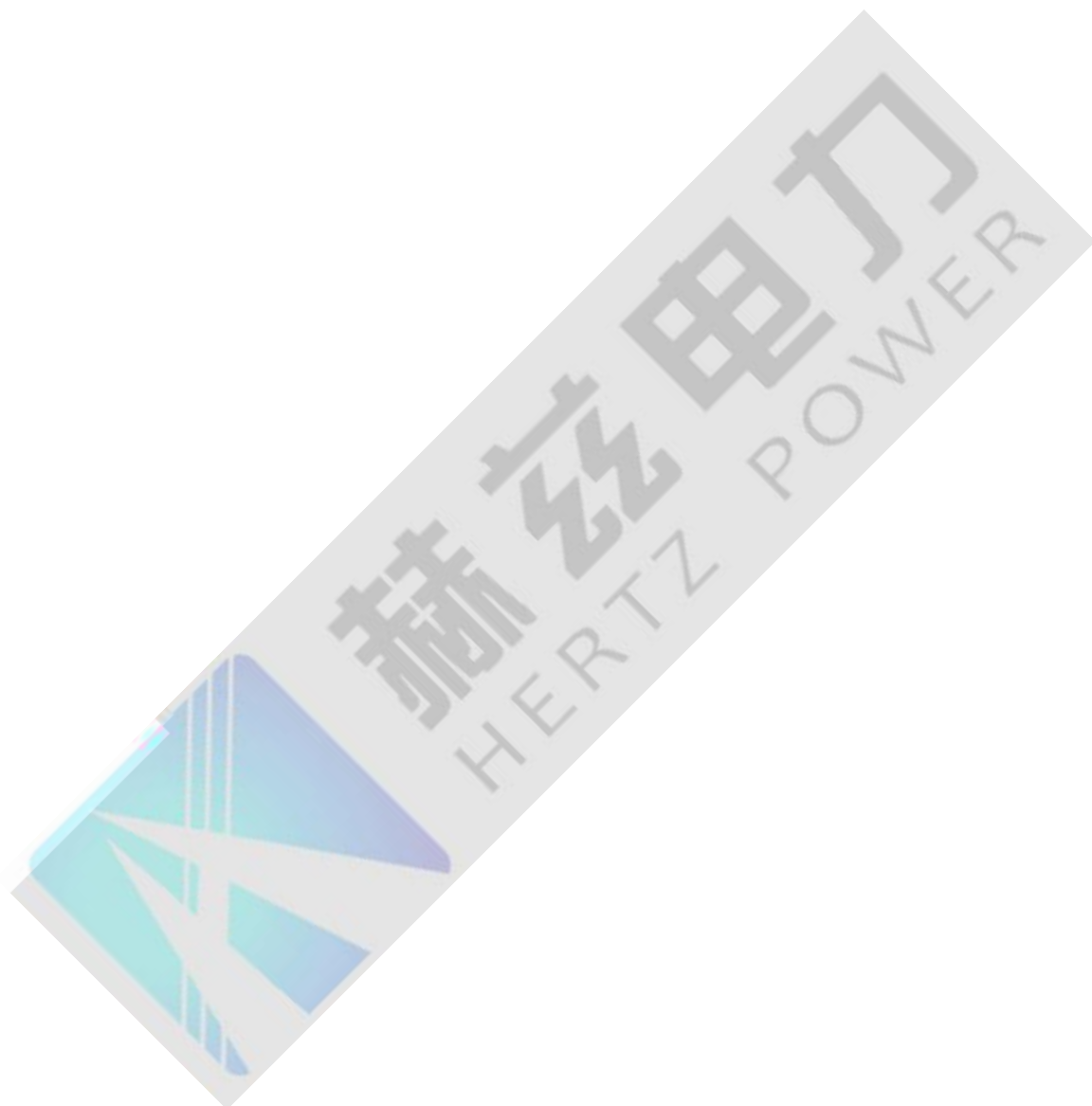
2 24
 3

5

6



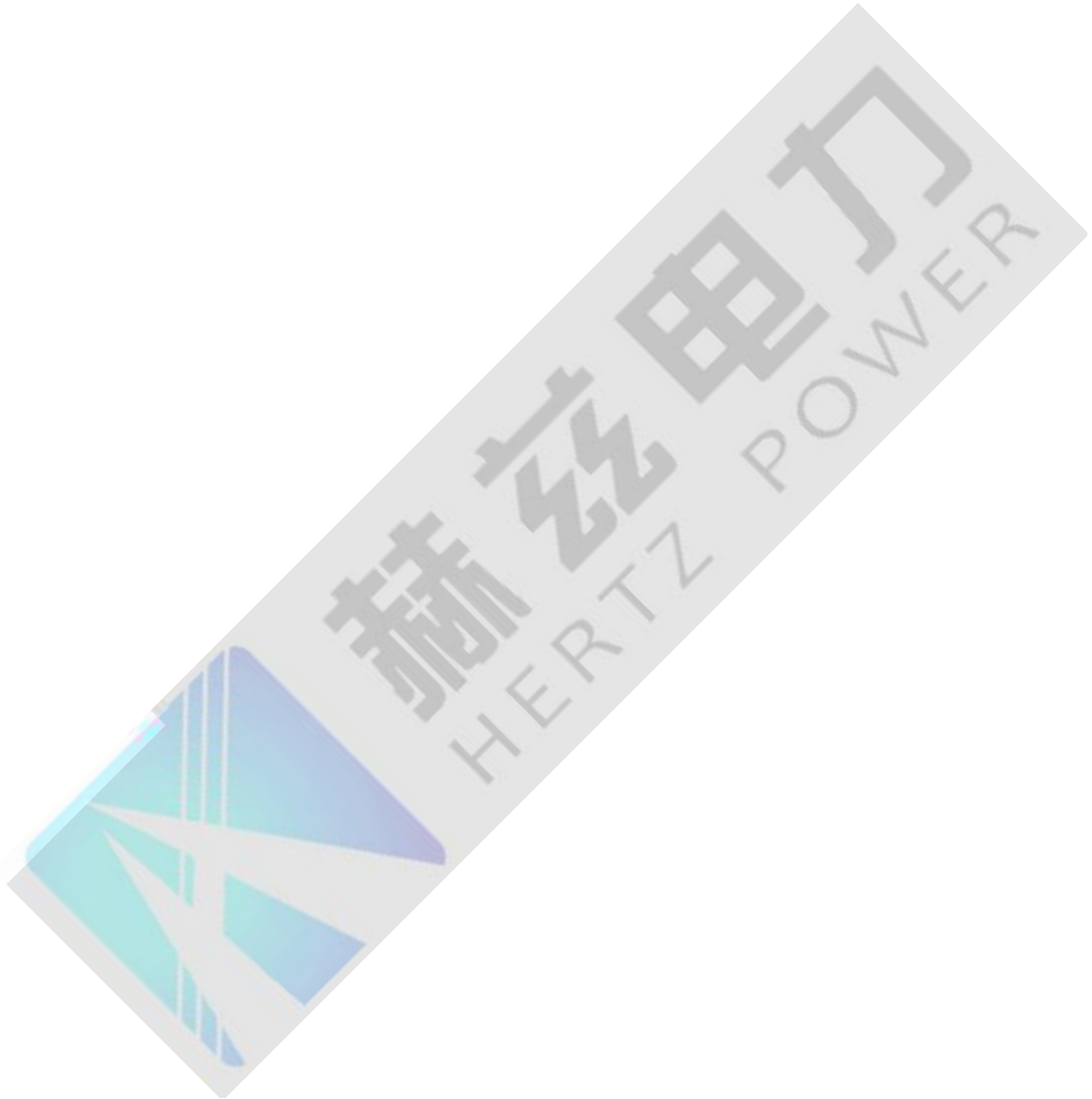
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32

