

Q / CSG

√

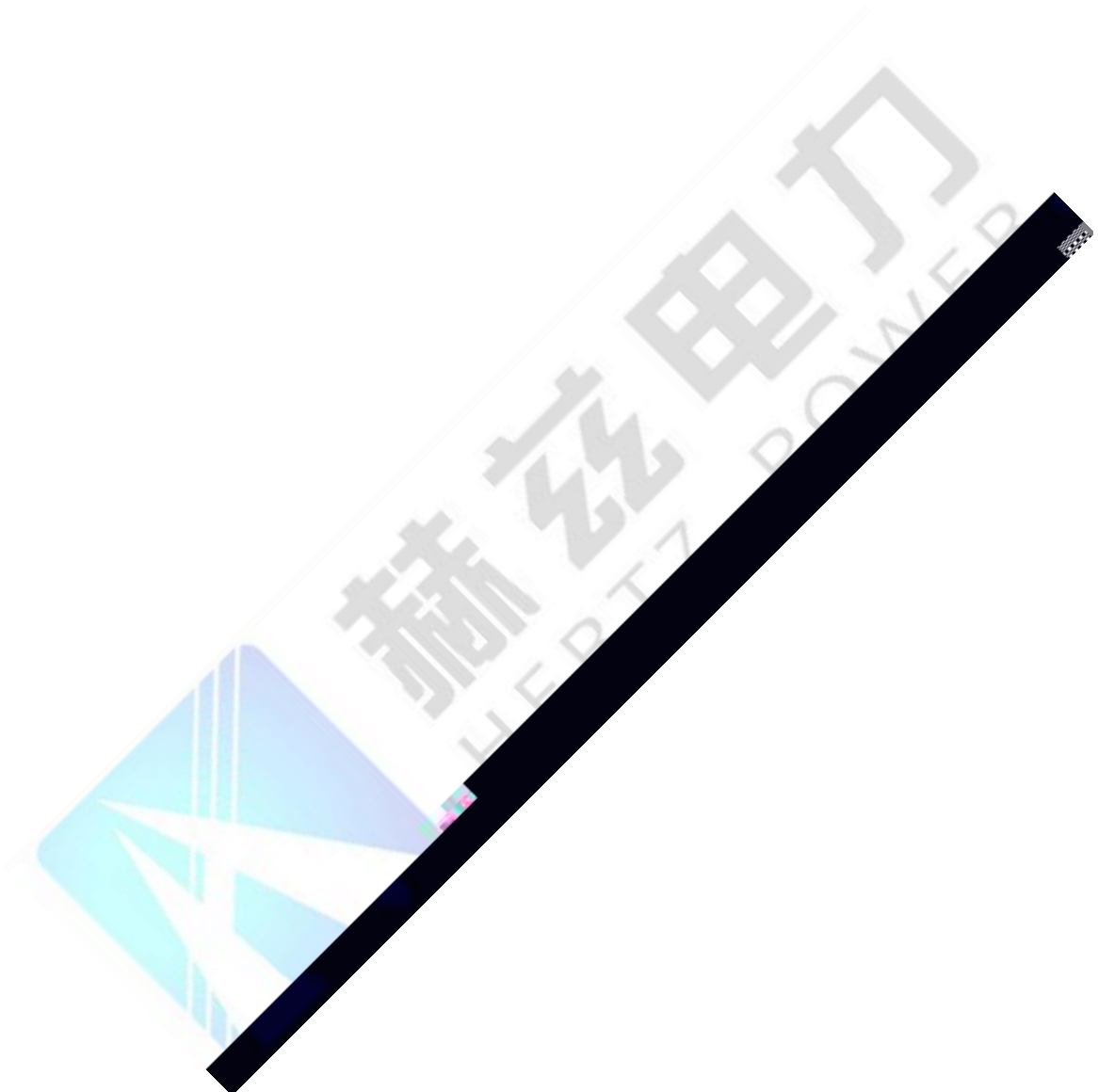
≈

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



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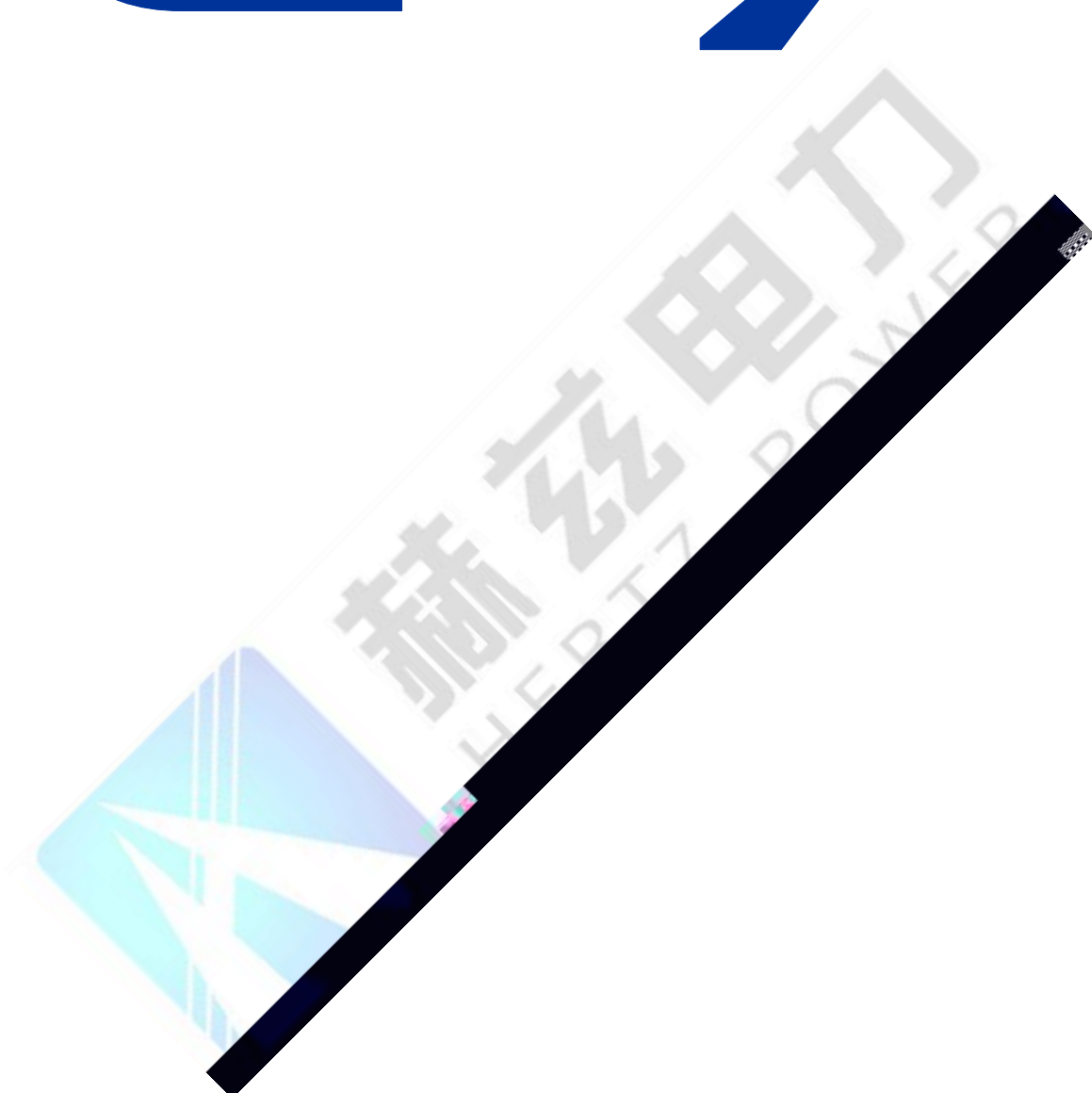
↔

$\frac{5}{8}$

2018 5 Ü ¶ ã .
İ ¶ ã



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*ZJ f)^p T8rv," ¶

GB/T 7252	1	No	∞	↓
GB/T 7354				
GB/T 7595	1			
GB/T 7598	1			
GB/T 7600	1	No		
GB/T 7601	1	No		
GB 7674	1 72.5kV	1		
GB/T 8349				
GB/T 8905	.			↓
GB/T 11022	1	L		
GB 11023	1	.		
GB/T 11024.1	1 1000V	Z	1	No ↓
GB 11032	.			
GB /T 12022	.			
GB/T 14542	1		↓	
GB/T 16927.1~.3	1			
GB/T 17623		No		
GB/T 20840.1~.8				
GB/T 26218.1~.3		1		
GB 50054	1			
GB 50148		Z 1		1
GB 50149			1	
GB 50150				
GB 50169			1	
GB 50204				
GB 50207				
GB 50209				
GB 50210				
GB 50233	110kV~750kV		1	
GB 50242		1		



9-2018

GB 50300

GB 50303

GB 50395

DL/T 4 4 15

GB 50617

DL/T 253

No

1

No

DL/T 264

z ħ 1

↑

DL/T 402

1

DL T 417

z

⌋

↑

DL/T	1093	z	ĩ	4	ĩ	∞	↑	
DL/T	1096	ĩ	4					
DL/T	1220				ĩ			
DL/T	1250						↑	
DL/T	1300				D_p		↑	
DL/T	1366	z		.				
DL/T	1378		„		OPGW		↑	
DL/T	1630							
DL/T	5390	ũ	4	ĩ				
JGJ	126				ĩ			
JGJ	169							
JJG	1021	z						
	[2014]161	^	z		4			
Q/CSG 1206007		z						
Q/CSG 1205011		ĩ						
Q/CSG 1203004.1	4		35kV	500kV	ĩ		↑	ĩ
Q/CSG 1203004.2	35kV		500kV				↑	
Q/CSG 1203004.3	20kV	ĩ					↑	

3

↓

3.1

z z |

3.2

z 4 z
ĩ

3.3

4 z

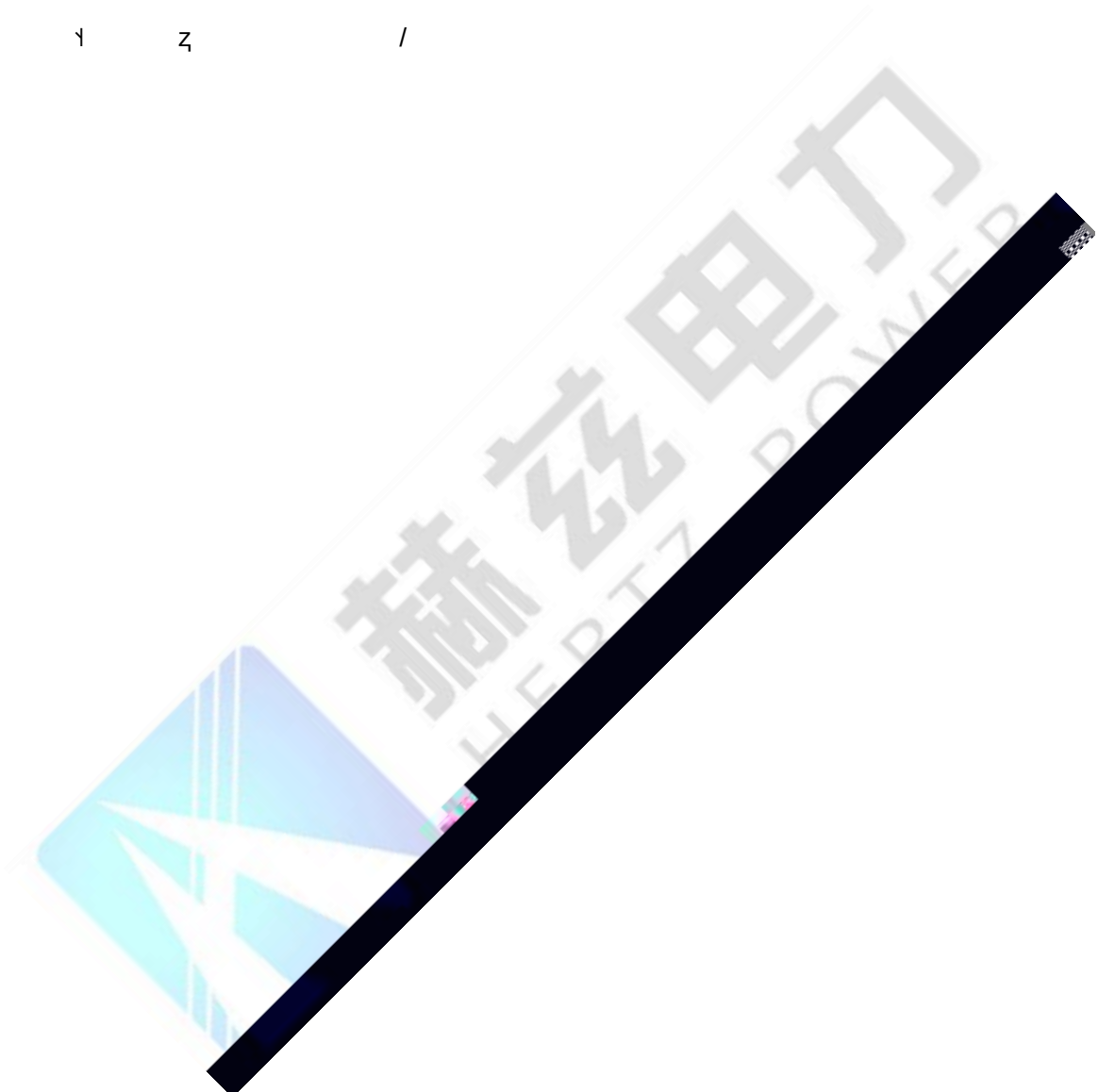


3.4

1 2 3

3.5

1 2 3



3.13

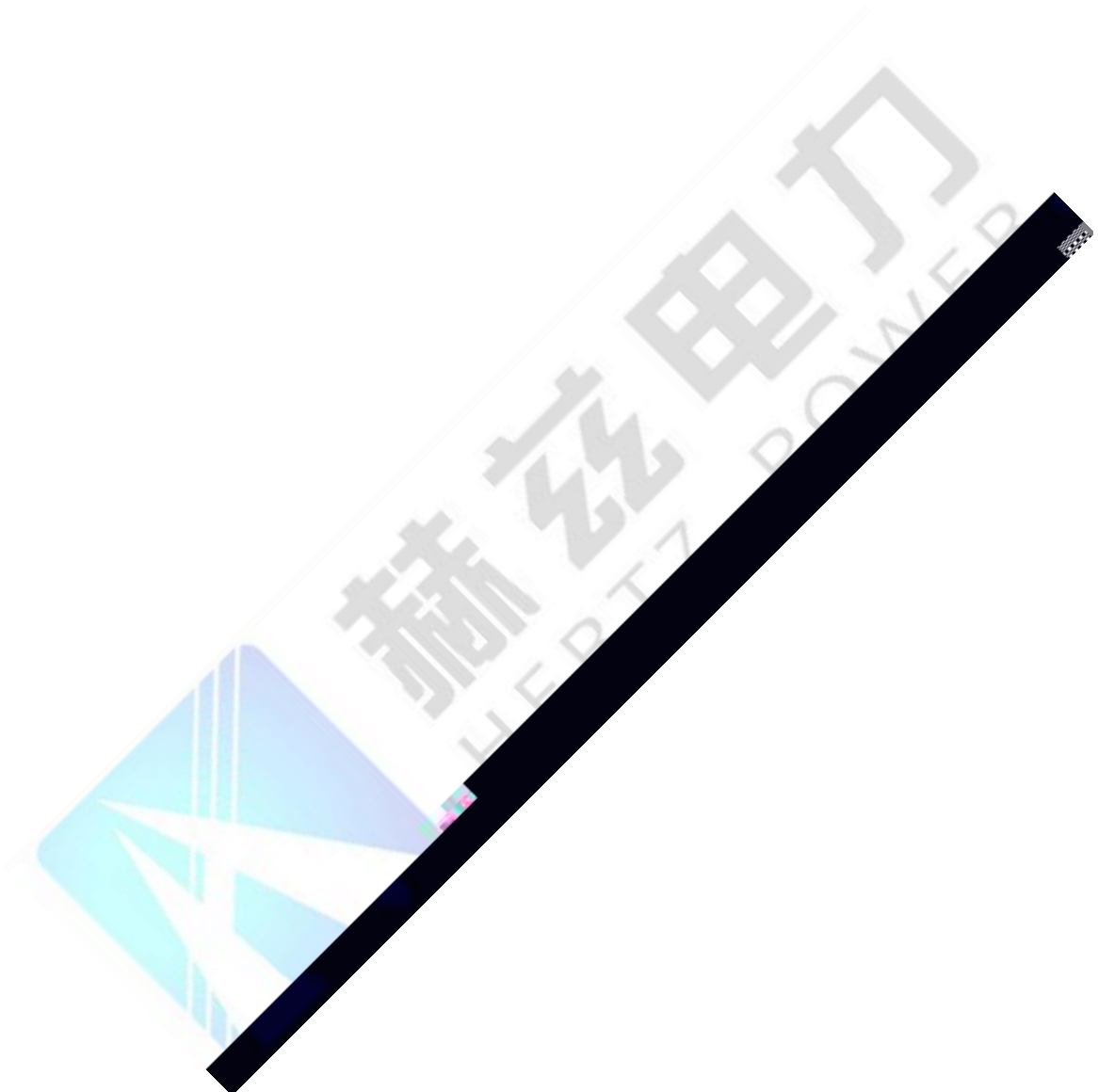
非 1

3.14

Symbol					
U_n	1				
U_m	1				
U_o/U	1 (U_o			1 U	
1)					
U_{ImA}	ImA	$\ddot{\alpha}$	1		
$\tan \delta$					
RTV				Room temperature vulcanized silicone rubber	
anti-pollution coating	RTV	DL/T 627 №	RTV-	v	RTV-
4					
4.1	Z_1		1 ↓	v	$\approx$
			$\downarrow$		Z_1
	Z_1		№		
4.2	↓				
~					
4.3		┌			v
~	v	$\ddot{I}$		№	$\approx$
4.4	∞	$\ddot{I}$	$\downarrow$		
	№				
4.5		$\ddot{I}$			
	$\parallel$	$\downarrow$			
4.6	$\dots$				
4.7	$\parallel$	v	非	v	Δ 非
4.8	'	Z_1	$\sim$ $\ddot{\alpha}$	v	



Q



2mA

1

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

4.20 Ĩ 1 ĩ ~
L ¼ L ¼ Ĩ 1 ĩ 1
2

2

1 kV	110 66 ĩ	220	500
h	≥ 24	≥ 48	≥ 72

4.21 ~ /

1 / Ĩ

2

3

4 ¼ No ¼
¾ ¼

5

≈ ~

5

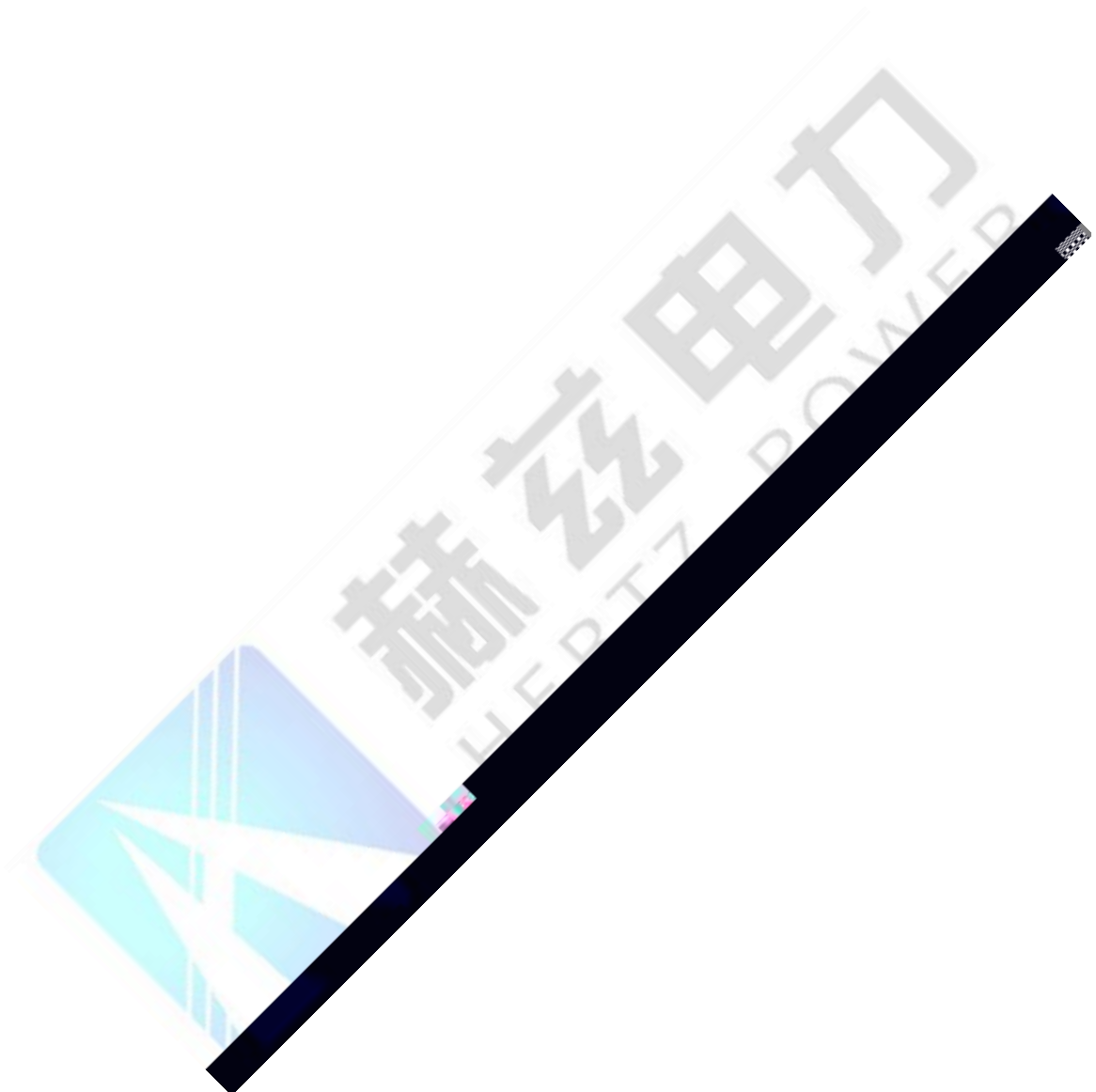
5.1

3

~	≠				
1			1 ≠ ¼ a b pH >5.4		Dp 1



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3

2. 5. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.

