

LAMPIRAN

**TABLE A-1 (CONT'D)
BASIC ALLOWABLE STRESSES IN TENSION FOR METALS¹**

Numbers in Parentheses Refer to Notes for Appendix A Tables; Specifications Are ASTM Unless Otherwise Indicated

Material	Spec. No.	P-No. or S-No. (5)	Grade	Notes	Min. Temp., °F (6)	Specified Min. Strength, ksi		Min. Temp.		
						Tensile	Yield	to 100	200	300
Carbon Steel										
Pipes and Tubes (2)										
A 285 Gr. A	A 134	1	...	(8b)(57)	| B	45	24	15.0	14.6	14.2
A 285 Gr. A	A 672	1	A45	(57)(59)(67)	| B	45	24	15.0	14.6	14.2
Butt weld	API 5L	S-1	A25	(8a)	|| -20	45	25	15.0	15.0	14.5
Smls & ERW	API 5L	S-1	A25	(57)(59)	| B	45	25	15.0	15.0	14.5
...	A 179	1	...	(57)(59)	-20	47	26	15.7	15.0	14.2
Type F	A 53	1	Gr. A	(8a)(77)	|| 20	48	30	16.0	16.0	16.0
...	A 139	S-1	A	(8b)(77)	| A	48	30	16.0	16.0	16.0
...	A 587	1	...	(57)(59)	-20	48	30	16.0	16.0	16.0
...	A 53	1	A	(57)(59)	} B	48	30	16.0	16.0	16.0
...	A 106	1	A	(57)						
...	A 135	1	A	(57)(59)						
...	A 369	1	FPA	(57)						
...	API 5L	S-1	A	(57)(59)(77)						
A 285 Gr. B	A 134	1	...	(8b)(57)	| B	50	27	16.7	16.4	16.0
A 285 Gr. B	A 672	1	A50	(57)(59)(67)	| B	50	27	16.7	16.4	16.0
A 285 Gr. C	A 134	1	...	(8b)(57)	| A	55	30	18.3	18.3	17.7
...	A 524	1	Gr. II	(57)	-20	55	30	18.3	18.3	17.7
...	A 333	1	1	} (57)(59)	-50	55	30	18.3	18.3	17.7
...	A 334	1	1							
A 285 Gr. C	A 671	1	CA55								(59)(67)	A
A 285 Gr. C	A 672	1	A55	(57)(59)(67)	A	} 55	30	18.3	18.3	17.7
A 516 Gr. 55	A 672	1	C55	(57)(67)	C					
A 516 Gr. 60	A 671	1	CC60	(57)(67)	C	60	32	20.0	19.5	18.9
A 515 Gr. 60	A 671	1	CB60	} (57)(67)	B	60	32	20.0	19.5	18.9
A 515 Gr. 60	A 672	1	B60							
A 516 Gr. 60	A 672	1	C60								C
...	A 139	S-1	B	(8b)	| A	60	35	20.0	20.0	20.0

Lampiran 1 ASME B31.3

TABLE A-1 (CONT'D)
BASIC ALLOWABLE STRESSES IN TENSION FOR METALS¹
 Numbers in Parentheses Refer to Notes for Appendix A Tables; Specifications Are ASTM Unless Otherwise Indicated
 Basic Allowable Stress *S*, ksi (1), at Metal Temperature, °F (7)

400	500	600	650	700	750	800	850	900	950	1000	1050	1100	Grade	Spec. No.	
														Carbon Steel Pipe and Tubes (2)	
13.7	13.0	11.8	11.6	11.5	10.3	9.0	7.8	6.5	...	...	...	...	...	A 134
13.7	13.0	11.8	11.6	11.5	10.3	9.0	7.8	6.5	4.5	2.5	1.6	1.0	A45	A 672	
13.8	...	...	...	...	...	...	...	...	...	...	...	...	A25	API 5L
13.8	...	...	...	...	...	...	...	...	...	...	...	...	A25	API 5L
13.5	12.8	12.1	11.8	11.5	10.6	9.2	7.9	6.5	4.5	2.5	1.6	1.0	...	A 179	
16.0	...	...	...	...	...	...	...	...	...	...	...	...	Gr. A	A 53
...	...	...	...	...	...	...	...	...	...	...	...	...	A	A 139
16.0	16.0	14.8	14.5	14.4	10.7	9.3	7.9	...	...	...	...	...	...	A 587
16.0	16.0	14.8	14.5	14.4	10.7	9.3	7.9	6.5	4.5	2.5	1.6	1.0	{ A A A FPA A }	A 53	
														A 106	
														A 135	
														A 369	
														API 5L	
15.4	14.6	13.3	13.1	13.0	11.2	9.6	8.1	6.5	...	...	...	...	...	A 134
15.4	14.6	13.3	13.1	13.0	11.2	9.6	8.1	6.5	4.5	2.5	1.6	1.0	A 50	A 672	
17.2	16.2	14.8	14.5	14.4	12.0	10.2	8.3	6.5	...	...	...	...	...	A 134
17.2	16.2	14.8	14.5	14.4	12.0	10.2	8.3	6.5	4.5	2.5	...	...	Gr. II	A 524
17.2	16.2	14.8	14.5	14.4	12.0	10.2	8.3	6.5	4.5	2.5	1.6	1.0	{ 1 1 CA55 A55 C55 }	A 333	
														A 334	
														A 671	
														A 672	
														A 672	
18.3	17.3	15.8	15.5	15.4	13.0	10.8	8.7	6.5	4.5	2.5	...	...	CC60	A 671
18.3	17.3	15.8	15.5	15.4	13.0	10.8	8.7	6.5	4.5	2.5	1.6	1.0	{ CB60 B60 C60 }	A 671	
														A 672	
														A 672	

Lampiran 2 ASME B31.3 Lanjutan

Results report EPC - 4.02

24

PIPING MATERIALS CLASSIFICATION				ATTACHMENT- 3	
REV. MARK				WORK NO. BA0333	
ISSUE DATE 10/26/95 05/03/96				# B1P1 (a) # <004>	
				PAGE 1 OF 2	

SERVICE	PLANT AIR	BRANCH TABLE				BA0333T-2		
C.A. (mm)	1.5	P.-T. RATING	TEMP. °C	-29	38	94	149	200
PWHT NO		PRESS. Kg/cm ²	20.04	20.03	18.28	16.17	14.22	(d)

