

00

[2002]10

[1999]101

2002 3 1

[1992] 375

50%

50%

u

o o

1

1.0.1

1.0.2

1

2

1.0.3

1.0.4

1

$\times 1 \pm$

2

3

$\times$

$\times$

4

=

$\times$

1.0.5

1.0.6

1.0.7

1.0.8

, ,

1

1.0.9

≥ 35

≤ -10

1.2

1.0.10

2000m

2000 3000m 1.1

3001 3500m 1.2

3501 4000m 1.3

4001m

1.0.11

5%

1.0.12

1.0.13

1000 /
1360 /
1680 /

1.0.14

4

1.0.15

1.0.1

2

2.1

22

2.2

2.2-1

		≤ 20m	≤ 80m
		≤ 20%	≤ 40%
		≤ 5 ≤ 30%	≤ 8 ≤ 50%

2.2-2

					()		
1					4263	4842	6232
					3136	3565	4584
					2737	3112	4006
					1096	1244	1602
					728	829	1069

					km	2818	3203	4122	
						2186	2484	3196	
						1552	1764	2269	
						1086	1234	1589	
						759	863	1112	
						89	101	131	
						km	877	997	1283
							438	500	643
							220	250	323
							167	188	242
							111	124	162
		GPS		C		3727	4274	5500	
				D		3198	3632	4671	
				E		2821	3203	4123	
2				1:200	km ²	76780	102374	163795	
				1:500		33383	44510	71216	
				1:1000		15174	20232	32374	
				1:2000		6676	8901	14244	
				1:5000		1975	2630	4210	
				1:10000		1109	1478	2364	
					1	200	1.8		
						2.0			
3			1:200	km	1016	1354	1864		
			1:500		785	1047	1440		
			1:1000		607	809	1113		
			1:2000		468	625	860		
			1:5000		362	481	665		
4					2698	3372	5733		

2.2-3

1	()				0.6	
2					0.5	
3					0.5	
4					1.2	
5	GPS	C	D	E	0.6	
6					0.6	2.2-2
7					0.48	
8					0.7	
9					0.4	

10	20cm	1.3	
11		1.1	
12	60%	1.2 1.5	
13	1:200	1.6	
14		1.5	

2.3

2.3-1

	≤ 300m 3cm	≤ 700m 2cm	700m ≤ 2cm
	≤ 5m	≤ 15m	15m
		1.5m	1.5m

2.3-2

					()		
1			1:200	km ²	204748	272301	382875
			1:500		89020	118396	166468
			1:1000		40464	53817	75680
			1:2000		17803	23680	33294
			1:5000		5260	7002	9838
			1:10000		2955	3924	5530
2			1		1.5		
3			1:200	km	3245	4316	6474
			1:500		2636	3506	5261
			1:1000		2023	2698	4046
			1:2000		1559	2075	3112
			1:5000		1268	1686	2529

2.4

2.4-1

	1 3	4 5	5

	km ≤ 10	km ≤ 20	km 20
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2.4-2

			()		
1		km	1206	1446	1880
2			1416	1700	2337
3			1624	1948	2599

2.5

2.5-1

≥ 2.0 m	≥ 1.8 m	1.8 m
≥ 15m	≥ 11m	11m

2.5-2

		()		
	km	2698	4384	6744

2.6

2.6-1

						()		
1				1:500	0.25m²	459	689	1102
				1:1000		756	1099	1732
				1:2000		1049	1509	2362
				1:5000		1966	2739	4215
				1:10000		2882	3969	6066
	2.0							
2				1:2	100cm²	24	34	56
				2:5		28	40	72
				1.5				
				1:2		14	20	36
	2:5	18	24	41				
3						1000		
4						3	3	

5				1000
---	--	--	--	------

3

3.1

3.1-1

	%
	120
	100
	80

1

2.