10

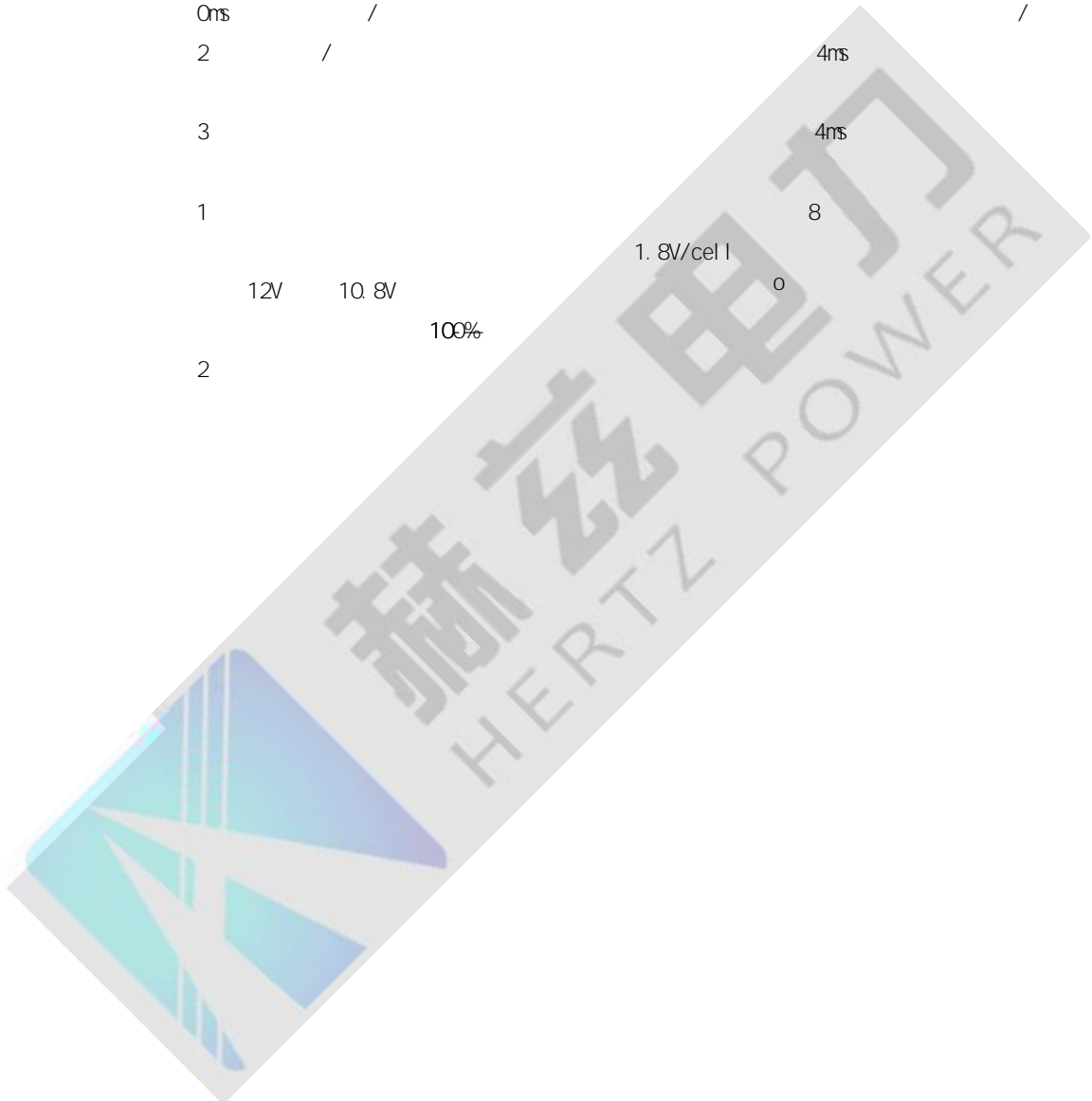


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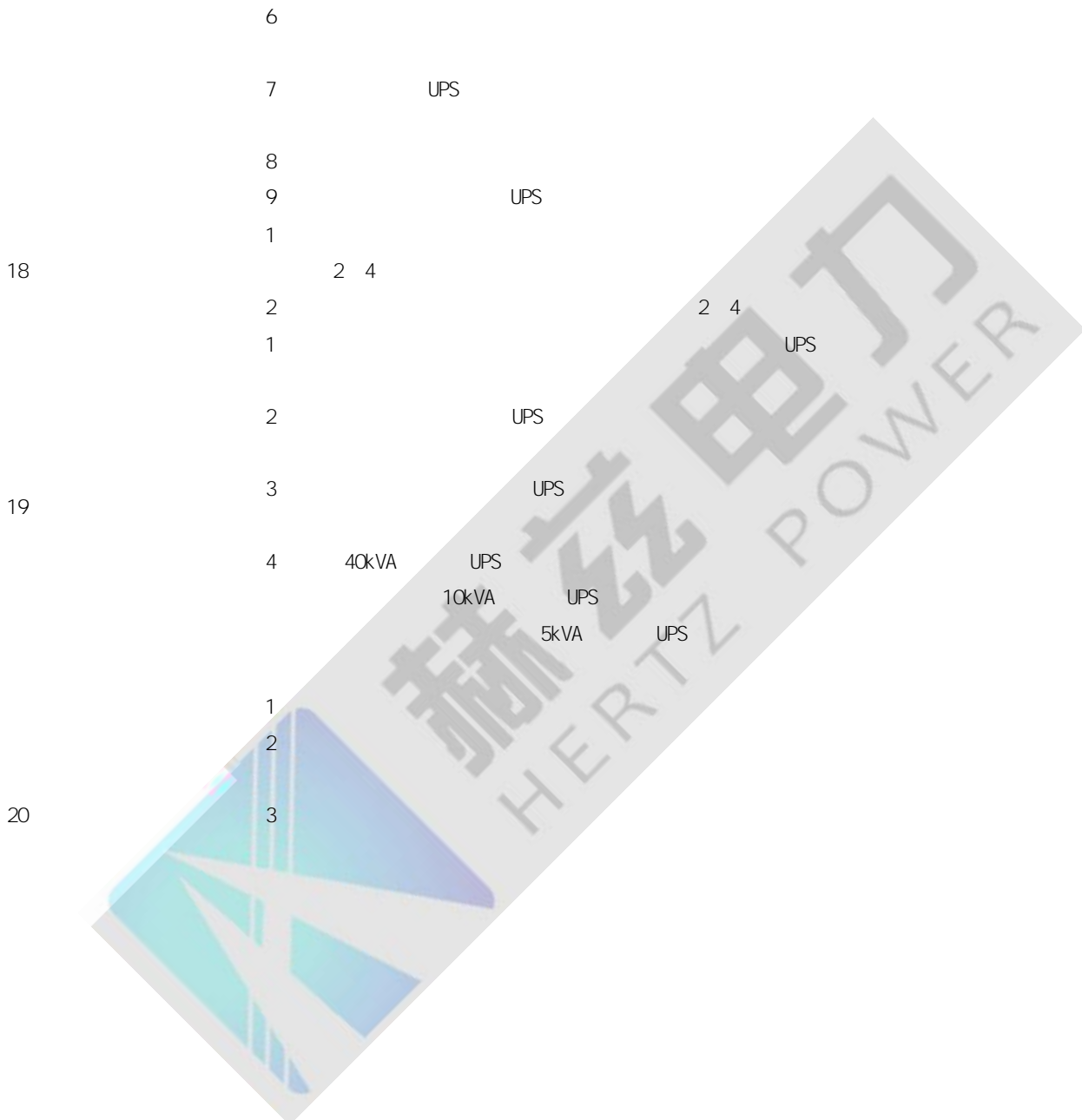
11



UPS	
1	0ms
4	0ms /
2	/
3	4ms
1	4ms
1	8
5	12V 10.8V 1.8V/cell 0
2	100%



			3		
			4		
11			1 2 3 4 5 6	350mm	
12			1 2 3 4 5 6 7 8 9		
13			1 2		
14		/	1 2 3		
15			1 2		
16			1 2 3	UPS 10kA 8/20μs SPD SPD SPD	
17			1 2 3 4 5		



33

5

6

7

8

9



33

			10		
			11		
			12		

20.2

34

1	1000V	2500V	10M	10M
2		1000V	0.5M	/
3		30%	100%	5%
4	1	± 1%		
	2	± 0.5%		
	3	0.5%		
	4			
5				10%
6	1			
	2			
	1			8
		1.8V/cel I		
7	12V	10.8V		
	2		100%	

			3 4		
10				/	
11			1 2 3 4 5 6 7 8 9 10 11 12 13 14	/	
12			1 2	$\pm 0.05V$ 0.03V	/
13				1000V 0.5M	
14			1 2 3 4 5 6 7 8 9	200Ah 15—30	



			10		
15			1 2 3 4 5	0.5% 1%	
16					
17			1 2 3 4		
18			1 2 3 4 5 6 7 8 9 10 11 12	500V 1.5mm 0.5mm	2.5mm
19			1 2 3 4 5 6 7 8	350mm 1 2	

	9	
	1	
	2	
	3	
	4	
20	5	
	6	
	7	
	8	
	9	
	10	
21	1	
	2	
22	1	
	2	
23	1	
	2	
24	1	
	2	
	3	
25	1	
	2	
	3	
26	1	
	2	
	3	
	4	0.5
27	1	
	2	
	3	
	4	
	1	
	2	
28		



