

- (6) Working expendables for gasification test
- (7) Maintenance tools and materials for general purpose

The details are shown in Fig. 4-4-1 and Table 4-4-1 to Table 4-4-6.

#### **4-5 PLAN ON ERECTION WORK**

The technical specification of erection work is studied as shown Appendix 6.

## LIST of FIGURE and TABLE

Table.4-2-1	Design condition
Fig. 4-2-1	Main components of coal gasification test facilities
Fig. 4-2-2	Drawing of whole plan
Fig. 4-2-3	Drawing of front view
Fig. 4-2-4	Drawing of side view
Fig. 4-2-5	Assemble drawing of coal drying system
Fig. 4-2-6	Assemble drawing of coal pulverize and coal injection system
Fig. 4-2-7	Assemble drawing of melting furnace
Fig. 4-2-8	Assemble drawing of runner
Fig. 4-2-9	Assemble drawing of gasifier
Fig. 4-2-10	Assemble drawing of main lance and sub-lance
Fig. 4-2-11	Assemble drawing of produced gas filtration system(1)
Fig. 4-2-12	Assemble drawing of produced gas filtration system(2)
Fig. 4-2-13	Assemble drawing of Produced gas filtration system(3)
Fig. 4-2-14	Assemble ground flare burner
Fig. 4-2-15	Assemble drawing of slag treatment system
Fig. 4-2-16	Assemble drawing of partial dust collector
Fig. 4-2-17	Piping diagram (1)
Fig. 4-2-18	Piping diagram (2)
Fig. 4-2-19	Arrangement drawing of N <sub>2</sub> , O <sub>2</sub> , & LPG collected equipment
Fig. 4-2-20	Anchor plan
Fig. 4-2-21	System configuration
Fig. 4-2-22	Single line diagram
Fig. 4-2-23	Piping & instrument diagram
Table.4-2-2	Principal specification
Table.4-2-3	Motor list
Table.4-2-4	Instrument list
Fig. 4-2-24	Engineering flow diagram
Table.4-2-5	Utility balance
Table.4-3-1	Schedule for erection, trial run, commissioning & test
Table.4-3-3	Standard time schedule for a coal gasification test run
Table.4-3-2	Test items for erection, trial run, commissioning & test
Fig. 4-3-1	Organization for Counterpart team
Fig. 4-4-1	Drawing of battery limit
Table.4-4-1	List of materials and utilities supplied by Counterpart
Table.4-4-2	List of equipments, tools and consumables for chemical analysis supplied by Counterpart
Table.4-4-3	List of office furniture supplied by Counterpart
Table.4-4-4	List of working tools and working expendables supplied by Counterpart
Table.4-4-5	List of maintenance tools and maintenance materials supplied by Counterpart
Table.4-4-6	Power source capacity in analysis room supplied by Counterpart

Table.4-2-1.(1) Design Condition

ITEM	DESIGN CONDITION	
1. Climate Data		
	Ambient Temperature	
	Daily maximum temperature	33.0 °C
	Yearly maximum temperature	31.5 °C
	Daily minimum temperature	21.0 °C
	Yearly minimum temperature	22.5 °C
	Daily normal/average temperature	24.0 °C
		at 7:00
	Daily normal/average temperature	30.0 °C
		at 13:00
	Daily normal/average temperature	26.5 °C
		at 18:00
	Relative Humidity	
	Daily maximum humidity	96 %
		24 °C at 7:00
	Daily minimum humidity	47 %
		32 °C at 13:00
	Daily normal humidity	92 %
		at 7:00
	Daily normal humidity	62 %
		at 13:00
	Daily normal humidity	79 %
		at 18:00
2. Materials		
(1) Coal	Moisture	Max. 35 %
	Size	- 50 mm
(2) Calcined lime	Component	90 % Cao over
		4-8 % CO2
	Size	- 30 mm
(3) Scrapped iron	Component	Fe 93-96 %
		C 3-3.5 %
		Si 1-2 %
	Size	about 110 mm Dia.
3. Utilities		
(1) Oxygen	as cylinders	
	Purity	99 % over
	Temperature	ambient temperature
	Pressure	10 kg/cm2G
(2) Nitrogen	as cylinders	
	Purity	99 % over
	Temperature	ambient temperature
	Pressure	10 kg/cm2G

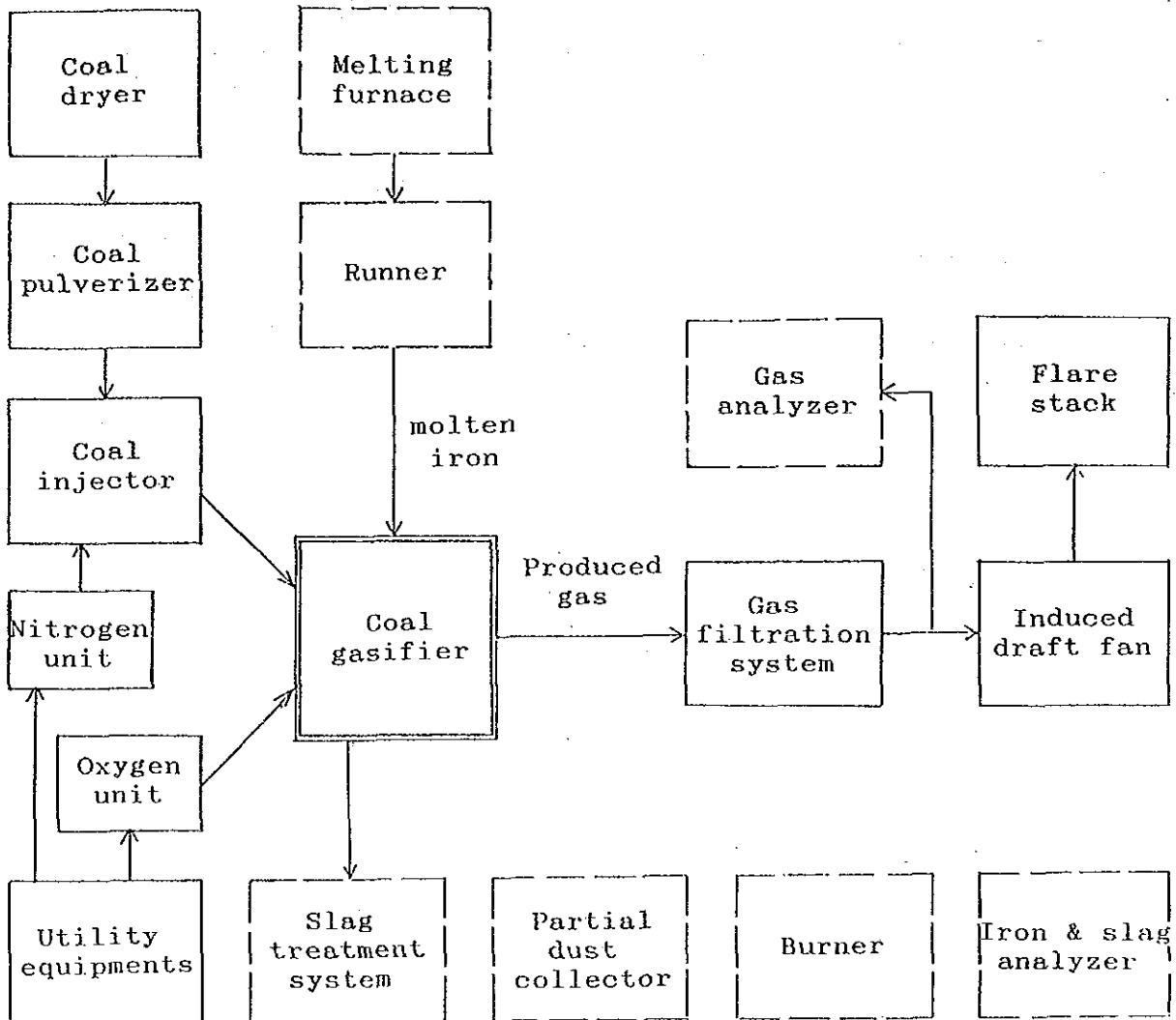
Table.4-2-1.(2) Design Condition

ITEM	DESIGN CONDITION	
(3) Electric Power	Frequency	50 Hz
	Phase	3 phase
	Voltage	380 V $\pm$ 10 %
	Power	Max. 350 KVA
(4) Compressed Air	Temperature	ambient temperature
	Pressure	Min. 6 kg/cm <sup>2</sup> G
(5) Compressed Air for Instrumentation	Temperature	ambient temperature
	Pressure	Min. 6 kg/cm <sup>2</sup> G
	Dew point	0 °C
(6) Cooling Water	Water analysis	
	Color	20 Pt.Co
	Turbidity	-
	Odor	No
	Taste	No
	PH	6.5
	Solid Content	4.1 ppm
	Conductivity	-
	Organic Content	4.4 ppm KMnO <sub>4</sub>
	Free CO <sub>2</sub> Content	No
	Alkalinity	
	Phenol phtalein	0 ppm CaCO <sub>3</sub>
	Methyl orange	40.0 ppm CaCO <sub>3</sub>
	Carbonate	0 ppm CaCO <sub>3</sub>
	Hydroxide	0 ppm CaCO <sub>3</sub>
	Bicarbonate	40.0 ppm CaCO <sub>3</sub>
	Hardness	
	Calcium	4.28 ppm Ca <sup>++</sup>
	Magnesium	1.72 ppm Mg <sup>++</sup>
	Iron content	negative
	Sulfate content	negative
	Phosphate	negative
	Ammonium content	negative
	Nitrate content	negative
	Silica content	-
	Chloride content	7.10 ppm Cl <sup>-</sup>
	Residual chlorine	0.30 Cl <sub>2</sub>
Temperature	25-27 °C	
Pressure	Min. 10 kg/cm <sup>2</sup> G	
(7) Liquefied Petroleum Gas as cylinder	Calorific Value	24000 kcal/Nm <sup>3</sup> over ambient temperature
	Temperature	ambient temperature
	Pressure	2 kg/cm <sup>2</sup> G

Table.4-2-1.(3) Design Condition

ITEM	DESIGN CONDITION	
4. Waste		
(1) Cooling water	Temperature	inlet temperature + Max.10 °C
(2) Dust	Component	Fe tot. 40-50 %
	Flow rate	C 10-25 %
	Flow rate	3 kg/h
(3) Slag	Basicity	CaO/SiO <sub>2</sub> = 1.5
	Flow rate	2.4 kg/h
(4) Produced Gas	Flow Rate	64.5 Nm <sup>3</sup> /h

Fig.4-2-1 Main Components of Coal Gasification Test Facilities





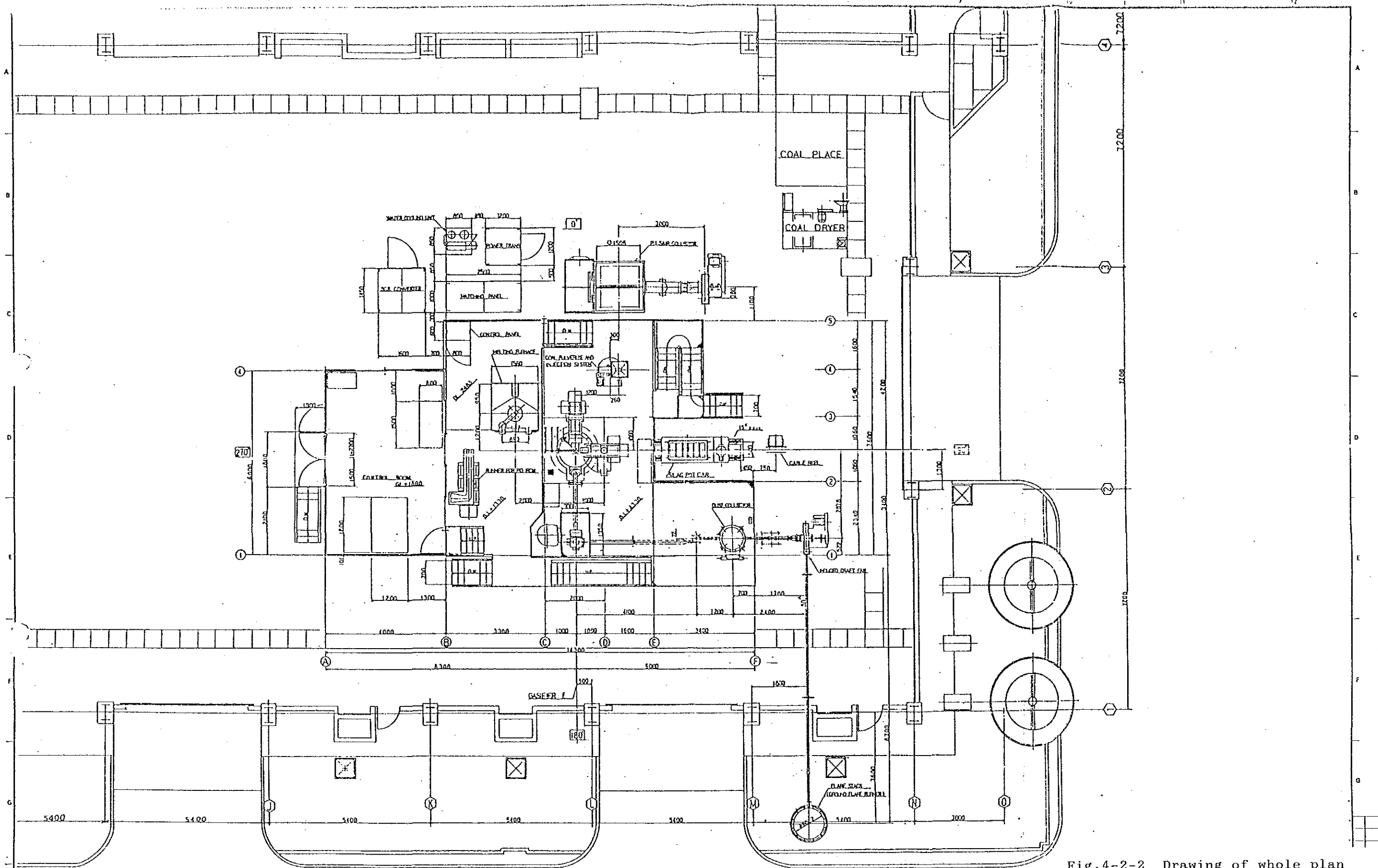


Fig.4-2-2 Drawing of whole plan

REVISION		
NO	DATE	DESCRIPTION

DATE	MANAGER OF DEV.
AUG 13 . 85	
SCALE	MANAGER
1/80	
	CHIEF
	CHECKED BY
	DRAWN BY

BANKO\_COAL\_GASIFICATION  
TEST\_PLANT  
ARRANGEMENT\_DRAWING



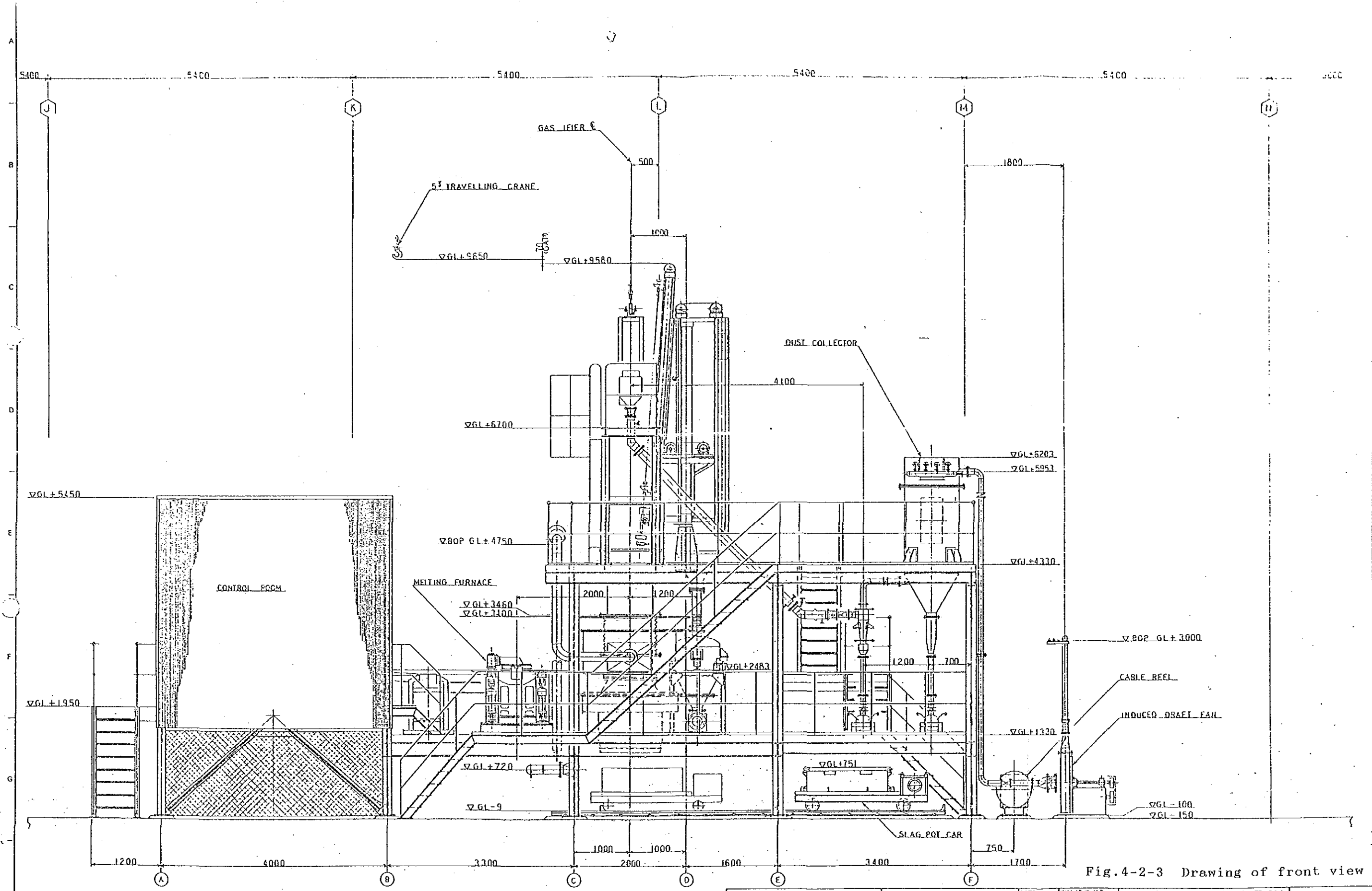


Fig.4-2-3 Drawing of front view

REVISION			DATE	DRAWN BY	CHECKED BY	APPROVED BY	PROJECT
NO.	DATE	DESCRIPTION					

DATE	AUG. 8, 85	SCALE	3/8"	<b>BANKO COAL GASIFICATION TEST PLANT FRONT VIEW.</b>
MANAGER				
				<b>SUMITOMO METAL INDUSTRIES LTD.</b> PLANT ENGR - 32 - OSAKA JAPAN

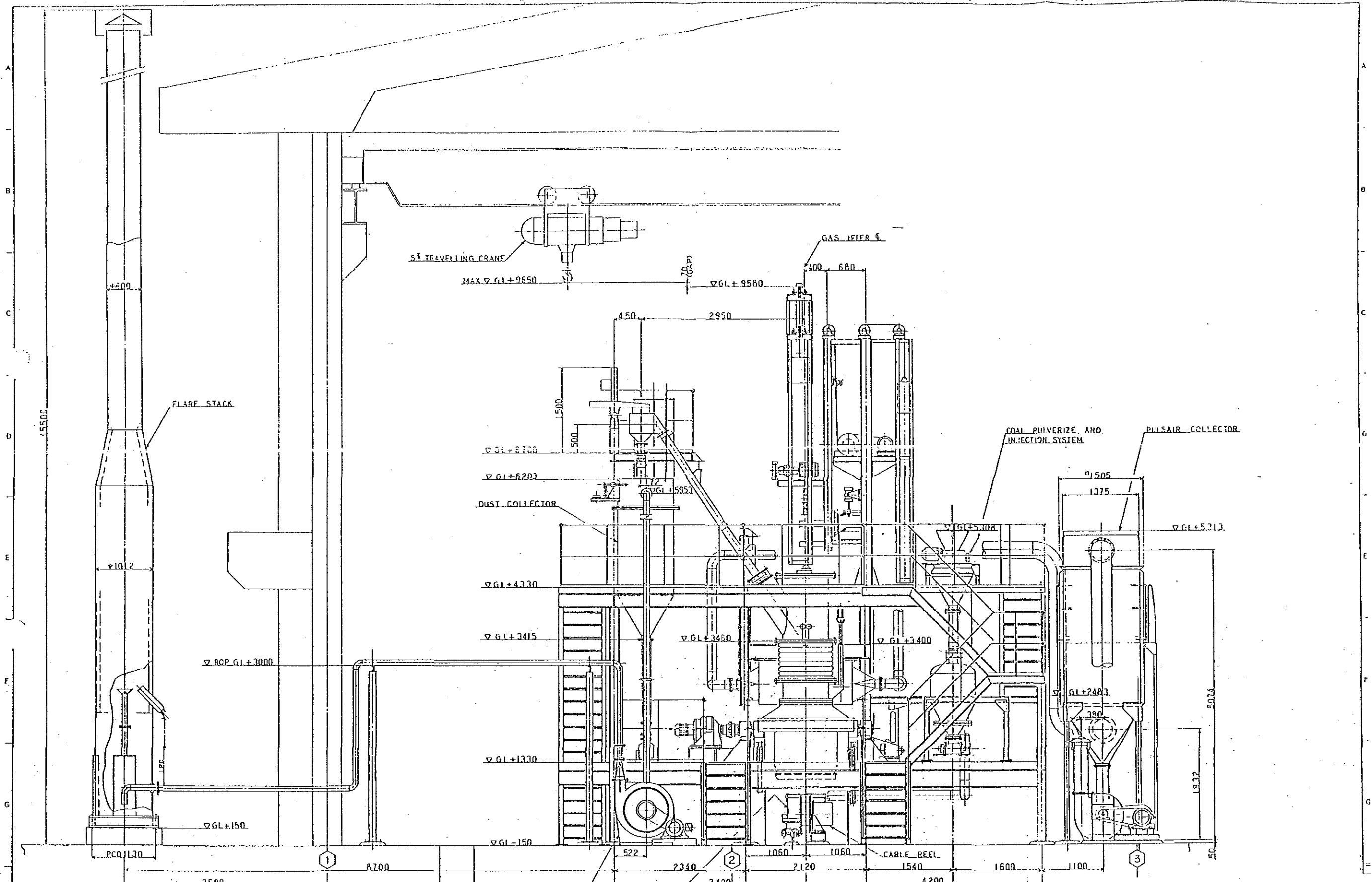
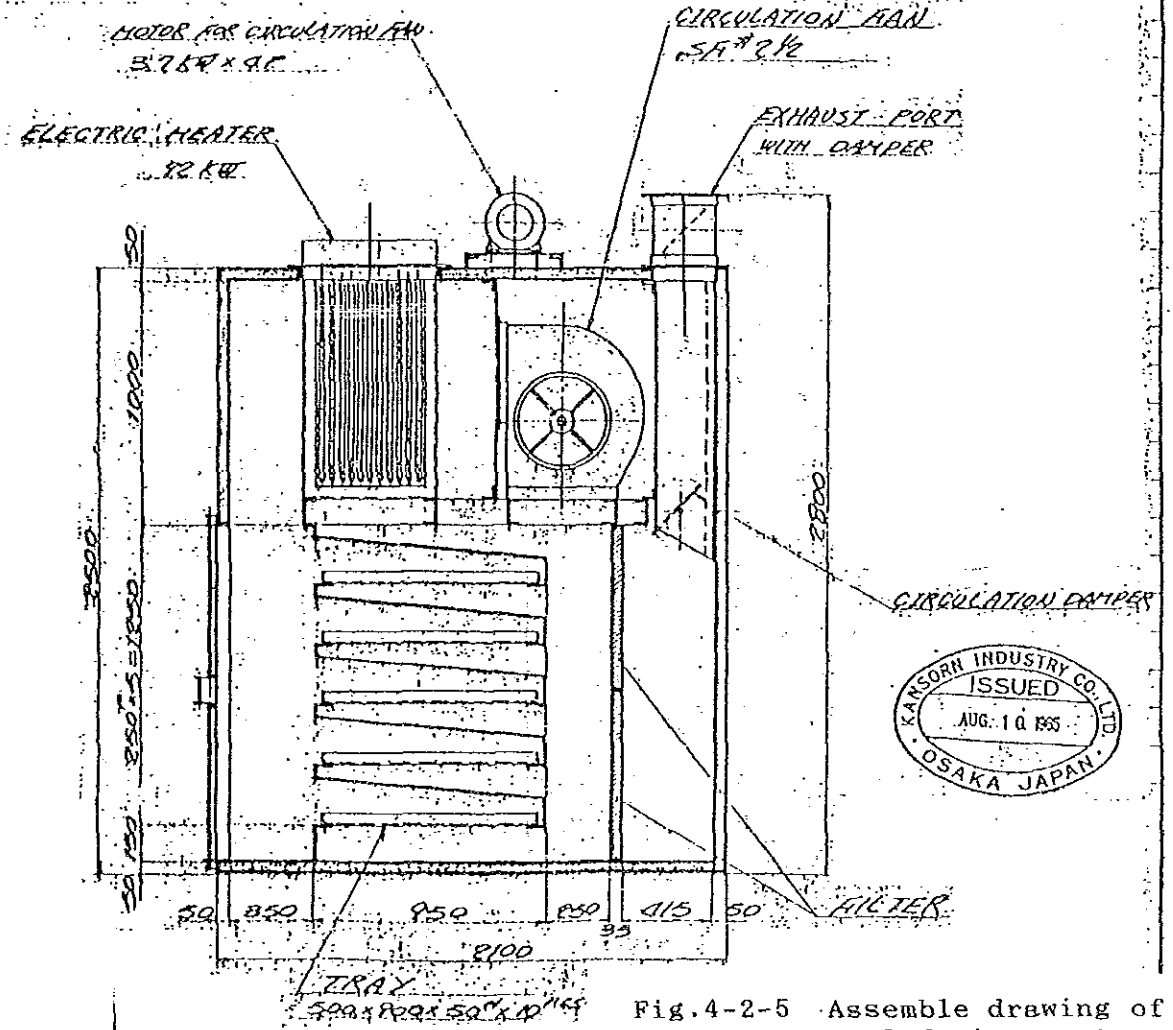
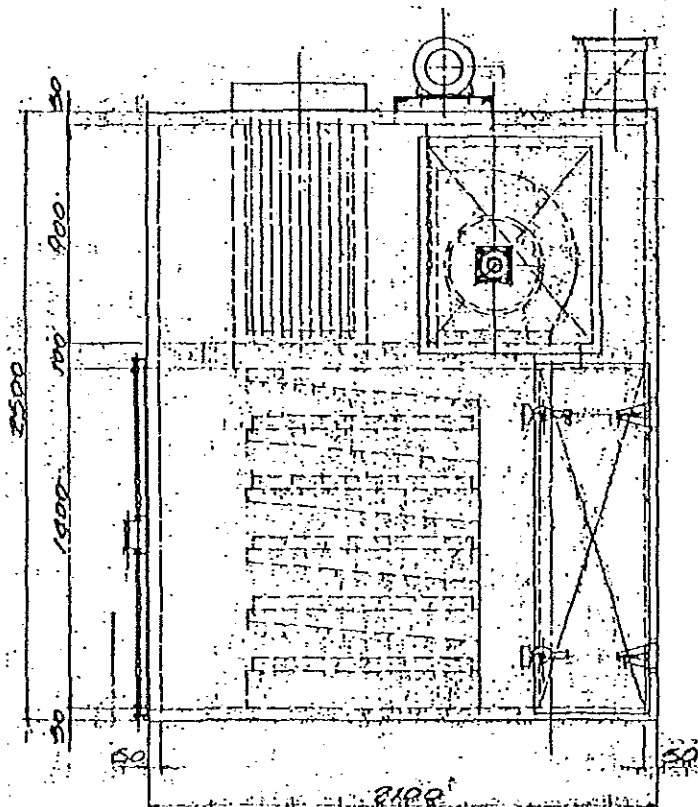
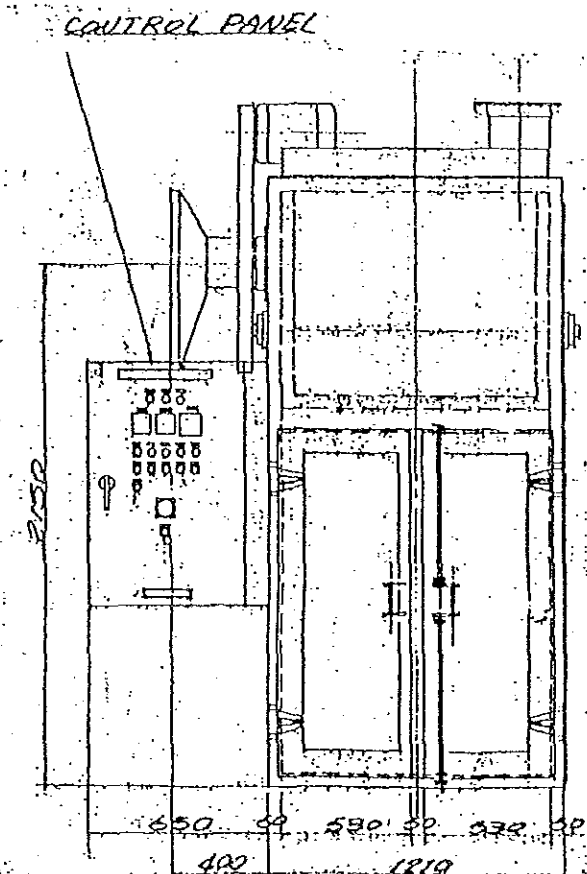
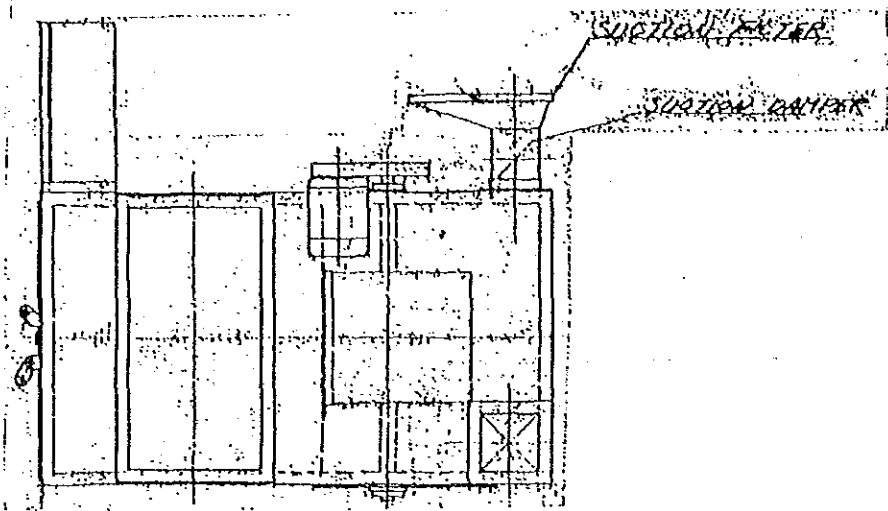


Fig.4-2-4 Drawing of side view

REVISION		DATE	MAN IN CHARGE	RANKO COAL GASIFICATION TEST PLANT SIDE VIEW
NO	DATE	DESCRIPTION	MANAGER	
				SUMITOMO METAL INDUSTRIES LTD. PLANT ENGIN - 33 - OSAKA JAPAN

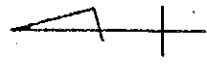


KANSORN INDUSTRY CO. LTD.  
ISSUED  
AUG. 10 1955  
OSAKA JAPAN

Fig.4-2-5 Assemble drawing of coal drying system

株式会社 KANSORN INDUSTRY CO. LTD.	参考 No. 6008-283	製 日 1955	製 所 大阪	製 者 株式会社 KANSORN INDUSTRY CO. LTD.	製 品 名 KANSORN TYPE DRYER	製 図 名 KANSORN TYPE DRYER	製 図 番 S-24458-2
-----------------------------------	--------------------	----------------	--------------	---	-----------------------------------	-----------------------------------	--------------------------

REV.	DESCRIPTION	DATE	BY	CHK'D
△	10.8.4 変更訂正 - 3ヶ所	10.8.17	△	△
△				

P.N. 