3.2

3.2-1

3.2-2

1		1	200		16065	22950	34425
		1	500		8033	11475	17213
		1	1000		5355	7650	11475
		1	2000		3570	5100	7650
		1	5000		1071	1530	2295
		1	10000		536	765	1148
		1	25000		268	383	574
		1	50000		134	191	287
2			1.3				
3			1.5				

3.3

3.3-3

	≤ 30m	30m
	40	50
	65	95
	310	460
	420	620
	360	560
	150	240

			20 $D \leq 30$				210	495	619	701	
			30 $D \leq 40$				249	587	734	832	
			40 $D \leq 50$				297	700	875	991	
3			$D \leq 10$		34	49	82				
			10 $D \leq 20$		43	62	102				
			20 $D \leq 30$		51	74	122				
			30 $D \leq 40$		61	88	145				
			40 $D \leq 50$		72	105	173				
			50 $D \leq 60$		80	116	193				
			60 $D \leq 80$		89	129	214				
			1.15								
			1.2								
		4				$D \leq 10$		66	99		
10 $D \leq 20$	83			124							
20 $D \leq 30$	99			149							
30 $D \leq 40$	116			173							
40 $D \leq 50$	132			198							
50 $D \leq 60$	158			238							
60 $D \leq 80$	198			297							
			$D \leq 10$		206						

		m²			400			5490		6040		
					500			6400		7040		
		500				4.2-1		1				
8		m²						≤ 500 kPa		500 kPa		
		0.10					2775	3330	3330	3996		
		0.25					3965	4758	4758	5710		
0.50				5156	6188		6188	7425				
9			(kN)									
			≤ 500				6786		7488			
			1000				7424		8237			
			1000 500				1.1					
10							3978		4563			
							9945		11412			
							8775		9891			
							7020		7605			
11												
		/					29250		58500			
							35100					
12			D		D ≤ 20			1753				
			m		D 20			2104				
								409				
								205				

3.3-5

1					1.5	
2					2.0	
3					1.3	
4					1.3	
5					3.0	
			D(m)	D ≤ 10	2.0	
				10 D ≤ 20	2.5	
				D 20	3.0	

		$F \leq 1000\text{m}^2$ $0.5 \text{ m/d} \quad K \leq 20\text{m/d}$ $S \leq 7.0\text{m}$	$F \leq 2000\text{m}^2$ $0.5\text{m/d} \quad K \leq 50\text{m/d}$ $7.0 \text{ m} \quad S \leq 13.0\text{m}$	1000m^2 F 2000m^2 $K \leq 0.5\text{m/d} \quad K \leq 50\text{m/d}$ $S \leq 13.0\text{m}$

4.1-2

	10	50	100	500	1000	2000
--	----	----	-----	-----	------	------

- 1.
2. 0.5 0.5
3. 2000 I 3.5% 4.5% 5.0%
4. 4.1.1.1

4.2

4.2.1

22%

4.2.2

4.2-1

1		(kn)	≤ 500			6400
			1000			10000
			3000			15000
			5000			25000
			10000			40000
			15000			55000
			20000			70000
			20000 5000			1.25
		φ (mm)	φ ≤ 500			5000
			500 φ ≤ 800			7000
			800 φ ≤ 1000			9000
			φ 1000			12000
2						500
		(kn)	≤ 1000			3500
			3000			4500
			5000			6000
			10000			9000
			10000 5000			1.25
3		D(m)	D<30			1200
			30 D ≤ 40			1500
			40 D ≤ 50			1800
			50 D ≤ 60			2200
			D 60			2600
4						60
						100

							1000
					D ≤ 30		500
				D m	D 30 10		1.1

4.2-2

4.2-3

					3272	2618	4593
					2181	1745	3062
					1606	1285	2253
					1402	1122	1968
					1459	1167	1980
					1216	973	1650
					1029	823	1386
					538	430	802
					91	163	135
					74	134	112
					62	112	93
					53	95	78
					59	91	
					50	74	
					42	62	



.	23
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5.3-1

			()		
1			760	1080	1400
2			608	864	1120
			730	1037	1344
			1094	1555	2016
			1216	1728	2240
			912	1296	1680