			<p>7 1%</p> <p>0.5%</p> <p>8</p> <p>9 1</p> <p>10 3</p> <p>11</p> <p>12</p> <p>13 GPS GPS</p> <p>1ms</p> <p>14</p> <p>15</p>		
29			<p>1</p> <p>2 220V 25K 110V 7K</p> <p>3</p> <p>4</p> <p>5</p> <p>6</p> <p>7</p>		
30			<p>1</p> <p>2</p> <p>3 4</p> <p>4 2</p> <p>5 4</p>		
31			<p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>5</p> <p>6</p> <p>5%</p>		

			7 8 9 10 11 12 13 110kV 14 110kV 15 16		
32			1 110kV 2 3 10kV 35kV 4 500kV GIS 5 500kV 6 PT	6 110kV 220kV GIS 6 110kV 220kV PT	
33			1 2 500kV 3 500kV 220kV 4 220kV		



5

6 500kV

7 220kV

8

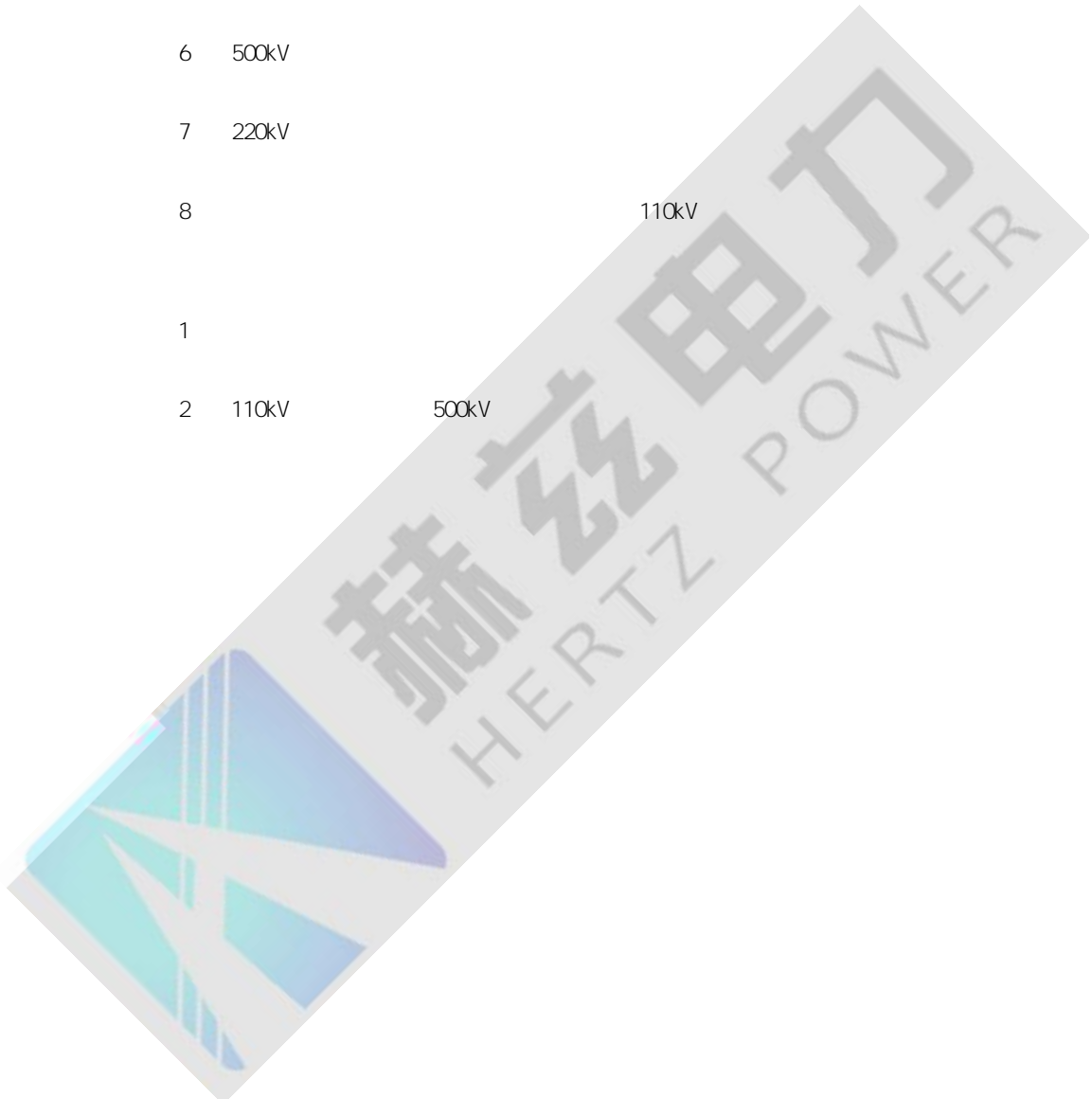
110kV

1

2 110kV

500kV

34



34

20.3

35

	1		2500V	10M
	2	1000V		10M
	3	#1		
	4	#2		
	5	#1		
	6	#2		
1	7	#1		/
	8	#2		
	9	ATS		
	10	500kV		
	11		380V	380V
		380V		
	1			
	2			
	3			
	4			
	5			
2	6			
	7		1mm/m	1mm/m
	8		1.5mm	2mm
	9			
	10			
	11			
	12			