$\tan \delta \leq 3$ 50 ≤ 1 ≤ 1

| ≤ 1 | | | | | | | | | | |
|----------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 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 | 2.9 | 3.3 | 3.7 |

a K ≤ 20
b
4 e 9

3

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

$$t = \frac{1}{f_N}$$

$$t = \frac{1}{f_s}$$

$$t = \frac{1}{f_s}$$

15s

4 1.5Um/√3 66kV 100pC 66kV 300pC

11

110kV 110kV 110kV

11

12

| 110kV | 220kV |
|---------|----------|
| 60 ± 5% | 102 ± 5% |

13

10000MΩ 1000MΩ 1000MΩ tan δ 2%

20kV

14

tan δ



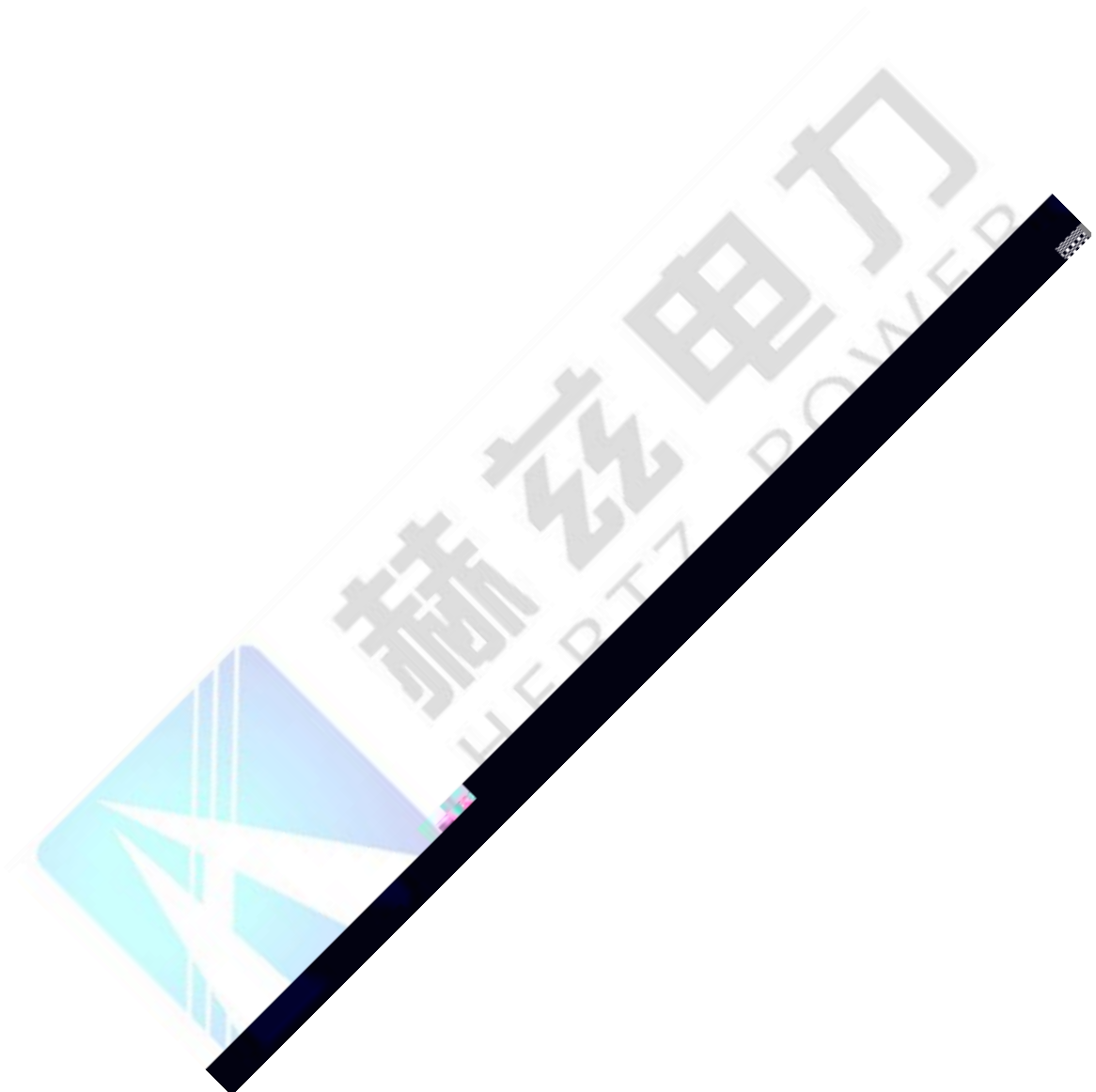
1000MΩ

tan δ

2%



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| ~ | ≠ | | | | |
|----|---|----------------------|---|---|--------|
| | | | 500kV 10 H ₂ 10 C ₂ H ₂ 0.1
220kV ĩ 10 H ₂ 30 C ₂ H ₂ 0.1
2 № mg/L ≤ 35
3 D _p 1 kV 110kV ≥ 45 110kV ĩ ≥ 40 | | |
| 20 | | № | 1
2 20min | | |
| 21 | | ĩ | 1 | | |
| 22 | | ũ 1
z
ĩ | 1
2 1MΩ
3 | / | |
| 23 | | ĩ | 1 L 1
2
3 1 MΩ
4
5 | / | |
| 24 | | ĩ | 1 DL/T 540
2
3 1MΩ
4 | / | |
| 25 | | 1 z
ĩ | 1 L 1
2 1MΩ
3 1 z v
4 | / | |
| 26 | | 1
D _{pe} | 1 1 ĩ 1 D _{pe} 5
5min
2 D _{pe} ĩ 1 1 z ĩ 1
3 ũ ĩ 1 ĩ 1 ~ D _{pe} | | 5
3 |
| 27 | | | 1
v | | |



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

3

~ ≠

34

1 2

2

1

1

1

2

2

3

GB 5273 2

35

2

1

2

3

4 6.0

1

2

1

2

1

2

36

1

2

1

1

2

3

37

2

1

3

4 1 2

1

1

2

3

4

5

6

7

1 2

3

4

4h

2

3

38

1

3

4

1

2

3

4

1

2

30

1

1

2

3

4

1

2

5

1

6

39

1

7

1



3

| ~ | ≠ | | | | |
|---|---|--|----|--------------------------|-----|
| | | | 5 | ĩ | |
| | | | 6 | | ı |
| | | | 7 | ĩ | |
| | | | 8 | | ĩ ı |
| | | | 9 | 500kV ĩ ı 240MVA ĩ ı L ı | ũ |
| | | | 10 | z | |

5.2 SF₆

4 SF₆

| ~ | ≠ | | | | | | | | |
|---|---|-----------------|-----------------|----|----------------|-----------------|-----|-----------------|--|
| 1 | | SF ₆ | SF ₆ | ≠ | ĩ ı | SF ₆ | ĩ | SF ₆ | |
| | | | SF ₆ | 20 | N ₂ | 250 μ L/L | ĩ ı | | |
| 2 | | SF ₆ | | | | | | | |





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4 SF₆

≈ ≠

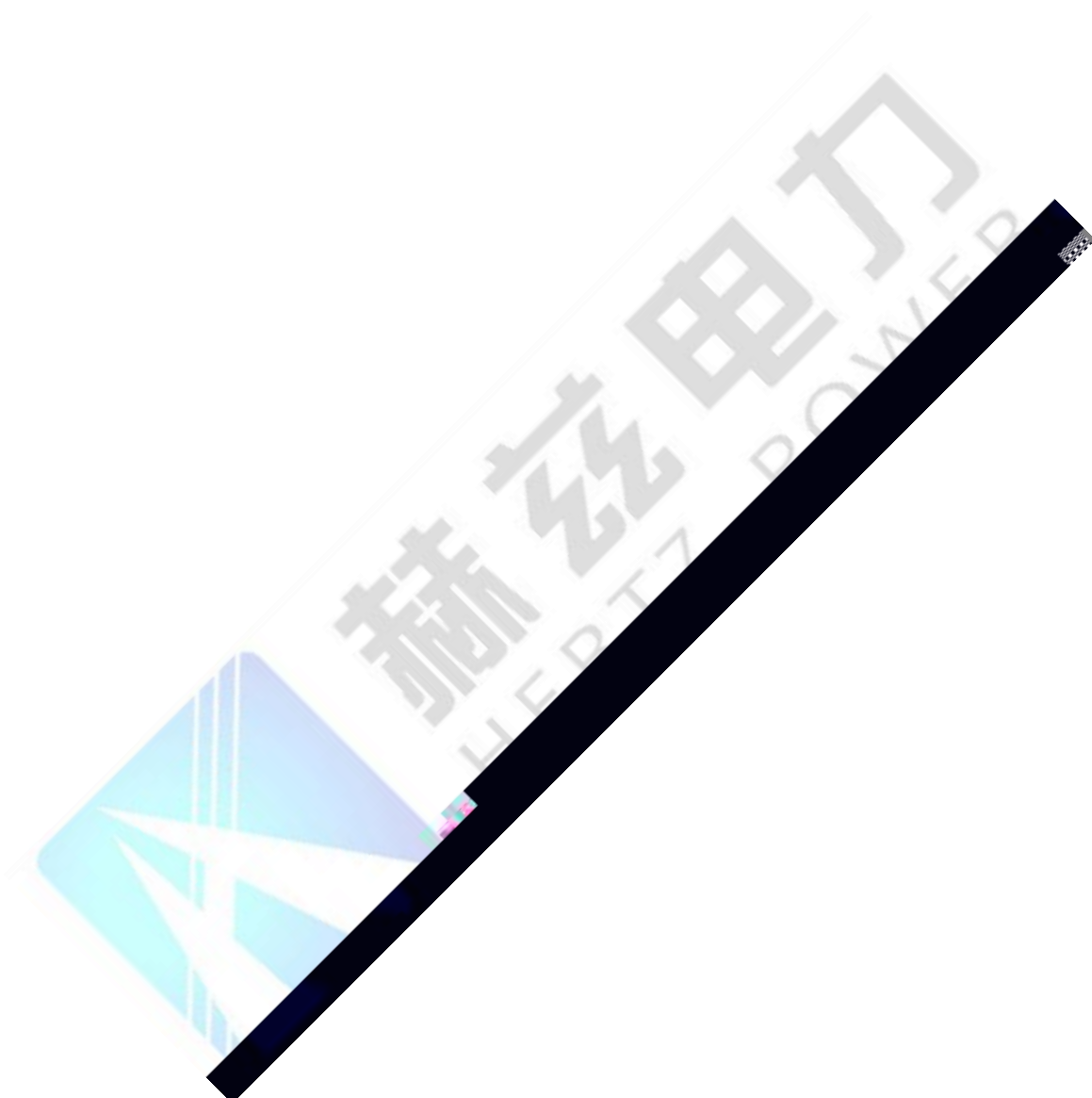
tan δ
%

z₁ 1

| 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

| № | № | № | | | |
|----|---|---------|---|--|--|
| | | 1 | 2 1 3 1 3
3 1 3 1 3
4 1 3 500V 1000V
1MΩ
5 | | |
| 24 | | | 1
2 | | |
| 25 | | α | GB/T26218.2-2010 10.3
a P2-P1 ≥ 20 mm
b S P2 0.9
c S ≥ 70 mm
d 500kV 1 4.7m
e 1000m
1000-2000m 2000m
1.13 2000-2500m 2500m
1.20 2500-3000m 3000m
1.28 3000m
f | | |
| 26 | | 1 | Um 40.5kV 400mm 1000m
↓
a) 1000-2000m 2000m
1.13
b) 2000-2500m 2500m
1.20
c) 2500-3000m 3000m
1.28
d) 3000m | | |
| 27 | | 1
CT | | | |
| 28 | | 3 | | | |
| 29 | | 1 | 220kV 110kV 1 1 1 | | |
| 30 | | | 1
2 | | |