5.3-2

				()			
		1:5000		768	960	1152	2.2-1
		1:10000		640	800	960	
		1:25000		512	640	768	
		1:50000		384	480	576	
		1:100000		320	400	480	
		1:250000		256	320	384	
		1:500000		192	240	288	

5.4

6				420
7		L km	L ≤ 5	20
			5 L ≤ 10	40
			L 10	50
		1.3		
8		3.3-3		

5.6

5.6-1

						()
1			D (m)	D ≤ 300		840
				300 D ≤ 1000		6800
				1000 D ≤ 2000		10200
				D 2000		13600
				D ≤ 300	M	20400
				D 300		3400
				D ≤ 100		5100
				100 D ≤ 200		30
				D 200		40
						50
2				D ≤ 200		20000
				200 D ≤ 1000		30000
				1000 D ≤ 1500		40000
				D 1500		50000

5.6-2

					()
1					840
					8000
					2000
					4500
2		D (m)	D ≤ 50		5000
			50 D ≤ 100		10000
			D 100		15000
3					

6

6.1

6.2

6.2-1

6.2-2

				()		
1				54600	78100	109300
				6900	9900	13900
				29100	41700	58400
				32800	46900	65600
				9100	13000	18300
				16400	23400	32900
				102100	145800	204100
2				47400	67700	94800
				91200	130200	182300
				47400	67700	94800
3				51000	72900	102100
				76500	109500	153200
				12400	17800	24800
4				21900	31300	43800
				32900	47000	65600
				3300	4900	6800
				2700	3900	5400

6.3

6.3-1

1			5600	8000	11300
2			5500	7800	11000
3			3300	4900	6800
4			5000	7300	10200
5			1800	2600	3600
6			5500	7800	11000

7

7.1

22%

7.2

7.2-1

						18
						25
						45
1						220
						130
						260
2						18
					km	14400
						21600
			D ≤ 10			1800
			10 D ≤ 20			2520
			20 D ≤ 30			3240
			30 D ≤ 50			4320



	4	3
	6	5
	8	6
	12	10
3	3	
2160		
3600		
4320		
5760		
0.5		

7.2-1

20	
14	
20	20

NIII

13500 6300

				D 50		14400
						1.3
						1.2 3.0

8

8.1

10

8.2

8.2-1

			()	
1			8	
2			8	
			18	
3			19	
			26	
			40	
4			70	
			49	0.002mm
			12	
			47	
5			23	
			15	
6			30	
7			23	
8			14	
9			52	
10			319	
			638	
11			55	
			29	
12			264	1.3
			497	
13			40	12
			116	15
14			53	
15			23	
16			137	5
			56	2
17			413	

	≤ 600kPa			775	
				930	
				1240	
18				29	17
				56	
19				49	30
				71	
				99	
20				133	
21				14	
22				27	
23				36	
24				56	
25				258	
26				30	
27	≤ 600 kpa	() ()		4341	
		() ()		9096	
		()		1447	,
		()		3514	

