AQ8001-2007

[2003]114

2013 11 20 11

21

12 20

:

1.
2.
3.
4.
5.

6.
7.
8.
9.
10.
11.
12.
13.

1.
2.
3.
4.
5.
6.
7.

1

1.1

“ ”

1

2

3

1.2

60

/

1 → → →
→4223 →4223 →4223 →4225
→ → →

2

3 4-2 4-2
2013 12 24

1.3

1.3.1

1 2009-8-27
2 2009-8-27
3 [2013]
4 2009-8-27
5 2009-8-27
6 [2004] 397
7 [2000] 296
8 2011 1 1
9 446
10 [2006] 466
11 [2009] 549
12
[2004] 8
13

4

14 [2009] 22

15 [2003] 6

16 [2009]28

17 [1995] 56

18 “ ”

[2011]33

19 ( )

([2004]24

20 [2007]47

21 [2006]146

22 [2008]49

23 [2010]17

24

[2007]167

25

[2005]8

26

[2005]125

27 [2004]56

28 [2005]133

29 [2000]

81

30

[2011]15

31 [2008]160

32 [2008]161

33 [2008]175

34 [2008]176

35 [2009]142

36

[2006]216

37

[2005]49

38 “ ”

[2010]146

39 ([2012]

16)

40

[2007]290

41

[2007]25

42

[2006]30

43

[2008]39

44

1.3.2

1 2011

2 GB6722 2011

3 GB 50383-2006

4 AQ1008-2007

5 GB/T50518-2010

6 AQ1028-2006

7 AQ1044-2007

8 AQ6201-2006

9 AQ1029-2007

10 AQ8001-2007

11 [2003]114

12 GB14285-2006

13 AQ1023-2006

14 MT390-1995

15 AQ1048-2007

16 AQ6210-2007

1.3.3

B

1

2

3

4

5

6

7

8

9

10

1.4

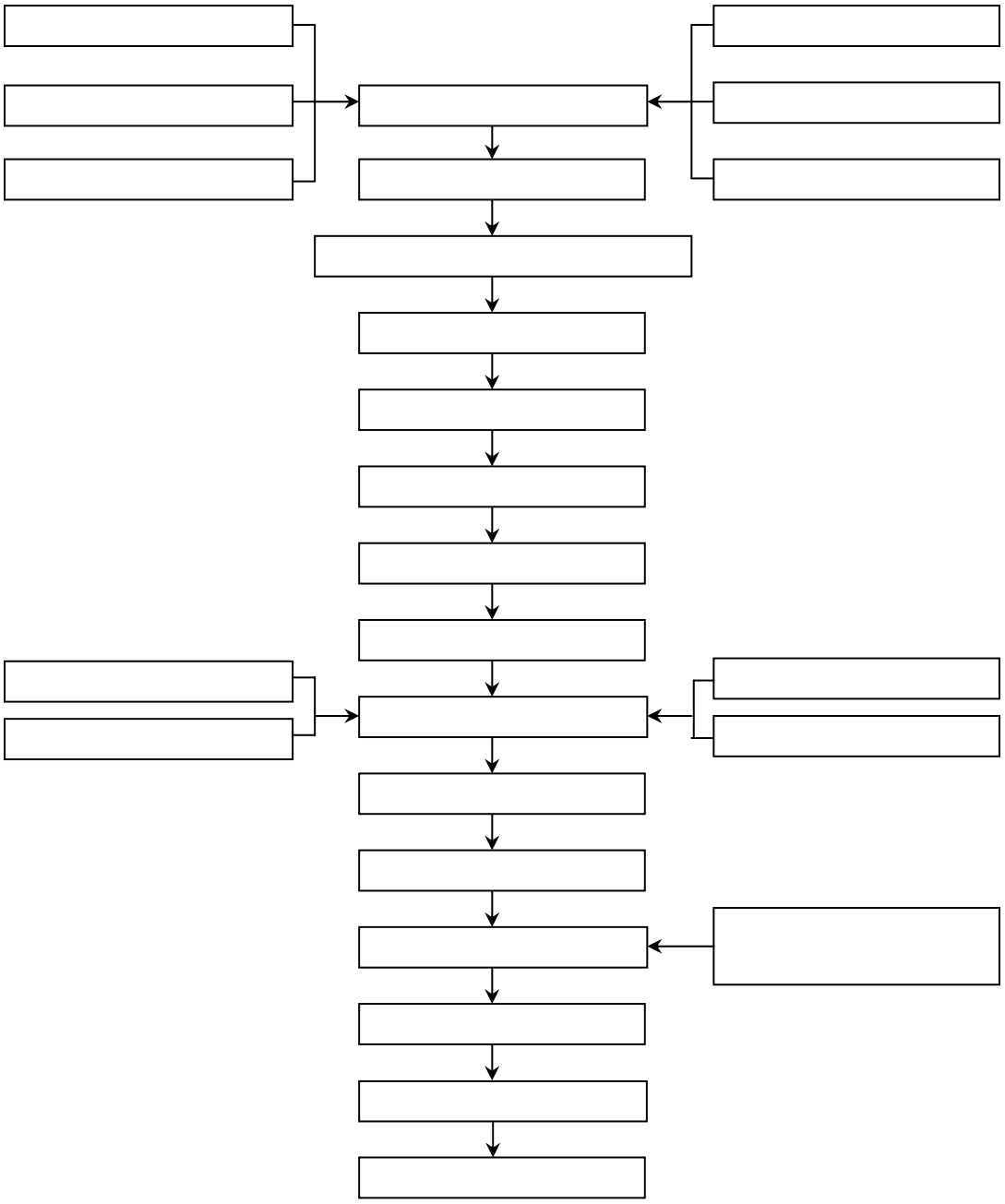
1.4-1

1

2

3

4



1.4-1

5

6

7

8

1.5

1.5.1

2012 1 11 C150000201003112006219 1

2

3

4

5

6 2.597km^2

7 0.60Mt/a

8 MK1527130317 2016 3 24 A150201131703 2016 3 29

9 150000000000286 2014 3 23

10 C150000201003112006219 2015 1 11

11 201527280143 2022 5 18

12 MK [2012]K040 2014 3 23

2004 11 117

[2004]351

[2006]243

[2007]285 [2009]197

[2006]127 [2009]54

2006 12 2008 7

2009 9

2009 10 10

“ [2009]71 ”

2009 11 9

“ [2010]5 ”

60

/

0.60Mt/a -

[2009]9

[2010]167

[2010]94

2010 10 2011 3

1.5.2

110°37′31″—110°39′47″ 39°23′52″—39°24′56″

1.5.3

2km

0.2km 0.5km

32km 54km

109 210

1.5-1

1.5.5

—

6.2 36.6 1975 7 22 -29.6

1961 2 11 350mm 7 8 9

2492.1mm 7 2.04m

3.2m/s 8

24m/s

1.5.6

0.05

1.5.7

2012 1 11

C15000020100311200621 91 1.5-1

1.5-1

	X	Y
1	4368092.65	37437338.42
2	4366302.64	37437958.43
3	4366242.64	37437028.42
4	4365836.63	37437108.43
5	4365708.63	37436150.42
6	4366972.64	.37435978.42
7	4367112.64	37436798.42
8	4367802.65	37436718.42
+1258 +1175m		

1.5.8

/ 141.04Mt

/ 107.29Mt / 78.84Mt 3-2

26.19Mt 4-2 52.65Mt 2013

12 74.54Mt 38.05Mt

6.5a

1.5.9

1

N_2

1 (T_3y)

3.67~28.47

2 $J_{1-2}y$

129.45~186.77 163.43

2~6

3 J_2

0~53.06 22.12

4 N_2

ZK2406 10.84

5 Q_4

0~25.20 8.50

2

—

210° 1-3°

3

1 J_{1-2y}^{1}

4-1 5.85~25.52 12.69

4 1~2

2 J_{1-2y}^{2}

4-1 5-1 21.90~45.39

31.88

5 3~4 2 5-1 5-2

3 J_{1-2y}^{3}

5-1 4-2 31.47~42.83

35.97 4 1~3

1

4 J_{1-2y}^{4}

4-2 3-1 39.00~83.92

50.76

1~2 1

5 J_{1-2y}^{5}

3-1 25.61~63.87 47.52

2 1~3 1

1.5.10

1

J_{1-2y} 129.45~186.77

163.43 6~9 6.12~11.46 9.32 5.7%

3~5 4.97~10.80 8.30

5.08%

2

3-2 4-2 5-1 5-2 2-3

2 3-2 4-2

3-2

0.05~4.10 3.07 3.15~4.10 3.67

4-2 37.97~48.20 42.45

4-2 1.82~3.49 2.74

1.82~3.31 2.67 1

-1 34.35~40.83 37.10

3

1

1.54 1.60g/cm^3 1.34 1.38t/m^3 280°

2 120

285Ω·m 63% 77%

2

3-2 4-2

0.3 0.4 I

3

Mad

10.10% 12.41%

5.07% 10.53%

Ad

13.13% 15.02%

8.24% 8.93%

Vdaf

36.46% 37.20%

St,d

0.87% 1.85%

4

Qnet,d 29.52

30.44MJ/kg

GR·I R·I

Y

CO_2

7% 5% 3-2 4-2

C H O

5-15m 28m 9-18.28m

5 GB5751—86

3-2

CY41 BN31 4-2 CY41

6

“ ”

7.00% 8.00% 0.10 0.5% 0.7%

7 3-2 4-2

2 CO_2

8

1.5.11

1

1200—1400

— —

1400—1500 “ ”

“ ”

1 Q_4 N_2

0~25.20m

2m 1~13L/S 52.8L/S

3.433m/d HCO_3~Ca

N_2

2

J_3-K_{1Zh} J_{1-2y} T_{3Y}

J_3-K_{1Zh}

0 101.46m 43.27m

1384.12 1395.70m q=0.0078

0.058L/S·m K=0.04m/d HCO_3·SO_4·CI-Na HCO_3-Ca·Na·Mg

0.45 0.46g/l

J_{1-2y} 133 279m

4 5 6

q=0.000647 0.0144L/S·m HCO_3·CI-Ca·Na 0.101

1.754 g/l

T_{3Y}

2

1

0~25.20m

2m 1~13L/S 52.8L/S

3.433m/d HCO_3~Ca

2 4

ZK417

q=0.0002L/S·m K=0.0199m/d 1223.82m

HCO3—Na·Ca HCO3·Cl—Na 0.29—0.86g/L

—

3 4 T_{3Y}

6

q=0.0007L/S·m 0.0238m/d

1258.30m

4

“ ”