1

2

3

4

7

5

6



36

2		
1nA/		(20± 15)
		± 5%
3	0.75	





12

1

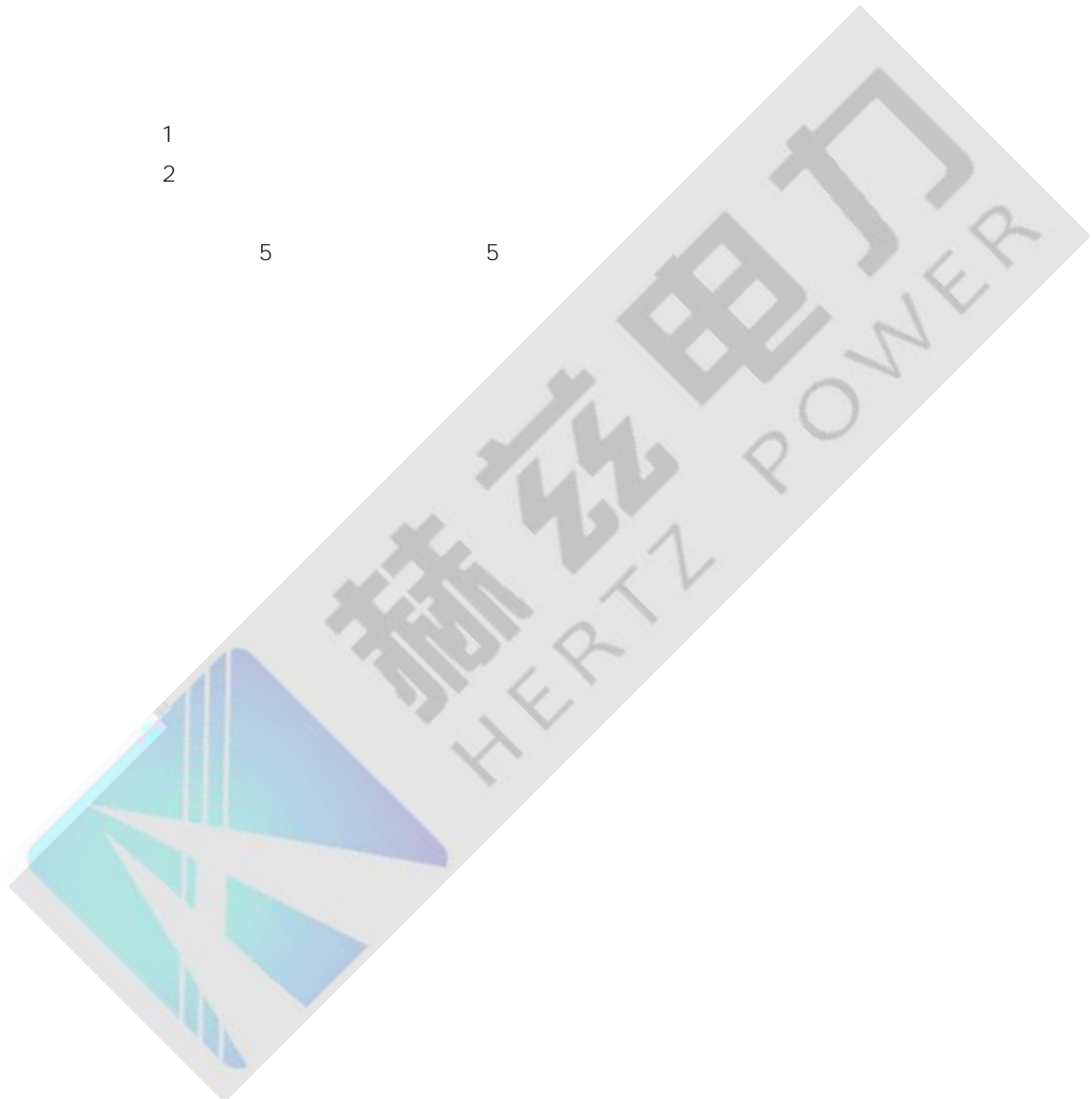
13

2

5

5

14




Q/



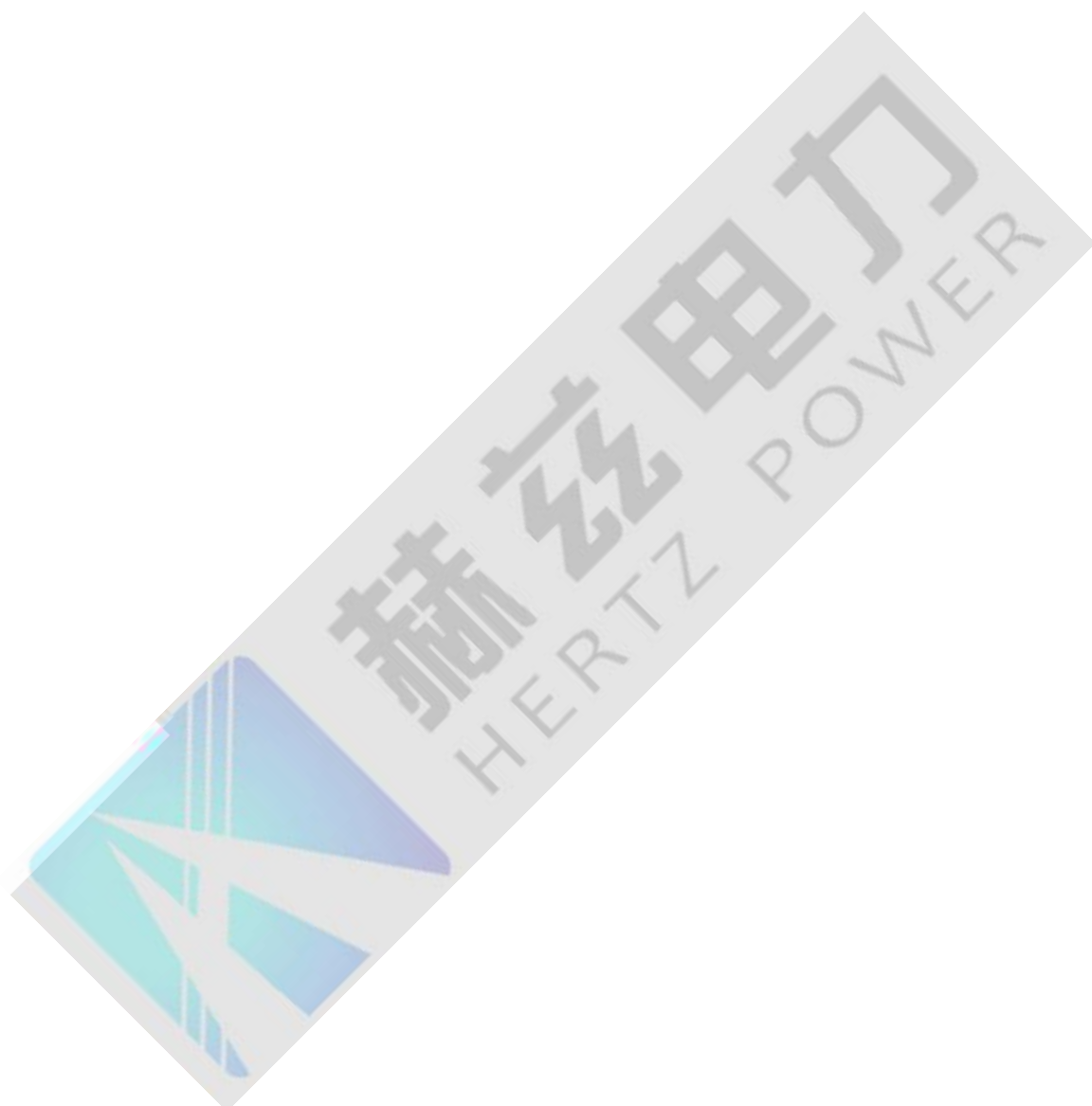
- 2
- a
- b
- c 400cm² 2
- d
- e 2 300mm
- f



g				
h				
i				
1		2mm	5	2.5mm
a				
b				
c				
d				
e				
f				
2				F € ĩ Ā Ć Ħ Ā Đ ¥ ö
a				
b				
c				
d				
e				
f				
g		20mm	10%	
2	P YC, Ö x Ō • 8 A ž p U " 5 E P d a 4 5 g m • " 5 • N } 3 P P YC, " € — € M Y S, „ ç Q % • C ĩ			
a				
3				
a		0.90h		
		0.8mm		0.90h
b				0.90h
c				10mm É j K
d			1.5mm	1mm
e				
f				
g				
h				
i				
		3mm	2mm	



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			<p>1.1 m ± 20mm</p> <p>140mm 100mm 5mm</p> <p>3mm</p> <p>3)</p> <p>a)</p> <p>b)</p> <p>c)</p> <p>24h</p> <p>10min</p> <p>d)</p> <p>e)</p> <p>f)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2"></th> <th>mm</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>15</td> </tr> <tr> <td></td> <td></td> <td>5</td> </tr> <tr> <td></td> <td></td> <td>0.1</td> </tr> <tr> <td></td> <td></td> <td>0.1</td> </tr> </tbody> </table>			mm			15			5			0.1			0.1		
		mm																		
		15																		
		5																		
		0.1																		
		0.1																		
			<p>4</p> <p>a) 4m</p> <p>b)</p> <p>c) 300mm</p> <p>d) 2m</p> <p>e) 90° 300mm</p> <p>1m 3mm, 5m 10mm</p> <p>1m 3mm, 5m 15mm</p>																	
			<p>5</p> <p>a)</p> <p>b)</p> <p>c)</p> <p>d)</p> <p>1m 3mm, 5m 10mm</p> <p>1m 3mm, 5m 15mm</p>																	
			<p>6</p>																	

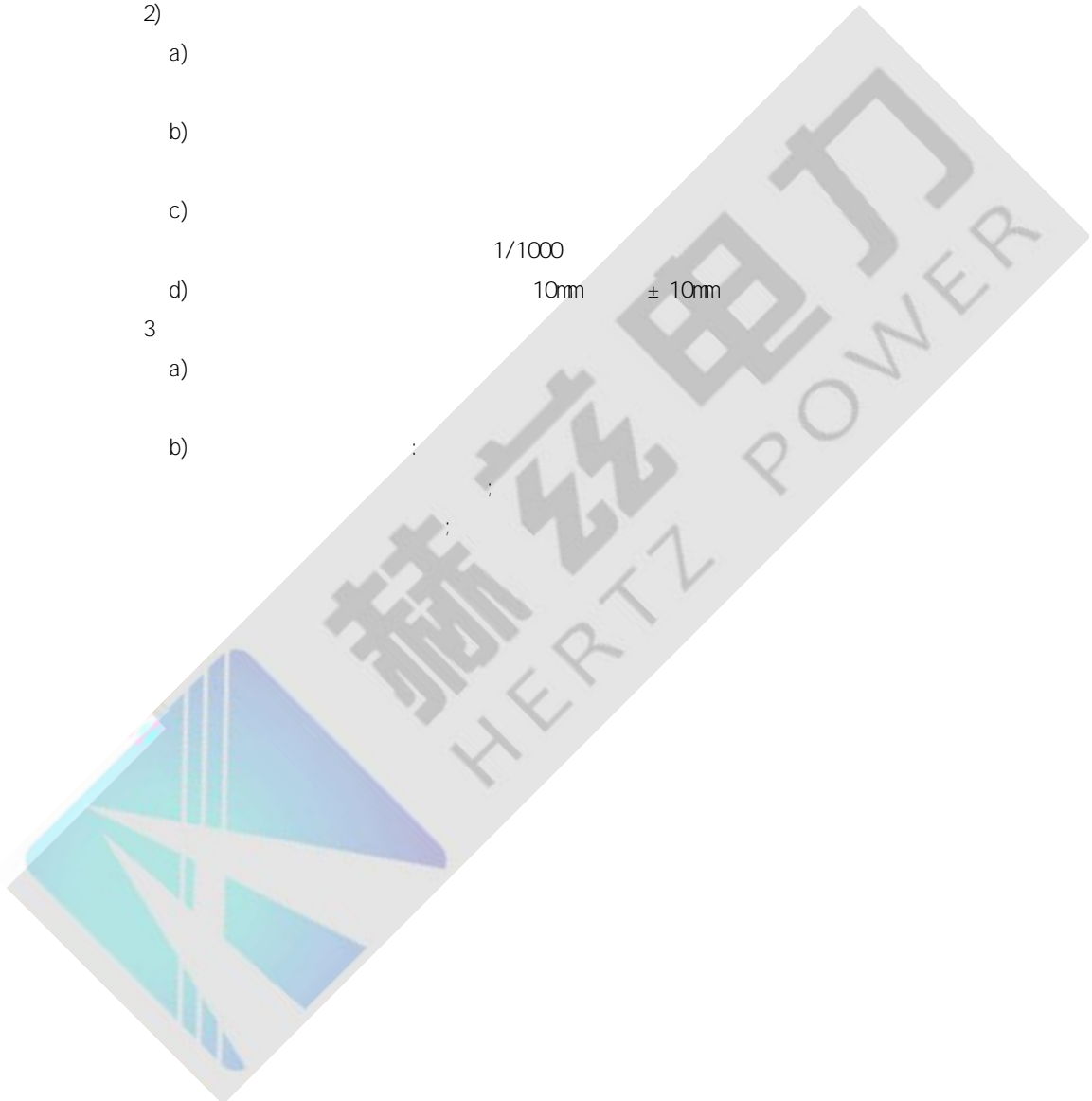
- a)
- 50mm
- b)
- c)
- 7
- a
- b)
- $\pm 15\text{mm}$
- $\pm 10\text{mm}$
- 9)
- a)
- b)

