

Q / CSG

Q/CSG1205019-2018

1

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11 GIS HGIS GIL

12

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14

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18

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20

21

22 1KV

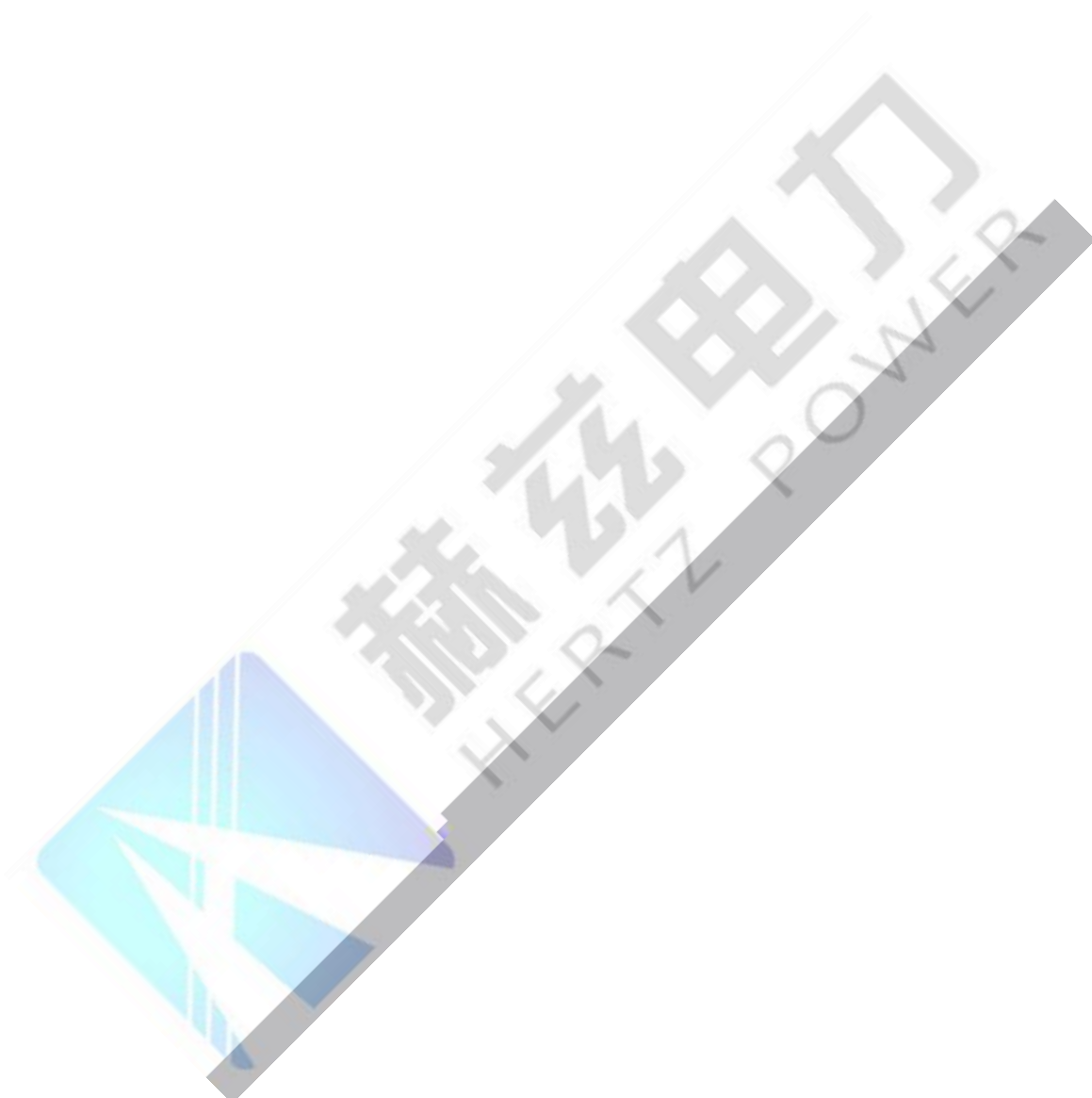
23 1KV

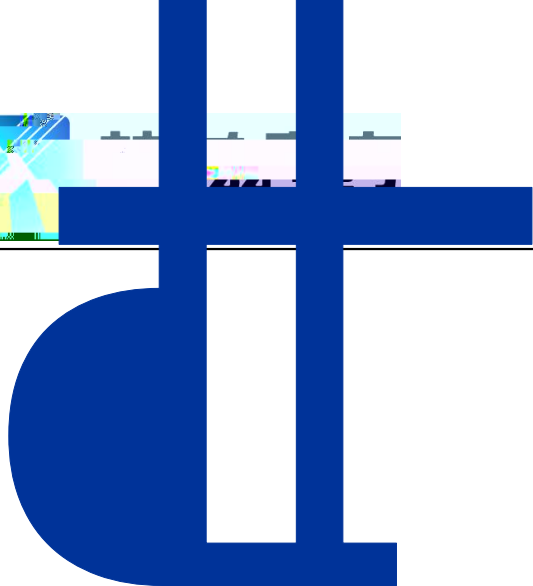
24

A

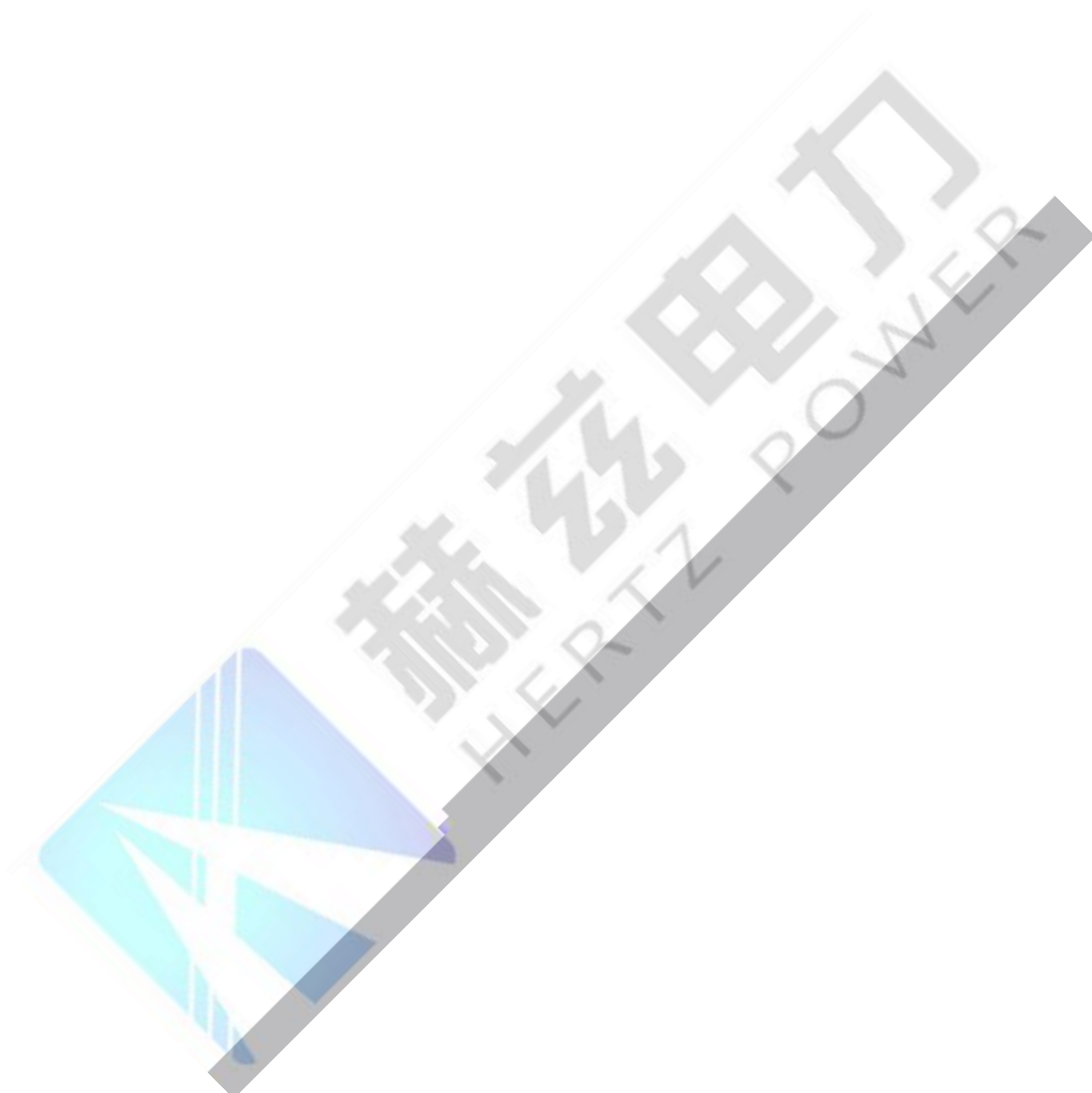
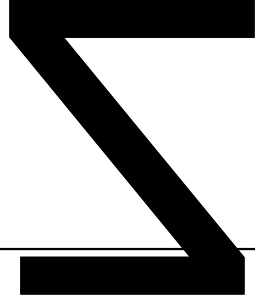
B SF₆

C





*ZJ f)^p T8rv," ¶

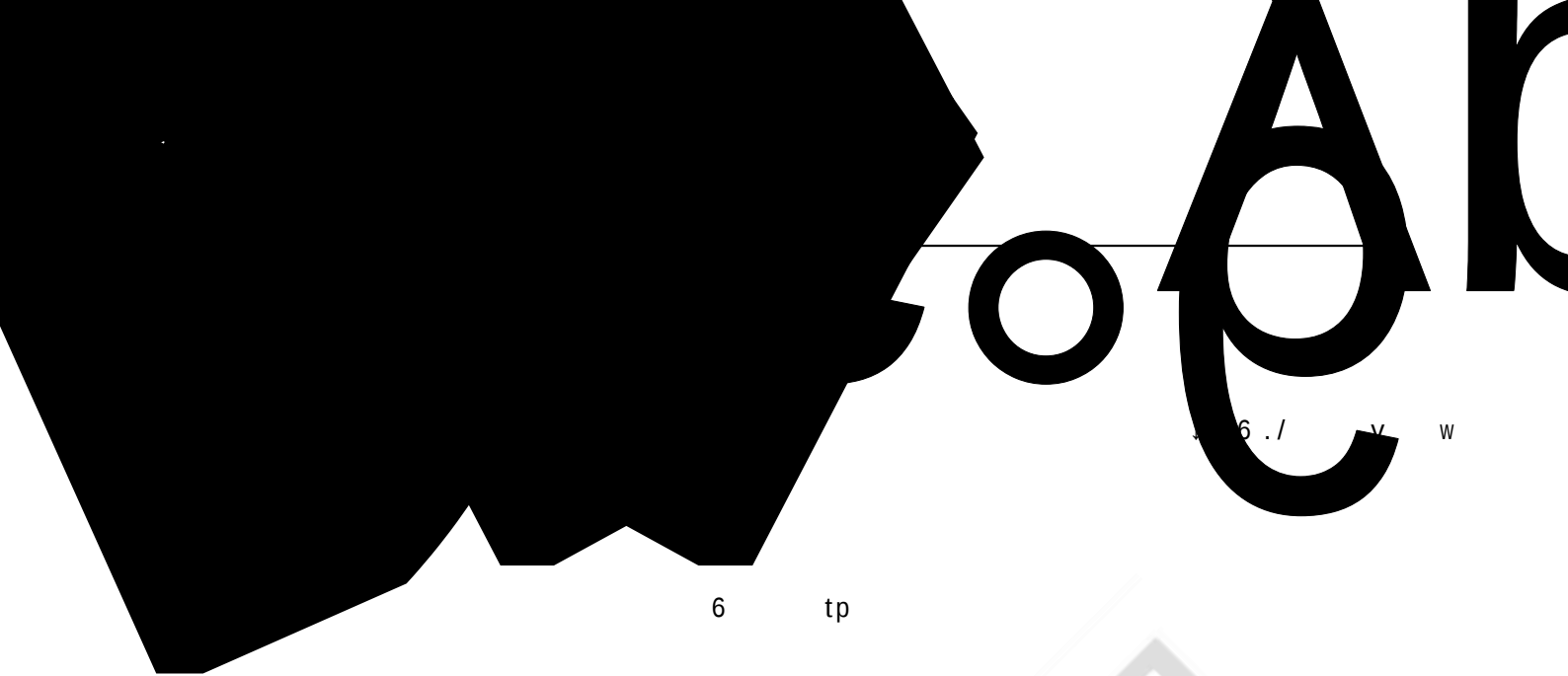


3

3.1

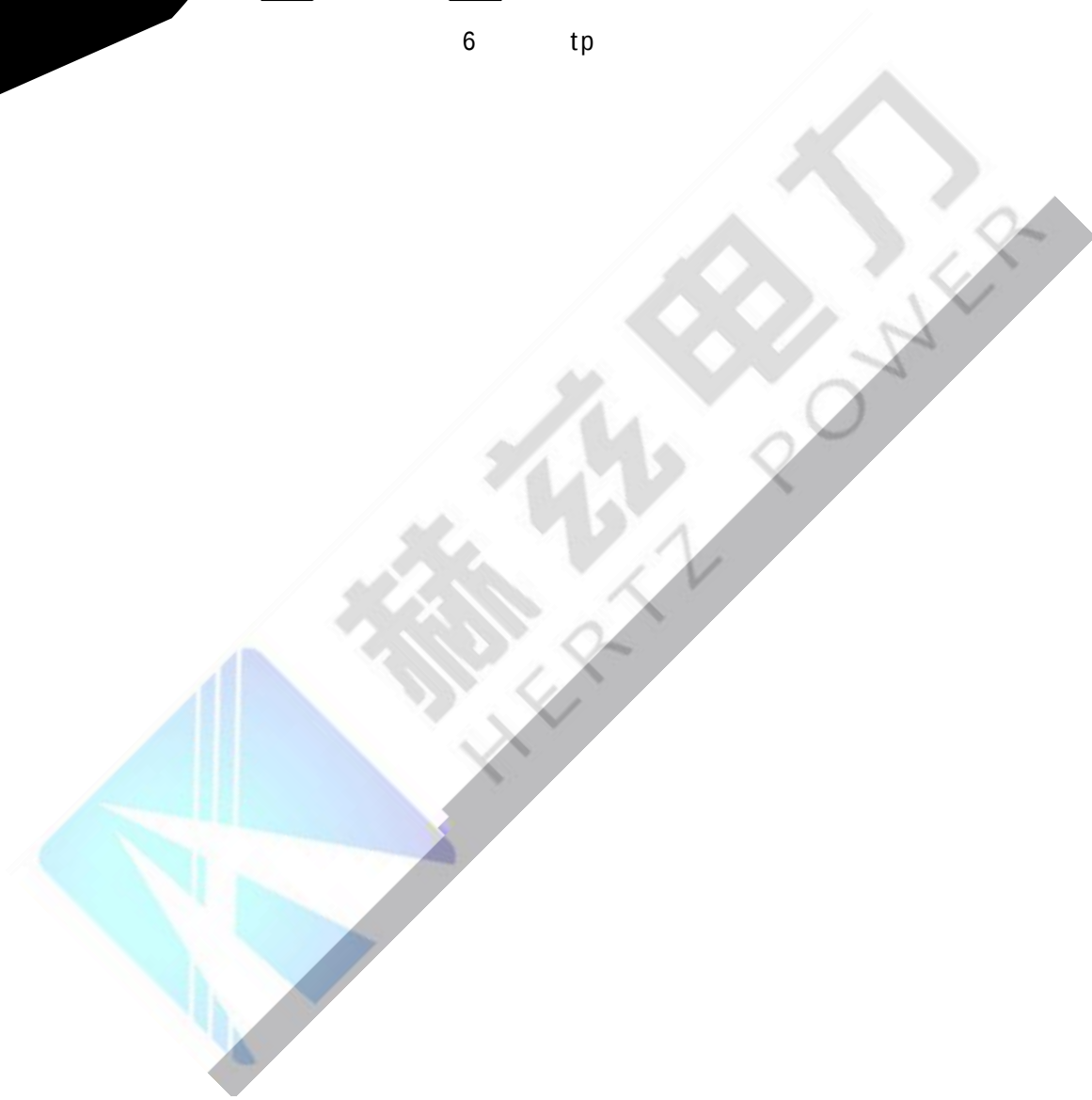
3.2

3.3



6 . / v w

6 tp



3.13

3.14

Symbol				
U_n				
U_m				
U_o/U	(	U_o		U
)				
U_{ImA}		ImA		
$\tan \delta$				
RTV			Room temperature vulcanized silicone rubber	
anti-pollution coating	RTV	DL/T 627	RTV-	RTV-
4				

4.1

4.2

4.3

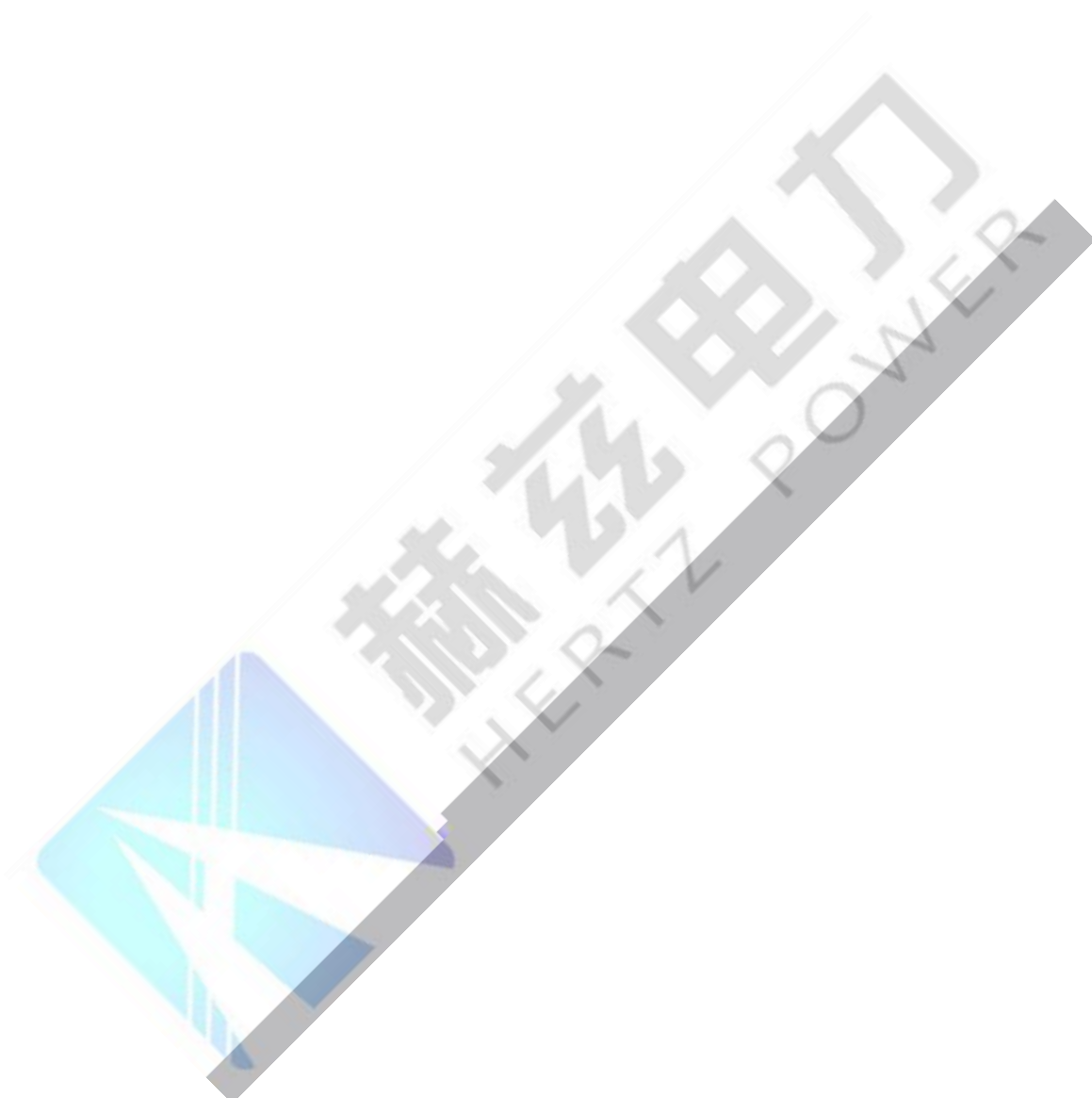
4.4

4.5

4.6

4.7

4.8



2mA

1

	V	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

2

2

kV	110 66	220	500
h	≥ 24	≥ 48	≥ 72

4.21

1

2

3

4

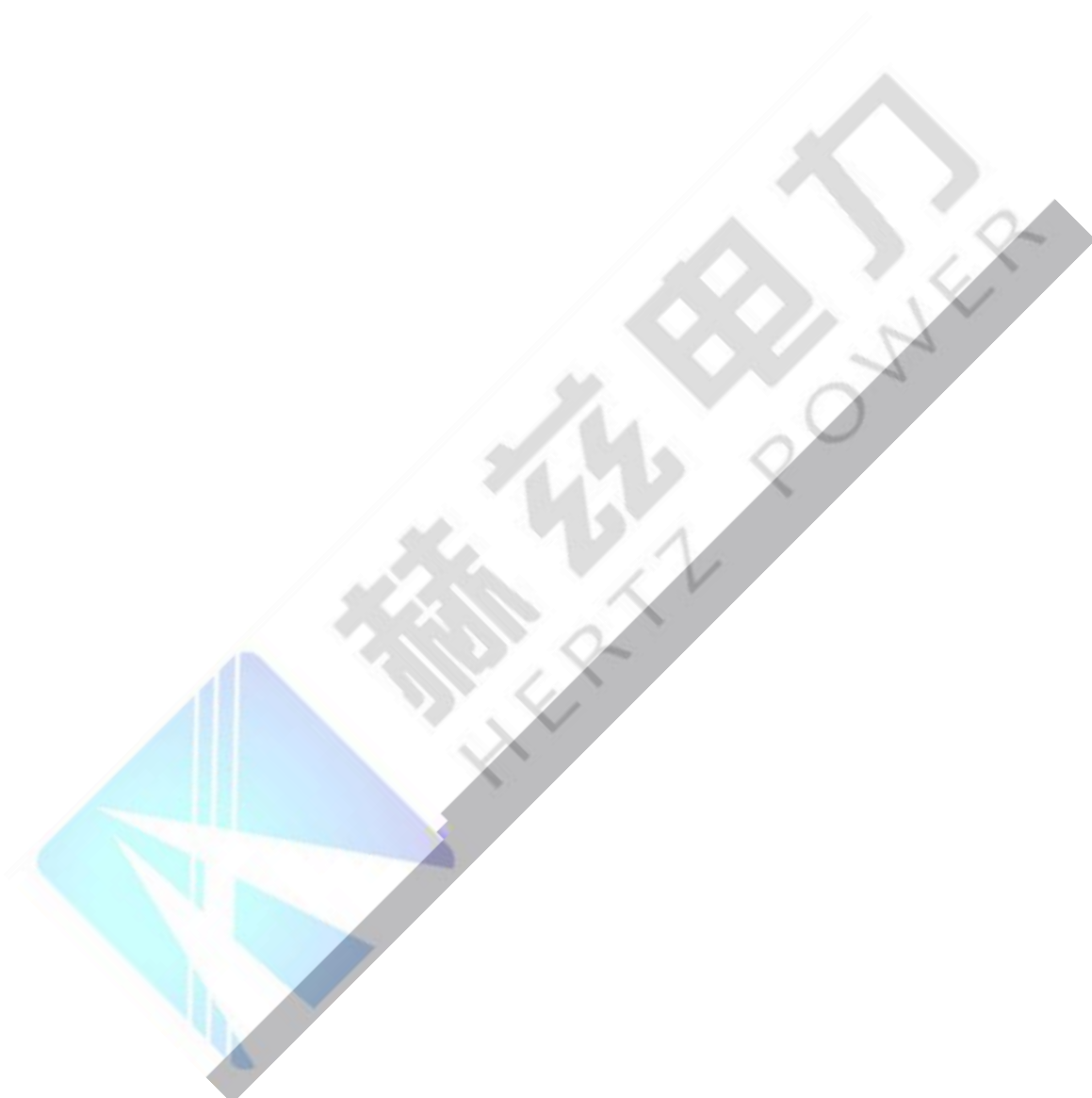
5

5

5.1

3

1			1 a b	pH >5.4	





3

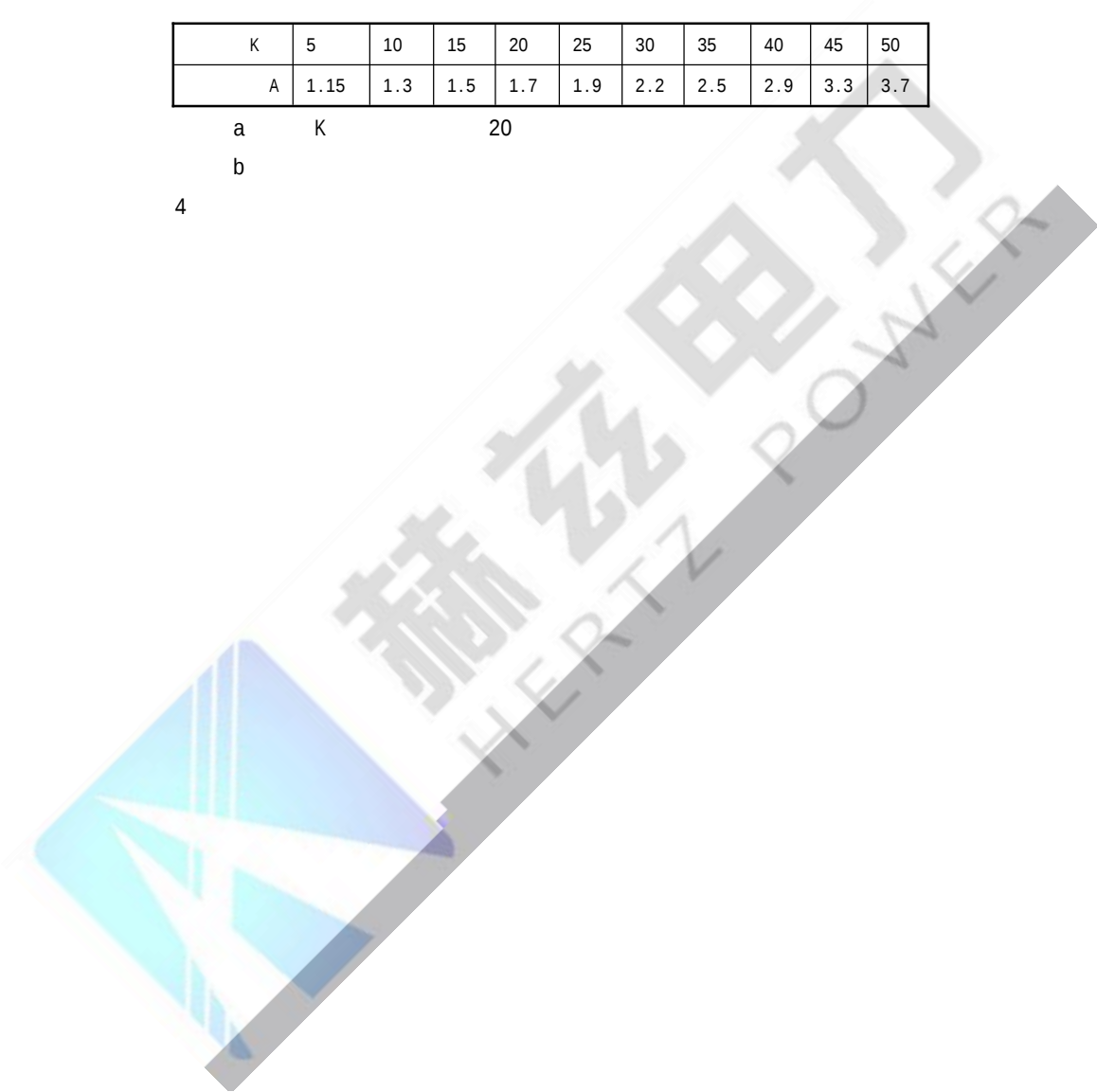
2. 5. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78.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