2108.2mm

5

q 0.1L/S·m

-

$20m^3/h$ $30m^3/h$

1.5.12

30MPa

39—59MPa 49MPa

30MPa

49—60MPa

1.5.13

1 2012 8 28

1.39m^3/min 1.00m^3/t 1.55m^3/min

1.12m^3/t

0.930m^3/min

0.670m^3/t 2013 3 6

2 2012 4 18 4-2

4-2

3 2012 4 18

4-2 4-2

4

5

6

7 3-2

1.5.14

0.9Mt/a 3-2 4-2

1.2Mt/a 3-2

1.2Mt/a 4-2 5-2

1.6

1.6.1

1

-

+1233m 3-2 2

3-2

+1191m 4-2 2

4-2

2

4-2

3

16 7.2m^2 470m

18 7.0m^2 420m

22kg/m

47m 3.0m

4

12.6m^2

13.5m^2

12.6m^2

400m^3 4-2 800m

220m^3

100m^3

5

1

2

3

4

5

6

4223

MG300/730-WD SGZ764/2 250

ZY6400/18/38 98

ZG6400/18/38 5 SZZ764/160 1

PCM110 1 DSJ100/63/90 3 JD-1

1 BRW315/31.5 2 BPW200/6.3 2

BH-40/2.5 1 JH-20 1 JSDB-13 1

3 ZG6400/18/38

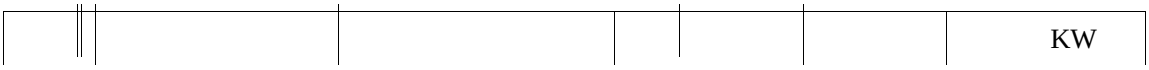
2.5m 175m

7

4225 4225

4225 4-2

1.6-1



1 EBS19.8e Tcd9e12fc4ca4- 10.5 98.4

1.6.3

2012 8 28

1.39m^3/min 1.00m^3/t 1.55m^3/min

1.12m^3/t

0.930m^3/min

0.670m^3/t 2013 3 6

KJ110N JF-F8

18

18 5 18

1.6.4

3 200m^3 600m^3

100×4mm

50×3.5mm

50m DN25

100m DN25 DN25

1 BPW315/6.3 Q=315L/min P=6.3MPa

1 BPW125/5.5 Q=125L/min

P=5.5MPa

2 2

200m 50m

50m 15-20m

CCHZ-1000 ALJH-1

2

2

1.6.5

JSG9

3NBB250/2.5-15 Φ70×4

BH-4.0/2.5

$CaC1_2$

1.6.5**L & A & ? 2 Ï 4 ³**

400m^3 DA1-125*4 3 1 1 1 ,
132kW, 660kV 133 5mm
2 4-2 800m
220m^3 DA1-125*4 3 1 1
1 , 132kW, 660kV 133
5mm 4-2 2

1.6.7

KJ110N

2 6
34 11 9 2
8 1 3 23
6 11 6

1.6.8

1000m
3t 0.5
2m 5m 24

2012032801 (

1.6.9

1

DTL-100/63/280×2

B=1000mm 300m V=3.15m/s N=280kW×2

2

JK-2.5×2/30

2500mm 2000mm 90kN 30

V=2.5m/s JR158-10 280kW 660V 590r/min

XRB15-6/6

15 /

3

1 SGZ764/500 SZZ764/160

DSJ100/63/90×2

DTL-100/63/90×2 DTL-100/63/280×2

2 WC3FB

2 WC1.8J 2

1.6.10

1 LL-55 1 LGH-18/8G

10m^3/min 0.8MPa 55kW 380V

2970rpm

50m

Φ70×4

1.6.11

1

35kV 10kV

LGJ-240 3km

2

10/6kV

10kV 660V 380V 10kV

10kV 660V 380V 220V

10kV 660V 380V

KYGC-1 14

NZ90-10 CD-2kVA

10kV 9 10kV/0.4KV

10kV/0.69kV 10kV

660V KYDC-1 7

380/220V KYDC-1 3

10/0.69kV 10/0.4kV

3

10kV S9-500/10 500kVA 10/0.69kV

S9-315/10 315kVA 10/0.4 0.23kV

10kV 10kV 10kV 2

S9-200/10 200kVA 10/0.4kV LL-110-3

3 GFE-75-3 4

4

10kV

10kV

4-2

10kV

5

10kV 10kV

10kV

10kV

10kV 1.14kV 0.69kV 0.127kV

10 kV PBG-10 8 4

2 10/0.69 kV 2

0.69 kV KJZ5 7

KBSGZY-400/10/0.69

6

10 kV PBG-10 8 5

3222 1 10/0.69 kV 4

0.69 kV KJZ5 5 KBSG-500/10/0.69

3 KBSG-400/10/0.69 1 4223

4225 4225

1.6.12

HJD-80A

80

6

14

1 12

10kV

1 2

1.6.13

45km 2014

2 27

45km 30min

9

1 1 1 6

1.6.14

AQ1051-2008

1.6.15

1.7 “ ”

1.7.1

KJ110N

2

2.1

2.1.1

2.1.2

SCL

“ ”

2.1.3

3

4

2.1.4

“ → → →
→ ”

2.2

2.2.1

1

10%

1

2012 4 18 4-2

4-2

1mm 30 2000g/m^3

12% 600 1050

300 400 g/m^3

2500 2Mpa

CO

2

2.2-1

2.2-1

SiO_2 /%	/mg.m^3		
10	10	3.5	SiO_2≤10% SiO_2 10%
10 50	2	1.0	
50 80	2	0.5	
≥80	2	0.3	

10μm 100μm

5μm 10μm

5μm

2

1

2

3

4

5

3

4

2.2.2

1

2 2012 4 18

4-2 4-2

1

600

2

3

1

4-2

3

2

300MΩ

4

5

1

2

3

4

2.2.3

1

2

1

2

3

3

4

1

4-2

2

3

4

2.2.4

1

2012 8 28

1.39m^3/min

1.00m^3/t 1.55m^3/min

1.12m^3/t

0.930m^3/min

0.670m^3/t 2013 3 6

1

5% 16% 12%

650-750 0.28mJ

2000 1.2Mpa

2

CH_4 H_2 16% 12%

3

2

1

2

3

4

5

6

7

8

“

”

3

1

2

3

4

2.2.5

1

2

q 0.1 / ·

3

4

5

6

210° 1—3°

7

- - -

1m

2.2.6

1

2

1

“ ” “ ”

2

3

3

4

1 2

2.2.7

1

1

2

3

4

5

6

7

8

9

10

2

1

2

3

4

5

6

7

3

1

2

2.2.8

1

1

2

3

4

5

6

7

300V

2

1

2

2.2.9

1

2

1

2

3

4

2.2.10

1

1

2

3

4

5

6

2

2m

2.2.11

1

1

190OC 160OC

1.1

2

3

4

5

2

2.2.12

1

2

3

4

5

2.2.13

1

1

CH_4 CO_2 NO_X SO_2

H_2S CO

CH_4

CO

CO_2

NO_X

SO_2

H_2S

2

CO

2

3

4

2.3

2.3.1

2.3-1

2.3-1

1			
2			
3			
4			
5			
6			
7			

8			
9			
10		2m	
11			
12			
13			

2.3.2

1

GB18218-2009

[2004]56

1 2 3 4

5 ≤6 6

7 ≥

2.3-2 8 ≥

2.3-3

2.3-2

		1t	
		50t	
		250t	
		20t	
	28 ≤ 60	100t	

2.3-3

		0.1t	
		5t	
		25t	
	28	200t	
	28 ≤ 60	500t	

2

1 2012 8 28

1.39m^3/min 1.00m^3/t 1.55m^3/min

1.12m^3/t

0.930m^3/min

0.670m^3/t 2013 3 6

2 2012 4 18 4-2

4-2

3 2012 4

18 4-2 4-2

4

5

3

1

2 4-2 3

3

4 4-2

6

5

6 5.0t 10000

7

2 4

3

“ ”

3.1

3.1.1

1			150000000000286 2014 3 23
2			C150000201003112006219 1 2015 1 11
3			201527280143 2022 5 18
4			MK [2012]K040 2014 3 23
5			MK1527130317 2016 3 24
			A150201131703 2016 3 29

3.1.2

3.1-1

3.1-1

DS K D @ E0t 7feE 7re C#ve 276Q827 e 26 Qt26 TP#pf\@#seI##uF\@#vfTP$óe' 7Ö¶½

'8Kó Ã

lE¯

Kó ÃEY

3.1.3

}*ó

{ Ž

,1

1

2

1

2

“ ”

3

(

[2012] 16)

15 2013

“ ”

4

“ ”

“ ”

5

6

7

3 4

8

9

“ ”

10

11

“ ”

12

13

16

10

5 15

5

20 10

3.1.4

1

“ ”

5 12

2

1

1 2 13 3 3

1 1 3

3

4

2013

123 2013 111

3.1-1

3.1-1

1				MK1527130317	2016 3 24
				A150201131703	2016 3 29
2				150201131223	2016 11 29
				B150201135756	2016 11 30
3				MK1510120095	2016 3 24
				B150201120191	2016 3 29
4				MK1506130942	2016 7 30
				B150201133648	2016 7 29
5				MK151003560	2015 9 24
				B150201114388	2015 9 24

3.1-2

3.1-2

1		4		
2		6		
3		6		
5		2		
6		12		
7		2		
9		2		
10		2		
11		8		
12		11		
13		1		
14		10		
15		4		
16		3		
17		1		
18		9		
19		2		
20		2		
21		1		
22		2		
23		1		
24		3		
		94		

5

197 135 12

50 1.4 135

45

[2007]290

3.1.5

1

1 5

2

3

4

5

3.1.6

1

“ ”

2 ZH-30 KL4LM A

3

4 2013 1 12

3.1.7

2013 60 15 /

900 “ ”

1 “ ”

2

3

4

5

6

7

3.1-3

3.1-3 2013

1		100
2		80
3		120
4		130
5		120
6	10	40
7	20	50
8	GPS 2	20
9		70
10		80
11		80
12		10
		900

3.2

3.2.1

3.2-1

8

3.2-1

1			“ ”		
2					
3					
4			2013 60 15 900 “ ”		