NOM. SIZE (NPS)	MATERIAL	PRODUCT	END	WALL THICK	REF. TO	NOTE	REV
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NOM. SIZE (NPS)	MATERIAL	PRODUCT	END	WALL THICK	REF. TO	NOTE	REV
PIPE							
1/2-11/2	A53GR. B	SMLS	PE	SCH 80	ASME B36.10M	(76)	
2- 6	A53GR. B	ERW-SMLS	BE	SCH 40	ASME B36.10M	(76)	
8- 14	A53GR. B	ERW	BE	SCH 20	ASME B36.10M	(76)	
16- 24	A53GR. B	ERW	BE	STD	ASME B36.10M	(76)	
26- 34	A672GR. A55CL. 13	EFW	BE	STD	ASME B36.10M	(c)	
36- 36	A672GR. A55CL. 13	EFW	BE	10.31T	ASME B36.10M	(c)	
38- 44	A672GR. A55CL. 13	EFW	BE	STD	ASME B36.10M	(c)	
ELBOW/TEE/REDUCER/CAP							
1/2-11/2	A105	-	SW	CL. 3000	ASME B16.11	(3)	
2- 24	A234GR. WPB	SMLS	BW		ASME B16.9	(13)	
26- 44	A234GR. WPB	WELD	BW		B3.314.2	(13)(21)	
SCREWED CAP							
1/2-11/2	A105	-	SCRD	CL. 3000	ASME B16.11	(22)	
LONG BOSS							
1/2-11/2	A105	-	PE	SCH 80	A3.0333.38	(77)	
FULL COUPLING							
1/2-11/2	A105	-	SW	CL. 3000	ASME B16.11		
HALF COUPLING							
1/2-11/2	A105	-	SW	CL. 3000	A3.312.2		


NOM. SIZE (NPS)	MATERIAL	CLASS	TYPE-FACE	THICK	REF. TO	NOTE	REV
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FLANGE							
1/2-11/2	A105	ANSI 150	SW-RF		ASME B16.5		
2- 24	A105	ANSI 150	SO-RF	12"	ASME B16.5		
26- 44	A105	ANSI 150	WN-RF		ASME B16.47		
SR. B							
LIND FLANGE							
1/2- 24	A105	ANSI 150	RF		ASME B16.5		
FIG-8 BLANKS							
1/2- 6	A516GR. 70	ANSI 150	RF		A3.620.21		
SPACER & BLANKS							
8- 24	A516GR. 70	ANSI 150	RF		A3.620.22		
GASKET							
1/2- 4	NON ASBESTOS (26MA)	ANSI 150	RF	1.5T	ASME B16.21		
6- 44	NON ASBESTOS (26MA)	ANSI 150	RF	3.0T	ASME B16.21		
BOLT/NUT							
1/2- 24	A193GR. B7/A194GR. 2H	150	S. BOLT/HEX. NUT		A3.560.1		
26- 44	A193GR. B7/A194GR. 2H	150	S. BOLT/HEX. NUT		A3.560.2		
1/2- 24	A193GR. B8/A194GR. 8	150	S. BOLT/HEX. NUT		A3.560.1	(78)	

NOM. SIZE (NPS)	BODY/TRIM	CLASS	END	TYPE	VALVE NO.	REF. TO	NOTE	REV
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GATE VALVE								
1/2-11/2	A105/#8	150	RF	BB. OS&Y	VAF260	ASME B16.10	(50)	
2- 24	A216GR. WCB/#1	150	RF	BB. OS&Y	VAF210	ASME B16.10	(b)	
16- 20	A216GR. WCB/#2	150	RF	BB. OS&Y	VAF212	ASME B16.10		
GLOBE VALVE								
1/2-11/2	A105/#8	150	RF	BB. OS&Y	VBF266	ASME B16.10	(50)	
2- 8	A216GR. WCB/#1	150	RF	BB. OS&Y	VBF216	ASME B16.10		

Lampiran 3 Piping Materials Classification B1P1

		PIPING MATERIALS CLASSIFICATION				ATTACHMENT- 3	
						WORK NO. BA0333	
REV. MARK	A	B				# BIP1 (a) #	<004>
ISSUE DATE	10/26/95	03/08/96				PAGE	2 OF 2

SERVICE	PLANT AIR				BRANCH TABLE				BA0333T-2
C.A. (mm)	1.5	P.-T. RATING	TEMP. °C	-29	38	94	149	200	
PWHT NO			PRESS. Kg/cm2G	20.04	20.03	18.28	16.17	14.22	(d)

NOM. SIZE(NPS)	BODY/TRIM	CLASS	END	TYPE	VALVE NO.	REF. TO	NOTE	REV
CHECK VALVE								
1/2-11/2	A105/#8	150	RF	BC, LIFT	VCF250	ASME B16.10	(50)	
2- 24	A216GR.WCB/#1	150	RF	BC, SWING	VCF210	ASME B16.10		
DIAPHRAGM VALVE								
3/4- 12	A395+PTFE/ PTFE	150	RF		VLF203	BY MFR	(54)	
BUTTERFLY VALVE								
3- 24	A395/#1+NBR	150	WAFER		VKW210	BY MFR	(53)	
26- 40	A395/#1+NBR	150	LUG-TYPE		VKF210	BY MFR	(53)	
NEEDLE VALVE								
1/2-11/2	A105/#8	150	RF	BB, OS&Y	VFF201	ASME B16.10	(50)	
BALL VALVE								
1/2- 16	A216GR.WCB/304+ PTFE	150	RF	F. FULL	VJF210	BY MFR	(54)(90)	
PLUG VALVE								
3/4- 16	A216GR.WCB/316+ PTFE	150	RF	F. REDUCE	VHF210	BY MFR	(54)(90)	
WAFER TYPE CHECK VALVE								
26- 40	A216GR.WCB/#1	150	WAFER	DUAL	VZW210	API 594		

- NOTES :
- (a) The detail of jacket piping shall be in accordance with the following drawings :
 DWG. NO. A3.0330.51, A3.0330.52, A3.0330.54
 A3.0330.55, A3.0330.56
 - (b) VAF212 shall be applied to suction line of CO-5201.
 - (c) A134(A283GR.D)/EFW STD thickness may be applied on following service lines.
 - Closed Cooling Water(Return and Supply)
 - Fire Fighting Water
 - (d) This P.T rating shall be applied to piping in NPS 14 and under. P.T rating for piping in NPS 16 and over shall be as follows:

TEMP. (deg C)	-29	38	94	149	200
PRESS. (Kg/cm2G)	15.55	15.55	15.55	15.04	14.22
	(3), (13), (21), (22), (30), (50), (53), (54), (76), (77), (78), (88), (90)				

--- SEE ATTACHMENT "GENERAL NOTES".