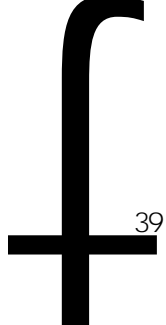


- k) ;
- l)
- 2)
 - a)
 - b)
 - c)
 - d)
- 3)
 - a)
 - b)

1/1000

10mm ± 10mm





- d
 - e) - 10mm
- 2
- a)
 - b)
 - c)
- d
 - e) - 10mm
- 3
- a)
 - b)
 - c)
 - d
- 4
- a) 1m 10m 20mm
10- 20mm



e)

f
30mm

100mm

g

250mm

h

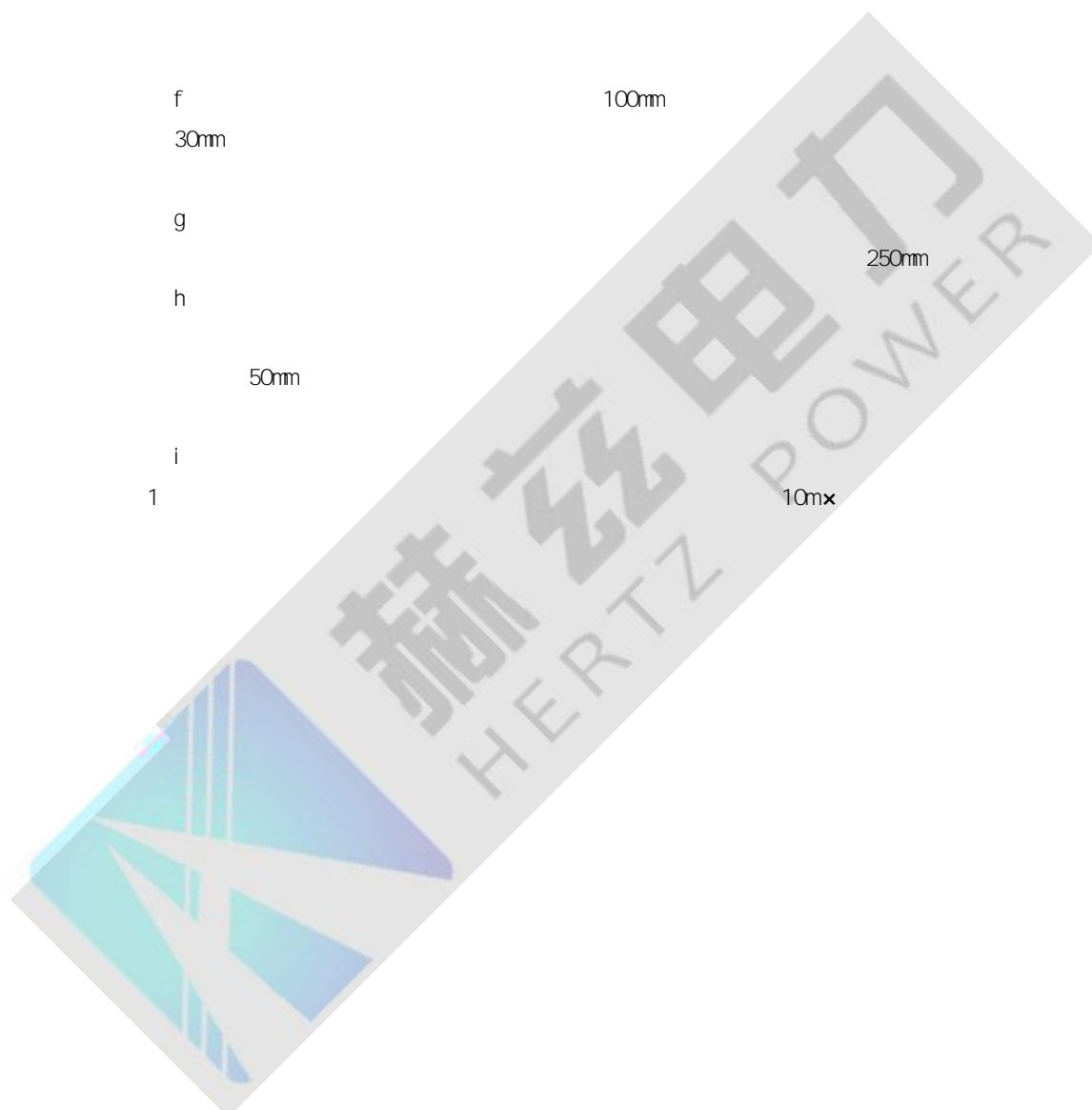
50mm

i

1

10mm

12





			7	<table border="1"> <thead> <tr> <th colspan="2"></th> <th>mm</th> </tr> </thead> <tbody> <tr> <td colspan="2"></td> <td>20</td> </tr> <tr> <td colspan="2"></td> <td>± 20</td> </tr> <tr> <td rowspan="2"></td> <td></td> <td>5</td> </tr> <tr> <td></td> <td>10</td> </tr> <tr> <td rowspan="3"></td> <td></td> <td>± 2</td> </tr> <tr> <td></td> <td>+20 0</td> </tr> <tr> <td></td> <td>5</td> </tr> <tr> <td rowspan="4"></td> <td></td> <td>10</td> </tr> <tr> <td></td> <td>+20 0</td> </tr> <tr> <td></td> <td>+20 0</td> </tr> <tr> <td></td> <td>h/1200 20.0</td> </tr> </tbody> </table> <p>h</p>			mm			20			± 20			5		10			± 2		+20 0		5			10		+20 0		+20 0		h/1200 20.0		
		mm																																		
		20																																		
		± 20																																		
		5																																		
		10																																		
		± 2																																		
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		10																																		
		+20 0																																		
		+20 0																																		
		h/1200 20.0																																		
3		1	<p>a) 700mm 500mm</p> <p>b)</p> <p>c)</p> <p>d) 450mm</p> <p>e) 250mm 450mm 350mm 10min 1.5 0.05MPa 0.6MPa</p> <p>f) 0.05MPa 1h</p>																																	
		2	<p>a) 10min 0.05MPa 1.5 0.6MPa</p> <p>b) ;</p> <p>c)</p> <p>d) ± 20mm</p> <p>f)</p>																																	
		3)	<p>a)</p> <p>b)</p>																																	