5 5 1 Tf 036

9					

3.2.2

3.3

3.3.1

1

2

→

→ →

→

3

“ ”

4

→ →

3.3.2

4

4.1

4.1.1

1

1

2

2

1

2

3

4

4.1.2

15

1

2

3

4

5

6

7

8

9

10

11

12

13

14

4.1.3

[2004] 8 [2004] 397

SCA

4.1.4

Safety Checklist Analysis SCA

1				
2				
……				

4.2

4.2.1

1 4.2-2

2

4223 4225 4225

4.2.2

1

-

+1233m 3-2 2

3-2

+1191m 4-2 2

4-2

2

4-2

3

16 7.2m^2 470m

18 7.0m^2 420m

22kg/m

47m 3.0m

4

12.6m^2

13.5m^2

12.6m^2

400m^3 4-2 800m

220m^3

100m^3

5

1

2

3

4

5

6

4223

MG300/730-WD SGZ764/2 250

ZY6400/18/38 98

ZG6400/18/38 5 SZZ764/160 1

PCM110 1 DSJ100/63/90 3 JD-1

1 BRW315/31.5 2 BPW200/6.3 2

BH-40/2.5 1 JH-20 1 JSDB-13 1

3 ZG6400/18/38

2.5m 175m

7

4225 4225

4225 4-2

4.2-1

					KW
1		EBZ132( )		1	132
2		DSJ80/40/2*75		2	150
3		MYT1-125/330		2	7.5
4		FBDNo5.0/2*22		2	30
5		ZM15D		2	1.5
6		KGQ-12		1	7.5

8

1 20m

2 30m

3 45°

75°

4 30m

9

3-2 4-2

4-2 4-2 5-2

40m

4.2-2

1		GB50215-2005	GB50215-2005	
2		GB50215-2005 3 3 5 5	GB50215-2005	
3			3 4223 2	
4		GB50215-2005	2.4m 20m 2.0m	
5				
6			4223 4225 4225	
7			4223 ZY6400/18/38 98 ZG6400/18/38 5 31.5Mpa	
8		15° 1.8m	4223 0-5° 2.8m	

9				

4.2.3

1 4-2 3-2 4-2

2 4-2

3

30m

4 3

4223 2

5 3

3

3

4223

6

7

8 1 4223 4224

9 4-2

10 4-2

11

4.2.4

4.3

4.3.1

1 4.3-1

2

4223 4225

4225

4.3.2

1

FBCDZ-6- 16B 2 1 1

1332m^3/min 3480m^3/min, 1020Pa 2600Pa 2

75kW 380V

→ →

→ → → → → →

2272m^3/min 1365m^3/min

907m^3/min 2341m^3/min

2

3

4223 4223

4223 1

4223

4

FBD-№6 2 15kw

10m

Φ800mm

5

1 2013 5 3

1 2 C/TFJ13/K-0133

C/TFJ13/K-0134

2 2011 4 18

26.9m^3/s 20.3m^3/s

51m^3/s. 8461.7pa 2.06m^2

C/TFZL11/K-0032

3 2013 3 18 3

8min 6min 73%

4

1 1 2 13 3

3 1 1

3

5

4.3-1

	m^3/min	m^3/min	m^3/min	%	m^3/min	%				
	2358	2389	2048	86.84	2500	4.45	FBCDZ-No16B			
		m^2	m/s	m^3/min	m^3/min		%			
							CH_4	CO_2	CO	
				2358	2200					
1		7.2	2.30	994		8	0	0	0	
2		6.69	3.40	1365		6	0	0	0	
				2389						
1		7.93	4.60	2189		12	0.01	0.02	6	
2		8.34	0.40	200	200	11	0	0	0	
				2048						
1	4222	13.5	1.30	1053	907	16	0	0.02	0	
2		8.93	0.15	80	60	16	0	0.02	0	

3		5.14	0.26	80	60	14	0	0.04	0	
4	4223	12.6	0.50	378	330	16	0.02	0.03	0	
5		4.73	0.26	75	60	14	0	0.04	0	
6		12.6	0.11	80	60	17	0	0	0	
7	4223	12.6	0.40	302	330	17	0.02	0.02	5	
		12.6	1.00	750	600	14	0	0	0	
		13.5	1.60	1290	1000	13	0	0	0	

4.3-2

1		CO_2		
2		1. 30% 150m 400m	FBCDZ-6- 16B 2 1 1 1332m^3/min 3480m^3/min, 1020Pa 2600Pa 2 75kW 380V 150m 400m	
		2. 2940Pa 3920Pa		
		3.	2 FBCDZ-6- 16B	
		4. AQ1055-2008 3.3.2.4		

		5.		
3		1.	4-2	
		2.	4225	
		3. 1 1		
		4.		
		5.		
		6.		—
		7.		
4		1.	FBD-NO.6	
		2.		
5		1. 4		—

		2. 5t 3 5t 1		—
		3.		
6		1. 2 2		
		2.		—
7		1. 2		

4.3.3

1

2

3

4

5

6

4.3.4

AQ1028-2006

4.4

4.4.1

1 4.4-2

2

4.4.2

1

2012 8 28

1.39m^3/min

1.00m^3/t 1.55m^3/min

1.12m^3/t

0.930m^3/min

0.670m^3/t 2013 3 6

1 KJ110N JF-F8

2 4223 2 1

≥1.0% ≥1.5%

1% 2

10m ≥1.0%

≥1.0% 1.0%

3 13

4

5 CO

6

7 18

18 5 18

2

1

2012 4 18 4-2

4-2

3 200m^3 600m^3

100×4mm

50×3.5mm

50m DN25

100m DN25 DN25

1 BPW315/6.3 Q=315L/min P=6.3MPa

1 BPW125/5.5 Q=125L/min

P=5.5MPa

2 2

200m 50m

50m 15-20m

2

2

2

3

CCHZ-1000 ALJH-1

4.4-1

1		1.	2012 8 28	
		2. $10m^3/t$		—
		3.		—
2				
2.1			AZJ-92	
2.2		1. 0.75%	0.03% 0.04% 0.70%	
		2.		
3			2013 2	
4			2012 4 18	

5			3 200m^3 600m^3 50m 100m Φ150mm	
6		1.		
		2.		—
		3.		
7		1.		
		2.	2013 2	
		3.	2 4223 4223 4225 4225 1	

4.4.3

1

2

3

4

5

6

7

4.4.4

4.5

4.5.1

1 4.5-1

2

4223 4225

4.5.2

1 2012 4 18

4-2 4-2

2

50m

100m

3

4

1

3NBB250/2.5-15 Φ70×4

2 “

” BH-4.0/2.5

$CaC1_2$

5

JSG9

6mm-8mm

CO CO_2 CH_4

10m-20m

6

2013

4.5-1

1			4-2 I	
2				
3			JSG-9	
4		100m 50m $200m^3$	3 $200m^3$	
5				
5.1				
5.2			50m	
5.3				
6		1. 80m 50m		—
		2. 10m		—

4.5.3

1

AQ1055-2008 [2008]161

2

3

4

5

4.5.4

4.6

4.6.1

1 4.6-1

2 “ ” “
”

4223 4223

4.6.2

1

20m

400mm×400mm

1m

2

400m^3 DA1-125*4 3 1 1 1 ,
132kW, 660kV 133 5mm
2 4-2 800m
220m^3 DA1-125*4 3 1 1
1 , 132kW, 660kV 133
5mm 4-2 2

3

0.5m

4

ZL-150A 1

4.6-1

1		278 280	DA1-125*4 3 133 5mm 2	
2		259	20m 30m 30m	
3		1.	2013 ZL-150A 1	
		2.		

4			20m	
5				
6				—

4.6.3

1

1 Q =20m^3/h

Q =30m^3/h

2 +1233.5m +1285m 51.5m

3 Q=108m^3/h H=80m N=2950r/min P=37kW

T=24×1.2×20/108=5.33 h <20h 1.2

T_{max}=24×1.2×30/2×108=4 h <20h 1.2

H=1.2× 51.5+6+1 =70.2 m <80m 1.2 6

1

2

R=0.07m

V- 2m/s

$Q=\pi R^2V\times3600=110.78m^3/h$

$110.78m^3/h$ 20h 24h

$20.0m^3/h$

3

8

$Q=400\ m^3>8\times20m^3=160m^3$

4 2013 5 10

3

5 20m 30m

30m 4-2 40m

30m

6

7

40m

8

9

10

11

4.6.4

4.7

4.7.1

1 4.7-1

2

4.7.2

1

KJ110N

2 6

34 11 9 2

8 1 3 23

6 11 6

2

1 5

4.7-1

1		1.	KJ110N	
		2. AQ6201-2006 MA MA	MA	
		3. AQ1029-2007 5 6 7	6	

		4. AQ1029-2007 9.1 9.2.4		
		5.		

6.
9.1
NÑ8nr)QR”Ý

4.8

4.8.1

1 4.8-1

2

4.8.2

1

1000m

3t 0.5

2m 5m 24

2012032801 (

2

3

2

“ ” “ ” “ ”

2

4.8-1

1		1 AQ1055-2008 3.2.1.2.9		—
		2 2.5km AQ1055-2008 3.2..1.2.10		
		3 127V		
		4 3 10		
		5 2t 10 400kg 2		
		6 1 400kg		
2			1000m 3t 0.5 2m 5m 24	

4.8.3

1

2

3 2

2

4

5 “

”

4.8.4

4.9

4.9.1

1 4.9-3

2

4.9.2

1

DTL-100/63/280×2

B=1000mm 300m V=3.15m/s N=280kW×2

2

JK-2.5×2/30

2500mm 2000mm 90kN 30

V=2.5m/s JR158-10 280kW 660V 590r/min

XRB15-6/6

15 /

3

1 SGZ764/500 SZZ764/160

DSJ100/63/90×2

DTL-100/63/90×2 DTL-100/63/280×2

2 WC3FB

2 WC1.8J 2

4.9-1

1			DSJ100/63/90×2	
1.1				
1.2		2 3		
1.3				
1.4				
1.5				
1.6				

1.7				
1.8		2 0.2m 50m 25m		
1.9		30m		
1.10				
1.11				
2				

4.9.3

1

2 2013 5 10

3

4

5

6

7

8

9

10

11

12

13

4.9.4

4.10

4.10.1

1 4.10-1

2

4.10.2

1 LL-55 1 LGH-18/8G

$10m^3$/min 0.8MPa 55kW 380V

2970rpm

50m

Φ70×4

4.10-1

1			1 LL-55 1 LGH-18/8G $10m^3/min$ 0.8MPa 55kW 380V 2970rpm	
1.1				
1.2				
1.3		2		
1.4		215℃.	215℃	
1.5		100mm 50mm	Φ70×4	
1.6				
1.7				