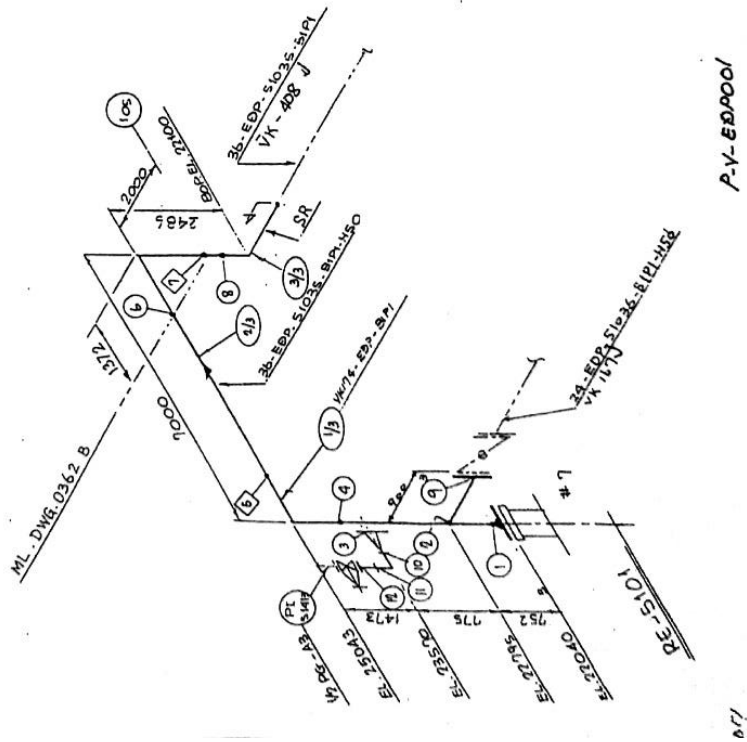
SERVICE : AMMONIA, DILUTED CAUSTIC SODA, CHEMICAL 1,2, EDC(Wet and Dry), EMERGENCY WATER, CONC. CAUSTIC SODA, CONC. SULPHURIC ACID, NITROGEN(LOW PRESS), 10K NITROGEN, L.P. STEAM CONDENSATE, LUBE OIL, 4K STEAM, DEMINERALIZED WATER, FIRE WATER, FUEL OIL, INDUSTRIAL WATER, INORGANIC WASTE LIQUID, CLOSED COOLING WATER, CHILLED WATER, VENT GAS, WASTE GAS, WASTE WATER, RAW WATER, SEAL OIL, SODA ASH SOLUTION, 20% NaOH SOLUTION, OC RECYCLE GAS