$\tan \delta$ 3 50

| | | | | | | | | | | |
|---|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 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



3

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

4 1.5Um/√3 66kV
100pC 66kV 300pC

5
110kV

11

n

1
2

12

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

13

1 10000MΩ
2 1000MΩ 1000MΩ
tan δ 2%

1

1 10 tan δ

tan δ

2

20kV

14

| tan δ % | |
|----------|-----|
| tan δ % | |
| 0.4 | |
| 0.5 | |
| 1.0 35kV | 1.5 |
| 0.5 | |
| 0.5 | |
| 1. 5 | |
| 0.5 | |
| 0.5 | |
| | |
| | |

2

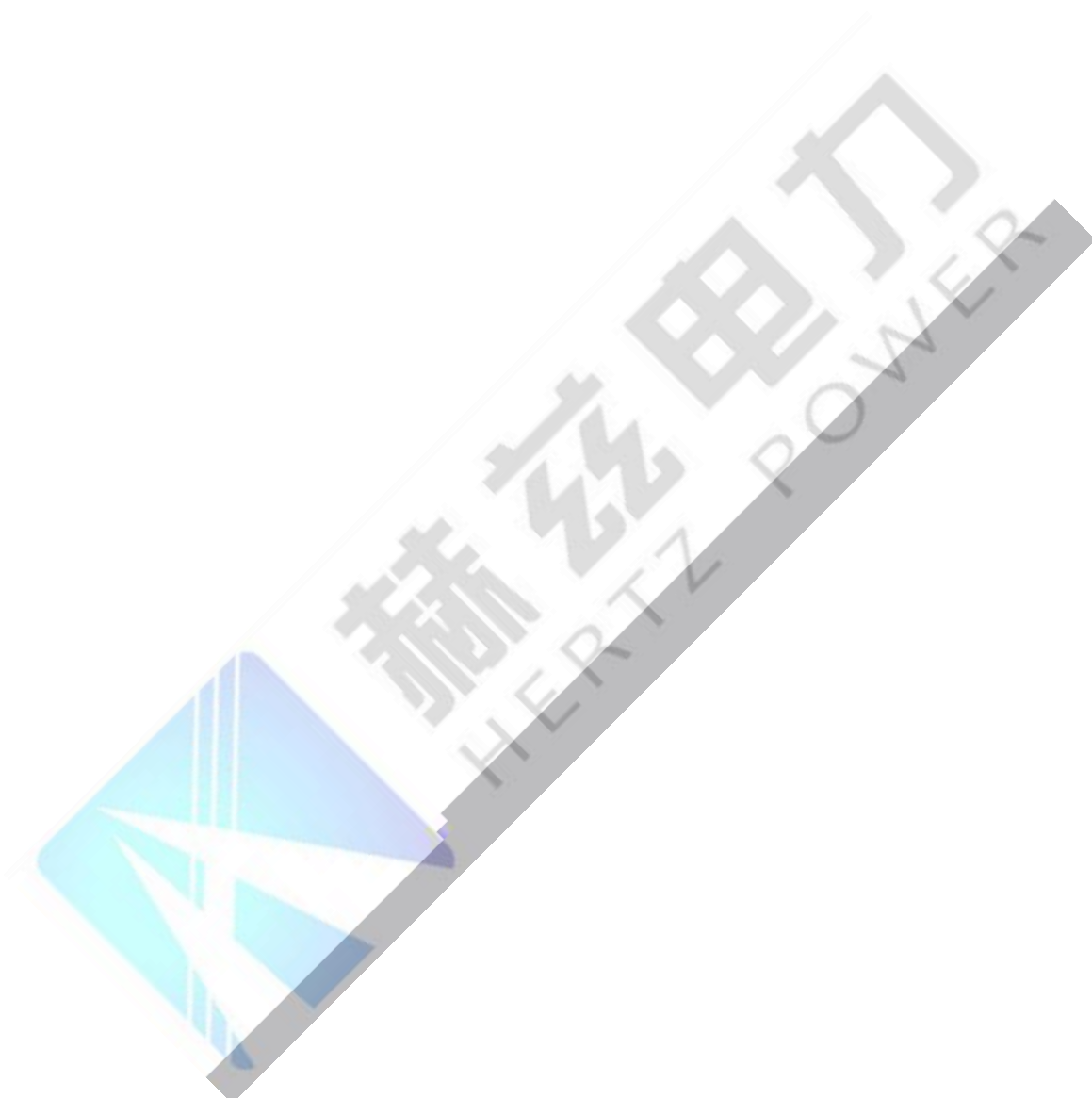
± 5%

3

1000MΩ tan δ 2%

3

30%
r



| | | | | | |
|----|--|--|--------------------------|---|--------|
| | | | | | |
| | | | 500kV
220kV
2
3 | 10 H ₂ 10 C ₂ H ₂ 0.1
10 H ₂ 30 C ₂ H ₂ 0.1
mg/L ≤ 35
kV 110kV ≥ 45 110kV ≥ 40 | |
| 20 | | | 1
2 | 20min | |
| 21 | | | | | |
| 22 | | | 1
2
3 | 1MΩ | / |
| 23 | | | 1
2
3
4
5 | 1 MΩ | / |
| 24 | | | 1
2
3
4 | DL/T 540
1MΩ | / |
| 25 | | | 1
2
3
4 | 1MΩ | / |
| 26 | | | 1
2
3 | 5min
5 | 5
3 |
| 27 | | | 1 | | |



| | | | | | |
|----|--|----|---|--|--|
| | | | | | |
| | | | 2 | | |
| 28 | | | GB/T26218.2-2010 10.3
a P2-P1 ≥ 20 mm
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 | | |
| 29 | | | 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 | | |
| 30 | | CT | 1
2 | | |
| 31 | | | 1 3°
2
3
4 | | |
| 32 | | | | | |
| 33 | | | 220kV 110kV | | |



3



34

- 1
- 2
- 1

35

- GB 5273
- 2
- 3
- 4 6.0

36

37

- 1
- 2
- 3
- 4
- 1

4h

38

- 2
- 3
- 4

30

39

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

x



3

| | | | | | |
|--|--|--|---------|--------|--|
| | | | | | |
| | | | 5 | | |
| | | | 6 | | |
| | | | 7 | | |
| | | | 8 | | |
| | | | 9 500kV | 240MVA | |
| | | | 10 | | |

5.2 SF₆

4 SF₆

1

SF₆

SF₆

SF₆

20

SF₆

250 μ L/L

SF₆

2

SF₆

4 SF₆

± 1%

6

1
2

1

7

4

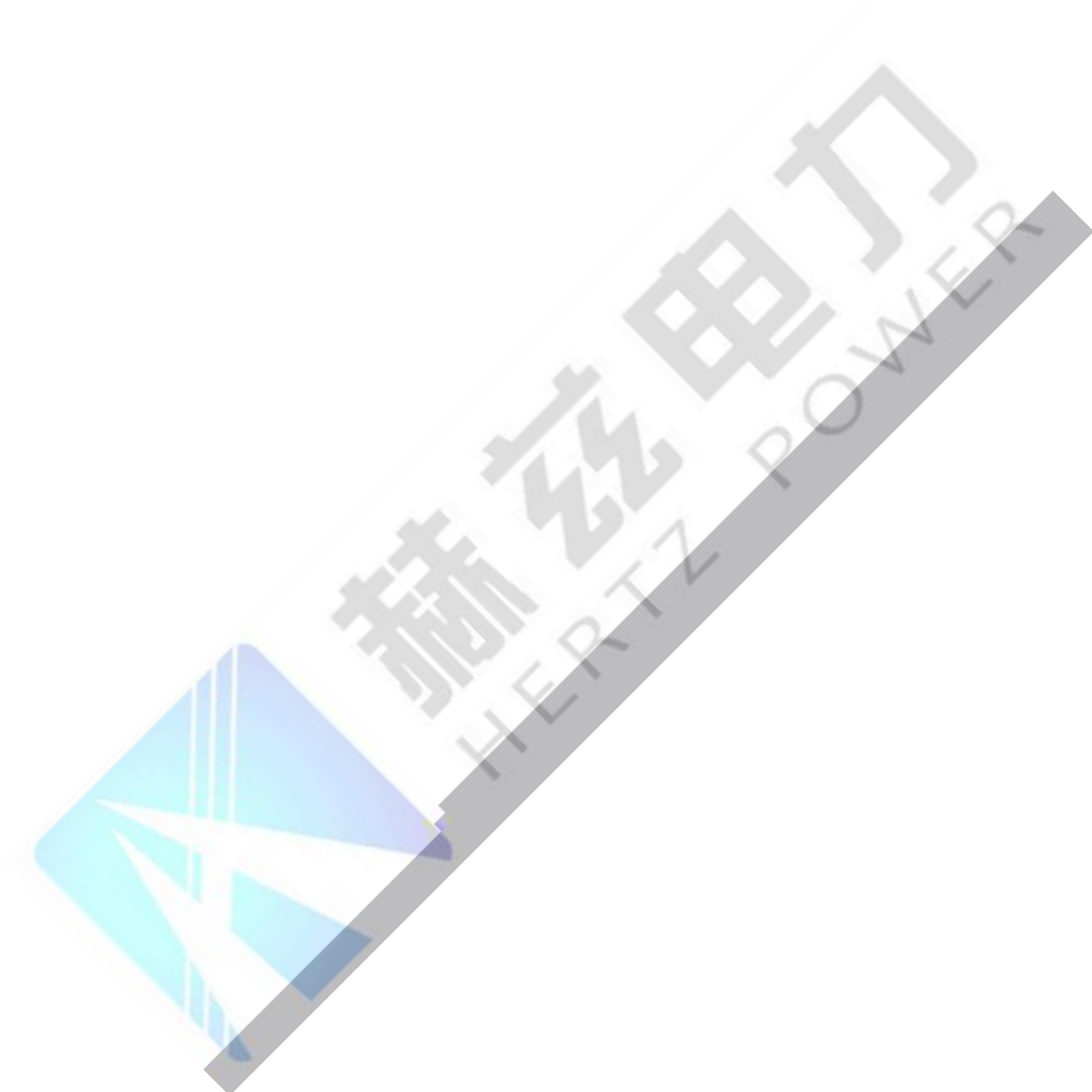
2



4 SF₆

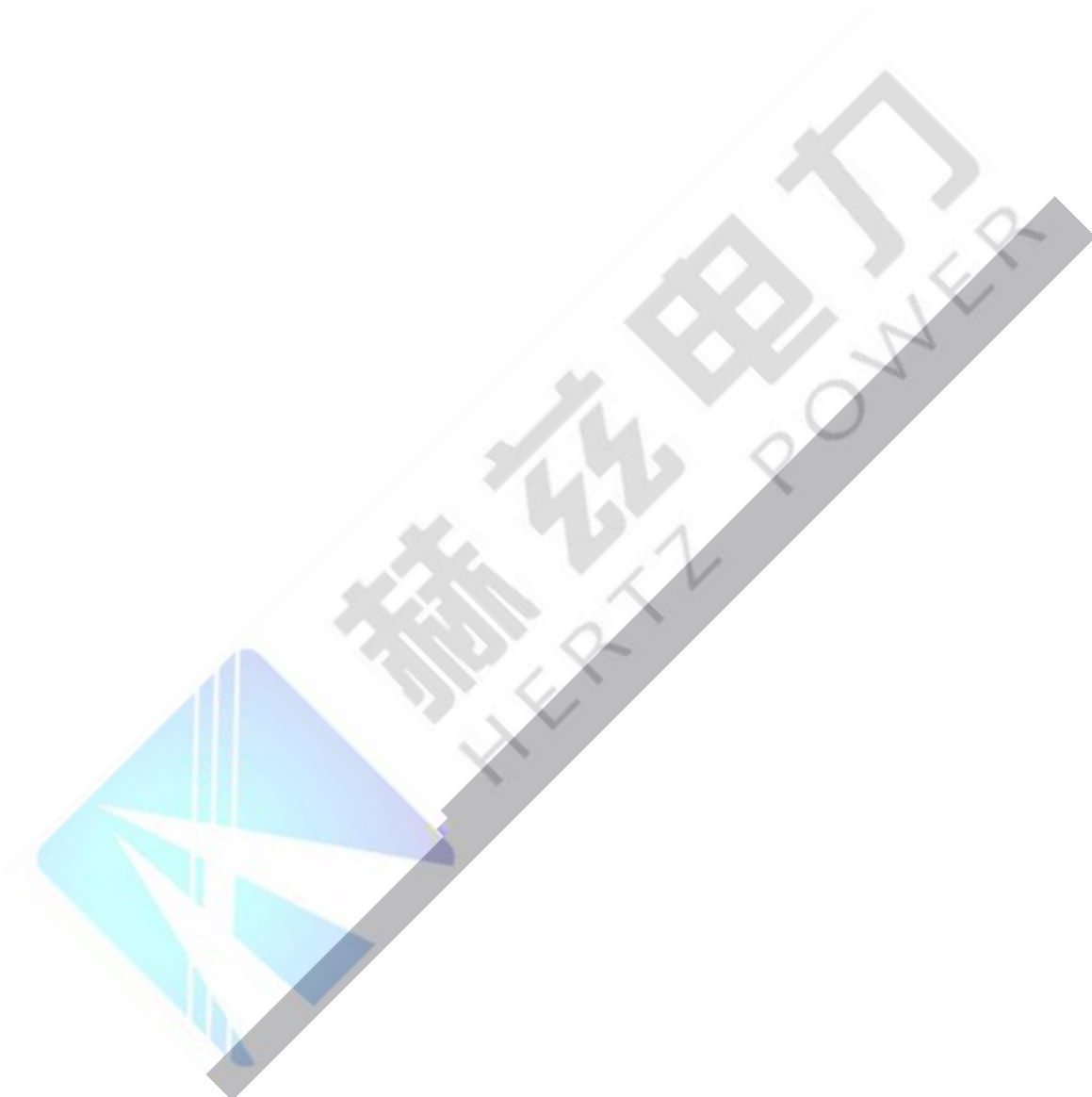
tan δ

| | | | | | | | | | | |
|---|------|-----|-----|-----|-----|-----|-----|----|----|----|
| 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
1MΩ
5 | 500V 1000V | |
| 24 | | | 1
2 | | |
| 25 | | | GB/T26218.2-2010 10.3
a P2-P1 ≥ 20 mm
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 | | |
| 26 | | | 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 | | CT | | | |
| 28 | | | | | |
| 29 | | | 220kV 110kV | | |
| 30 | | | 1
2 | | |



4 SF₆

1

GB 5273

31

2

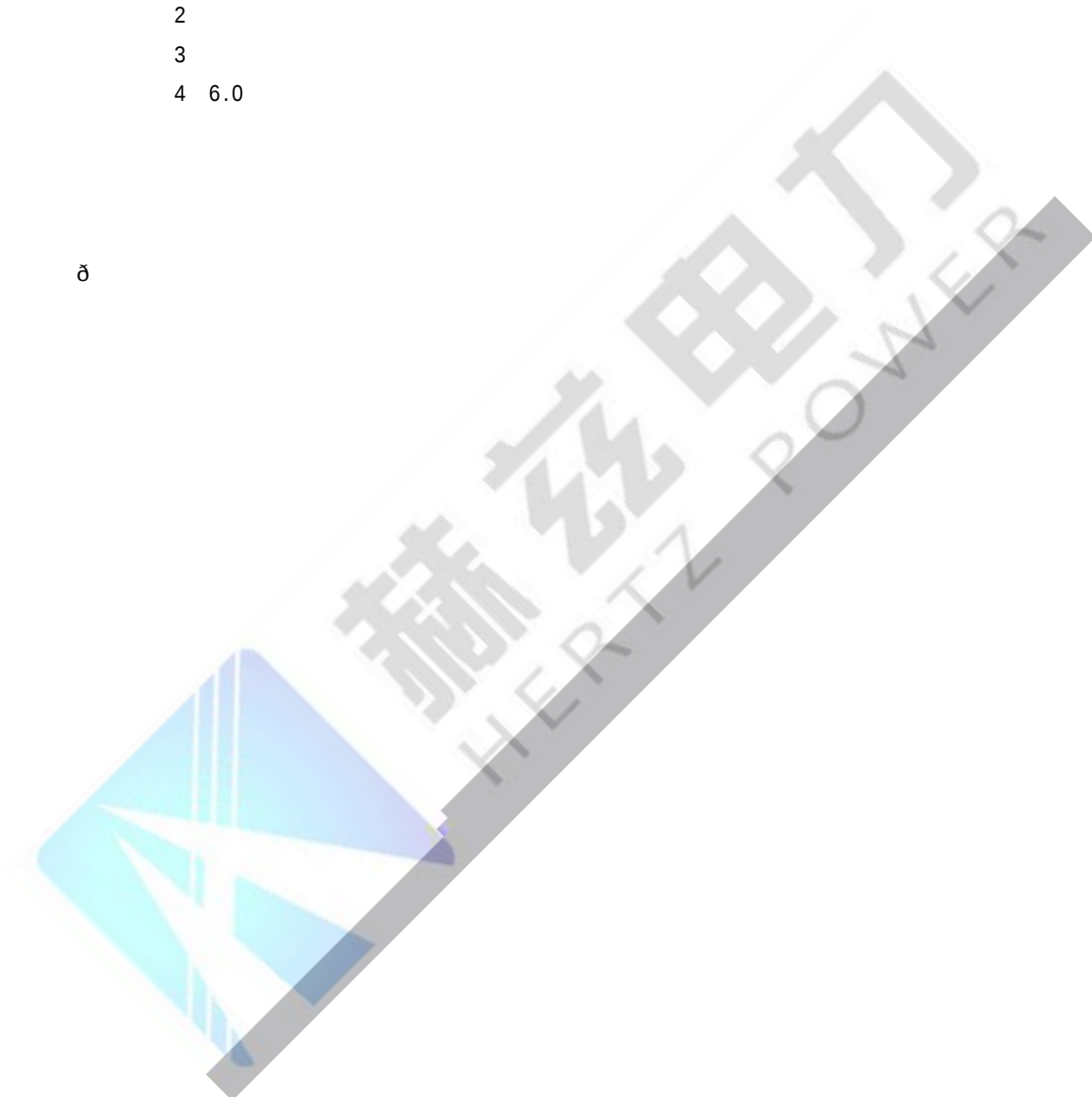
3

4 6.0

32

33

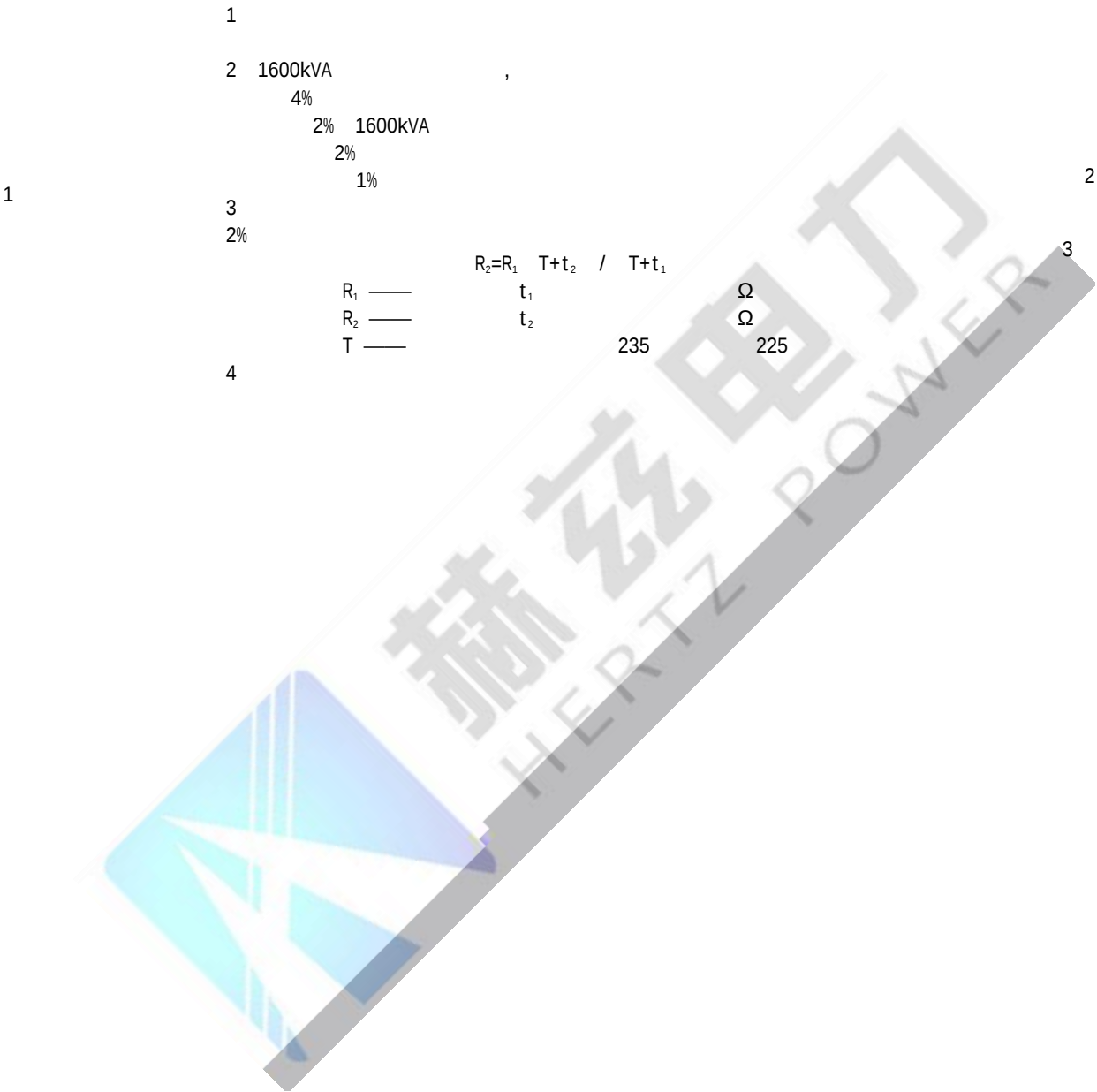
δ





5.3

5



5

a

K

20

3

A

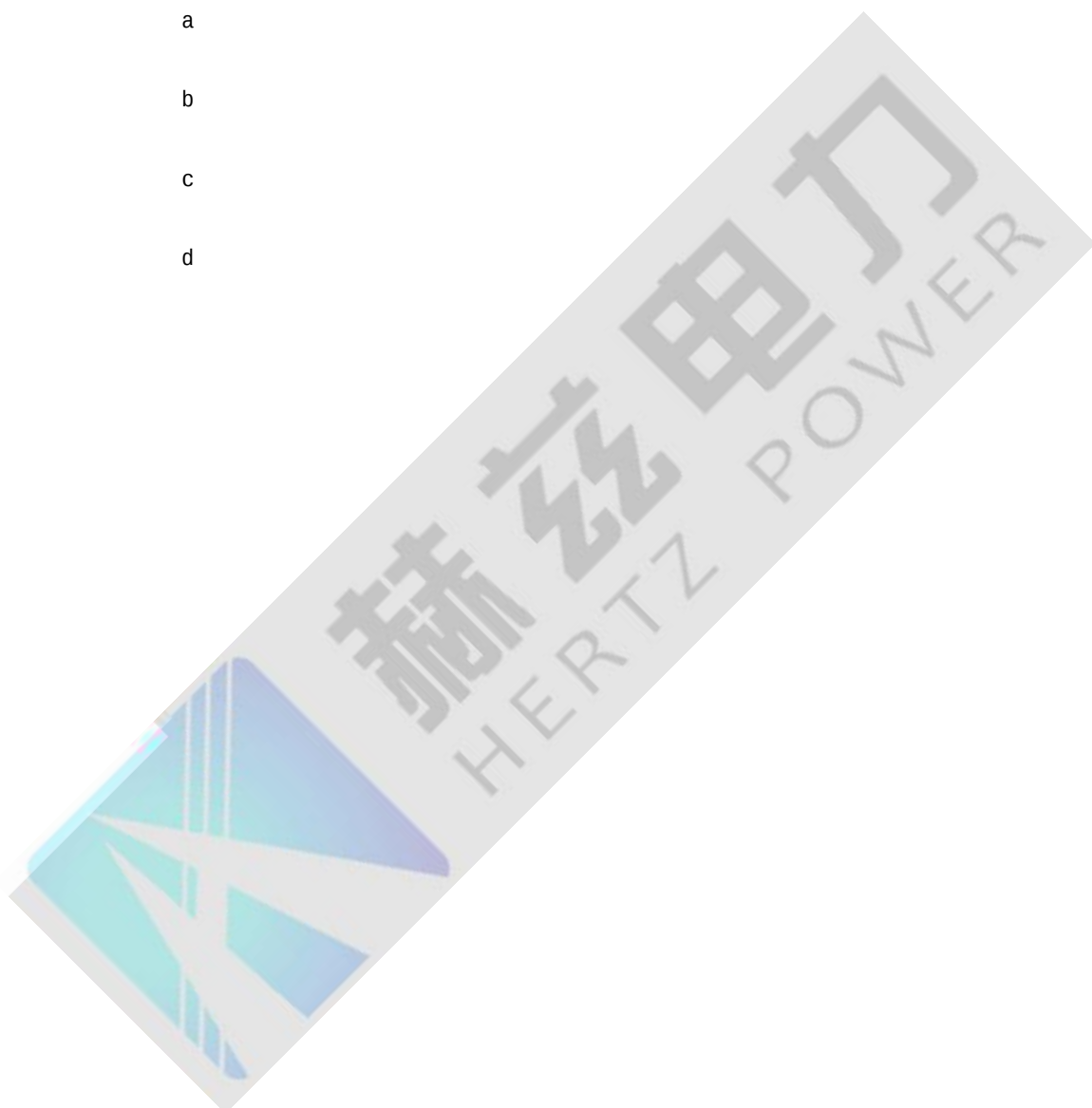
$$A = 1.5^{K/10}$$

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
b pH >5.4
c mgKOH/g ≤ 0.03
d ≥ 135
e mg/L ≤ 10
f 25 ,mN/m ≥ 40
g tan δ 90 % ≤ 0.5 ≤ 0.7
h kV ≥ 65
i 90 Ω ·m ≥ 6 × 10 ¹⁰
j % ≤ 1.0
k % ≤ 0.02
l 100mL 5 μ m ≤ 2000
2
3
a 72h 24h
b DL/T 722
c μ L/L
10 H ₂ 10 C ₂ H ₂ 0.1 | | |
| 2 | | | 1
2