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 4 SF_6 $\neq$

1

 $\dot{I}$ $\dot{I}$
$$Z$$
$$z$$

248

GB 5273 N

31

2

1

$$Z$$

3

4 6.0

✓

4

1

٧

1

32

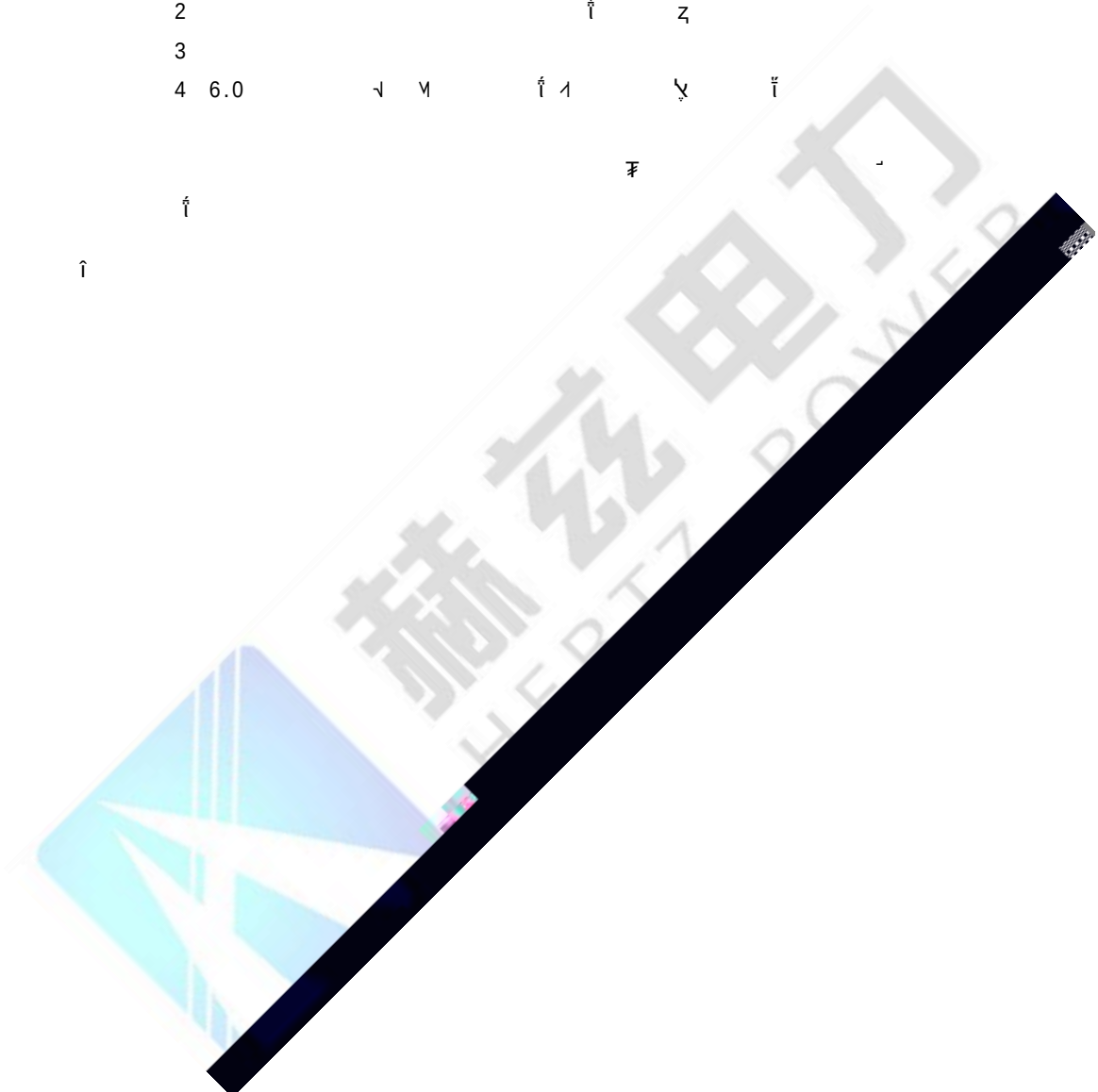
⌘

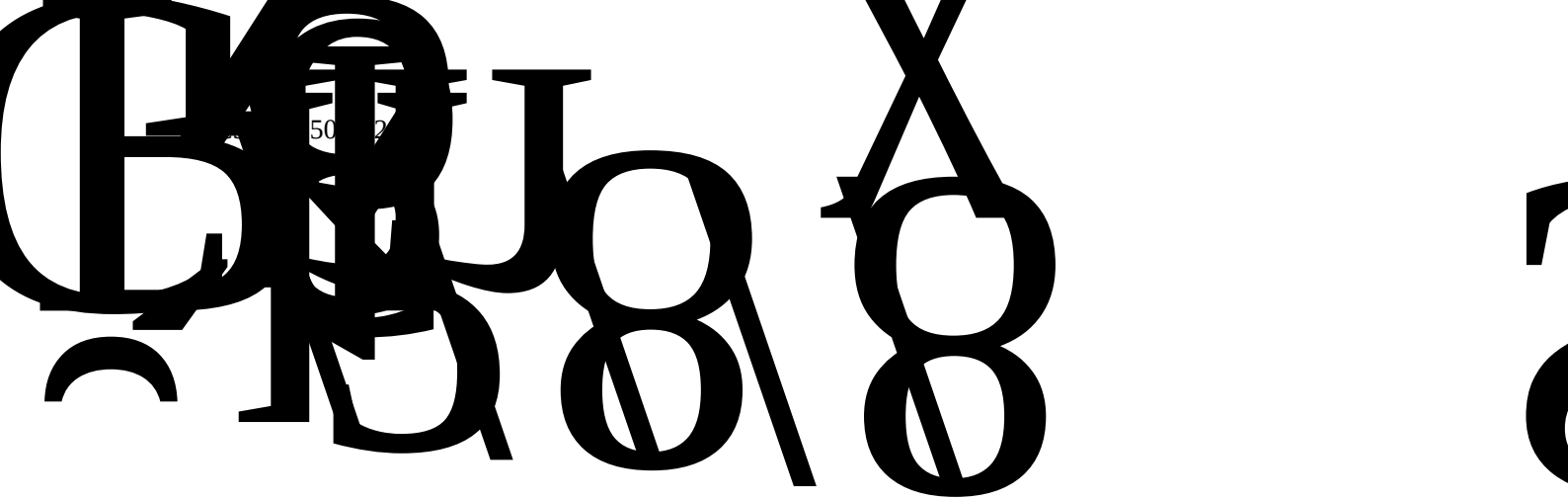
1

 $\dot{I}$

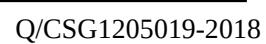
33

↑



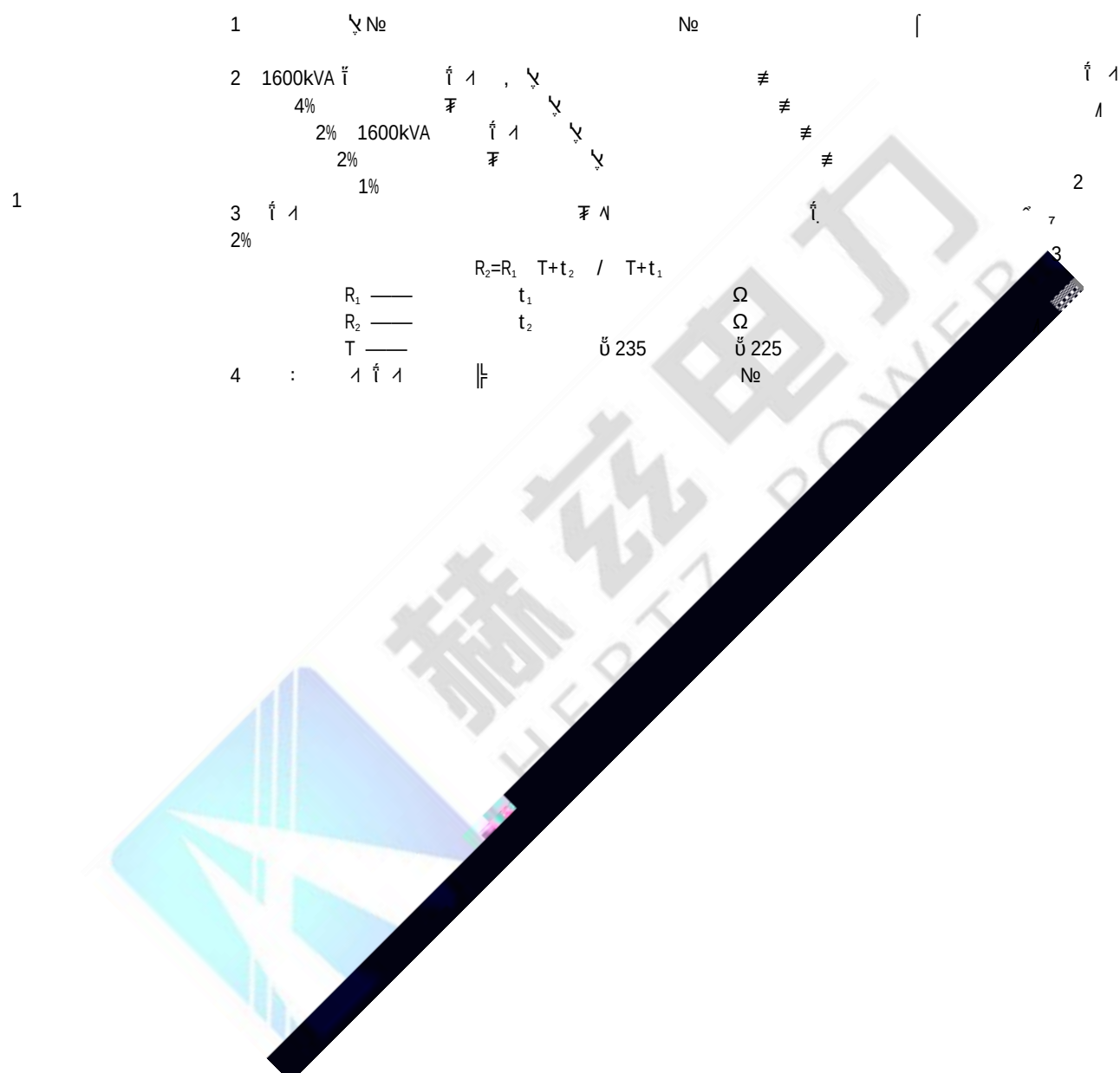


50 2



5.3

5

 $\neq$ 

5

 $\neq$

a

K

20

3

↓

 $\hat{A}$

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

1

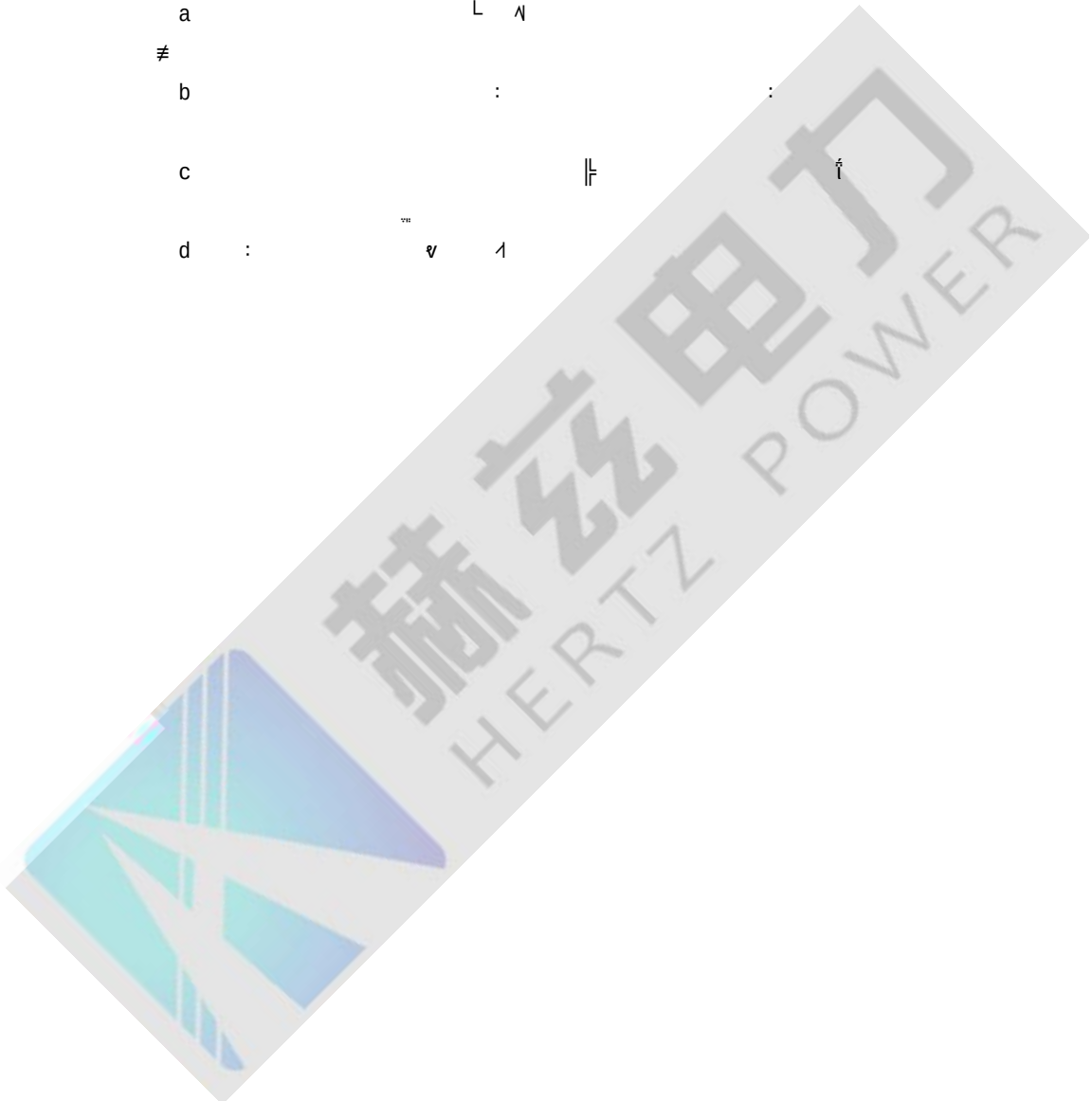
r



5

~ ≠

b ~ 10%
3 ≠
4 :
a L η
≠
b :
c ||
d : v 1



~ ≠

GB/T26218.2-2010 10.3

a ≠ P2-P1 ≥ 20 mm
b S ≠

14 $\overset{\nu}{\alpha}$



5

| ~ | ≠ | | | | |
|----|---|--|---|---|--|
| 21 | | | 1
2
3
4
5
6
7
8
9
10 | / | |

6

6.1 500kV

6 500kV

| ~ | ≠ | | | | |
|---|---|--|--|--|---|
| 1 | | | 1
a
b
c
d
e
f
g
h
i
j
k
l
2
3
a
b
c
10 H ₂ 10 C ₂ H ₂ 0.1 | pH >5.4
mgKOH/g ≤ 0.03
° ≥ 135
No mg/L ≤ 10
z 25 ,mN/m ≥ 40
tan δ 90 %
D _p 1 kV ≥ 65
90 Ω·m ≥ 6 × 10 ¹⁰
No % ≤ 1.0
No % ≤ 0.02
100mL 5 μm ≤ 2000
72h 24h
24h DL/T 722
μ L/L | ≤ 0.5
≤ 0.7
≥ 65
≥ 6 × 10 ¹⁰
≤ 1.0
≤ 0.02
5 μm ≤ 2000
24h
24h
DL/T 722
μ L/L |
| 2 | | | 1
2
R ₂ =R ₁ T+t ₂ / T+t ₁ | 1
2% | 1
2% |

6 500kV

≈ ≠

R_1 — t_1

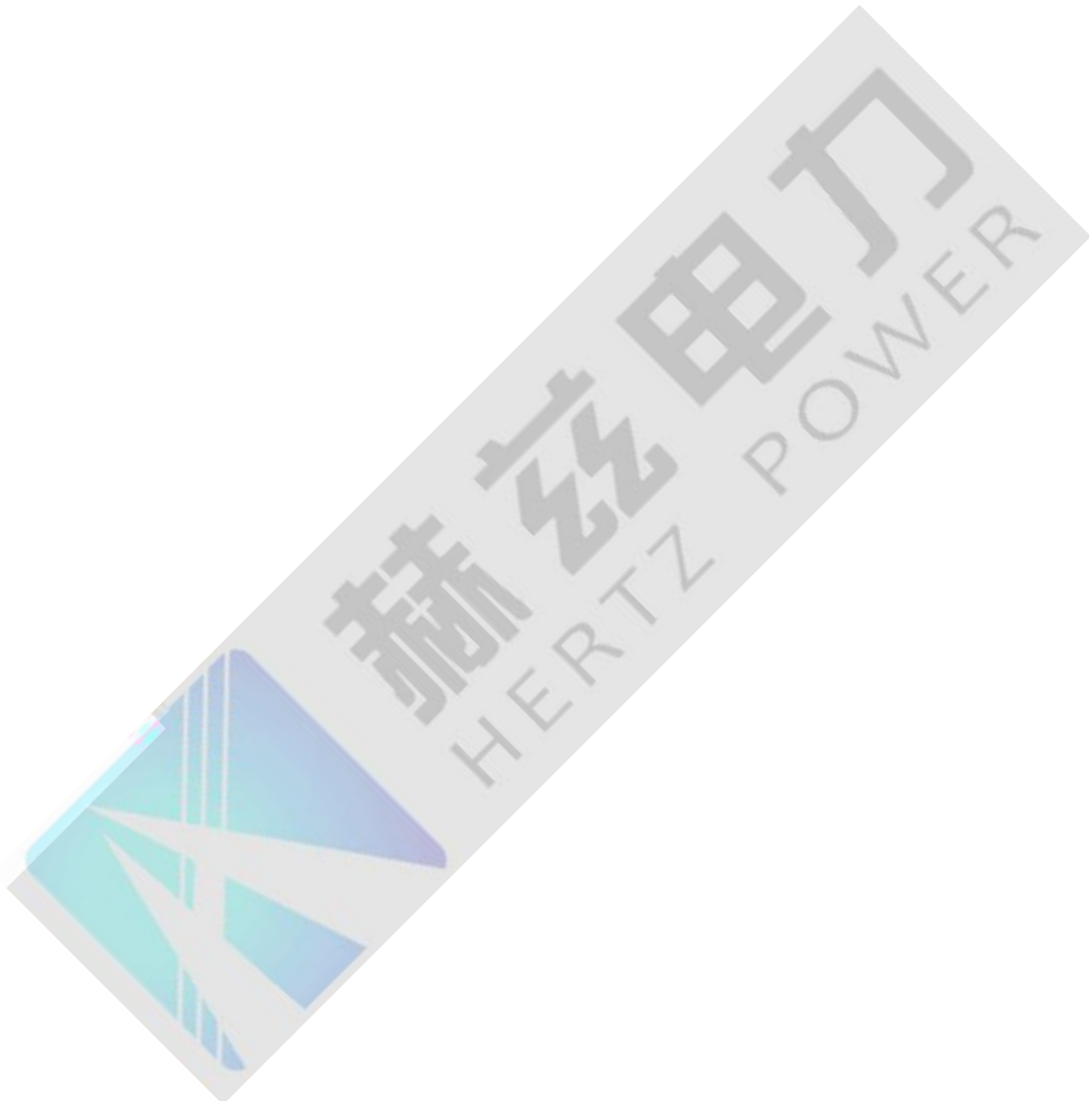


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6 500kV

≈ ≠

K 5 10 15 20 25 3





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6 500kV

| 序 | 号 | 项 | 内 | 要 | 求 |
|----|---|----------------------|--|------------|-----|
| | | | 2 | | / |
| 13 | | | 1 L 1
2
3 1MΩ
4
5
6
7 3° | / | |
| 14 | | 1 z
i | 1 L 1
2 1MΩ
3 1 z
4 | / | |
| 15 | | | 500kV 1
DL/T 264 z i 1
0.035MPa 1 z
24h | 1 z
1 z | |
| 16 | | 1
D _{pe} | 1 i i
5 5min D _{pe} | | |
| 17 | | | 1 65 ° C | | 24h |
| 18 | | | 1 i 100 μ m | | 24h |
| 19 | | | 1
2 1 | | |
| 20 | | 1
α | 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 𐄂 𐄂 𐄂 𐄂 𐄂

24

1 𐄂
2
1 𐄂
𐄂
2 𐄂 𐄂
3
4 6.0 𐄂 𐄂 𐄂 𐄂

25

1 𐄂 𐄂

26

2 d' d' 𐄂 𐄂 𐄂



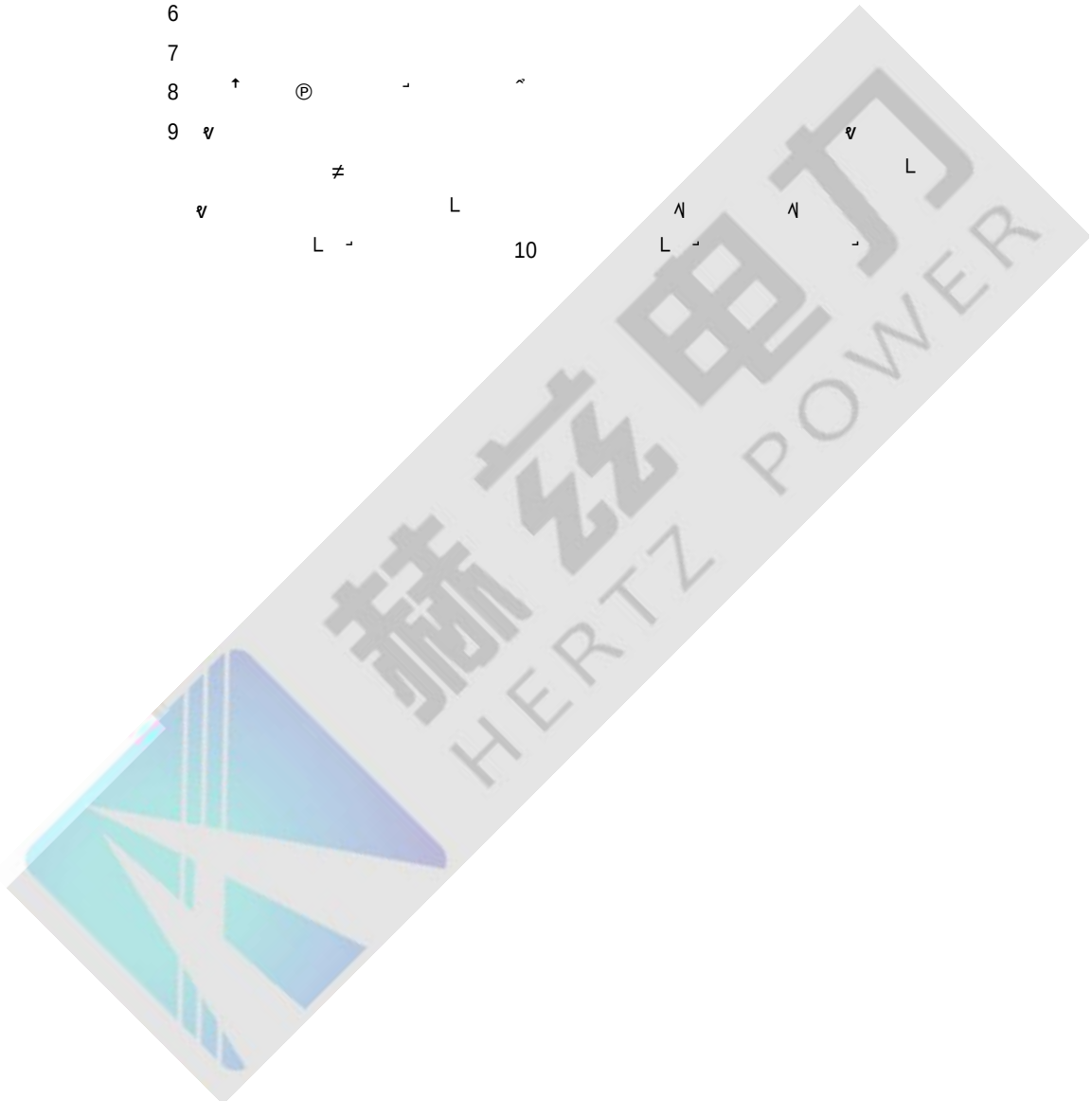
6 500kV

≈ ≠

3
4
5
6
7
8
9
10

↑ ⊕ ~
√ ≠ L
√ L ~

√ L ~



7 35kV

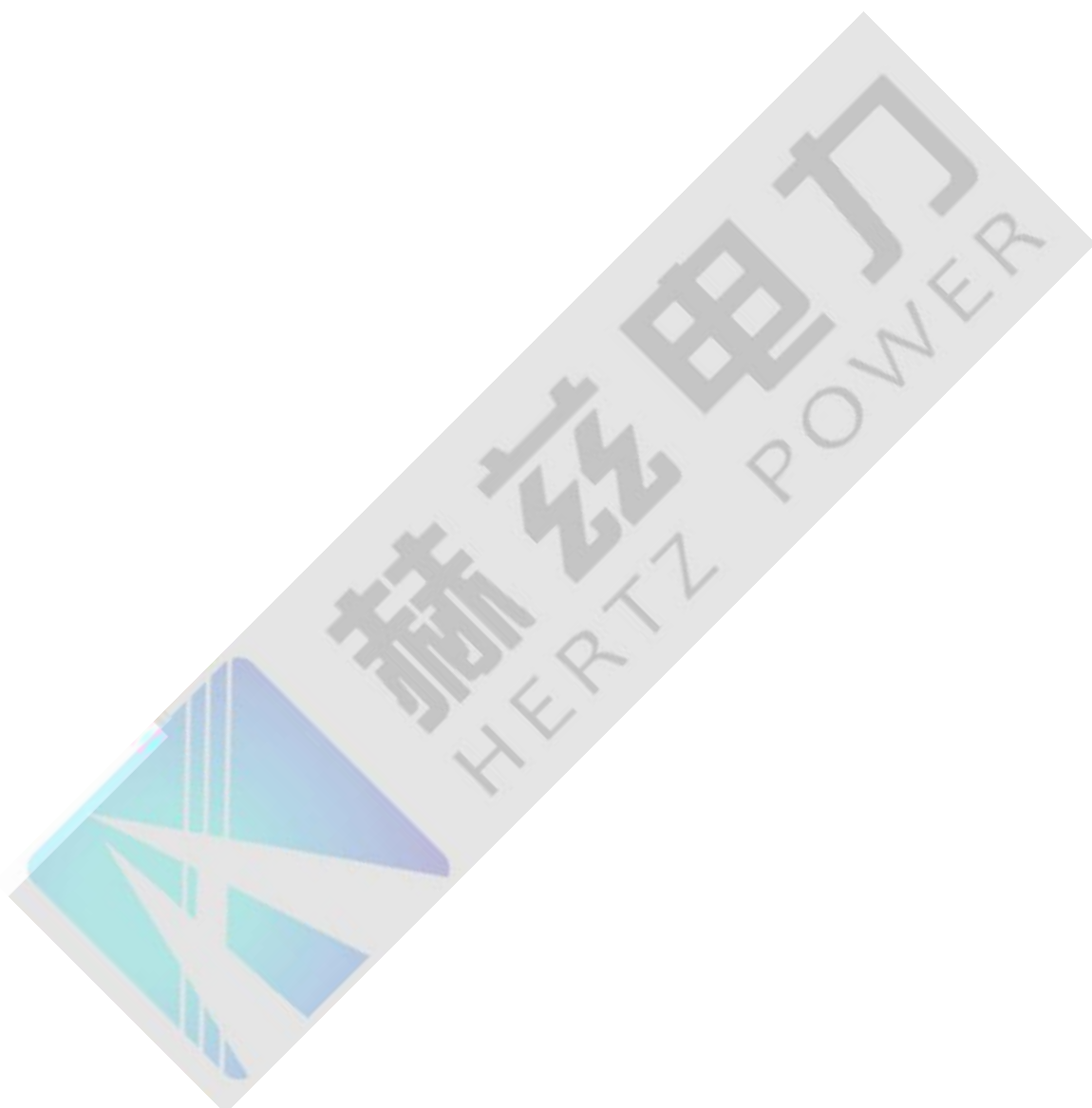
≈ ≠

i 90 Ω·m æ V

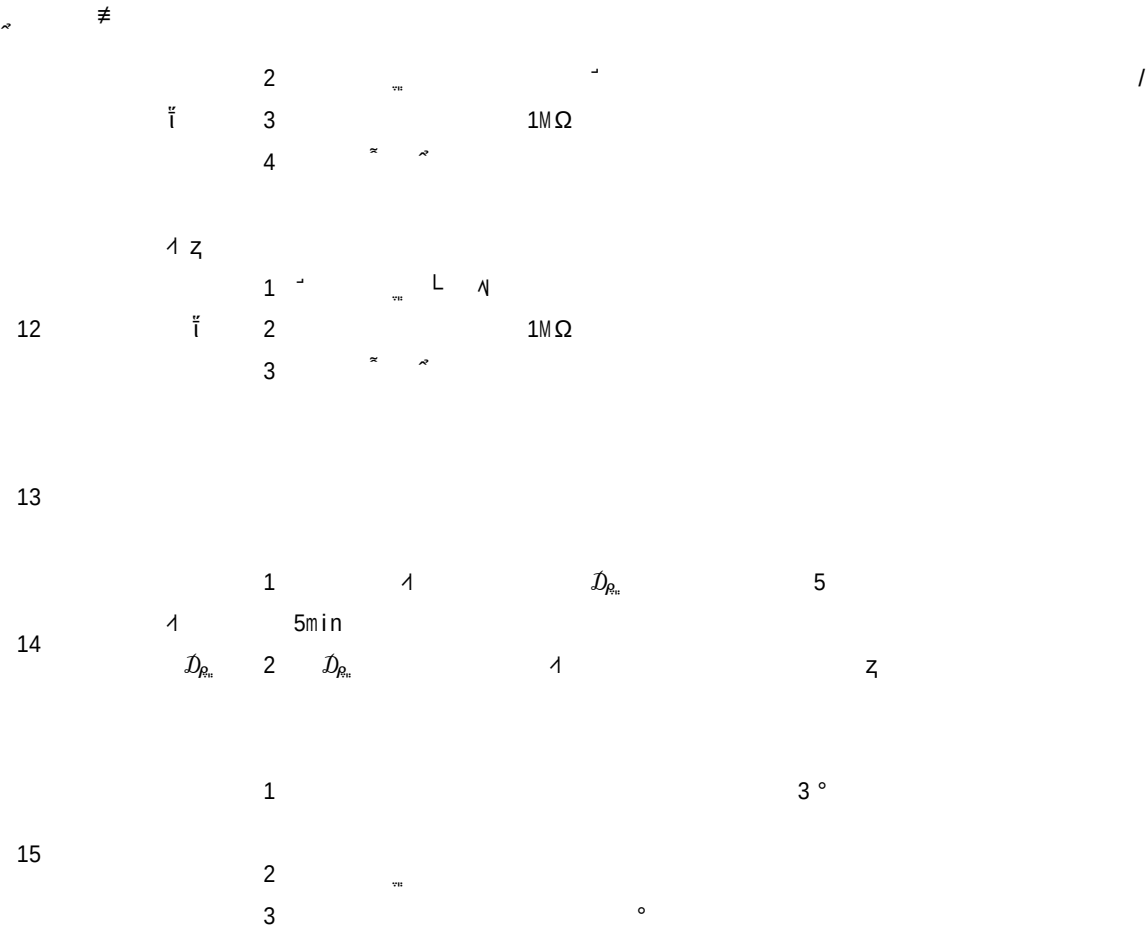




7 35kV



7 35kV





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7 35kV

| 序 | 号 | 名称 | 规格 | 单位 | 数量 |
|----|---|----------------------|----------------------|----|----|
| | | | 4 6.0 1 1 1 1 | | |
| 22 | | 1 2 3 | 1 2 3 | | |
| 23 | | 1 2 3 4 | 1 2 3 4 | | |
| 24 | | 1 | 1 | | |
| 25 | | 1 2 3 4 5 6 7 8 9 10 | 1 2 3 4 5 6 7 8 9 10 | | |
| 26 | | 1 | 1 | | |
| 27 | | 1 2 3 4 5 6 | 1 2 3 4 5 6 | | |

7 35kV

| | | | | | |
|---|---|--|---|---|-----|
| ~ | ≠ | | | | |
| | | | 7 | ĩ | |
| | | | 8 | ĩ | ĩ ı |
| | | | 9 | ≈ | |