Lampiran 5 Gambar isometri dengan kode VK-174

PITING MATERIAL TAKE-OFF SHEET FOR TUP-BM

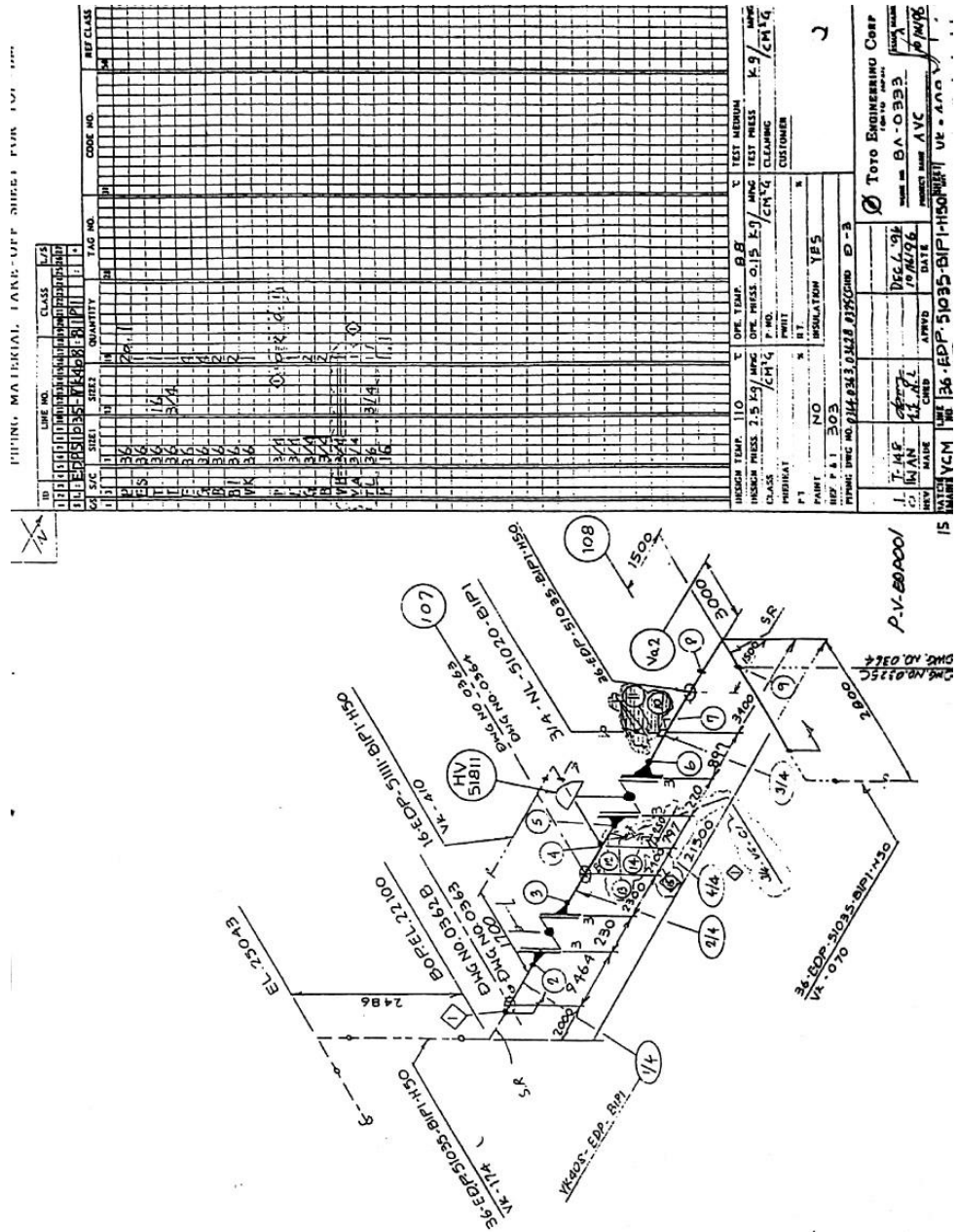
ID	LINE NO	CLASS	QTY	UNIT	REMARKS
1	34	3/4"	1.2	PI	3/4" - 408
2	34	3/4"	1.2	PI	3/4" - 408
3	34	3/4"	1.2	PI	3/4" - 408
4	34	3/4"	1.2	PI	3/4" - 408
5	34	3/4"	1.2	PI	3/4" - 408
6	34	3/4"	1.2	PI	3/4" - 408
7	34	3/4"	1.2	PI	3/4" - 408
8	34	3/4"	1.2	PI	3/4" - 408
9	34	3/4"	1.2	PI	3/4" - 408
10	34	3/4"	1.2	PI	3/4" - 408
11	34	3/4"	1.2	PI	3/4" - 408
12	34	3/4"	1.2	PI	3/4" - 408
13	34	3/4"	1.2	PI	3/4" - 408
14	34	3/4"	1.2	PI	3/4" - 408
15	34	3/4"	1.2	PI	3/4" - 408
16	34	3/4"	1.2	PI	3/4" - 408
17	34	3/4"	1.2	PI	3/4" - 408
18	34	3/4"	1.2	PI	3/4" - 408
19	34	3/4"	1.2	PI	3/4" - 408
20	34	3/4"	1.2	PI	3/4" - 408
21	34	3/4"	1.2	PI	3/4" - 408
22	34	3/4"	1.2	PI	3/4" - 408
23	34	3/4"	1.2	PI	3/4" - 408
24	34	3/4"	1.2	PI	3/4" - 408
25	34	3/4"	1.2	PI	3/4" - 408
26	34	3/4"	1.2	PI	3/4" - 408
27	34	3/4"	1.2	PI	3/4" - 408
28	34	3/4"	1.2	PI	3/4" - 408
29	34	3/4"	1.2	PI	3/4" - 408
30	34	3/4"	1.2	PI	3/4" - 408
31	34	3/4"	1.2	PI	3/4" - 408
32	34	3/4"	1.2	PI	3/4" - 408
33	34	3/4"	1.2	PI	3/4" - 408
34	34	3/4"	1.2	PI	3/4" - 408
35	34	3/4"	1.2	PI	3/4" - 408
36	34	3/4"	1.2	PI	3/4" - 408
37	34	3/4"	1.2	PI	3/4" - 408
38	34	3/4"	1.2	PI	3/4" - 408
39	34	3/4"	1.2	PI	3/4" - 408
40	34	3/4"	1.2	PI	3/4" - 408
41	34	3/4"	1.2	PI	3/4" - 408
42	34	3/4"	1.2	PI	3/4" - 408
43	34	3/4"	1.2	PI	3/4" - 408
44	34	3/4"	1.2	PI	3/4" - 408
45	34	3/4"	1.2	PI	3/4" - 408
46	34	3/4"	1.2	PI	3/4" - 408
47	34	3/4"	1.2	PI	3/4" - 408
48	34	3/4"	1.2	PI	3/4" - 408
49	34	3/4"	1.2	PI	3/4" - 408
50	34	3/4"	1.2	PI	3/4" - 408
51	34	3/4"	1.2	PI	3/4" - 408
52	34	3/4"	1.2	PI	3/4" - 408
53	34	3/4"	1.2	PI	3/4" - 408
54	34	3/4"	1.2	PI	3/4" - 408
55	34	3/4"	1.2	PI	3/4" - 408
56	34	3/4"	1.2	PI	3/4" - 408
57	34	3/4"	1.2	PI	3/4" - 408
58	34	3/4"	1.2	PI	3/4" - 408
59	34	3/4"	1.2	PI	3/4" - 408
60	34	3/4"	1.2	PI	3/4" - 408
61	34	3/4"	1.2	PI	3/4" - 408
62	34	3/4"	1.2	PI	3/4" - 408
63	34	3/4"	1.2	PI	3/4" - 408
64	34	3/4"	1.2	PI	3/4" - 408
65	34	3/4"	1.2	PI	3/4" - 408
66	34	3/4"	1.2	PI	3/4" - 408
67	34	3/4"	1.2	PI	3/4" - 408
68	34	3/4"	1.2	PI	3/4" - 408
69	34	3/4"	1.2	PI	3/4" - 408
70	34	3/4"	1.2	PI	3/4" - 408
71	34	3/4"	1.2	PI	3/4" - 408
72	34	3/4"	1.2	PI	3/4" - 408
73	34	3/4"	1.2	PI	3/4" - 408
74	34	3/4"	1.2	PI	3/4" - 408
75	34	3/4"	1.2	PI	3/4" - 408
76	34	3/4"	1.2	PI	3/4" - 408
77	34	3/4"	1.2	PI	3/4" - 408
78	34	3/4"	1.2	PI	3/4" - 408
79	34	3/4"	1.2	PI	3/4" - 408
80	34	3/4"	1.2	PI	3/4" - 408
81	34	3/4"	1.2	PI	3/4" - 408
82	34	3/4"	1.2	PI	3/4" - 408
83	34	3/4"	1.2	PI	3/4" - 408
84	34	3/4"	1.2	PI	3/4" - 408
85	34	3/4"	1.2	PI	3/4" - 408
86	34	3/4"	1.2	PI	3/4" - 408
87	34	3/4"	1.2	PI	3/4" - 408
88	34	3/4"	1.2	PI	3/4" - 408
89	34	3/4"	1.2	PI	3/4" - 408
90	34	3/4"	1.2	PI	3/4" - 408
91	34	3/4"	1.2	PI	3/4" - 408
92	34	3/4"	1.2	PI	3/4" - 408
93	34	3/4"	1.2	PI	3/4" - 408
94	34	3/4"	1.2	PI	3/4" - 408
95	34	3/4"	1.2	PI	3/4" - 408
96	34	3/4"	1.2	PI	3/4" - 408
97	34	3/4"	1.2	PI	3/4" - 408
98	34	3/4"	1.2	PI	3/4" - 408
99	34	3/4"	1.2	PI	3/4" - 408
100	34	3/4"	1.2	PI	3/4" - 408