R ₂ =R ₁ T+t ₂ / T+t ₁ | | 1 |

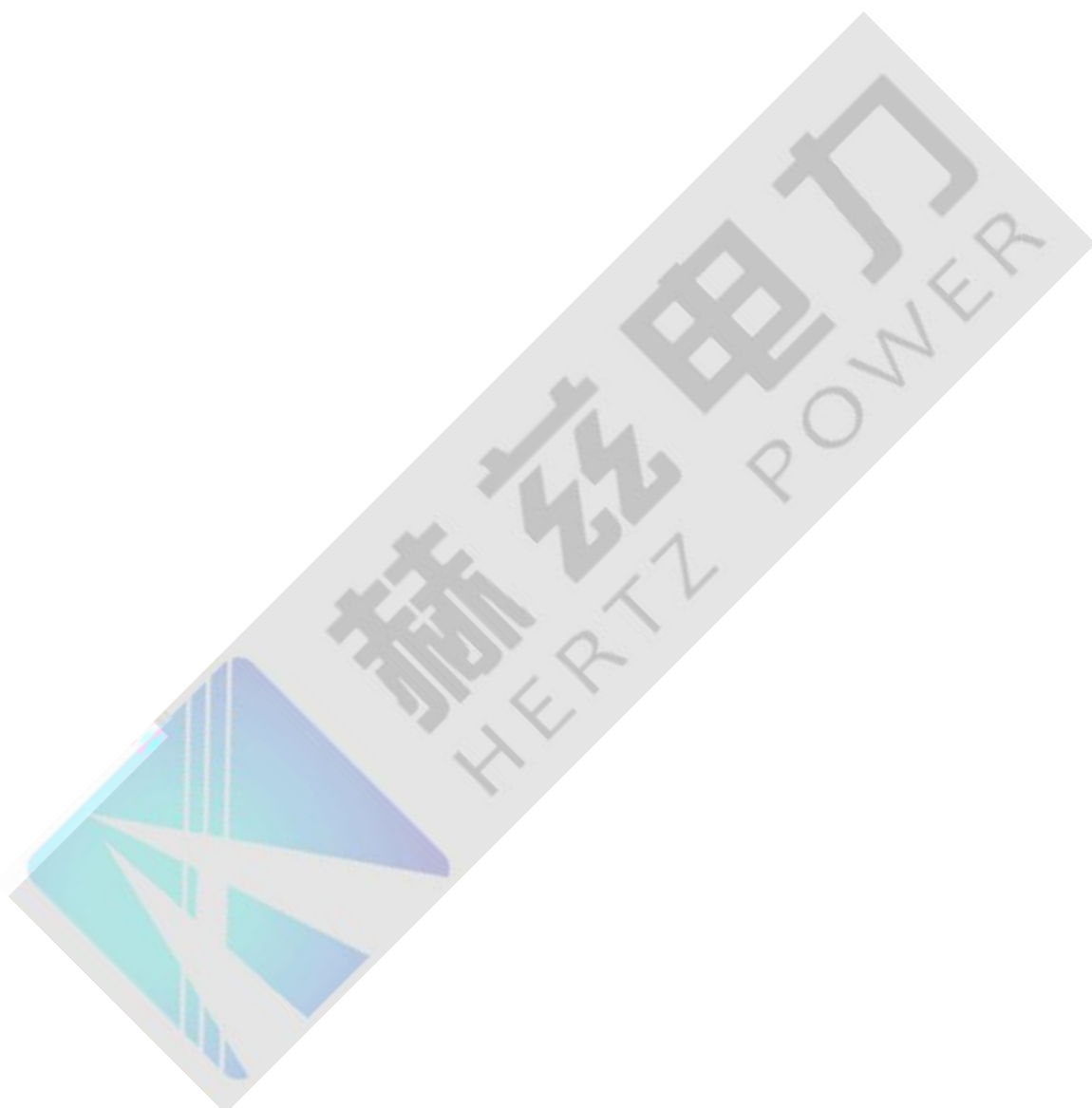
6 500kV

R_1 — t_1



6 500kV

K 5 10 15 20 25 3



6 500kV

1

2

9

3

4

5

2500V

1min

1

a

1000MΩ

b

2

a

b

10%

3

4

a

b

10

c

ē

d

4.5kV



6 500kV

| | | | | | |
|----|--|--|---|---|-----|
| | | | | | |
| | | | 2 | / | |
| 13 | | | 1
2
3
4
5
6
7

1MΩ

3 ° | / | |
| 14 | | | 1
2
3
4

1MΩ | / | |
| 15 | | | 500kV
DL/T 264
0.035MPa
24h | | |
| 16 | | | 5
5min | | |
| 17 | | | 65 ° C | | 24h |
| 18 | | | 100 μ 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

24 P_{1/4}
1
2
1

25
2
3
4 6.0

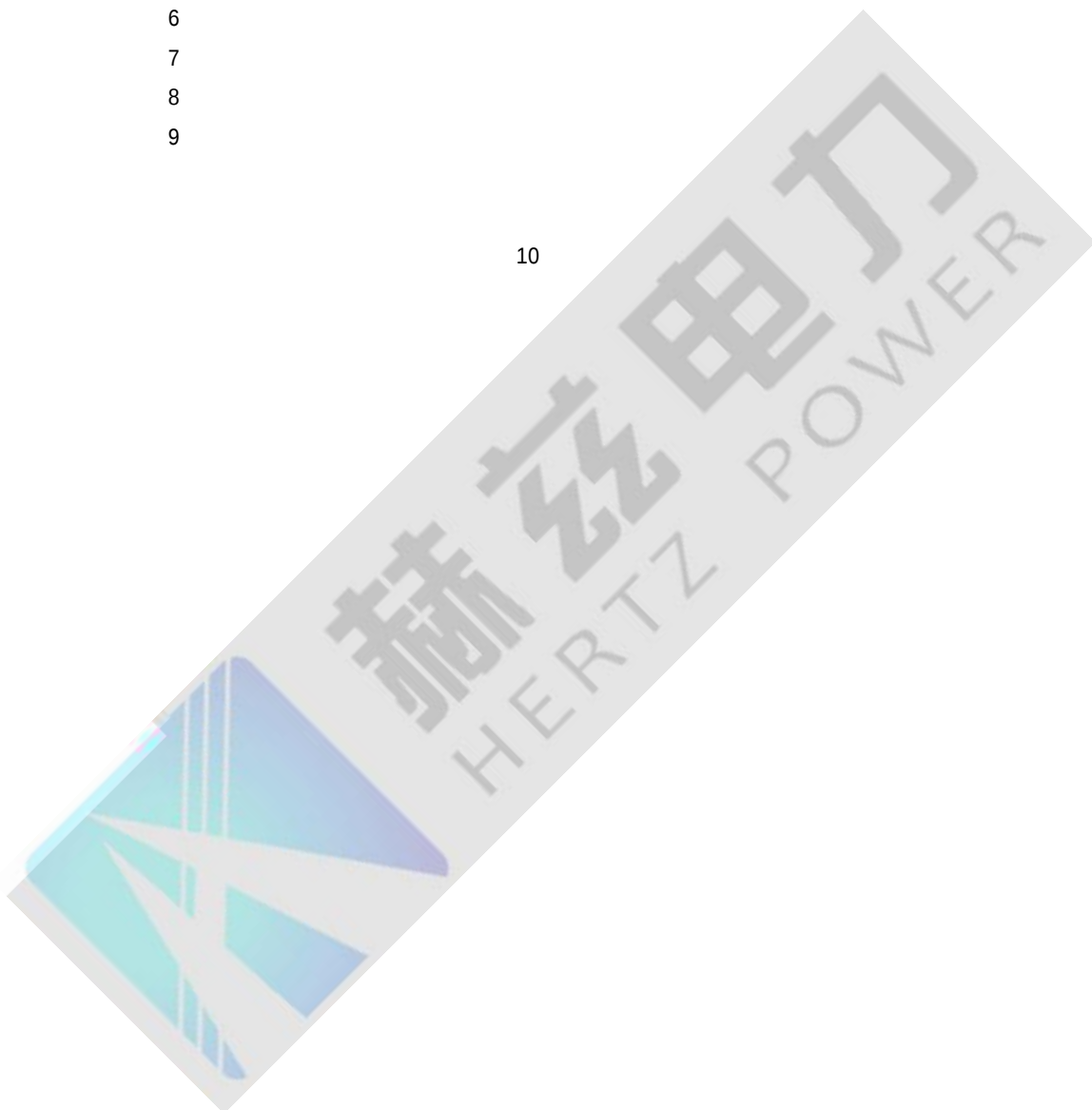
26
1
2 đ đ



6 500kV

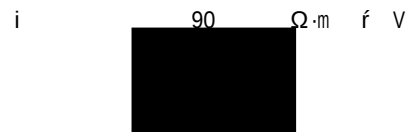
3
4
5
6
7
8
9

10



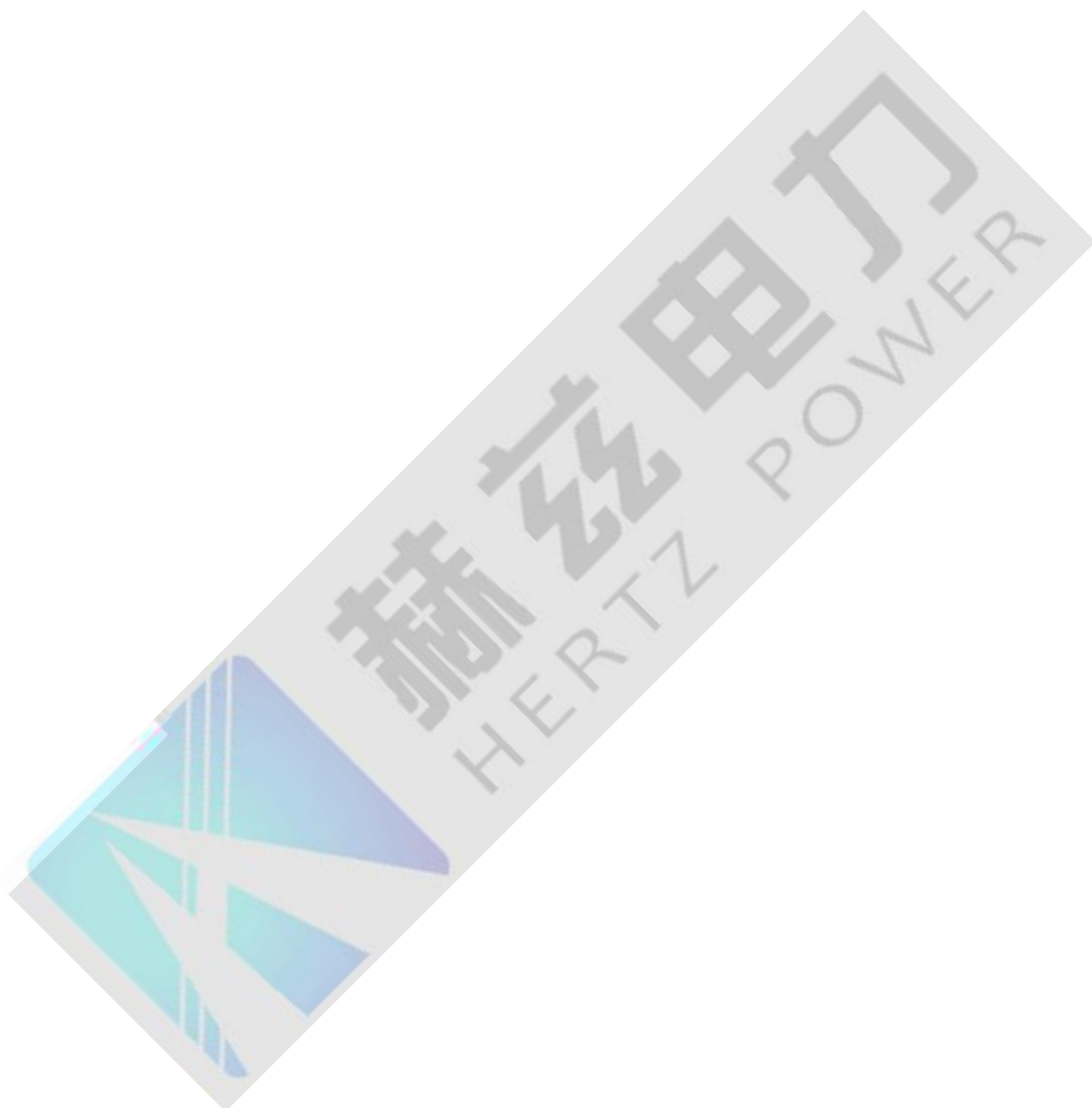


7 35kV





7 35kV



7 35kV

2 /
3 1MΩ
4

12 1
2 1MΩ
3

13

14 1 5
5min
2

15 1 3 °
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
2-5mm
80% | |
| 26 | | | | / | |
| 27 | | | 1
2
3
4
5
6 | / | |

7 35kV

| | | | | | |
|--|--|--|---|--|--|
| | | | | | |
| | | | 7 | | |
| | | | 8 | | |
| | | | 9 | | |

6.3 35kV

8 35kV

| | | | | | |
|---|---|-----------|---------|-----|----------|
| | 1 | | | | 1% |
| | 2 | | | | 1% |
| 1 | | $R_2=R_1$ | $T+t_2$ | / | $T+t_1$ |
| | | R_1 | t_1 | | Ω |
| | | R_2 | t_2 | | Ω |
| | | T— | | 235 | 225 |

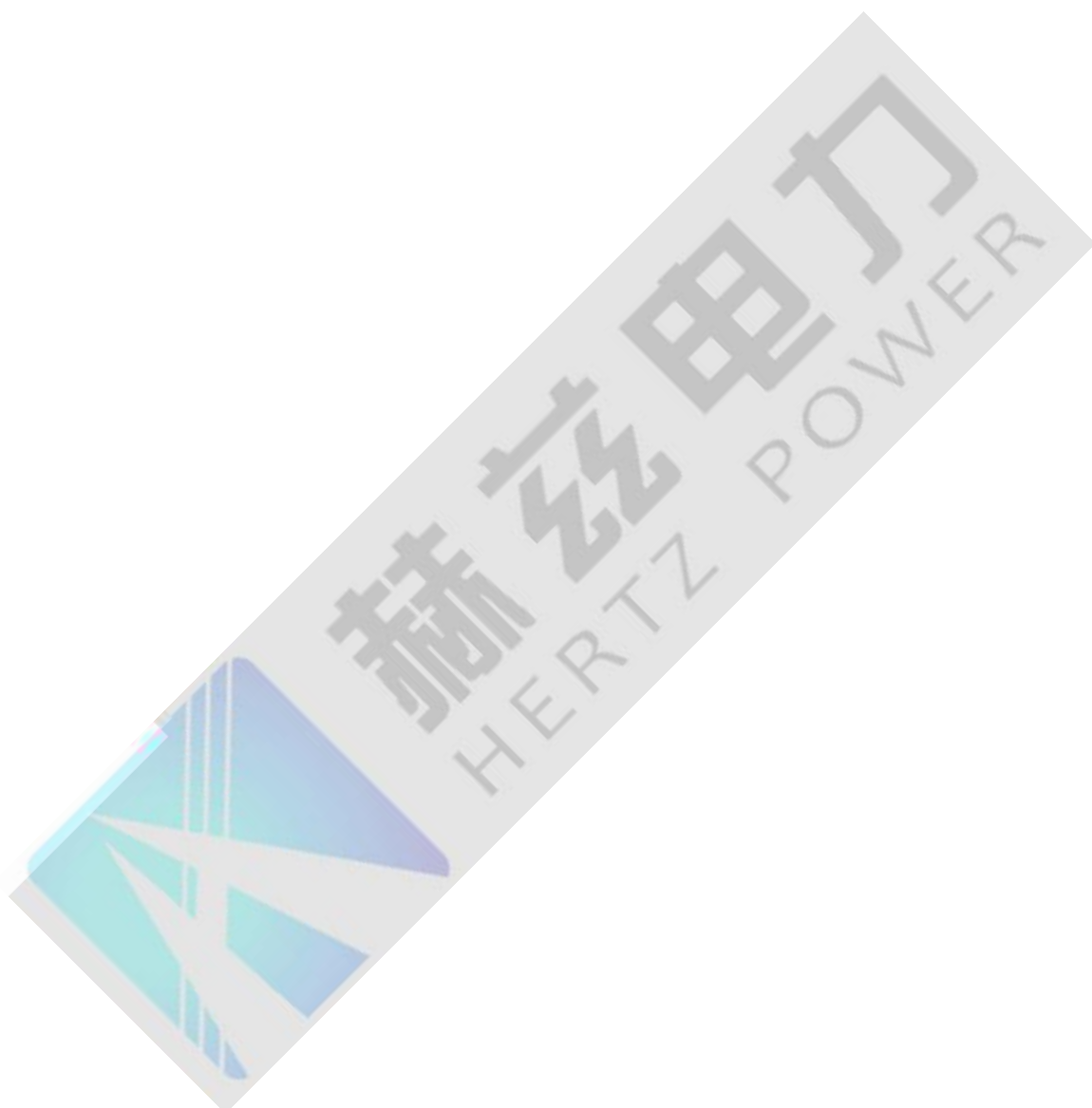
| | |
|---|-----------|
| 2 | $\pm 5\%$ |
|---|-----------|

| | | | | | | |
|-----|--------|--|----|----|-----|----|
| 1 | 1min | | | | | |
| | | <table><tr><td>kV</td><td>kV</td></tr><tr><td>128</td><td>96</td></tr></table> | kV | kV | 128 | 96 |
| kV | kV | | | | | |
| 128 | 96 | | | | | |
| 2 | 100kHz | 3000 | | | | |

| | | |
|---|---|-----|
| 3 | 3 | |
| | 4 | 20% |
| | 5 | 5% |
| | 6 | |

| | |
|---|------|
| 4 | 5 |
| | 5min |

| | |
|---|---|
| 5 | q |
|---|---|



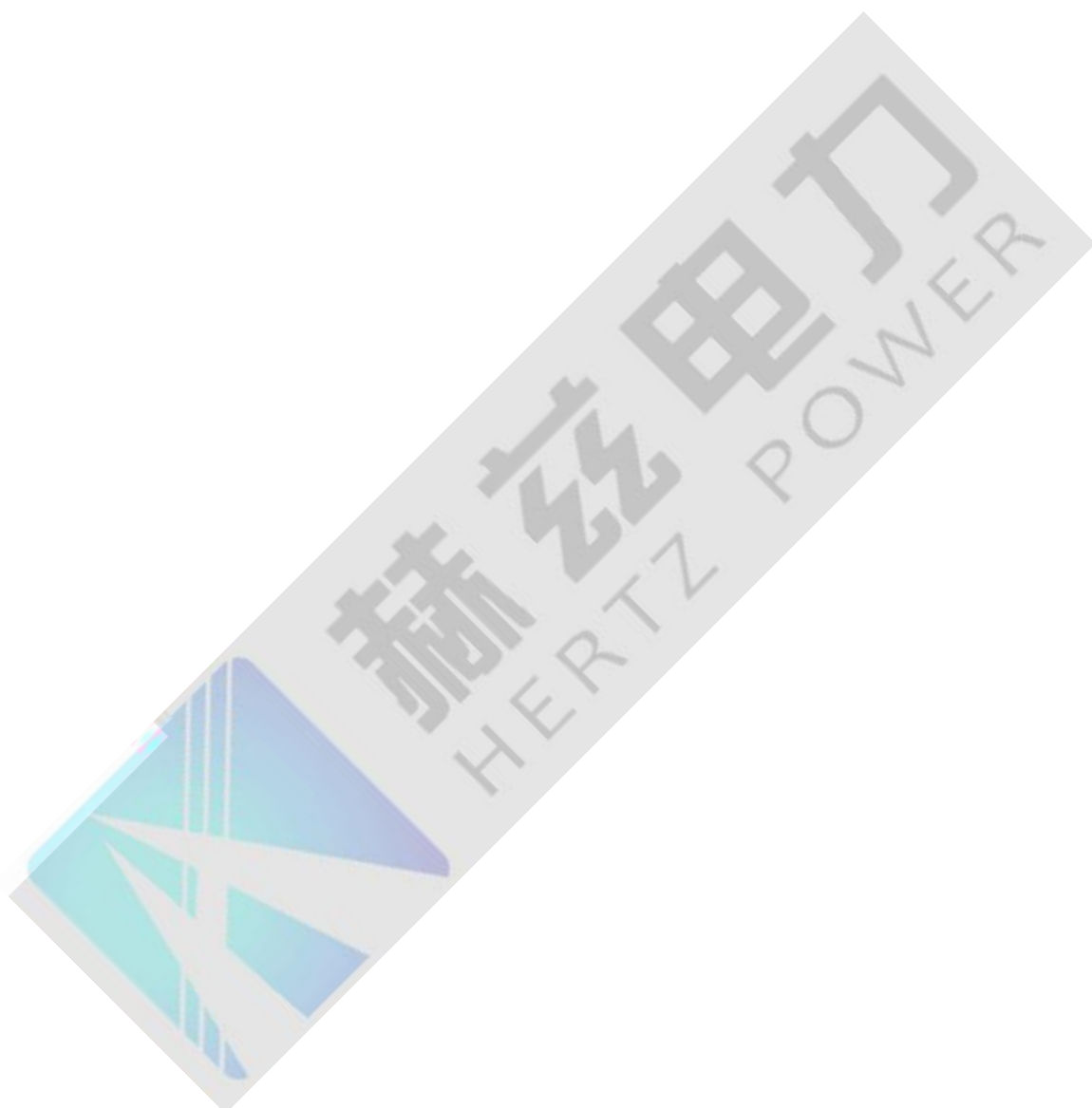
8 35k

| | | | | | |
|--|--|--|------------------------|----------------------------|--|
| | | | | | |
| | | | 8
9
10
11 35k | F
C2
SF ₆ | |