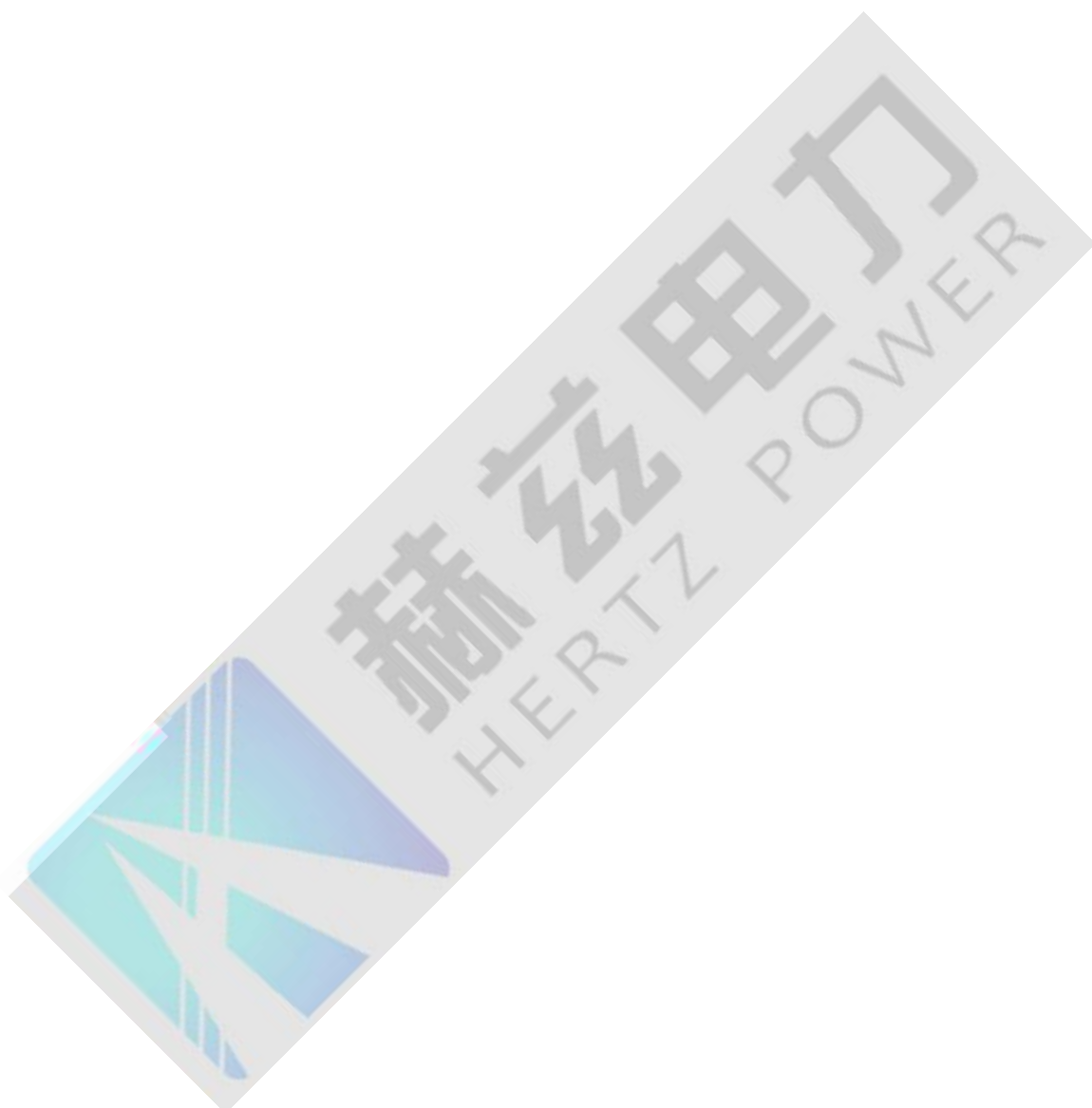
6.3 35kV

8 35kV

| | | | | | | | | | |
|-----|----|-------------------------------------|--|--------------|---|-----|----|--|--|
| ~ | ≠ | | | | | | | | |
| 1 | | | 1
2

$R_2=R_1 \quad T+t_2 \quad / \quad T+t_1$
$R_1 \quad t_1 \quad \Omega$
$R_2 \quad t_2 \quad \Omega$
$T—$
$\checkmark 235 \quad \checkmark 225$ | | Λ
1
~
2
Λ | | | | |
| 2 | | | $\checkmark \Lambda \quad \pm 5\%$ | | 1
35kV
2
~
$\checkmark$
Λ
L | | | | |
| 3 | | | 1
1min
<table><tr><td>kV</td><td>kV</td></tr><tr><td>128</td><td>96</td></tr></table>
2
100kHz
3000
Λ
3
Λ
$\parallel$
$\mathcal{D}_p$
$\parallel$
4
Λ
20%
5
Λ
Λ
$\checkmark$
5%
6
$\checkmark$
~ | kV | kV | 128 | 96 | | 1
35kV
2
Λ
$\checkmark$
$\parallel$
$\mathcal{D}_p$
3
35kV |
| kV | kV | | | | | | | | |
| 128 | 96 | | | | | | | | |
| 4 | | Λ
$\mathcal{D}_{p_{en}}$ | Λ
5min
$\mathcal{D}_{p_{en}}$
5 | | | | | | |
| 5 | | | | | 1
2
GB/T 1094.10 | | | | |
| 6 | | | 1

№
$\checkmark$ | $\checkmark$ | 1
35kV | | | | |



| | | | | | |
|---|---|--|---|----------|--|
| 2 | ≠ | | | | |
| | | | 8
9
10
11 35k (P)
i vii SF ₆ | i i F C2 | |



~ ≠

1 tan δ 1 10kV tan δ %

tan δ % 20

| 1 kV | 20 35 | 66 110 | 220 | 500 |
|------|-------|--------|-----|-----|
| | 2.5 | 0.8 | 0.6 | 0.5 |
| | 2 | | | |

20kV

ĩ

2 ~ 1 0.5 1

3

$U_m/\sqrt{3}$

U_m

1

tan δ ĩ

tan δ

0.2%

ĩ

0.5%

3

ĩ

tan δ

4

≠ 1

≠ 5%

1

5

tan δ

2%

tan δ

1

2kV

1

≠ 1

80%

1

1

√ 2

1

2

1

66kV ĩ

1

1

1

110kV ĩ

4

1

N₂

ĩ

1

1

2kV

1

3

2500V

4

1

110kV ĩ

ĩ

1

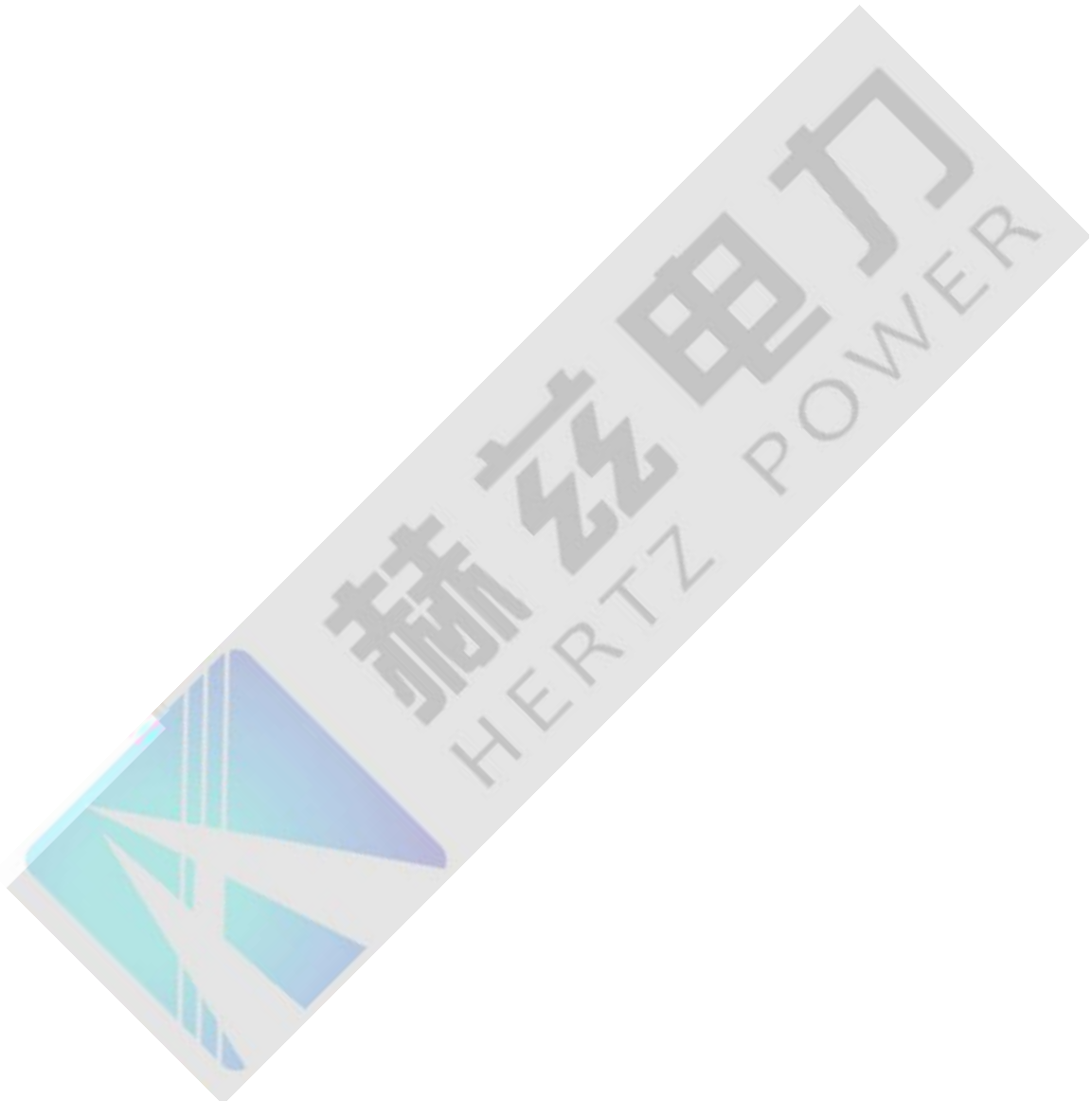
2kV

2500V

5



≈ ≠



≈ ≠

2 ≈

1

3
30%

√
50%

5 ≠

mm

1 :

2 L 1/

6

:

≠

3

4 :

√

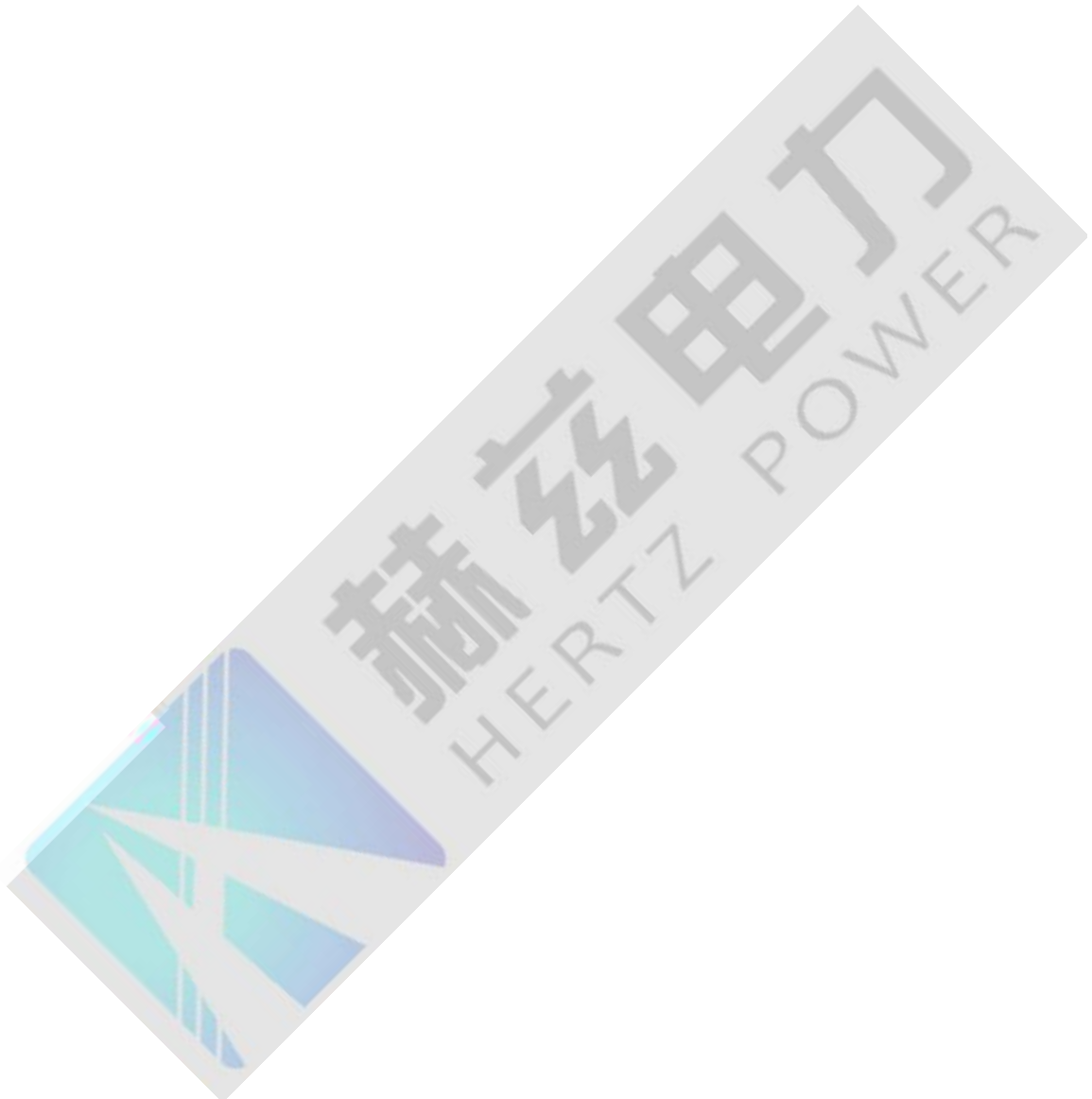
1

1

1 r



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11 SF_6

| | | | | | |
|---|-----------------|---|------|-------------------------|-------------------------------------|
| 4 | SF ₆ | 1 | 20 | Ne | ≤ 250 μ L/L |
| | | 2 | NeNe | SF ₆ ≥ 99.9% | CF ₄ ≤ 0.01% Air ≤ 0.03% |
| | | 3 | NeNe | SF ₆ ≥ 99.9% | CF ₄ ≤ 0.01% Air ≤ 0.03% |
| | | 4 | NeNe | SF ₆ ≥ 99.9% | CF ₄ ≤ 0.01% Air ≤ 0.03% |



11 SF₆

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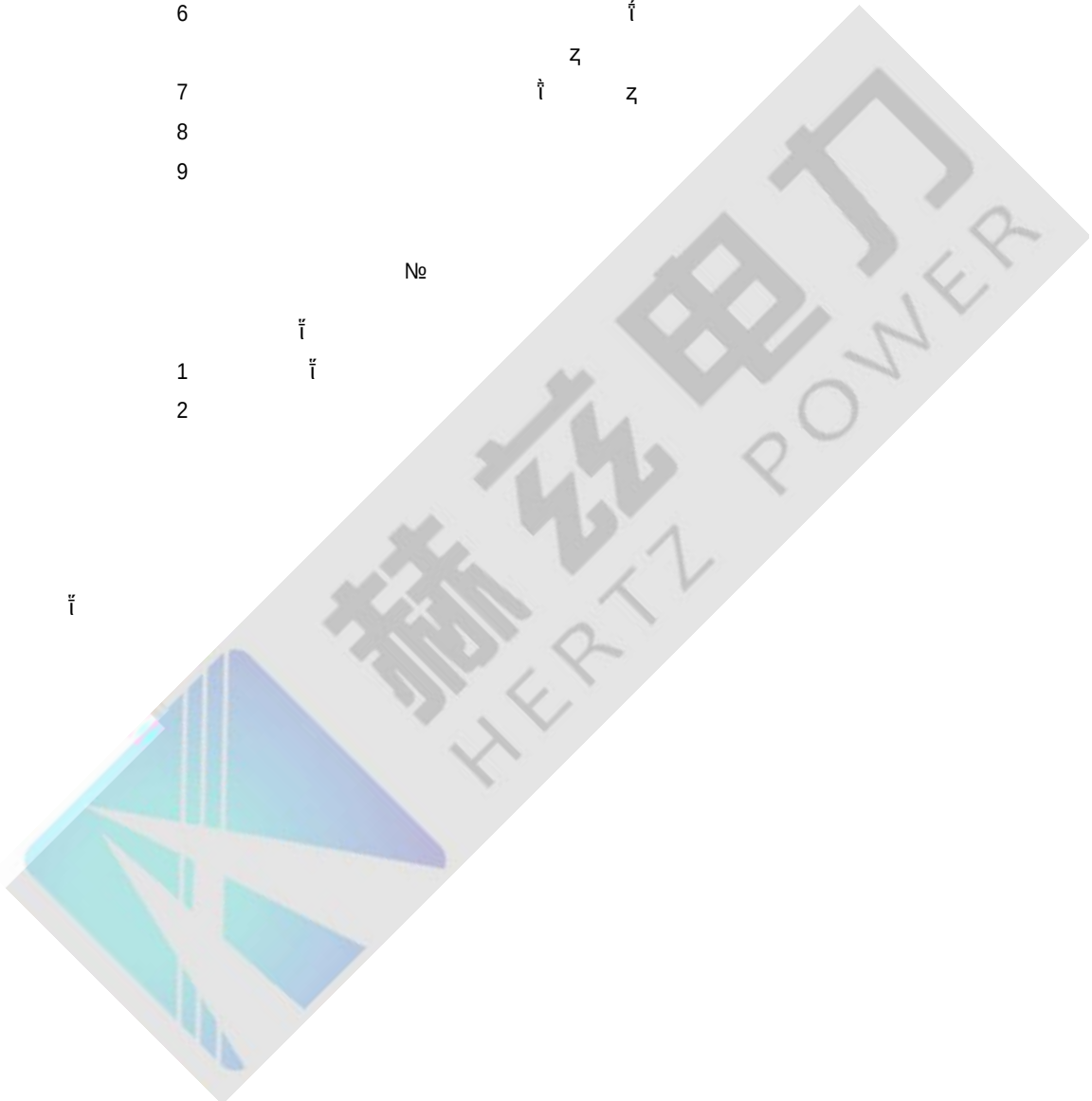
11

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11 SF₆

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| | | | z | JJG1021-2007 | |



| ~ | ≠ | | | | |
|---|---|-----|---|---|--|
| | | | $t_{\text{—}} \quad 1$
$4 \quad 1 \quad 66\text{kV} \quad \text{ĩ} \quad 1 \quad \text{ } \quad \text{Ÿ} \quad \text{№}$
vii | | |
| 5 | | | $1 \quad \text{[} \quad \text{Ÿ} \quad \text{Ÿ}$
10%
$2 \quad \text{[} \quad \text{Ÿ} \quad \text{Ÿ}$
15%
3
$R_2=R_1 \quad T+t_2 \quad / \quad T+t_1$
$R_1 \text{ —} \quad t_1 \quad \Omega$
$R_2 \text{ —} \quad t_2 \quad \Omega$
$T \text{ —} \quad \text{Ÿ} \quad 235 \quad \text{Ÿ} \quad 225$ | | |
| 6 | | ≠ | vii | | |
| 7 | | : | $1 \quad :$
30%
$2 \quad :$
$1 \quad 20\% \quad 50\% \quad 80\% \quad 100\% \quad 120\%$
$3 \quad 1 \quad 1 \quad 150\%$
$1 \quad 150\%$
$4 \quad 1 \quad 1 \quad 190\% \quad :$
$1 \quad 190\%$
$1 \quad 120\%$
$1 \quad 120\%$ | | |
| 8 | | ĩ ĩ | $1 \quad \circ \quad \text{Ÿ} \quad \circ$
$2 \quad \circ \quad 5\%$
$\text{№} \quad \text{ĩ}$
$3 \quad \text{ĩ} \quad \text{ĩ} \quad \text{L} \quad \text{Ÿ}$
$4 \quad \circ \quad \text{ĩ} \quad \text{ĩ} \quad \text{L} \quad \text{Ÿ}$
$\text{~} \quad 7 \quad \text{№} \quad \text{ĩ}$ | | |
| 9 | | ĩ | $1 \quad \text{ĩ}$
$2 \quad \text{ĩ}$
3
4 | / | |

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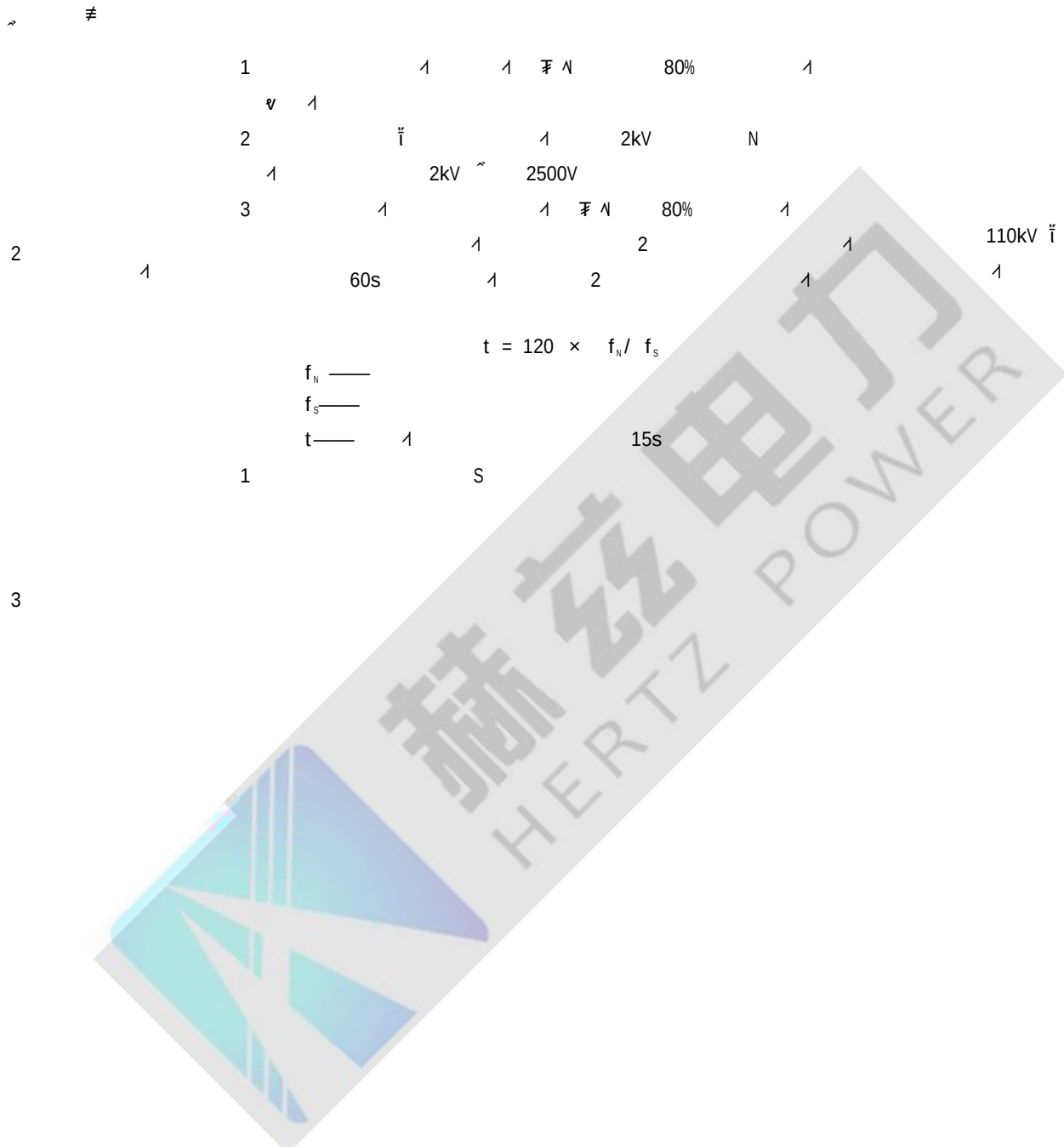
7