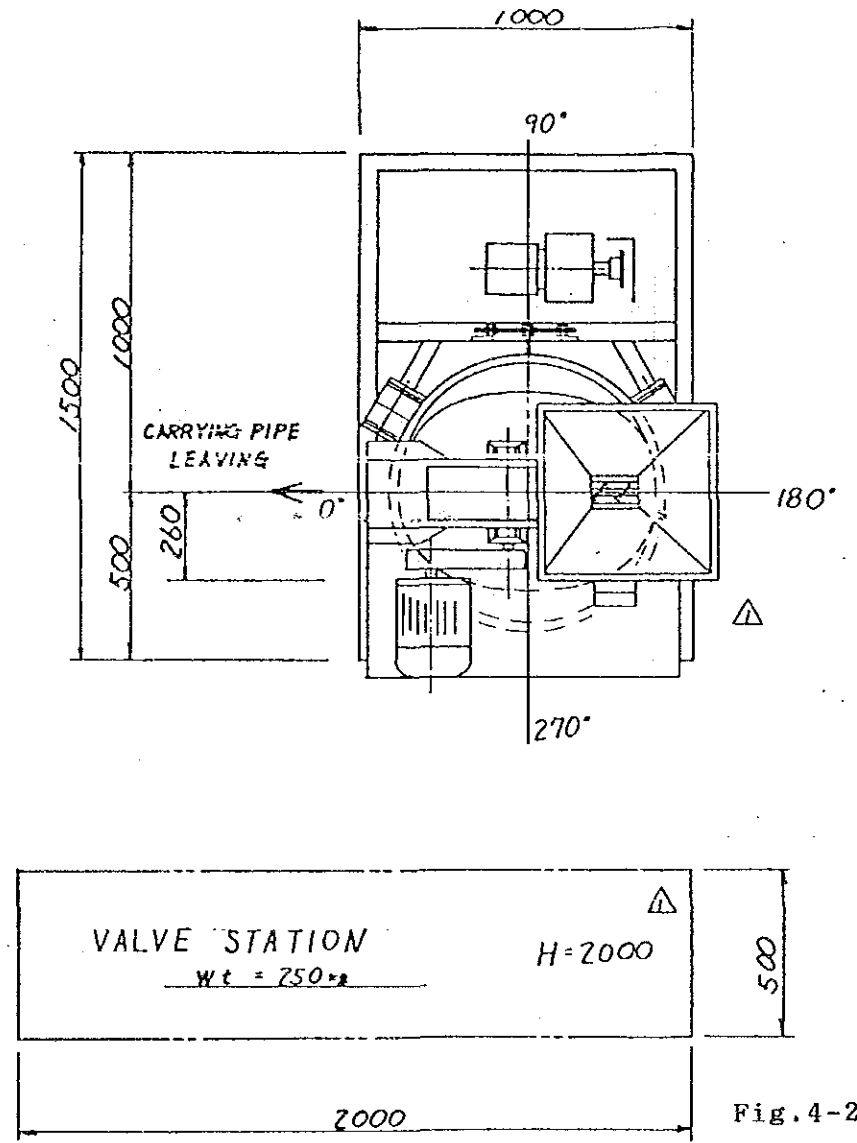
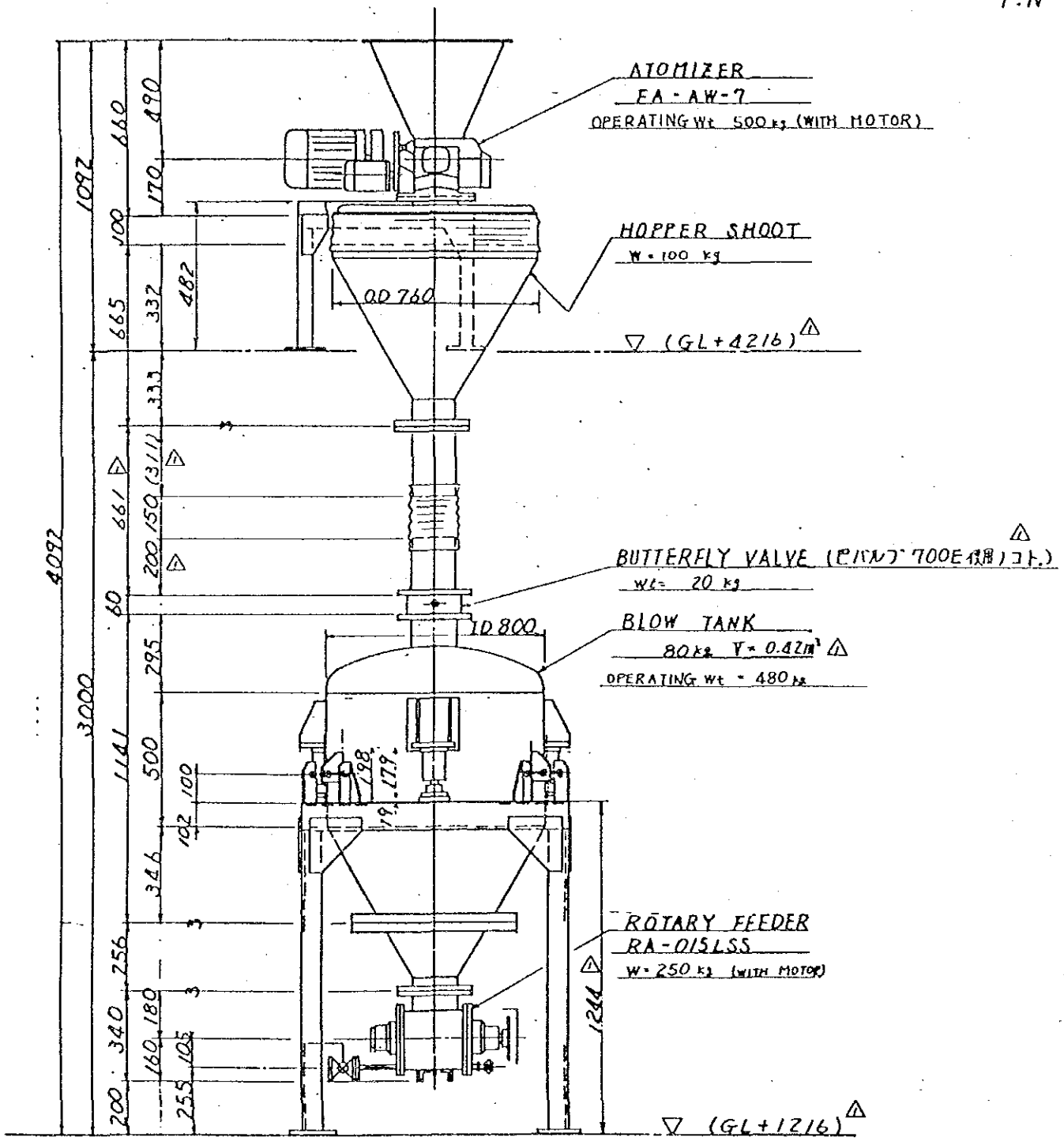
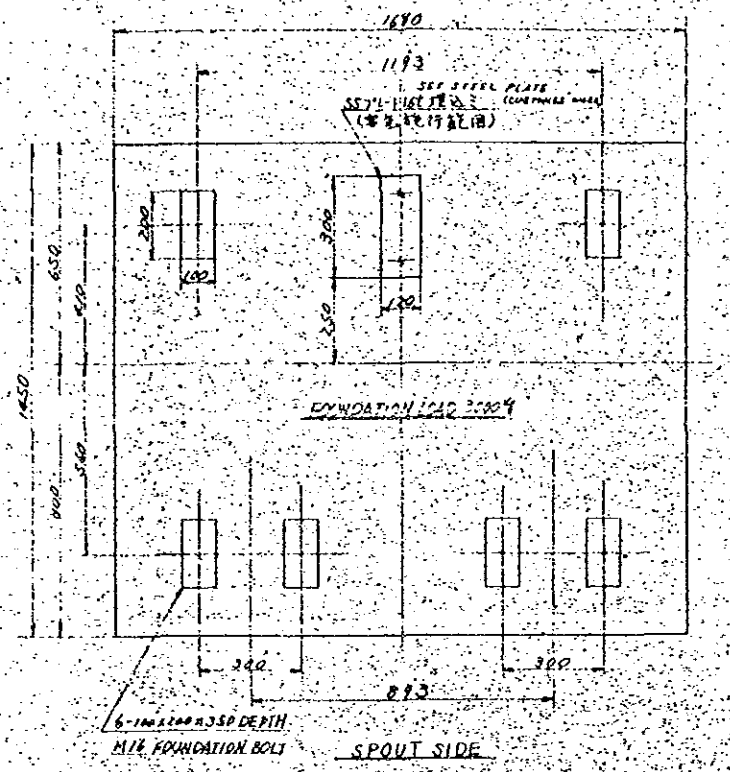
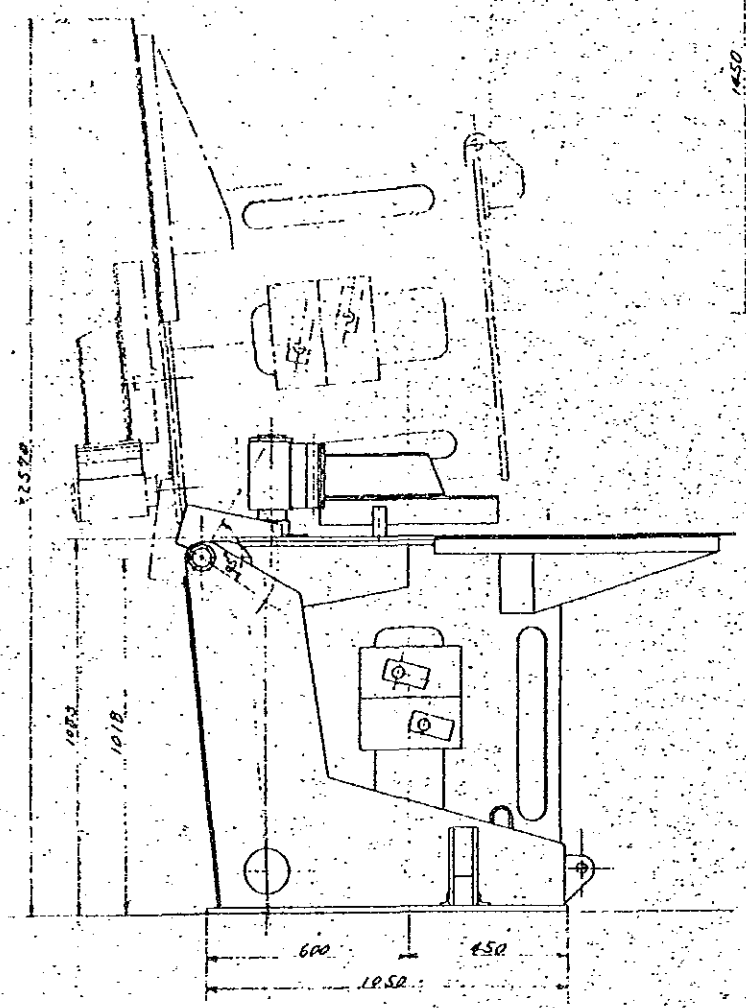
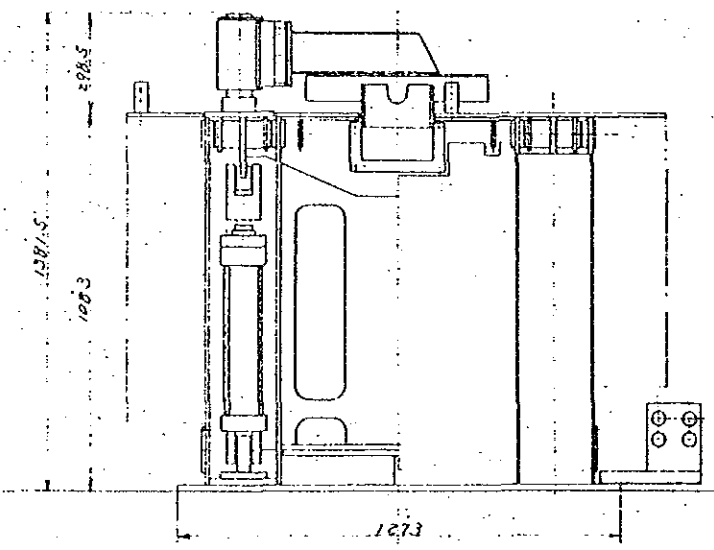
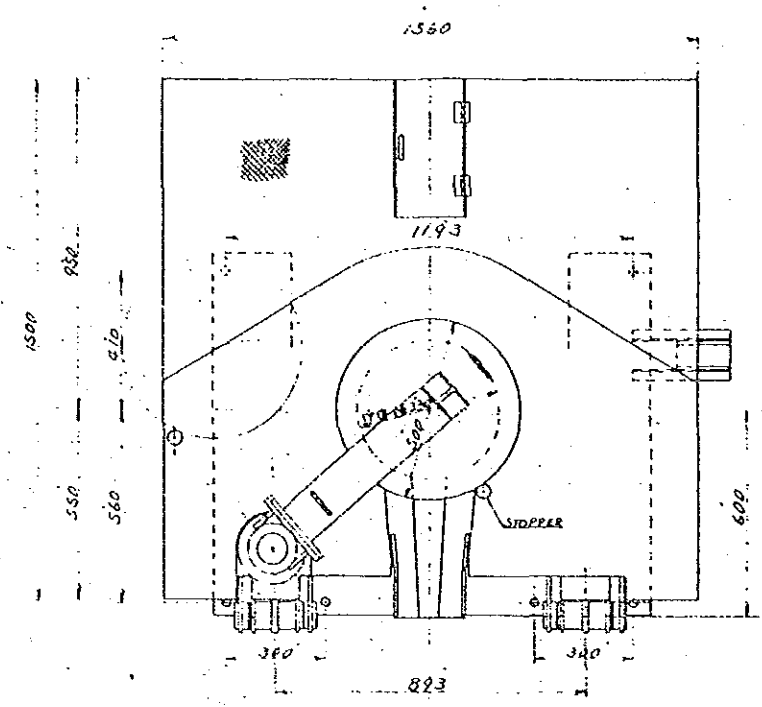


Fig.4-2-6 Assemble drawing of coal pulverize and coal injection system

MARK	PARTICULARS	QTY	REF.	MATL.	DIMENSION	REMARKS
	インドネシア向			住友金属工業株式会社		WORK NO. M10773 NO. REQ.
MANAG.	<i>M. Naka</i>		SCALE			COAL PULVERIZER & INJECTION SYSTEM (石炭粉砕貯蔵吹送設備) ASSEMBLY DRAWING
CHIEF			1/15			
ENG.			DATE			
CHKD	<i>S. Hira</i>		1985. 6. 14			
DRAWN	<i>S. Hira</i>					DWG. NO. P-0954-1a △
THE NIPPON ALUMINIUM MFG. CO., LTD.						



MELTING FURNACE FOUNDATION DRAWING

Fig.4-2-7 Assemble drawing of melting furnace

NO.	DATE	REVISION	BY
TITLE OF 300 <sup>mm</sup> x 250 <sup>mm</sup> x 300 <sup>mm</sup> SOURCE		SCALE 1/10	
MELTING FURNACE/GASIFIER		DATE 5.6.78	
DRAWING NO. MELTING FURNACE ASSEMBLY		JCL-063-001	
APPROVED BY	DESIGNED BY	REVISION BY	PLATE NO.
JAPAN AJAX MAGNETHERMIC CO. LTD.			

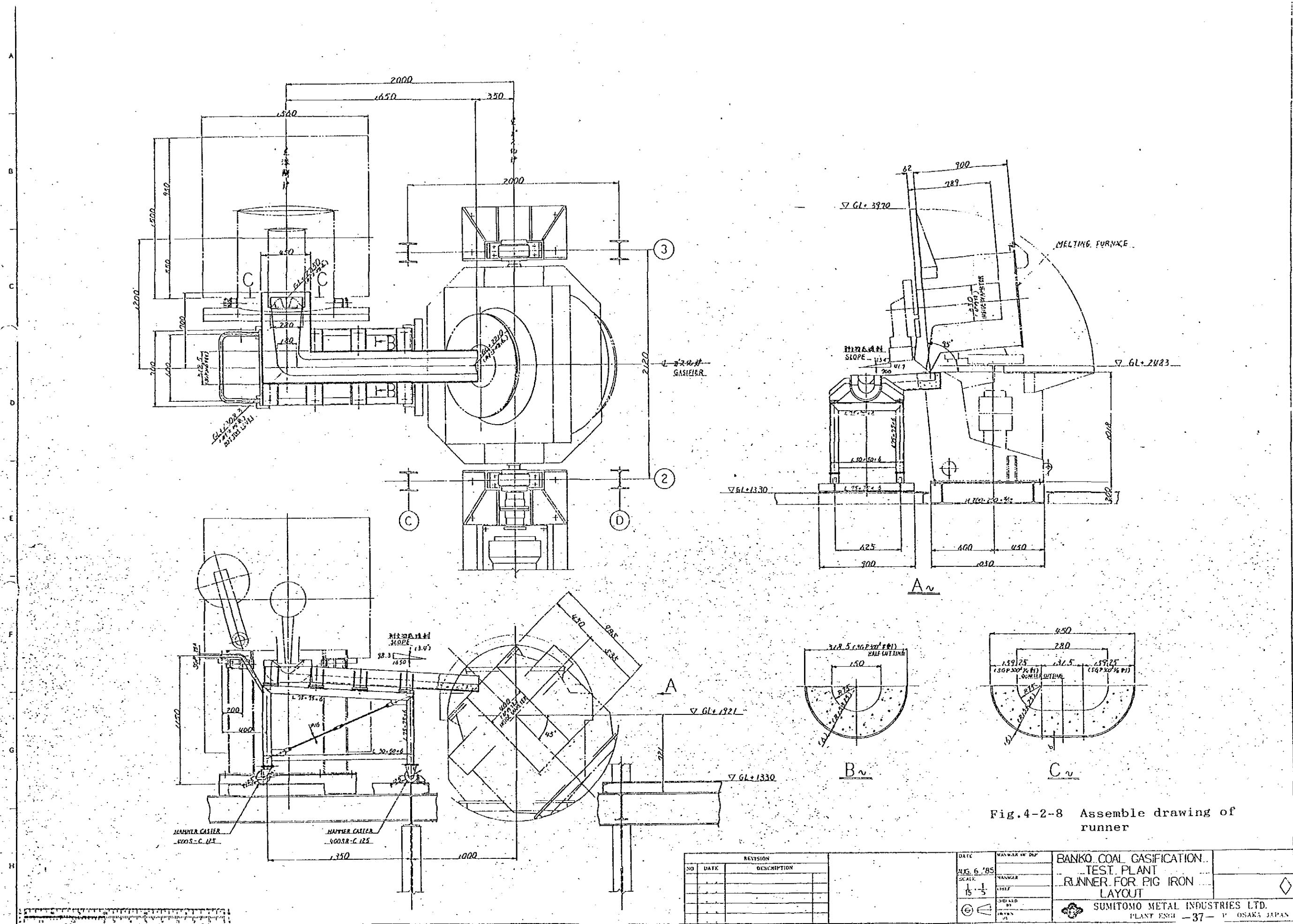


Fig.4-2-8 Assemble drawing of runner

REVISION			DATE	MANAGER OR DEP.	BANKO COAL GASIFICATION TEST PLANT RUNNER FOR PIG IRON LAYOUT
NO.	DATE	DESCRIPTION	SCALE	MANAGER	
			AUG. 6 '85		SUMITOMO METAL INDUSTRIES LTD. PLANT ENGR - 37 - OSAKA JAPAN
			1/5		

JCL-063-002  
OR EXTEND

NO	PARTIAL NAME	NO	DESCRIPTION	QTY	REMARKS
1	GASIFIER	1			
2	PLUNGER BLOCK	1			
3	PLUNGER BLOCK	1			
4	COUPLING	1 SET			
5	REDUCTION GEAR UNIT	1			
6	BASE	1			
7	BASE	1			
8	WATER-CAULD CABLE	2			
9	GUM HOSE	2			
10	GUM HOSE	11			
11	POWER PORT	1			
12	EXHAUST PORT	1			
13	PEEP WINDOW	3			

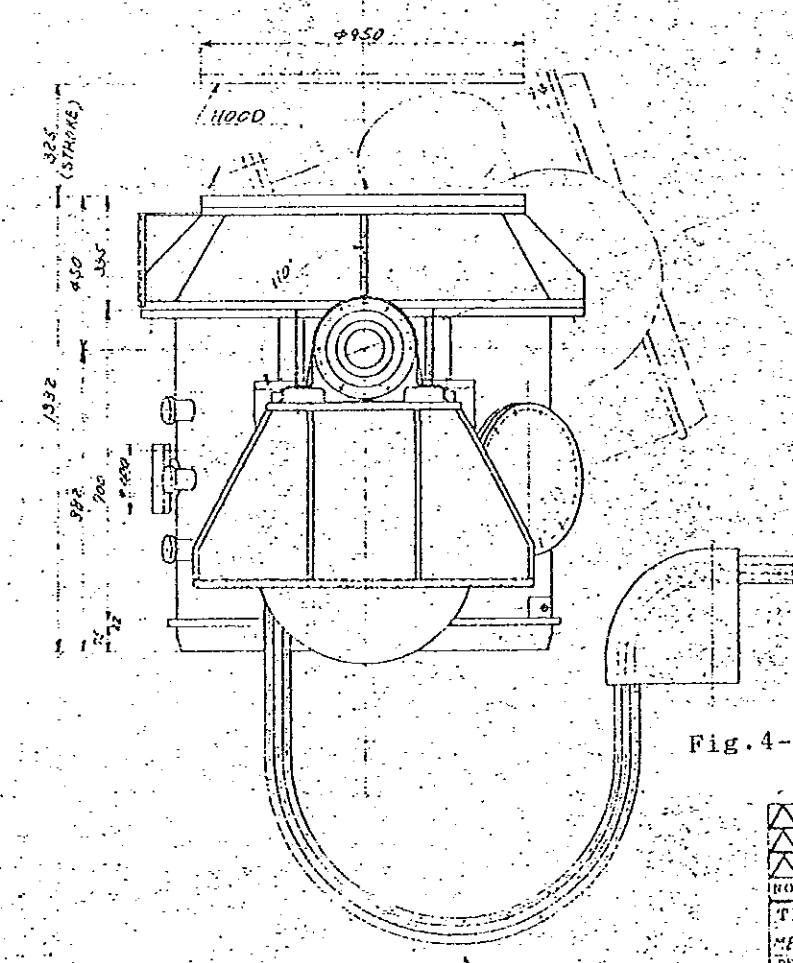
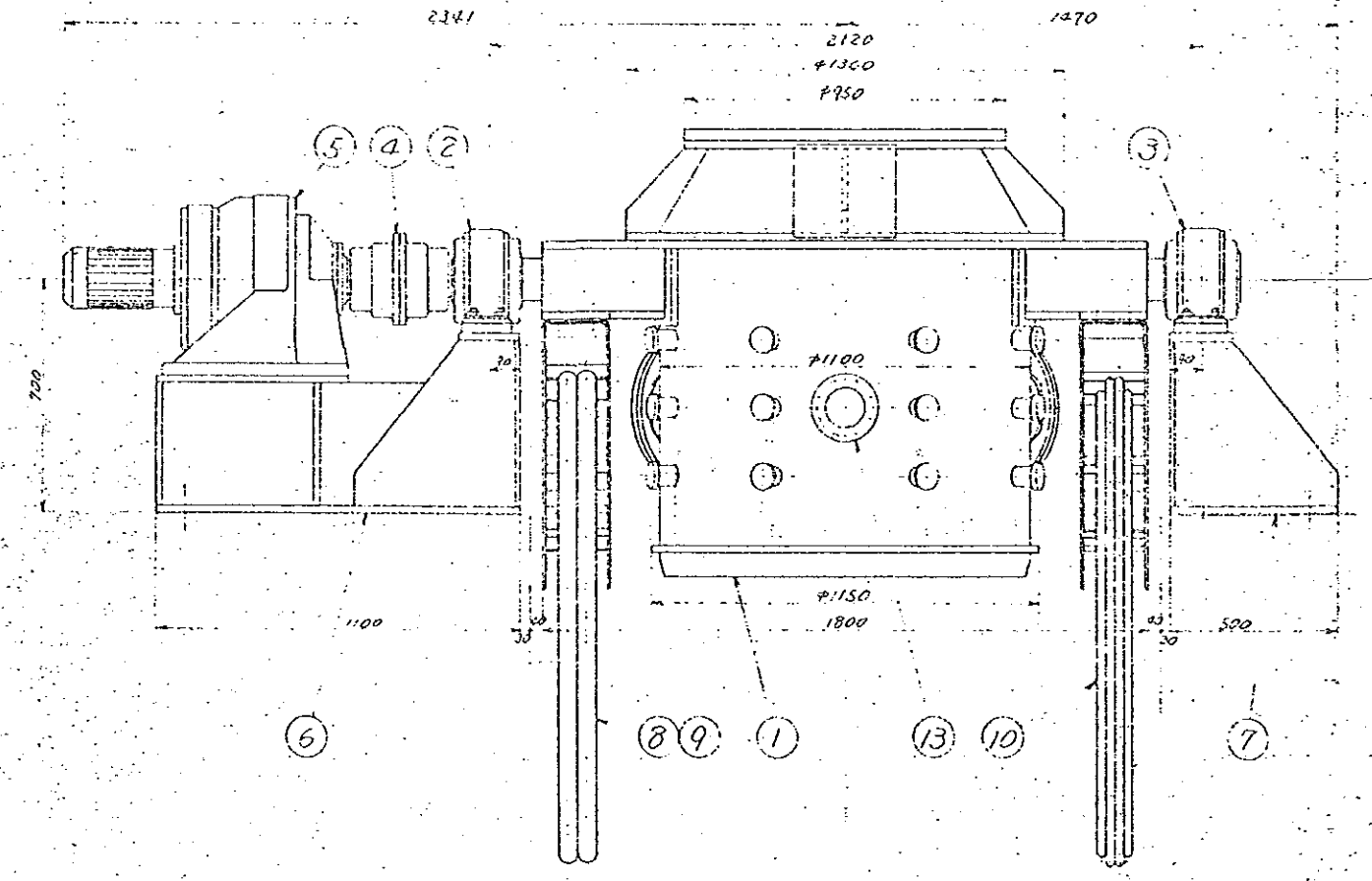
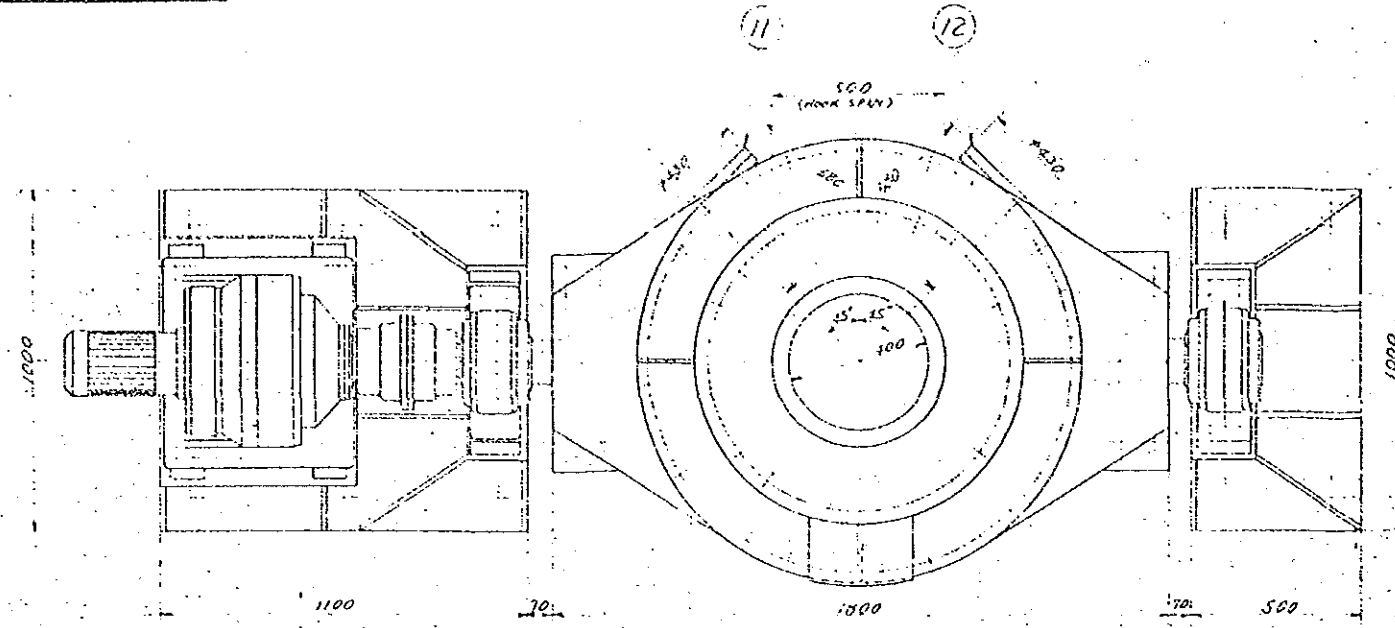
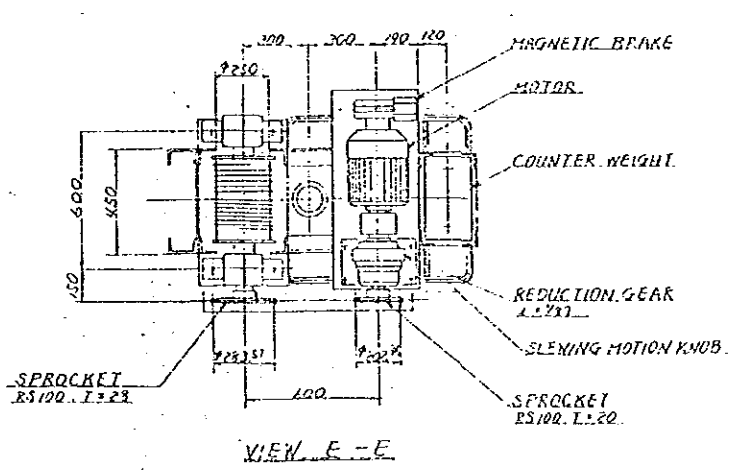
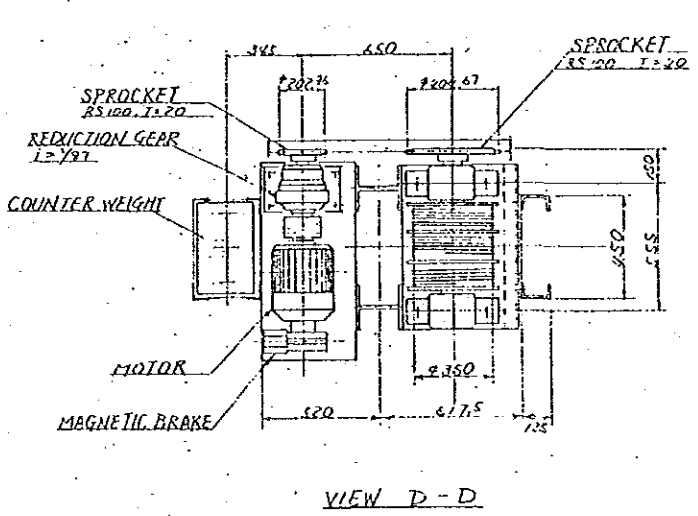
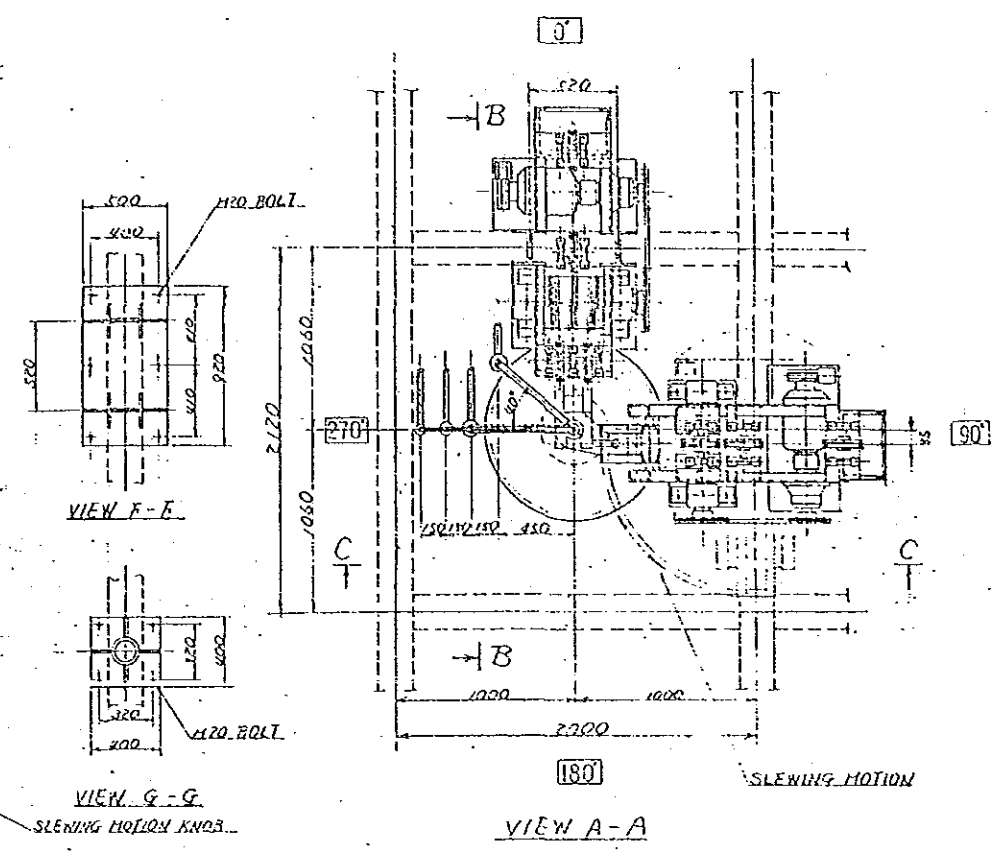
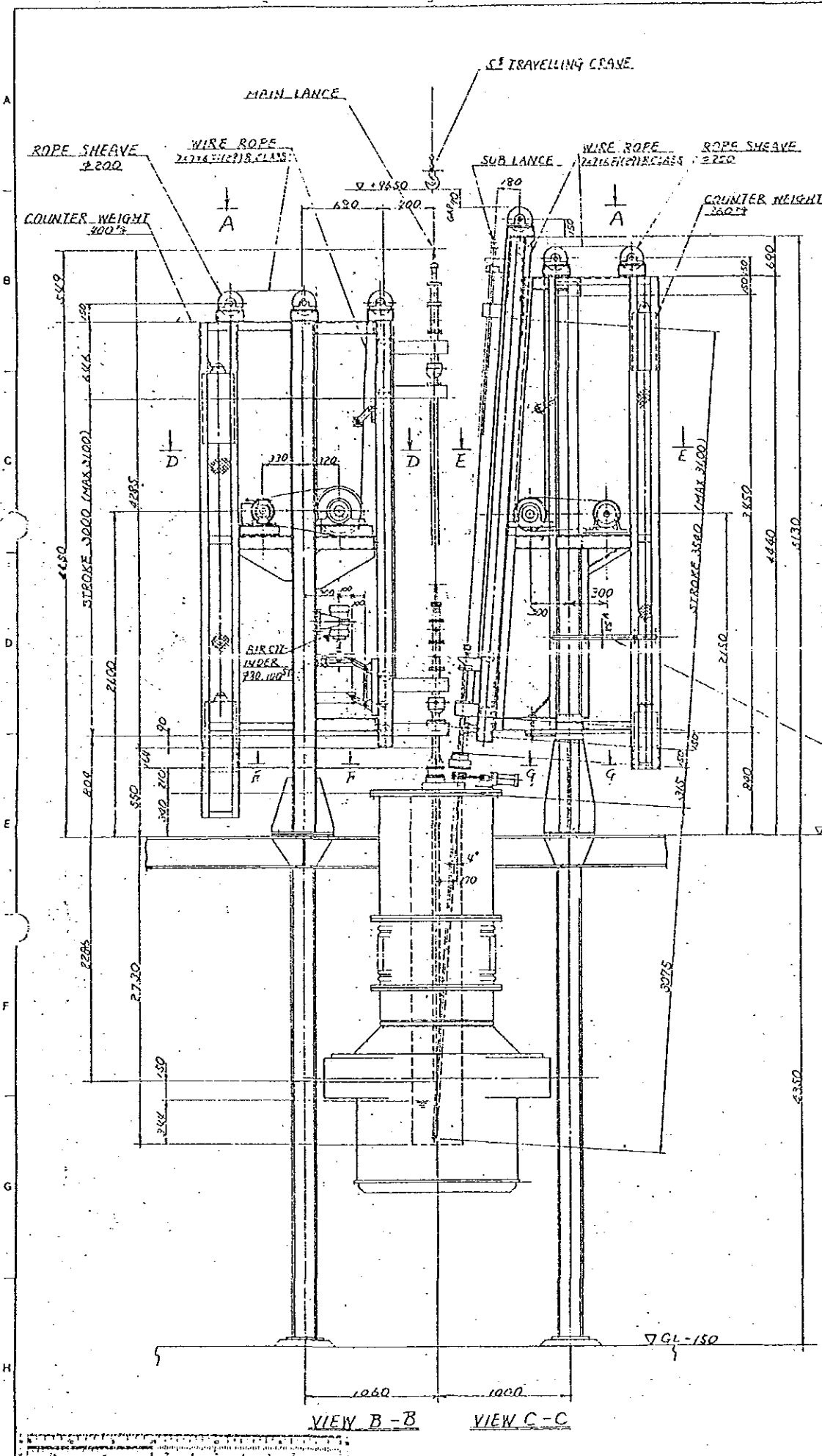