9

4



10

2

10%

3

30%

50%

5

1

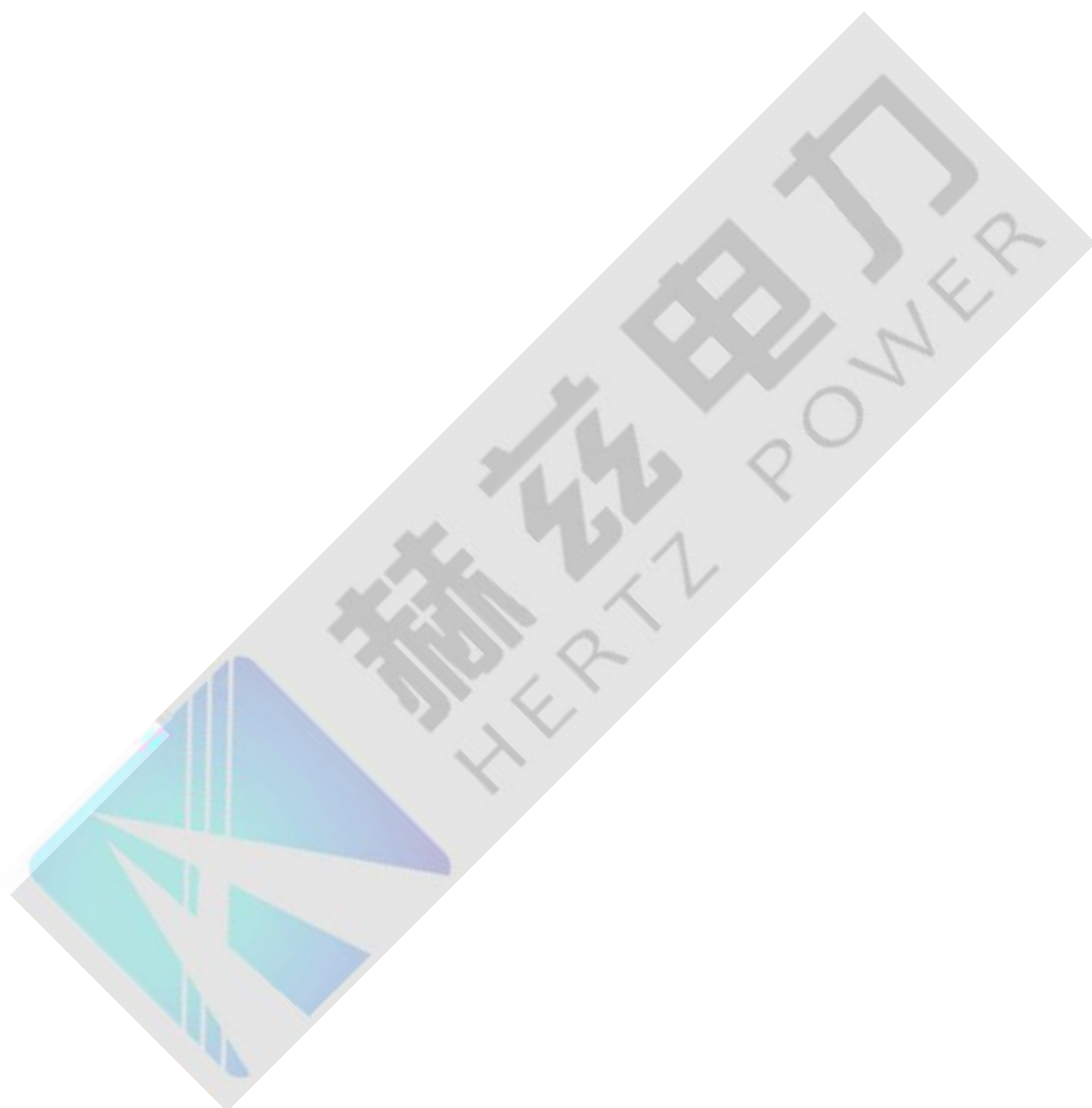
2

6

3

4

f



11 SF₆

2 220kV

3
2500V

2kV

4 110kV
2500V

2kV

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



11 SF₆

3

/

4

5

6

7

8

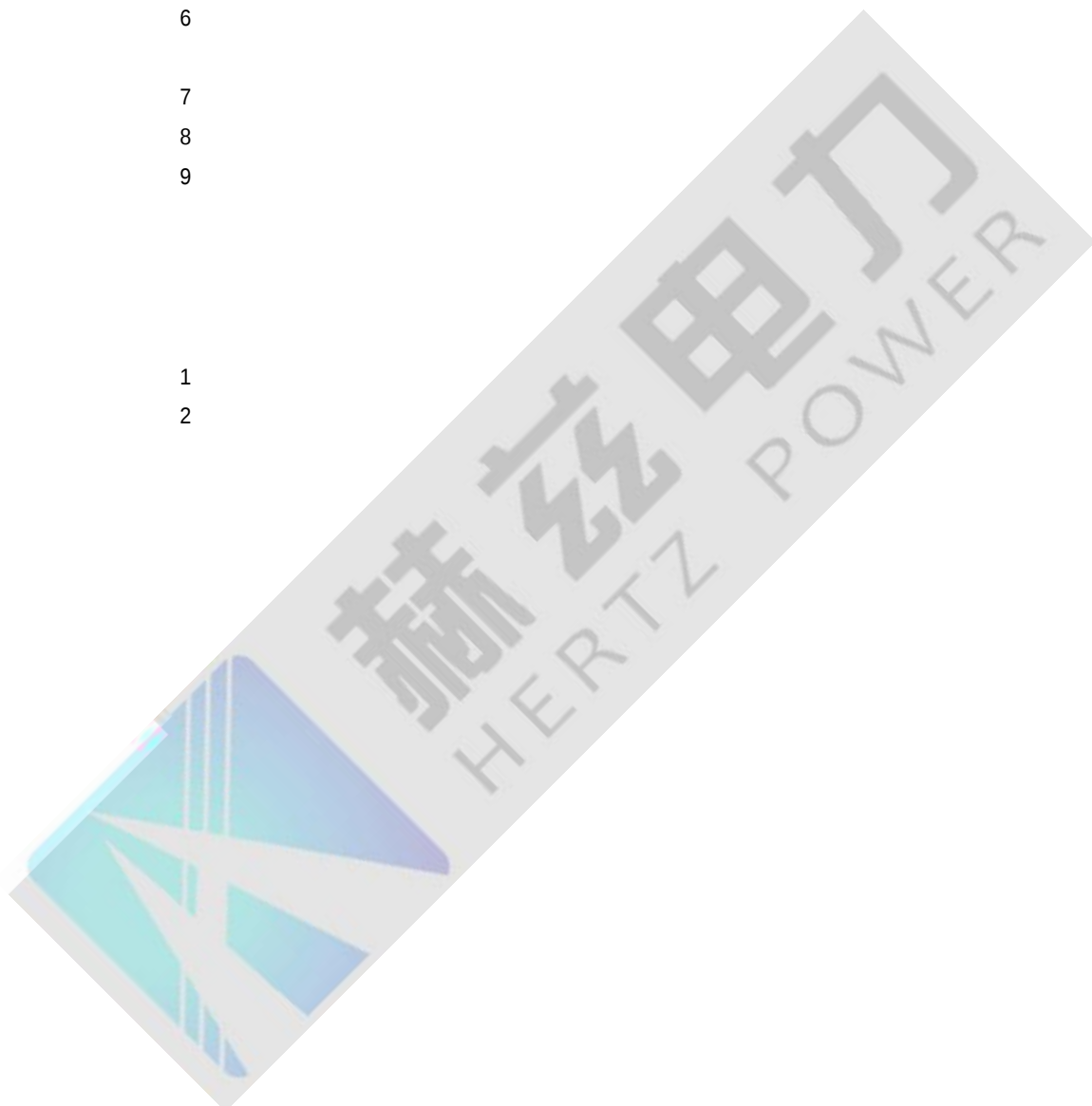
9

11

1

2

12



11 SF₆

| | | | | | |
|--|--|--|--------------|--|--|
| | | | | | |
| | | | JJG1021-2007 | | |

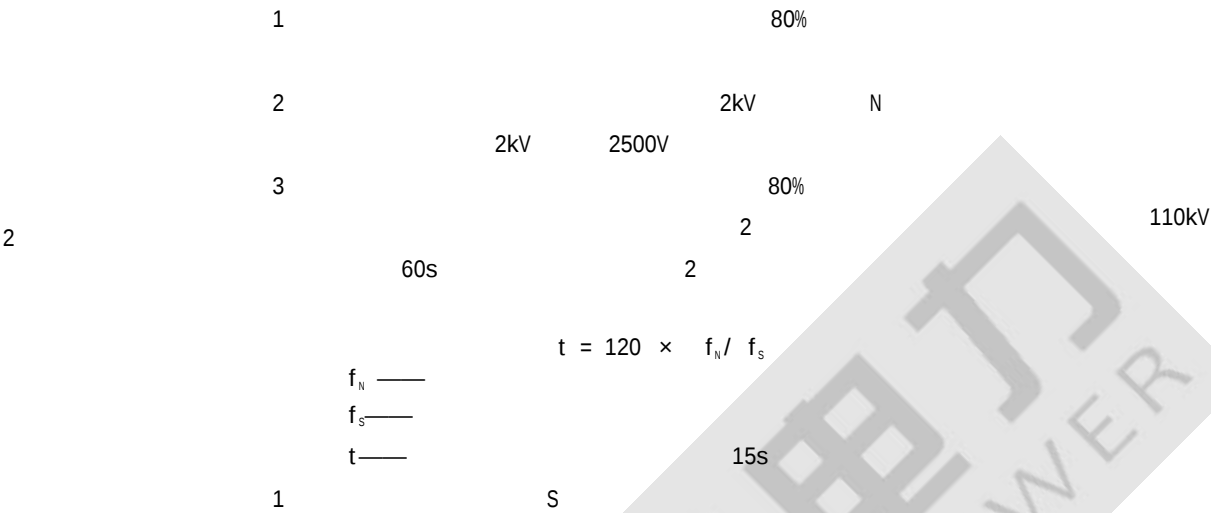


| | | | | | |
|---|--|--|---|---|--|
| | | | | | |
| | | | <p>t — 15s</p> <p>4 66kV</p> | | |
| 5 | | | <p>1</p> <p>10%</p> <p>2</p> <p>15%</p> <p>3</p> <p>$R_2=R_1$ $T+t_2$ / $T+t_1$</p> <p>R_1 — t_1 Ω</p> <p>R_2 — t_2 Ω</p> <p>T — 235 225</p> | | |
| 6 | | | | | |
| 7 | | | <p>1</p> <p>30%</p> <p>2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

5

6

7



13

4

1

2

3

4

7

5

/

6

7

8

1

2

3

4

5

6

8

7

8

9

80



10



1 1 1000MΩ 1000V

2 2

2 10%

3 1 5000 MΩ 1 2500V

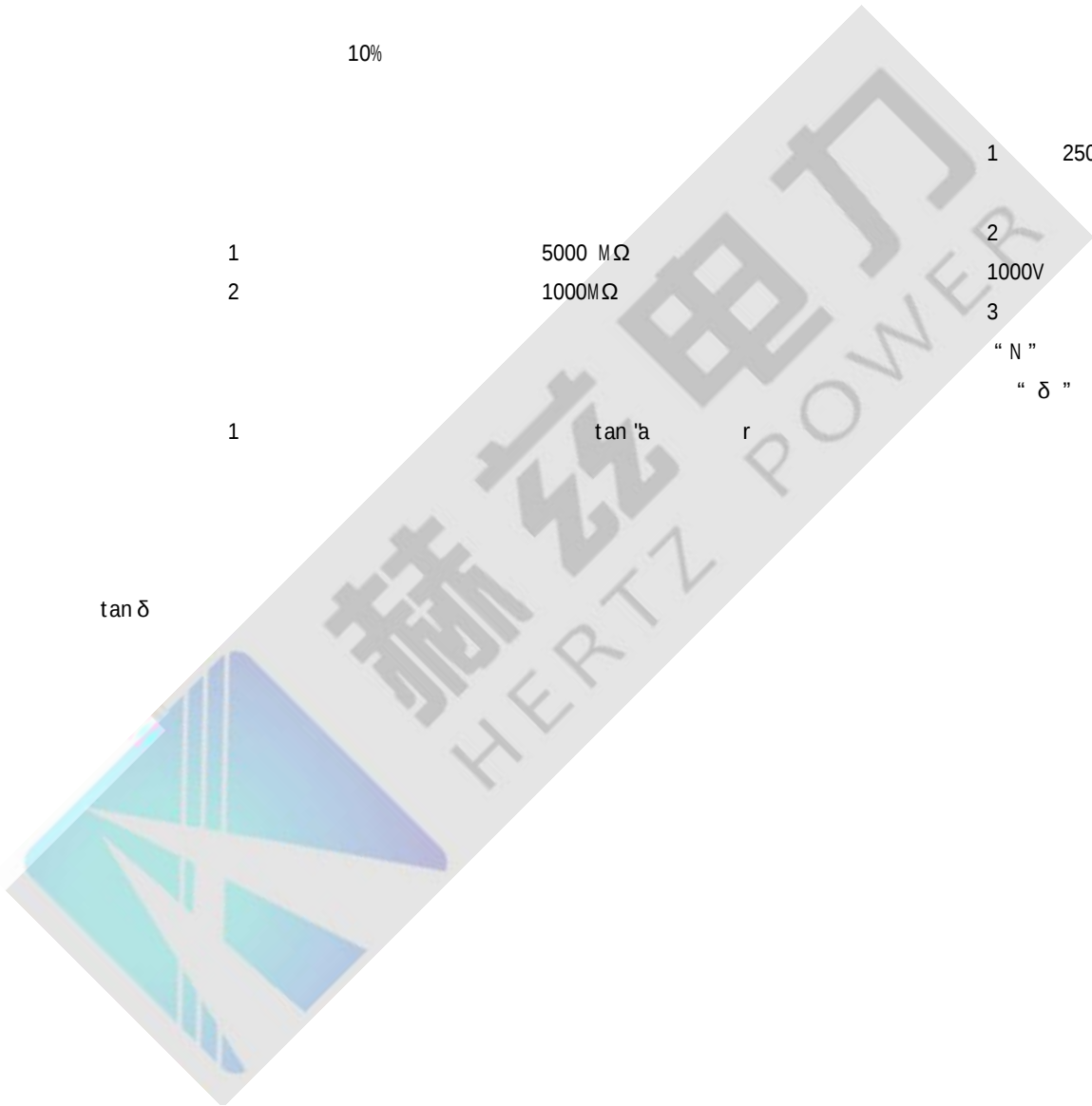
2 1000MΩ 2 1000V

3 “N” “J”

“δ”

1 tan 'a r

4 tan δ



14

5

6

6

1

7

2

5%

3

4

1

2

3

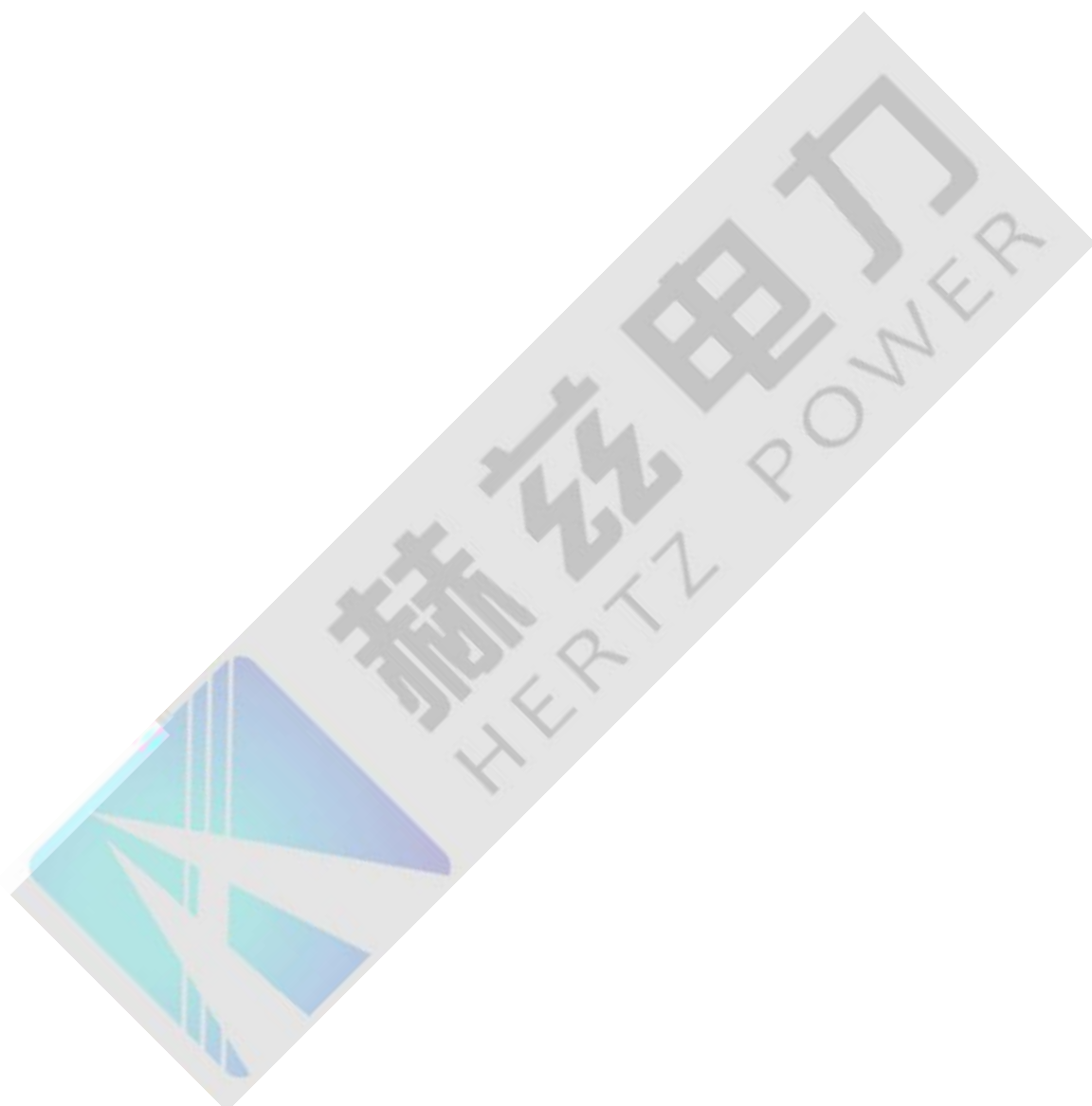
4

5

8

6

7



15 SF₆

| | | | | | |
|--|--|--|---|---|--------------|
| | | | | | |
| | | | 1
2 | 2500V | |
| | | | 1
2 | 100A | |
| | | | 1
2
a)
0.8
b) 110kV
500kV
c)
3
a) 500kV
b) 220kV
c
d 1.2U _m /√3 | 110kV
20
20
0.9 | 1 110kV
2 |
| | | | 1
2
± 5%
0.5%
0.2%
3
4 | 5000MΩ
tan δ
10kV
tan δ %
tan δ | |
| | | | 1
2
3
4
—
—
—
— | -
5ms
3ms
3ms
2ms | |
| | | | 1
2
3 | 35kV SF ₆ | |
| | | | 1 | ± 5% | |



15 SF₆

| | | | | | |
|--|--|--|--|---|----------------------------------|
| | | | | | |
| | | | 2 | | |
| | | | 1
2 | 10MΩ | |
| | | | 1

2
85% 110%
30%
3
80%
4 | 85% 110%
30%
65% 110%

50kA 85% | |
| | | | 1000MΩ | | 1

2
2500V

1000V |
| | | | | | |
| | | | 1

2

3 | 5% | |
| | | | 1 | | |

15 SF_6

2

3



15 SF₆

| | | | | | |
|--|--|--|----------------------------|---------|--|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | / | |
| | | | | / | |
| | | | | | |
| | | | | / | |
| | | | | | |
| | | | 1
2
3
4
5
6 | | |
| | | | 7 | 10 20mm | |
| | | | | | |
| | | | 1
2 | | |

15 SF_6

| | | | | | |
|--|--|-----------------|--|--|--|
| | | | | | |
| | | | | | |
| | | | 1
2
3 | | |
| | | | 1

2
3
4 “ ” | | |
| | | SF ₆ | 1 SF ₆ SF ₆
2 SF ₆

3 SF ₆
4 SF ₆
5 SF ₆

6

7

8 | | |
| | | | | | |
| | | | | | |
| | | | 1

2

3
4
5
6 “ / ” “ ”
7
8
9
10 | | |



15 SF₆

11

12

13

10

80%

2-5mm

14

1

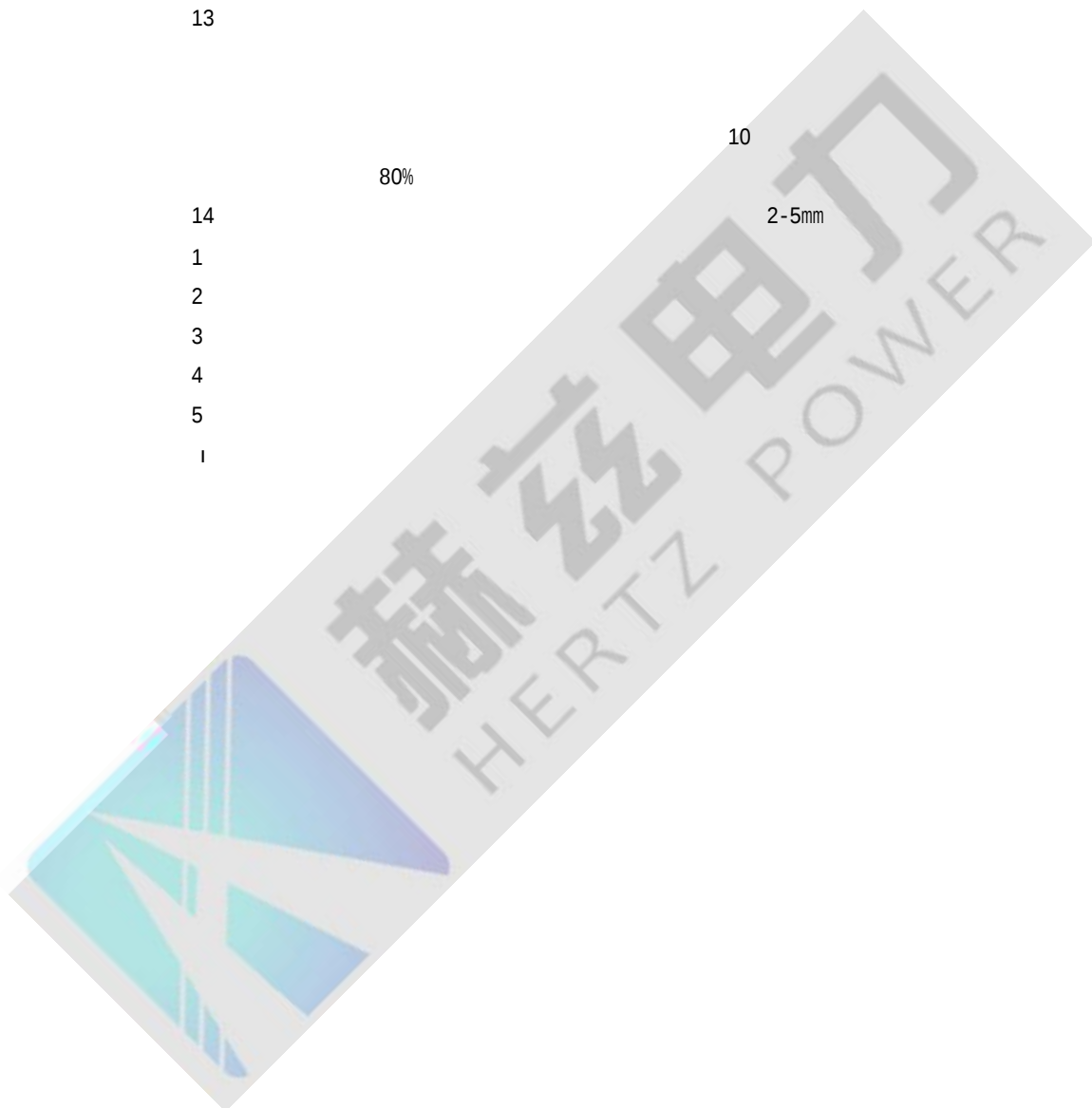
2

3

4

5

I





16

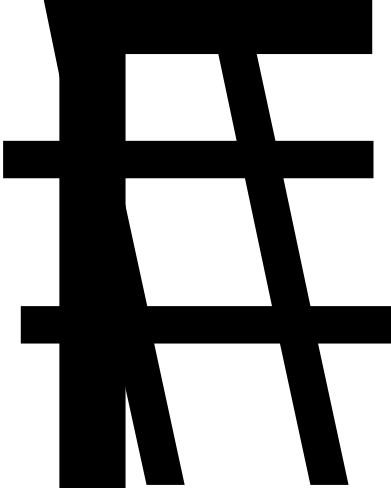
2kV

1min

2500V

- 1
- 2
- 3
- 4
- 5





13



17

2

1

2

3

4

5

6



| | | | | | |
|---|---|-----------------|---|------------------------|-----------------|
| | 1 | | | 100A | |
| | 2 | | | | GIS |
| 1 | | | | | GIS |
| | 3 | | | | |
| | 4 | | | | SF ₆ |
| | 1 | | | 1*10 ⁻⁶ () | |
| | 2 | SF ₆ | 5h | SF ₆ | 15 μ L/L |
| 2 | | | | | |
| | 3 | | GIS | 24h | |
| | 1 | SF ₆ | 20 | | GB7674 |
| | | 72.5kV | | | GB/T8905 SF6 |
| 3 | | SF ₆ | | | |
| | 2 | | | 150 μ L/L | |
| | 3 | | | 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 | | | | | |