DESIGNER: [Signature]
 CHECKER: [Signature]
 DATE: 10/1/01
 PROJECT: [Project Name]
 DRAWING NO: 324C
 SHEET NO: 101
 TOTAL SHEETS: 101
 CLASS: [Class]
 UNIT: [Unit]
 MATERIAL: [Material]
 INSULATION: YES
 TOTO ENGINEERING CORP.
 ADDRESS: [Address]
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 E-MAIL: [Email]
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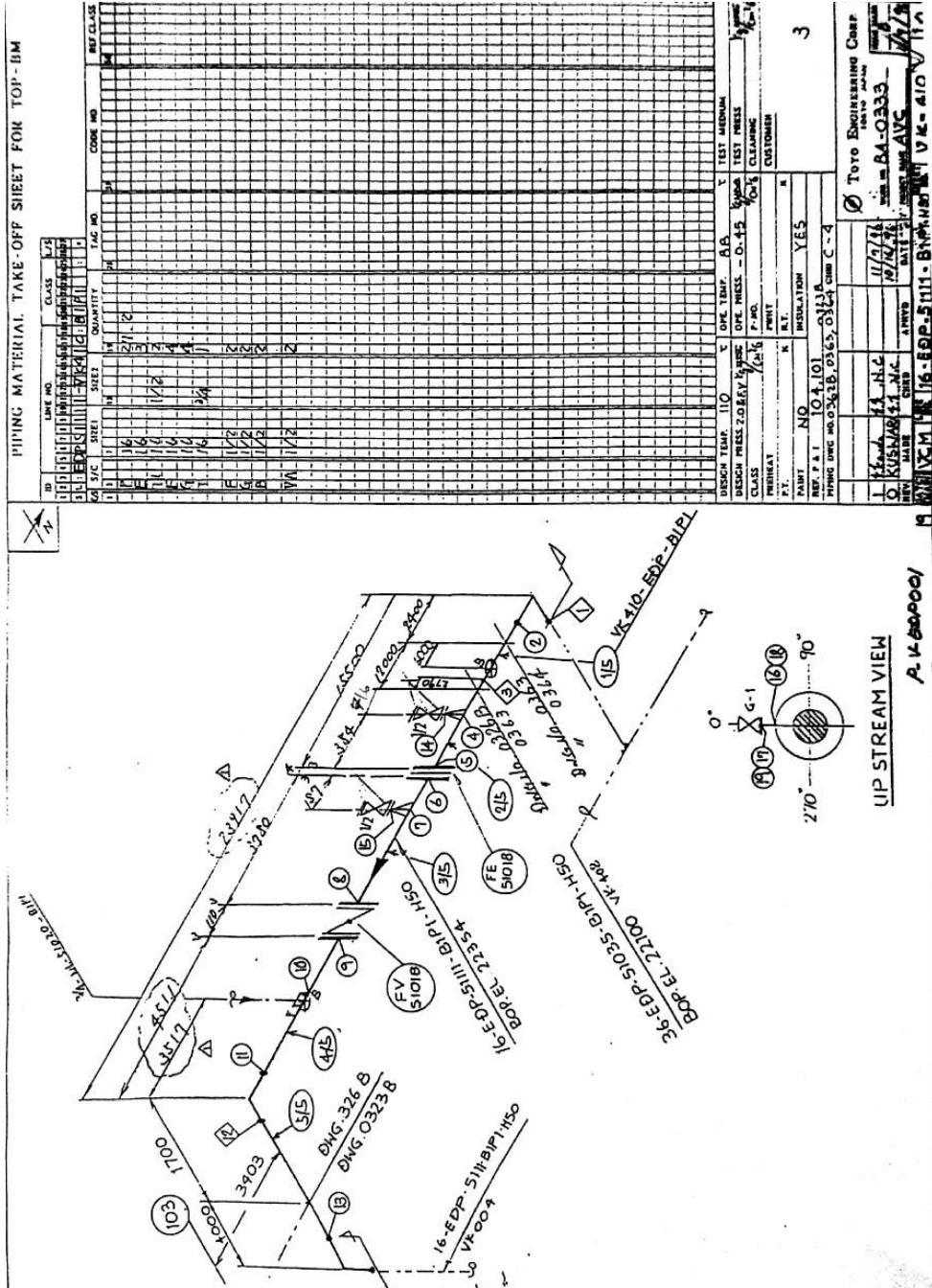