Fig.4-2-9 Assemble drawing of gasifier

NO	DATE	REVISION	BY
TITLE: 300 <sup>mm</sup> x 250 <sup>mm</sup> 300 <sup>mm</sup>		SOURCE	SCALE: 1/10
MELTING FURNACE GASIFIER		DATE: Aug 14 '52	
DESIGNATION: GASIFIER ASSEMBLY		DRAWING NO: JCL-063-002	
APPROVAL: [Signature]		FILM NO:	



仕様 SPECIFICATION

主上り重 (MAX. 7-711)	400 kg
巻上機 LOAD	3000 mm
昇降速度 (MAX. 7-711)	7.50 m/min
ELEVATOR SPEED	1.10 m/min
ドラム DRUM	φ 700 mm
ロープ WINDING ROPE	φ 10 mm
巻上機速度 (MAX. 7-711)	10 m/min
高速度 HIGH SPEED	3.3 m/min
低速度 LOW SPEED	1.10 m/min
モーター MOTOR	1500 rpm
回転数 ROTATION FREQUENCY	1500 rpm
非常停止 EMERGENCY WINDING	17.7-7.11 5%
減速比 REDUCTION RATIO	i = 1/27
主下り重 (MAX. 7-711)	250 kg
巻上機 LOAD	3540 mm
昇降速度 (MAX. 7-711)	7.50 m/min
ELEVATOR SPEED	1.10 m/min
ドラム DRUM	φ 700 mm
ロープ WINDING ROPE	φ 10 mm
巻上機速度 (MAX. 7-711)	10 m/min
高速度 HIGH SPEED	3.3 m/min
低速度 LOW SPEED	1.10 m/min
モーター MOTOR	1500 rpm
回転数 ROTATION FREQUENCY	1500 rpm
非常停止 EMERGENCY WINDING	17.7-7.11 5%
減速比 REDUCTION RATIO	i = 1/27

Fig.4-2-10 Assemble drawing of main lance and sub-lance

REVISION			DATE	MANAGER OF JAP	BANKO COAL GASIFICATION TEST PLANT MAIN LANCE, SUB LANCE SYOJIT
NO.	DATE	DESCRIPTION			
			11.23.05 <td> </td> <td rowspan="2">SUMITOMO METAL - 39 - IFS LTD.</td>		SUMITOMO METAL - 39 - IFS LTD.
			20.15		



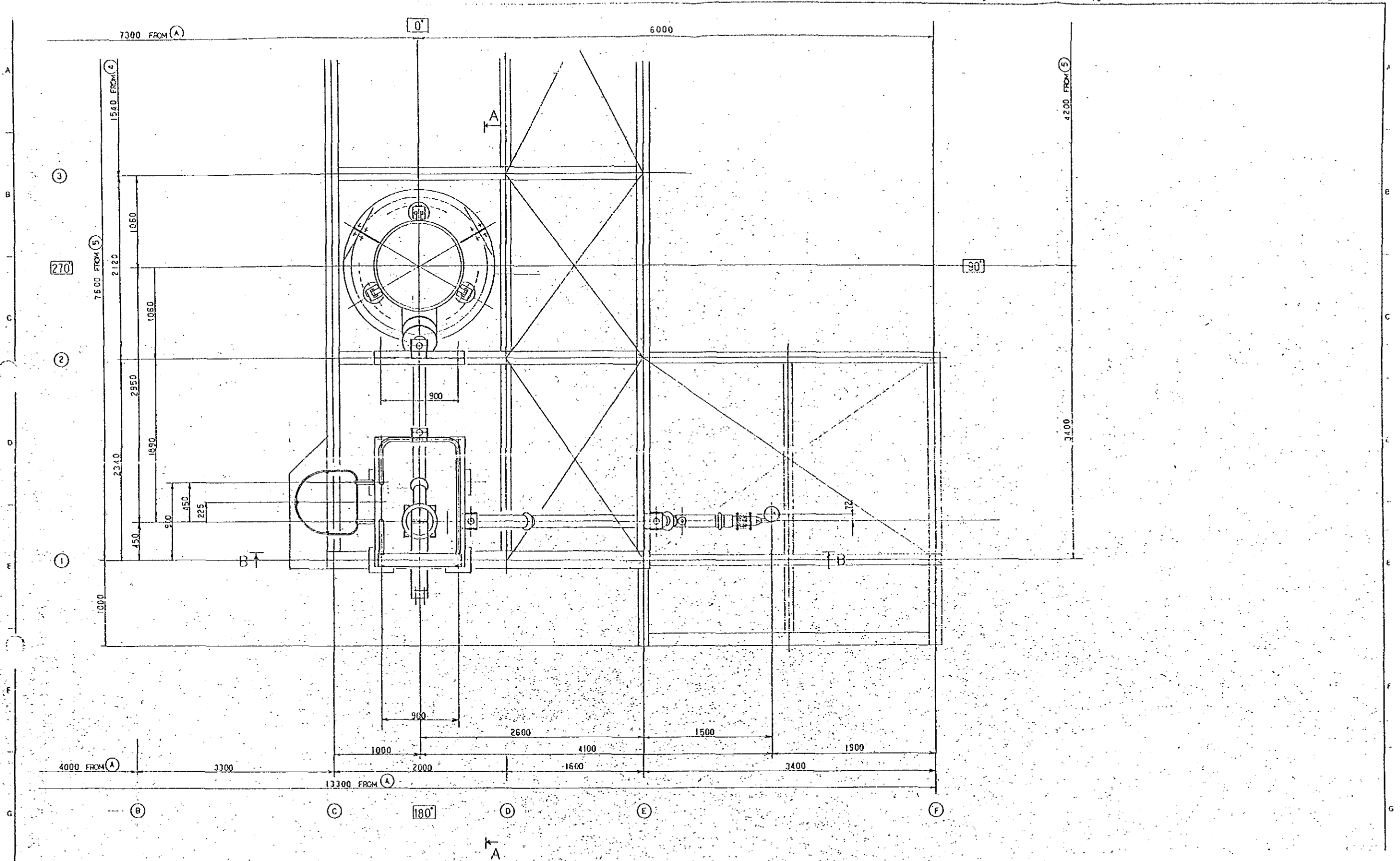


Fig.4-2-11 Assemble drawing of produced gas filtration system(1)

REVISION		
NO.	DATE	DESCRIPTION

DATE AUG. 5 '88	MANAGER OF DEP. 	BANKO COAL GASIFICATION TEST PLANT GAS LINE EQUIPMENT ASSEMBLY DRAWING (1/2)	◆
SCALE 1/20	MANAGER 		
		SUMITOMO METAL - 40 -	IES LTD.

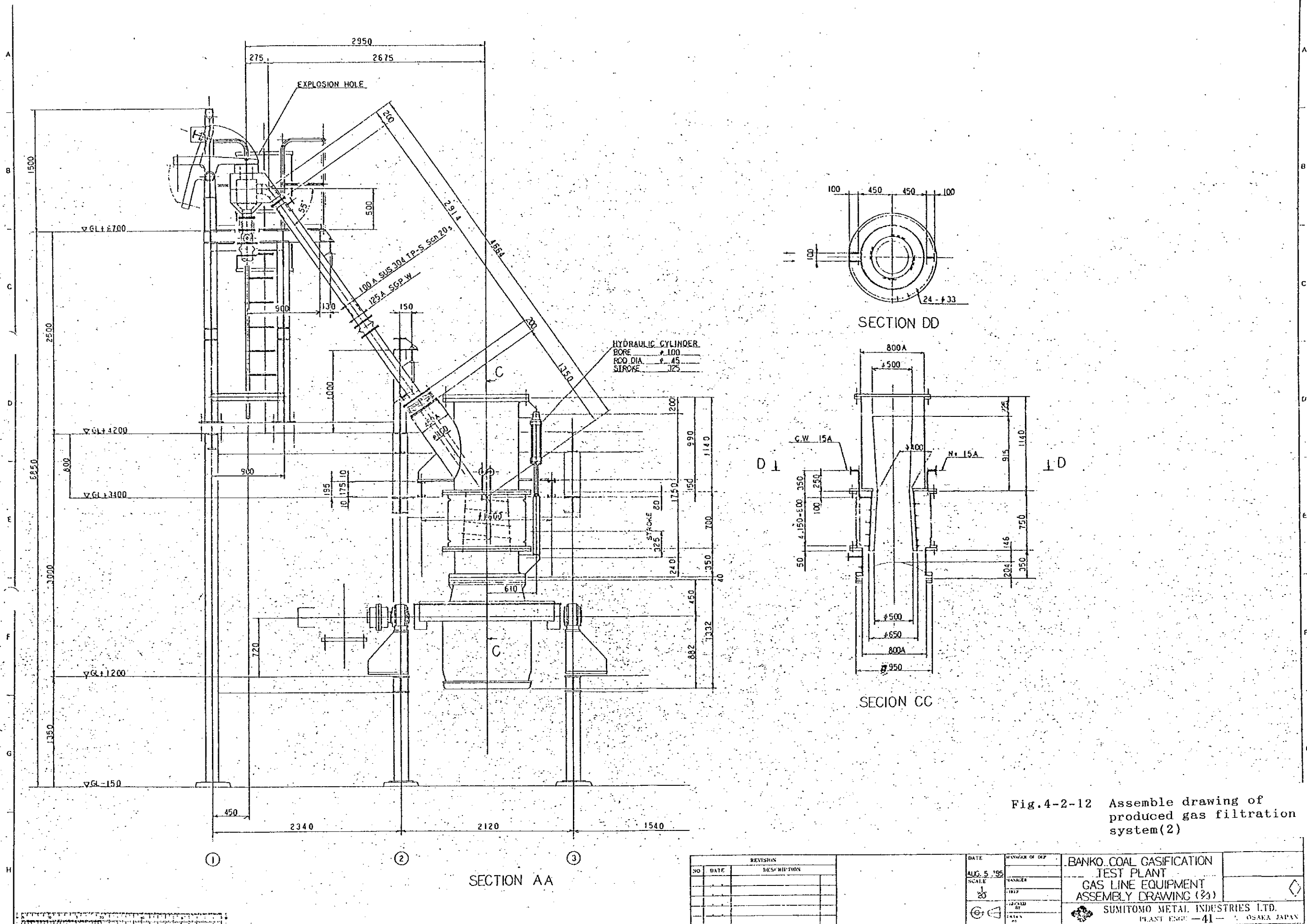
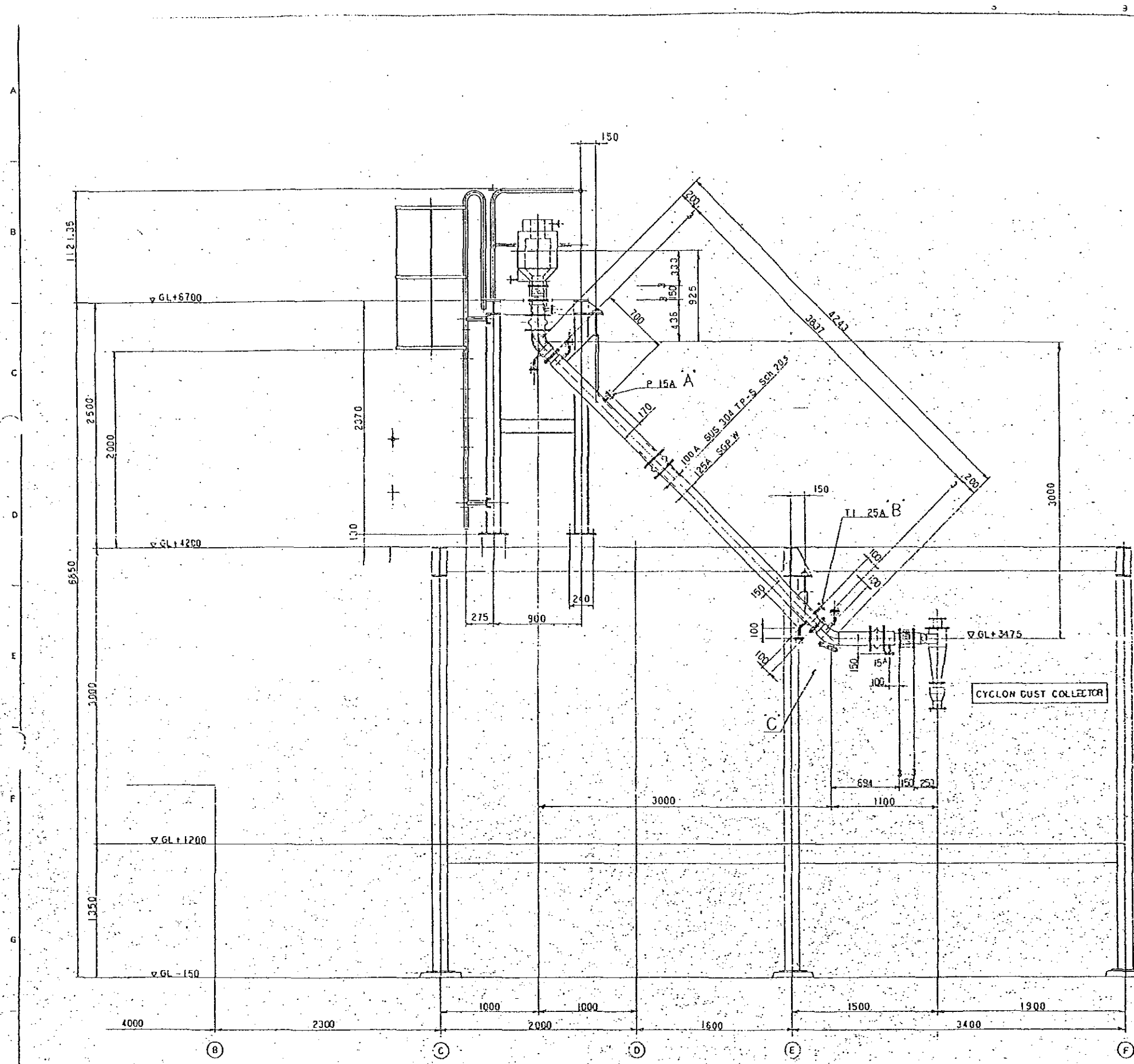


Fig.4-2-12 Assemble drawing of produced gas filtration system(2)

REVISION		DATE	MANAGER OF DEP.	BANKO COAL GASIFICATION TEST PLANT GAS LINE EQUIPMENT ASSEMBLY DRAWING (2)
NO.	DATE	DESCRIPTION	TANAKA	
				SUMITOMO METAL INDUSTRIES LTD. PLANT ENGR-41 OSAKA JAPAN

DATE: AUG. 5 '85  
SCALE: 1/20



SECTION BB

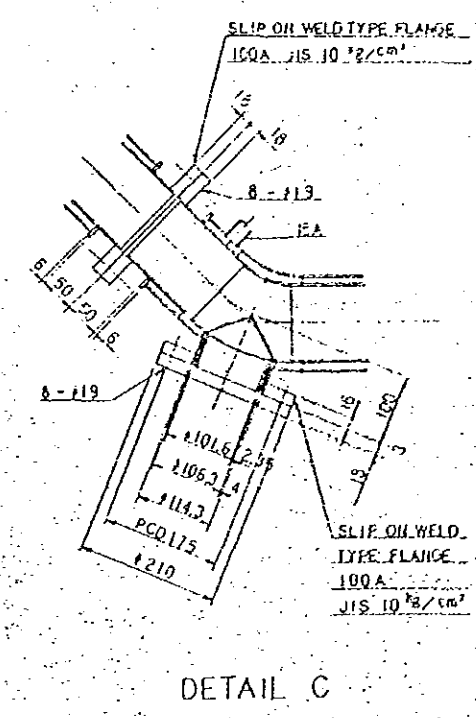
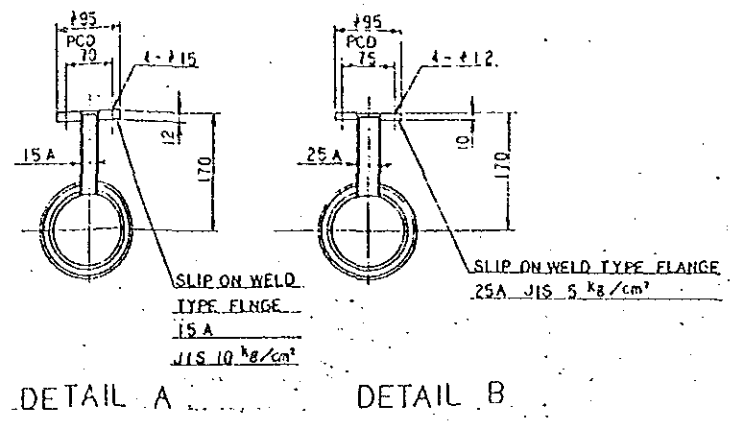
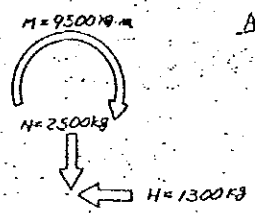
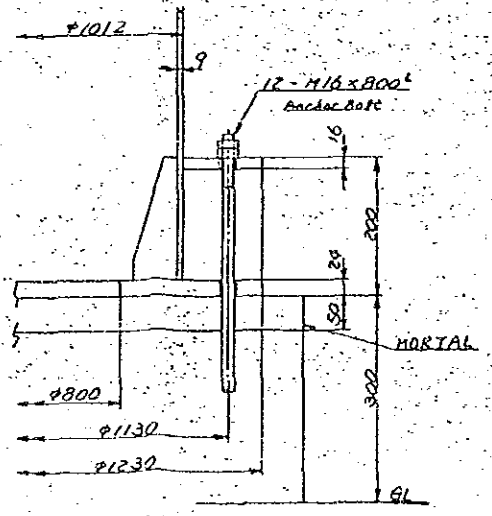
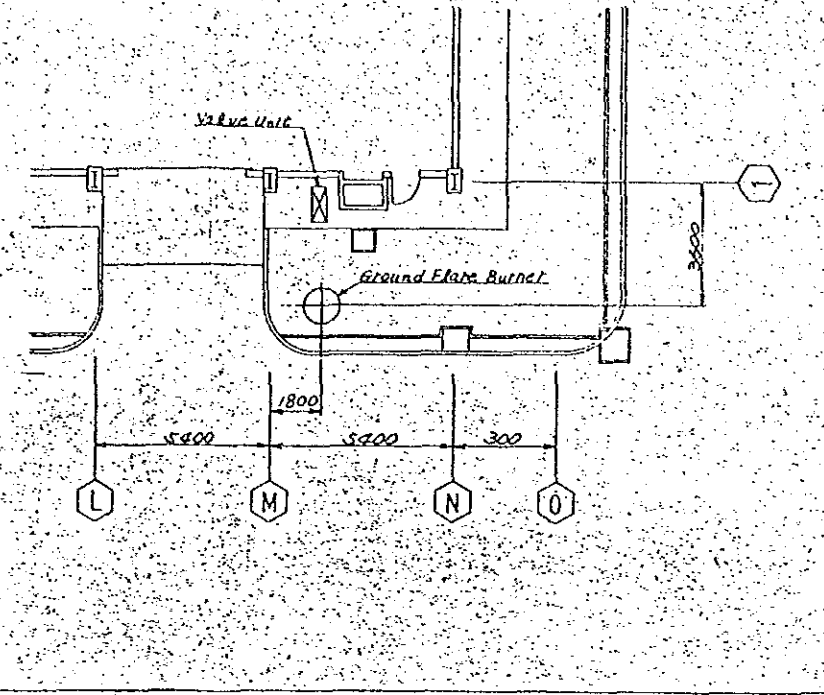
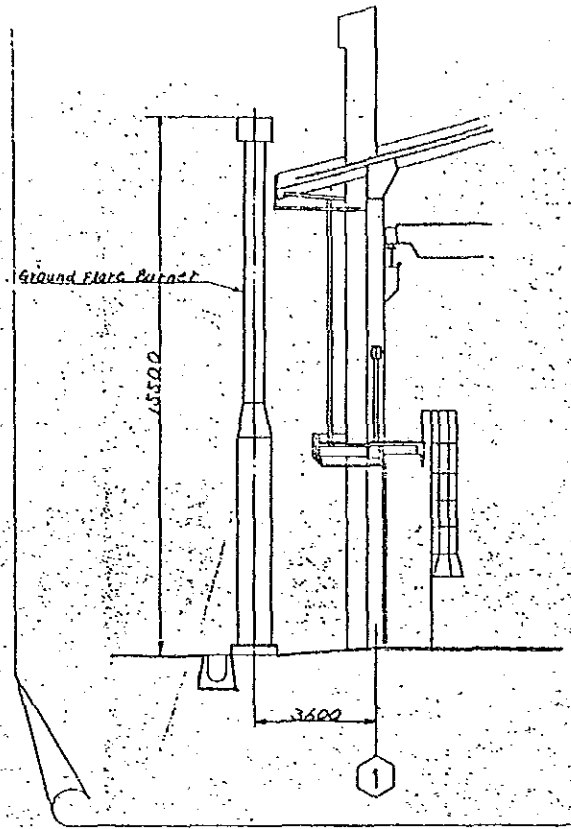
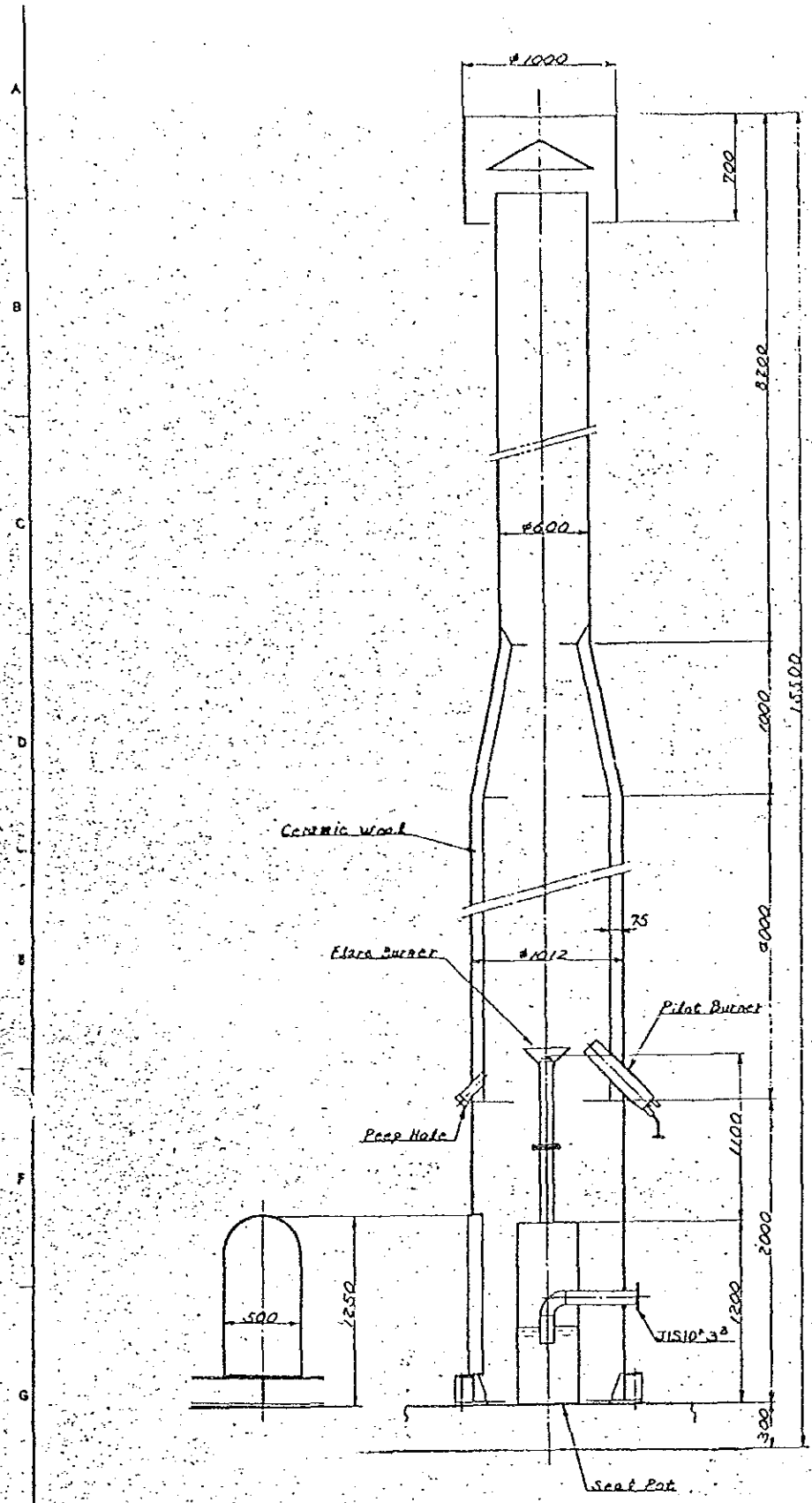


Fig.4-2-13 Assemble drawing of produced gas filtration system(3)

REVISION	
NO	DESCRIPTION

DATE	MANAGER OF DEP.	BANKO COAL GASIFICATION TEST PLANT	♦	
SCALE	DRAWN BY			GAS LINE EQUIPMENT ASSEMBLY DRAWING (3/3)
				SUMITOMO METAL - 42 - IES LTD.