4.10.3

1 2

2 1 LL-55 1 LGH-18/8G

10m^3/min 0.8MPa 55kW 380V

2970rpm

3

4

5

4.10.4

4.11

4.11.1

1 4.11-1

2

4.11.2

1

35kV 10kV

LGJ-240 3km

2

10/6kV

10kV 660V 380V 10kV

10kV 660V 380V 220V

10kV 660V 380V

KYGC-1-□ 14

NZ90-10 CD-2kVA

10kV 9 10kV/0.4KV

10kV/0.69kV 10kV

660V KYDC-1-□ 7

380/220V KYDC-1-□ 3

10/0.69kV 10/0.4kV

3

10kV S9-500/10 500kVA 10/0.69kV

S9-315/10 315kVA 10/0.4 0.23kV

10kV 10kV 10kV 2

S9-200/10 200kVA 10/0.4kV LL-110-3

3 GFE-75-3 4

4

10kV

10kV

4-2

10kV

5

10kV 10kV

10kV

10kV

10kV 1.14kV 0.69kV 0.127kV

10 kV PBG-10 8 4

2 10/0.69 kV 2

0.69 kV KJZ5 7

KBSGZY-400/10/0.69

6

10 kV PBG-10 8 5

3222 1 10/0.69 kV 4

0.69 kV KJZ5 5 KBSG-500/10/0.69

3 KBSG-400/10/0.69 1 4223

4225 4225

4.11-1

1		1.	35kV 10kV LGJ-240 3km	
		2. 2 1 1 10kV	10kV S9-500/10 500kVA 10/0.69kV S9-315/10 315kVA 10/0.4 0.23kV 10kV	
		3.		
		4. 2 1 40kW	10kV 10kV 2 1 40kW	
		5.		
		6. 3300V ,	3300V	—

		7.	10kV 10kV 10kV 2 S9-200/10 200kVA 10/0.4kV	
2				
3		45° MT818 MVV		
3		0.3m 0.3m 0.1m		
				—
4		“ ” “ ”	“ ” “ ”	
5				
5.1				

5.2				
5.3				
5.4				
5.5				
6		2 2	2	
7				
7.1		36V	36V	
7.2		2Ω 1Ω	2Ω 1Ω	
7.3		1 0.75 5mm 2Ω	1	

7.4		3	3	
8				
8.1			KBY-20	
8.2		1. 2.	1. 2.	
9		10%		

4.11.3

1

2

3 10kV

4 10kV 10kV

5

6

7

8 - ( )

- - ( )

9 8mm $0.8m^2$

1Ω

2Ω

10

“ ”

11

12

13

4.11.4

4.12

4.12.1

1 4.12-1

2

4.12.2

HJD-80A

80

6

14

1 12

10kV

1 2

MHYAV-20/M+000D72/M+00070.8

4.12-1

1			1 HJD-80A 10	

4.12.3

4.12.4

4.13

4.13.1

1

2 “ ”

2011 33

4.13.2

1

KJ110N

2 6

34 11 9 2

8 1 3 23

6 11 6

2

KJ236(A)

KJ236-K 150

3

2013 6

[2013]186

4

1 LL-55 1 LGH-18/8G

10m^3/min 0.8MPa 55kW 380V

2970rpm

50m

Φ70×4

20m

5

3 200m^3 600m^3 Φ150mm

6

HJD-80A

80

6

14

1 12

10kV

1 2

MHYAV-20/M+000D72/M+00070.8

4.13.3

1 KJ110N

AQ6201-2006

(AQ1029-2007)

2

AQ1048-2007

AQ6210-2007

3 2013 6

[2013]186

4

MT390-1995

5

6

4.13.4

“

”　　2011　33

4.14

4.14.1

4.14-1

2012

4.14.2

45km　　2014

2　27

45km　30min

9

1　　1　　1　　6

2013

4.14-1

1			45km 2014 2 27 45km 30min 9 1 1 1 6	
2				
3			2013 2013	

4.14.3

1

2 45km 30min

AQ1008-2007

3 1 9 1

1 1 6

4 2013

4.14.4

AQ1008-2007

4.15

4.15.1

2

SiO_2

3

4

4.15.4

4.16

4.16-1

4.16-1

1		
2		

3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		

5

5.1

5.1.1

5

5.1.2

1 Risk Rank RR

5.1-1

5.1-1

>30	I		W_1
>20≤30			W_2
>5≤20			W_3
≤5			W_4

2

Fault Tree Analysis FTA

-

5.2

5.2.1

18%

1

W =M N+O+P+Q+R+S+I+J

W - M-

N- O-

P- Q-

R- S-

I- J-

2 5.2-1

5.2-1

1	M	1 ≥25	3
		2 ≥15	2
		3 ≥10	1
		4 10	0
		1	3
		2 50%	2

		4	0
4	P	1	3
		2 ≥2 ≥10m	2
		3 ≥2 ≥5m	1
		4	0
5	Q	1	3
		2	2
		3	1
		4	0
6	R	1	3
		2	2
		3	1
		4	0
7	S	1	3
		2 10% 5 10%	2
		3 5% 10% 5 10%	1
		4	0
8	I	1	3
		2	2
		3	1
		4	0
9	J	1 “ ”	3
		2 60%	2
		3 80%	1
		4	0

3 5.2-2

5.2-2

1	(M)	25% 30%	3
2	(N)		1
3	(O)		1
4	(P)		1
5	(Q)		1
6	(R)		1
7	(S)	5%~10% 10%	1
8	(I)		1
9	(J)		1

4

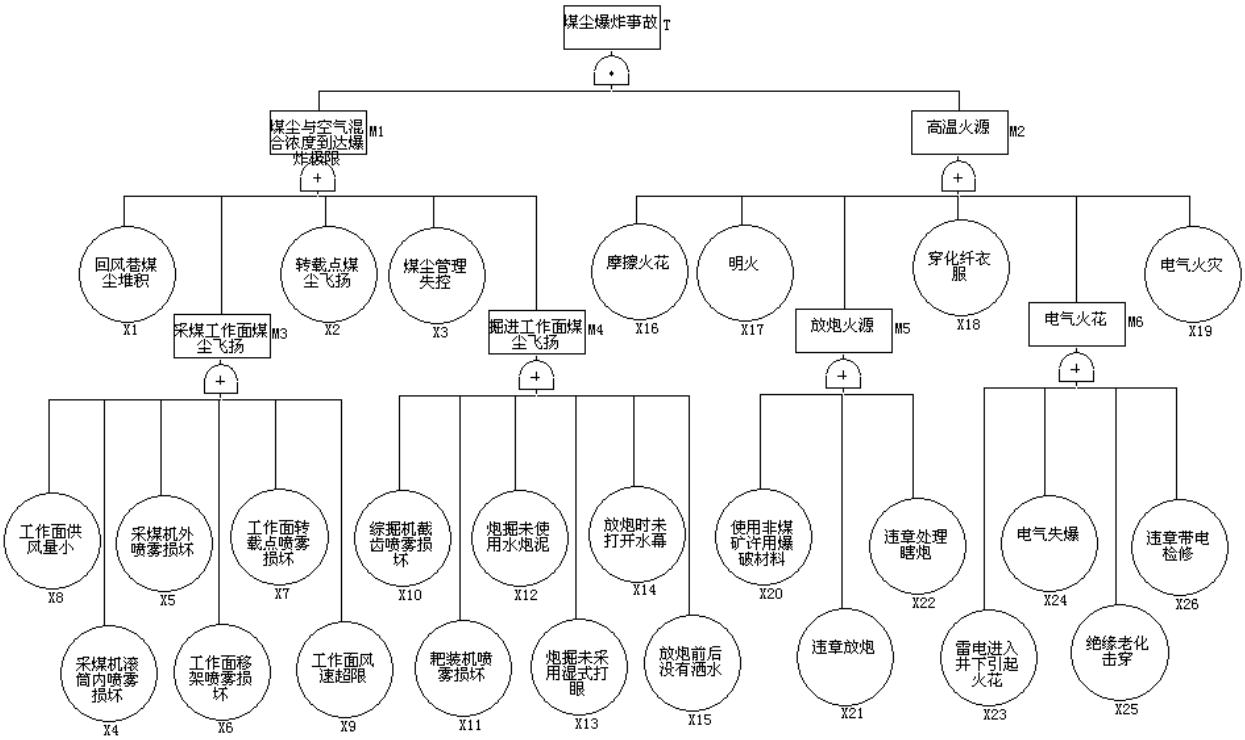
W = M (N+O+P+Q+R+S+I+J) = 3 (1+1+1+1+1+1+1+1)=24

W =24 20 30

5.2.2

1

5.2-1



5.2-1

2

T=M1·M2

=(X1 +X2 +X3+M3+M4)·(X16+X17+X18+ X19+M5+M6)

=(X1+X2+X3+X4+X5+X6+X7+X8+X9+X10

+X11+X12+X13+X14+X15)·(X16+X17+X18+X19+

X20+X21+X22+X23+X24+X25+X26)