P-V-EDP001

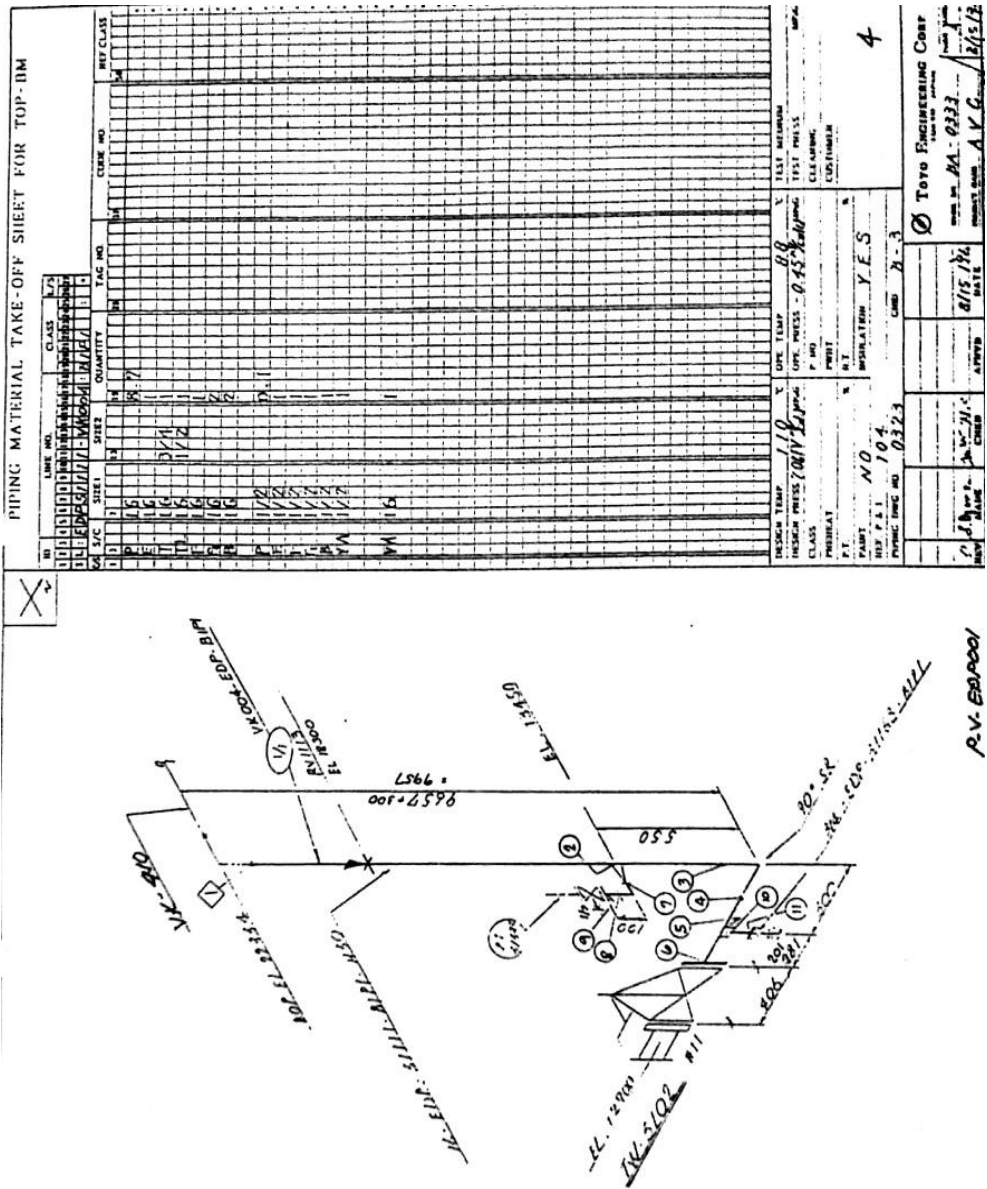
Lampiran 6 Gambar isometri dengan kode VK-408



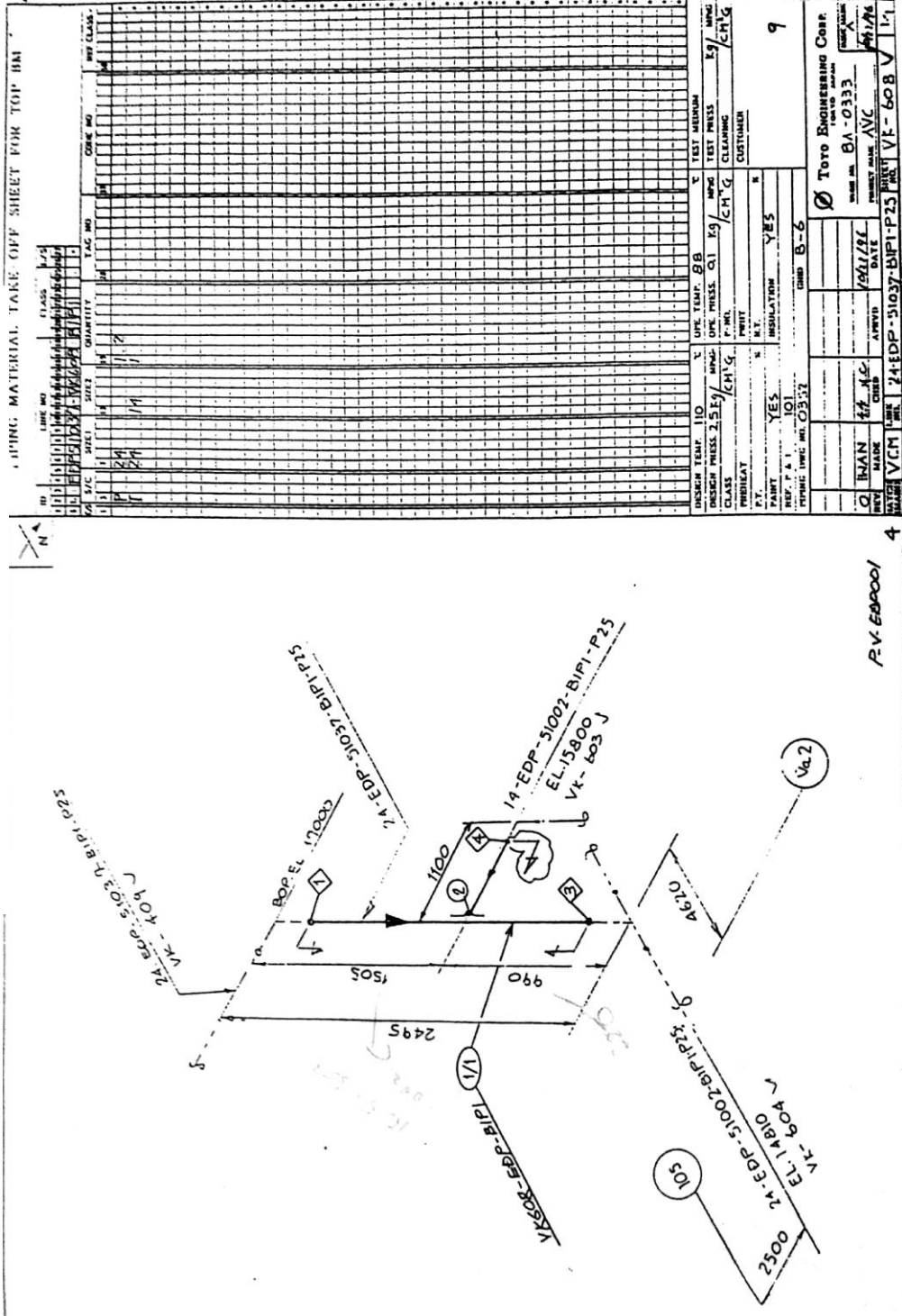
Lampiran 7 Gambar isometri dengan kode VK-410