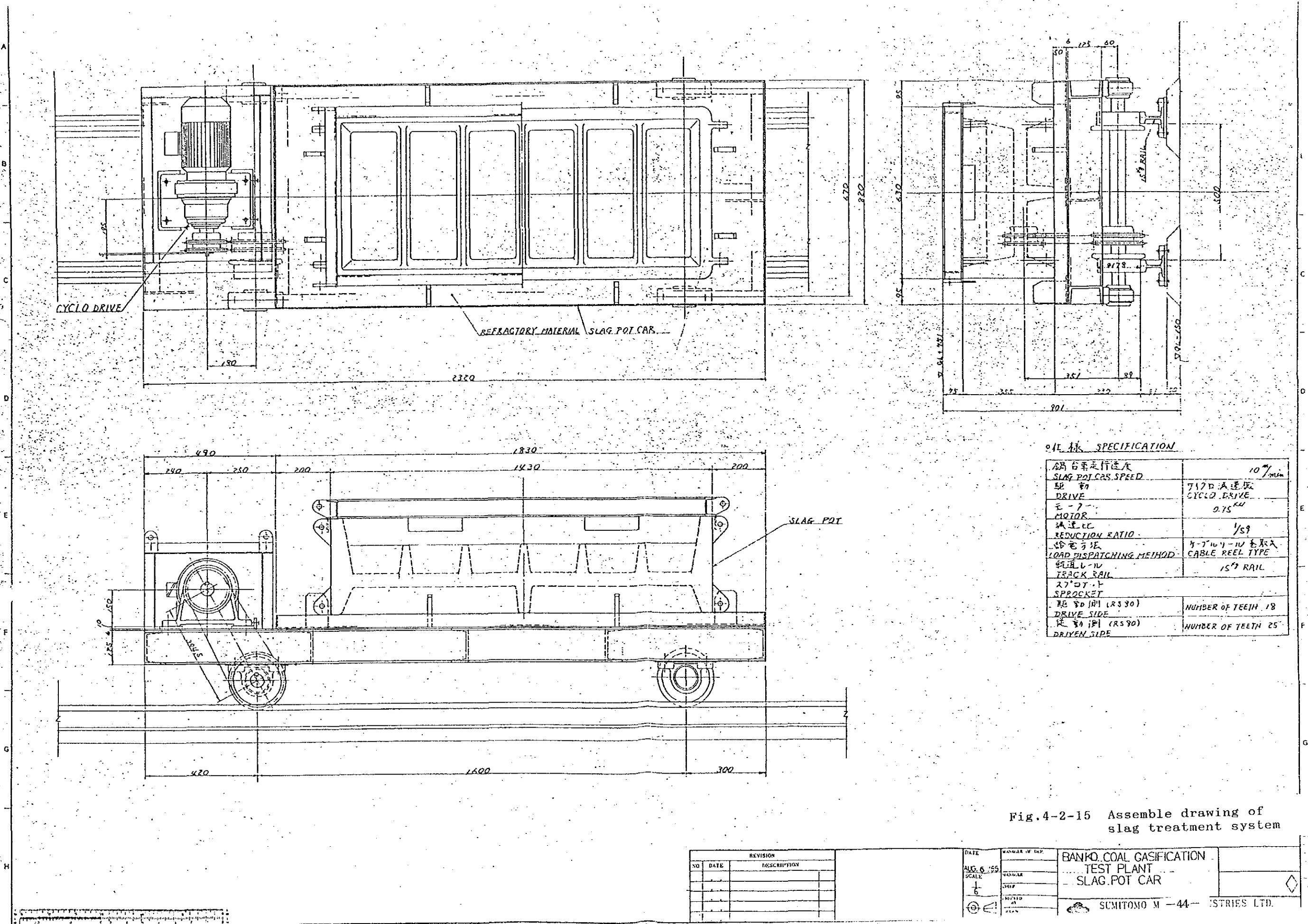


ANCHOR PLAN

Fig.4-2-14 Assemble drawing of ground flare burner

REVISION		
NO	DATE	DESCRIPTION

DATE	NUMBER OF CDR.	BANKO COAL GASIFICATION TEST PLANT GROUND FLARE BURNER
AUG. 8 '65		
SCALE		
1:100, 1/4"		
DATE		
Y10. 1/8"		



油標 SPECIFICATION

鍋台車行走速度 SLAG POT CAR SPEED	10 <sup>m</sup> /min
驅動機 DRIVE	717D A 速機 CYCLO DRIVE
電動機 MOTOR	0.75 <sup>kW</sup>
減速比 REDUCTION RATIO	1/59
配電方法 LOAD DISPATCHING METHOD	7-7164-11 卷取 CABLE REEL TYPE
軌道 TRACK RAIL	15" RAIL
齒輪 SPROCKET	
驅動側 DRIVEN SIDE	NUMBER OF TEETH 18
從動側 DRIVEN SIDE	NUMBER OF TEETH 25

Fig.4-2-15 Assemble drawing of slag treatment system

REVISION		DATE	NUMBER OF SHEET	BANKO. COAL GASIFICATION TEST PLANT SLAG POT CAR	SCIMITOMO M-44 INDUSTRIES LTD.
NO	DESCRIPTION				

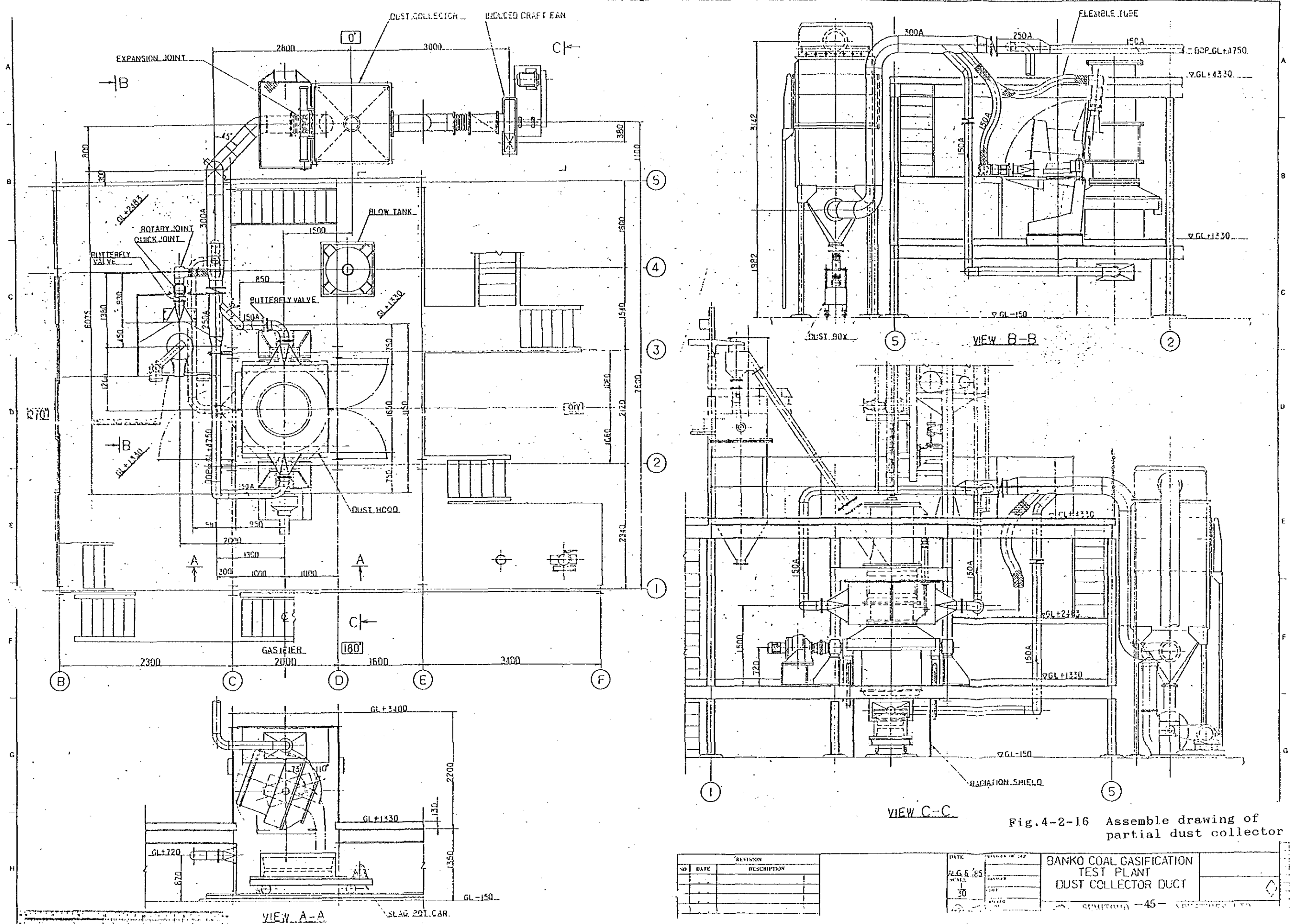


Fig.4-2-16 Assemble drawing of partial dust collector

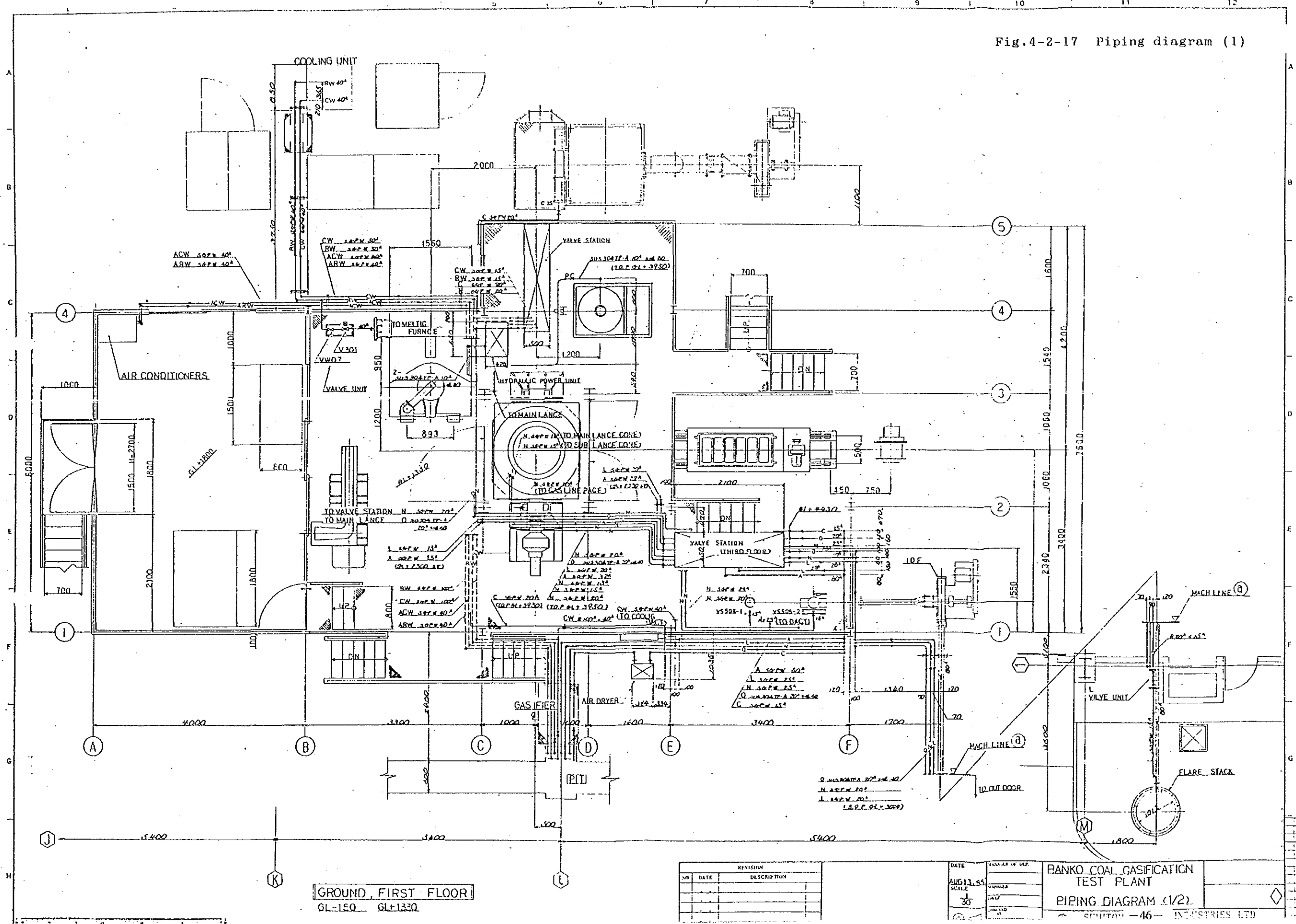
REVISION		DATE	DESIGNER	APPROVED
NO	DESCRIPTION			

DATE	APPROVED	BANKO COAL GASIFICATION TEST PLANT DUST COLLECTOR DUCT
ALG 6/85		
SCALE	30	


Fig.4-2-17 Piping diagram (1)



GROUND, FIRST FLOOR  
GL-150 GL-1330

REVISION	
NO	DESCRIPTION

DATE	AUG 13, 85
SCALE	1/30

BANKO COAL GASIFICATION  
TEST PLANT  
PIPING DIAGRAM (1/2)  
SHEET NO. 46 INDUSTRIES LTD

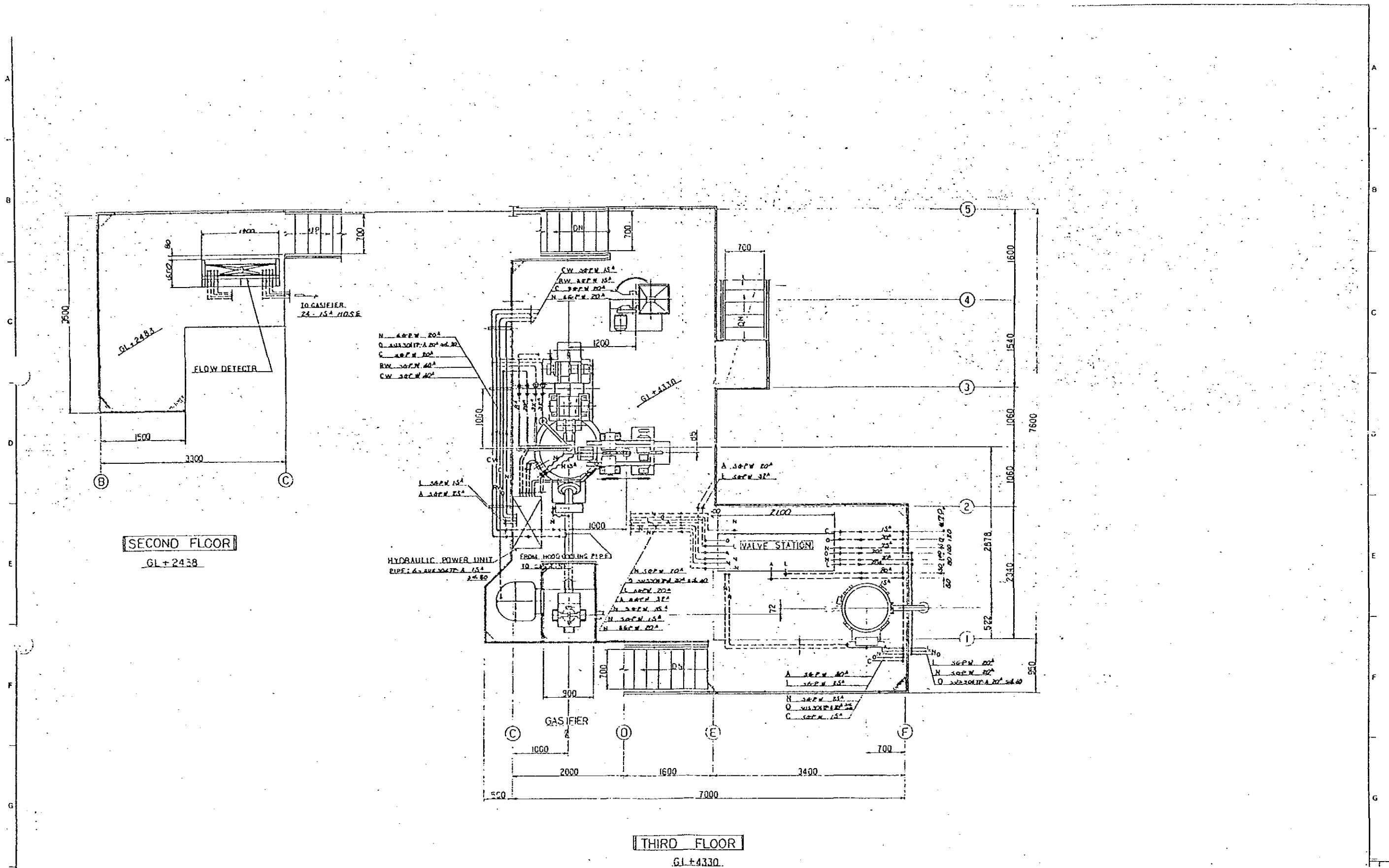


Fig.4-2-18 Piping diagram (2)

REVISION		DATE	NO. OF REV.	BANKO COAL GASIFICATION TEST PLANT
NO.	DATE	DESCRIPTION		
				PIPING DIAGRAM (2/2)
				SUMITOMO MET. - 47 - TRIES LTD.



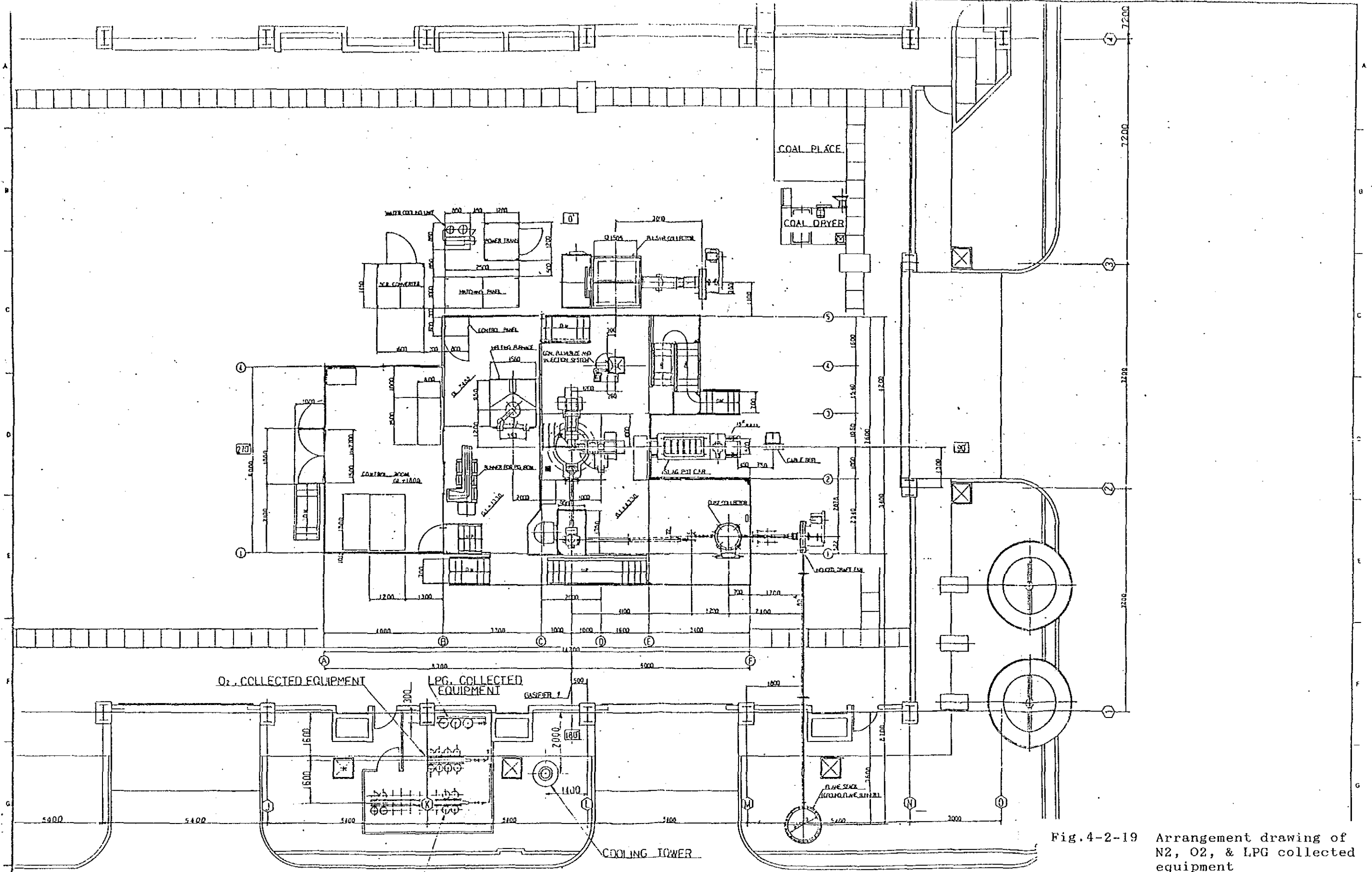
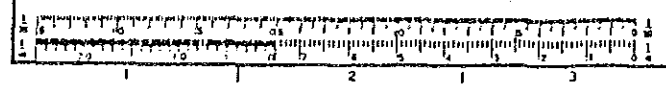


Fig.4-2-19 Arrangement drawing of N<sub>2</sub>, O<sub>2</sub>, & LPG collected equipment



REVISION		
NO	DATE	DESCRIPTION

DATE AUG 13 . 85	MANAGER OF DEP.	<b>BANKO COAL GASIFICATION TEST PLANT</b> N <sub>2</sub> , O <sub>2</sub> & LPG COLLECTED EQUIPMENT ARRANGEMENT DRAWING <b>SUMITOMO METAL INDUSTRIES LTD.</b> PLANT ENGINEER - 48 - OSAKA JAPAN
SCALE 1/80	MANAGER	
	CHEIF	
	CHECKED BY DRAWN BY	

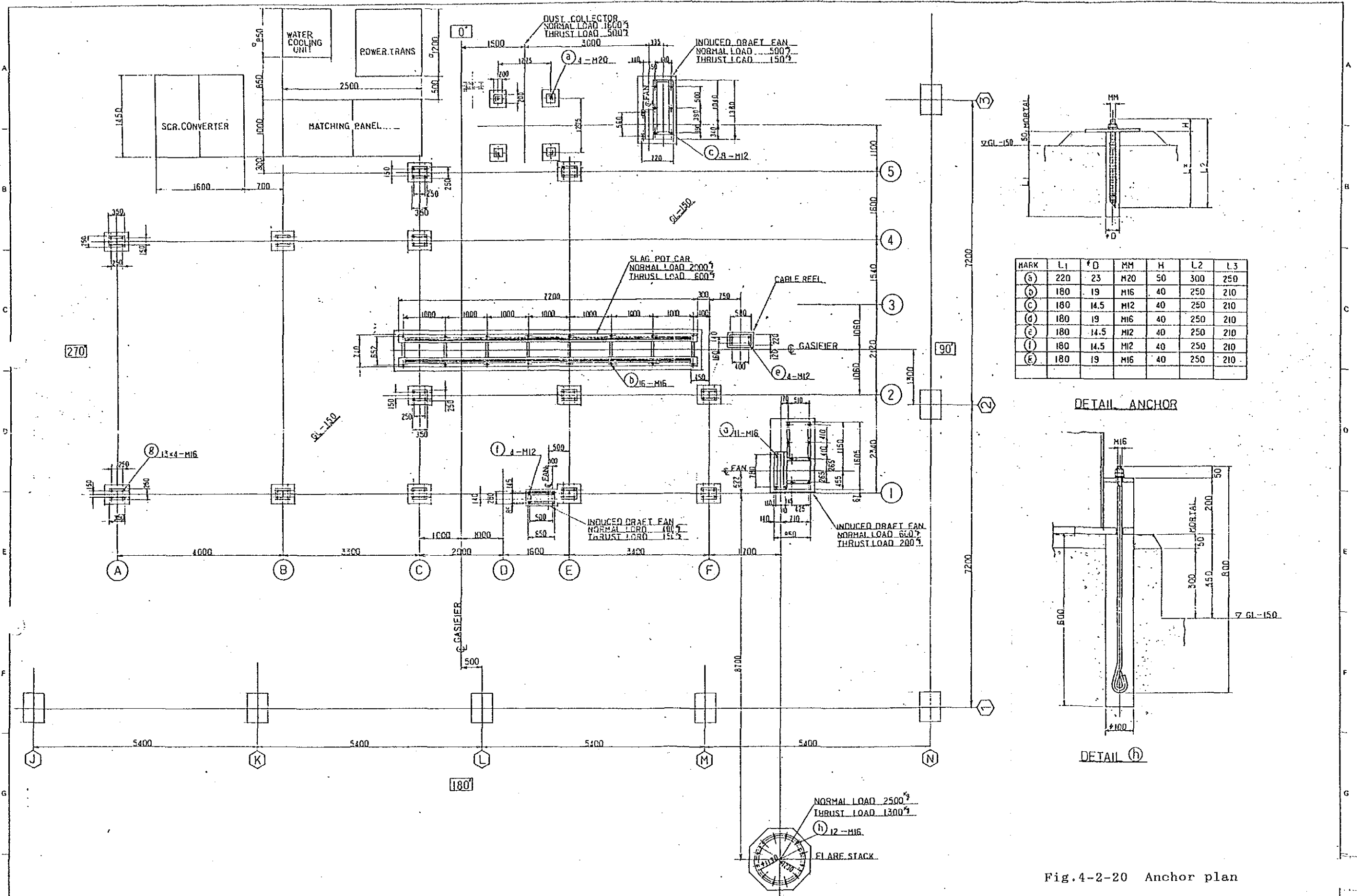


Fig.4-2-20 Anchor plan

REVISION		
NO	DATE	DESCRIPTION

DATE	MANAGER OF P&P	BANKO COAL GASIFICATION TEST PLANT ANCHOR PLAN
J.G.11.85		
SCALE	MANAGER	
1/30		

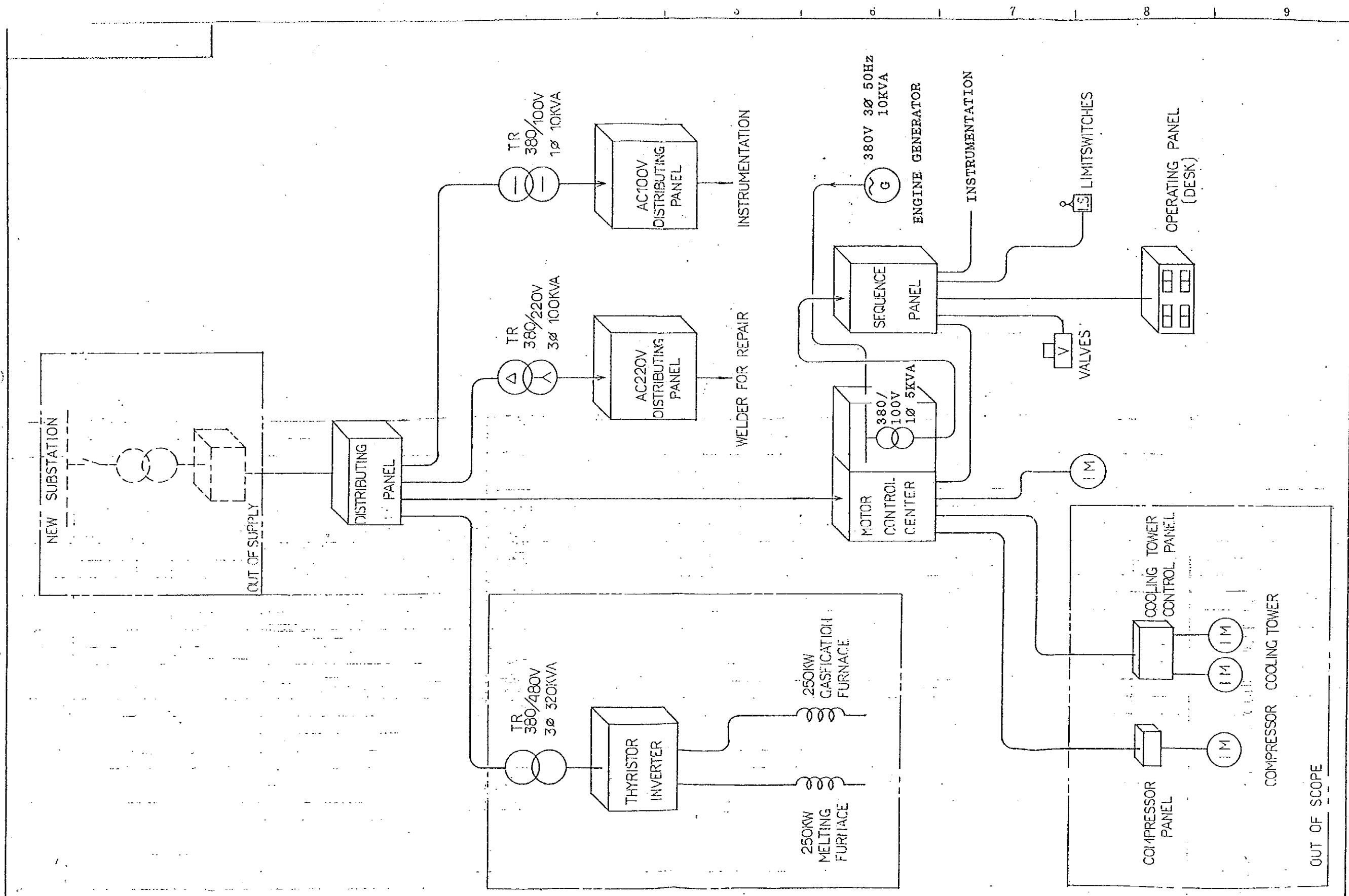


Fig.4-2-21 System configuration

SUMITOMO METAL INDUSTRIES, LTD.  
 PLANT ENGINEERING DEP.