8.3

8.3-1

			()
--	--	--	-----

8.4

8.4-1

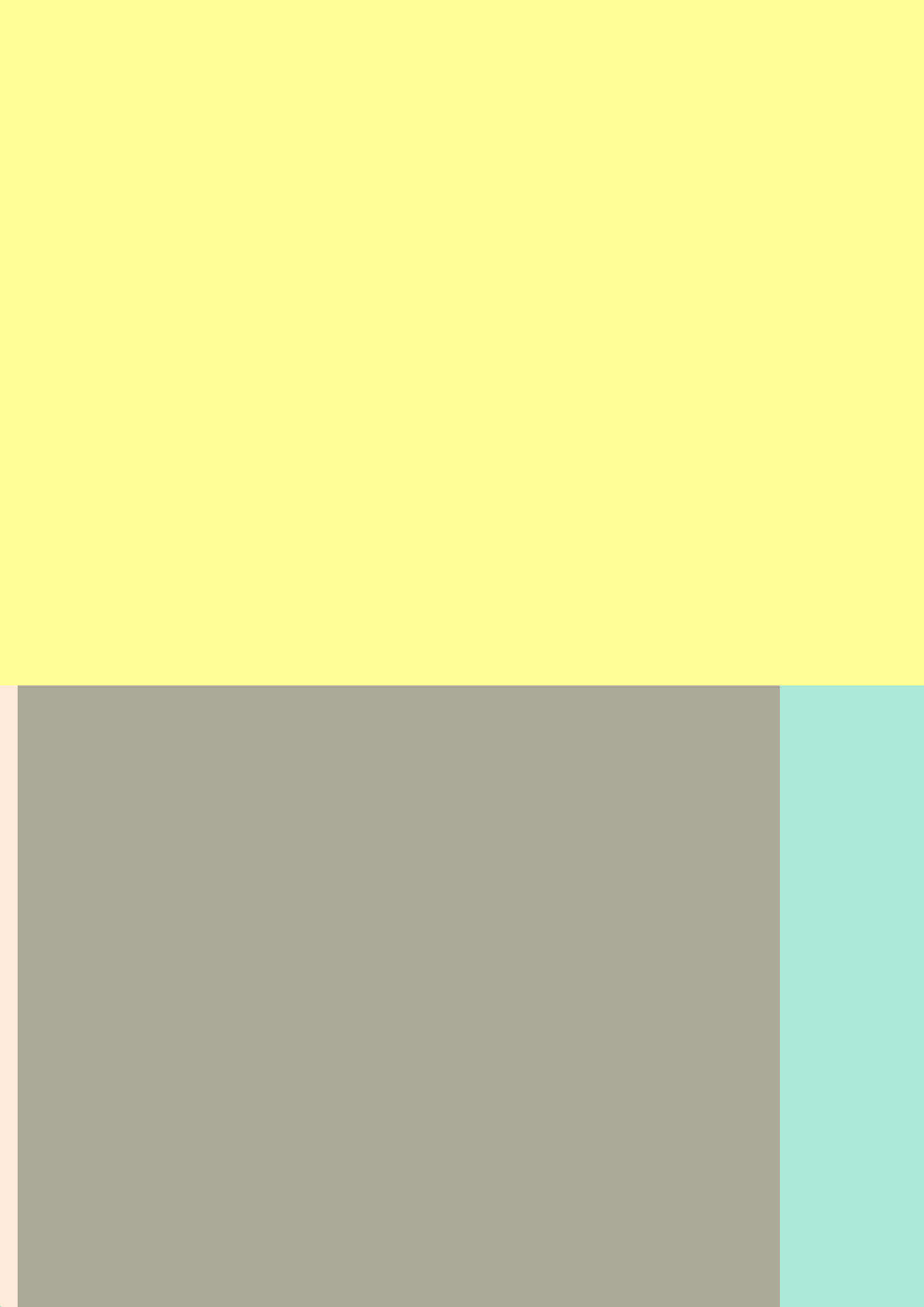
				()
1	(mm)	Φ50 70		19
		50 × 50 × 50		35
		50 × 50 × 100		38
		70 × 70 × 70		43
		100 × 100 × 100		69
2	(mm)	50 × 50 × 50		38
3	(mm)	50 200		16
4				14
5				27
				59

8.4-2

				()	
1				14	
2				47	
3				14	
				14	
				18	
4				47	3
5				117	
6				47	
				70	
7				185	
				233	
8				760	5
9				93	3
10				269	5
				289	
11				26	
12				2455	25 3
13				52	

8.4-3

				()
1				23
2				81
3				70



10.1.3

× 1±

× × ×

10.1.4

10.1.5

10.1.6

15 20%

10.2

10.2—1

%	60	68	68	73	73
%	10	4	4	3	3
%	30	28	28	24	24

10.2—2

1		1.40
2		1.04
3		1.70
4		0.5 0.55
5		0.8
6		0.3 0.4
7		0.84 0.92
8		0.76 0.88

10.3

10.3 1

1	H (m)	H<30	-5	6			-2
		30≤H 50	-2				1
		50≤H 70	1				2
		70≤H 150	3				3
		150≤H 250	5	7		10 m	-2
2			-1			10 20 m	1

			1			20 40 m	2
		3 km	2			40 60 m	4
			3	8			-2
			4				1
3			-2				2
			0				3
			1			10 m ³	0
			2			10 100 m ³	2
4		X	3			100 500 m ³	3
			-2			500 m ³	4
			1	10			-1
			2				2
5			3				3
			-2	11			-1
			1				1
			2				3
			3				