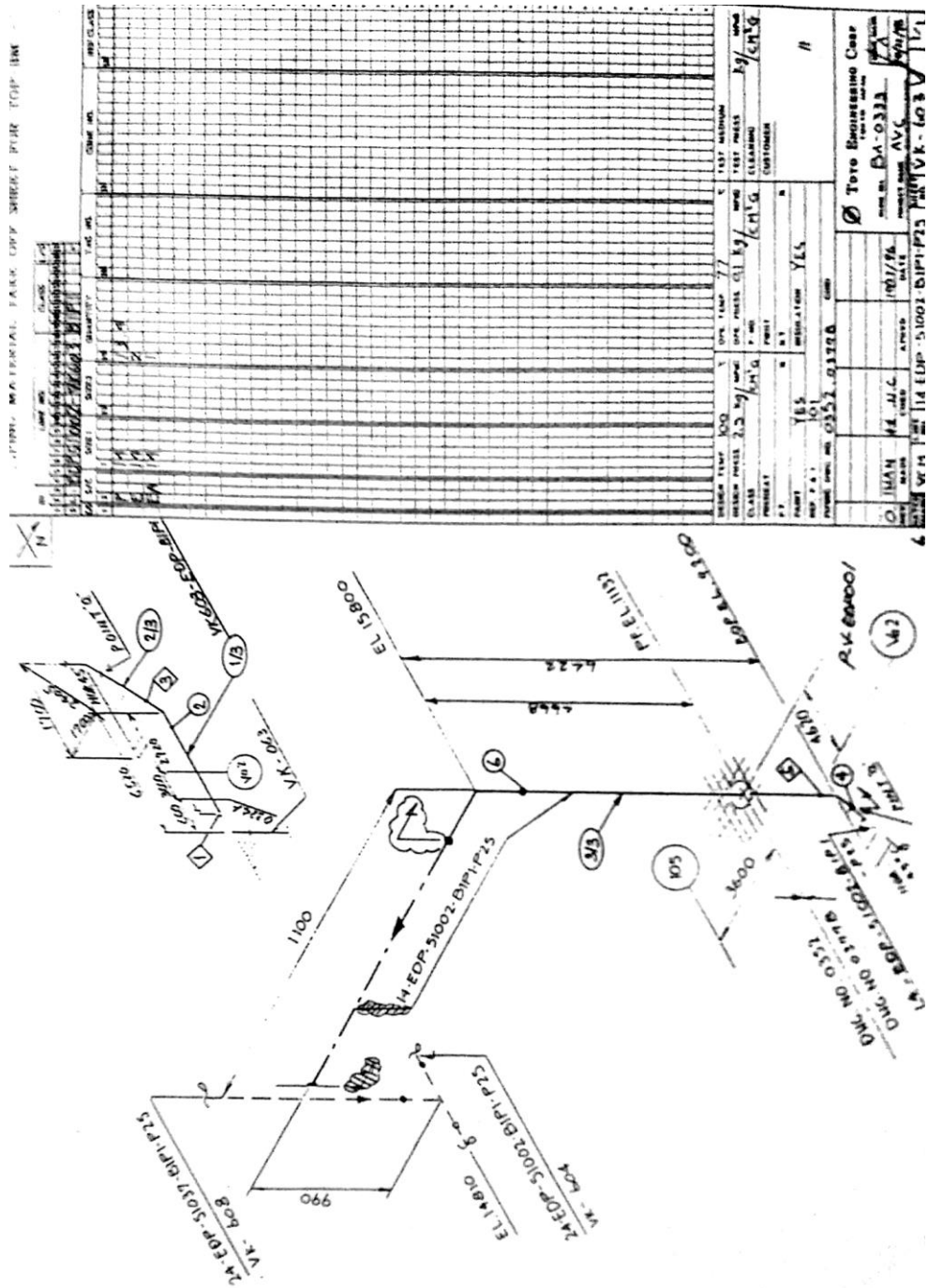
Lampiran 8 Gambar isometri dengan kode VK-004



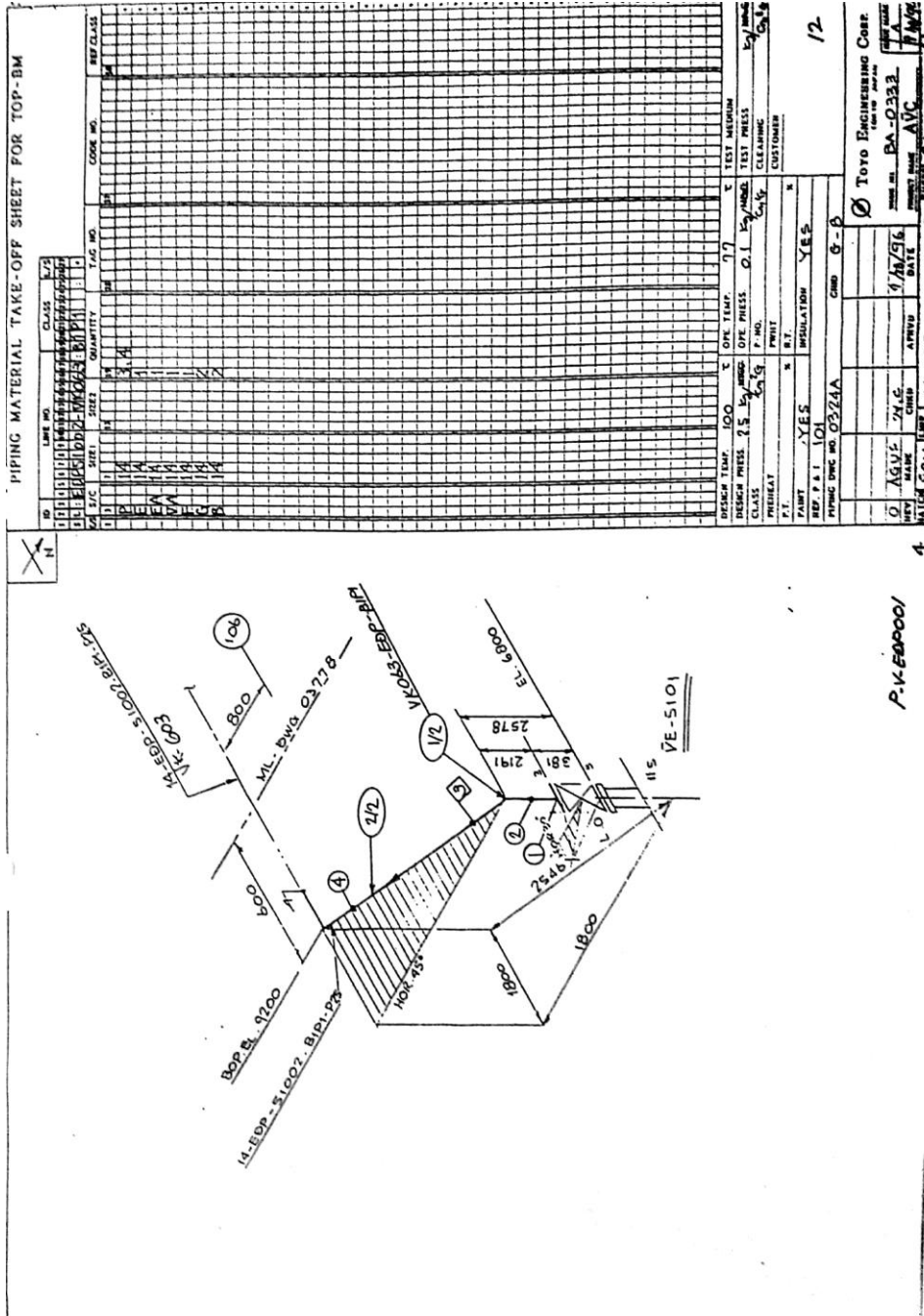
Lampiran 11 Gambar isometri dengan kode VK-608