APPROVED BY *S. Kamaoka*  
 CHECKED BY  
 DRAWN BY

TITLE  
 SYSTEM CONFIGURATION  
 (システム構成図)

DRAWING No.  
 0040-010  
 50

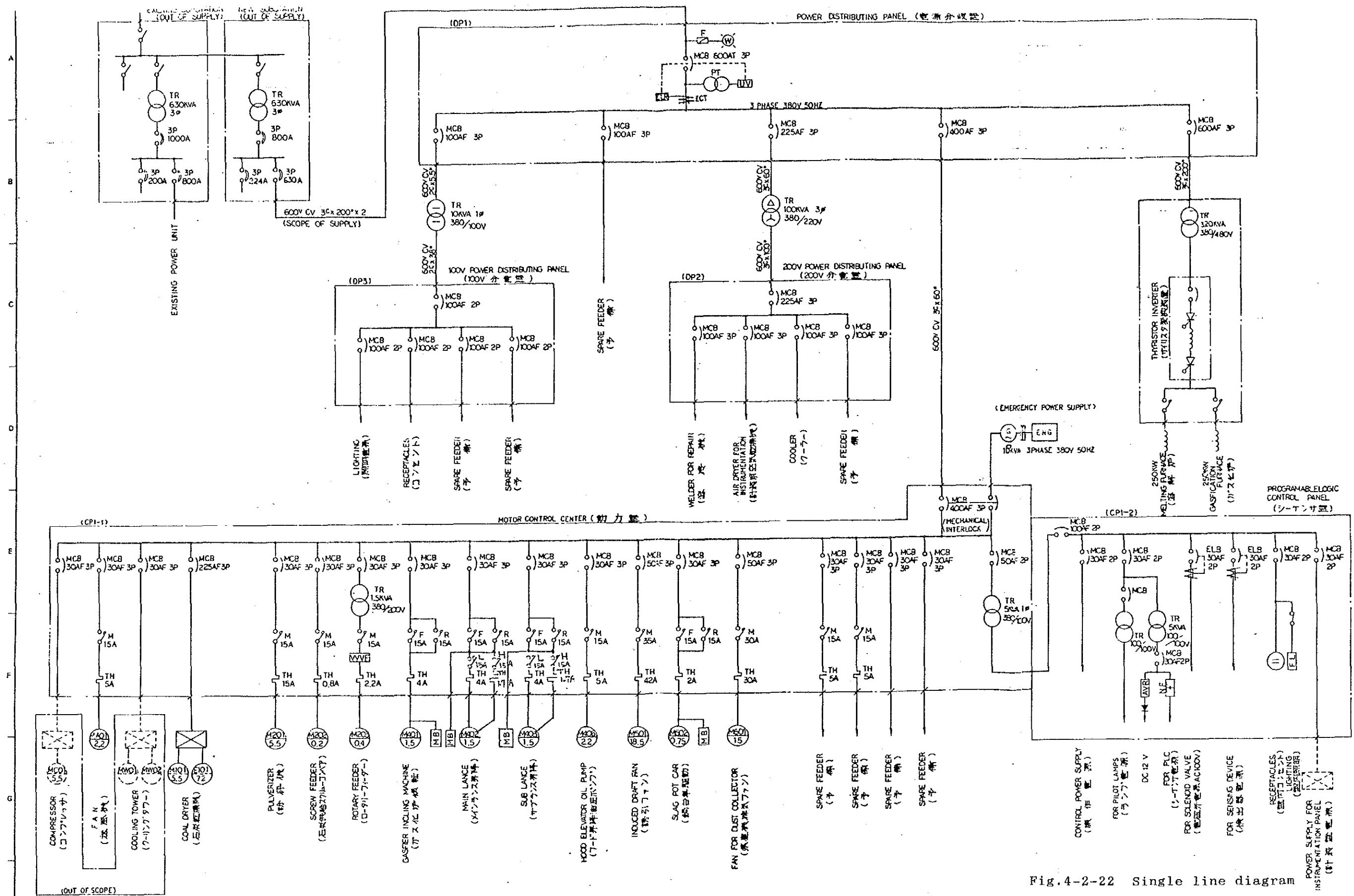
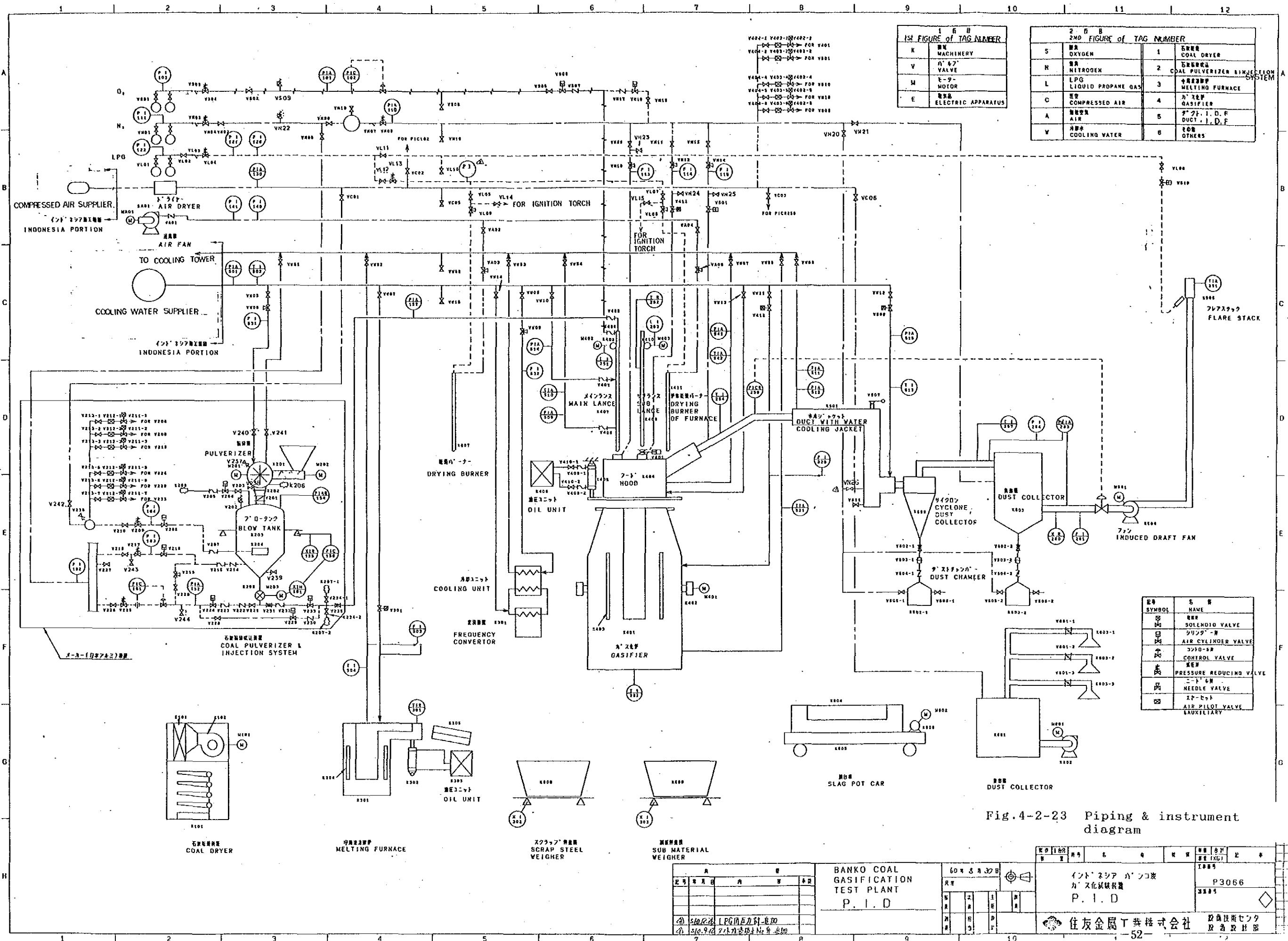


Fig.4-2-22 Single line diagram

NOTE  
 VVVF: VARIABLE VOLTAGE VARIABLE FREQUENCY PANEL  
 MB: MAGNET BRAKE

REVISION		
NO	DATE	DESCRIPTION

DATE	MANAGER OF DEP.	SINGLE LINE DIAGRAM (単線結線図)	E3546-C
SCALE	MANAGER		
		SUI-51- ETAL INDUSTRIES LTD. ENGINEERING DEP. OSAKA JAP.	



K	機	MACHINERY
V	弁	VALVE
M	モ	MOTOR
E	電	ELECTRIC APPARATUS

5	酸素	OXYGEN
N	窒素	NITROGEN
L	LPG	LIQUID PROPANE GAS
C	圧縮空気	COMPRESSED AIR
A	冷却水	COOLING WATER
1	乾燥機	COAL DRYER
2	粉砕機	COAL PULVERIZER
3	溶融炉	MELTING FURNACE
4	ガス化炉	GASIFIER
5	ダクト	I. D. F. DUCT
6	その他	OTHERS

○	SOLENOID VALVE	
□	シリンダ	AIR CYLINDER VALVE
△	コントロールバルブ	CONTROL VALVE
◇	圧縮機	PRESSURE REDUCING VALVE
▽	ニードルバルブ	NEEDLE VALVE
◇	エアピロットバルブ	AIR PILOT VALVE LAUXILIARY

Fig.4-2-23 Piping & instrument diagram

BANKO COAL GASIFICATION TEST PLANT P. I. D		60分	10月	10日	住友金属工業株式会社 設備技術センター 設備設計部
INDONESIA PORTION		P. I. D		P3066	
INDONESIA PORTION		INDONESIA PORTION			



Table.4-2-2.(1) Principle Specification of Coal Gasification Test Plant

DESCRIPTION	Q'TY	MAIN SPECIFICATION
1. Coal Drying System	1	Type:Chassis Type Heat Source:Electric Heater Moisture of Raw Materials: 35 % Moisture of product : 5 % Hot Air Temperature :100 °C Capacity:120 kg(wet)/Bach/1 h
2. Coal Pulverize & Injection System		
2-1 Coal Pulverizer	1	Type: Special Hammer Mill Inlet Grain Size :-25 mm Outlet Grain Size:-0.074 mm>70 % Capacity:80 kg/h
2-2 Coal Injector	1	Blow Tank Capacity:80 kg Pressure:9.9 kg/cm2G Feeder Type:Rotary Feeder Capacity:20-40 kg/h
3. Melting Furnace		
3-1 Melting furnace	1	Type:Medium Frequency Coreless Furnace Capability Materials:Cast Iron Melting Temperature:1700 °C Capacity :300 kg/120 min. Tilting Mechanism:Oil Hydraulic Tilting Oil Hydraulic Unit Capacity:12 l/min. Pressure :70 kg/cm2G Oil Tank:150 l Hydraulic Fluids:Non Combustion Fluids
3-2 Power Transformer	1	Type:Indoor Oil Immersion Self Cooling Type Phase:3 Phase Cycle:50 Hz Voltage Primary 380 V Secondary 480 V

Table.4-2-2.(2) Principle Specification of Coal Gasification Test Plant

DESCRIPTION	Q'TY	MAIN SPECIFICATION
3-3 SCR Frequency Converter	1	Type: Indoor Crucible Type Input/Output Power Phase:3 Phase Voltage:480/1000 V Cycle : 50/300 Hz Power : Max.380 KVA/250 KW
3-4 Runner	1	Type:refractory Lining Type
4. Gasifier		
4-1 Gasifier	1	Type:Medium Frequency Coreless Furnace Capability Materials:Cast Iron Melting Temperature:1650-1700 °C Capacity :300 kg/15 min. for boosting up the temp. Tilting Mechanism:Electric Tilting
4-2 Preheating Burner	1	Type:Nozzle-Mixed Type Fuel:LPG Capacity:70000 Kcal/h
5. Lance		
5-1 Main Lance	1	Type:Water-Cooled Tetra Pipe Type Diameter 8 A for pulverized Coal 20 A for Oxygen 32 A for Cooling Water(Inlet) 50 A for Cooling Water(Outlet) Pressure:10 kg/cm <sup>2</sup> G Driving Unit Type :Electric Motor Drive Speed: 10 m/min. 3 m/min.
5-2 Sub-Lance	1	Type:Non-Cooled Type Measurement Elements Sampling for Cast Iron Temperature of Cast Iron Carbon Content in Cast Iron Driving Unit Type: Electric Motor Drive Speed:10 m/min.



Table.4-2-2.(3) Principle Specification of Coal Gasification Test Plant

DESCRIPTION	Q'TY	MAIN SPECIFICATION
6. Produced Gas Filtration System		
6-1 Hood	1	Type:Refractory Lining & Water-Cooled Type Stroke:325 mm Driving Unit Type:Oil Hydraulic type Capacity:28 l/min. Pressure:80 kg/cm <sup>2</sup> G Hydraulic Fluids:Non Combustion Fluids
6-2 Duct	1	Type:Water-Cooling Type Cooling Capacity:1600 °C-150 °C Gas Volume:Max. 135 Nm <sup>3</sup> /h
6-3 Cyclone Dust Collector	1	Type:Cyclone Type Inlet/Outlet Dust Content 50/25 g/Nm <sup>3</sup> Produced Gas Temperature:150 °C
6-4 Dust Collector	1	Type:Bug Filter Inlet/Outlet Dust Content 25/0.05 g/Nm <sup>3</sup> Produced Gas Temperature:150 °C
6-5 Induced Draft Fan	1	Type:Turbofan Type Capacity:135 Nm <sup>3</sup> /h Pressure:800 mm Aq Produced Gas Temperature:150 °C
6-6 Flare Stack	1	Type:Electric Spark Ignition Type Capacity:135 Nm <sup>3</sup> /h Ignition Fuel:LPG
7. Slag Treatment System		
7-1 Slag Pot	1	Materials:Cast Steel Capacity :300 kg
7-2 Slag Pot car	1	Type :Electric motor driver car Speed:10 m/min.
7-3 Heating Burner	1	Type:Nozzle-mixed type Fuel:LPG Capacity:20000 Kcal/h

Table.4-2-2.(4) Principle Specification of Coal Gasification Test Plant

DESCRIPTION	Q'TY	MAIN SPECIFICATION
8. Dust Collector	1	Type:Bug filter Capacity:2800 Nm <sup>3</sup> /min. Pressure:200 mm Aq Collected spot:Melting furnace Gasifier Slag pot car
9. Utility System		
9-1 Oxygen, Nitrogen Collected Equipment	1	Oxygen cylinder Pressure:150 kg/cm <sup>2</sup> G Nitrogen cylinder Pressure:150 kg/cm <sup>2</sup> G Volume :46.7 l LPG cylinder Pressure:150 kg/cm <sup>2</sup> G
10. Gas Analyzer		
10-1 Gas Sampling Unit	1	Type:Pre-heated type Heating temperature:120 °C
10-2 CO & CO <sub>2</sub> Analyzer	1	Type:Infrared gas analyzer Measurement range CO :0-70 % CO <sub>2</sub> :0-50 %
10-3 O <sub>2</sub> Analyzer	1	Type:Magnetic gas analyzer Measurement range:0-2/0-10 %
10-4 H <sub>2</sub> Analyzer	1	Type:Thermal conductivity type gas analyzer Measurement range:0-50 %
10-5 Gas Chromatograph	1	Measurement range N <sub>2</sub> :0-100 % H <sub>2</sub> S:0-1000 ppm COS:0-1000 ppm
11. Slag & Iron Analyzer		
11-1 Slag Analyzer	1	Type:X-ray spectrometer Measurement elements CaO, SiO <sub>2</sub> , Al <sub>2</sub> O <sub>3</sub> , MgO, Fe <sub>2</sub> O <sub>3</sub> , Na <sub>2</sub> O
11-2 Iron Analyzer	1	Type:Non-dispersive infrared analyzer Measurement elements C, S

Table.4-2-2.(5) Principle Specification of Coal Gasification Test Plant

DESCRIPTION	Q'TY	MAIN SPECIFICATION
<b>12.Electrical Equipment</b>		
12-1 Power Distributing Panel (380 V)	1	Type:Self-standing, indoor-use type Devices:Molded cased circuit breaker(MCCB) MCCB 600AF, MCCB 400AF, MCCB 225AF, MCCB 100AF
12-2 Power Distributing Panel (200 V)	1	Type:Wall-mount, indoor-use type Devices:Molded cased circuit breaker(MCCB) MCCB 225AF, MCCB 100AF
12-3 Power Distributing Panel (100 V)	1	Type:Wall-mount, indoor-use type Devices:Molded cased circuit breaker(MCCB) MCCB 100AF
12-4 Motor Control Center & Programmable Logic Control Panel	1	Type: Self-standing,indoor-use Devices:Molded cased circuit breaker(MCCB) MCCB 400AF, MCCB 225AF, MCCB 100AF, MCCB 50AF MCCB 30AF Earth leakage breaker(ELB) ELB 30AF
12-5 Transformers (100 KVA)	1	Type:Oil-immersed, self-cooled, indoor-use, continuous-rating type 380/220 V, 3 phase, 50 Hz, 100 KVA
12-6 Transformer (10 KVA)	1	Type:Indoor-use, continuous-rating, dry type 380/100 V, single phase, 50 Hz, 10 KVA
<b>12-7 Operation Console</b>		
12-7-1 Main Console	1	Type:Self-standing, indoor use type Devices:Push-button switches Indicating lamps Change-over switches etc.
12-7-2 Mimic Console	1	Type:Wall-mount,indoor-use type Devices:Indicating lamps
12-7-3 Local Operating Box	9	Type:Wall-mount, indoor-use type Devices:Push-button switches Lamps etc.

Table.4-2-2.(6) Principle Specification of Coal Gasification Test Plant

DESCRIPTION	Q'TY	MAIN SPECIFICATION
12-8 Instrument Panel	1	Type:Self-standing, indoor-use type Devices:Recorder Indicator Indicating controller Processor Annunciator etc.
13.Generator	1	Type:Outdoor-use, oil engine type Capacity:380 V, 3 phase, 50 Hz, 10 KVA
14.Instrument Air Unit	1	Type: Indoor-use, cooling type Capacity:70 Nm <sup>3</sup> /h
15.Personal computer	1	Capacity:CPU 8MHz ROM 96 BYTE RAM 128 BYTE Devices :Printer CRT Floppy disk GPIB interface Data controller

Table.4-2-3.(1) Motor List

APPLICATION	Q'TY	OUTPUT (KW)	POLES (SPEED) (rpm)	VOLTAGE (V)	WINDING (CONTROL)	BRAKE
1. Fan	2	1.5	2 (3000)	380	CR (NR)	
2. De-ionized Water Pump	1	3.7	4 (1500)	380	CR (NR)	
3. Coal Dryer	1	5.5	4 (1500)	380	CR (NR)	
4. Coal Pulverizer	1	3.7	2 (3000)	380	CR (NR)	
5. Coal Screw Feeder	1	0.2	4 (1500)	380	CR (NR)	
6. Coal Rotary Feeder	1	0.4	4 (1500)	200	CR (VVVF)	
7. Melting Furnace Oil Pump	1	2.2	4 (1500)	380	CR (NR)	
8. Gasifier	1	1.5	4 (1500)	380	CR (R)	x
9. Main Lance	1	1.5	4/12 (1500/ 500)	380	CR (R)	x
10. Sub-lance	1	1.5	4/12 (1500/ 500)	380	CR (R)	x
11. Hood Oil Pump	1	7.5	6 (1000)	380	CR (NR)	
12. Induced Draft Fan	1	18.5	4 (1500)	380	CR (NR)	
13. Dust Collector	1	11.0	4 (1500)	380	CR (NR)	
14. Slag Pot	1	0.75	4 (1500)	380	CR (NR)	x
15. Air Conditioner	1	3.5	4 (1500)	380	CR (NR)	
16. Cooling Tower for (15)	1	0.15	6 (1000)	380	CR (NR)	

Table.4-2-3.(2) Motor List

APPLICATION	Q'TY	OUTPUT (KW)	POLES (SPEED) (rpm)	VOLTAGE (V)	WINDING (CONTROL)	BRAKE
17.Water Pump for (15)	1	0.75	4 (1500)	380	CR (NR)	

CR :Cage rotor type induction motor

NR :Non reversing type

R :Reversing type

VVVF:Variable voltage, variable frequency type

Table.4-2-4.(1) Instrument List

TAG.No	Q'TY	INSTRUMENT
1. O2 Line		
PIA-101	1	O2 injection pressure
FIC-102	1	O2 flow control for main lance
PI -103	1	O2 bomb pressure
2. N2 Line		
PIA-110	1	N2 supply pressure
PI -111	1	N2 bomb pressure
FI -113	1	N2 flow local indicator for main lance seal
FI -114	1	N2 flow local indicator for sum-lance seal
FI -115	1	N2 flow local indicator for gas duct purge
PI -162	1	N2 pressure local indicator for pulverizer
PI -163	1	N2 pressure local indicator for pulverizer
3. LPG Line		
FI -120	1	LPG line local indicator
PI -121	1	LPG line pressure indicator
PI -122	1	LPG bomb pressure
4. Air Line		
PIA-130	1	Compressed air supply pressure
PI -164	1	Compressed air pressure for airtation in blow tank
FI -140	1	Air flow local indicator for burner
PI -141	1	Air pressure local indicator for burner
5. Pulverized Coal Line (PC Line)		
FIC-151	1	PC carrier N2 flow
PI -152	1	PC carrier N2 pressure
PIA-154	1	PC blow tank pressure
XIR-155	1	PC blow tank weight
FIC-156	1	PC flow
PIA-157	1	PC injection pressure
XIH-161	1	Rotary rate for rotary feeder
6. Gasifier & Produced Gas		
LI -251	1	Main lance position indicator
TR -252	1	CD & molten iron temperature by sub-lance
LI -253	1	Local position indicator for sub-lance
TI -254	1	Produced gas temperature at hood outlet
TI -257	1	Inlet gas temperature for cyclone
PICR-265	1	Gasifier pressure control
XR -260	1	Gas analysis
XIA-000	1	Gas monitor
FI -261	1	Produced gas flow
TR -262	1	Gasifier refractory temperature
PdIA-263	1	Diff. pressure for dust collector
PI -264	1	Produced gas pressure for dust collector
TIA-271	1	Flare detector for flare stack

Table.4-2-4.(2) Instrument List

TAG.No	Q'TY	INSTRUMENT
7. Utility		
TR -301	1	Molten iron temperature in melting furnace
XI -302	1	Weight for scrapped iron
XI -302	1	Weight for sub-materials
XI -801	1	Analysis for slag
XI -802	1	Analysis for pig iron
XI -803	1	Off-line analyzer for common equipment
IP -902	1	Trend recorder
8. Water Line		
PIA-501	1	Cooling water supply pressure
TI -502	1	Cooling water supply temperature
FIA-503	1	Cooling water flow for melting furnace
TI -504	1	Cooling water temperature for melting furnace
FIA-509	1	Cooling water flow for main lance
TIA-510	1	Cooling water temperature for main lance
TIA-511	1	Cooling water temperature for water cooling duct
FIA-512	1	Cooling water flow for water cooling duct
TI -513	1	Cooling water temperature for water cooling duct
PI -514	1	Cooling water pressure for main lance
PI -515	1	Cooling water pressure for water cooling duct
FIA-520	1	Cooling water flow for gasifier
TIA-521	1	Cooling water temperature for gasifier
FI -531	1	Cooling water flow for pulverizer
FI -532	1	Cooling water flow for frequency converter panel for melting furnace & Gasifier
FIA-541	1	Cooling water flow for hood
TIA-542	1	Cooling water temperature for hood





ITEM NAME	NO.	UNIT	10-25	10-12	10-12
COAL	C-1	WATER CONTENT %	5.2		
	C-2	GRAIN SIZE μm	742 TONS		
PIG IRON	F-1	TEMPERATURE °C	1800-1700		
	F-2	WEIGHT KG	300		
QUICK LIME	Ca-1	WEIGHT KG	1.8	1.2	2.4
	O-1	PRESSURE kg/cm <sup>2</sup>	10-12		
	O-2	PRESSURE kg/cm <sup>2</sup>	4-6		
OXYGEN	M-1	FLOW RATE Nm <sup>3</sup> /H	65-75		
	M-2	PRESSURE kg/cm <sup>2</sup>	6-10		
	M-3	PRESSURE kg/cm <sup>2</sup>	6-8		
	M-4	PRESSURE kg/cm <sup>2</sup>	6-8		
	M-5	PRESSURE kg/cm <sup>2</sup>	4-6		
NITROGEN	N-6	FLOW RATE Nm <sup>3</sup> /H	10.6	7.1	14.2
	N-7	PRESSURE kg/cm <sup>2</sup>	6-8		
	N-8	PRESSURE kg/cm <sup>2</sup>	6-8		
	N-9	PRESSURE kg/cm <sup>2</sup>	6-8		
	N-10	PRESSURE kg/cm <sup>2</sup>	6-8		
LPG	L-1	PRESSURE kg/cm <sup>2</sup>	1-2		
	L-2	PRESSURE MPaG	600		
	L-3	FLOW RATE Nm <sup>3</sup> /H	0.83		
	L-4	FLOW RATE Nm <sup>3</sup> /H	1.5		
COMPRESSED AIR	Ah-1	PRESSURE kg/cm <sup>2</sup>	5-7		
	Ah-2	FLOW RATE Nm <sup>3</sup> /H	67.2		
	Ah-3	PRESSURE kg/cm <sup>2</sup>	3-5		
AIR	AI-1	PRESSURE MPaG	500		
	AI-2	FLOW RATE Nm <sup>3</sup> /H	100		
	AI-3	PRESSURE MPaG	500-600		
PRODUCED GAS	Q-1	PRESSURE MPaG	100		
	Q-2	FLOW RATE Nm <sup>3</sup> /H	84.5	43	88
	Q-3	TEMPERATURE °C	1300-1500		
	Q-4	CO %	51.8		
	Q-5	H <sub>2</sub> %	7.1		
DUST COLLECTION	X-1	TEMPERATURE °C	24.1		
	V-1	TEMPERATURE °C	17.0		
	V-2	DUST CONTENT g/Nm <sup>3</sup>	50		
	V-3	PRESSURE MPaG	-110 - -120		
	V-4	TEMPERATURE °C	150		
	V-5	PRESSURE MPaG	-220 - -230		
	V-6	DUST CONTENT g/Nm <sup>3</sup>	25		
	V-7	PRESSURE MPaG	-420 - -430		
	V-8	DUST CONTENT g/Nm <sup>3</sup>	0.05		
	V-9	PRESSURE MPaG	-480 - -480		
	V-10	PRESSURE MPaG	50-60		
COOLING WATER	W-1	PRESSURE MPaG	200		
	W-2	FLOW RATE m <sup>3</sup> /H	2800		
	W-3	PRESSURE kg/cm <sup>2</sup>	10		
	W-4	FLOW RATE m <sup>3</sup> /H	39.9		
	W-5	TEMPERATURE °C	32.2		
	W-6	FLOW RATE m <sup>3</sup> /H	6		
	W-7	FLOW RATE m <sup>3</sup> /H	20.4		
	W-8	FLOW RATE m <sup>3</sup> /H	8.4		
	W-9	TEMPERATURE °C	55.2		
	W-10	PRESSURE kg/cm <sup>2</sup>	3.5		
	W-11	FLOW RATE m <sup>3</sup> /H	12.0		
W-12	FLOW RATE m <sup>3</sup> /H	8.4			
W-13	FLOW RATE m <sup>3</sup> /H	3.6			
W-14	TEMPERATURE °C	55.2			
W-15	FLOW RATE m <sup>3</sup> /H	1.7			
W-16	TEMPERATURE °C	40			
W-17	FLOW RATE m <sup>3</sup> /H	10.8			
W-18	TEMPERATURE °C	64.4			
W-19	FLOW RATE m <sup>3</sup> /H	7			
W-20	TEMPERATURE °C	40			
W-21	FLOW RATE m <sup>3</sup> /H	39.9			
W-22	TEMPERATURE °C	50			