18 GIS HGIS GIL

2 /
3

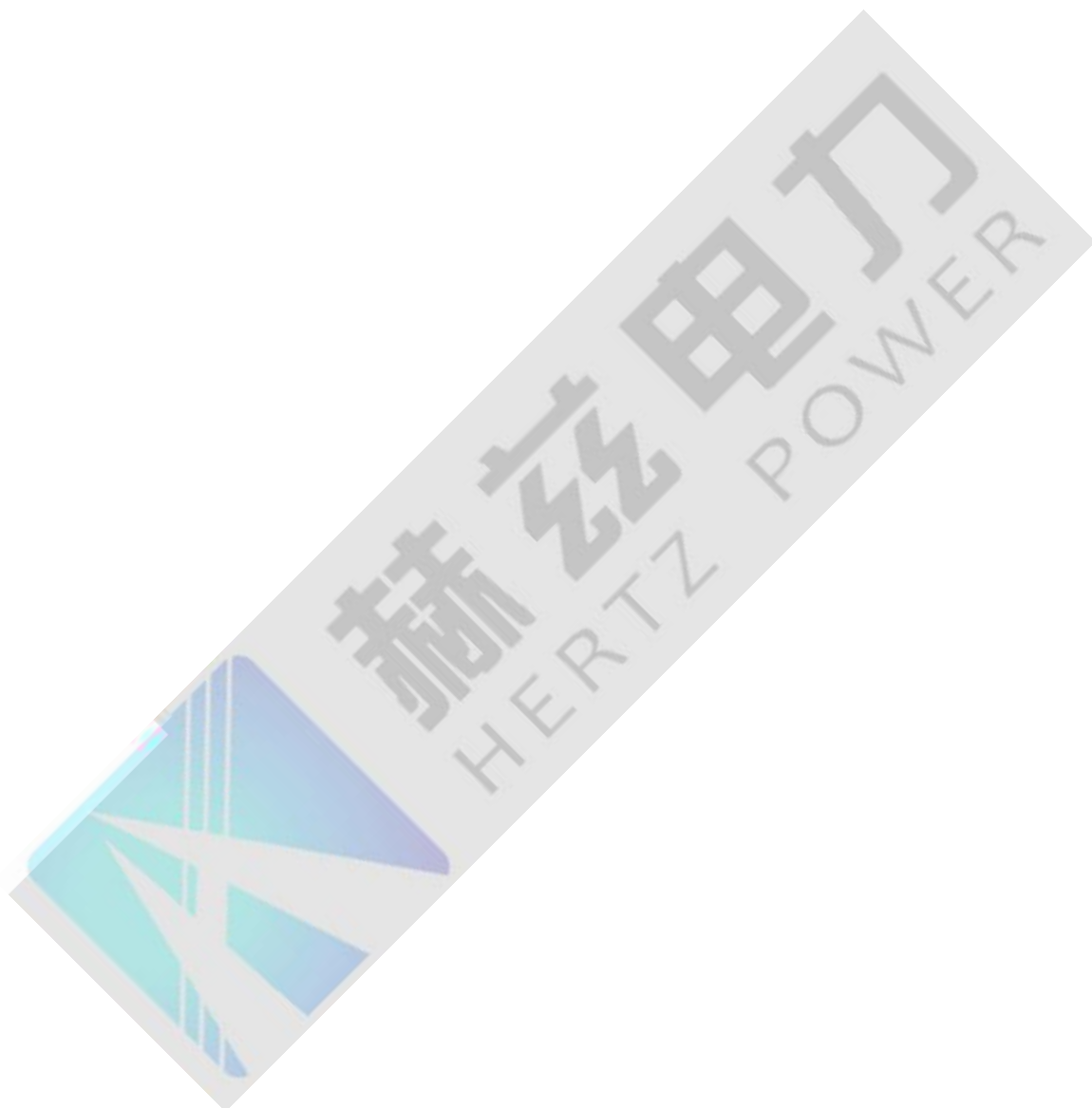
8 2MΩ 500V 1000V

9 2kV 1min 2500V

10

tan δ

11



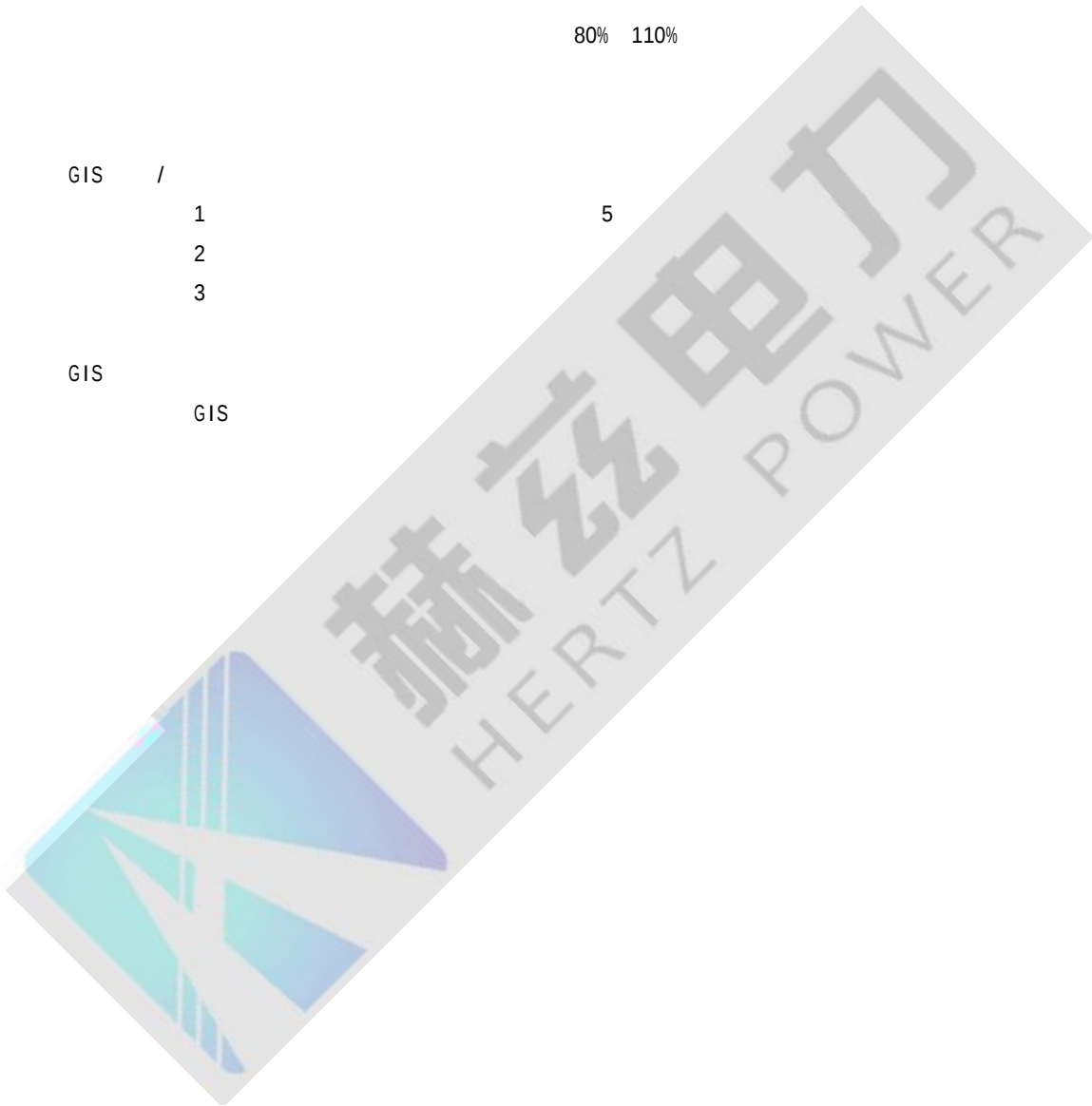


18 GIS HGIS GIL

GIS /
32 80% 110%

GIS /
33 1 5
2
3

GIS
34 GIS



2B



M

18 GIS HGIS GIL

45

46

47

48

4

1

2

3

4

1

2

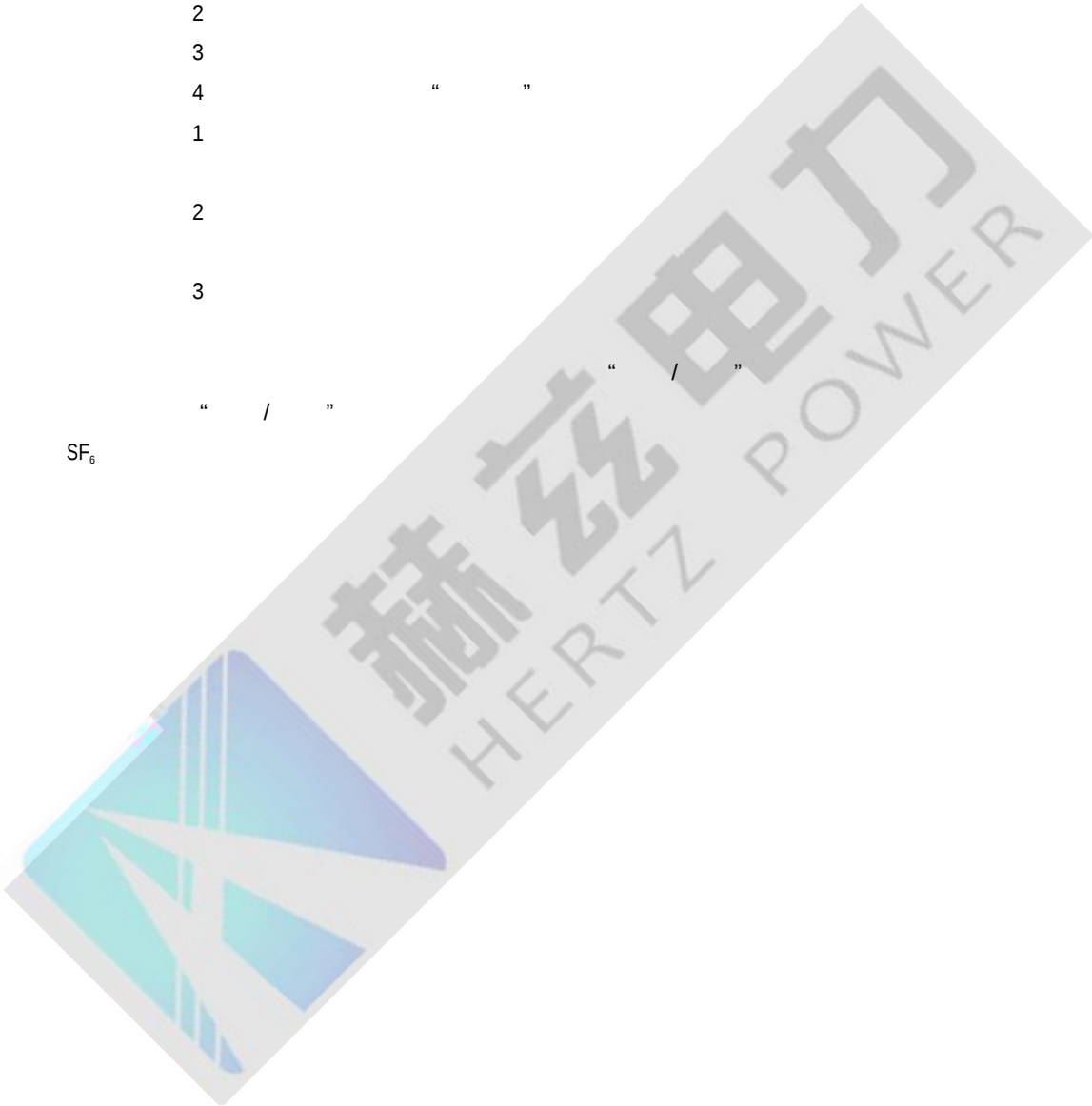
3

“ / ”

“ ”

“ / ”

SF₆



| | | | | | | | | | | | | | |
|----|-----|----|---|----|-------|----|------|----|----|----|----|--|--|
| | | | | | | | | | | | | | |
| 1 | | | 1 2500V
2 | | | | | | | | | | |
| 2 | | | 1
2 | | | | | | | | | | |
| 3 | | | 2kV 1min | | 2500V | | | | | | | | |
| 4 | | | 1 100A
2 | | | | | | | | | | |
| 5 | | | 1 <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>
2
3

4
5 | 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 40.5kV
2ms 40.5kV 3ms 3kA
10kV 2ms
c 2ms
d | | | | | | | | | | |
| 7 | | | 20% | | | | | | | | | | |
| 8 | | | 1 85% 110%
30% | | | | | | | | | | |



| | | | | | |
|----|-----------------|--|--|--|-----------------|
| | | | | | |
| | | | 2 65% 110%
85% 110%
30%
3
80% 50kA 85%
4 | | |
| 9 | | | 1 1000V
2 10MΩ
3 | | |
| 10 | | | | | |
| 11 | SF ₆ | | SF ₆ 20
1 ≤ 150 μ L/L
2 SF ₆ 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
0.5%
4 24h | | SF ₆ |
| 14 | | | 1 1000MΩ
2 | | 2500V
1000V |
| 15 | | | 1 80% TV | | |

19

2

2kV

1

16



| | | | | | |
|----|--|-----------------------------------|--|-----------------------------|-------|
| | | | | | |
| | | | 2 | | |
| 25 | | | | | |
| 26 | | | 1000M Ω | | 2500V |
| 27 | | 1mA
U_{1mA}
$0.75U_{1mA}$ | 1 GB11032
2 U_{1mA}
3 $0.75U_{1mA}$
4 | $\pm 5\%$

50 μA | |
| 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 | | | 2500MΩ | | 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><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
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 | | | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | 1
2
3
4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | 1
2
3
4
5 | / | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

20

| | | | | | |
|--|--|--|---|--|--|
| | | | | | |
| | | | 6 | | |
| | | | 7 | | |
| | | | 8 | | |
| | | | 9 | | |

13.2

21

2500V

1

2500MΩ

2

GB/T 11024.1

1 3Mvar

± 5%

2 3Mvar

0 5%

2

3

4

1.02

5

DSV»∞



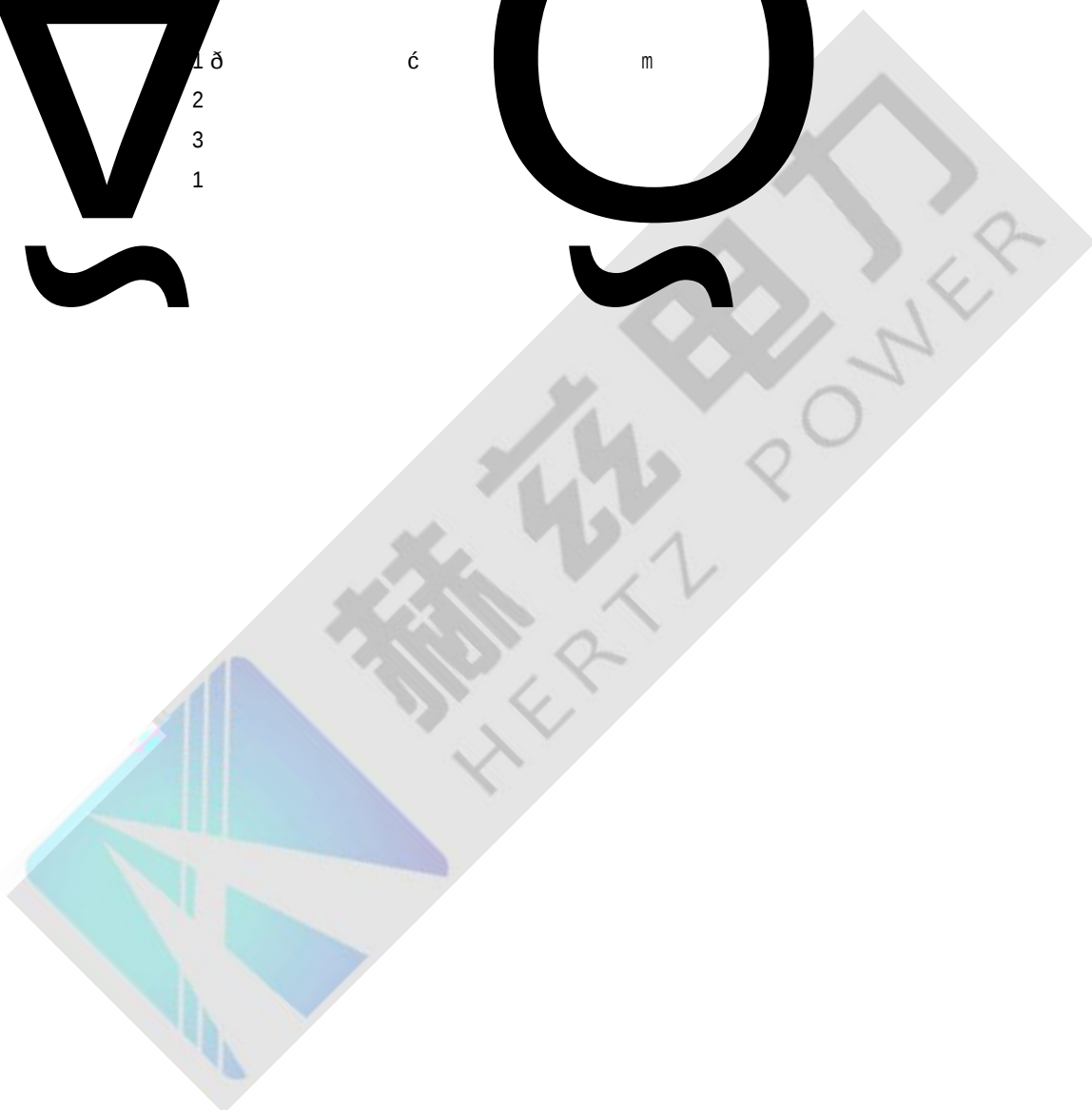
21

■ ■

7 3 4 1 ð 2 3 1

8

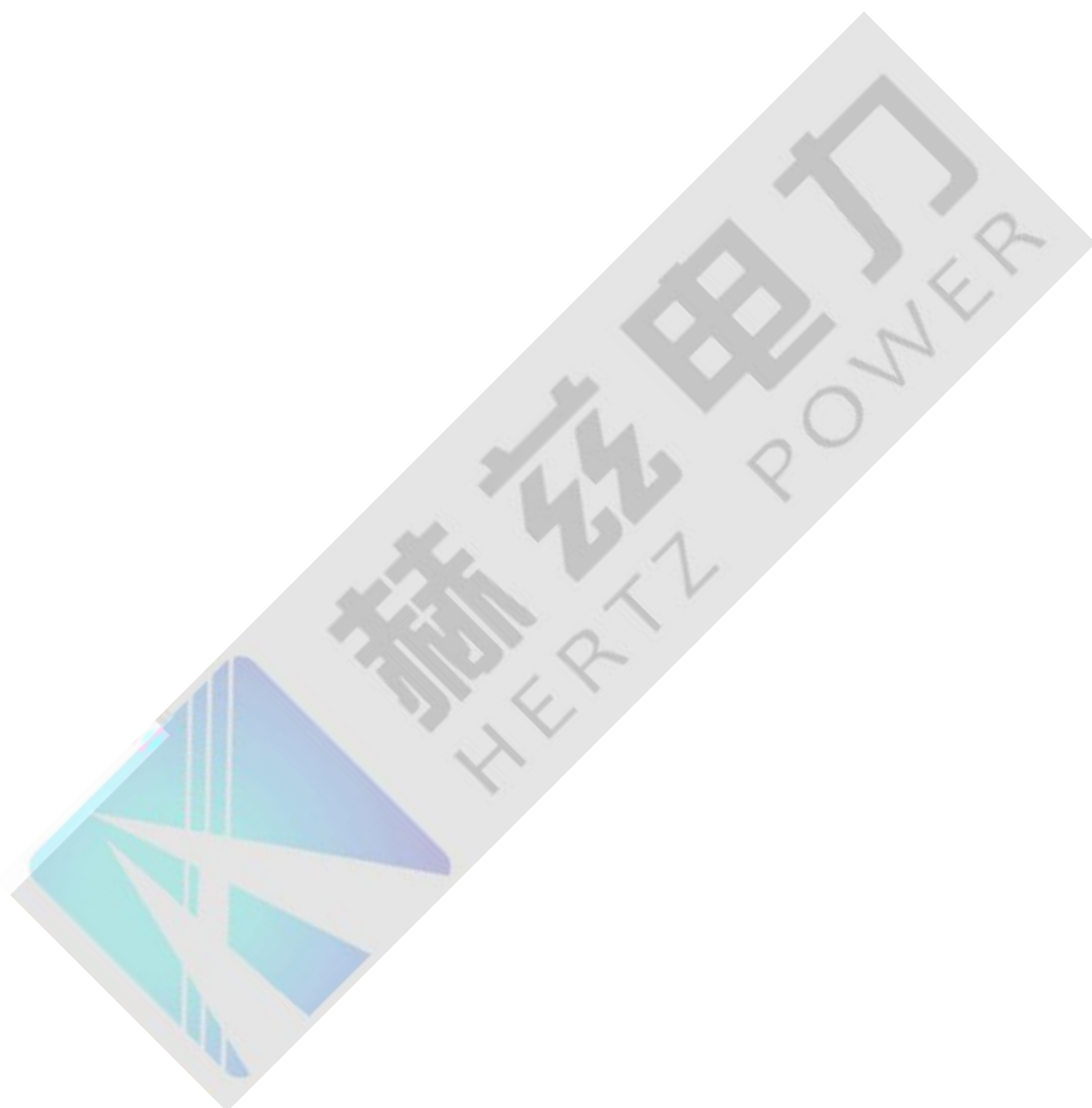
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|---|--|--|--|--|--|
| | | | | | |
| | | | 4
5
6
7 | | |
| 6 | | | 1
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N J | | |
| 7 | | | 1
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| 8 | | | 1
2
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9
/ | | |

13.4

- 120%
- 2
- 3
- 4n



24 35kV

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-----|-----|---|-----|-----|-----|-----|-----|-----|-----|-----|------|----|----|----|----|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|--|--|
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | | | 1
2
a35kV3
± 1%
b± 0.5%
c% 1/10
± 1% | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | 1
2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | 1
2

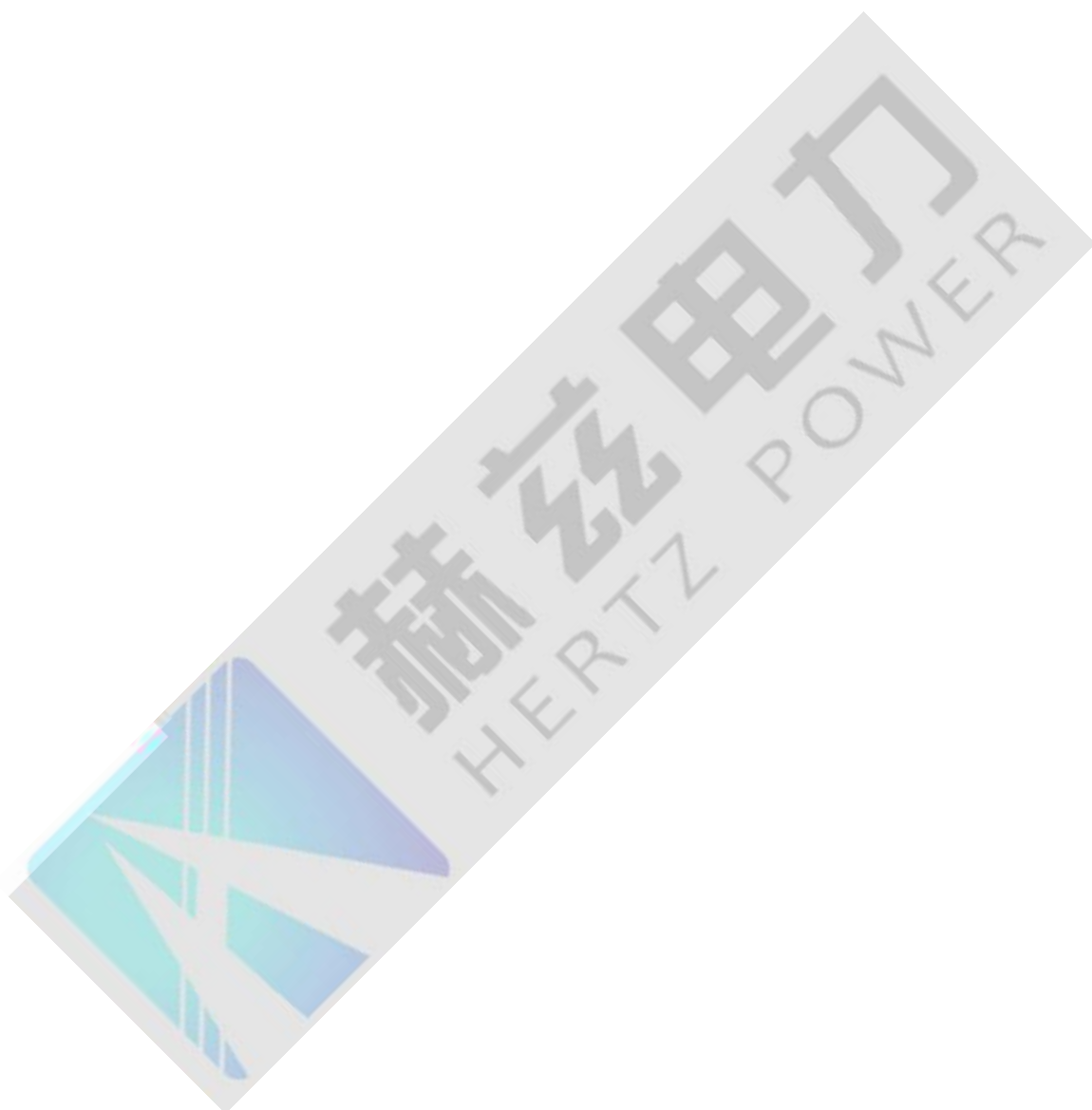
3
4
52500V1min | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | 170%10000MΩ20
2
<table><tr><td>K</td><td>5</td><td>10</td><td>15</td><td>20</td><td>25</td><td>30</td><td>35</td><td>40</td><td>45</td><td>50</td><td>55</td><td>60</td></tr><tr><td>A</td><td>1.2</td><td>1.5</td><td>1.8</td><td>2.3</td><td>2.8</td><td>3.4</td><td>4.1</td><td>5.1</td><td>6.2</td><td>7.5</td><td>9.2</td><td>11.2</td></tr></table>
aK20
b
3A

A = 1.5 ^{K/10} 1

20 | 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 | | |
| 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 | | | | | | | | | | | | | | | | | | | |



24 35kV



24 35kV



24 35kV

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

14.2 35kV

25 35kV

| | | | | | |
|---|--|--|--|---------------------------------|--|
| | | | | | |
| 1 | | | <div>1</div> <div>a</div> <div>b<p>pH >5.4</p></div> <div>c<p>mgKOH/g ≤ 0.03</p></div> <div>d<p>≥ 135</p></div> <div>e<p>mg/L ≤ 20</p></div> <div>f<p>25 ,mN/m ≥ 40</p></div> <div>g<p>tan δ 90 % ≤ 1.0</p></div> <div>h<p>kV ≥ 40</p></div> <div>i<p>90 Ω·m ≥ 6 × 10¹⁰</p></div> <div>j<p>% ≤ 0.02</p></div> <div>2</div> <div>3</div> <div>a<p>24h</p></div> <div>b<p>GB/T 7252</p></div> <div>c<p>μ L/L</p></div> <div>20 H₂ 10 C₂H₂ 0.1</div> | | |
| 2 | | | <div>1 1600kVA , 2%</div> <div>2 1%</div> <div>2%</div> <div><div>R₂=R₁ T+t₂ / T+t₁</div><div>R₁ — t₁ Ω</div><div>R₂ — t₂ Ω</div><div>T — 235 225</div></div> | | |
| 3 | | | <div>1 70% 10000 MΩ</div> <div>20</div> <div>2 50</div> | <div>1 2500V</div> <div>2</div> | |