40

$\pm 5\text{mm}$

C



f

		mm
1		5
2		+20 5
3		± 20

2

a)

b)

c

		mm
1		5
2		± 30
3		10
4		3

1

a

b

c

d

e

6

2)

a

β f

24h 72h

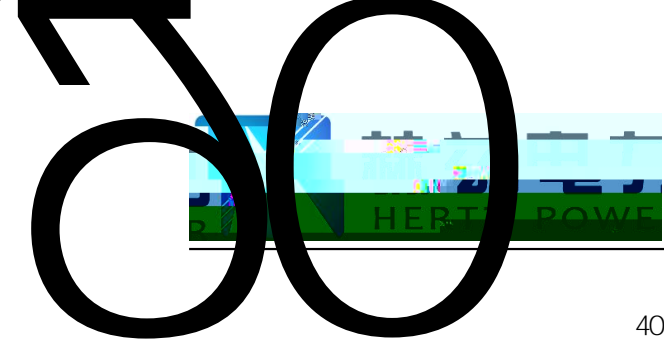
GB50208

24h

1/3,

5-10mm

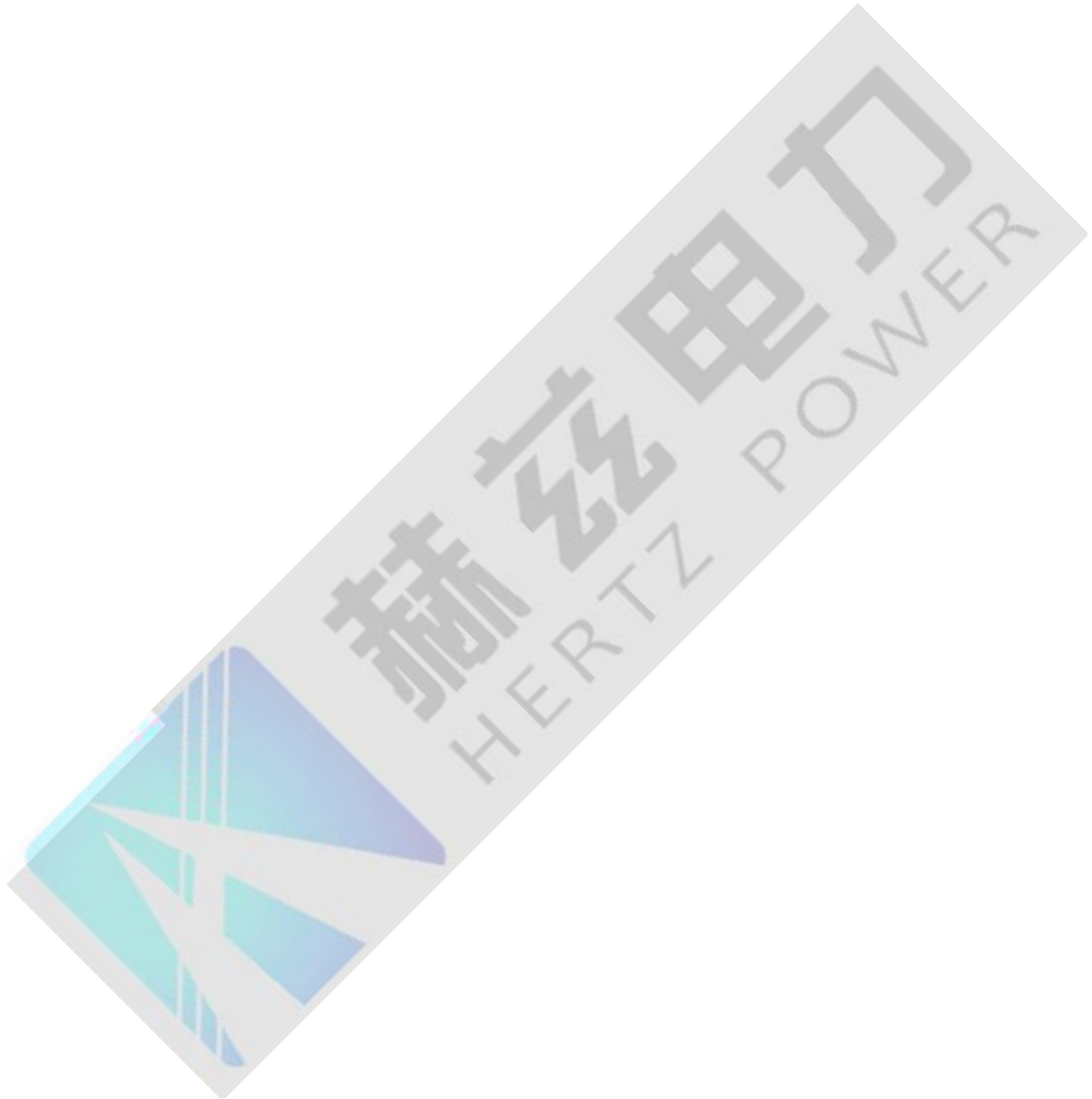
			2		
			a)		
			b)	5mm	
			c)		
			1		
			a)	1	
			2		
			b)		
			c)	2%	
			d)	5%	
			2		
			a)		
			b)		
			c)	kN	0.9
			d)	60%	0.5
			e)		
			3)		
			a)		
			b)		25kg
			c)	200mm	
			d)	15mm	0.5m
			e)		
			f)	50mm	30mm
			4		
			a)		
			b)		
			c)		
			d)	10mm	
			5		
			a)		
			b)	300mm	
			c)		
			d)	20mm	
			1		
			2		
			a)		
			b)		80%
8					
9					



40

c)

20m



	1
	2
1	3



HERTZ

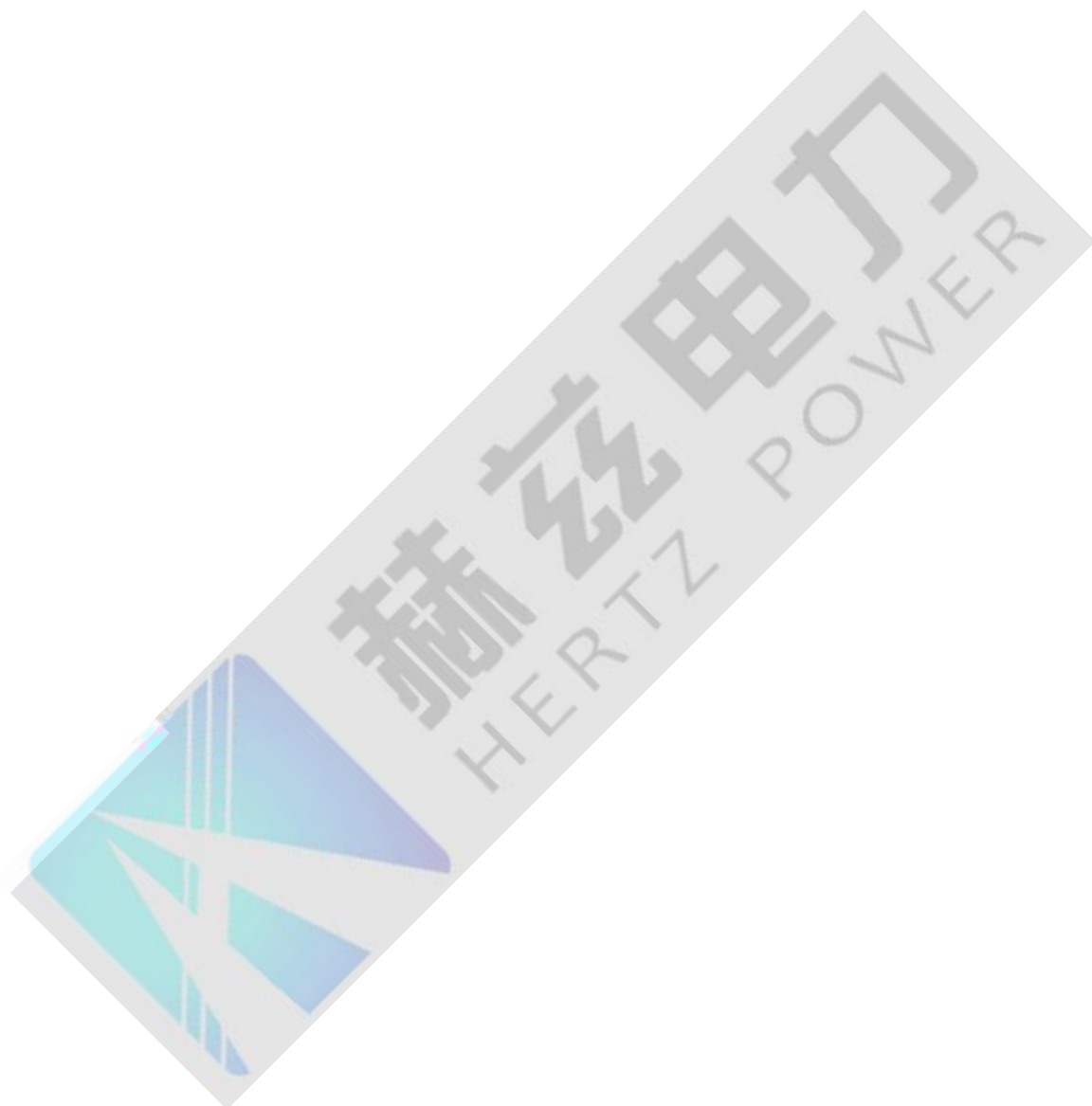
CSG1205019-2018



42

6									
7									
8								8mm	
9									
10				300g/m ² ,		100%			
11					4			4	
12									
13								0.8mm	
1						3			
2	2	4					1mm		
3						0.2%		2mm	
4			0.5%		0.6%				
5	-								