165

K1= X1 X16 K2= X2 X16 K3= X3 X16

K4= X4 X16 K5= X5 X16 K6= X6 X16

K7= X7 X16 K8= X8 X16 K9= X9 X16

K10= X10 X16 K11= X11 X16 K12= X12 X16

K13= X13 X16 K14= X14 X16 K15= X15 X16

K16= X1 X17 K17= X2 X17 K18= X3 X17

K19= X4 X17 K20= X5 X17 K21= X6 X17

K22= X7 X17 K23= X8 X17 K24= X9 X17

K25= X10 X17 K26= X11 X17 K27= X12 X17

K28= X13 X17 K29= X14 X17 K30= X15 X17

K31= X1 X18 K32= X2 X18 K33= X3 X18

K34= X4 X18 K35= X5 X18 K36= X6 X18

K37= X7 X18 K38= X8 X18 K39= X9 X18

K40= X10 X18 K41= X11 X18 K42= X12 X18

K43= X13 X18 K44= X14 X18 K45= X15 X18

K46= X1 X19 K47= X2 X19 K48= X3 X19

K49= X4 X19 K50= X5 X19 K51= X6 X19

K52= X7 X19 K53= X8 X19 K54= X9 X19

K55= X10 X19 K56= X11 X19 K57= X12 X19

K58= X13 X19 K59= X14 X19 K60= X15 X19

K61= X1 X20 K62= X2 X20 K63= X3 X20

K64= X4 X20 K65= X5 X20 K66= X6 X20

K67= X7 X20 K68= X8 X20 K69= X9 X20

K70= X10 X20 K71= X11 X20 K72= X12 X20}

K73= X13 X20 K74= X14 X20 K75= X15 X20

K76= X1 X21 K77= X2 X21 K78= X3 X21

K79= X4 X21 K80= X5 X21 K81= X6 X21

K82= X7 X21 K83= X8 X21 K84= X9 X21

K85= X10 X21 K86= X11 X21 K87= X12 X21

K88= X13 X21 K89= X14 X21 K90= X15 X21

K91= X1 X22 K92= X2 X22 K93= X3 X22

K94= X4 X22 K95= X5 X22 K96= X6 X22

K97= X7 X22 K98= X8 X22 K99= X9 X22

K100= X10 X22 K101= X11 X22 K102= X12 X22

K103= X13 X22 K104= X14 X22 K105= X15 X22

K106= X1 X23 K107= X2 X23 K108= X3 X23

K109= X4 X23 K110= X5 X23 K111= X6 X23

K112= X7 X23 K113= X8 X23 K114= X9 X23

K115= X10 X23 K116= X11 X23 K117= X12 X23

K118= X13 X23 K119= X14 X23 K120= X15 X23

K121= X1 X24 K122= X2 X24 K123= X3 X24

K124= X4 X24 K125= X5 X24 K126= X6 X24

K127= X7 X24 K128= X8 X24 K129= X9 X24

K130= X10 X24 K131= X11 X24 K132= X12 X24

K133= X13 X24 K134= X14 X24 K135= X15 X24

K136= X1 X25 K137= X2 X25 K138= X3 X25

K139= X4 X25 K140= X5 X25 K141= X6 X25

K142= X7 X25 K143= X8 X25 K144= X9 X25

K145= X10 X25 K146= X11 X25 K147= X12 X25

K148= X13 X25 K149= X14 X25 K150= X15 X25

K151= X1 X26 K152= X2 X26 K153= X3 X26

K154= X4 X26 K155= X5 X26 K156= X6 X26

K157= X7 X26 K158= X8 X26 K159= X9 X26

K160= X10 X26 K161= X11 X26 K162= X12 X26

K163= X13 X26 K164= X14 X26 K165= X15 X26

3

T′=M1′+M2′

=(X1′X2′X3′M3′M4′)+(X16′X17′X18′X19′M5′M6′)

=(X1′X2′X3′X4′X5′X6′X7′X8′X9′X10′X11′X12′X13′X14′X15′)

+(X16′X17′X18′X19′X20′X21′X22′X23′X24′X25′X26′)

2

P_1= X4X10X1X2X3X11X12X13X14X15X5X6X7X8X9

P_2= X20 X23 X16 X17 X18 X19 X24 X25 X26 X21 X22

4

I(1)=0.037037037037 I(2)=0.037037037037

I(3)=0.037037037037 I(4)=0.049382716049

I(5)=0.030864197531 I(6)=0.030864197531

I(7)=0.030864197531 I(8)=0.030864197531

I(9)=0.037037037037 I(10)=0.037037037037

I(11)=0.037037037037 I(12)=0.037037037037

I(13)=0.037037037037 I(14)=0.024691358025

I(15)=0.006172839506 I(16)=0.086419753086

I(17)=0.08024691358 I(18)=0.08024691358

I(19)=0.092592592593 I(20)=0.076388888889

I(21)=0.027777777778 I(22)=0.055555555556

I(23)=0.006172839506 I(24)=0.006172839506

I(25)=0.006172839506 I(26)=0.086419753086

I(19)>I(16)=I(26)>I(17)=I(18)>I(20)>I(22)>I(4)>I(10)=I(1)=I(2)
=I(3)=I(11)=I(12)=I(13)=I(9)>I(5)=I(6)=I(7)=I(8)> I(21)
> I(14)>I(15)=I(23)=I(24)=I(25)

5

165 165 165

2

2

1 2

5.3

5.3.1

1

W =M F+G+H+K+N+B+J

W - M-

F- G-

H-

K-

N-

B-

J-

2 5.3-1

5.3-1

[redacted]			3
1	M	2	2
		3	1
2	F	1 “ ”	3
		2 1 20% 30%	2
		3 5% 10%	1
		4	0

1 “ ” 2 3

[redacted]

[redacted]

[redacted]

	N	3	1
		4	0
7	B	1	3
		2	2
		3	1
		4	0
8	J	1 “ ”	3
		2 60%	2
		3 80%	1
		4	0

3 5.3-2

5.3-2

1	M		3
2	F		1
3	G		1
4	H		1
5	K		1
6	N		1
7	B		1
8	J		1

4

W =M F+G+H+K+N+B+J =3 (1+1+1+1+1+1+1)=21

W =21 20 30 II

5.3.2

1

1

2

3

4

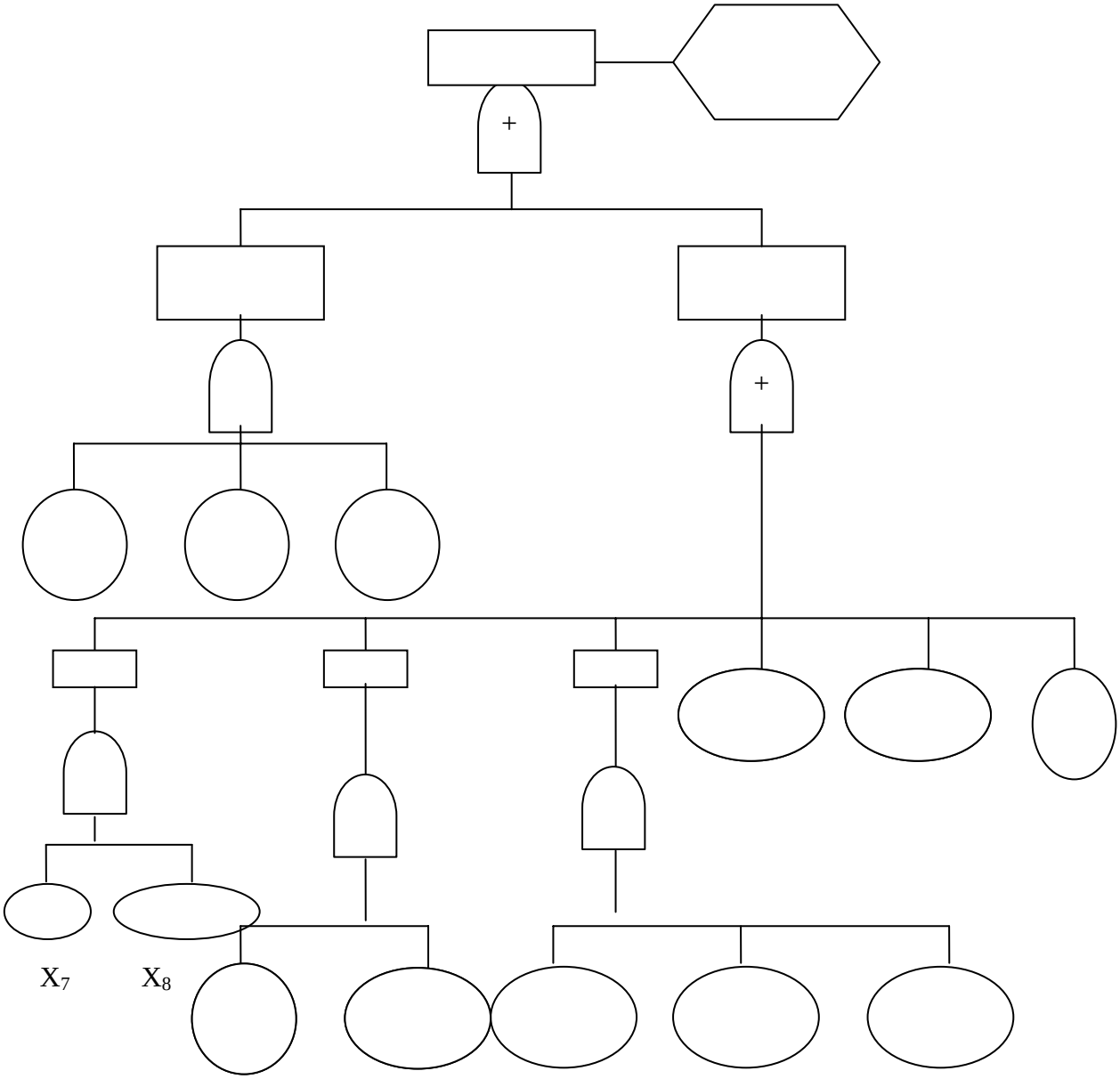
5

6

7

2

5.3-1



5.3-1

3

T= A_1+A_2 a

= $X_1X_2X_3+B_1+B_2+B_3+X_4X_5X_6$ a

= $X_1X_2X_3+X_7+X_8+X_9+X_{10}+X_{11}+X_{12}+X_{13}+X_4+X_5+X_6$ a

=$X_1X_2X_3a+X_4a+X_5a+X_6a+X_7a+X_8a+X_9a+X_{10}a+X_{11}a+X_{12}a+X_{13}a$

11

K1={X_1 X_2 X_3 a} K2={X_4 a }

K3={X_5 a} K4={X_6 a}

K5={X_7 a} K6={X_8 a}

K7={X_9 a} K8={X_{10} a}

K9={X_{11} a} K10={X_{12} a}

K11={X_{13} a}

4

$I_{Ф\ 4} = I_{Ф\ 5} = I_{Ф\ 6} = I_{Ф\ 7} = I_{Ф\ 8} = I_{Ф\ 9} = I_{Ф\ 10} = I_{Ф\ 11} = I_{Ф\ 12} = I_{Ф\ 13} > I_{Ф\ 1} = I_{Ф\ 2} = I_{Ф\ 3}$