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No 1
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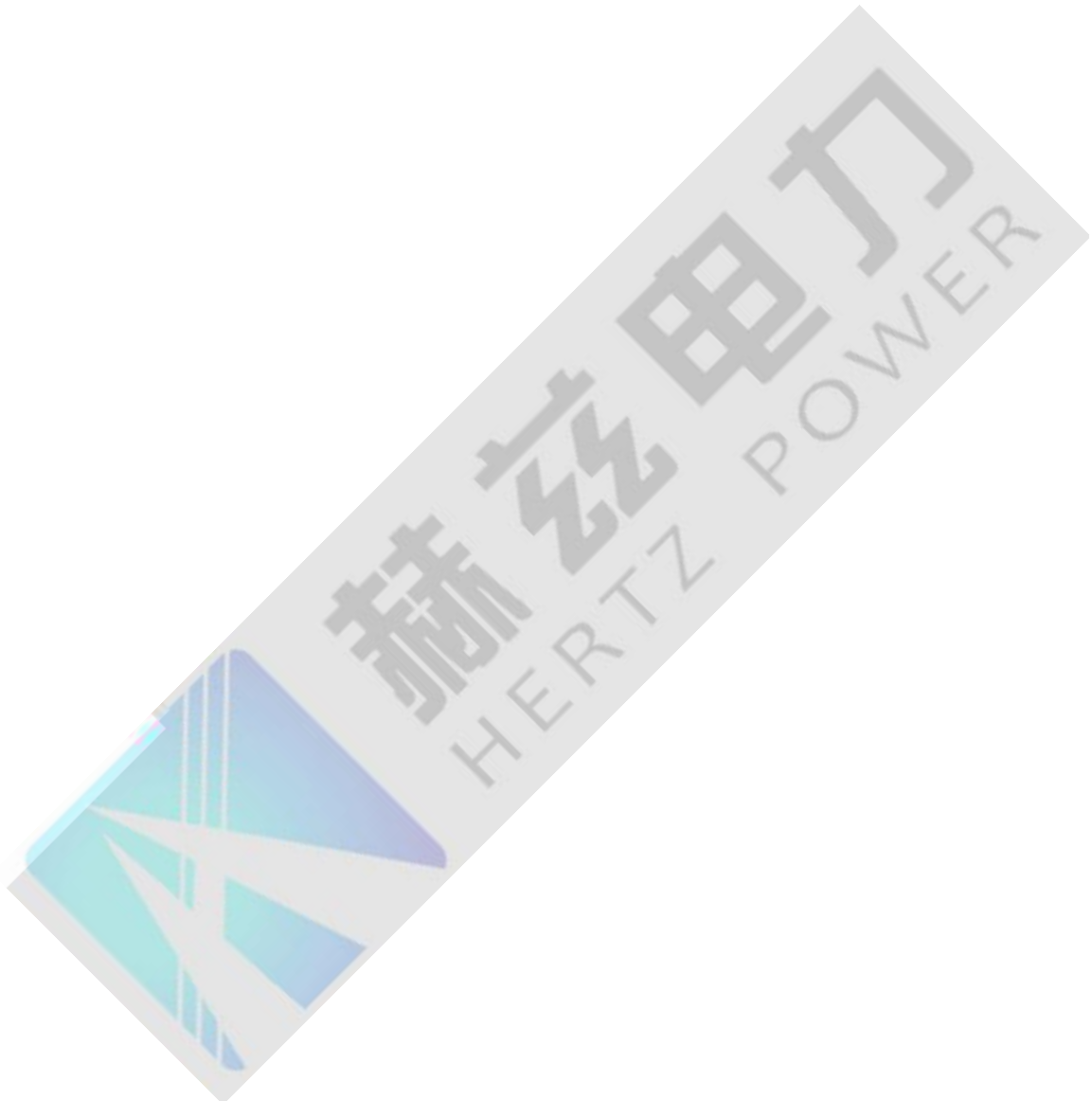
1

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Q/CSG1205019-2018



15 SF₆

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| № | ≠ | | | | |
| 1 | | | 1
2 2500V | | |
| 2 | | | 1 100A 1
2 | | |
| 3 | | 1 | 1 SF6 1 3
2
a) 1 Dp 1 1 1
0.8
b) 110kV 1 1 110kV 1
1 7 500kV 1
c) 1 L 1 1
3
a) 500kV 1 1 1 0.9
b 220kV 1 1 1 1
c 1 1 1 1
1 3
d 1.2Um / √3 1 | | 1 110kV 1
1
2 1 20
No
No 20
1 |
| 4 | 1 | | 1 5000MΩ
2 tan δ
± 5% 10kV 1 tan δ % ↓
0.5%
0.2%
3 1 tan δ
4 L 1 | | |
| 5 | | α | 1 1 1
2 No 1 L 1
3 -No 1 L 1
4 L 13 No ↓
— 5ms
— No 3ms
— 3ms
— 2ms | | |
| 6 | | No | 1 35kV 1 SF6
2 1 1
3 | | |
| 7 | | | 1 L 13 1 ± 5% | | |



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15 SF₆

| 序 | 号 | 名称 | 规格 | 单位 | 数量 |
|----|---|----------|--------|----------|------|
| | | 1 | 2 | L | 1 |
| 8 | | No | 1 | No | 10MΩ |
| | | 1 | 2 | L | 1 |
| 9 | | No | 1 | 85% 110% | 1 |
| | | 2 | No | No | 1 |
| | | 85% 110% | 1 | 30% | No |
| | | 3 | 80% | 50kA | 85% |
| | | 4 | L | 1 | 1 |
| 10 | | | 1000MΩ | 1 | 1 |
| | | | 2500V | 1 | 1 |
| | | | 1000V | 1 | 1 |
| 11 | | | | | |
| 12 | | | 1 | o | o |
| | | 2 | 5% | No | 7 |
| | | 3 | 1 | L | 1 |
| 13 | | | 1 | : | : |

15 SF₆

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3 :

v 1



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15 SF₆

| № | № | | | | |
|----|----|---------------------------------|------|---------|---|
| | | 1 | | | |
| | | 2 | | | |
| 22 | | 1 | L | 1 | |
| 23 | | 1 | L | 1 | / |
| 24 | | 1 | L | 1 | / |
| | | No | | | |
| 25 | | 1 | L | 1 | |
| 26 | | | L | 1 | / |
| 27 | | 2 | 2 | | |
| 28 | | 1
2
3
4
5
6
7 | 10mm | 10 20mm | |
| 29 | | | 1 | 1 | |
| 30 | No | 1 No
2 No | | No | 1 |

15 SF_6

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|----|---|--------------------------|--|--|--|
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| | | | ≈ | | |
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2 1 1 1
3 1 1 1 | | |
| 32 | | | 1 1 1
2
3 № 1
4 “ ” ≈ ≈ | | |
| 33 | | SF ₆ 1 z
ĩ | 1 SF ₆ 1 ≈ SF ₆
2 SF ₆ ≈ Ů
3 SF ₆ 1 z 1
4 SF ₆ 1 z 1 z
5 SF ₆ 1
6
7
8 L L
9 o 1
10 ≈ 1 ≈ | | |
| 34 | | | 1 1 | | |
| 35 | | | w 1 | | |
| 36 | | ĩ | 1 1 1
2 № 1 №
3 1
4
5 1
6 “ / ” © “ ”
7 1
8 1 1
9 1
10 | | |



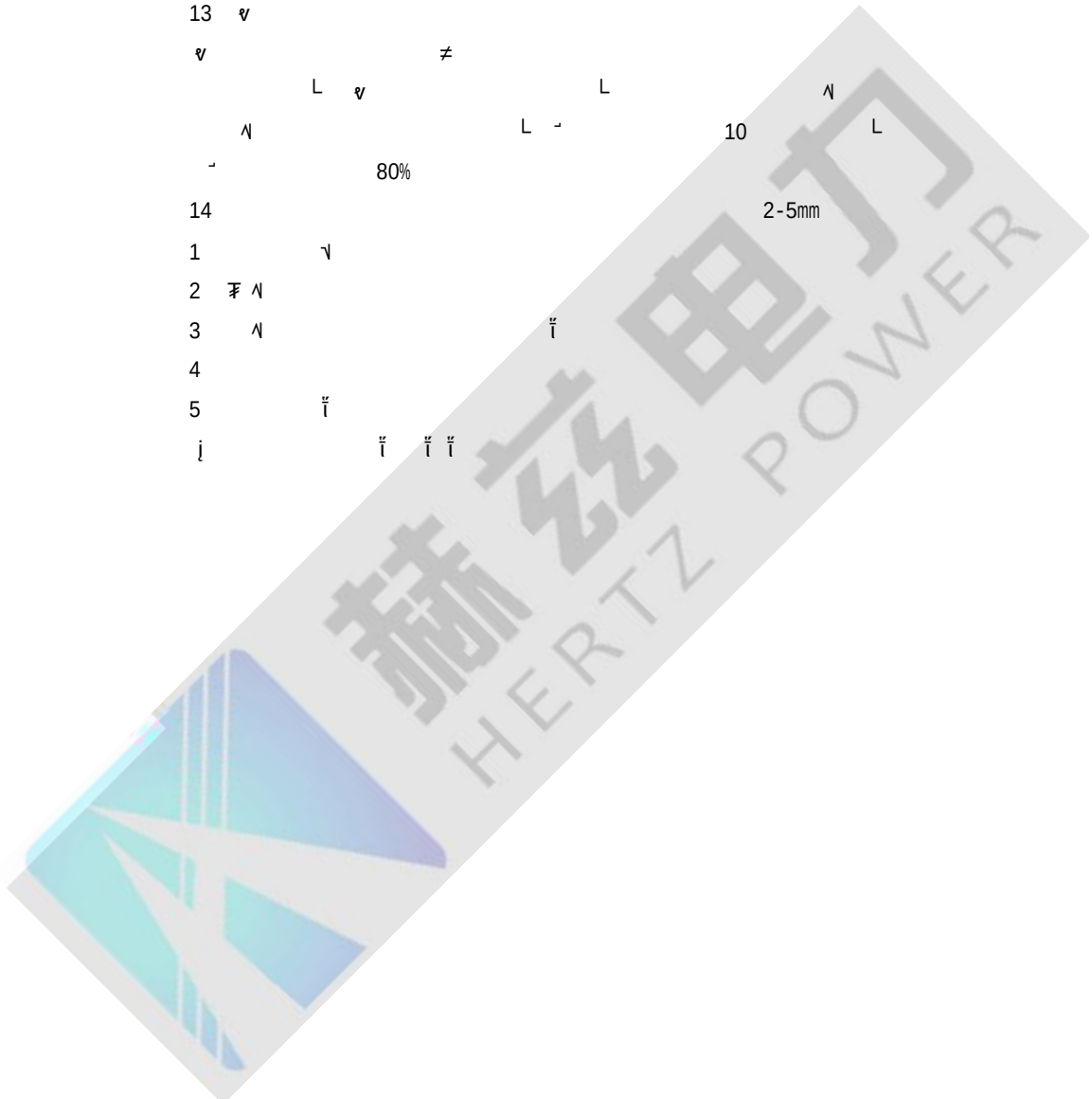
Q/CSG1205019-2018

13 SF₆

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12 ↑ ⊕ ~
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13 ∇
∇ ≠
L ∇ L
∇ L ∇ L
10 L
80%
14 2-5mm
1 ∇
2 ∇
3 ∇
4
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ĩ ĩ ĩ

37

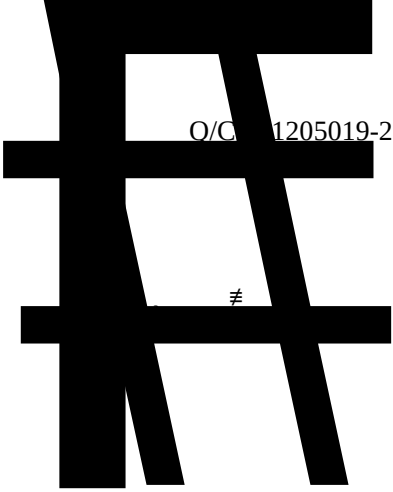


[illegible]



16

10 ≠ ↑ L 1 2kV 1min ~ 2500V
 11 1 L 1
 12 Z₁ Z₂ 1
 13 1 2 3 4 5 g "



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|---|-----------------|------|---|-----------------|------------------------|
| 1 | ≠ | 1 | 100A | 1 | |
| | | 2 | GIS | | GIS |
| | | 120% | | | |
| | | 3 | | | SF ₆ |
| 2 | SF ₆ | 1 | 1*10 ⁻⁶ () | | |
| | | 2 | 5h | SF ₆ | No 15 μ L/L |
| | | 3 | GIS | 24h | |
| | | 1 | SF ₆ | 20 | No GB7674 GB/T8905 SF6 |
| 3 | SF ₆ | 1 | 72.5kV | | |
| | | 2 | No | | 150 μ L/L |
| | | 3 | No | | 250 μ 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 | NoNo | | | | |
| | | | | | |

18 GIS HGIS GIL

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1 Z 2 3 1 Z /

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2MΩ

500V 1000V

↑

L

9

1 2kV

1min

~ 2500V

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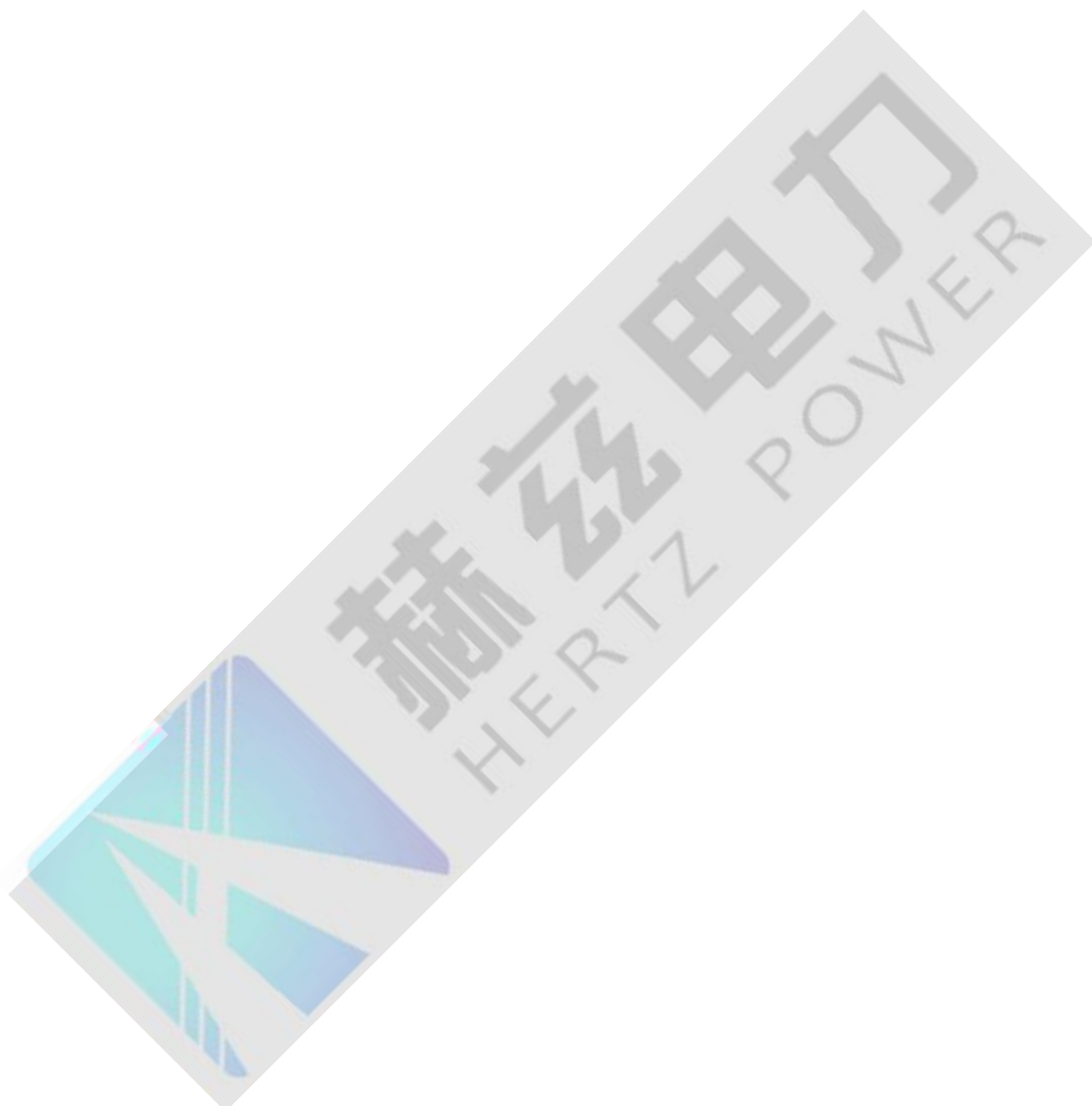
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18 GIS HGIS GIL