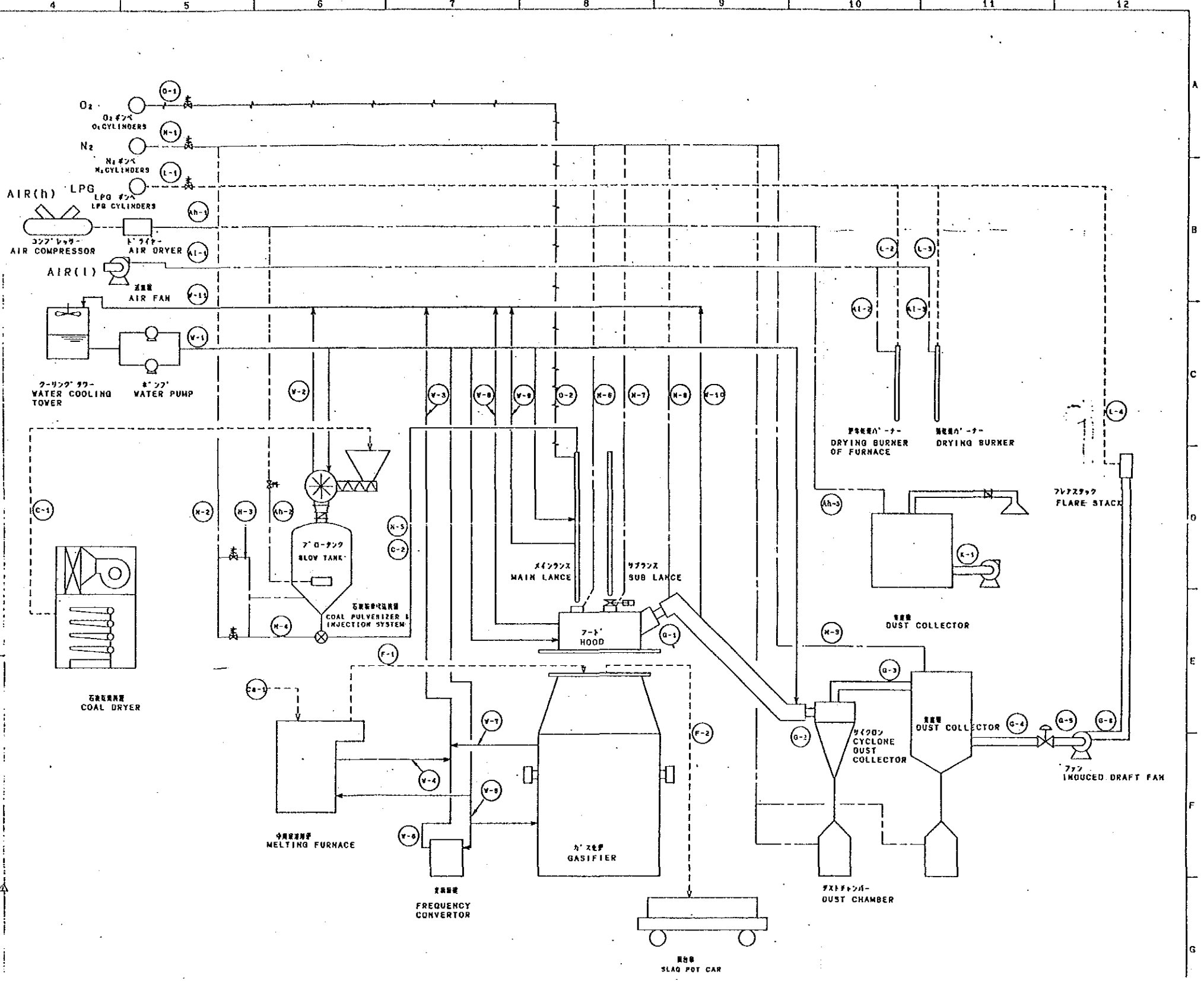


Fig.4-2-24 Engineering flow diagram

BANKO COAL GASIFICATION TEST PLANT E. F. D.		INDONESIA BANKO COAL GASIFICATION TEST PLANT E. F. D.	
住友金属工業株式会社		住友金属工業株式会社	



Table.4-2-5 Utility balance  
in standard test run

EQUIPMENT	OXYGEN (Nm3/h)	NITROGEN (Nm3/h)	LPG (Nm3/h)	COMPRESSED AIR (Nm3/h)	COOLING WATER (m3/h)	AIR (Nm3/h)
1.Coal drying system						
2.Coal pulv.& Inject.sys.		10.6		53.7	(6.0)	
3.Melting Furnace					16.8	
4.Runner			(0.8)			(21.0)
5.Gasifier	18.0		(3.0)		3.6	(73.0)
6.Main lance					10.8	
7.Hood		56.0			1.7	
8.Water-cooling Duct		(29.0)			7.0	
9.Bug Filter		6.0				
10.IDF						
11.Flare Stack			1.5			
12.Dust Collector				13.5		
Total (1)	18.0	72.6	1.5	67.2	6.0	0
Total (2)	( 0 )	(29.0)	(3.8)	( 0 )	(39.9)	(94.0)

\* Total (1) : Utility, consumed during coal gasification test

Total (2) : Utility, consumed before or after the test

Table.4-3-1 Schedule for Erection, Trial Run & Commissioning and Coal Gasification Test

	FY 1986		FY 1987			
	3Q	4Q	1Q	2Q	3Q	4Q
Erection	[Bar]					
Trial run & commissioning		[Bar]				
Test (Camp.1)			[Bar]			
Test (Camp.2)				[Bar]		
Analysis data					[Bar]	
Test (Camp.3)						[Bar]
Completion of report						[Bar]

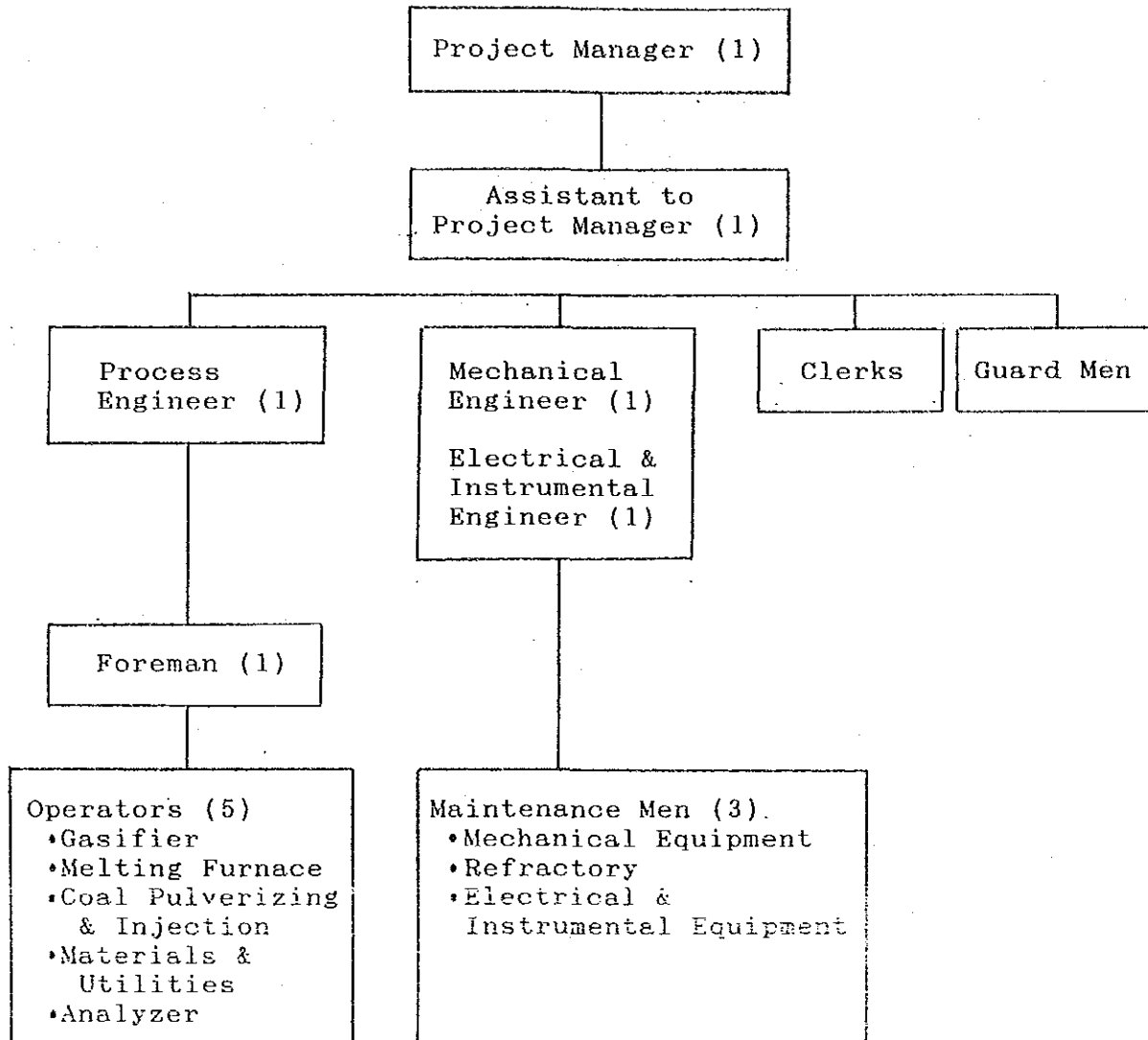
Table.4-3-3 Standard Time Schedule for a Coal Gasification Test Run

Hour	9	10	11	12	13	14	15	16	17
Melting furnace	Molten iron preparation			Tapping					
Gasifier	Preheating			Charging	Test	Finishing job			
Coal system	Drying & Pulverizing								

Table.4-3-2 Test Item for Trial Run, Commissioning and Coal Gasification Test

CONTENT	
1. Trial run & Commissioning	1. Non-load test of the facilities (1) Rotation direction check of motors (2) On-off check of solenoid valves for hydraulic actuator & air actuator  2. On-load test of the facilities (1) Check of capacity for the facilities on load state
2. Gasification Test	
(1) Campaign.1	1. Experiments to understand the characteristics of the facilities (1) Heat loss of gasification (2) Tests of gasifier temperature holding condition (3) Study of furnaces repair intervals (4) Establishment of an optimum testing condition
(2) Campaign.2	1. Coal gasification tests for Banko Coal (1) Influence of moisture and ash (2) Influence of C,H,O and S contents
(3) Campaign.3	1. Supplement tests to the result of analyzed data collected during Campaign.2

Fig.4-3-1 Organization Table for Counterpart

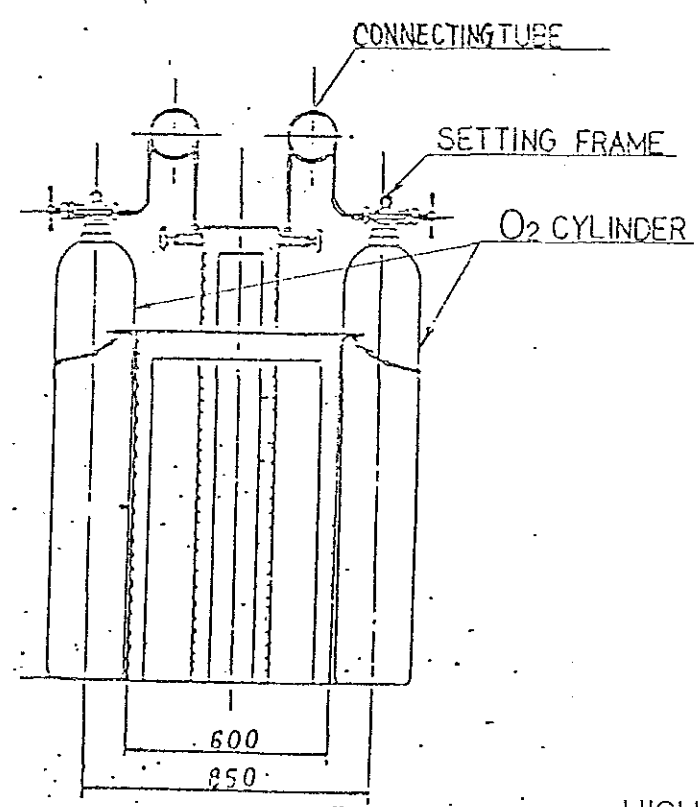
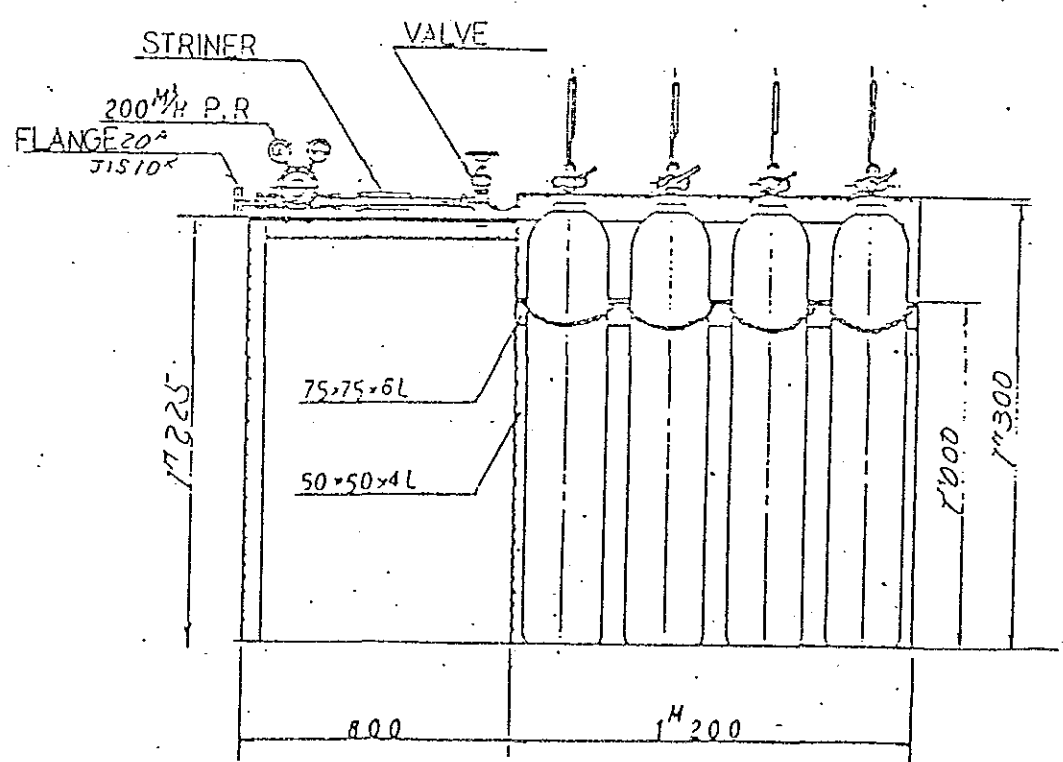
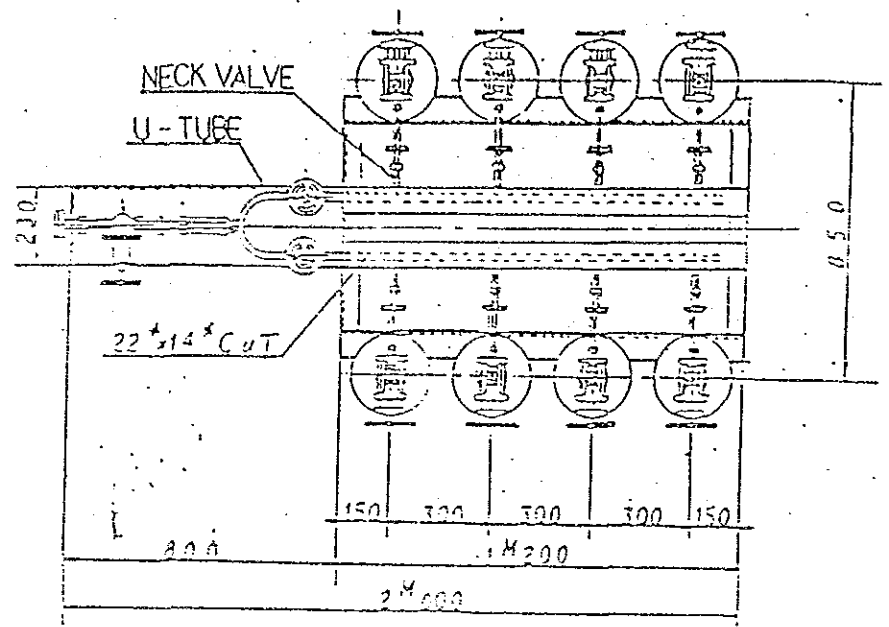






Japan portion  
 · Cylinder stand  
 · Valve etc.  
 · Connecting tube

Indonesia portion  
 · Cylinders



HIGH-PRESSURE ON RIGHT

D=2320 mm  
 H=1355 mm  
 T=4.0 mm

actual inner volume 46.7 l

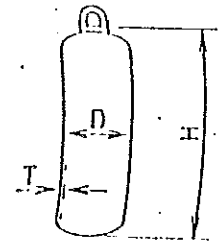
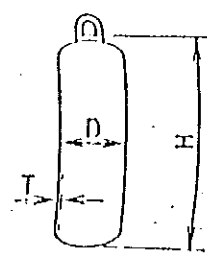
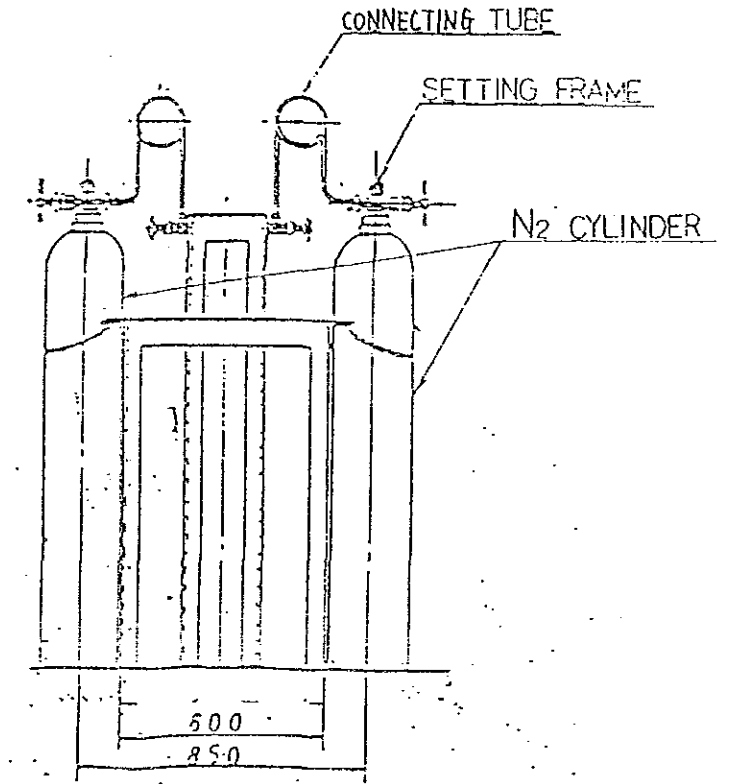
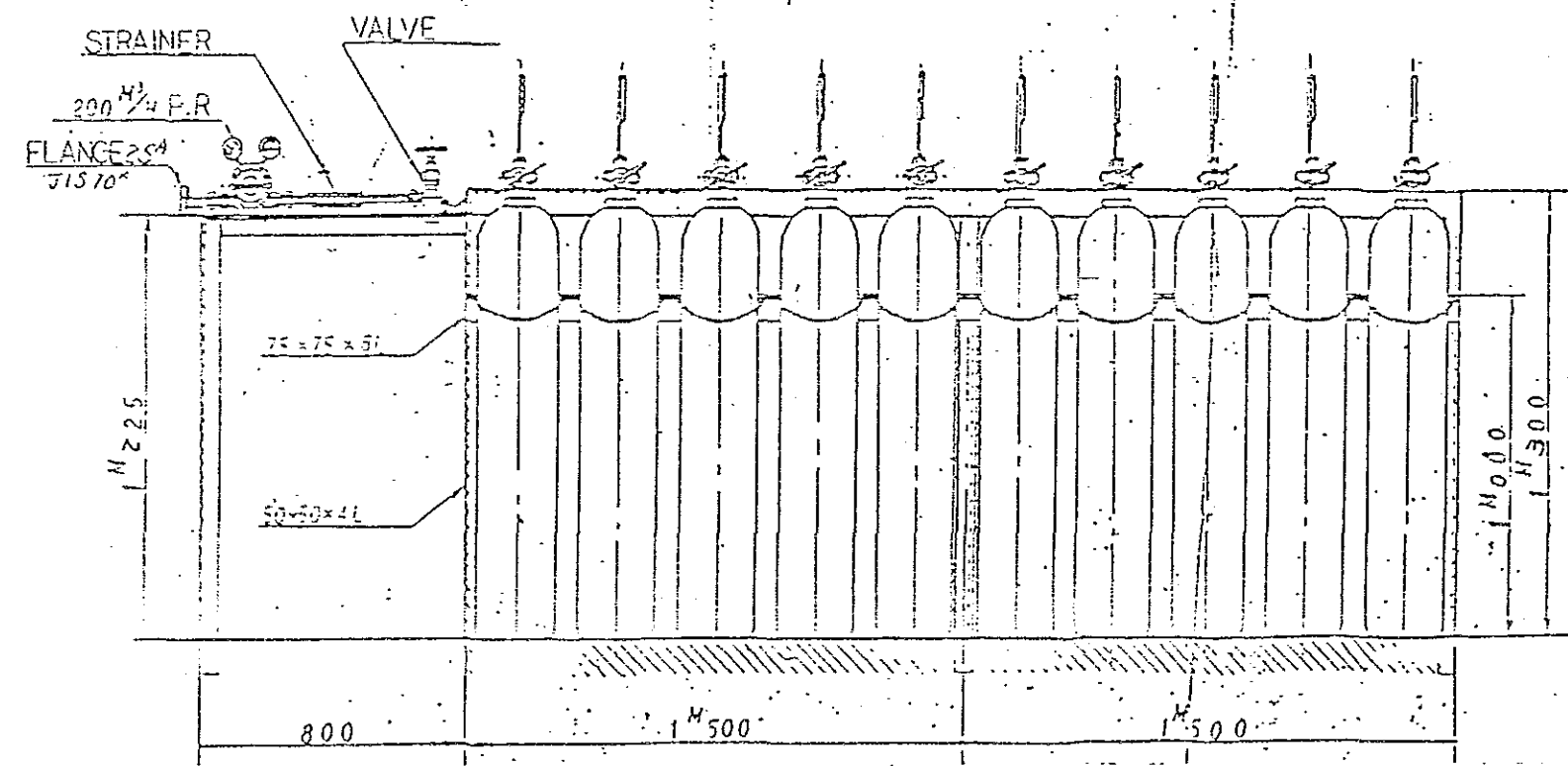
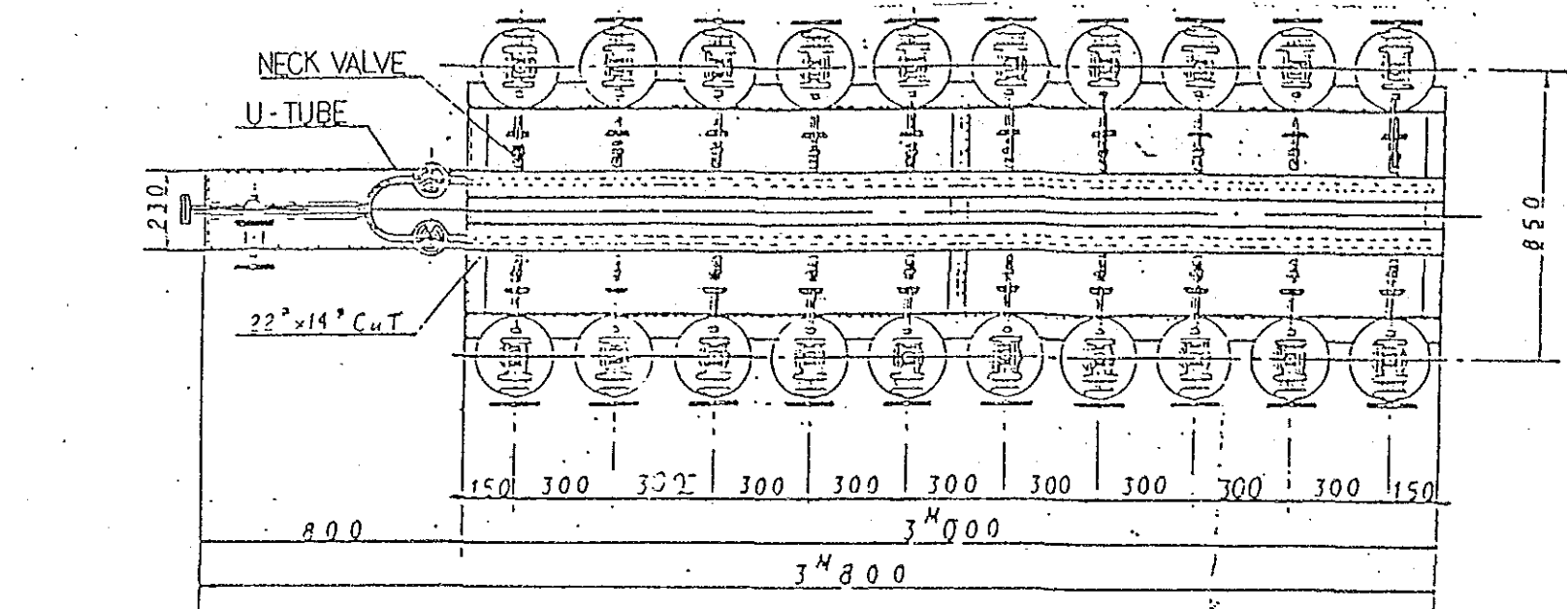


Fig.4-4-1 (1)

DATE	MANAGER OF DEP	O <sub>2</sub> COLLECTED EQUIPMENT
SCALE	MANAGER	
	CHIEF	4 x 2 = 8
	CHECK	SUMITOMO METAL INDUSTRIES, LTD. PLANT ENGINEERING DE-68-133 JAPAN
	DRAWN	

Japan portion  
 · Cylinder stand  
 · Valve etc.  
 · Connecting tube

Indonesia portion  
 Cylinders



D=2320 mm  
 H=1355 mm  
 T=4.8 mm

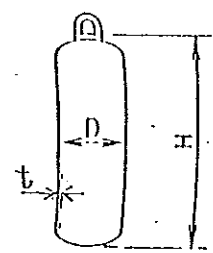
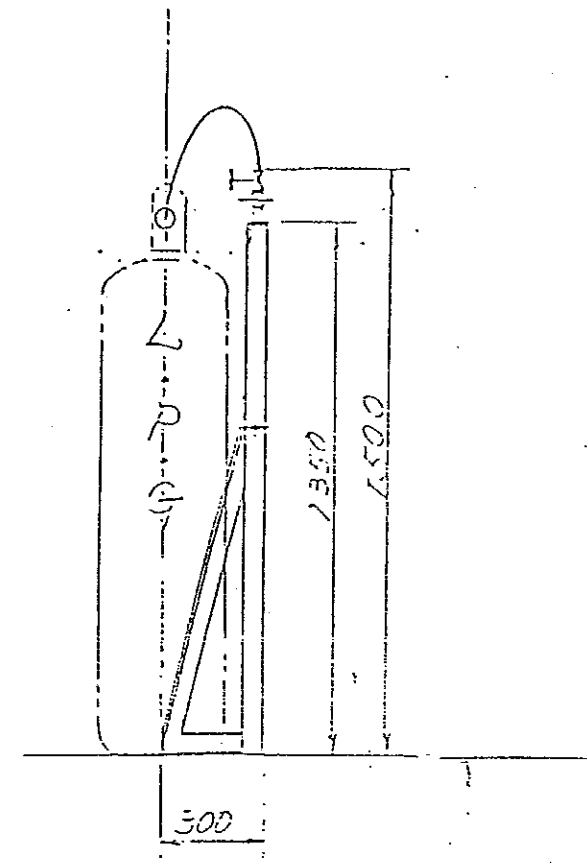
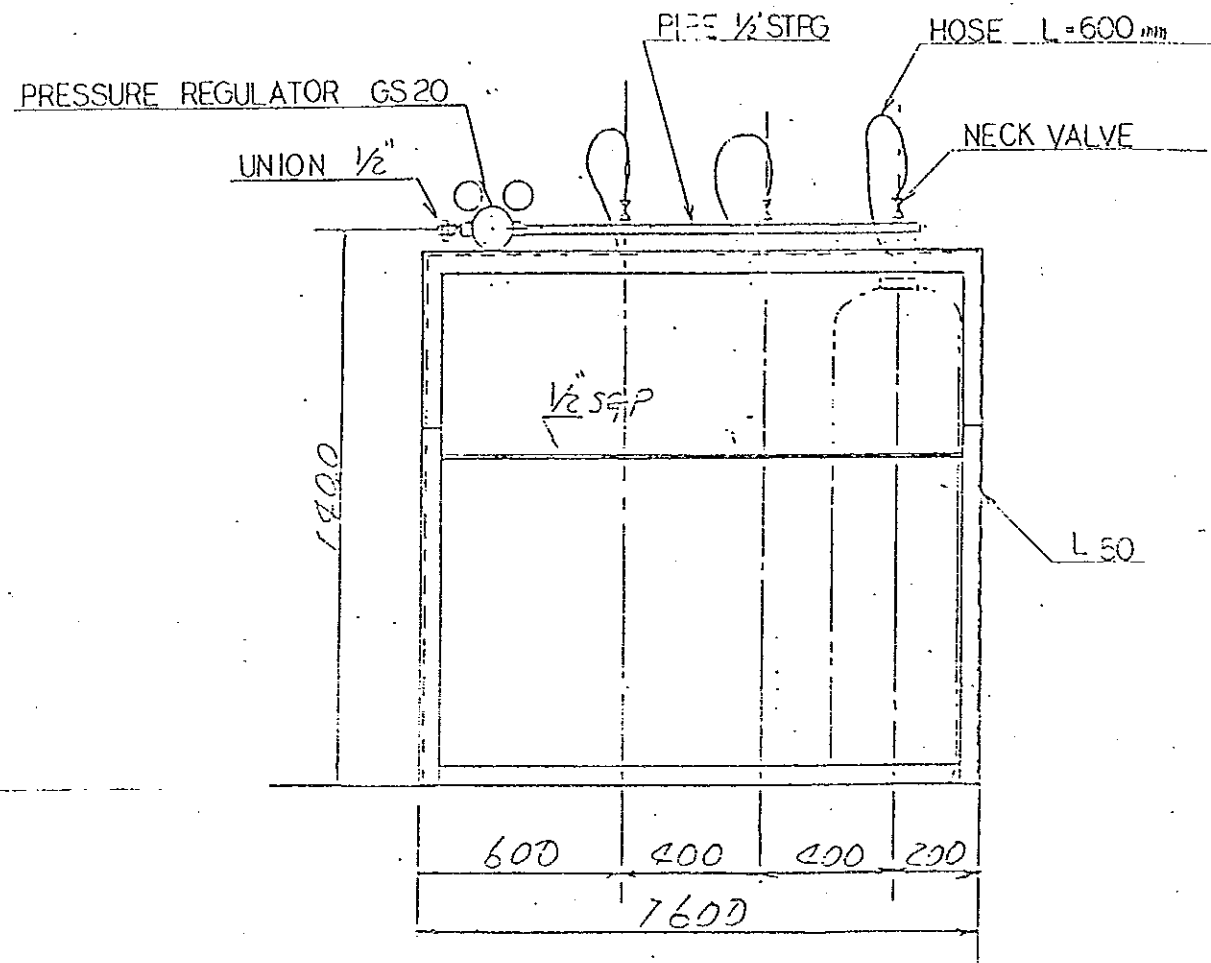
actual inner volume 46.7<sup>l</sup>

Fig.4-4-1 (2)

DATE	MANAGER OF DEP	N <sub>2</sub> COLLECTED EQUIPMENT
SCALE	MANAGER	
	CHEF	10 x 2 = 20
	CHECK	SUMITOMO METAL INDUSTRIES, LTD. PLANT ENGINEERING DEP. OSAKA JAPAN
	DRAWN	