10.3 2

	≤ 3	3 10	≥ 10
	≤ 30%	≤ 60%	60%
	≤ 30%	60% ≤	60%

10.3 3

1			0.7

2

4			1.2
5		60 m	1.1
6		≥ 8	1.1 1.2
7		250 m	1.1
8		1000 m 8 km	1.2
9			1.05 1.5

10.4

10.4 1

1	200	9
2	500	20.9
3	1,000	38.8
4	3,000	103.8
5	5,000	163.9
6	8,000	249.6
7	10,000	304.8
8	20,000	566.8
9	40,000	1,054.0
10	60,000	1,515.2
11	80,000	1,960.1
12	100,000	2,393.4
13	200,000	4,450.8
14	400,000	8,276.7
15	600,000	11,897.5
16	800,000	15,391.4
17	1,000,000	18,793.8
18	2,000,000	34,948.9

2,000,000

1.7

11.

11.1

11.1.1

11.1.2

× ×

11.1.3

×

11.1-1

	≥ 300MW	300MW	≥ 330kV	330kV	≥ 330kV	330kV
%	15	17	20	23	17	20

11.2

11.2.1

11.7-1

11.2.2

11.7-2

11.3

11.3-1

MW							
1000			303.66	425.12	607.31	880.60	1093.16
1000			274.27	383.98	548.54	795.38	987.37
800			241.62	338.27	483.24	700.70	869.83
600			204.07	285.70	408.14	591.80	734.65
300			163.26	228.56	326.51	473.44	587.72
200			25.71	175.99	251.42	364.56	452.56
100			83.27	116.57	166.53	241.47	299.75

11.4

11.4-1

kV							
500			18.35	25.69	36.70	53.22	66.06
330			14.85	20.79	29.70	43.07	53.46
220			7.90	11.06	15.80	22.91	28.44
110			4.75	6.65	9.50	13.78	17.10
≤ 35			2.85	3.99	5.70	8.27	10.26
			0.8				

11.4-2

1				0.80	
2				1.35	
3				1.15	
4				1.10	
5				0.67	
6				0.15	
7				0.41	
8				0.24	11.2-3 300MW
9				0.42	

10		30m	1.05	
11		0.4km ²	100m	
12			1.10	
13			1.80	
14			0.30	
15			0.60	
16			0.05	

11.5

11.5-1

	kV							
1	500		km	1303	1902	2605	3777	4950
	330			1107	1615	2213	3209	4205
	220			651	950	1302	1888	2474
	110			495	723	990	1436	1881
2				4.0				

11.5-2

1	35kV	0.43	11.4-1 110kV
2		1.00	11.4-1
3	110kV 220kV	1.20	
4			
5			
6		1.15	
7			
8		1.10	
9		0.40	
10	50%	1.30	
11		1.5	
12	10km 10km		

11.6

11.6.1

11.6.2

11.7

11.7-1

		1 1/1	≤ 20m	3 3/3	≤ 80m	5 6/6	≤ 150m	7 10/10	150m	9 14/14
		1 1/10	≤ 20%	2 5/16	≤ 40%	4 8/22	≤ 50%	6 12/28	50%	8 16/36
		1 (1/1)		2 (2/2)		3 (3/3)		4 4/4		5 (5/5)
		≤ 5%		≤ 10%	≤ 25%		≤ 40%		>40%	
		1 5/2		3 15/5		5 25/8				9 45/14

		(1/1)		(2/2)		(3/3)		(4/4)	;	(5/5)

1.

2.