4

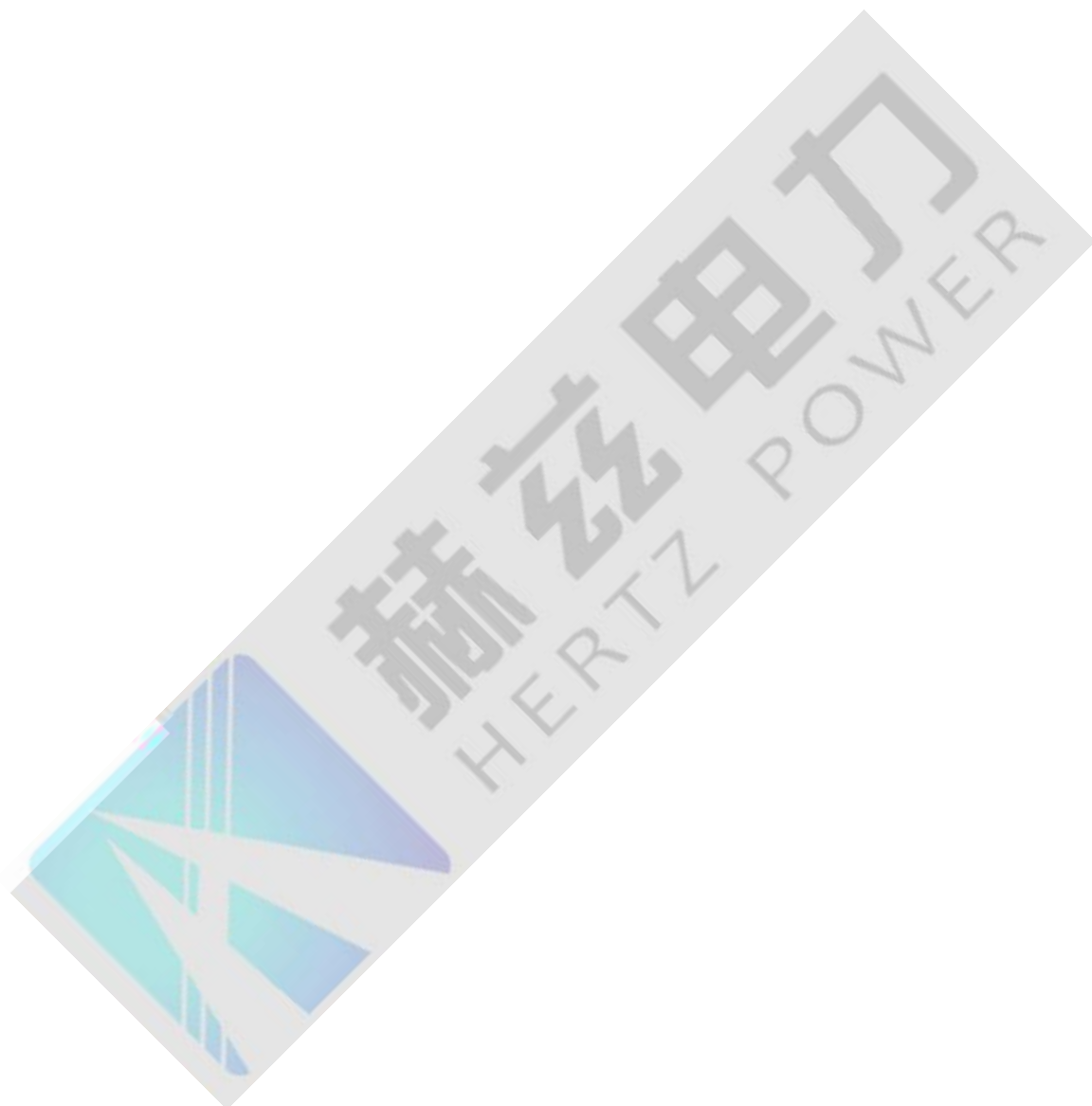


43

8	0.5kg	15	6mm	3kg 2~3
9				1~2
10				2.5
11	1~2			
12				
13	LED			
14				
1mm ²				
15		100W		
16		1~2		
17		1~2		
18			2.4m	
1	36V			
2				50%
3				



Q/CSG1205019-2018



43

5

2

6

N
N PE

PE

7

8

2-5mm

1

1

2

2

6

0.5l x

5

3

N

/

4

5

1

5.7.1

NO

2

10

6

3

5 10

24



43

			4		
			5		

24.6

44

1			1 RAL 7035 800 mm 600 mm 2260 mm 3.2mm 2 3 4 () 5 4mm ² 100mm ² 50mm ² 6 2-5mm 7 10% 8 9 10		10k V 500kV
2			1 75° /s 50° /s 704× 576 50m / 2048× 1536 2 3 / 360 4 5 0.7 0.5		1 / 5

CSG1



1.5

2

30

2-5mm

6

7

8

3

P14



			15 16 17 18 19 DLT634. 5104- 2002		
4			1 2 3 4 5 6 7 8 9 10 RTU GA 1089- 2013 CSD RPU	/	1 3 4
5			1 2 3 4 5	2 U	0. 5M

1			1) 2) 3) 4) 5) 6) 7) 8)	3	
2			1 2 3 4 5 6 7	2	
3			1 2 3		
4			1 2 3		
5			1 2		
6			1 2		
7					