Japan portion  
 ·Cylinder stand  
 ·Valve etc.  
 ·Connecting tube

Indonesia portion  
 ·Cylinders

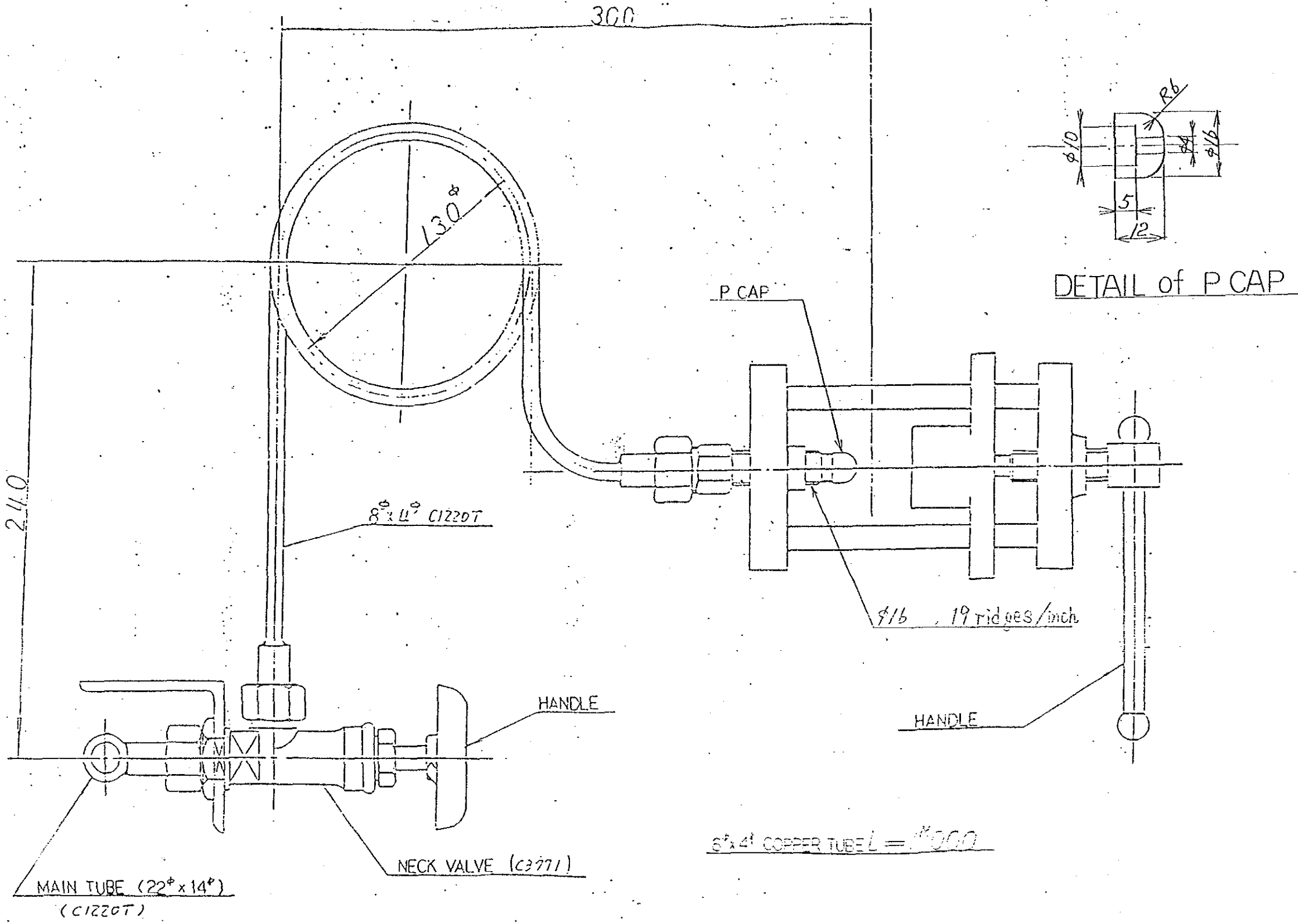


D = 370 mm  
 H = 1250 mm  
 t = 3.2 mm

actual inner volume 100 l

Fig.4-4-1 (3)

DATE	MANAGER OF DEP	LPG	3 COLLECTED EQUIPMENT
SCALE	MANAGER		
	CHEF	 SUMITOMO METAL INDUSTRIES, LTD. PLANT ENGINEERING -70- OSAKA JAPAN	
	CHECK		
	DRAWN		

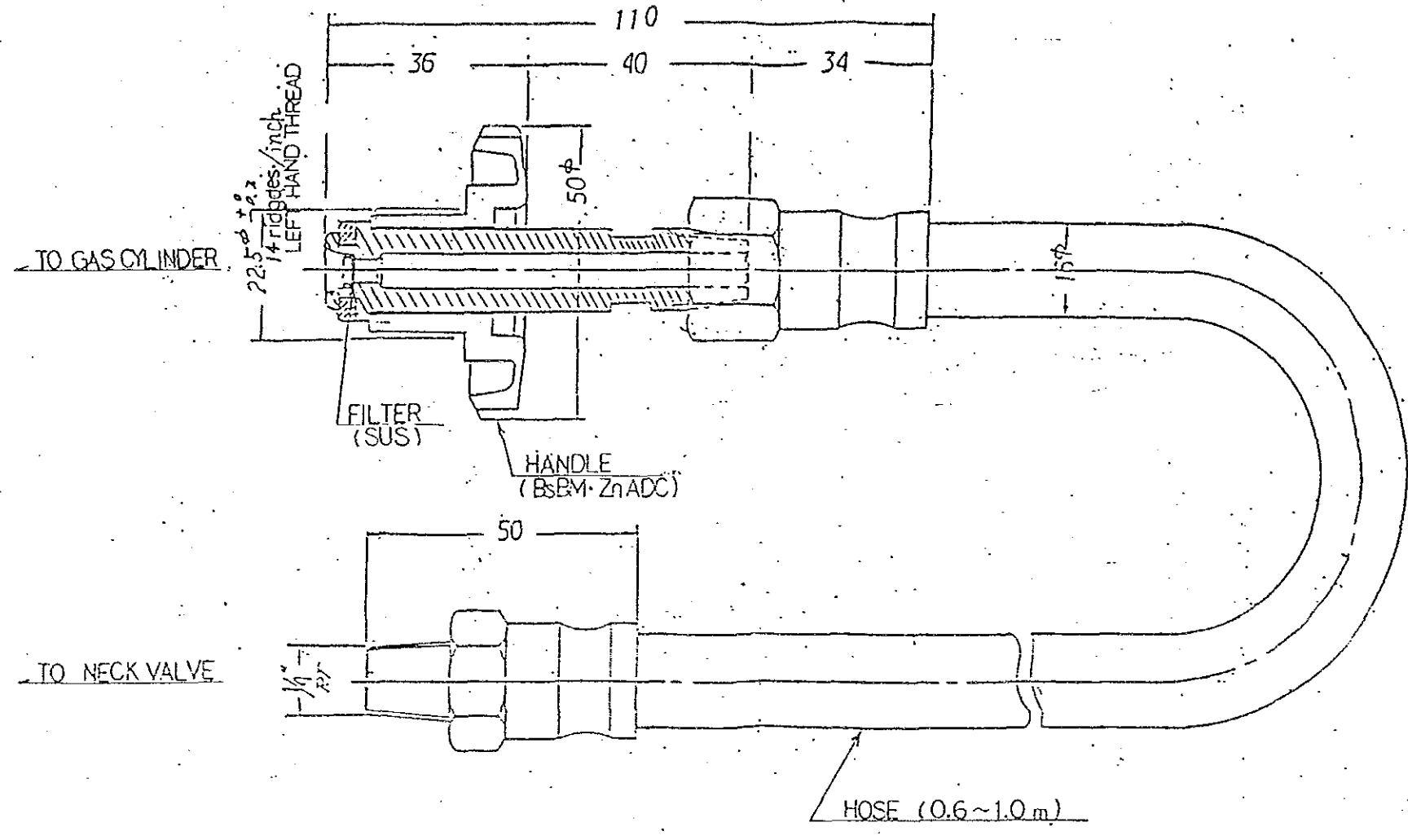


DETAIL of P CAP

6 x 4 COPPER TUBE L = 1000


Fig.4-4-1 (4)

DATE	MANAGER OF DEP	O <sub>2</sub> COLLECTED EQUIPMENT CONNECTING TUBE
SCALE	MANAGER	
	CHIEF	SUMITOMO METAL INDUSTRIES, LTD PLANT ENGINEERING DEP. OSAKA JAPAN
	CHECK	
	DRAWN	

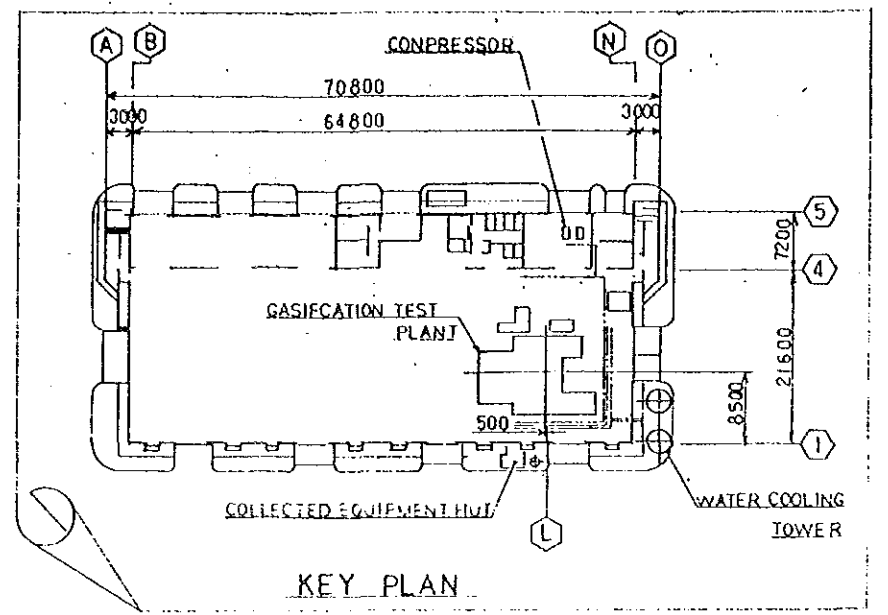
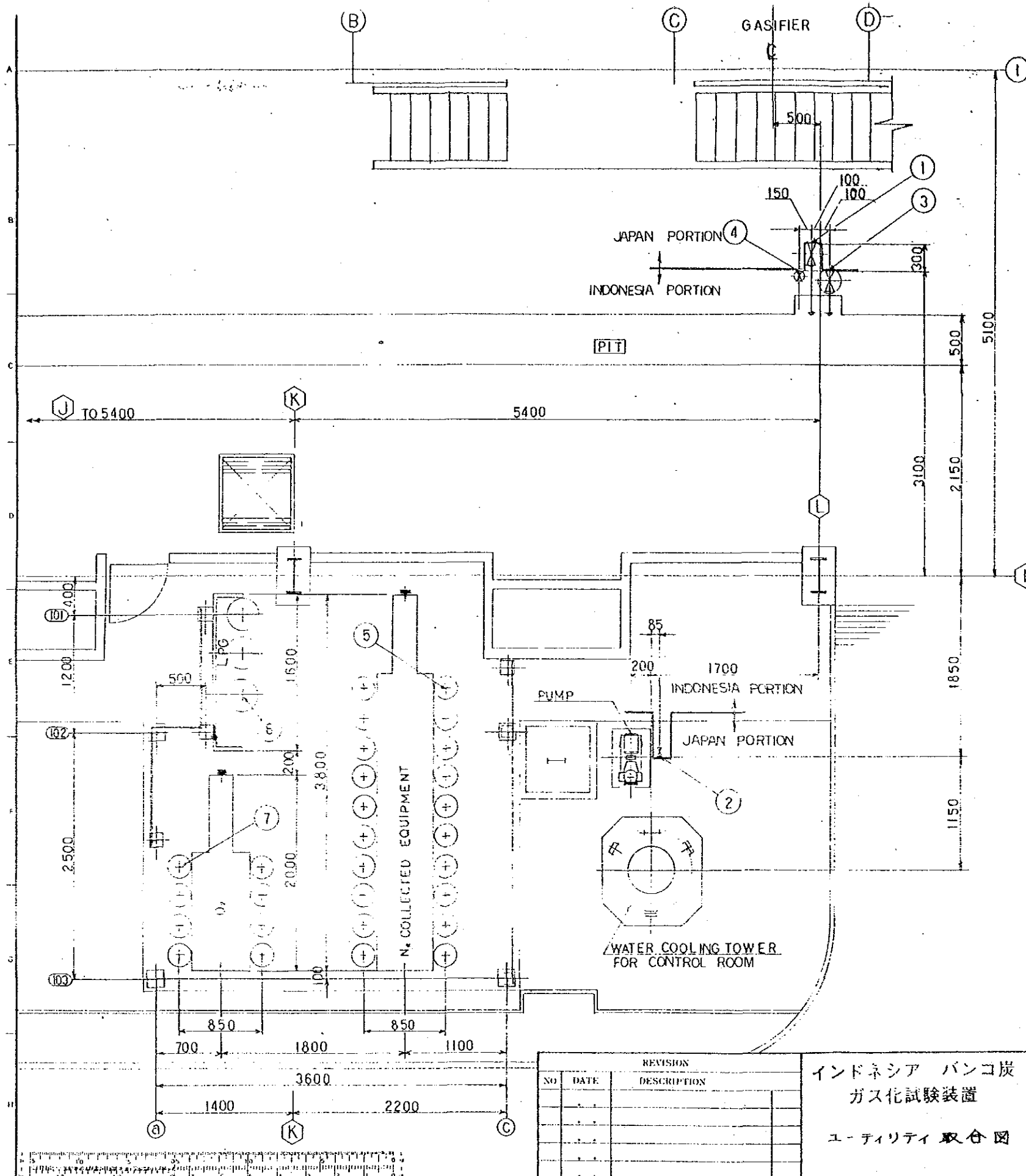


LPG

Fig.4-4-1 (5)


DATE	MANAGER OF DEP	HANDLE - TYPE CONNECTING HOSE
SCALE	MANAGER	
	CHEF	 SUMITOMO METAL INDUSTRIES, LTD. PLANT ENGINEERING DEP. OSAKA JAPAN
	CHECK	
⊕	DRAWN	

Kashima Plant Kogyo Co., Ltd.  
 APPD. Y. Okamoto  
 CHKD.  
 DWN. Y. Minowa  
 DWG. NO. C-86087



MATCH POINT NO.	UTILITIES	MATCH POINT	SIZE	CONNECTION	REMARKS
取合番号	床下名	取合位置	口径	接続例	備考
①	COOLING WATER	BOP GL-50	100A	FLANGE	FEED PIPE
②	工業用水	BOP GL-50	15A	UNION	FEED PIPE
③	工業用水	BOP GL-50	100A	FLANGE	RETURN PIPE
④	COMPRESSED AIR	BOP GL-50	25A	FLANGE	
⑤	NITROGEN	+GL+1200	—	CONNECTING TUBE	
⑥	LPG	+GL+1200	—	CONNECTING TUBE	
⑦	OXYGEN	+GL+1200	—	CONNECTING TUBE	

BOP → BOTTOM OF PIPE

FIG. 4-4-1 (6)

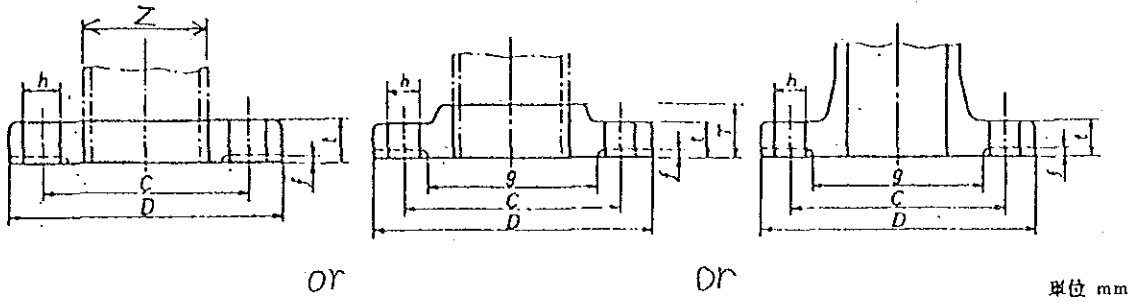
REVISION		
NO.	DATE	DESCRIPTION

インドネシア バンコ炭  
 ガス化試験装置  
 ユーティリティ取合図

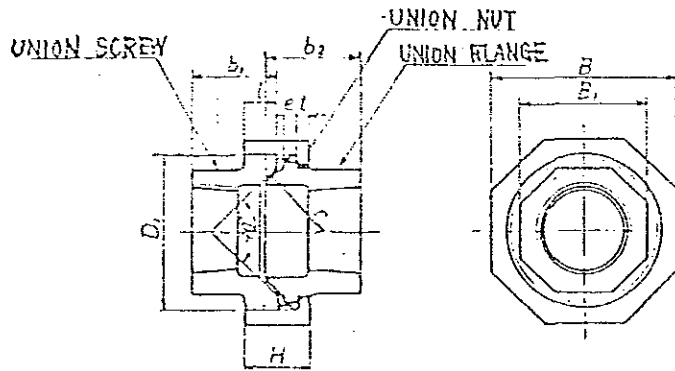
DATE: FEB 28 '86  
 SCALE: 1/30  
 MANAGER OF DEP.  
 MANAGER  
 CHIEF  
 CHECKED BY  
 DRAWN BY

BANKO COAL GASIFICATION TEST PLANT  
 UTILITIES MATCH POINT  
 SUMITOMO METAL INDUSTRIES LTD.  
 PLANT ENGINEERING DEP. OSAKA JAPAN

Fig. 4-4-1 (7) Dimension of JIS 10<sup>k</sup> Flange



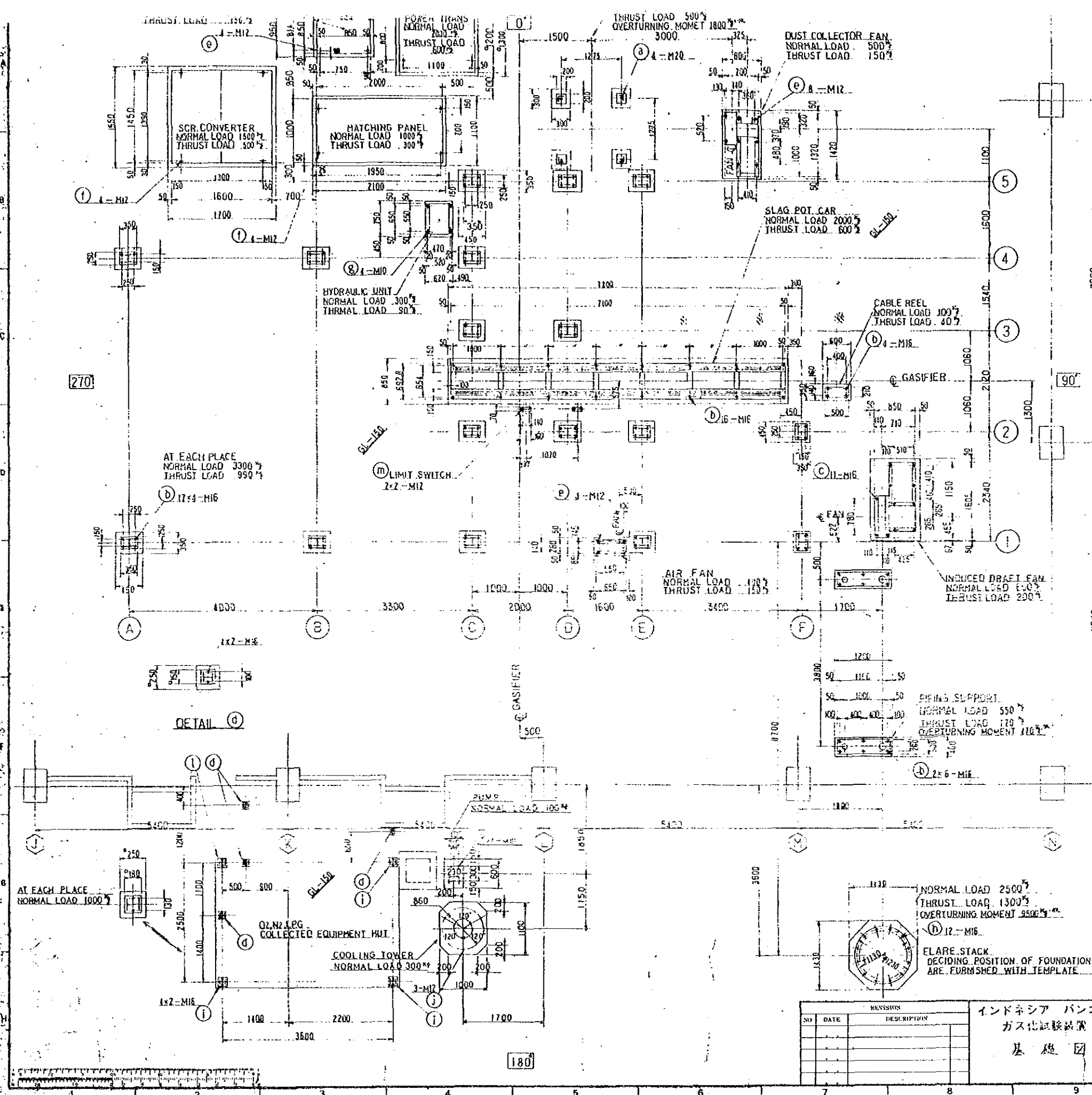
Utility	Diameter of pipe Z	Diameter of flange D (mm)	t (mm)	g (mm)	Hole for bolts			Note
					C (mm)	Number of Holes	Diameter of Hole h	
Compressed Air	25A (1B)	125	14	70	90	4	19	Flat face
Cooling Water	100A (4B)	210	18	155	175	8	19	Flat face



Utility	Union screw & Union flange				Union nut				Note
	l (mm)	b <sub>1</sub> (mm)	e (mm)	b <sub>2</sub> (mm)	B <sub>1</sub> (mm)	H (mm)	t (mm)	B (mm)	
Make up water for cooling tower of control room	9	21	3	21.5	27	17	3	42	



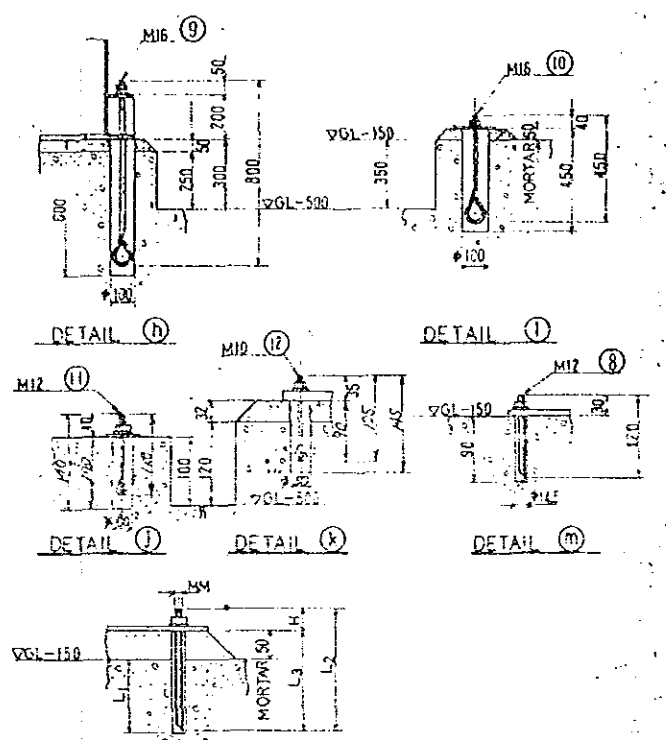




NO.	MARK	TYPE	SIZE	LOCATION
4	1	CHEMICAL ANCHOR	SS41 M20x230, W.N. JOIN (12)	
100	2		M16x220, W.N. JOIN (11)	
11	3		M16x220, S.W.N. JOIN (11)	
8	4		M16x150, W.N. JOIN (17)	
16	5		M12x180, S.W.N. JOIN (11)	
12	6		M12x180, W.N. JOIN (12)	
4	7		M10x180, W.N. JOIN (15)	
4	8	CHEMICAL ANCHOR	SS41 M12x120, W.N. JOIN (11)	
12	9	FOUNDATION BOLT	M16x800, W.N. JOIN (11)	
8	10	FOUNDATION BOLT	M16x450, W.N. JOIN (11)	
3	11	FOUNDATION BOLT	M12x120, W.N. JOIN (11)	
4	12	FOUNDATION BOLT	SS41 M10x125, W.N. JOIN (11)	

NOTE:  
 S.W. --- BEVELLED WASHER  
 W. --- PLAIN WASHER  
 N. --- HEXAGON NUT

1. TAPER LINER AND MORTAR AND CHEMICAL ANCHOR ARE FURNISHED BY CONSTRUCTOR.  
 2. HOLE IN ANCHOR FOR PIPE SUPPORT IS NOT DRAWN IN THIS DRAWING, AND FURTHER HOLE IN ANCHOR IS FURNISHED BY CONSTRUCTOR.



NO.	MARK	L <sub>1</sub>	φD	MM	H	L <sub>2</sub>	L <sub>3</sub>
①	①	130	12	M10	30	120	150
②	①	130	14.5	M12	30	120	150
③	②	130	14.5	M12	35	150	150
④	①	70	19	M16	30	150	120
⑤	②	130	19	M16	40	220	180
⑥	③	130	19	M16	40	220	180
⑦	①	130	23	M20	50	230	180

DETAIL ANCHOR

FIG. 4-4-1 (8)

REVISION NO. DATE DESCRIPTION		インドネシア バンコ炭 ガス化試験装置 基礎	DATE: 3.13.85 SCALE: 1/40 DRAWN BY: [Signature] CHECKED BY: [Signature]	MANAGER OF DIV. BANKO COAL GASIFICATION TEST PLANT ANCHOR PLAN.	SUMITOMO METAL INDUSTRIES LTD. PLANT ENGINEERING DEPT. OSAKA JAPAN
----------------------------------	--	------------------------------	--	--	---

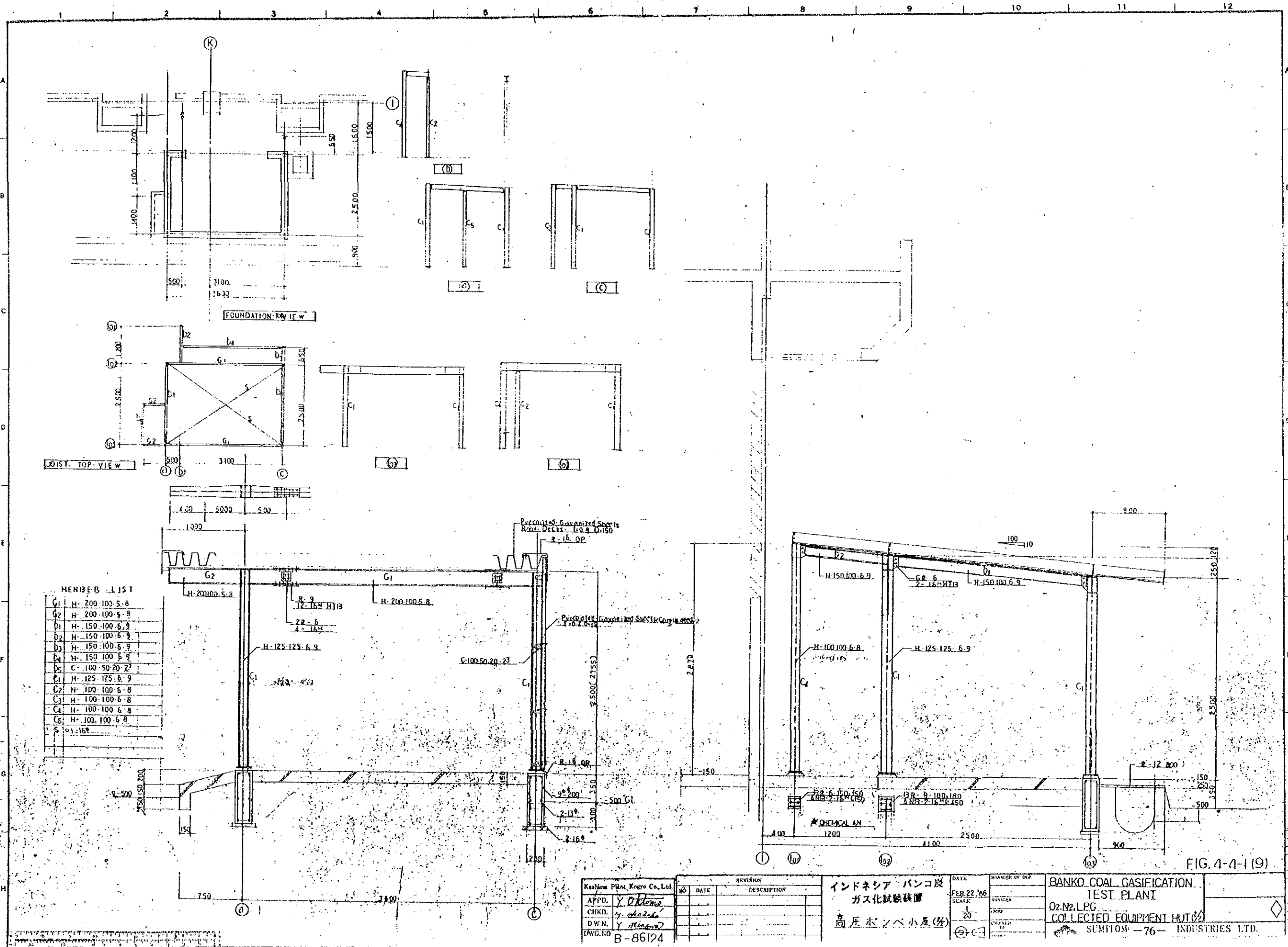


FIG. 4-4-1(9)

Kasei Engineering Co., Ltd. APPD. Y. D. Kono CHKD. Y. Choshi D.W.N. Y. Minawa DWG. NO. B-86124	REVISION NO. DATE DESCRIPTION		DATE FEB. 22, '66	MANAGER OF O.P. MANAGER CHECKED BY DESIGNED BY	BANKO COAL GASIFICATION TEST PLANT O <sub>2</sub> , N <sub>2</sub> , LPG COLLECTED EQUIPMENT HUT (2)	
	インドネシア パンコ炭 ガス化試験装置 高圧ボンベ小屋(2)		SCALE 1/20	SUMITOMO -76- INDUSTRIES LTD.		