11.7-2

		9	18	35	52	73
		12	21	34	50	67

11.7-3

	4	10	15	20	25

12

12.1

12.1.1

12.1.2

12.1.3

× ×

12.2

12.2.1

11.7-1

12.2.2

11.7-3

12.3

12.3-1

			()				
1		Km	0.22	0.33	0.51	0.77	1.11
2			0.71	1.08	1.67	2.52	3.64

0.6

14.3-1

V
10.60
9.40
5.00
11.80

10.00

15.

15.1

15.2

15.2-1

	PH		PH

15.3

15.3-1

	80	40	60
	80	60	40

15.4

15.4-1

				()		
1		$L \leq 0.2$	km	1000		
		$0.2 \leq L < 1.0$		1000		
		$1.0 \leq L < 3.0$		3560		
		$3.0 \leq L < 5.0$		9026		
		$5.0 \leq L < 10.0$		12760		
		$10.0 \leq L < 50.0$		20095		
		$L \geq 50.0$		68095		
2		$L \leq 1.0$		2500		
		$1.0 \leq L < 50.0$		2500		
		$50.0 \leq L < 200.0$		58360		
		$200.0 \leq L < 1000.0$		206860		
		$L \geq 1000.0$		926860		
3		$L \leq 1.0$			2000	
		$1.0 \leq L < 10.0$			2000	

		10.0 L ≤ 50.0	km	15770	
		L 50.0		60970	
4		L ≤ 1.0	km	3130	
		1.0 L ≤ 5.0		3130	
		5.0 L ≤ 20.0		13010	
		L 20.0		43010	
5		L ≤ 5.0		8500	
		5.0 L ≤ 20.0		8500	
		20.0 L ≤ 50.0		31000	
		50.0 L ≤ 100.0		72100	
		L 100.0		137100	

1.

2.

3m

3m

3.

1.2

4.

0.8

D _s 150		2876
--------------------	--	------

- 1.
2. 100000 100000

16.3

16.3 1

D _s m		()
5 D _s ≤ 20	km	2373
20 D _s ≤ 50		2157
50 D _s ≤ 100		2373
100 D _s ≤ 150		2588
D _s 150		3020

15km 15km

16.4

16.4 1

		D _s m		()
1		D _s 150		2192
		50 D _s ≤ 150		3396
		5 D _s ≤ 50		6208
				4386
				6792
				12417