25 35kV

3

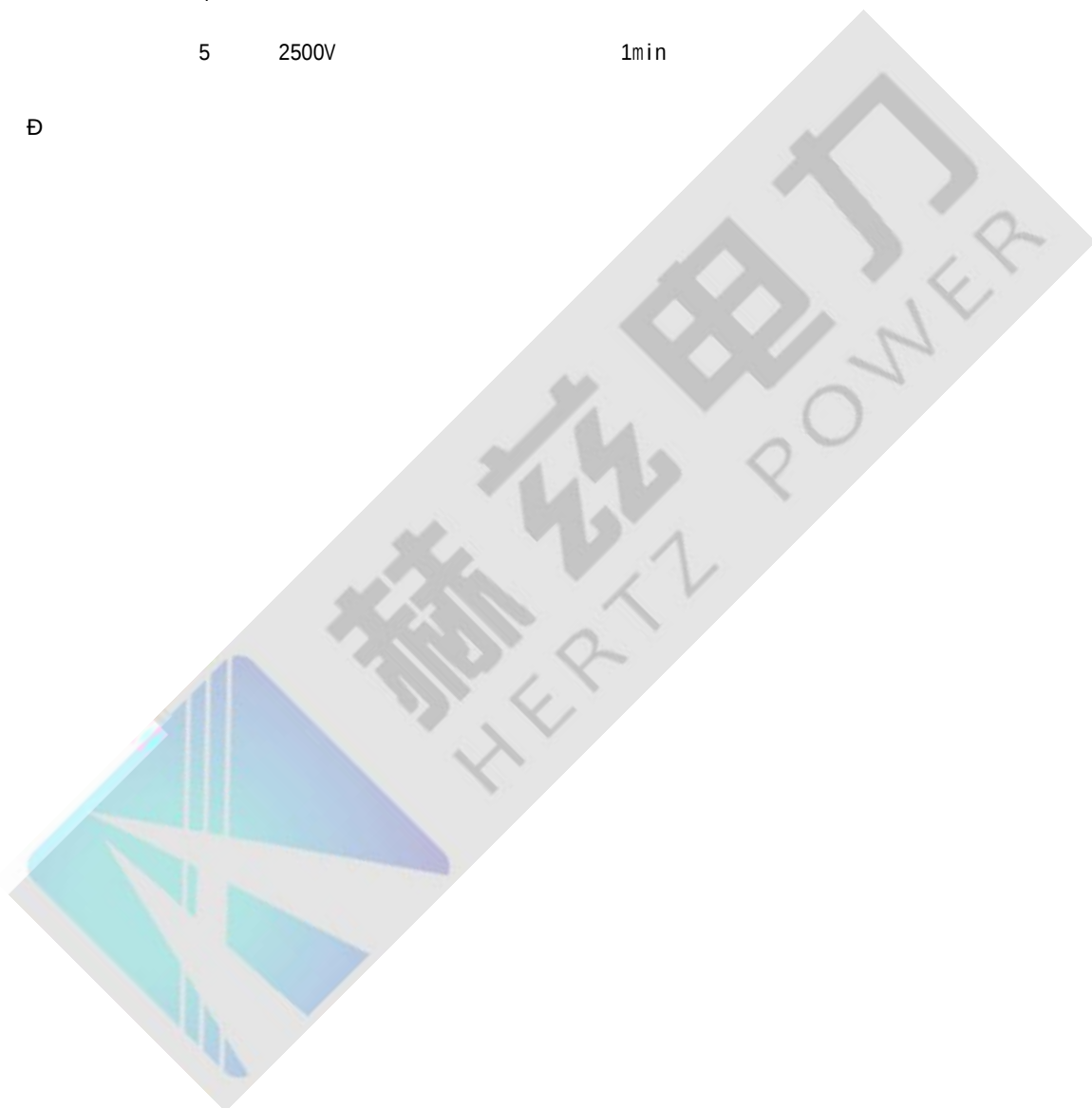
4

5 2500V

1min

7

Đ



25 35kV



25 35kV

| | | | | | |
|--|--|--|---|--|--|
| | | | | | |
| | | | 8 | | |
| | | | 9 | | |

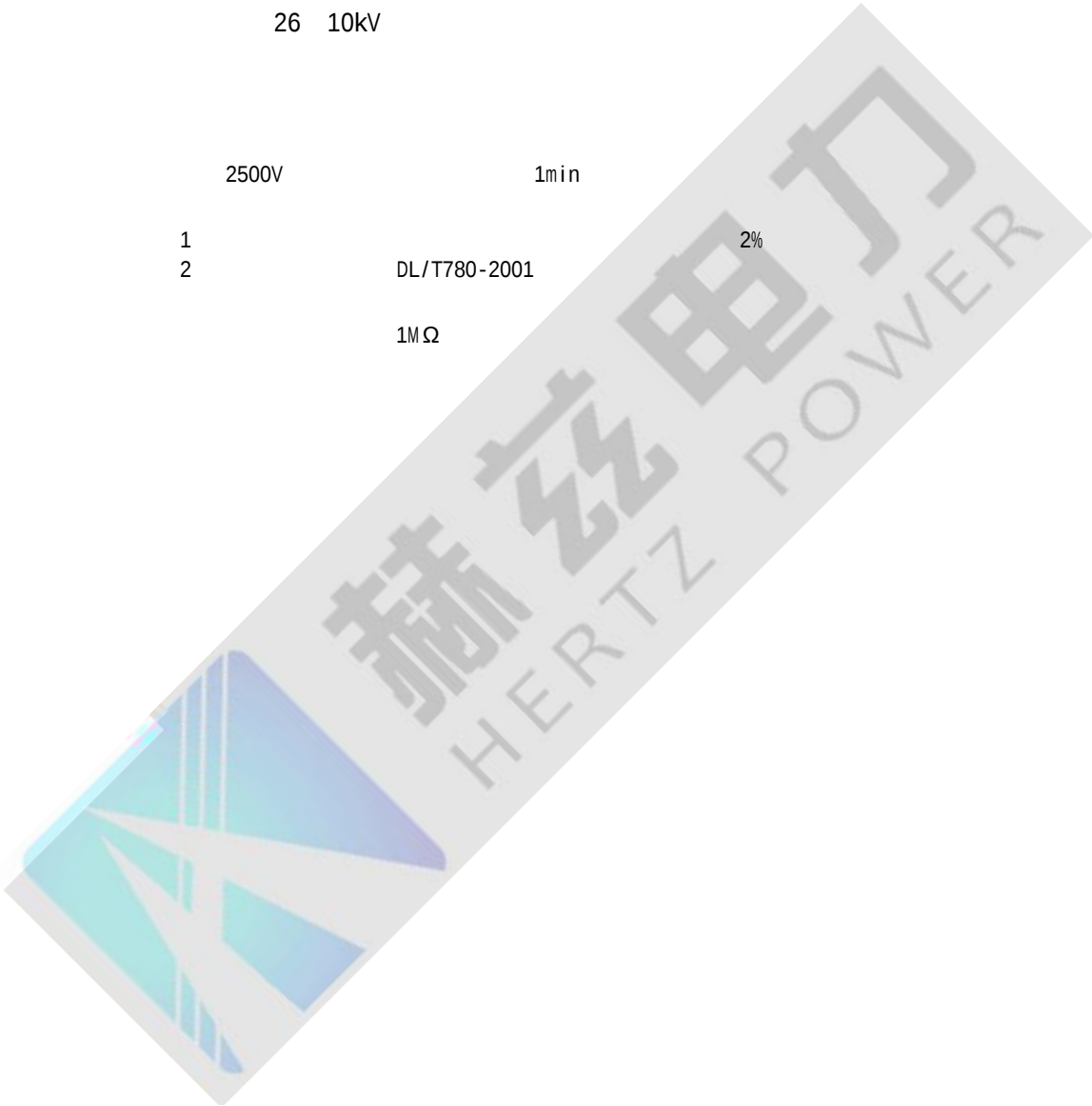
14.3 10kV

26 10kV

1 2500V 1min

2 1 2 DL/T780-2001 2%

3 1MΩ



1

GB11032

1 35kV

5000V

2500M Ω

2 35kV

2500V

2

1000M Ω

3 1kV

500V

2M Ω

4

5M Ω

500V

1

GB 11032

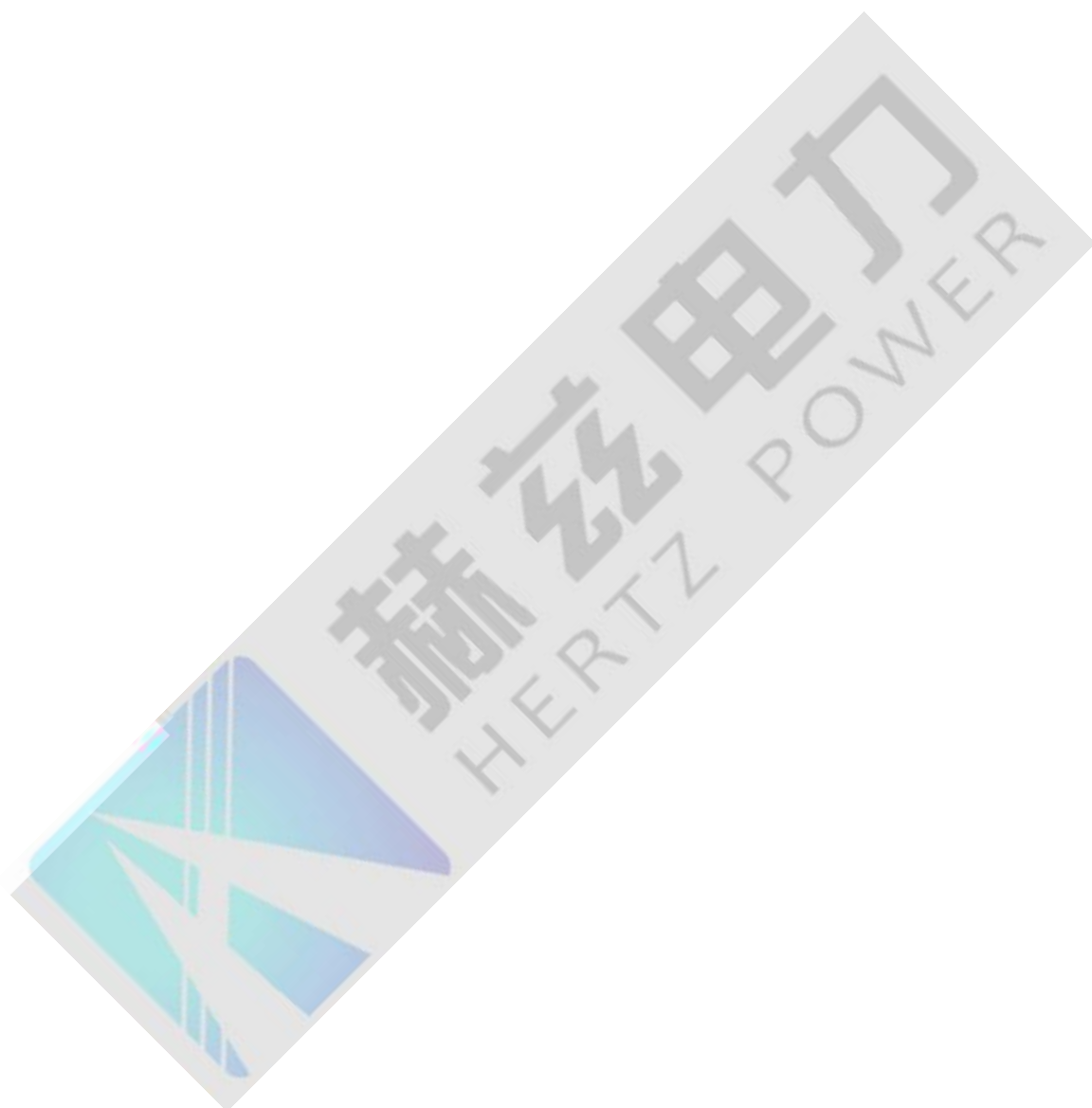
3

2

3

0.75

4





| 1 | | | 1
2
1000MΩtan δ10000MΩ1000MΩ2% | | 1
2500V

2
1000V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------|------|-----------------------|---|-------|------------------------------|----|--|--|--|---|-----|-------|-------|---|-----|-------|-------|------|-----|-------|-------|----|-----|-------|-------|----|------|-------|-------|-----------------------|------|---------|---------|-----|-----|---------|---------|-----|-----|---------|---------|-----|-----|-------------|-------------|---|--|---|--|
| 2 | | 20kV

tan δ | 1
2
3
2%
± 5%1000MΩtan δ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | | | 1
2
1min
<table><tr><th rowspan="2">kV</th><th rowspan="2">kV</th><th colspan="2">kV</th></tr><tr><th></th><th></th></tr><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></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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | 1.

1)
<table><tr><th colspan="4">tan %</th></tr><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></table>
2)
3)
2. | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 0.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1.0 | 35kV | 0.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 0.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 0.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1.5 | U _m =500kV | 0.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 0.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 0.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5

20pC $1.05U_m / \sqrt{3}$

1 SF₆ 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
50MΩ
1MΩ /kV

2500V

2

| kV | kV | 1min | kV |
|----|------|------|----|
| 10 | 12 | 42 | |
| 35 | 40.5 | 100 | |

1

2

3

3

4

4

1

2

3

4

5

100%

6

7

8

1

2

A

B

C

5

30

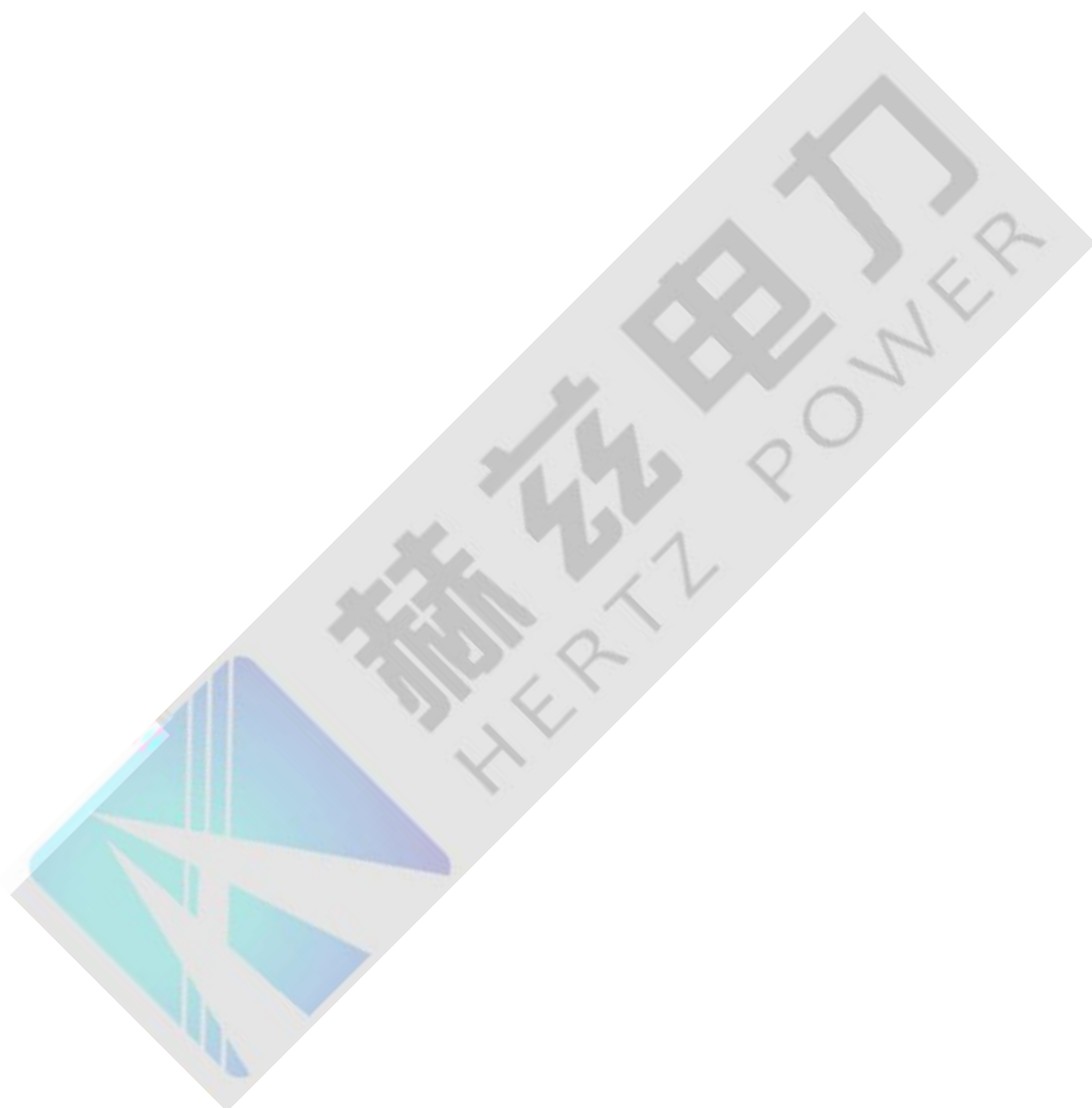
| | | | | | |
|--|--|--|-------------------------------------|---|--|
| | | | | | |
| | | | 3
4
5
6
7

8
9 | / | |

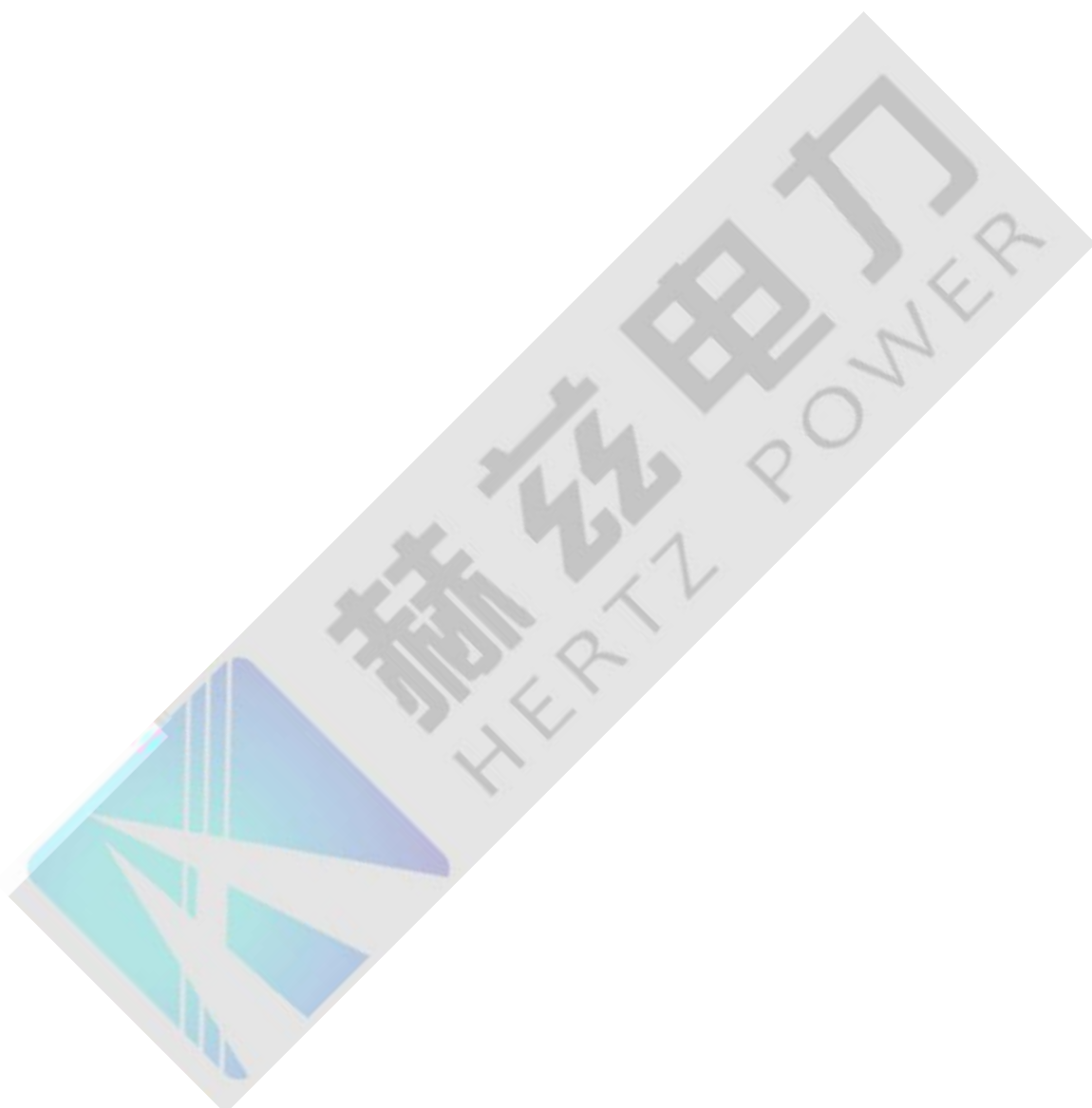
18

31

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------|-------------------|---|-------|---------|-------|----------------------|--|--|-----|--|-------|--|-----------------|----|----|--------------|--|-----------------|----|--|---------|-------------------|-------------------|----|--|---------|-------------------|-------------------|----|--|---------|-------------------|-------------------|----|--|
| | 1 | 1000MΩ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 2 | 0.6/1kV | 1000V | 0.6/1kV | 2500V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 6/6kV | 5000V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 500V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 2 | 0.5MΩ /km | | | 50MΩ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 110kV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | | 10kV | 1min | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 20 300Hz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | <table><tr><td>U₀/U kV</td><td></td><td></td><td colspan="2">min</td></tr><tr><td>18/30</td><td></td><td>2U₀</td><td>15</td><td>60</td></tr><tr><td>21/35-64/110</td><td></td><td>2U₀</td><td colspan="2">60</td></tr><tr><td>127/220</td><td>1.7U₀</td><td>1.4U₀</td><td colspan="2">60</td></tr><tr><td>190/330</td><td>1.7U₀</td><td>1.3U₀</td><td colspan="2">60</td></tr><tr><td>290/500</td><td>1.7U₀</td><td>1.1U₀</td><td colspan="2">60</td></tr></table> | | | | U ₀ /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 | |
| U ₀ /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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



$$\begin{array}{lll} Z \leq 2000 / I & I > 4000 A & Z \leq 0.5 \Omega \\ I \text{ — } & & A \\ Z \text{ — } & & \Omega \end{array}$$



32

11



33

UPS

1

0ms

0ms

/

/

4

2

/

4ms

3

4ms

1

8

1.8V/cell

12V

10.8V

100%

5

2

2V

赫兹电力
HERTZ POWER

| | | | | | |
|----|--|---|---|-------|--|
| | | | | | |
| | | | 3 | | |
| | | | 4 | | |
| 11 | | | 1
2
3
4
5
6 | 350mm | |
| 12 | | | 1
2

3

4

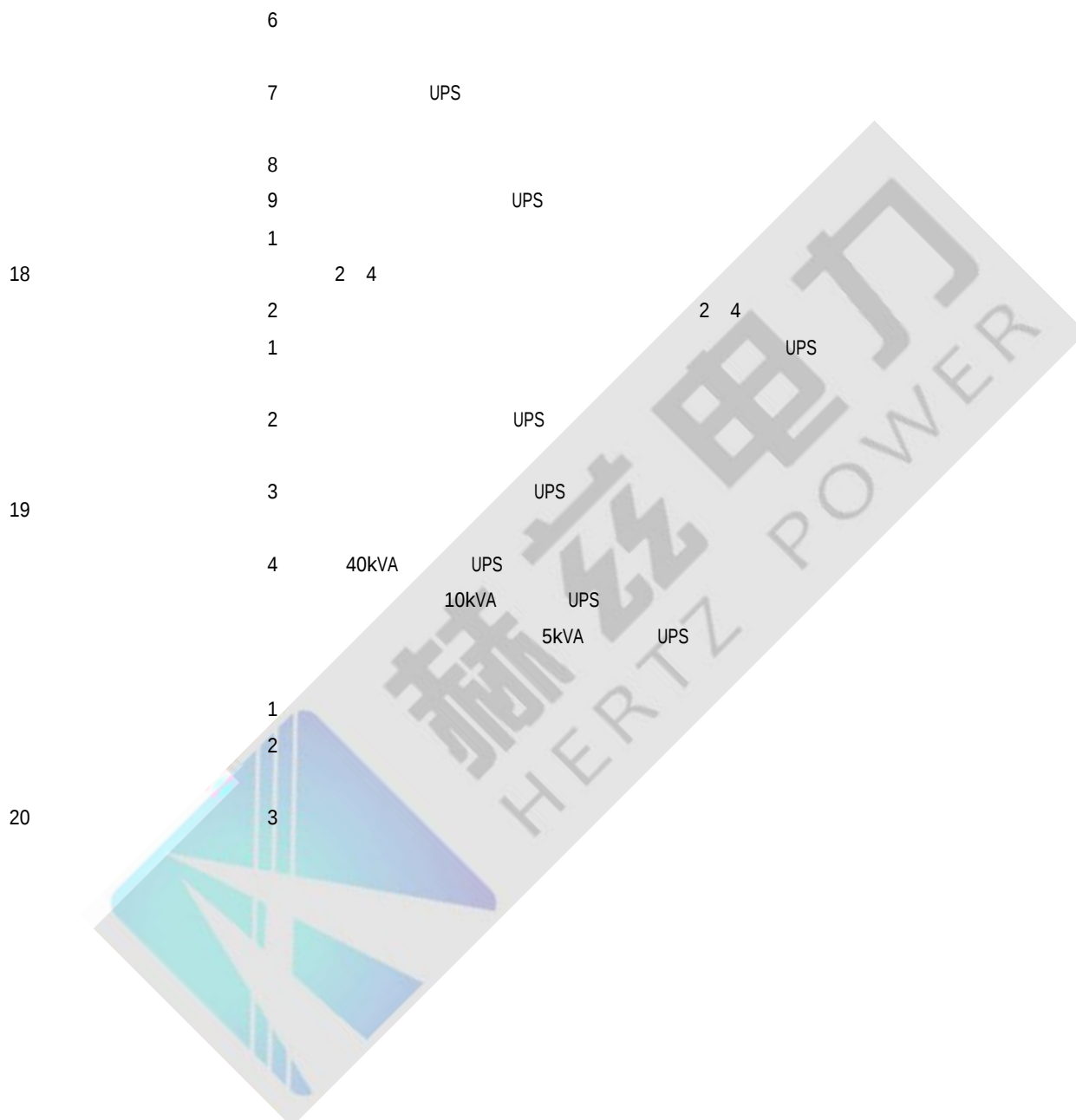
5
6
7

8

9 | | |
| 13 | | | 1
2 | | |
| 14 | | / | 1
2
3 | | |
| 15 | | | 1
2 | | |
| 16 | | | 1 UPS
10kA 8/20μs SPD
2 SPD SPD SPD
3 SPD | | |
| 17 | | | 1
2
3
4
5 | | |



33



5

6

7

8

9

♦



33

| | | | | | |
|--|--|--|----------------|--|--|
| | | | | | |
| | | | 10
11
12 | | |

20.2

34

| | | | | |
|---|-------|---------|-------|-----------|
| 1 | 1000V | 2500V | 10MΩ | 10MΩ |
| 2 | | 1000V | 0.5MΩ | / |
| 3 | | 30% | 100% | 5% |
| 4 | 1 | ≤ ±1% | | |
| | 2 | ≤ ±0.5% | | |
| | 3 | ≤ 0.5% | | |
| | 4 | | | |
| 5 | | | | 10% |
| 6 | 1 | → | → | |
| | 2 | | | |
| | 1 | | | 8 |
| | | 12V | 10.8V | 1.8V/cell |
| 7 | 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 Ω | |
| 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 | |
| | 1 | |
| 21 | 2 | |
| | 1 | |
| 22 | 2 | |
| | 1 | |
| 23 | 2 | |
| | 1 | |
| 24 | 2 | |
| | 3 | |
| | 1 | |
| 25 | 2 | |
| | 3 | |
| | 1 | |
| 26 | 2 | |
| | 3 | |
| | 4 | 0.5 |
| | 1 | |
| 27 | 2 | |
| | 3 | |
| | 4 | |
| | 1 | |
| | 2 | |
| 28 | | |