5

11

11

5.4

5.4.1

1

W =A B+C+D+E+J

A- B-

C- D-

E- J-

2 5.4-1

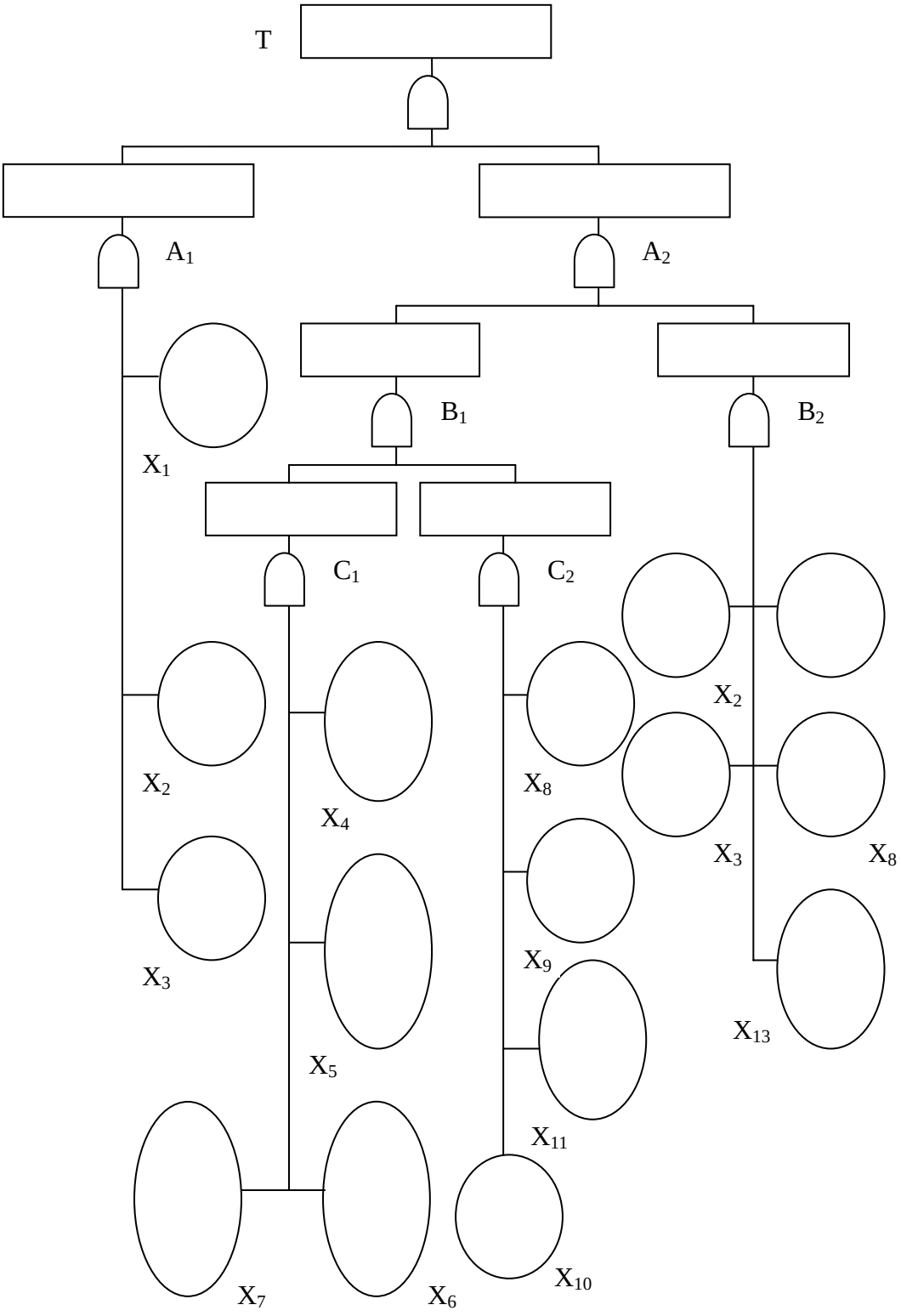
5.4-1

1	A	1	3
		2	2
		3	1
		4	0
2	B	1	3
		2	2
		3	1
		4	0
3	C	1	3
		2	2
		3	1
		4	0
4	D	1	3
		2	2
		3	1
		4	0
5	E	1 “ ”	3
		2 1 20% 30%	2
		3 5% 10%	1
		4	0
6	J	1	3
		2	2
		3	1
		4	0

3 5.4-2

5.4-2

1	A		1
2	B		2



5.4-1

2

$t=A_1+A_2=X_1X_2X_3+B_1B_2$

$=X_1X_2X_3+(C_1+C_2)X_2X_3X_8X_{12}X_{13}$

$=X_1X_2X_3+(X_4X_5X_6X_7+X_8X_9X_{10}X_{11})X_2X_3X_8X_{12}X_{13}$

$=X_1X_2X_3+X_2X_3X_4X_5X_6X_7X_8X_{12}X_{13}+X_2X_3X_8X_9X_{10}X_{11}X_{12}X_{13}$

3

$P_1=\{X_1 \quad X_2 \quad X_3\}$

$P_2=\{ X_2 \quad X_3 \quad X_4 \quad X_5 \quad X_6 \quad X_7 \quad X_8 \quad X_{12} \quad X_{13}\}$

$P_3=\{ X_2 \quad X_3 \quad X_8 \quad X_9 \quad X_{10} \quad X_{11} \quad X_{12} \quad X_{13} \}$

3

$I_\Phi(2)=I_\Phi(3) \quad I_\Phi(1) \quad I_\Phi(8)=I_\Phi(12)=I_\Phi(13) \quad I_\Phi(4)=I_\Phi(5)=I_\Phi(6)=$

$I_\Phi(7) \quad I_\Phi(9)=I_\Phi(10)=I_\Phi(11)$

$P_1 \quad P_2 \quad P_3$

3 P_1 P_2 P_3

3

P_1 P_2 P_3

1 X_2 X_3

2

3

4

5

6

5.5

5.5.1

1

W =C D+E+F+G+H+I+J+K

W - C-

D- E-

F- G-

H- I-

J- K-

2 5.5-1

5.5-1

1	C	1	3
		2	2
		3	1
		4	0
2	D	1	3
		2	2
		3	1
		4	0
3	E	1	3
		2 1a	2
		3 5% 10%	1
		4	0
4	F	1 “ ”	3
		2	2
		3 5% 10%	1
		4	0
5	G	1 “ ”	3
		2 5% 10%	2
		3 5% 10%	1

		4	0
6	H	1 ≥3%	3
		2 3% ≥2%	2
		3 2%	1
		4	0
7	I	1	3
		2	2
		3 85%	1
		4	0

4

W =C D+E+F+G+H+I+J+K =1 (1+2+1+2+1+1+1+1) =10

W =10 5 20 III

5.5.2

5.5.2.1

1

5.5-1

2 96 4

1

$T= A_1 \cdot A_2 = A_3 A_4 \cdot A_5 + A_6$

$= X_1+X_2+X_3+X_4 \quad A_7 A_8 \quad X_9+X_{10}+X_{11}+X_{12}+X_{13}+X_{14}$

$= X_1+\ldots\ldots+X_4 \quad X_5+X_6 \quad X_7+X_8 \quad X_9+X_{10}+X_{11}+X_{12}+X_{13}+X_{14}$

$= X_1+\ldots\ldots+X_4 \quad X_5X_7+X_5X_8+X_6X_7+X_6X_8 \quad X_9+X_{10}+\ldots\ldots+X_{14}$

$= X_1X_5X_7+X_1X_5X_8+\ldots+X_4X_6X_7+X_4X_6X_8 \quad X_9+X_{10}+\ldots+X_{14}$