1.15 1.30



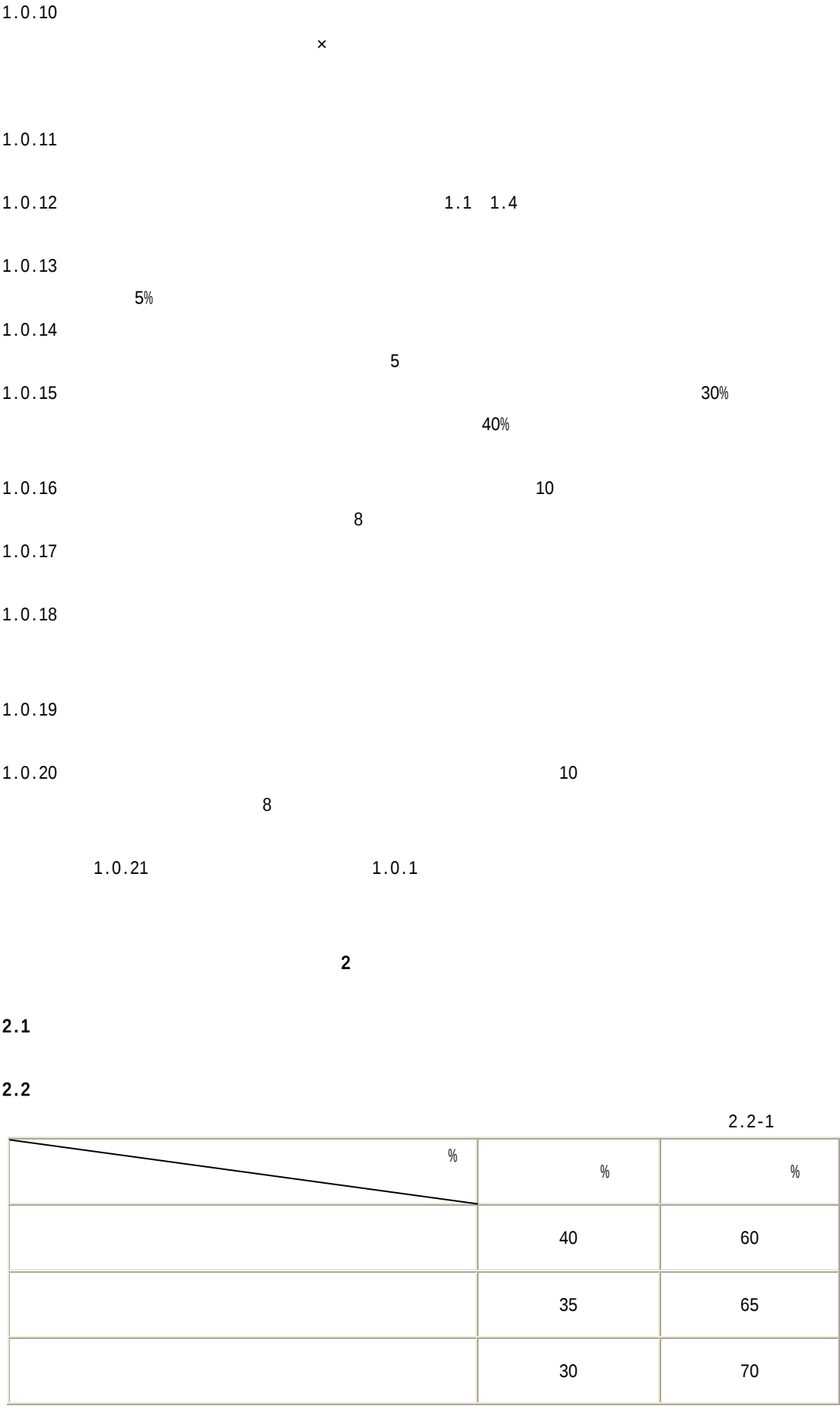
16.10

16.10 1

			()
1			1954
2			16.4-1 1
3			2128
4		.	85000
5		Km	2157

1.
2. 5
3. 500

		1			
1.0.1					
1.0.2					
1.0.3					
	1		×	$1 \pm$	
	2				
	3		×	×	×
1.0.4					
1.0.5					
1.0.6					
1.0.7					



2.3

2.3.1

2.3-1	
1. 2. 3.	≤ 3
1. 2. 3. 4.	500m ≥ 4
1. 2. 3. 4. 5.	

2.3.2

2.3-2	
1. 2. 3. 4. 5.	120m 6m
1. 2. 3. 4. 5.	≥ 120m 6 9m
1. 2. 3. 4. 5.	3000m 9m

2.3.3

2.3-3	
1. 2.	

	3.
	1. 2. 3.
	1. 2. 3. 4.

2.3.4	
	2.3-4
	1. 2. 3. 4.
	1. 2. 3. 4.
	1. 2. 3. 4.

2.3.5	
	2.3-5
	1. 2. $\leq 50m$ 3.
	1 2 2 50 100m 3
	1 2 2

3.2

3.2-1

%	%	%
	35	65
	40	60

3.3

3.3-1

1	3000t
2	
3	
4	
5	
6	
7	
8	
9	
10	
1	3000 10000t
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
1	2000t

2	10000t
3	
4	
5	
6	1000
7	
8	
9	
10	
11	
12	≥ 2000t
13	
14	

1. 2.5%
2. 2.5%

4

4.1

4.2

4.2-1

%	%	%	%	%
	35	65	50	50
	50	50	60	40
	40	60	50	50
	60	40	65	35

- 1.
- 2.