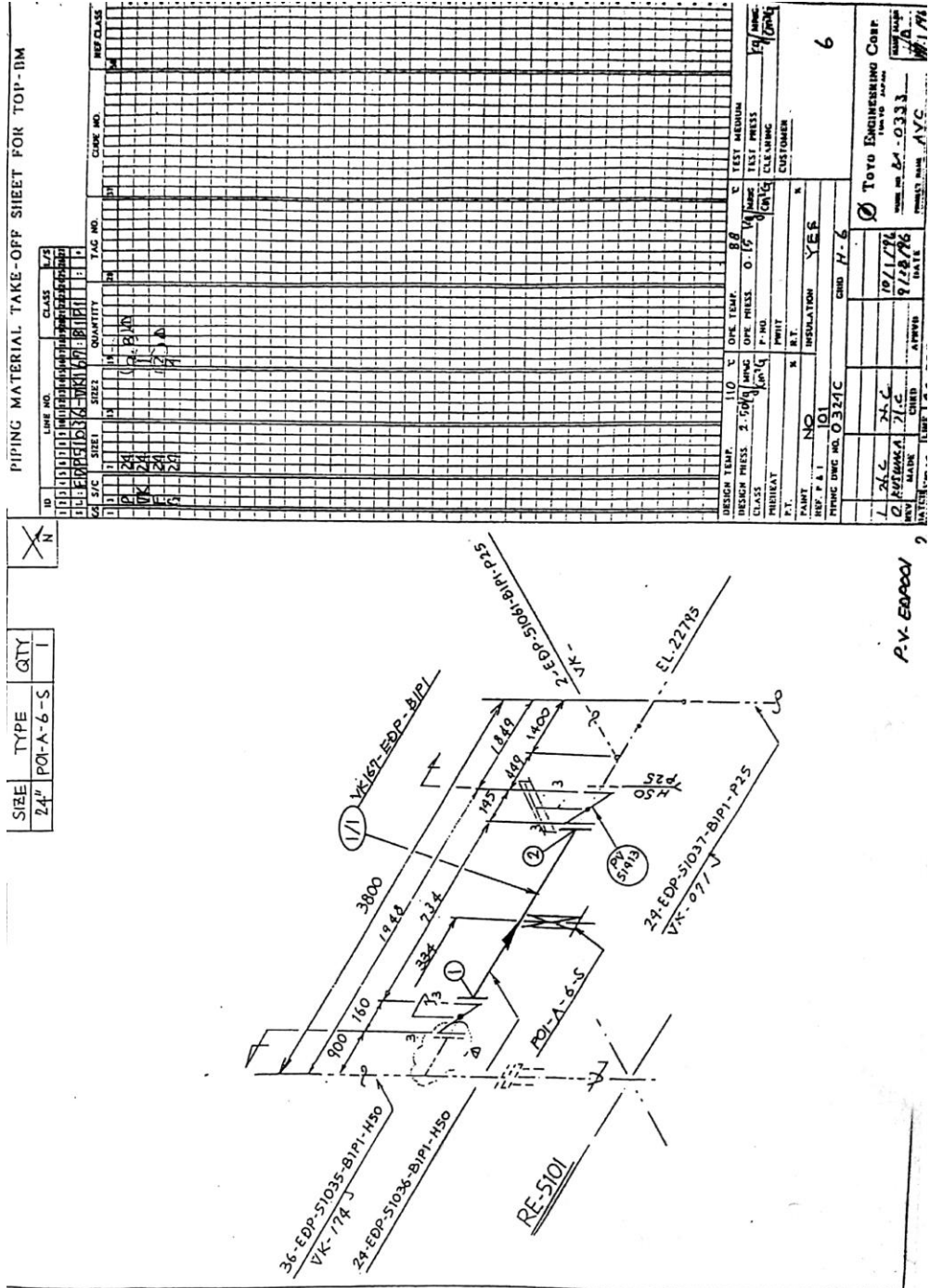
Lampiran 13 Gambar isometri dengan kode VK-603



Lampiran 14 Gambar isometri dengan kode VK-063



Lampiran 15 Gambar isometri dengan kode VK-167



PIPE TYPE				QTY			
24" PO1-A-6-S				1			

PIPING MATERIAL TAKE-OFF SHEET FOR TOPI-DM									
LINE NO.	CLASS	SIZE	QTY	WGT	UNIT	TEST MEDIUM	TEST PRESS	CLEANING	CUSTOMER
1/1	VK-167	24"	1			BB	0.15	0.00	

DESIGN TEMP.	110 °C	DESIGN PRESS.	2.50 MPa
OPER. TEMP.	BB	OPER. PRESS.	0.15 MPa
TEST MEDIUM	BB	TEST PRESS.	0.15 MPa
CLEANING	0.00	CUSTOMER	

PAINTE	NO	INSULATION	YES
REF. P. A. 1	101	GRID	H-6
PIPING DWG NO.	0327C		

DATE	19/11/2011	SCALE	1:1
DRAWN BY	W. J. H. M. A.	CHECKED BY	
REVISED BY		APPROVED BY	

TOTO ENGINEERING CORP.		
ADDRESS	INDONESIA	PT. NUSANTARA
PHONE NO.	0333	INDONESIA
FAX NO.	0333	
EMAIL	AYC	

P.V. EDP0001

Lampiran 16 Gambar isometri dengan kode VK-070