$X_1X_5X_7X_9+X_1X_5X_7X_{10}+\ldots\ldots+X_4X_6X_8X_{13}+X_4X_6X_8X_{14}$ 96

$T'=A_1'+ A_2'= A_3'+ A_4'+ A_5'A_6'$

$= A_3'+ A_7'= A_8'+ A_5' \quad A_9'+ A_{10}'$

$=X_1' X_2'X_3' X_4'+ X_5'X_6'+ X_7'X_8'++ X_9'X_{10}'X_{11}' X_{12}'X_{13}'X_{14}'$

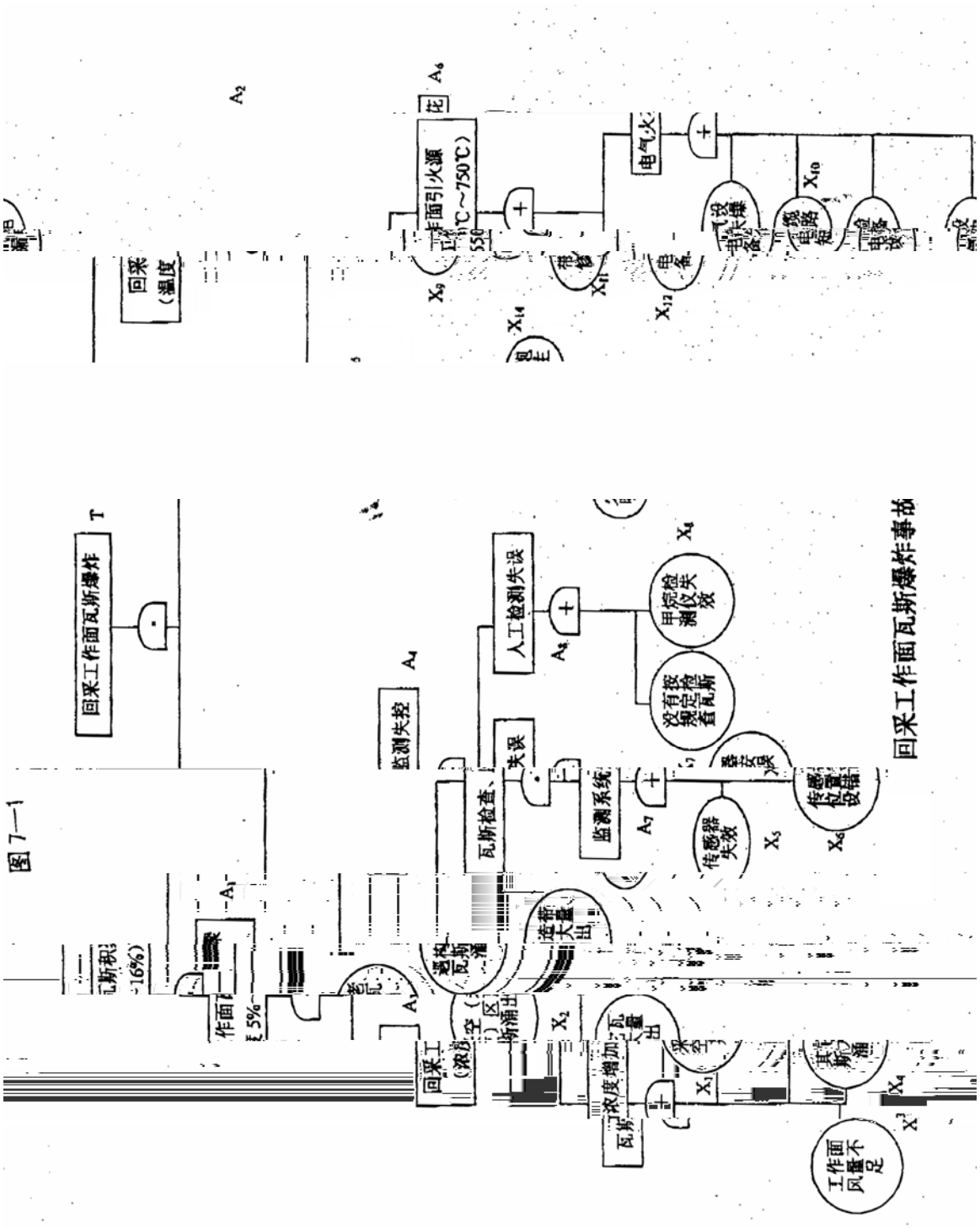
4 ,

$P_1=\{ X_1 ,X_2,X_3 ,X_4\}$

$P_2=\{ X_5, X_6\}$

$P_3=\{ X_7, X_8\}$

$P_4=\{ X_9 ,X_{10},X_{11},X_{12},X_{13} ,X_{14}\}$



5.5-1

2

$$I_{\Phi\ 5}=I_{\Phi\ 6}=I_{\Phi\ 7}=I_{\Phi\ 8}>I_{\Phi\ 1}=I_{\Phi\ 2}=I_{\Phi\ 3}=I_{\Phi\ 4}>I_{\Phi\ 9}=I_{\Phi\ 10}=I_{\Phi\ 11}=I_{\Phi\ 12}$$

$=I_{\Phi\ 13}\ =I_{\Phi\ 14}$

3

1 96

96 4 4

2 4 P_2 P_3 P_2 P_3

P_2 P_3

P_2 P_3

P_2 P_3

4

1

2

3

5.5.2.2

1

5.5-2

2

144 4

1

T= A1· A2

= A_3·A_4 X_9+ A_5+A_6

= X_1+X_2+X_3 A_7A_8 X_9+X_{10}+X_{11}+X_{12}+X_{13}+X_{14}+X_{15}+X_{16}

= X_1+X_2+X_3 X_4+X_5 X_6+X_7+X_8 X_9+……+X_{16}

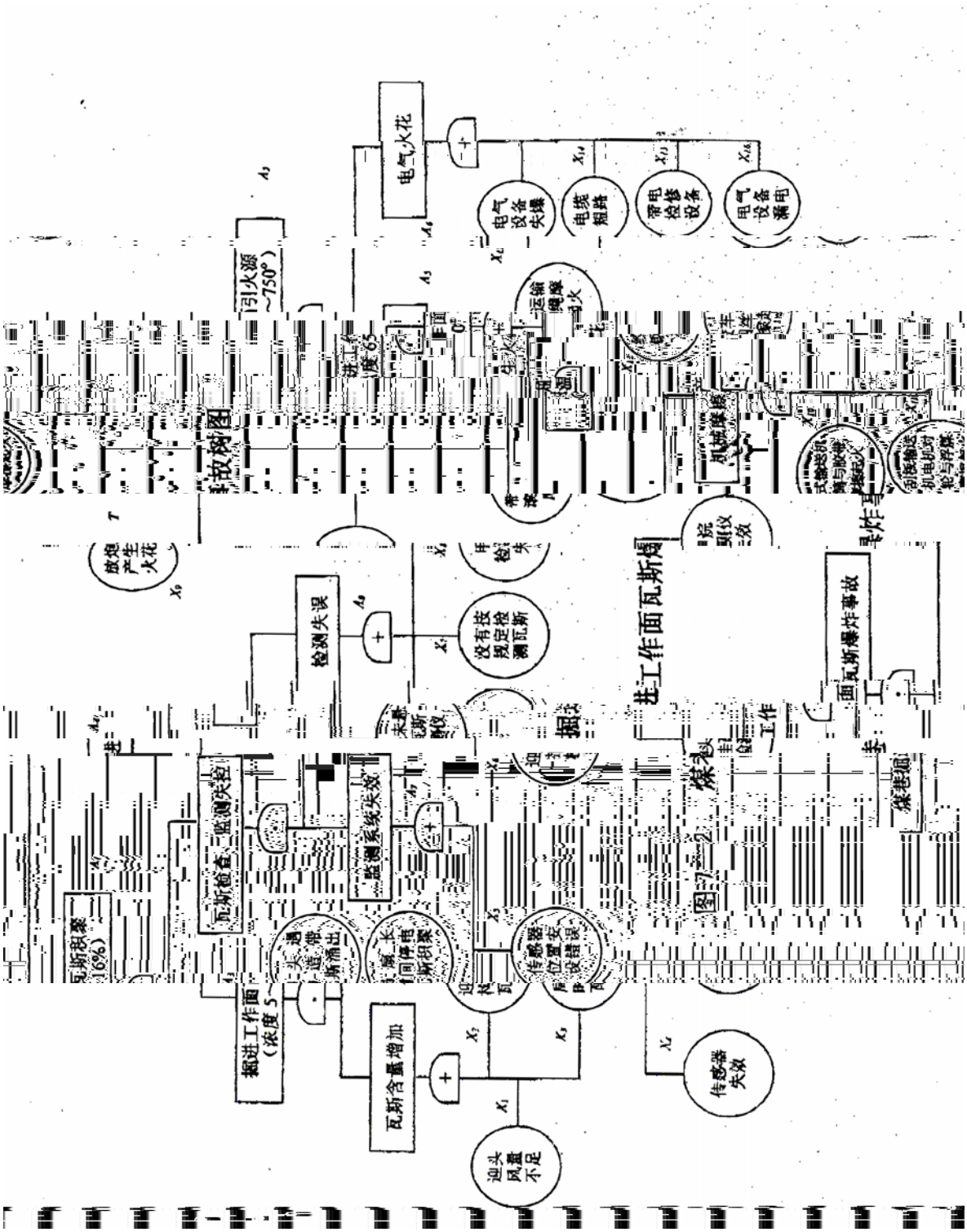
=$X_1X_4X_6X_9$ +$X_1X_4X_6X_{10}$+……+$X_3X_5X_8X_{15}$+$X_3X_5X_8X_{16}$

144

T′= A1′+ A2′= A3′+ A4′+ A5′A6′X9′

$=X_1'X_2'\ X_3'+X_9'X_{10}'X_{11}'X_{12}'\ X_{13}'X_{14}'X_{15}'\ X_{16}'$

$= X_1'X_2'\ X_3'+X_4'X_5'+X_6'X_7'\ X_8'+X_9'X_{10}'\ X_{11}'X_{12}'\ X_{13}'X_{14}'X_{15}'X_{16}'$



5.5-2

P1={ X1 ,X2, X3 }

P2={ X4, X5}

P3={ X_6 X_7, X_8}

P_4={ X_9 ,X_{10},X_{11},X_{12},,X_{13} ,X_{14},X_{15} X_{16} }

2

$I_{Ф\ 4}$ =$I_{Ф\ 5}$ $I_{Ф\ 1}$ =$I_{Ф\ 2}$ =$I_{Ф\ 3}$ = $I_{Ф\ 6}$ =$I_{Ф\ 7}$ =$I_{Ф\ 8}$ $I_{Ф\ 9}$ =$I_{Ф\ 10}$ =$I_{Ф\ 11}$ =$I_{Ф\ 12}$ =$I_{Ф\ 13}$ =$I_{Ф\ 14}$ =$I_{Ф\ 15}$ =$I_{Ф\ 16}$

3

1 144 144

4

4

2 4 P_2 P_1 P_3

P_2 P_1

P_3

4

1

2

3

4

5

5.6

5.6.1

1

W =Q R+S+T+U+V+X+J

W - Q-

R- S-

T- U-

V- X-

J-

2 5.6-1

5.6-1

1	(Q)	1	3
		2	2
		3	1
2	(R)	1	3
		2	2
		3	1
		4	0
3	(S)	1	3
		2	2
		3	1
		4 “ ”	0
4	(T)	1	2
		2	1
		3	0
5	(U)	1	2
		2	1
		3	0

6	(V)	1	2
		2	1
		3	0
7	(X)	1	2
		2	1
		3	0
8	(J)	1	3
		2	2
		3	1
		4	0

3 5.6-2

5.6-2

1	(Q)		2
2	(R)		2
3	(S)		1
4	(T)		1
5	(U)		0
6	(V)		1
7	(X)		0
8	(J)		1

4

W = Q R+S+T+U+V+X+J

= 2 (2+1+1+0+1+0+1)=12

W =12 5 20 III

5.6.2

1

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

2

5.6-1

3

1

T=a $A_1+A_2+A_3+A_4$

=a $B_1 \cdot X_3+B_2 \cdot X_7+X_8+X_9+B_3 \cdot X_{12}$

=aX_1X_3+aX_2X_3+aX_4X_7+aX_5X_7+aX_6X_7+aX_8+aX_9+a$X_{10}X_{12}$+a$X_{11}X_{12}$