4.3

4.3-1

1	50000m³
5	

		45		55
		25	20	55
		45	20	35
		25	20	55
		55	10	35
		60		40
		70	10	20

5.3

5.3.1

5.3-1

1	4
2	110kV
3	≤ 20
1	2 4 50MW 50MW
2	220kV 330kV
3	20 20
1	2 4
50MW	
2	500kV
3	
4	≥ 20

1

1.1

2

5.3.2

5.3-2

1.	30%
2.	30%
3.	
4.	
5.	
1	30%
60%	
2	
30% 60%	

	:	4
	70m 25000m ³ /s	4
	,	3

6

6.1

6.2

6.2-1

%		%	%
		45	55
		40	60
		45	55
		45	55
		45	55

6.3

6.3.1

6.3-1

1	
1	
2	
1	
2.	
3	
4	

1.89

“ 1 ”

0.61

6.3.2

6.3-2

1	1000m 15m 30 50m 30 50m
2	500m
1	1000m 15m 30 50m 30 100m
2	500 1000m
3	

1	1000m	15m	250m
2	400 1000m	800 1500m	
3	1000m		

- 1.2.00.7
- 2.1.1

6.3.3

6.3-3

1	1000t
2	300t 100t
3	300t 5000t
4	
1	1000 10000t
2	1000t
3	300 1000t 100 500t
4	300 1000t 5000 30000t
1	10000t
2	≥1000t
3	
4	1000t 500t
5	1000t 30000t
6	

6.3.4

6.3-4

	3C
	4D 4C
	4E

1.
2. , 15 150

6.4

6.4.1

6.4-1

			()	()
			1.86	2.34

			1.95	2.44
			2.58	3.23
			3.26	4.07
			4.05	5.08
			0.52	0.64
			0.45	0.54

-
- 1.2
1.1 ;
- , ,
- 0.6 1.0 ;
- 1.5
() 1040 ;
- $\times 0.8$
- $\times 0.6$ $\times 0.8$
- 160 200km , 1.3
- 1.1
0.6
- 30km 5km 1.5
- ,
- 1.5 ;
- 0.92
- 0.85
- 1.0.8 2.5%
- 1.1
-

6.4-2		
%	0.58	0.72

- 0.8
- 1.0.8
- 10km 6.4.1 “ ”
-

7.1

7.2

7.2-1

%		%	%	%
		10	30	60
		15	30	55
		20	30	50

1	
2	
3	24 50m
4	20
5	
6	
7	
8	
9	10000m ²
1	
2	
3	50m
4	20 20
5	
6	
7	
8	≥ 10000m ²

1. 20001m² 5001 20000m² 5000m²
2. , 1.3 1.6
3. , 1.3
4. , 1.5
5. , 2.0
6. , 10000 20000 /ha

7.3.2

7.3-2

1	
2	
1	
2	
1	
2	
3.	

7.3.3

7.3-3

I	1 2 DN 1.0m 3 4
	1 5000 500m ³ 2 (DN 1.0m) 1 m ³ /s

8.2-1

		%	%
		40	60
		100	
		80	20
		70	30
		60	40
		50	50
		30	70

8.3

8.3-1

	1	5m	1/500							
	2									
	3									
	4									
	5	500m			20km	150000ha				
	6	100000m								
	1	5	50m	1/500	1/100					
	2									
	3									
	4									
	5	500	1000m		20	30km	150000			
	6	350000ha		100000	300000m³					
	1	50m	1/100							
	2									
	3									
	4									
	5	1000m			30km	350000ha	300000m³			
	6									

1	200	9.0
2	500	20.9
3	1,000	38.8
4	3,000	103.8
5	5,000	163.9
6	8,000	249.6
7	10,000	304.8
8	20,000	566.8
9	40,000	1,054.0
10	60,000	1,515.2
11	80,000	1,960.1
12	100,000	2,393.4
13	200,000	4,450.8
14	400,000	8,276.7
15	600,000	11,897.5
16	800,000	15,391.4
17	1,000,000	18,793.8
18	2,000,000	34,948.9
2,000,000		1.6

1	
	1.1
	1.2
	1.3
2	
	1.0
	1.1
	1.2
	1.3
3	
	1.2
	1.6
4	

		0.8
		1.0
		1.2
		1.6

5

M

	3	
	4	
	5	
	6	
	7	

1. 1.3

2. () () 0.3