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GIS /

32 1 80% 110% Ne

1

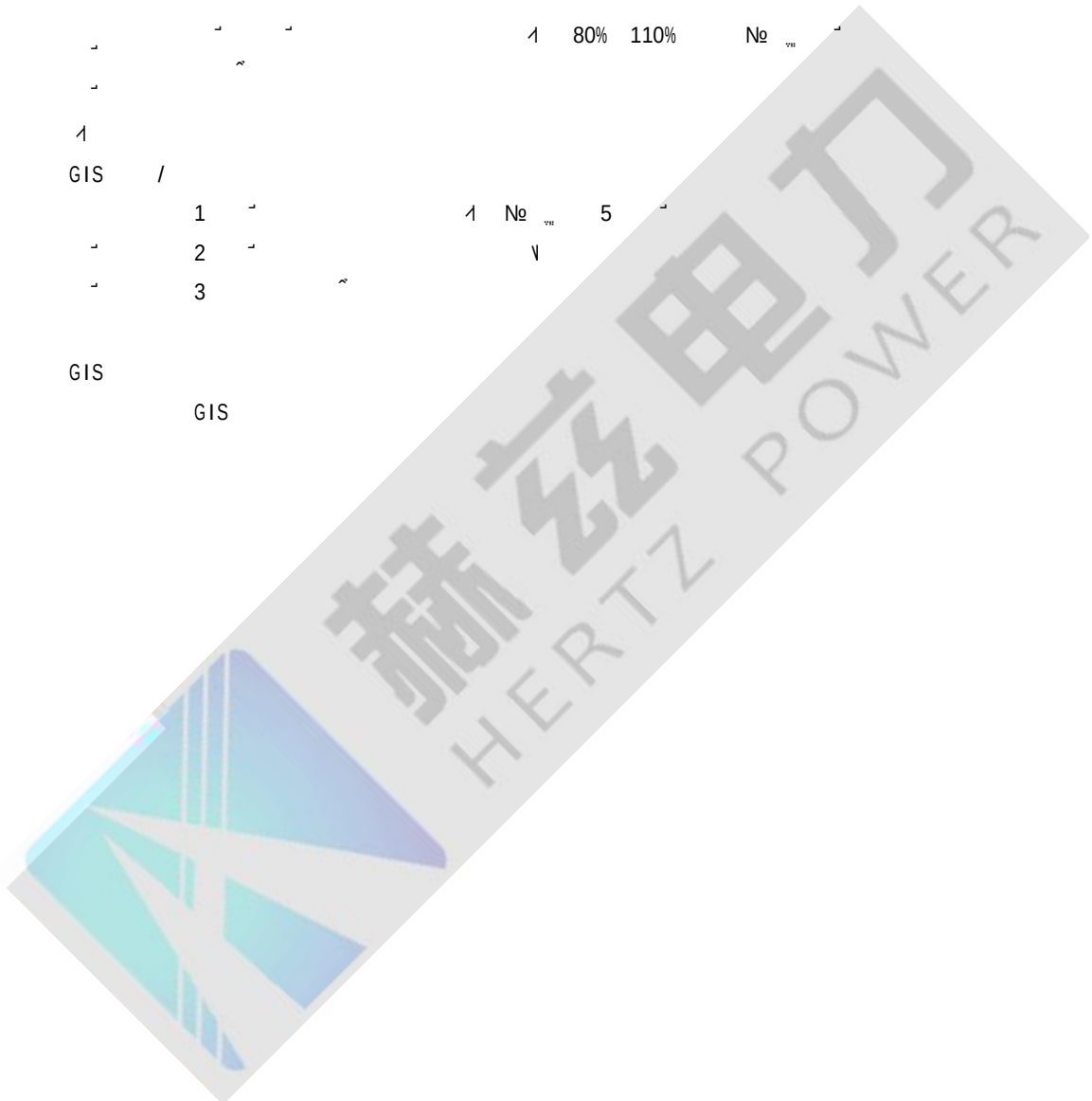
GIS /

1 1 Ne 5

33 1 2 3

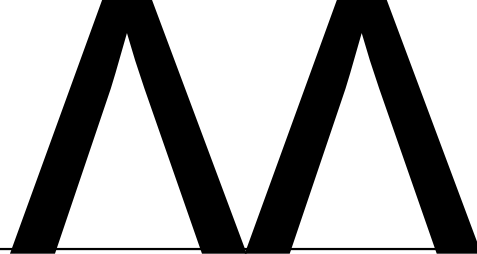
GIS

34 GIS



18 GIS HGIS GIL

≈ ≠



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18 GIS HGIS GIL

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3 No “ ” ≈

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46

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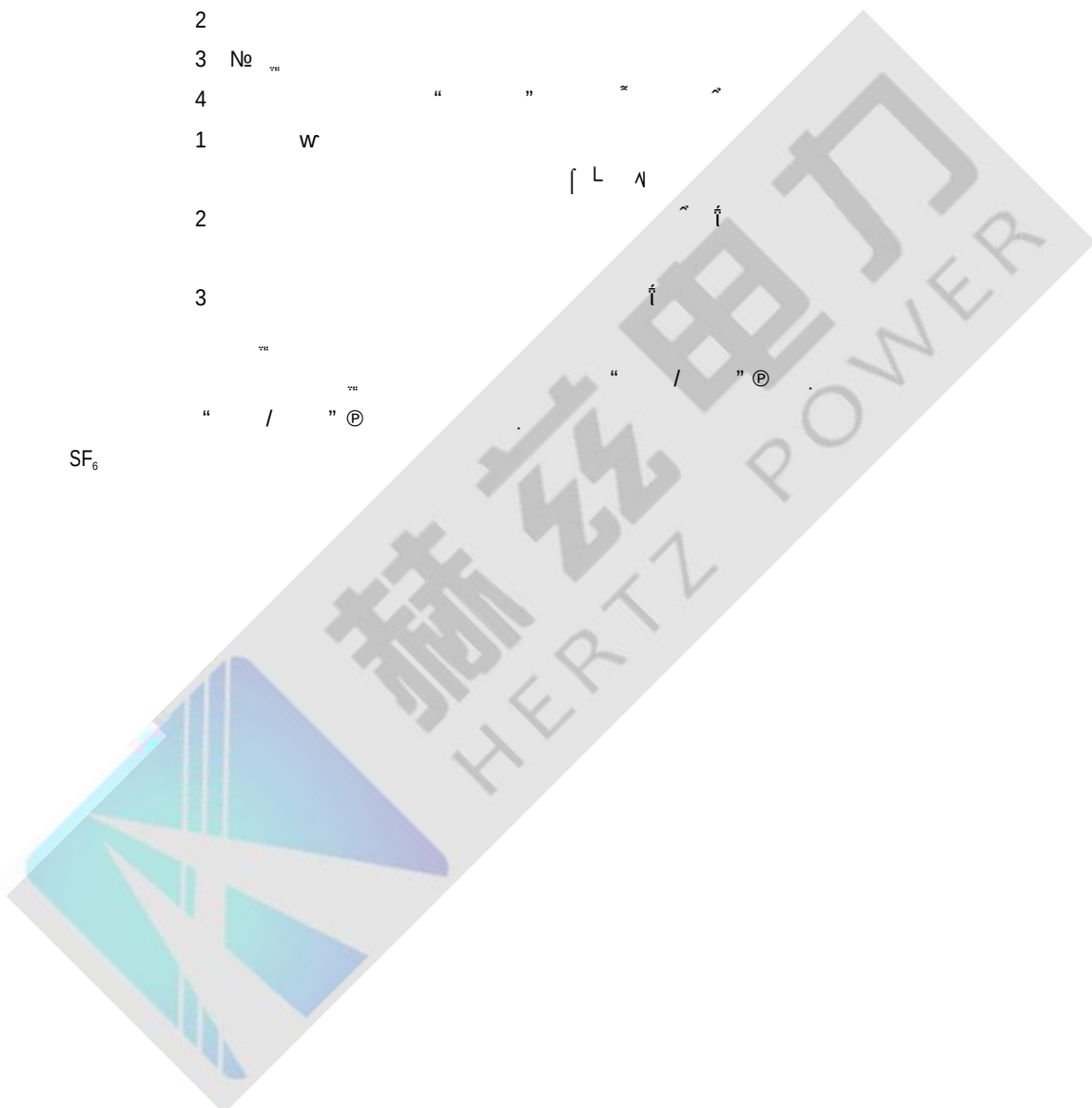
3 “ ”

47

“ / ” ⑤

SF₆

48



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|------|-----|-------------|---|------|---------|----|------|----|----|----|----|--|--|
| ~ | ≠ | | | | | | | | | | | | |
| 1 | | | 1 2500V
2 L 4 | | | | | | | | | | |
| 2 | | 1 | 1
2 ~ 1. | | | | | | | | | | |
| 3 | | ↑
L
1 | 1 2kV 1min | | ~ 2500V | | | | | | | | |
| 4 | | | 1 100A 1
2 | | | | | | | | | | |
| 5 | | 1 | 1 17 1
<table><tr><td>1 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> 2 o 1 o 1
3 1 † 1
4 1
5 № 1 | 1 kV | 7.2 | 12 | 40.5 | kV | 30 | 42 | 95 | | |
| 1 kV | 7.2 | 12 | 40.5 | | | | | | | | | | |
| kV | 30 | 42 | 95 | | | | | | | | | | |
| 6 | | No | 1 SF6
a 1 1 1
b № L 4
c -№ L 4
d L 43 № ↓
— 5ms
— № 3ms
2
a 1
b 40.5kV
2ms 40.5kV 3ms 3kA 1
10kV 2ms
c № 2ms
d | | | | | | | | | | |
| 7 | | No
1 | No 1 o 20% | | | | | | | | | | |
| 8 | | | 1 85% 110%
1 30% | | No
~ | | | | | | | | |



| 序 | 号 | 名称 | 规格 | 单位 | 数量 |
|----|---|-------------------------|--|----|--------------------|
| | | No. 1 | 2 No. 1 65% 110%
85% 110%
1 30% No. 1
3 80% 50kA 85%
4 L 1 | | 1 |
| 9 | | No. 1 | 1 1000V
2 No. 1 10MΩ
3 1 | | |
| 10 | | | | | |
| 11 | | SF ₆ | SF ₆ 20 No. 1
1 ≤ 150 μL/L
2 SF ₆ 24h | | SF ₆ |
| 12 | | SF ₆
NeNo | No. 1
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 | 1 1000MΩ
2 1 | | 2500V 1
1000V 1 |
| 15 | | 1 | 1 1 80% No. 1 TV
1 1 | | |

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2kV



| 序 | 号 | 名称 | 规格 | 单位 | 数量 |
|----|---|---|--|----------|---------|
| 25 | | | | | |
| 26 | | | 1000MΩ | | 2500V 1 |
| 27 | | 1mA
1 U _{1mA}
1 0.75U _{1mA} | 1 GB11032
2 U _{1mA} L 1
3 0.75U _{1mA}
4 | 50μA ±5% | |
| 28 | | 1 | | | |
| 29 | | | 1
2
3
4 | | |
| 30 | | | 1
2
3
4
5 | No | |
| 31 | | | 1
2
3
4
5 | No | |
| 32 | | No | No | No | |
| 33 | | | | | |

| | | | | | |
|----|---|---|---|---|--|
| ~ | ≠ | | | | |
| 34 | | | 1 ħ ħ
2
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| 35 | | √ | 1 L
2 L [√ | | |
| 36 | | √ | 1 √ ħ
2 √ √ ħ | | |
| 37 | | | 1 √ ħ
2 No √ | | |
| 38 | | √ | √ L √
o ħ ħ | | |
| 39 | | | 1 √ √
2 √ ħ √ ħ
3 √
4 √ √ √ z
5 √ | | |
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9 √ | / | |

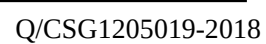
13

13.1



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| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-------|--|-------|------------------------------------|-------|-------|----|----|----|----|----|---|---|-------|-------|-------|-------|-------|-------|--|-----|-----|------|----|------|------|------|------|--|--|--|
| ~ | ≠ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | 2500MΩ | | 1
1000V
1
2500V
1
2 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | | GB/T 11024.1
1 3Mvar ± 5%
2 3Mvar 0~5%
3 1
4 1.08
1.02
5 | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | | | 1 1 1 kV
<table><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>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><td></td></tr><tr><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><td></td></tr></table>
2 75%
3 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 | | | 1 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | 1
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| 5 | $\bar{v}_1$ | | | |
| 6 | | | v_1 | |
| 7 | $\bar{v}_1$ | | | |
| 8 | | | $\bar{v}_1$ | $\bar{v}_1$ |
| 9 | $\bar{v}_1$ | | | v_1 |

22

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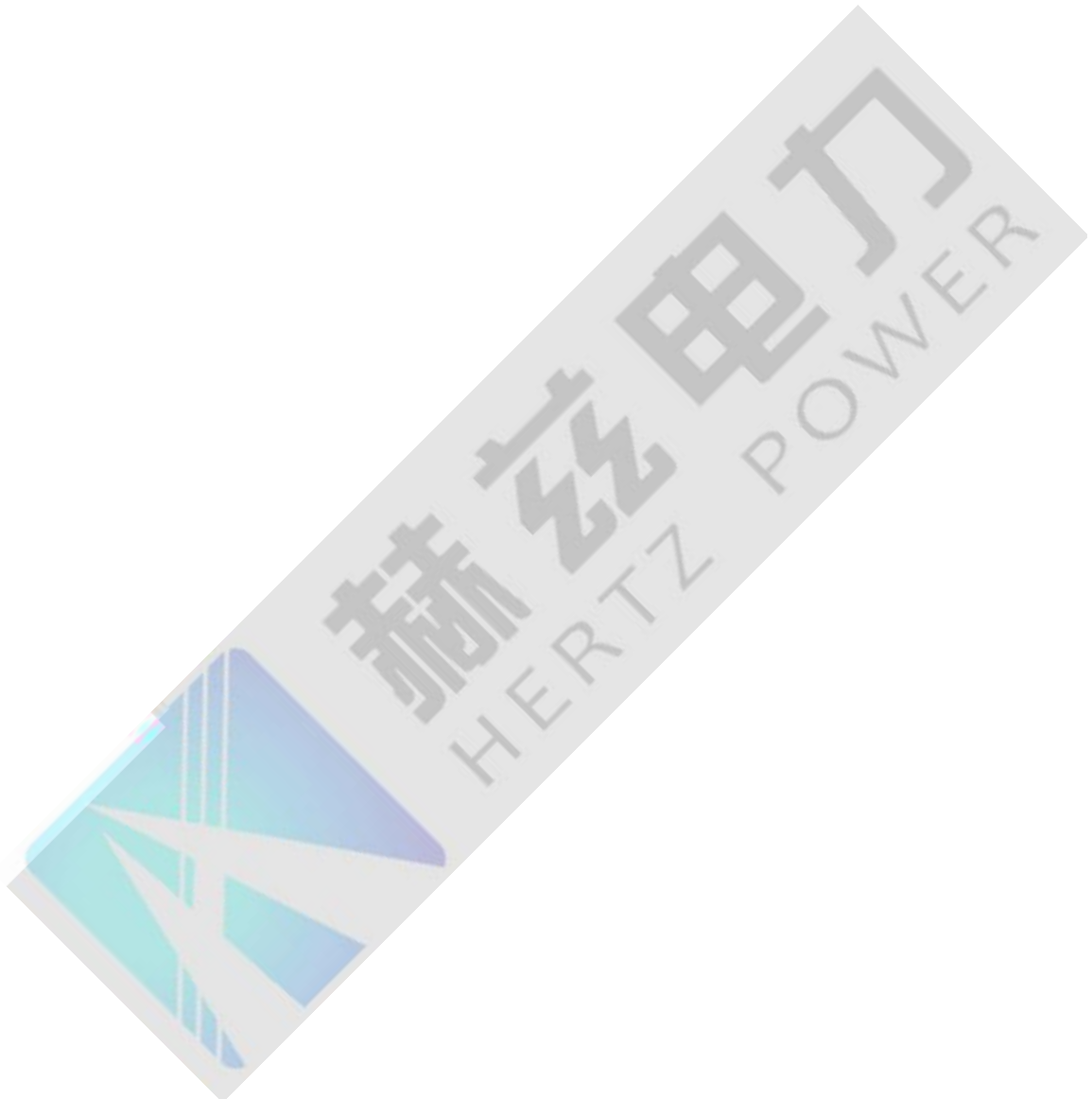
13.4

23

| ≈ | ≠ |
|---|-------|
| 1 | ≈ 20% |
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| 4 | ≈ |



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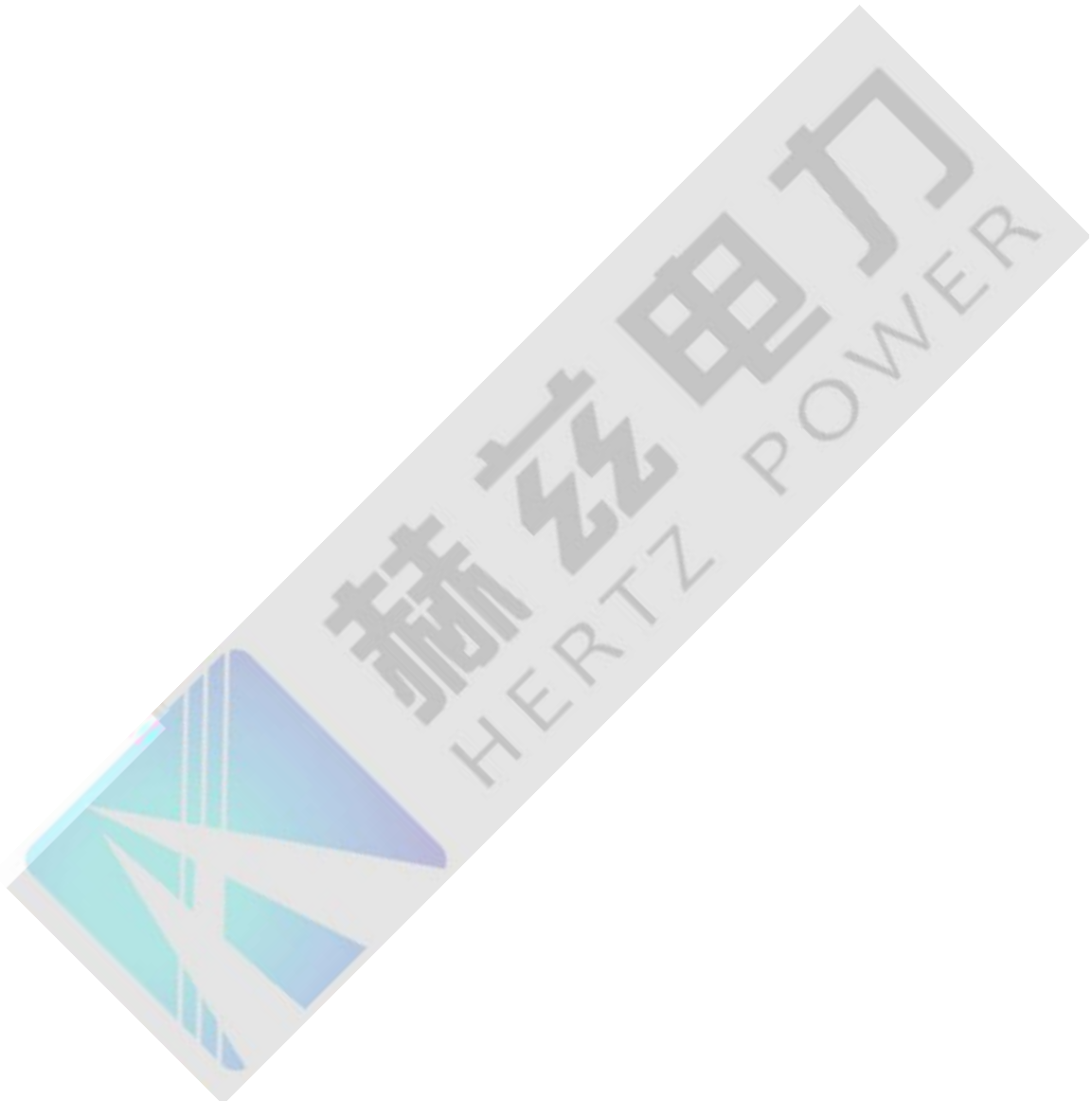
24 35kV

| | | | |
|---|---|---------------------------------------|--|
| 3 | № | 1
2
a
± 1%
b
c
± 1% | №
L
1
35kV
1
3
1
1
1
№
1
± 0.5%
№
1
1
%
1/10 |
| 4 | № | 1
2 | 1
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24 35kV



24 35kV

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24 35kV

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14.2 35kV

25 35kV

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25 35kV

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14.3 10kV

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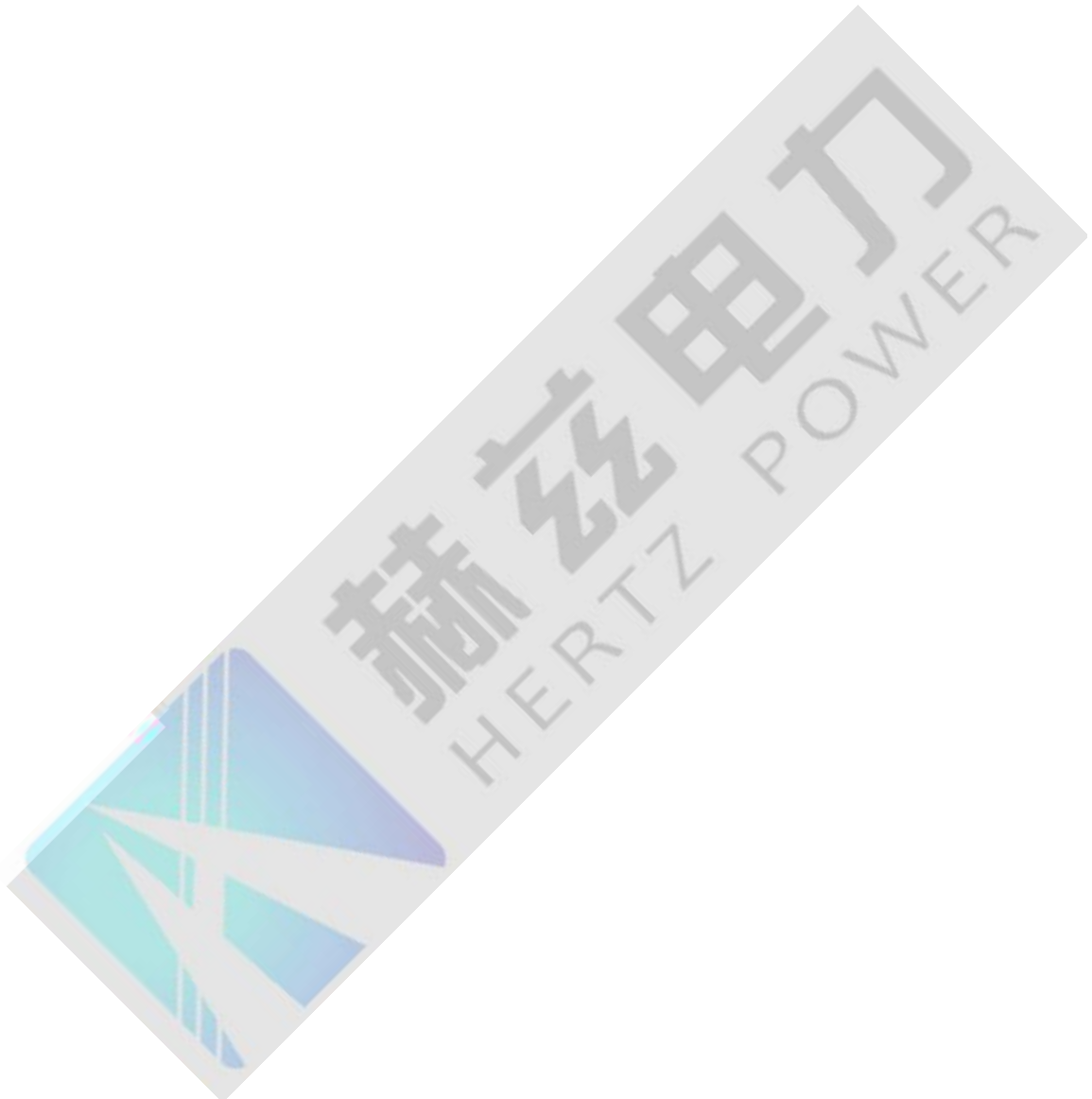
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1 $1.05U_{95}/\sqrt{3}$ 20pC