34

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

| | | | | | |
|----|--|--|--|--|--|
| | | | | | |
| | | | 7
8

9

10
11

12

13 110kV
14 110kV

15

16 | | |
| 32 | | | 1 110kV

2

3 10kV 35kV

4 500kV GIS 110kV 220kV GIS
6

5 500kV 110kV 220kV
6

6 PT PT | | |
| 33 | | | 1

2 500kV

3 500kV 220kV

4 220kV | | |



34

5

6 500kV

7 220kV

8

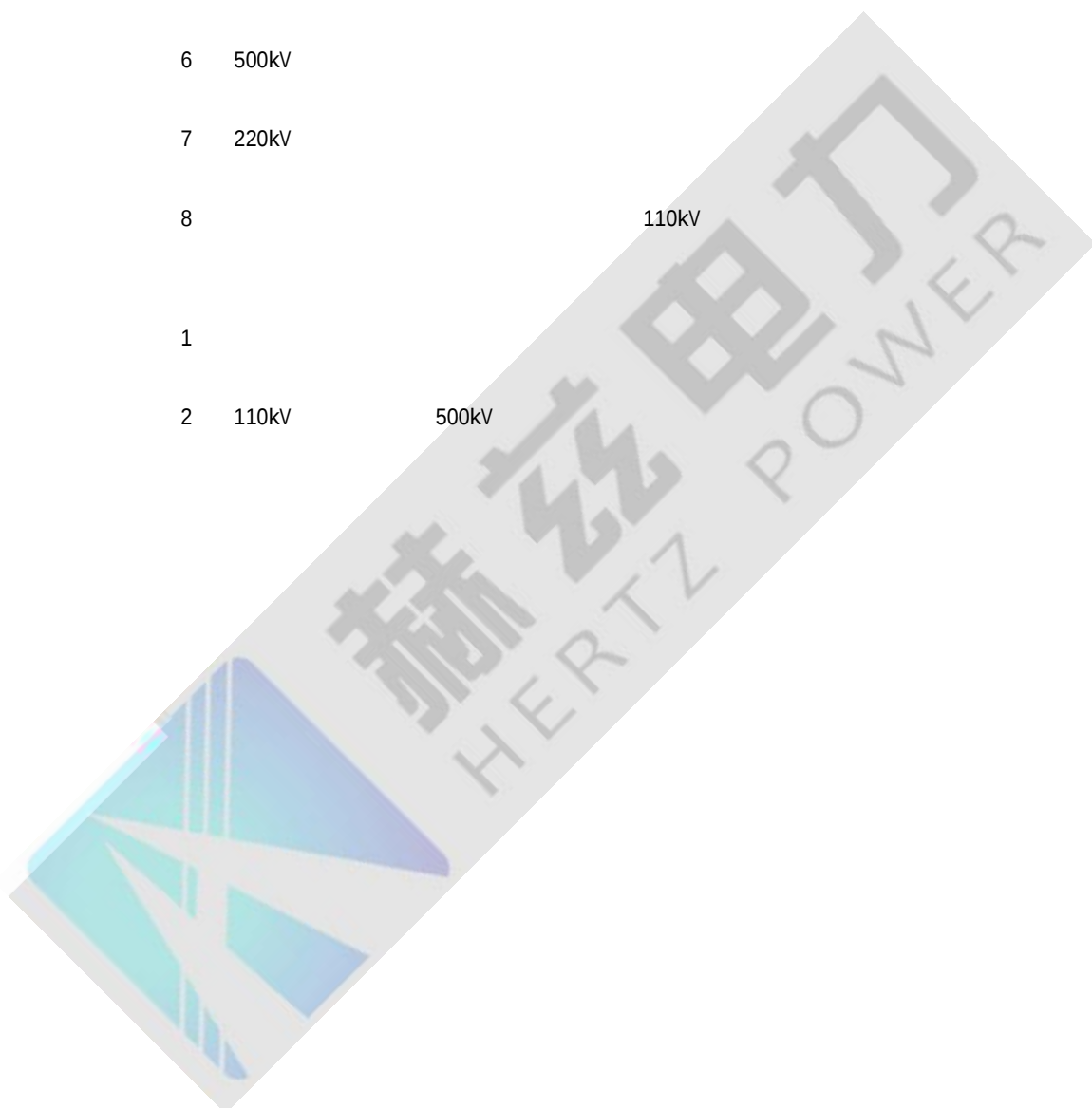
110kV

1

2 110kV

500kV

34



34

| | | | | | |
|--|--|--|--|--|--|
| | | | | | |
| | | | | | |

20.3

35

| | | | | |
|---|----|-------|--------|-------|
| | 1 | | 2500V | 10MΩ |
| | 2 | 1000V | 10MΩ | |
| | 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 | | | |



2
1mA/ (20 ± 15)
± 5%
3 0.75





12

1

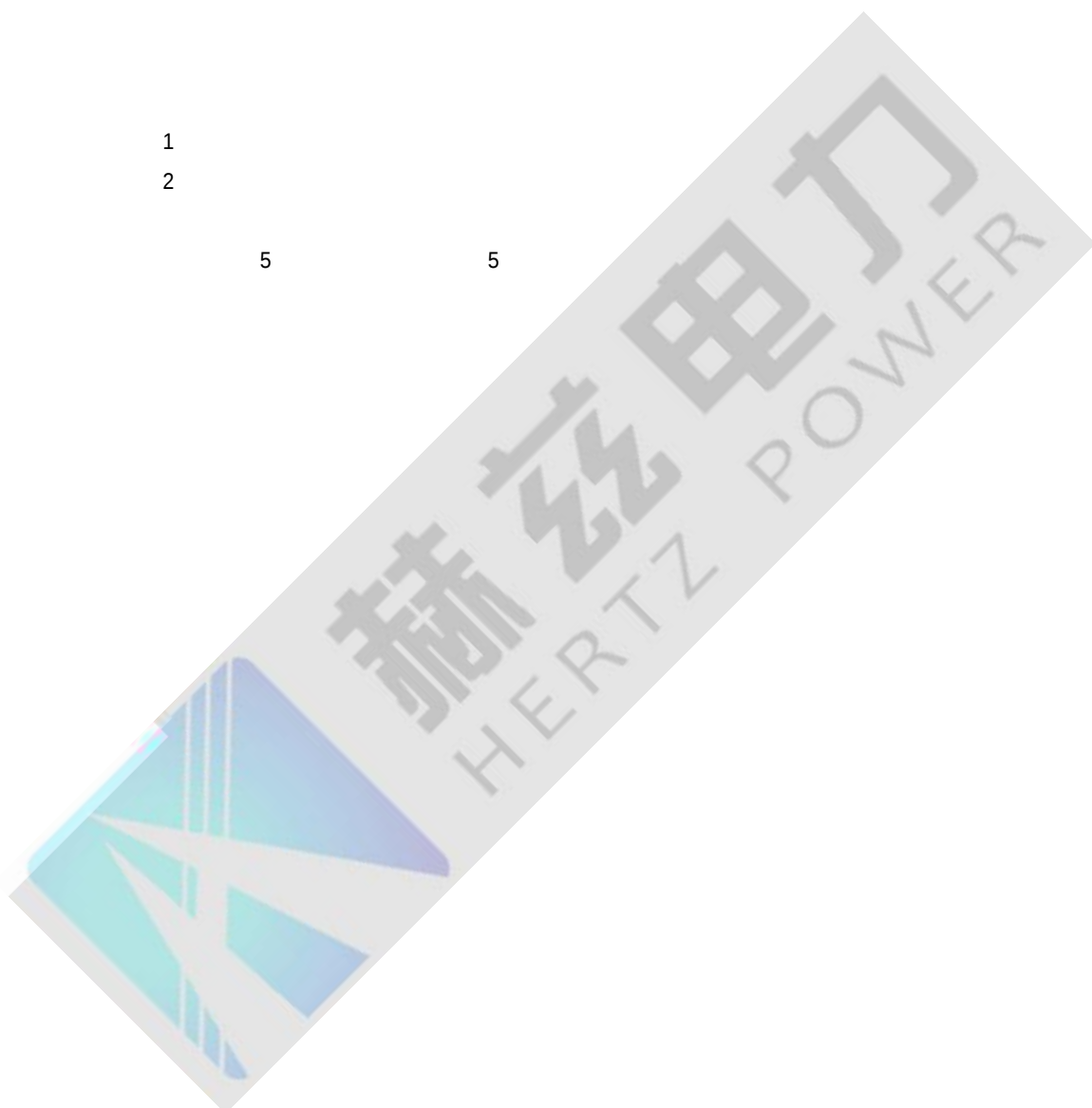
13

2

5

5

14





39

2

a

b

c

400cm²

2

d

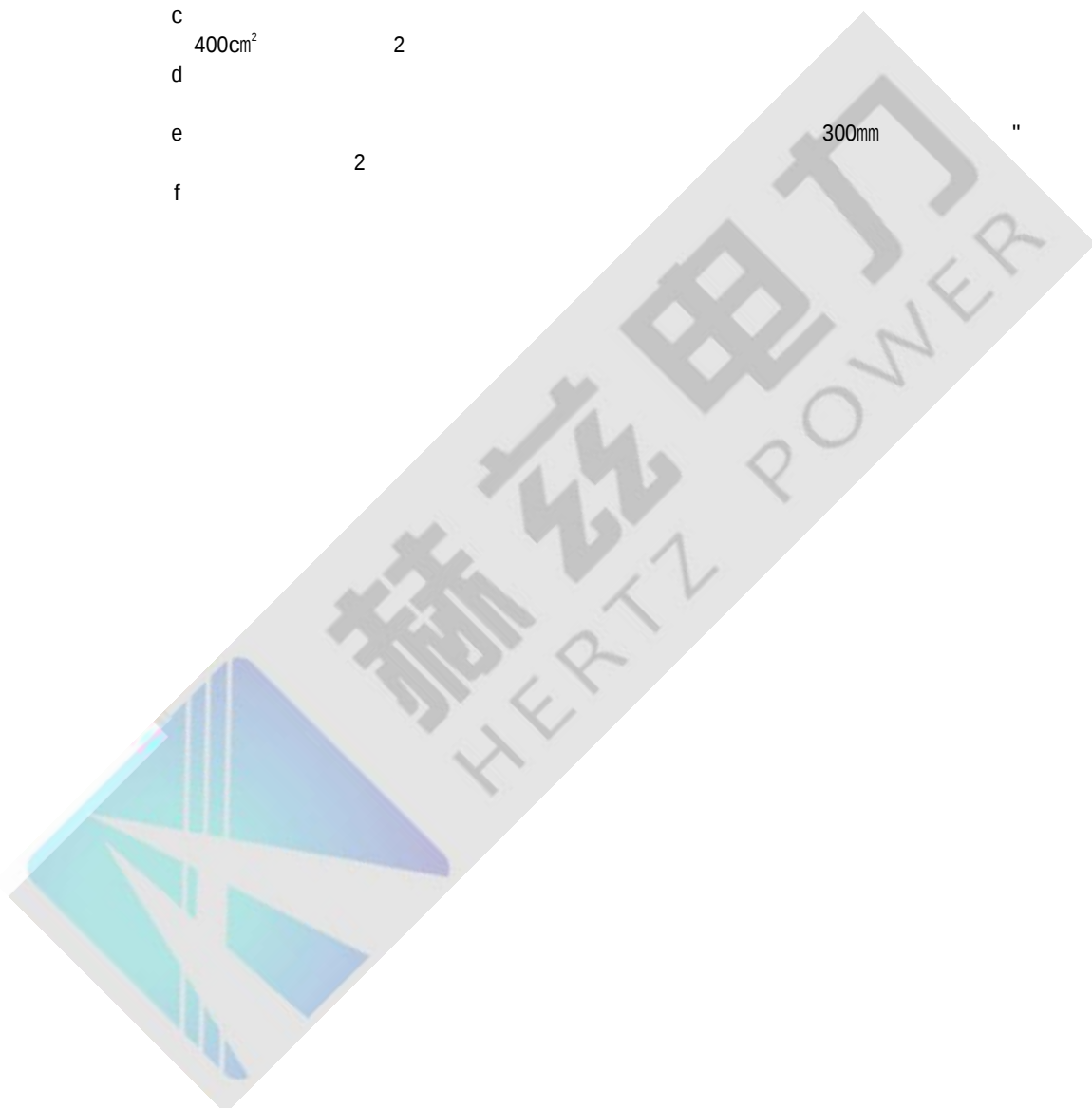
e

2

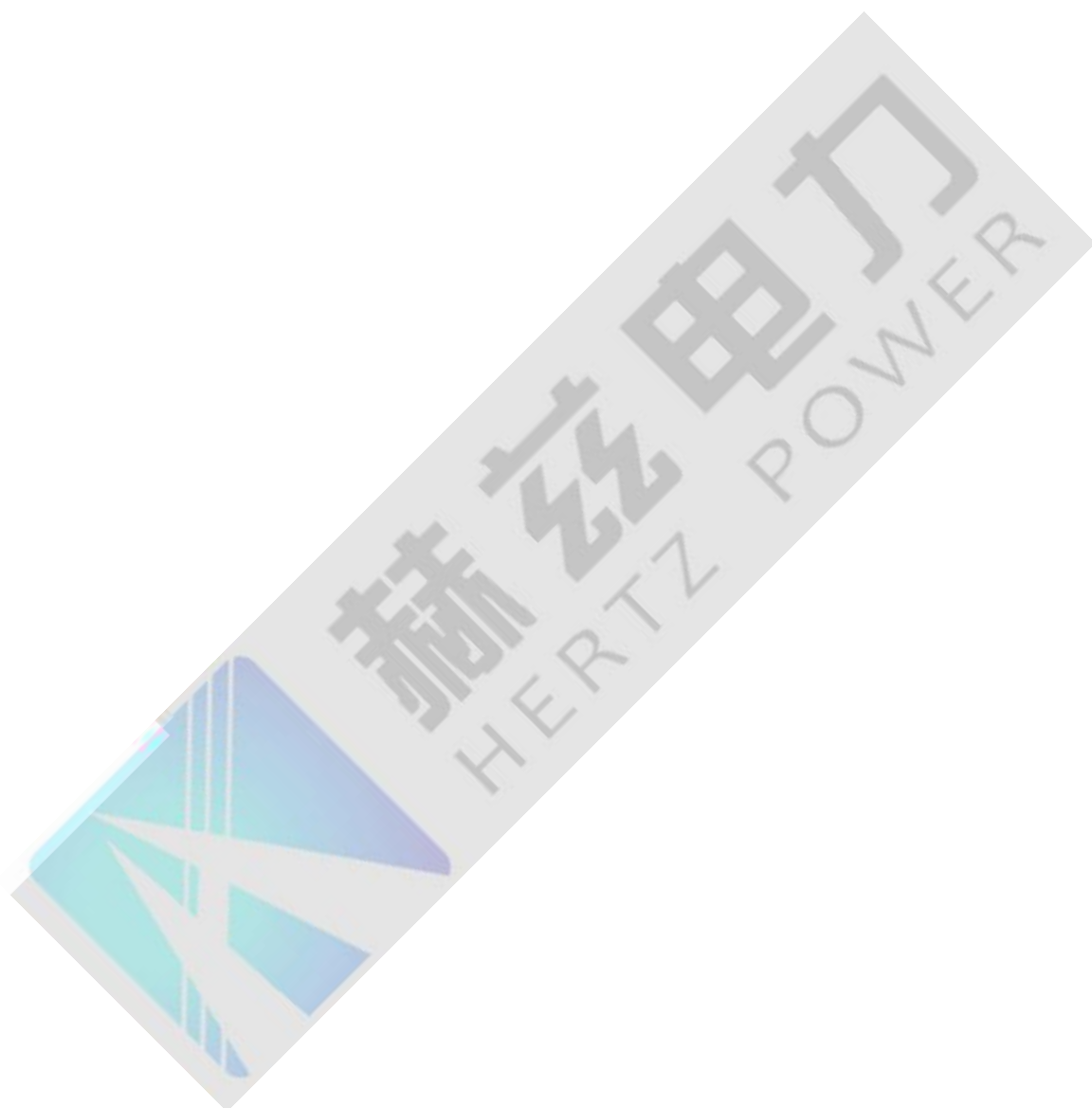
f

300mm

"



| | | | | |
|---|---|-------|---------|--------|
| | g | | | |
| | h | | | |
| | i | 2mm | 5 | 2.5mm |
| 1 | a | | | |
| | b | | | |
| | c | | | |
| | d | | | |
| | e | | | |
| | f | 5-8mm | | 8-12mm |
| 2 | a | | | |
| | b | | | |
| | c | | | |
| | d | | | |
| | e | | | |
| | f | | | |
| | g | 20mm | 10% | |
| 2 | h | | 4-8mm . | |
| | g | I II | | |
| 3 | a | | | |
| | | 0.90h | | |
| | | 0.8mm | | 0.90h |
| | b | | | 0.90h |
| | c | | | ≥ 10mm |
| | d | | ≥ 1.5mm | ≥ 1mm |
| | | ≥ 3mm | ≥ 2mm | |
| | e | | | |
| | f | | | |
| | g | | | |
| | h | | | |
| | i | | | |



6

7

8

9

- a) 100mm
- b) $\leq 100\text{mm}$ 8
- c) $\leq 500\text{mm}^2$

1

2

6

3

4

5m

2mm

1

7

2

3

4

500mm

1050mm

1

- a)
 - 1.5
 - 0.6MPa
 - 10min
 - 0.02MPa
 - 1h
 - 0.05MPa
 - 1.15
 - 2h
 - 0.03MPa,

- b) $\bar{e} \bar{E}$,

- c)
 - 1m
 - 0.5m
 - 0 15m

8

3

- d)



| | | | | | | | | | | | | | | | | | | | | |
|--|--|-----|---|--|--|----|--|--|----|--|--|---|--|--|-----|--|--|-----|--|--|
| | | | | | | | | | | | | | | | | | | | | |
| | | | <div><div>1. 1m</div><div>± 20mm</div><div>140mm</div><div>100mm</div><div>5mm</div><div>3mm</div></div> <div><div>3)</div><div>a)</div><div>b)</div><div>c)</div><div>24h</div><div>10min</div><div>d)</div><div>e)</div><div>f)</div><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></td><td></td><td>0.1</td></tr></table></div> <div><div>4</div><div>a)</div><div>4m</div><div>b)</div><div>c</div><div>300mrn</div><div>2m</div><div>d</div><div>90 °</div><div>300mm</div><div>e</div><div>1m</div><div>3mm , 5m</div><div>10mm</div><div>1m</div><div>3mm , 5m</div><div>15mm</div></div> <div><div>5</div><div>a)</div><div>b</div><div>c</div><div>d)</div><div>1m</div><div>3mm , 5m</div><div>10mm</div><div>1m</div><div>3mm , 5m</div><div>15mm</div></div> <div><div>6</div></div> | | | mm | | | 15 | | | 5 | | | 0.1 | | | 0.1 | | |
| | | mm | | | | | | | | | | | | | | | | | | |
| | | 15 | | | | | | | | | | | | | | | | | | |
| | | 5 | | | | | | | | | | | | | | | | | | |
| | | 0.1 | | | | | | | | | | | | | | | | | | |
| | | 0.1 | | | | | | | | | | | | | | | | | | |

a)

b)

2008 07 11 12:00:00 9 v8 RX,, 9 29 ÔÆ

7

a) 1áE 1€ P,€

b)

± 10mm

± 15mm

9)

a)

b)



- k) ;
- l)

2)

a)

b)

c)

1/1000

d)

$\leq 10\text{mm}$

$\pm 10\text{mm}$

3

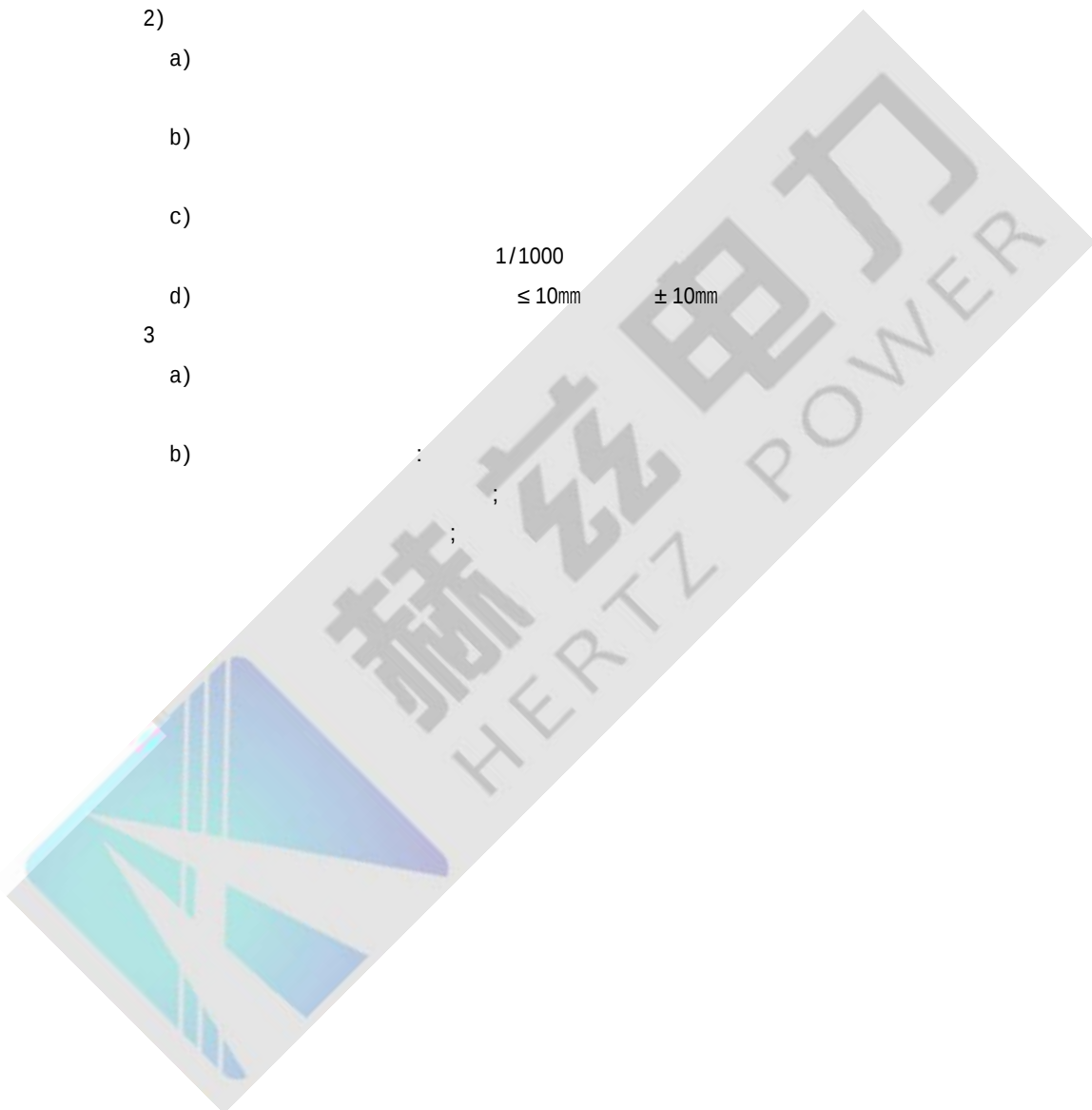
a)

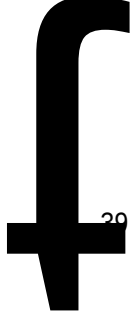
b)

:

;

;





d

e)

-10mm

2

a)

b)

c)

d

e)

-10mm

3

a)

b)

c)

d

4

a)

10m

20mm

1m

10-20mm



e)

f

30mm

100mm

g

250mm

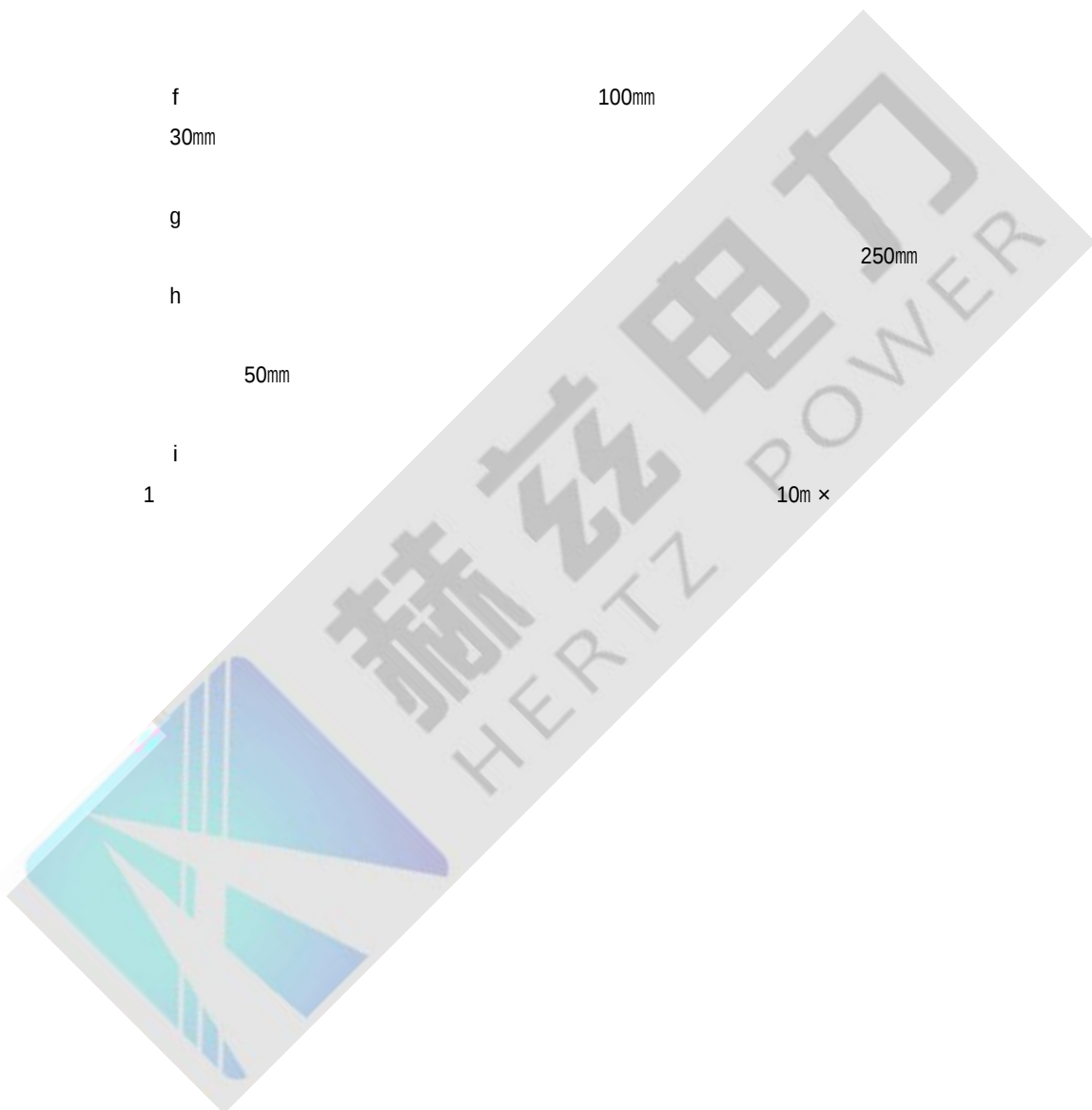
h

50mm

i

1

10m ×





| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|--------------------|--|---------|--------|----|--|--|----|--|--|------|--|--|---|--|----|--|--|-----|--|-------|--|---|--|--|----|--|-------|--|-------|--|--------------------|--|--|
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 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="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></table> | | | mm | | | 20 | | | ± 20 | | | 5 | | 10 | | | ± 2 | | +20 0 | | 5 | | | 10 | | +20 0 | | +20 0 | | ≤ h/1200 ≤ 20.0 | | |
| | | mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ± 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ± 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | +20 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | +20 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | +20 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ≤ h/1200 ≤ 20.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | a) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | 500mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 700mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | b) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | c) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | d | | 450mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 250mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 450mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 350mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | e | 1.5 | 0.6MPa | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 10min | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 0.05MPa | 1h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | f | 0.05MPa | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | a) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 10min | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 0.05MPa | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | ; | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | b) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | c) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | d) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | ± 20mm; | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | f) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 3) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | a) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | b | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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

24h

72h

GB50208

1/3,

24h

6

2)

a

a °

:

5-10mm

| | | | | | |
|---|--|--|----|--------------------|--------------------|
| | | | | | |
| | | | 2 | | |
| | | | a) | | |
| | | | b) | 5mm | |
| | | | c) | | |
| 8 | | | 1 | | |
| | | | a) | 1 | |
| | | | 2 | | |
| | | | b) | | |
| | | | c) | 2% | |
| | | | d) | 5% | |
| | | | 2 | | |
| | | | a) | | |
| | | | b) | | |
| | | | c) | kN | $\geq$ |
| | | | d) | $\geq$ | ≥ 0.9 |
| | | | e) | | ≥ 0.5 |
| | | | 3) | | |
| | | | a) | | |
| | | | b) | | 25kg |
| | | | c) | 200mm | |
| | | | d) | 15mm | 0.5m |
| | | | e) | | |
| | | | f) | $\leq 50\text{mm}$ | $\leq 30\text{mm}$ |
| | | | 4 | | |
| | | | a) | | |
| | | | b) | | |
| | | | c) | | |
| | | | d) | $\leq 10\text{mm}$ | |
| | | | 5 | | |
| | | | a) | | |
| | | | b) | 300mm | |
| | | | c) | | |
| | | | d) | $\leq 20\text{mm}$ | |
| 9 | | | 1 | | |
| | | | 2 | | |
| | | | a) | | |
| | | | b) | 80% | |

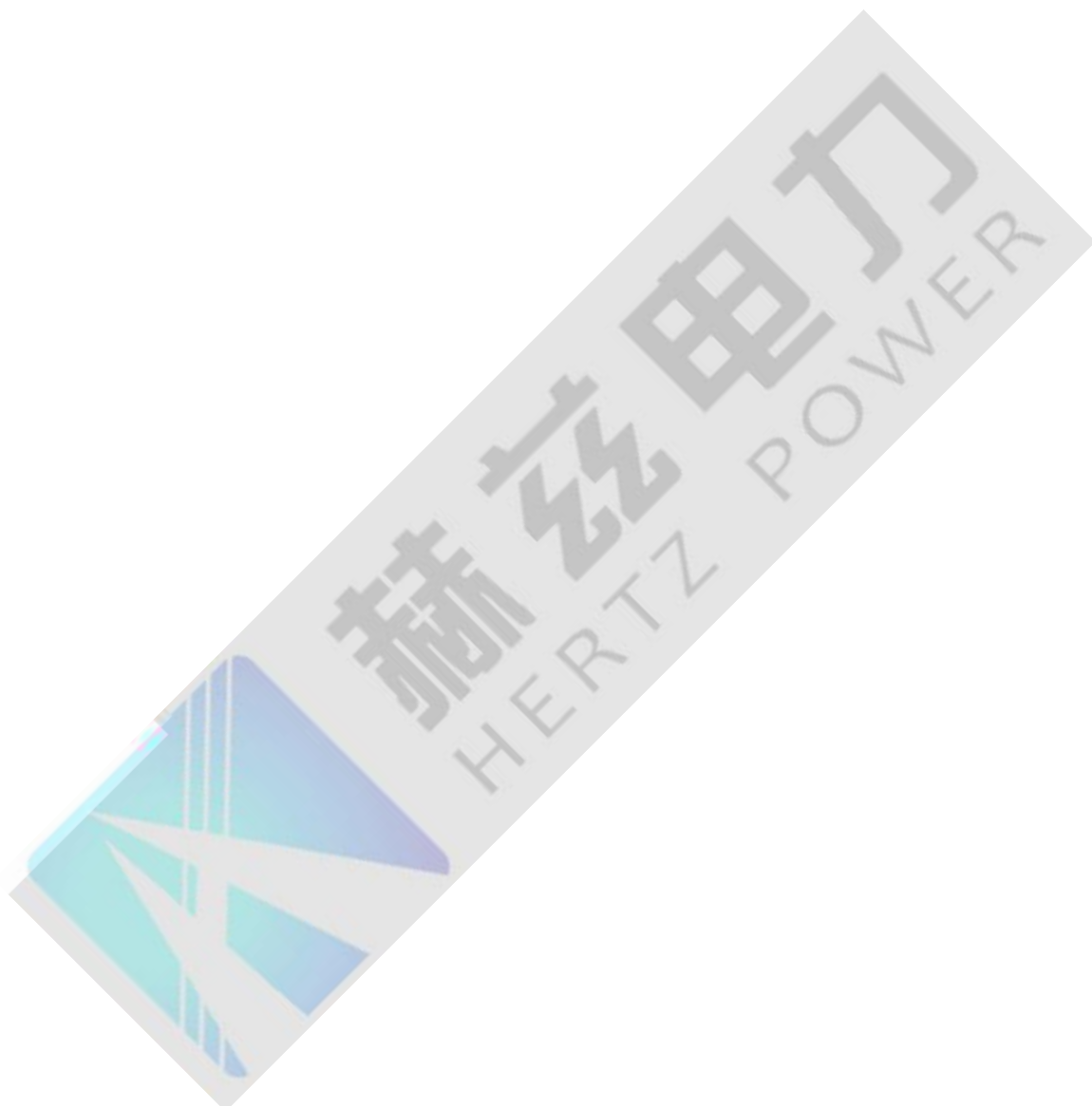
30



40

c)

20m



1

1

2

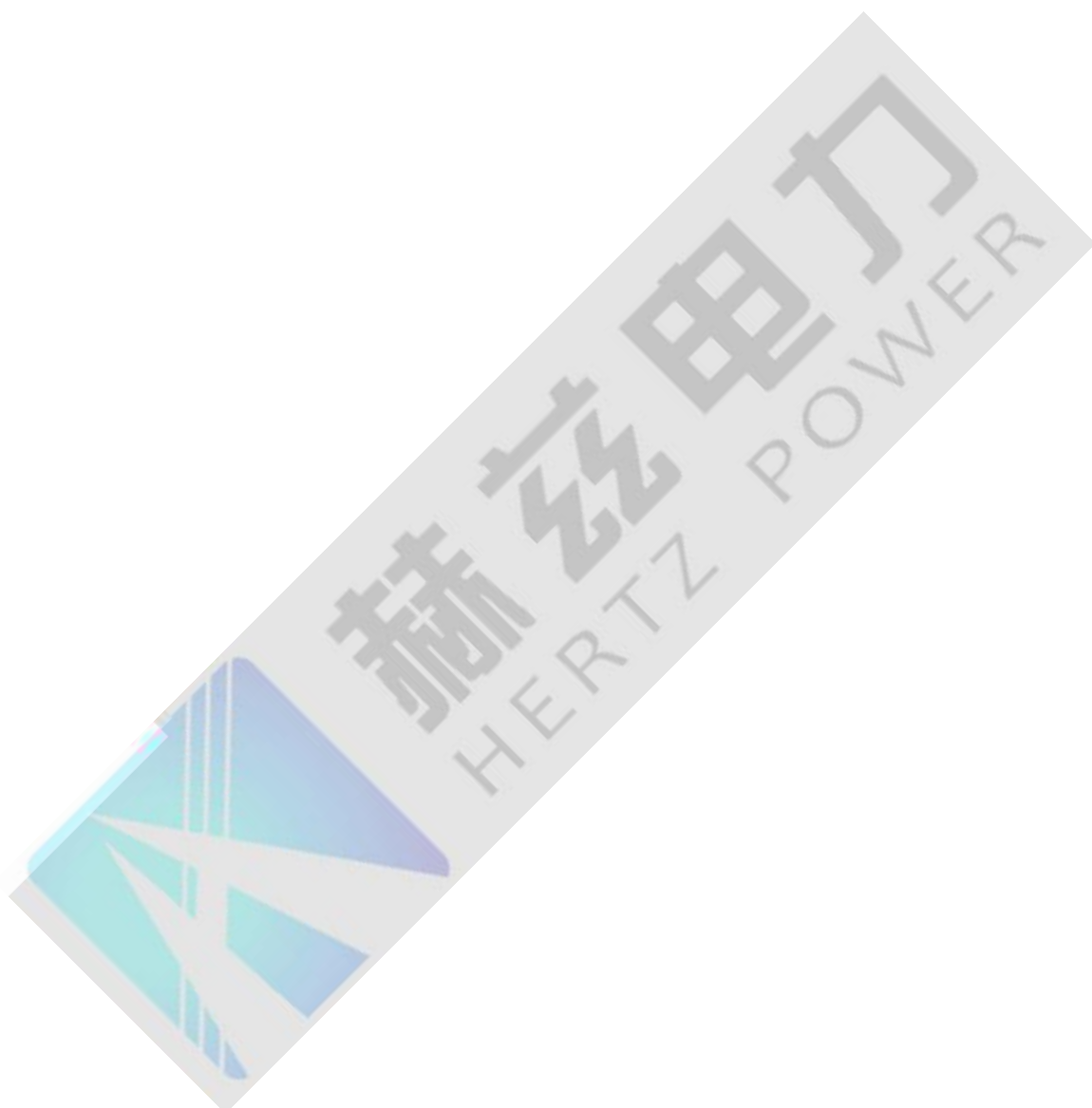
3



HERTZ



6
7
8 8mm
9
10 300g/m2, 100%
11 4 4
12
13 0.8mm
1 3
2 2 4 1mm
3 S“jPQp 7“ou-ōw1 Q`ÑV 0.2% 2mm
4 0.5% 0.6%
5 s@



43

15

8

0.5kg

3kg

6mm

2 3

9

1 2

10

2.5

11

1 2

12

13

LED

14

1mm²

15

100W

1 2

16

1 2

17

18

2.4m

36V

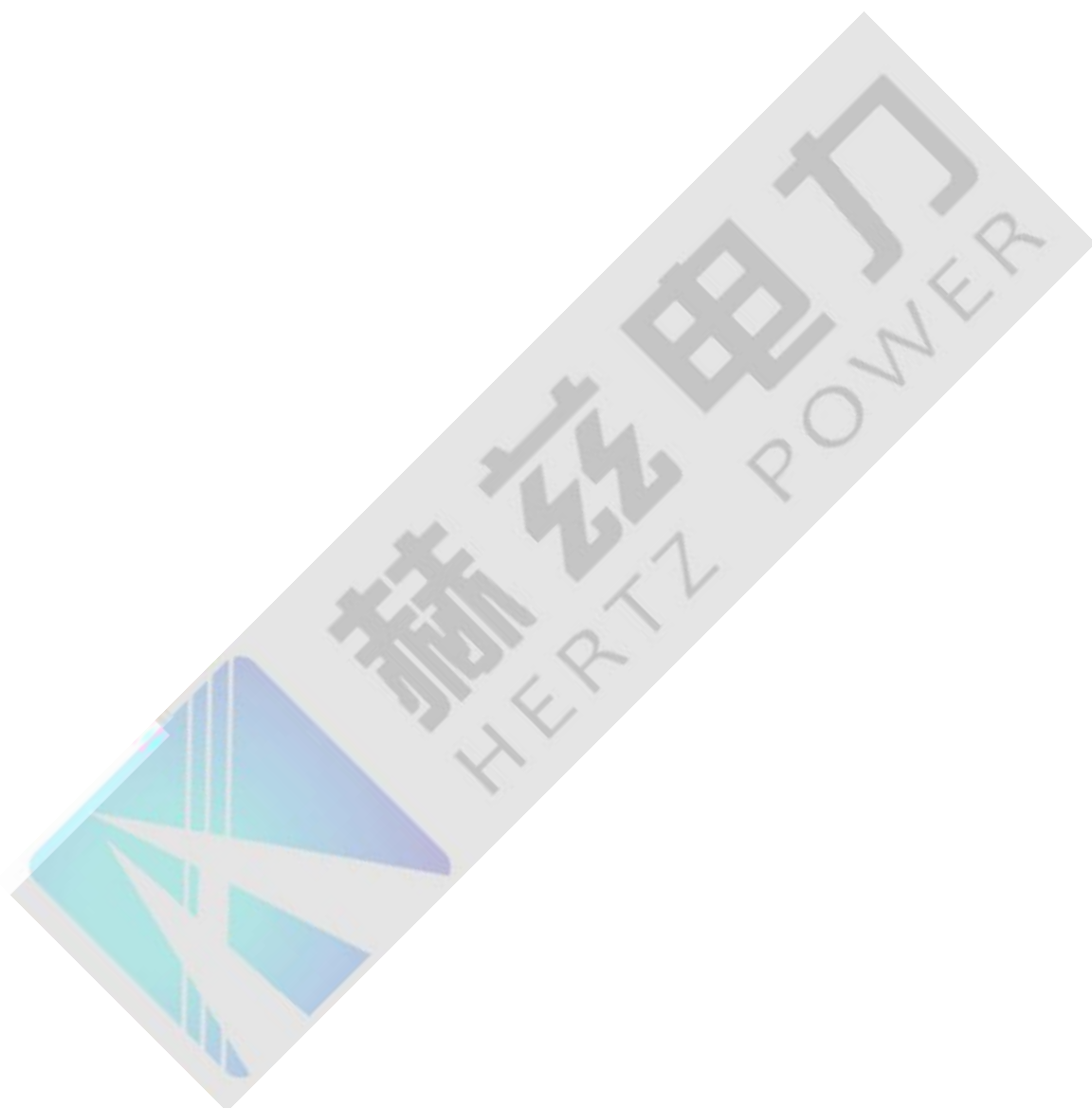
1

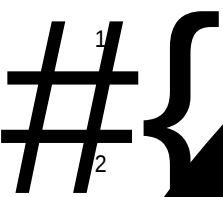
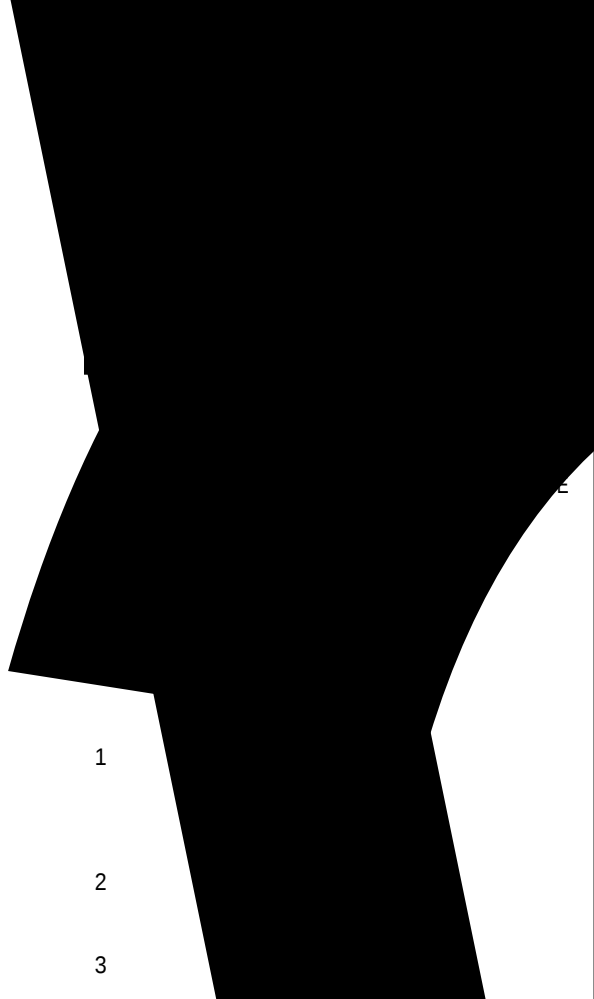
2

50%

3

y n







43

| | | | | | |
|--|--|--|---|--|--|
| | | | | | |
| | | | 4 | | |
| | | | 5 | | |

24.6

44

| | | | | | |
|---|--|--|---|-------------------|---------------------------|
| | | | | | |
| 1 | | | <div><div>1</div><div>RAL7035</div><div>800 mm600 mm2260 mm</div><div>3.2mm</div><div>2</div><div>3</div><div>4</div><div>() ,</div><div>5</div><div>100mm²</div><div>4mm²</div><div>50mm²</div><div>6</div><div>7</div><div>10%</div><div>8</div><div>9</div><div>10</div></div> | 10k
V
500kV | |
| 2 | | | <div><div>1</div><div>≥ 75 ° /s ≥ 50 ° /s ≥ 704 × 576 ≥ 50m</div><div>/</div><div>≥ 2048 × 1536</div><div>2</div><div>3</div><div>/</div><div>360</div><div>4</div><div>5</div><div>0.7</div><div>0.5</div></div> | / | <div>1</div> <div>5</div> |

44

1.5

2

30

2-5mm

6

7

8

3



| | | | | | |
|---|--|--|--|---|-------------|
| | | | | | |
| | | | 15
16
17
18
19
DLT634.5104-2002 | | |
| 4 | | | 1
2
3
4
5
6
7
8
9
10
RTU
GA 1089-2013
OSD
RPU | / | 1
3
4 |
| 5 | | | 1
2
3
4
5
Ω
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 | | | | | |



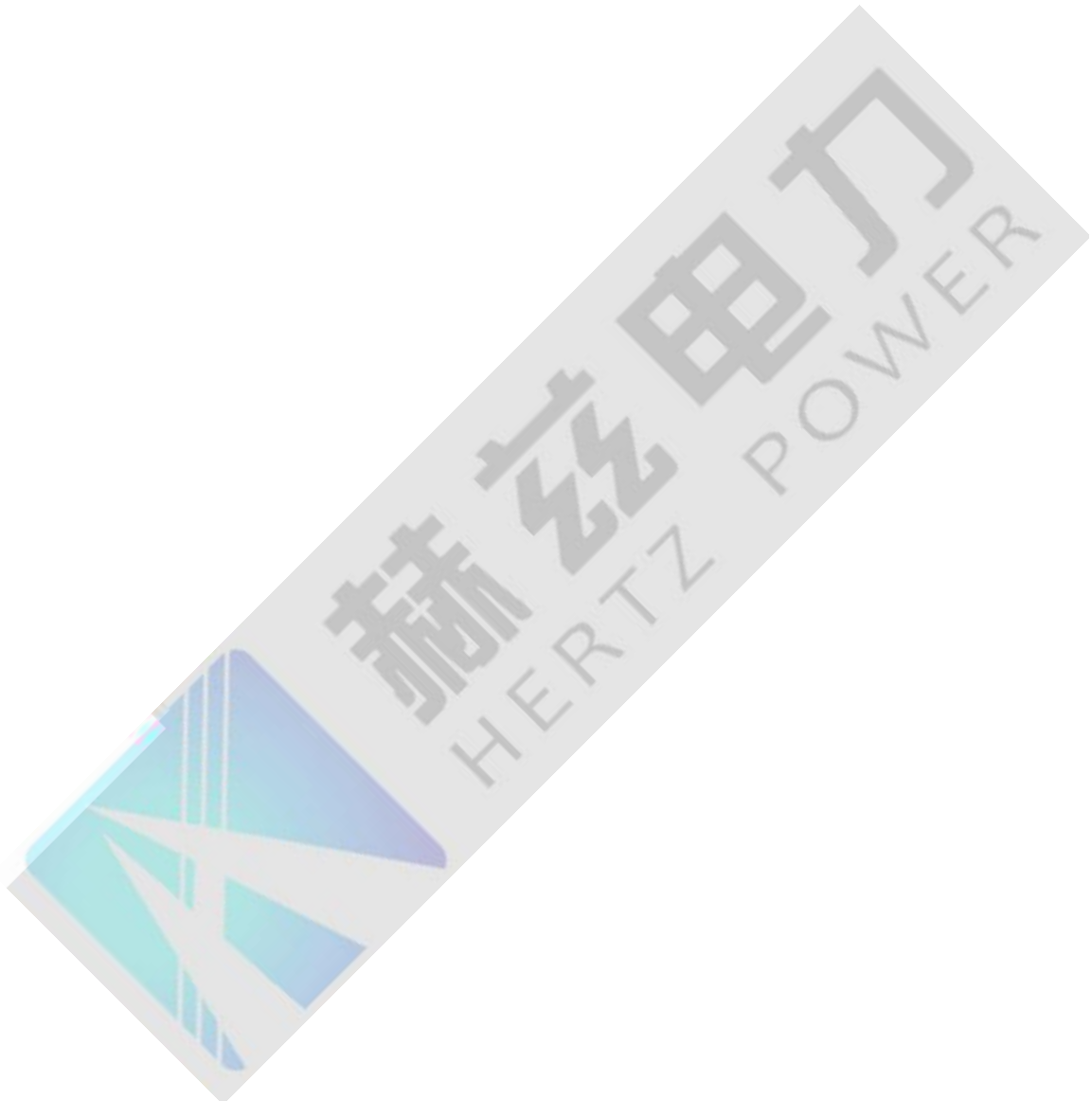
24.8

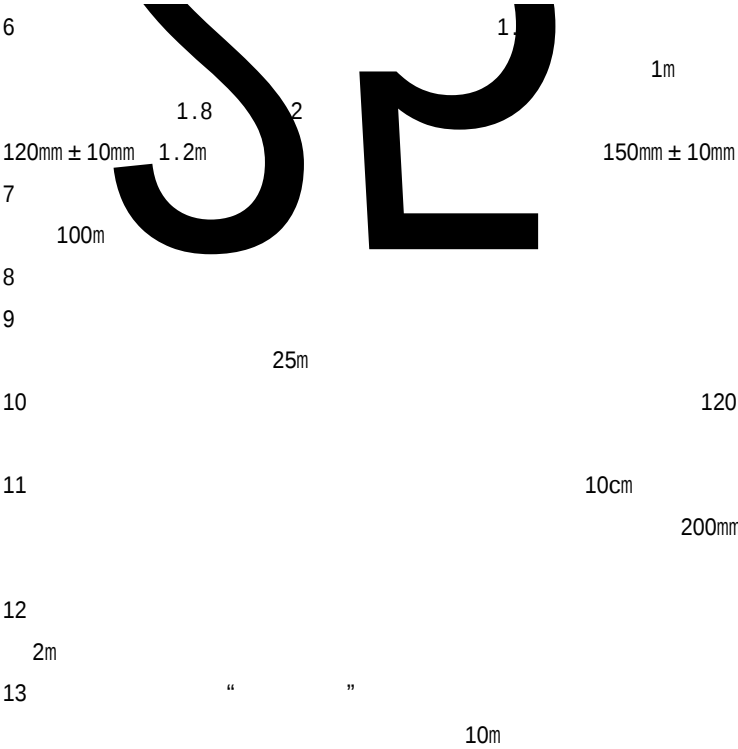
46

1

7

1





13

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

14

25

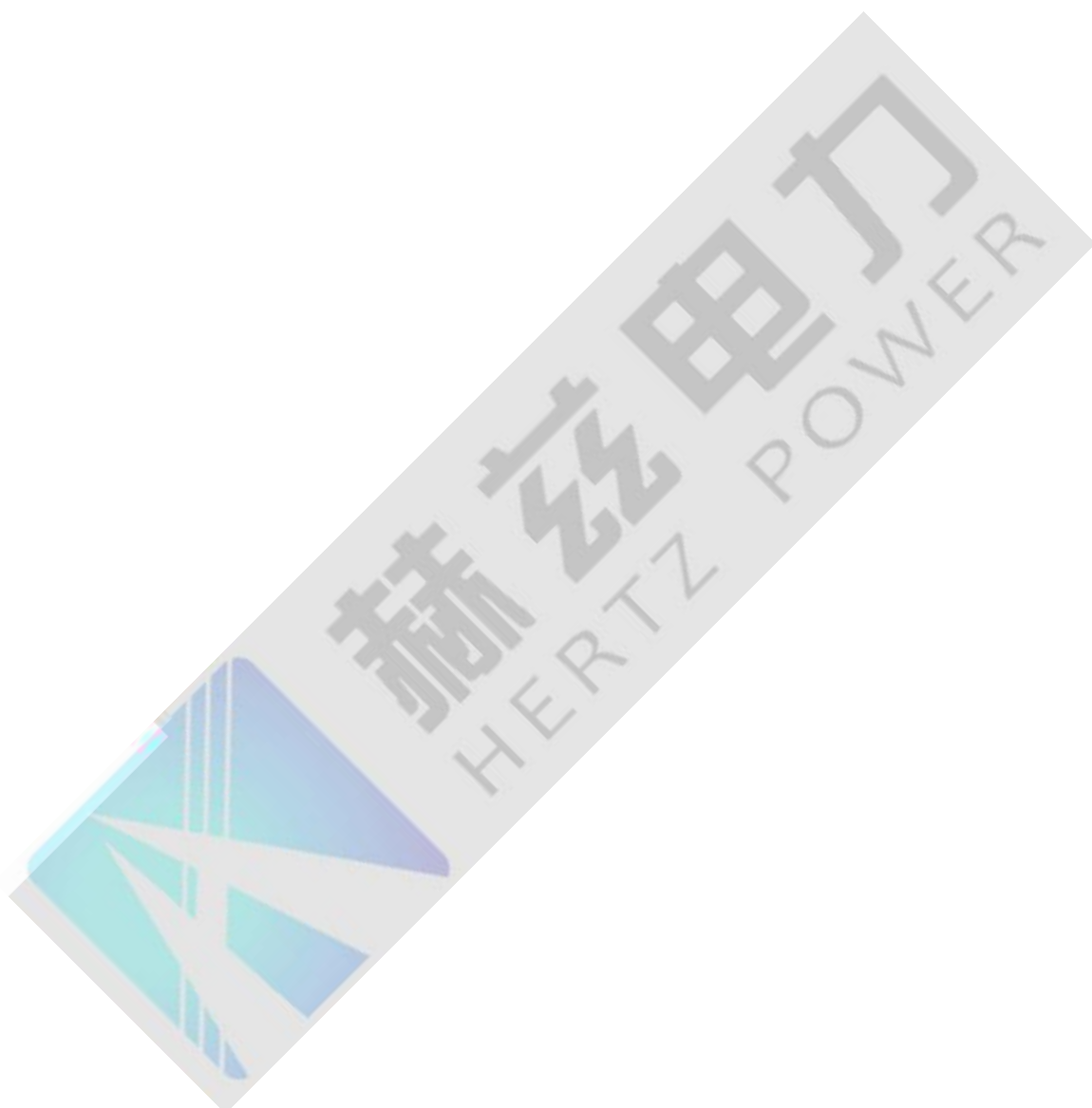


24.9

47

| | | | | | |
|---|--|--|--|--|--|
| | | | | | |
| 1 | | | <div><div>1</div><div>1)
2)
3)
4)</div><div>-M100 Y100 -K100</div><div>2</div><div>1)
2)
3)
4)</div><div>- Y100 -K100</div><div>3</div><div>1)
2)
3)
4)</div><div>- C100 -K100</div><div>4</div><div>1)
2)
3)
4)</div><div>- C100 Y100 -K100</div><div>Q/CSG10001-2004</div></div> | | |
| 2 | | | <div><div>1</div><div>A Y100 M20 B C100 Y100 C M100 Y100</div><div>2</div><div>M100 Y100</div><div>3</div><div></div><div>4</div><div></div><div>5</div><div></div><div>Q/CSG10001-2004</div><div>6</div><div></div></div> | | |

| | |
|------|----------|
| 7 | 15-100mm |
| 8 | |
| 9 | |
| 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 mN/m | ≥ 40 | GB 50150 |
| 7 | tan δ % | 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 Ω •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