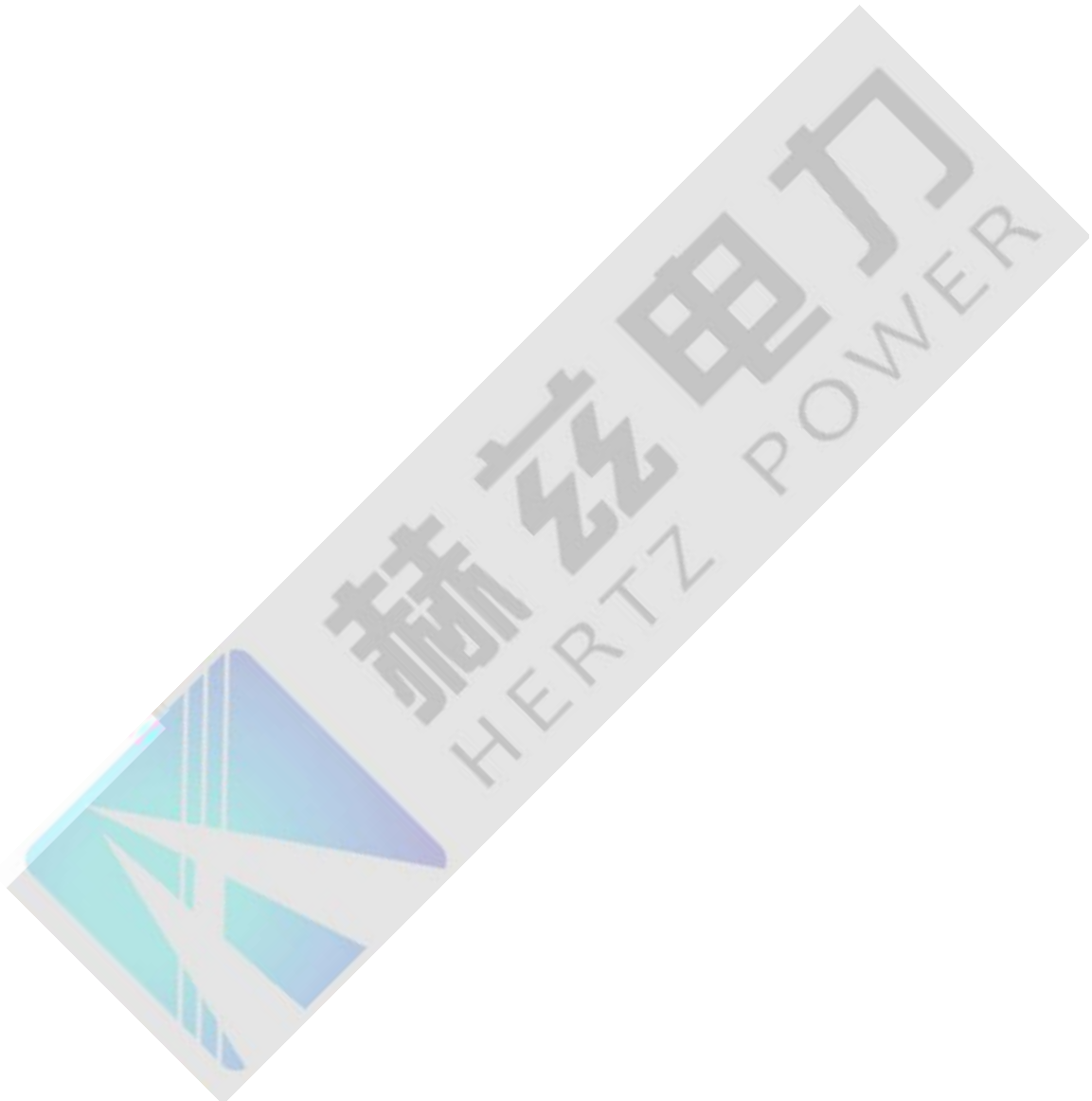
24.8

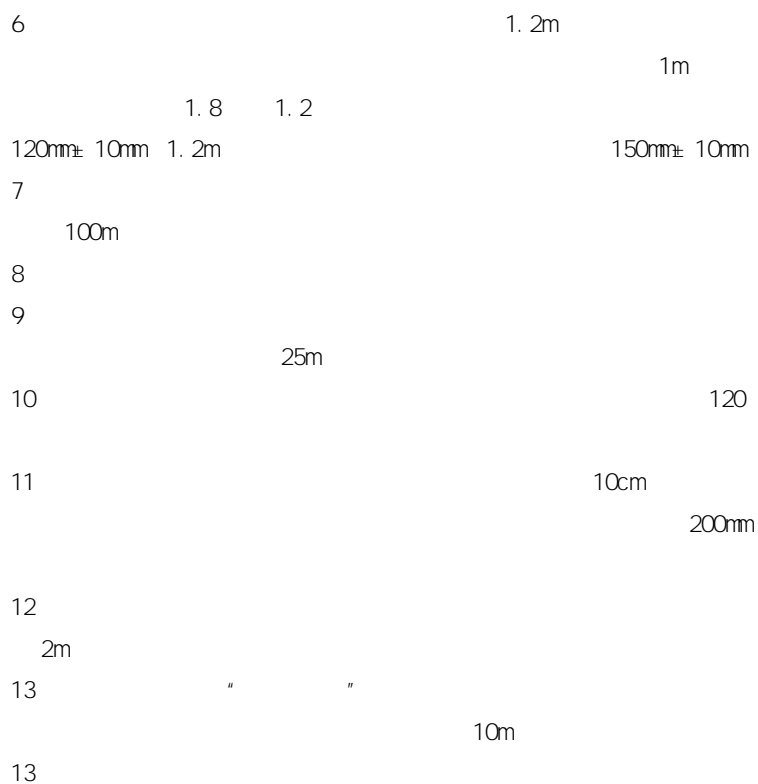
46

1

7

1





/kV		
	/m	/m
10kV	2.5	2
35~110kV	5	3
220kV	7	4
330kV	9	5
500kV	9	5

14

25



24.9

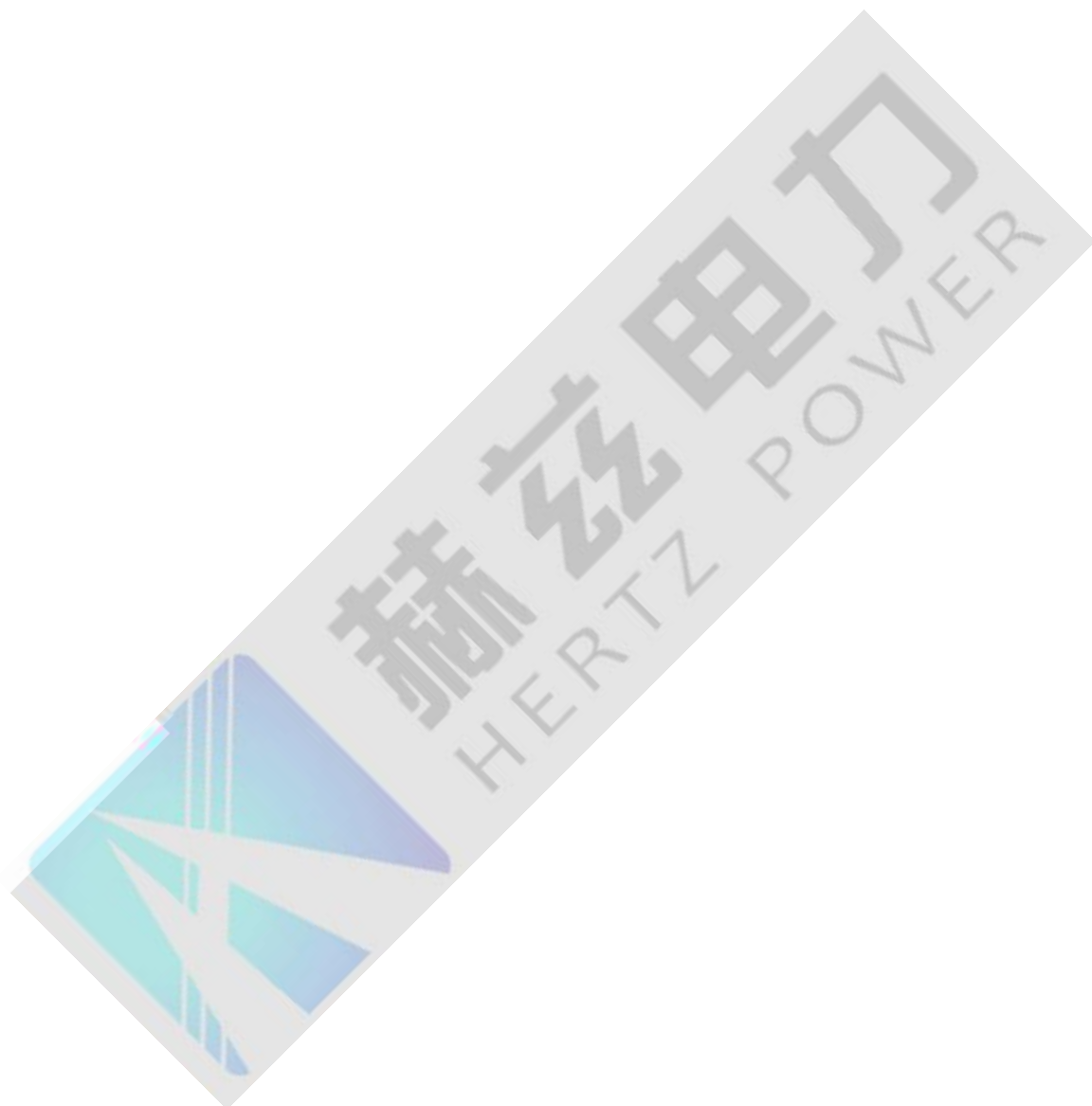
47

1		<p>1</p> <p>1) 2) 3)</p> <p>4) - M00 Y100 - K100 Q/CSG10001-2004</p> <p>2</p> <p>1) 2) 3)</p> <p>4) - Y100 - K100 Q/CSG10001-2004</p> <p>3</p> <p>1) 2) 3)</p> <p>4) - C100 - K100 Q/CSG10001-2004</p> <p>4</p> <p>1) 2) 3)</p> <p>4) - C100 Y100 - K100 Q/CSG10001-2004</p>		
2		<p>1</p> <p>A Y100 M20 B C100 Y100 C M00 Y100</p> <p>2 M00 Y100</p> <p>3</p> <p>4</p> <p>5</p> <p>6</p> <p>Q/CSG10001-2004</p>		

7
8
9

15-100mm

Q/CS



A

A. 1

A. 1

A. 1

1			
2	PH	>5.4	GB/T 7598
3	KOH mg/g	0.03	GB/T 264
4		135	GB 261 -
5	mg/L	500kV 10 220kV 15 110kV 20	GB/T7600 GB/T 7601
6	25 mV/m	40	GB 50150
7	tan %	90 500kV 0.5 220kV 1.0	GB/T 5654
8	kV	500kV 65 110kV~220kV 45 35kV 40	1. GB/T 507 2. DL/T 429.9
9	90 •m	6×10^{10}	GB/T 5654 DL/T 421
10	%	500kV 1.0	DL/T 423 DL/T 703 500kV
11	%	0.02	GB/T 511
12			GB/T 17623 DL/T 722 DL/T 722
13		500kV 100mL 5um 2000	DL/T 1096

A. 2

A. 2

A. 2

	1. 6kV 2. 1 35kV 2
	A-1 2 ~ 9
	A-1

B

SF₆

B. 1 SF₆

DL/T1366

GB12022

GB12022

B. 1 SF₆

1	1
2 40	2
41 70	3
71 100	4
1 100	
2 SF ₆ 24h	

B. 2

1

2

B. 2 SF₆

C