1 SF_6 250uL/L 24h

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SF_6

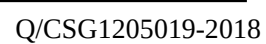
2 SF_6 1%

3 SF_6 24h
 $SF_6 \geq 99.9\%$ $CF_4 \leq 0.01\%$ Air $\leq 0.03\%$

7

SF_6

8



17

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|------|------|------|------|
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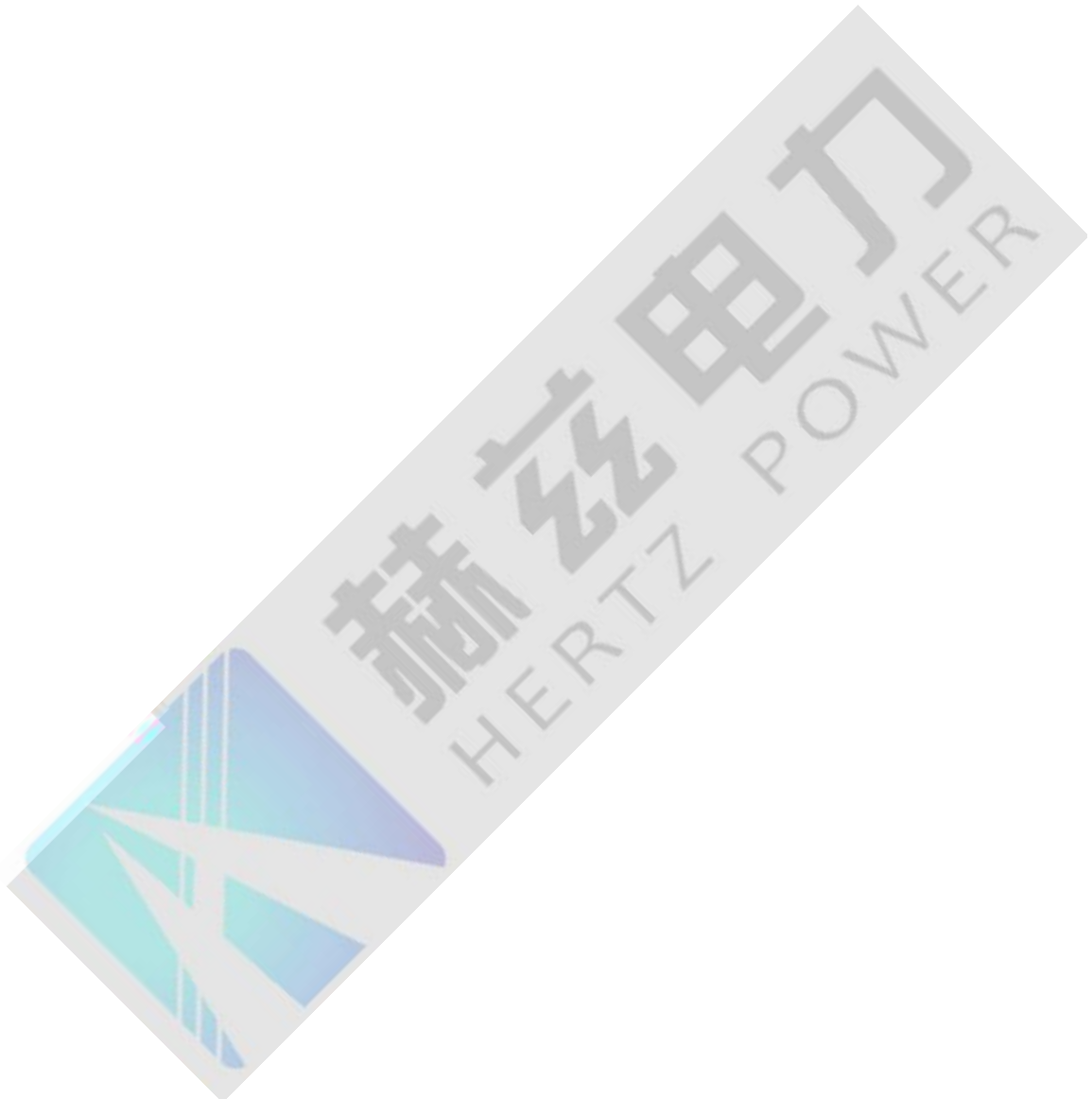
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$$I \text{ ———}$$
$$Z \text{ ———}$$

$$I > 4000 A$$
$$\frac{Z}{I}$$

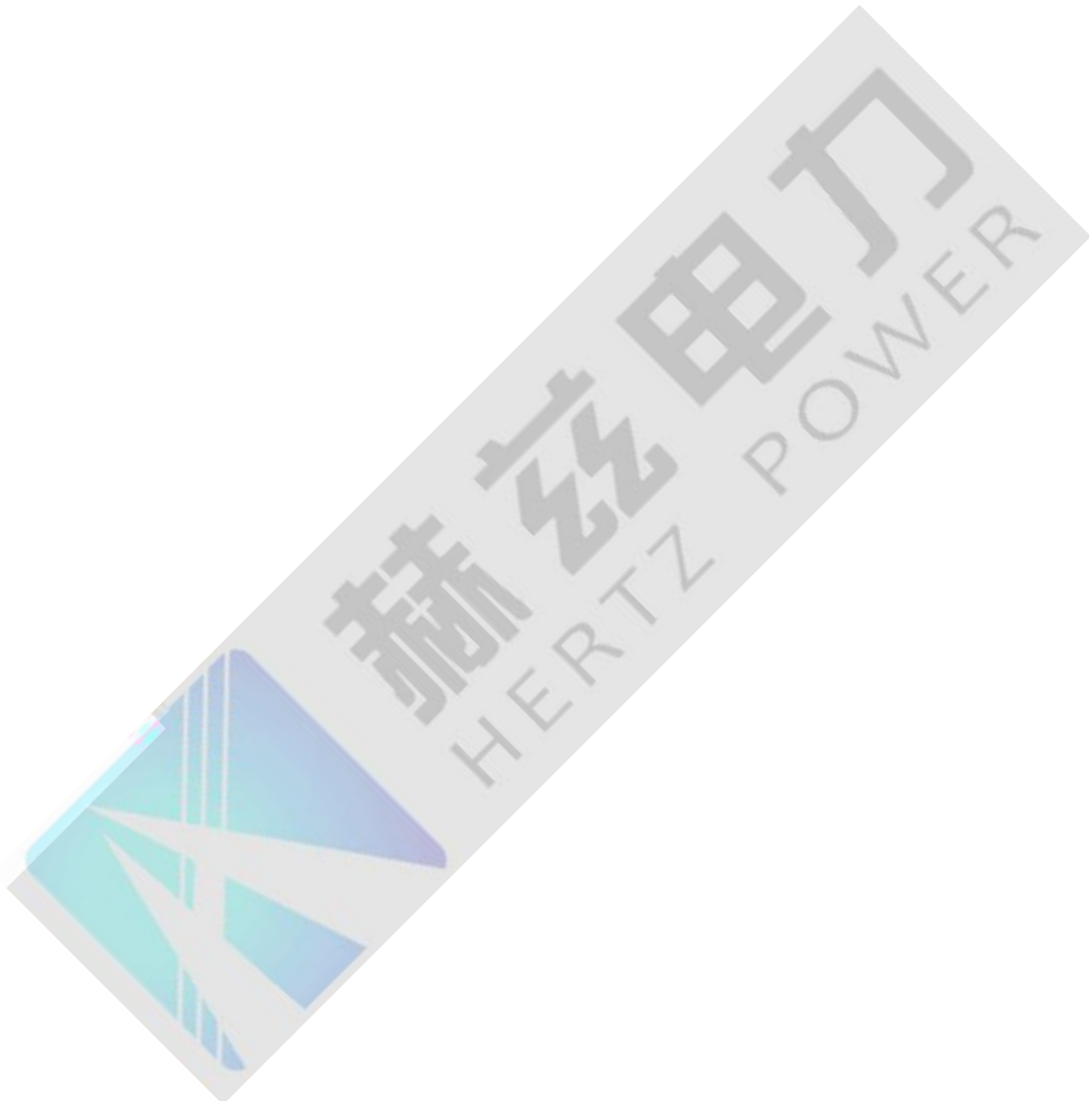
$$Z \leq 0.5 \Omega$$
$$A$$
$$\Omega$$

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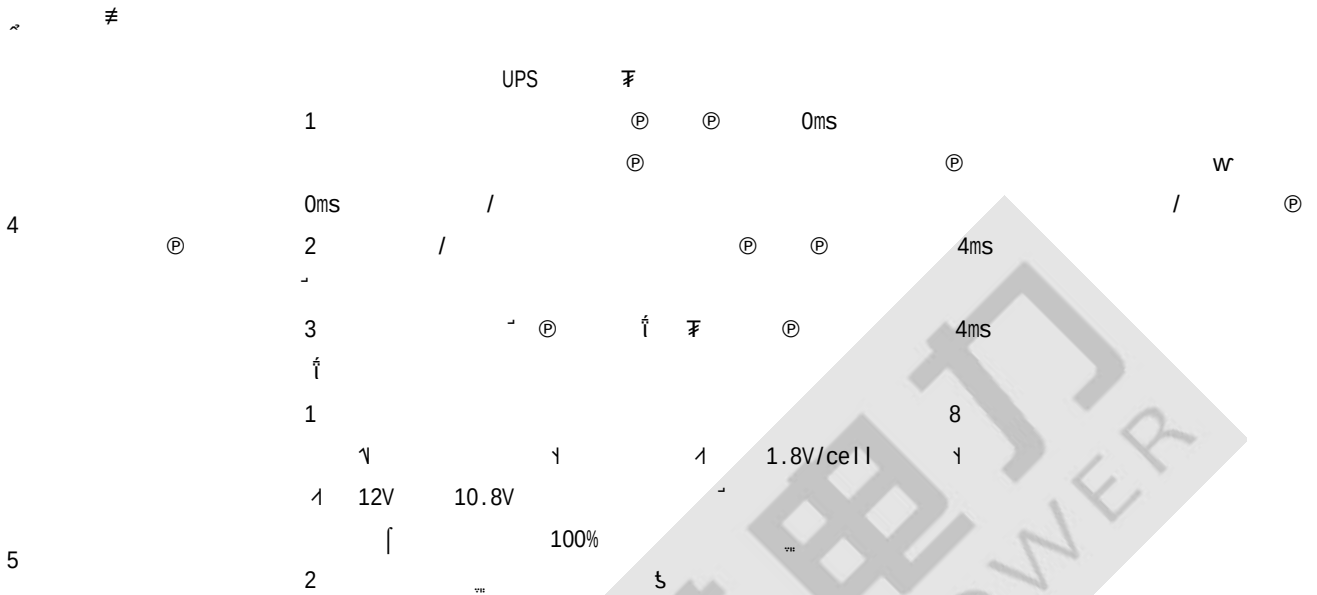
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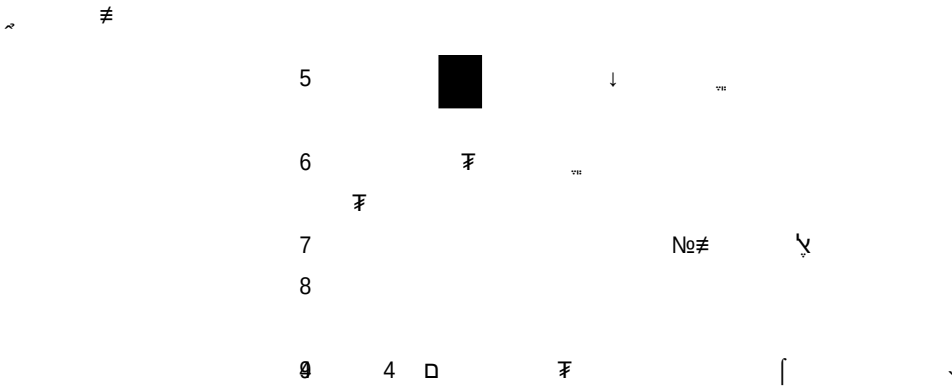
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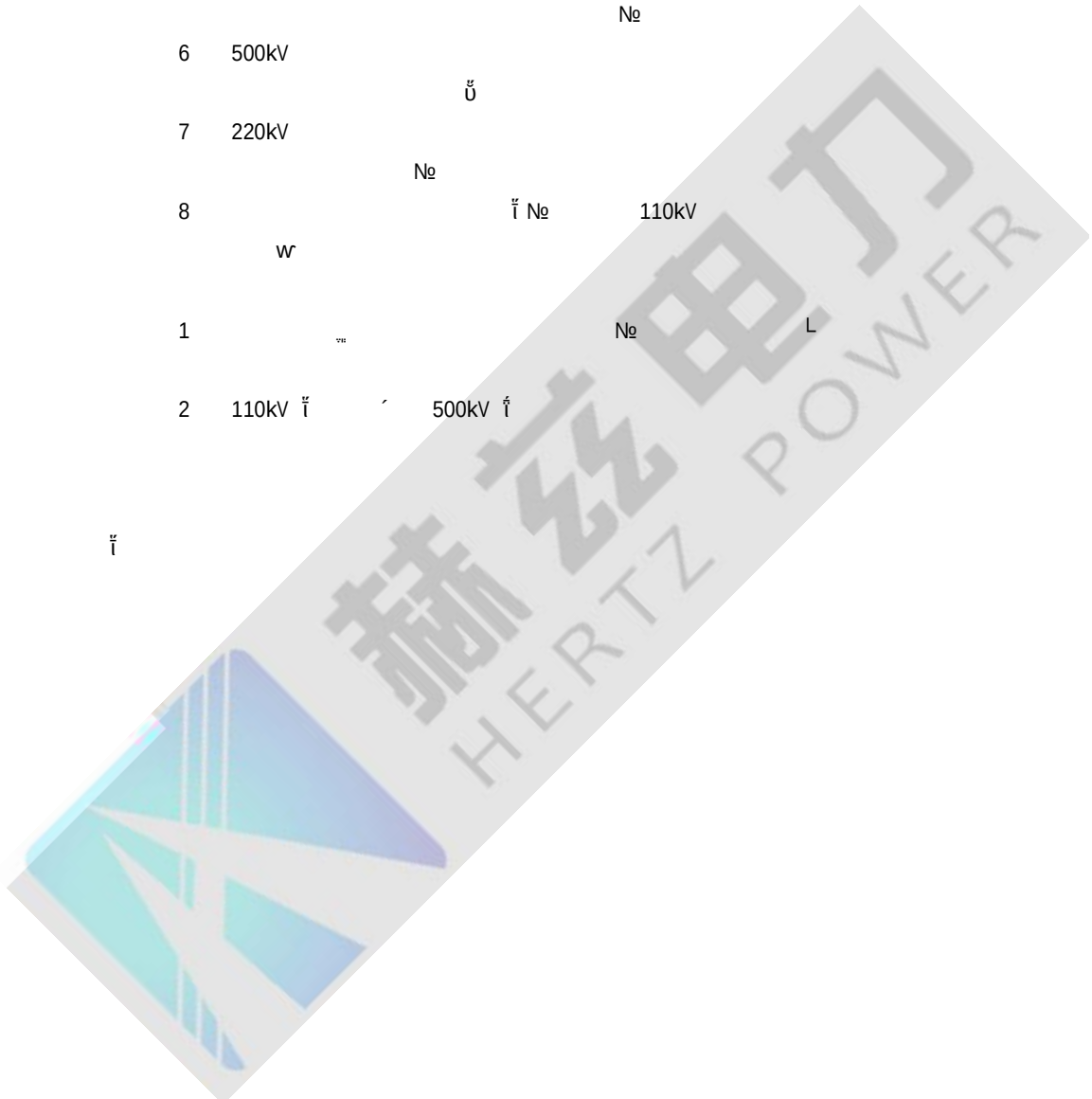
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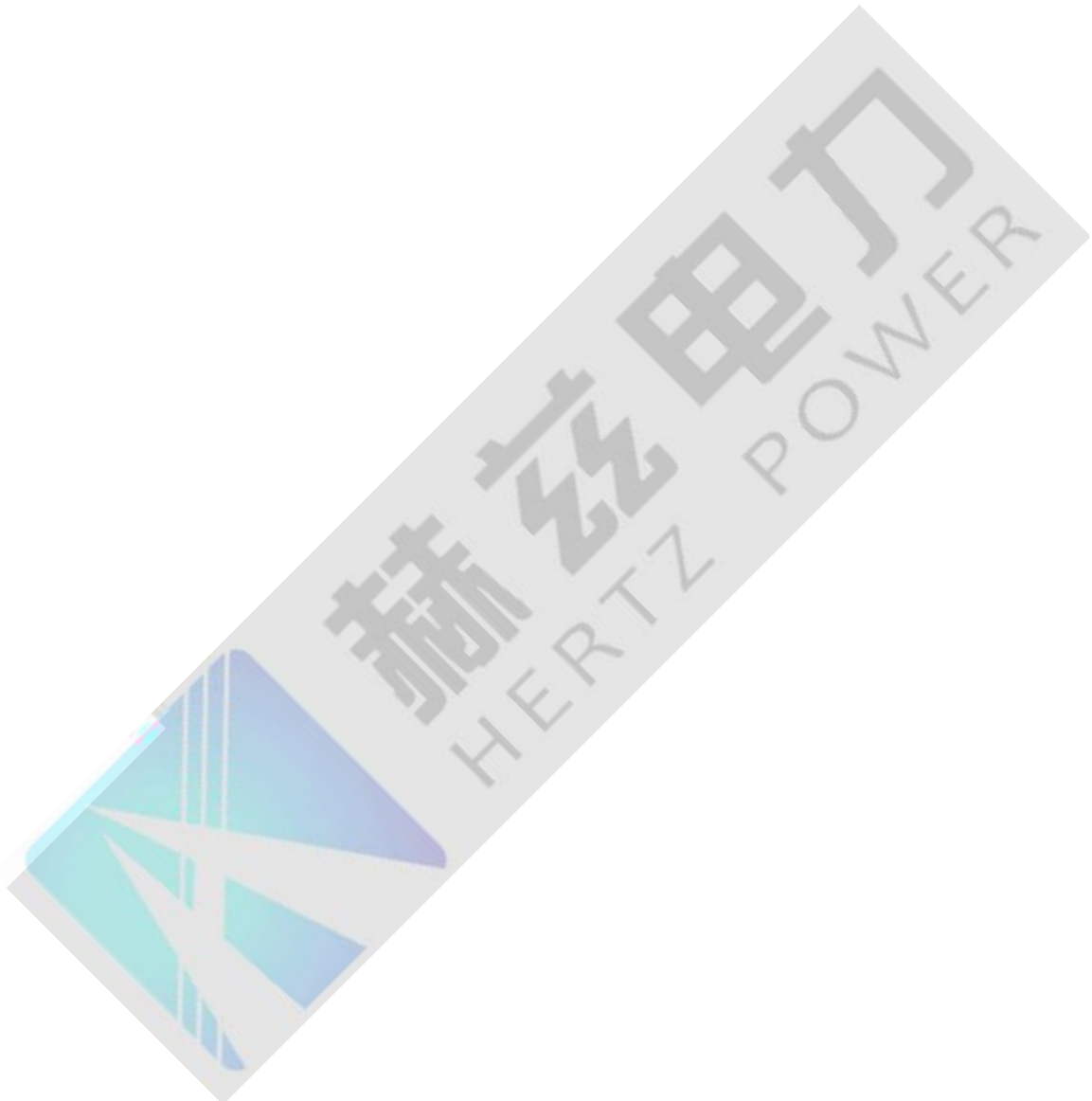
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| | | | <p>o 1.1m ± 20mm</p> <p>140mm 100mm 5mm</p> <p>3mm</p> <p>3)</p> <p>a) i</p> <p>b) 1</p> <p>c) o 1</p> <p>24h</p> <p>1 1 z 10min 1 z</p> <p>d)</p> <p>e)</p> <p>f)</p> <table><tr><td></td><td></td><td>mm</td></tr><tr><td></td><td></td><td>15</td></tr><tr><td></td><td></td><td>5</td></tr><tr><td></td><td></td><td>0.1</td></tr><tr><td>1</td><td></td><td>0.1</td></tr></table> <p>4 i</p> <p>a) i</p> <p>b) 4m o 1</p> <p>c) 300mrn 1</p> <p>d) 2m</p> <p>e) 90 ° 300mm</p> <p>f) 1m 3mm, 5m 10mm</p> <p>1m 3mm, 5m 15mm</p> <p>5 i</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 1</p> | | | mm | | | 15 | | | 5 | | | 0.1 | 1 | | 0.1 | | |
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Figure 1 consists of four schematic diagrams labeled 1, 2, 3, and 4, illustrating the experimental setup for different conditions. Each diagram shows a top-down view of a subject's head and the positions of various stimuli.

- Condition 1:** Shows a subject looking at a screen. A fixation point is marked with a cross. A target is marked with a cross. A distance of 10m is indicated between the fixation point and the target.
- Condition 2:** Shows a subject looking at a screen. A fixation point is marked with a cross. A target is marked with a cross. A distance of -10mm is indicated between the fixation point and the target.
- Condition 3:** Shows a subject looking at a screen. A fixation point is marked with a cross. A target is marked with a cross. A distance of -10mm is indicated between the fixation point and the target.
- Condition 4:** Shows a subject looking at a screen. A fixation point is marked with a cross. A target is marked with a cross. A distance of 10m and 20mm is indicated between the fixation point and the target.