9

K1={X_1 X_3 a} K6={X_8 a}

K2={X_2 X_3 a} K7={X_9 a}

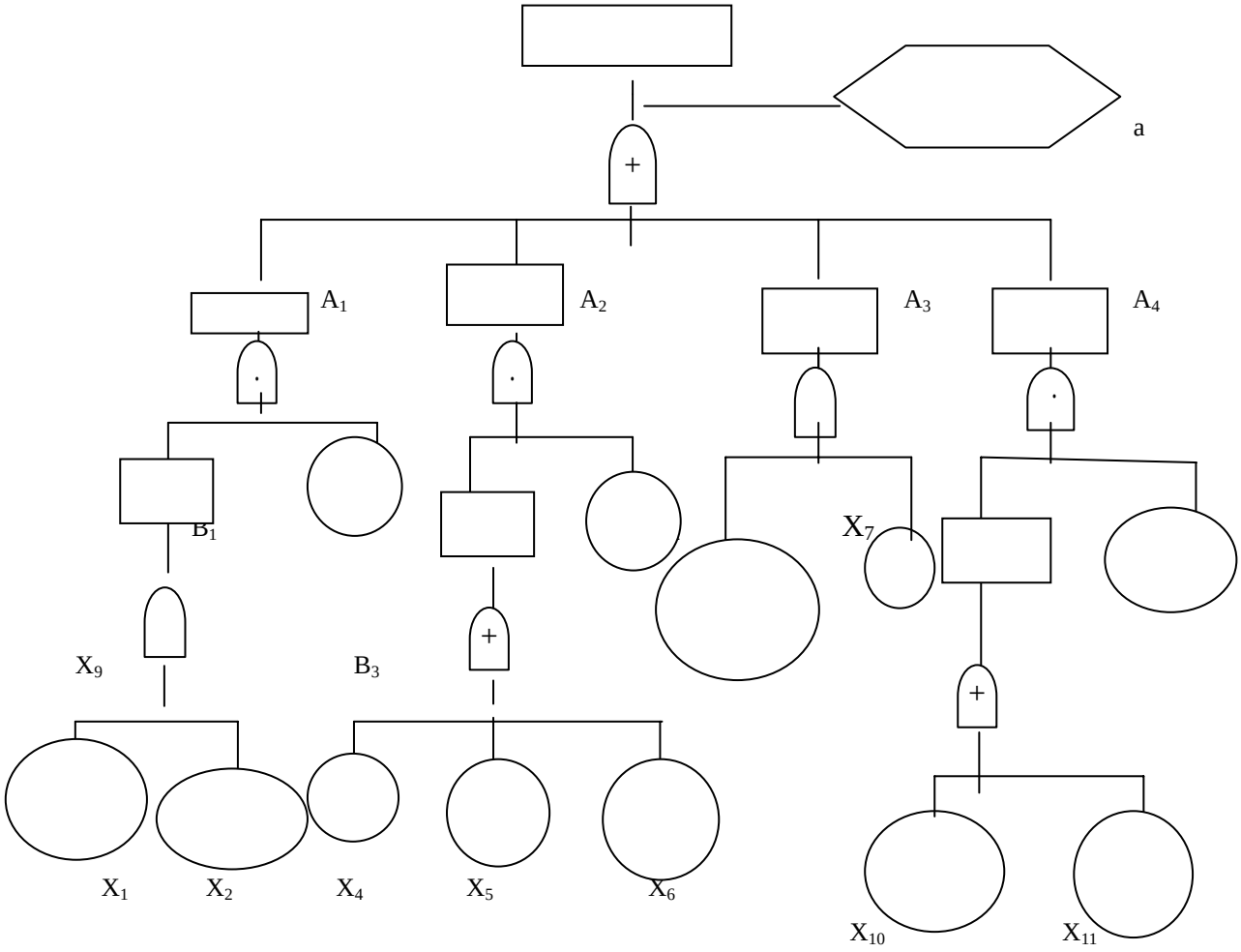
K3={X_4 X_7 a} K8={X_{10} X_{12} a}

K4={X_5 X_7 a} K9={X_{11} X_{12} a}

K5={X_6 X_7 a}

2

$I_{Ф\ 8} = I_{Ф\ 9}$ $I_{Ф\ 7}$ $I_{Ф\ 3} = I_{Ф\ 12}$ $I_{Ф\ 1} = I_{Ф\ 2} = I_{Ф\ 4} = I_{Ф\ 5} = I_{Ф\ 6} = I_{Ф\ 10}$ $I_{Ф\ 11}$



5.6-1

4

5.7

5.7.1

5.7-1

5.7-1

	24		
	21		
	6		
	10		
	12		

W =max W W W W W

W -

W -

W -

W -

W -

W =max 24 21 6 10 12 =24

II

5.7.2

165 11

18 96

144 9

144 96

6

6.1

6.1.1 2011 1 2012 2

1 2011 1 25 12

120

2 2011 3 10 18 30

1 2

3 2011 3 25

1209 7 30

4 2011 5 3 8 40 ,

, 50

, , ,

,5 3 11 ,

5 2011 5 7

50

1 5 30

6 2011 5 9 19 15 16

1

7 2011 5 11 21 25

133-138

12 1 04 12 8 30

13 20 20

8 2011 5 26

9 2011 5 27 17

10 2011 5 31 11 50

12107

12107 5

13 05

11 2011 6 2 10 20

+210

12 2011 6 12 21

13 2011 6 17 0 20

14 1 13

1570

6 8

14 2011 6 23 02 402

15 2011 6 30 22 0

6

16 2011 7 12 14 12 22113

3 2

17 2011 7 31 4 30

3103

18 2011 8 5 2 20 532

86

19 2011 8 6 23 40

36

36

20 25

23 2011 9 20 7 0

1310 110

8 20 9 7

24 2011 9 29 11 40

29 13 40

25 2011 10 29 12 10

26 2011 11 17 , 1295

102 20

14

27 2011 11 18 3 2

7 4

1 12 7

5

28 2012 2 3 7 30

10 50

29 2012 2 8 22 17

,

6.1.2

1

2011 1 -2012 2 29 49

15

2

1 2 10 15 9 15

2 2 4 4 1 6 1 3

3

1	11.1%	2	4.08%
10	22.2%	15	30.61%
9	44.4%	15	30.61%
2	11.1%	2	4.08%
1	5.56%	6	12.24%
1	5.56%	6	12.24%
1	5.56%	3	6.12%

6.2

1995 50

6.3

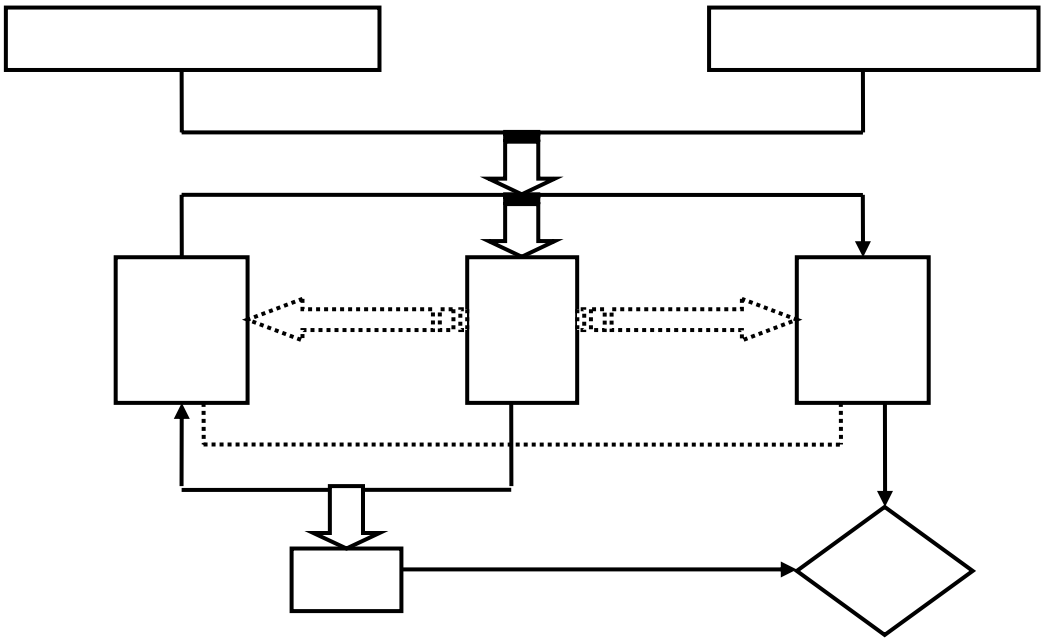
6.3.1

6.3-1

“ ”

“ ”

“ ”



6.3-1

“

”

6.3.2

1

4-2

2

3

4

5

6

7

7.1

2013 11 20 11 21

1

2

3

4

5

6

7

8

9

10 4

11 4225

12

13 4255

14

15

16

17

18

19

20

7.2

7.2.1

1

2

3

4

5

7.2.2

1

2

3

5

4

7.2.3

1

2

3

7.2.4

1

2 “ ”

72h

3

20h

4

7.2.5

1

2

3

4

5

7.3

7.3.1

1

2

3

4 30MPa

5

6

7

600×600mm

8

9

10

7.3.2

1

“ ”

2

3

4

5

6

7

0.1m 0.2m

7.3.3

1

2

3

2 2

4 113

5 128

6

7

8 10m

300mm 10m

9

10

11

12 AQ 1028-2006

7.3.4

1

2

3

4

5 20m

1.5%

6 1.0%

20m 1.0%

$0.5m^3$ 2.0%

20m

1.0%

7 “ ”

8

9

10

11

7.3.5

1

2

3

4

5

6

7.3.6

1

2

3

4

5

6 226

7

8

9 100m

10

11

12

13

7.3.7

1

2

3

4

5 “ ”

6

7

7.3.8

1

2

3

AQ 1029-2007

7.3.9

1

2 310 314

3

4 315 346

5

6

7

8

9

“ ” “ ”

10

7.3.10

1

2

3

4

5

6 50

7

8

9

10 5km/h

11

12

13

14

15

16

1

2

3

4

5

17

18

19

20

7.3.11

1

2

3

7.3.12

1

2

3

“ ”

4

5

6

7

8 “ ” “ ”

“ ”

“8”

“ ”

( )

“ ”

1

2

3

4

5

6

7 ,

8

9

10

7.3.13

1

2

3

4

0.25 m/s 0.5m/s 1.5 m/s 2.0m/s

5

6

7

8

9

7.3.14

1

2

3

8

8.1

8.1.1

II

8.1.2

[2004]56

4-2

4-2

6

8.2

8

1

2

3

4 (
[2012] 16)

5 12

6

7

8
1 9

9

10

11

12 3-2 4-2 4-2
3-2 4-2
4-2 4-2 5-2
40m

13

1 3 30m

2 2.4m

2.2m 20m 2.0m

3

2012 8 28

4

“ ”

5 KJ110N

6

7

8

9

10					
11		1	LL-55	1	LGH-18/8G

8.3