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| | | | 7 | <table><tr><td colspan="2"></td><td>mm</td></tr><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="2"></td><td></td><td>± 2</td></tr><tr><td></td><td>+20 0</td></tr><tr><td rowspan="4"></td><td></td><td>5</td></tr><tr><td></td><td>10</td></tr><tr><td></td><td>+20 0</td></tr><tr><td></td><td>+20 0</td></tr><tr><td colspan="2"></td><td>≤ h/1200 ≤ 20.0</td></tr></table> <p>h</p> | | | mm | | | 20 | | | ± 20 | | | 5 | | 10 | | | ± 2 | | +20 0 | | | 5 | | 10 | | +20 0 | | +20 0 | | | ≤ h/1200 ≤ 20.0 | | |
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| 3 | | | 1 | <p>a) 500mm</p> <p>b) 700mm</p> <p>c) 450mm</p> <p>d) 250mm 450mm 350mm</p> <p>e) 1.5 0.6MPa</p> <p>1 z 10min 1 z 0.05MPa 1 z</p> <p>1 z 0.05MPa 1 z 1 z 1 z</p> <p>f) 0.05MPa</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 2 | <p>a) 1.5 0.6MPa</p> <p>1 z 10min 1 z 0.05MPa 1 z 1 z</p> <p>b) ;</p> <p>c) ;</p> <p>d) ± 20mm;</p> <p>f) 1 z</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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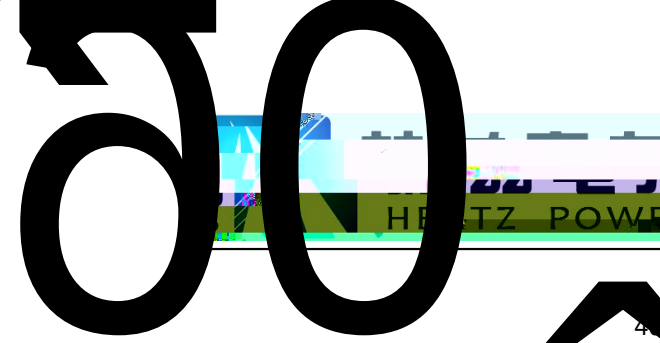
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d) 15mm 0.5m
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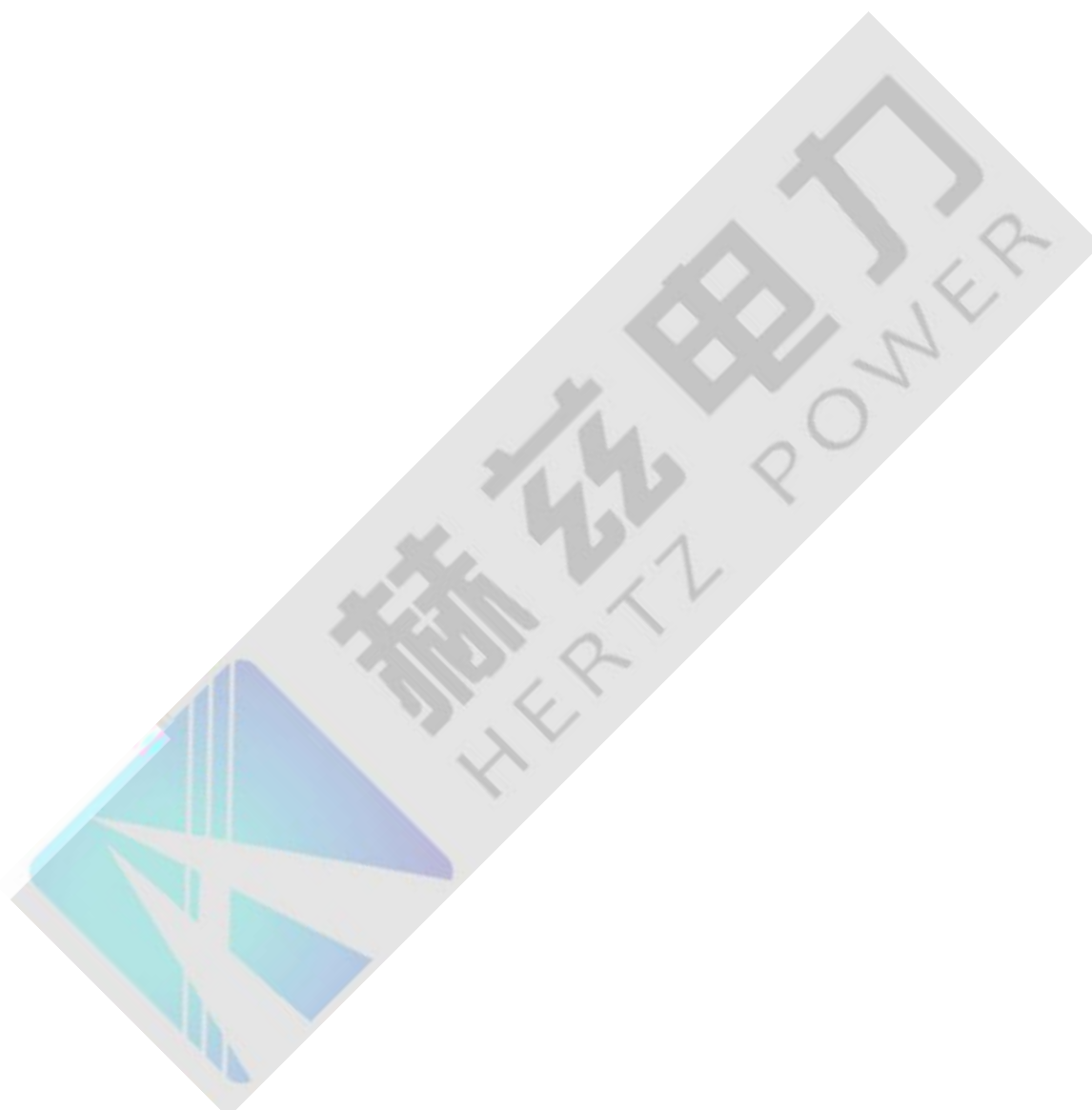


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HERTZ POWER

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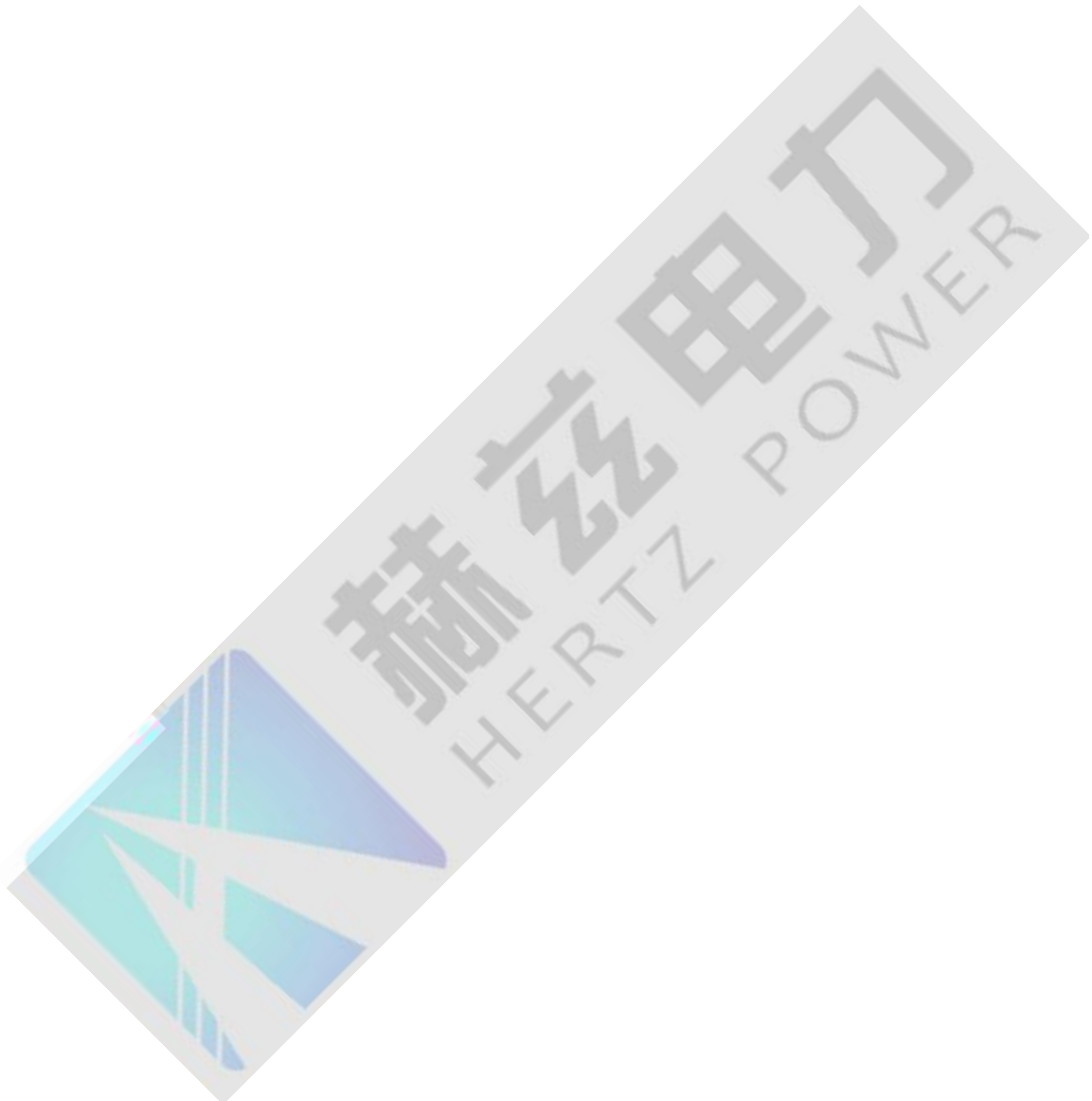
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0.6% Ĩ

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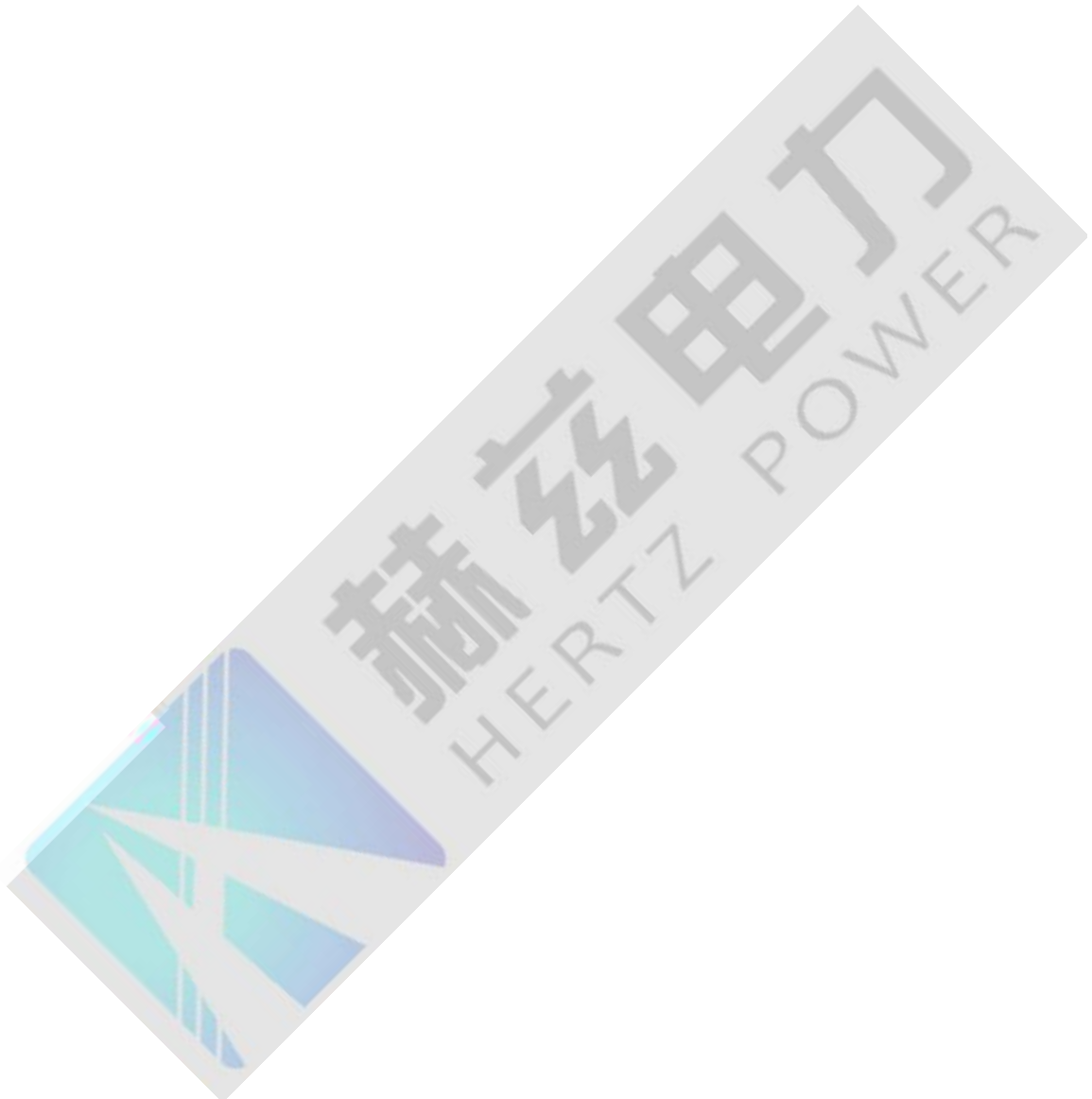
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| 2 | | ĩ | <div><div>1</div><div>≥ 75 ° /s</div><div>≥ 50 ° /s</div><div>≥ 704 × 576</div><div>≥ 50m</div><div>≥ 2048 × 1536</div><div>2</div><div>3</div><div>4</div><div>5</div><div>0.7</div><div>0.5</div></div> | | <div><div>1</div><div>≠</div><div>≈</div><div>5</div></div> |

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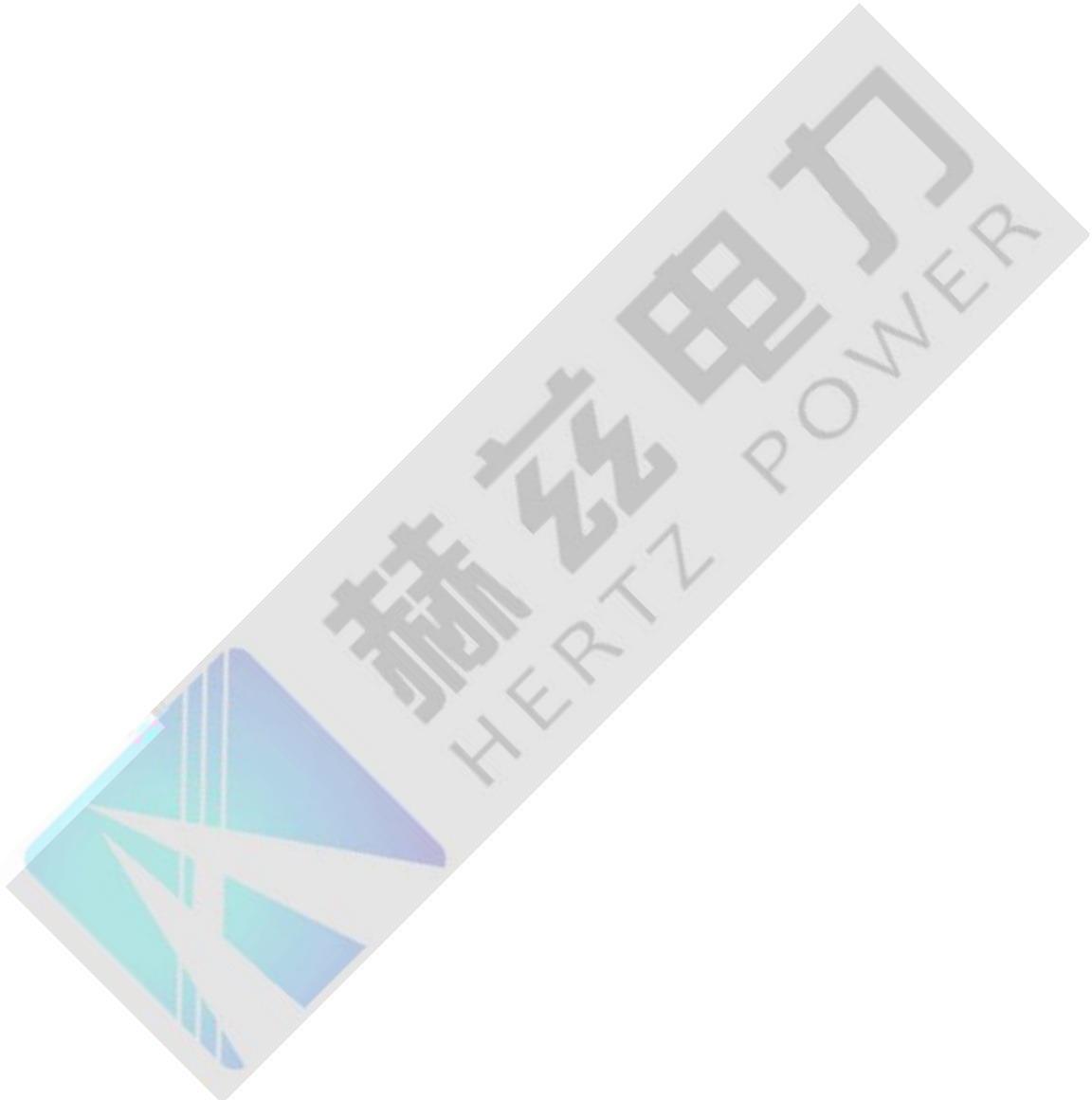
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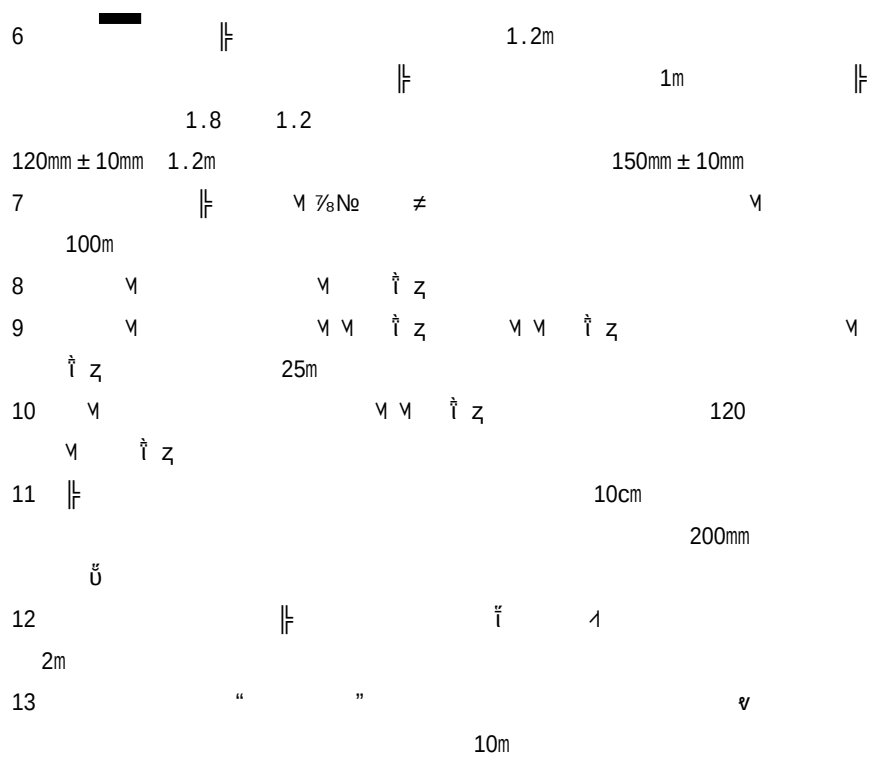
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| 330kV | 1 | 9 | 5 |
| 500kV | 1 | 9 | 5 |

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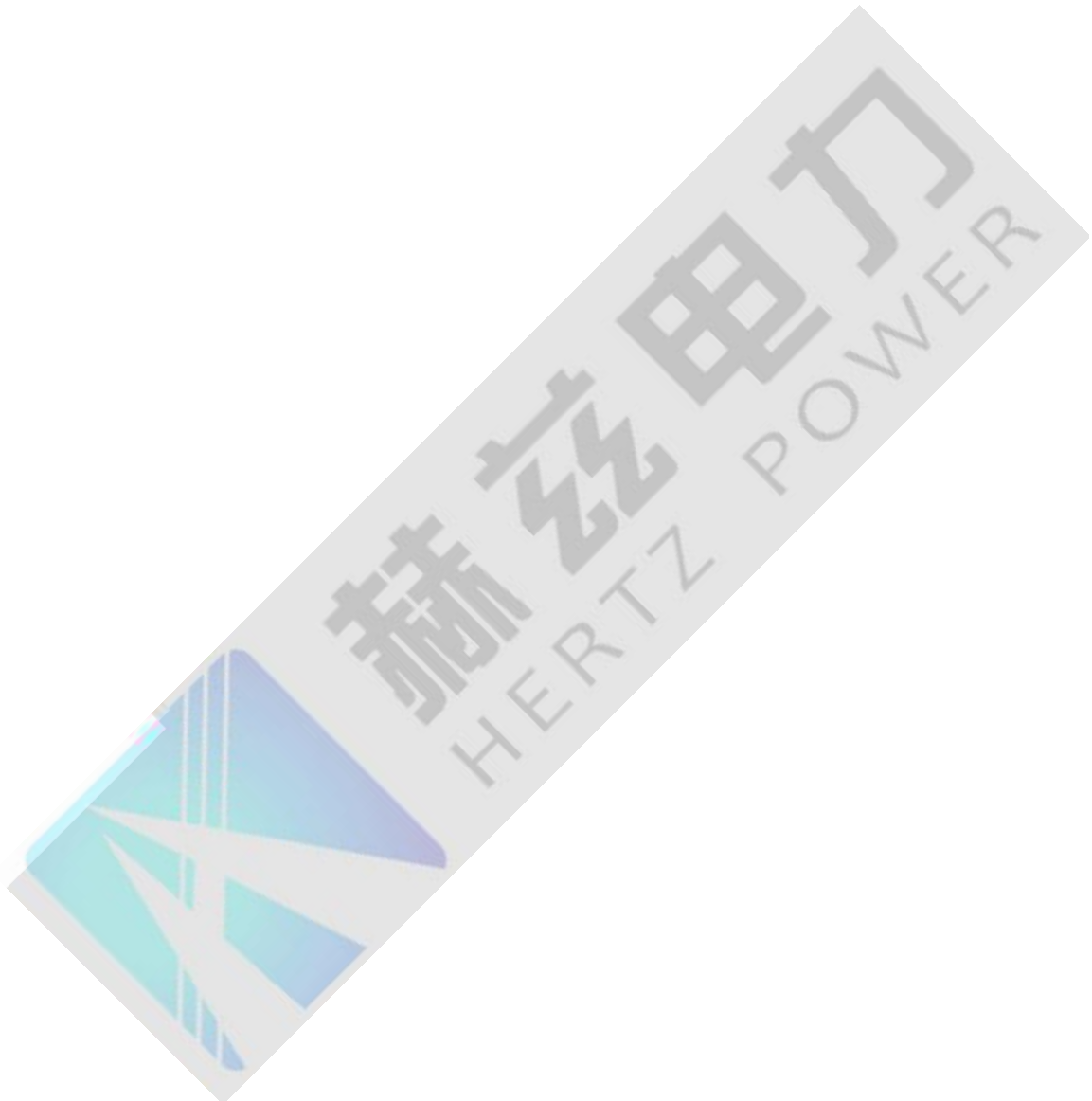
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| 1 | | | |
| 2 | PH | >5.4 | GB/T 7598 1 |
| 3 | KOH
mg/g | ≤ 0.03 | GB/T 264 |
| 4 | o | ≥ 135 | GB 261 - o |
| 5 | mg/L | 500kV ≤ 10
220kV ≤ 15
110kV 1 ≤ 20 | GB/T7600 1 1 No
GB/T 7601 1 1 No |
| 6 | 25 Z
mN/m | ≥ 40 | GB 50150 |
| 7 | tan δ % | 90
500kV ≤ 0.5
220kV 1 ≤ 1.0 | GB/T 5654 |
| 8 | Dp 1 kV | 500kV ≥ 65
110kV~220kV ≥ 45
35kV 1 ≥ 40 | 1. GB/T 507 Dp 1
2. ~ α DL/T
429.9 Z |
| 9 | 90 Ω•m | ≥ 6 × 10 ¹⁰ | GB/T 5654
DL/T 421 Z |
| 10 | No % | 500kV ≤ 1.0 | DL/T 423 1
DL/T 703
500kV 1 |
| 11 | % No | ≤ 0.02 | GB/T 511 1 v 1 |
| 12 | No No | | GB/T 17623 No
DL/T 722 1 1 No ∞ t
1 DL/T 722 1 1 No ∞ t |
| 13 | 1 | 500kV 1 1
100mL
5um ≤ 2000 | DL/T 1096 1 1 |

A.2

A.2

A.2

| | |
|---------|---------------------------------|
| ≠ | |
| D_p 1 | 1. 6kV Ⅰ
2. ↓
1 35kV
2 |
| . № | Ⅰ 1 A-1 2 ~ 9 |
| № | A-1 |

| | |
|-----------------------------|---|
| | ű |
| ² 1 | 1 |
| 2 40 | 2 |
| 41 70 | 3 |
| 2005-10-90, v
2006-10-90 | 4 |
| 1 100 3 | |
| 2 SF ₆ 24h ~ | |

[illegible]

B.2 SF₆

C