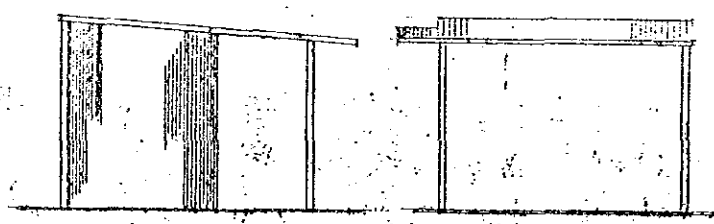
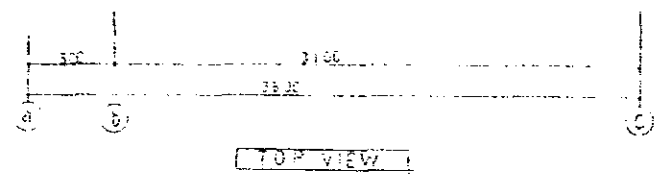
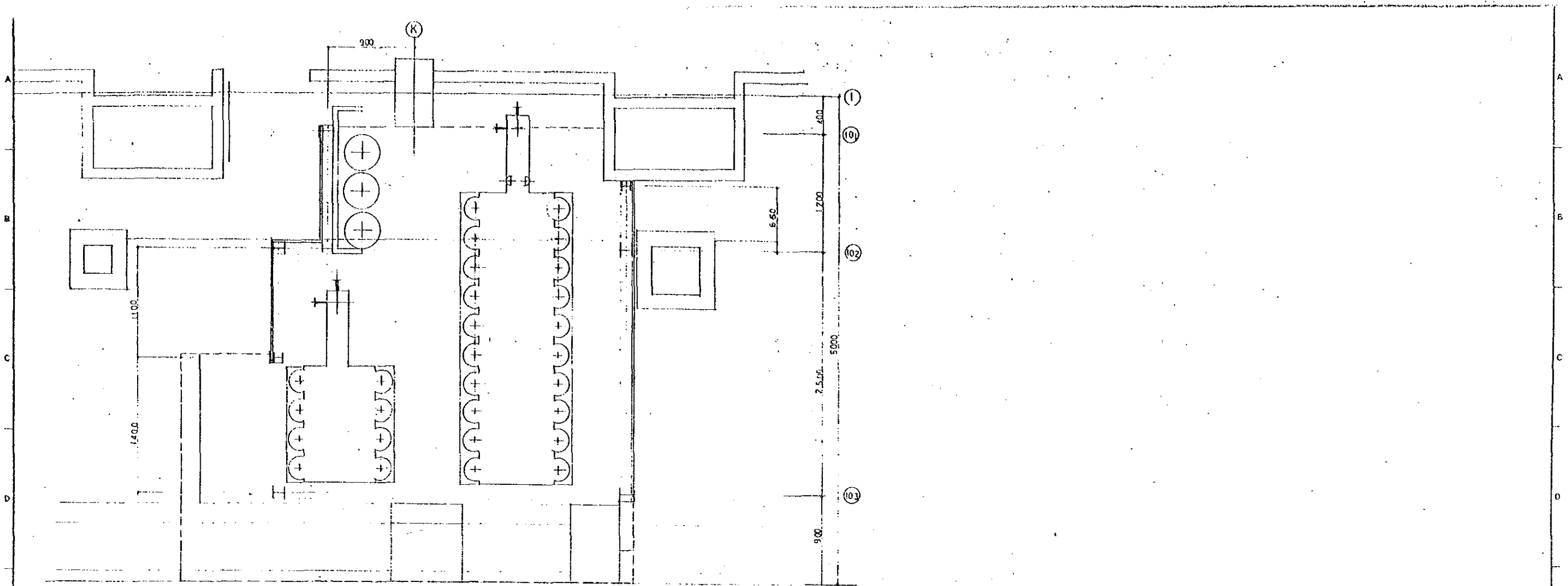


FIG.4-4-1(10)

Kashima Plant Kogyo Co., Ltd.	
APP'D.	<i>Y. Okawa</i>
CHK'D.	<i>M. Kobayashi</i>
DWN.	<i>Y. Minami</i>
DWG. NO.	B-86123

NO.	DATE	REVISION DESCRIPTION

インドネシア バンコ炭  
ガス化試験装置  
高圧ポンプ小屋(1/2)

DATE	FEB 22 '86
SCALE	1/20
MANAGER OF DEP.	
MANAGER	
CHK'D.	
DWG. NO.	

BANKO COAL GASIFICATION  
TEST PLANT  
O<sub>2</sub>, N<sub>2</sub>, LPG  
COLLECTED EQUIPMENT HUT(2)  
SUMITOMO METAL INDUSTRIES LTD.  
PLANT ENGINEERING DEPT. OSAKA JAPAN



Table. 4-4-1. (1)<sub>A</sub> List of materials & utilities supplied by counterpart

ITEMS	Q'TY	SPECIFICATION
1. Oxygen	8 cylinders /charge	<ul style="list-style-type: none"> <li>• purity 99% over</li> <li>• gas pres. 150 kg/cm<sup>2</sup>G at 35°C</li> <li>• actual inner vol. 46.7 lit.</li> <li>• available vol. 6.54 Nm<sup>3</sup></li> <li>• dimension refer Fig. 4-4-1 (1)</li> <li>• connecting tube refer Fig. 4-4-1 (4)</li> <li>• location of cylinders refer Fig. 4-4-1 (6)</li> </ul>
2. Nitrogen	20 cylinders /charge	<ul style="list-style-type: none"> <li>• purity 99% over</li> <li>• gas pres. 150 kg/cm<sup>2</sup>G at 35°C</li> <li>• actual inner vol. 46.7 lit.</li> <li>• available vol. 6.54 Nm<sup>3</sup></li> <li>• dimension refer Fig. 4-4-1 (2)</li> <li>• connecting tube refer Fig. 4-4-1 (4)</li> <li>• location of cylinders refer Fig. 4-4-1 (6)</li> </ul>
3. Liquefied petroleum gas	3 cylinders /charge	<ul style="list-style-type: none"> <li>• calorific value 24,000 Kcal/Nm<sup>3</sup> over</li> <li>• gas pres. = 6 kg/cm<sup>2</sup>G at 15°C</li> <li>• actual inner vol. 100 lit.</li> <li>• available vol. 26 Nm<sup>3</sup></li> <li>• dimension refer Fig. 4-4-1 (3)</li> <li>• connecting tube refer Fig. 4-4-1 (5)</li> <li>• location of cylinders refer Fig. 4-4-1 (6)</li> </ul>

Table. 4-4-1 (1)<sub>B</sub> List of materials & utilites supplied by counterpart

ITEM	Q'TY	SPECIFICATION
4. Compressed Air	67 Nm <sup>3</sup> /H	<ul style="list-style-type: none"> <li>• supply pres. min. 6 kg/cm<sup>2</sup>G</li> <li>• temp. ambient temp.</li> <li>• connecting method refer Fig. 4-4-1 (7)</li> <li>• connecting location refer Fig. 4-4-1 (6)</li> </ul>
5. Cooling water	39.9 TON/H	<ul style="list-style-type: none"> <li>• water analysis see Table. 4-2-1 (2)</li> <li>• supply pres. min. 10 kg/cm<sup>2</sup>G</li> <li>• supply temp. max. 32°C NOR. 25 - 27°C</li> <li>• return temp. 46 - 47°C (necessary capacity of cooling tower 150RT)</li> <li>• connecting method refer Fig. 4-4-1 (7)</li> <li>• connecting location refer Fig. 4-4-1 (6)</li> </ul>
6. Make up water for cooling tower of control room	0.2 TON/H	<ul style="list-style-type: none"> <li>• connecting method refer Fig. 4-4-1 (7) (Japan side = female screw) PT 1/2</li> <li>• connecting location refer Fig. 4-4-1 (6)</li> </ul>

Table. 4-4-1. (1)<sub>C</sub> List of materials & utilities supplied by counterpart

ITEMS	Q'TY	SPECIFICATION
7. Coal		See Table. 4-2-1.(1)
Trial run	2 ton	
Test	8 ton	
8. Calcined Lime		See Table. 4-2-1.(1)
Trial run	150 kg	
Test	980 kg	
9. Silica sand		$\text{SiO}_2$ 90% over -5mm
Trial run	120 kg	
Test	780 kg	
10. Scrap iron		See Table. 4-2-1.(1)
Trial run	2 ton	
Test	10 ton	

Table. 4-4-1. (1)<sub>D</sub> List of Utilities Supplied by counterpart

During the gasification test we need following cylinders

1. Oxygen	Trial run	80 cylinders
	Test	520 cylinders
2. Nitrogen	Trial run	370 cylinders
	Test	1300 cylinders
3. Liquefied petroleum gas	Trial run	55 cylinders
	Test	280 cylinders



Table 4-4-1 (2) Oil list

No.	Items	necessary volume	recommendation	properties	Note
1	Water-Glycol	540 lit.	NEW HILAND FRG46	see oil list 2	Hydraulic working oil
2	Heatproof Grease	20 kg	PILONOC GREASE2	see oil list 2	Butter state
3	Extreme-pressure grease	5 kg	EVNOC GREASE AP2	see catalogue	Butter state Soap type Li
4	Extreme-pressure gear oil	30 lit.	NONOC SP	see catalogue	Non-lead type
5	Multi-purpose industrial Grease	30 lit.	MULTINOC GREASE2	see catalogue	Butter state
6	Lubrication oil	3 lit.	SPINOC S	see oil list 2	
7	Turbine oil	30 lit.	POK TURRINE	see catalogue	

Table. 4-4-1. (3)

Oil list 2  
(specification of oil)

1. NEW HILAND FRG46		
(1) ISO VG cSt		46
(2) Gravity (ton/m <sup>3</sup> )		1.05
(3) Pour point (°C)		-35
(4) PH		9
(5) Preparatory alkalinity (0.1N Hcl ml/10g)		16
(6) Moisture (%)		40
2. PILONOC GREASE2		
(1) cSt (at 100°C)		10.3
(2) Mixture (at 25°C, 60W)		288
(3) Pour point (°C)		250over
(4) Amount of evaporation (% at 99°C, 22hr)		0.46
(5) Oxidation stability test (kg/cm <sup>2</sup> at 99°C, 100hr)		0.15
(6) Separation Index (% at 100°C, 24hr)		1.2
(7) Waterproof (% at 79°C, 1hr)		1.8
(8) Ash (%)		0.022
3. SPINOC S		
(1) ISO VG cSt		10
cSt (at 100°C)		2.6
(2) Viscosity Index		104
(3) Ignition point (°C)		164
(4) Dropping point (°C)		-25
(5) Rust prevention test (distilled water, 24hr)		No rust
(6) Corrosion test, Cu-strip (at 199°C, 3hr)		1
(7) Color ASTM		L0.5



# EPNOC GREASE AP

(EXTREME PRESSURE MULTI-PURPOSE INDUSTRIAL GREASE)

## DESCRIPTION

Epnoc Grease AP is an extreme pressure multi-purpose industrial grease designed for applications where heavy loads, shock loads, or water contamination are present. It is a lithium soap grease incorporating extreme pressure additives and a well refined, high V. I. oil.

## APPLICATION

Epnoc Grease AP is recommended for industrial grease applications where heavy or shock loads require the use of extreme pressure greases with good retention characteristics. In these applications it will resist squeeze-out and will provide good anti-wear protection for heavily loaded bearing surfaces.

It is also applicable where there is water contamination in that it will resist the washing and leaching action of the water.

Typical applications of Epnoc Grease AP include plain and rolling element bearings in steel mills and other metal working applications, wet end bearings on paper machines, and bearings of heavy mining and construction machinery. It can be used in any type of bearings where EP multi-purpose greases are desired.

## CHARACTERISTICS

### 1. Resists High Temperatures

Epnoc Grease AP is made from high melting soaps combined with selected oils to give product with good high temperature stability.

### 2. Resists Water Action

The combination of high quality soaps used in Epnoc Grease AP provides excellent resistance to water washing and leaching. The grease absorbs

water without softening, so it will prevent moisture from reaching and damaging bearing surfaces.

### 3. Good Extreme Pressure Characteristics

Epnoc Grease AP has good extreme pressure characteristics and provides adequate protection for bearings operating under excessively heavy loads or shock loads, or both.

### 4. Good Mechanical Stability

Epnoc Grease AP has excellent resistance to mechanical shear so it will not soften and leak from the bearings under severe operating conditions.

### 5. Oxidation And Rust Resistance

The combination of high quality oil and special soaps with effective oxidation and rust inhibitors gives Epnoc Grease AP excellent oxidation and rust resistance.

### 6. Good Pumpability

Epnoc Grease AP dispenses readily through hand and power guns at low temperatures. It can also be dispensed satisfactorily through centralized lubrication systems at normal ambient temperatures.

### 7. Minimizes Environmental Pollution

The "AP" in the Product name stands for "Anti-pollution". Epnoc Grease AP is free from lead and minimizes environmental pollution from used grease and from grease washed into drainage systems.

## TYPICAL TESTS

		↓		
		0	1	2
Penetration Worked	@ 25°C	359	315	282
Dropping Point	°C	186	194	200
Soap Type		Li	Li	Li
Corrosion Test Cu-Strip	@ 70°C, 50h	Pass	Pass	Pass



# BONNOC SP

## Industrial Enclosed Gear Lubricants

BONNOC SP are formulated from selected high VI base oils combined with a sulfur-phosphorus extreme pressure additive to provide good wear protection, excellent adhesion, and good cushioning of shock loads.

Enclosed gears used in steel mills and other mills under severe conditions are most efficiently lubricated by an extreme pressure type lubricant that will retain its stability in service and not thicken over a long period of time. BONNOC SP meet these requirements.

BONNOC SP is superior to lead type BONNOC in oxidation and thermal stability, and in ability to separate readily from water.

### CHARACTERISTICS

#### 1. High Load Carrying Capacity

BONNOC SP provide a tough film that withstands "shock loads" and heavy duty steady loads far in excess of manufactures' requirements for gear and bearings and reduce wear by addition of excellent extreme pressure additive.

#### 2. Non-Corrosive to Metals

BONNOC SP are non-corrosive at gear case operating temperatures to all the usual metals that are used in gears or bearings such as steel, copper, bronze, babbitt or cadmium nickel.

#### 3. Low Viscosity Change with temperature

BONNOC SP have high viscosity index which means that the change in viscosity caused by change in temperature is relatively low. When equipment is cold, greater ease of starting, lower torque and dependable circulation are assured.

#### 4. Oxidation stability

BONNOC SP are designed to resist the normal thickening induced by high temperature operation.

#### 5. Water Separation

BONNOC SP have good water separation properties. And they can easily separate water in gear cases.

#### 6. Resistance to Foaming

By addition of anti foaming agent BONNOC SP have excellent foam resisting properties.

### APPLICATION

BONNOC SP are recommended for lubrication of all kinds of enclosed gears in various industrial machines, such as:

Steel mill, Construction machinery, Mining machinery, Forging machinery, Machine tool, Chemical machinery, Rubber forming machinery, Material handling machinery.

### TYPICAL TEST DATA

Product Designed Grade		68	100	150	220	260	320	460	560	680	1800	3800
Viscosity	cSt @ 40°C	61	102	154	228	254	346	456	566	694	1,756	3,620
	cSt @ 100°C	8.4	11.3	14.7	19.4	20.7	25.4	30.4	35.0	39.8	70.2	99.5
Viscosity Index		103	97	95	95	96	96	96	96	96	96	87
Flash Point	°C	206	216	226	230	234	238	238	242	242	286	270
Pour Point	°C	-25	-25	-20	-12.5	-12.5	-12.5	-12.5	-12.5	-12.5	0	+2.5
Corrosion Test	@100°C, 3h	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Copper strip		Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Timken OK.	1h	40	45	45	50	55	55	55	55	60	50	50
AGMA Grade		2 EP	3 EP	4 EP	—	5 EP	6 EP	7 EP	8 EP	8 EP	—	—



# MULTINOC GREASE

## (MULTI-PURPOSE INDUSTRIAL GREASES)

### PRODUCT DESCRIPTION

MULTINOC GREASES are high quality multi-purpose industrial grease suitable for a wide variety of applications.

It is formulated with a lithium soap and a selected oil having a viscosity of about 360 SSU @ 100°F. An oxidation inhibitor and rust preventive additive are included to provide improved service and storage life.

MULTINOC GREASES have a high melting point, excellent shear resistance, good water resistance and satisfactory low temperature properties. It is suitable for bearing lubrication operating temperatures ranging from about -22°F(-30°C) to 257°F(125°C).

#### APPLICATION

MULTINOC GREASES are recommended for general industrial usage where a single, high quality grease is required for several different applications. It can be used for the lubrication of both plain and rolling element bearings, as well as grease lubricated gears and sliding elements.

It is outstanding for the lubrication of electric motor bearings.

#### CHARACTERISTICS

##### 1. GOOD MECHANICAL STABILITY

MULTINOC GREASES soften less than 50 points after 100,000 strokes in the ASTM grease worker. This indicates that the grease has excellent resistance to mechanical shear so it will not soften and leak from the bearings under severe operating conditions.

##### 2. RESISTS WATER AND WATER WASHING

MULTINOC GREASES will absorb approximately an equal amount of water without softening excessively or losing its grease-like consistency.

In service the grease will remain in bearings and provide effective lubrication in moist atmospheres or where water is present.

##### 3. OXIDATION AND RUST RESISTANT

The combination of high quality oil and special soaps with effective oxidation and rust inhibitors gives MULTINOC GREASE excellent oxidation and rust resistance.

##### 4. GOOD FOR LOW-HIGH TEMPERATURES

MULTINOC GREASES can be used at operating temperatures ranging from about -22°F(-30°C) to 257°F(125°C), and will perform satisfactorily in bearings which may occasionally reach temperature as high as 300°F(149°C) for short periods of time. At these higher operating temperatures relubrication should be more frequent.

##### 5. LONG STORAGE LIFE

MULTINOC GREASES do not harden and cake, or soften and bleed oil excessively during extended periods of storage.

#### TYPICAL TEST DATA

		↓	
		1	2
Penetration Worked	@25°C	318	278
Dropping Point.	°C	204	208
Soap Type		Lithium	Lithium
Corrosion Test, Cu-Strip	@100°C, 24h	Pass	Pass
Oxidation Stability Test		0.20	0.20
	kg/cm <sup>2</sup> @ 98.9°C, 100h. press. drop		



# FBK TURBINE

## (TURBINE & HYDRAULIC OILS)

### PRODUCT DESCRIPTION

FBK TURBINE series are high quality inhibited turbine oils. These oils were first developed in 1951 and since then the quality of the oils has been improved together with the development of turbine generators. Presently FBK TURBINE series are being employed in more than 600 units of turbines. Particularly as examples to show their reliability and high quality, FBK TURBINE 32 has been employed in 600 MW Super Critical GE Turbine Generator of No. 1 unit of the Anegasaki Thermal Power Plant of Tokyo Electric Power Co. which was put into operation in September 1967, and FBK TURBINE 83 in IHI Reduction Geared Marine Turbine of 40,000 PS installed in T/V Nisseki-Marun, 372,698 DWT Tanker, owners Tokyo Tanker Co., Ltd.

FBK TURBINE series are premium grade rust and oxidation inhibited oils, designed for use in those applications requiring a high quality inhibited oil. They provide outstanding performance in steam and hydraulic turbines, hydraulic systems, air compressors, circulating systems and a wide variety of industrial applications.

Their superior quality has earned the approval of leading manufacturers of turbines, hydraulic equipment, and machine tools.

FBK TURBINE series are formulated to give protection against foaming, corrosion or rusting, and gumming or sludging of the oil. Some of their more important characteristics are as follows.

#### CHARACTERISTICS

##### 1. Highly resistant to Oxidation

These oils contain extremely effective inhibitors which make them highly resistant to oxidation. Experience with FBK TURBINE series has shown that intervals between drain periods may be extended. In addition, the possibility of gum or sludge formation during the service life of these oils is minimized.

For modern steam turbines operated at high temperature and high pressure, a long life turbine oil which withstands severe operating conditions is required. FBK TURBINE series have excellent oxidation stability and are in good condition after use more than 100,000 hours.

##### 2. Protect against Rust

FBK TURBINE series prevent rusting even under severe service conditions. This series of oils contains a rust inhibitor which "plates out"

on metal surfaces in the presence of water under dynamic conditions, forming a tenacious film that is impervious to moisture. As even small particles of rust can cause considerable damage to precision made parts, rust prevention properties of FBK TURBINE series are of prime importance.

##### 3. Resistant to Foaming

These oils are so processed that they are highly resistant to foaming.

##### 4. Separate quickly from Water

These oils have excellent demulsibility.

#### RECOMMENDED USES

Typical application where FBK TURBINE series are recommended include; direct connected and geared steam turbines, hydraulic turbines, gas turbines, generators, electric motors, air compressors, machine tools, speed reducers, hydraulic systems and circulating systems.

TYPICAL TEST RESULTS ON FBK TURBINE

GRADE	32	46	56	68	83	100	
Viscosity, cSt	@ 40°C	31.5	44.1	53.8	70.1	78.3	100.5
	@ 50°C	21.3	28.9	34.4	45.0	49.2	
	@ 100°C	5.4	6.7	7.6	9.1	9.7	11.4
Viscosity Index		104	106	104	103	102	99
Flash Point, COC	°C	210	224	230	238	242	250
Pour Point, °C		-12.5	-12.5	-12.5	-12.5	-12.5	-12.5
Neutralization Value, mg KOH/g		0.14	0.14	0.12	0.10	0.10	0.13
Corrosion, Copper Strip @ 100°C, 3h		1 a	1 a	1 a	1 a	1 a	1 a
Rust Prevention Test in Synthetic Salt Water		Pass	Pass	Pass	Pass	Pass	Pass
Oxidation Test, Hours		1500 <sup>+</sup>	1500 <sup>+</sup>	1500 <sup>+</sup>	1500 <sup>+</sup>	1500 <sup>+</sup>	1500 <sup>+</sup>
SAE Grade (Motor Oil)		(10W)	20	20	20	30	30

Table.4-4-1 (5) List of Utilities & Facilities supplied  
by Counterpart for Construction

1. Utilities

- (1) Electric Power
- (2) Industrial Water
- (3) Drinking Water
- (4) Compressed Air
- (5) Oils

2. Facilities

- (1) Overhead Crane
- (2) Lighting Apparatus
- (3) Lavatory
- (4) Water Service



Table.4-4-1 (6) List of Foundation Work

	No.	Items	Charge		Note
			Japan	Indonesia	
Indoor Foundation	1	Making holes for chemical anchor	○		We think 15 cm thickness of precast concrete is already worked in the building.
	2	Mortar work	○		
	3	Setting of base plate and chemical anchor	○		
Outdoor Foundation	4	Ground concrete work		○	
	5	Making anchor holes for anchor bolts		○	
	6	Mortar work	○		
	7	Setting of base plate and anchor bolts	○		

Table.4-4-1 (7) List of Holes for Pipes  
through the Wall of the Building

- (1) Exhaust gas duct        300A (environmental gas)
- (2) Exhaust gas duct        80A (CGS gas)
- (3) Exhaust gas duct        20A X3 (O2,N2,LPG)  
    - for safety valve exhaust gas -
- (4) Entrance of utilities    25A X2 (N2,LPG)  
                              20A     (O2)

Table.4-4-2.(1) List of Equipments, Tools and Consumables for Chemical Analysis supplied by Counterpart

ITEMS	Q'TY	SPECIFICATION
1. Equipment & Tools		
1-1 Refrigerator	1	Standard specification
1-2 Vacuum cleaner	1	Standard specification
1-3 Gas pressure regulator	1	Type:Two-stage type pressure:Max. 3 kg/cm <sup>2</sup>
1-4 Hot plat	1	Capacity:1000 kw
1-5 Insulated pot	1	Standard specification
1-6 Kettle	1	Capacity:2 l
1-7 Gas cylinder support	1	with 1 m-chain and 2 hooks
2. General Consumables (1)		
2-1 Spoon		Stainless steel
	5	15 cm (Micro)
	5	15 cm
	5	18 cm
	3	24 cm
	2	Scoop (large)
2-2 Beaker		Polyethylene
	10	100 ml
	5	200 ml
	5	500 ml
2-3 Pan		Aluminum
	4	290 x 200 x 65
	4	320 x 230 x 65
	4	355 x 255 x 65
2-4 Sample plate	1	Aluminum 90 mm
2-5 Wasted cloth	1	7 kg
2-6 Sample bag		Polyethylene
	100	100 x 200
	100	200 x 300
	100	270 x 400
2-7 Soaps	60	Solid
	15	Liquid

Table.4-4-2.(2) List of Equipments, Tools and Consumables for Chemical Analysis supplied by Counterpart

ITEMS	Q'TY	SPECIFICATION
2-8 Brush	8	Type-2 (No.2)
	4	Type-4 (No.4) 2-9 Washer
	8	for Test tube
	6	1000 ml
2-10 Silica Gel	1	12.5 kg
2-11 desiccater	1	240 mm inside diameter
3. Standard Gas & Utility Gas		
3-1 Oxygen for combustion gas		Proximate analysis of coal Purity:greater than 99.5 % Pressure:2.8 kg/cm2 Consumption:9 l/min. Gas bomb:7 m3
3-2 Nitrogen for operation gas		Proximate analysis of coal Purity:greater than 99.5 % Pressure:2.8 kg/cm2 Consumption:9 l/min. Gas bomb:7 m3
3-3 Oxygen for combustion gas		Ultimate analysis of coal Purity:greater than 99.99 % Pressure:2.8 kg/cm2 Consumption:7 l/l analysis Gas bomb:7 m3
3-4 Helium for operation gas		Ultimate analysis of coal Purity:greater than 99.99 % Pressure:2.8 kg/cm2 Consumption:250 cc/l analysis Gas bomb:7 m3
3-5 Nitrogen for operation gas		Ultimate analysis of coal Purity:greater than 99.50 % Pressure:2.8 kg/cm2 Consumption:a little Gas bomb:7 m3
3-6 CO2 for dosing gas		Ultimate analysis of coal Purity:greater than 99.50 % Pressure:2.8 kg/cm2 Consumption:6 l/l analysis Gas bomb:30 kg
3-6 PR for operation gas		Slag analysis Content:oxygen 90.0 % + metan 10.0 %

Table.4-4-2.(3) List of Equipments, Tools and Consumables for  
Chemical Analysis supplied by Counterpart

ITEMS	Q'TY	SPECIFICATION
3-7 Oxygen for combustion gas		Pig iron analysis Purity:greater than 99.5 % Pressure:2.6 kg/cm2 Consumption:4 l/l analysis Gas bomb:7 m3
3-8 Nitrogen for operation gas		Pig iron analysis Purity:greater than 99.5 % Pressure:2.6 kg/cm2 Consumption:4 l/l analysis Gas bomb:7 m3
3-9 Standard gas		Gas analysis (CO,CO2,H2,O2) Content:CO2 5.0 % + N2 95.0 %
3-10 Span gas		O2 analysis Content:O2 2.0 % + CO2 5.0 % + N2 95.0 %
3-11 Span gas		H2 analysis Content:H2 49.0 % + CO2 5.0 % + N2 46.0 %
3-12 Span gas		CO analysis Content:CO 99.0 % + N2 1.0 %
3-12 Span gas		CO2 analysis Content:CO2 5.0 % + N2 95.0 %
3-13 Helium for carrier gas		Gas analysis (H2S, COS, N2) Purity:greater than 99.99 %
3-14 Standard gas		Gas analysis (H2S, COS, N2) Content:H2S 0.02 % + N2 99.98 % COS 0.02 % + N2 99.98 %

Table.4-4-3 List of Office Furniture supplied by Counterpart

ITEMS	Q'TY
1. Desk & chair	5 sets
2. Meeting table	4 pieces
3. Meeting chair	16 pieces
4. White board with white board pen & eraser	1 set
5. First-aid medicine & box	1 set
6. Stretcher	1 set
7. Helmet rack	1 set
8. Wear cabinet	10 sets
9. Book shelf	2 sets
10. Waste basket	10 pieces
11. Xerox (rental)	1 set
12. Paper for Xerox	1 set
13. Vacuum cleaner	1 set
14. Broom	3 pieces
15. Hot water supplier (electric heater)	1 set
16. Hot water supplier (vacuum bottle)	1 piece
17. Coffee cup & spoon	15 sets
18. Kitchen cabinet (small)	1 set
19. Sink (small)	1 set
20. Electric refrigerator	1 set
21. Telephone	1 set

\* The specification of office furniture are appended the report presented on December in 1985.

Table.4-4-4.(1) List of Working Tools & Expendables for Gasification Test supplied by Counterpart

ITEMS	Q'TY
1. Working tool	
1-1 Scoop	3 pieces
1-2 Light with cable	4 pieces
1-3 Electric cord with reel	2 sets
1-4 Portable light with dry battery	5 sets
1-5 Trestle	1 set
1-6 Electric solding tool with solder	1 set
1-7 Tool box	2 set
1-8 Tool cabinet	1 set
1-9 Brick cutter	1 set
1-10 Chain block	1 set
1-11 Grease gun	2 set
1-12 Bomb carrier for gas cylinder	1 set
1-13 Hand track	1 set
1-14 Oil hydraulic jack (oil pump)	1 pieces
1-15 Oil hydraulic jack (jack)	1 pieces
1-16 Scale	1 set
1-17 Air hammer	1 set
1-18 Ladder	1 set
1-19 Case for granulated carbon	4 pieces
1-20 Case for silica sand	4 pieces
1-21 Case for calcined lime	4 pieces
1-22 Bucket	2 pieces
1-23 Sample sorting case	6 pieces
1-24 Cabinet for sample sorting case	1 set
1-25 General tools (pipe wrench)	2 sets
1-26 General tools (hammer)	2 sets
1-27 General tools (screw driver)	2 sets
1-28 General tools (insulated driver)	2 sets
1-29 General tools (socket wrench)	2 sets
1-30 General tools (socket wrench for air hammer)	2 sets
1-31 General tools (insulated pincers)	2 sets
1-32 General tools (double-ended wrench)	2 sets
1-33 General tools (round file, pillar file)	2 sets
1-34 General tools (double-ended spanner)	2 sets
1-35 General tools (nipper)	2 sets
1-36 General tools (plier)	2 sets
1-37 General tools (compasses)	2 sets
1-38 General tools (race knife)	2 sets

Table.4-4-4.(2) List of Working Tools & Expendables for Gasification Test supplied by Counterpart

ITEMS	Q'TY
2. Working expendables	
2-1 Grease oil	18 l
2-2 Machine oil	36 l
2-3 Cylinder oil	36 l
2-4 Motor oil	36 l
2-5 Insulating oil	36 l
2-6 Lubricating oil	36 l
2-7 Waste cloth	100 g
2-8 Compressed air hose	50 m
2-9 Water hose	50 m
2-10 Hose coupling	10 pieces
2-11 Hose clip	20 pieces
2-12 Two colored rope	100 m
2-13 Plastic sheet	
2-14 Insulating tape	20 pieces
2-15 Silica sand	150 g
2-16 Molding sand	54 tons
2-17 Sealing tape	10 pieces

\* The specification of working tools, etc. are appended the report presented on December in 1985.



Table.4-4-5.(1) List of Maintenance Tools & Materials Supplied by Counterpart

ITEMS	Q'TY
1. Maintenance materials	
1-1 Steel plate	1 set
1-2 Steel pipe	1 set
1-3 Angle steel	1 set
1-4 Band steel	1 set
1-5 Channel steel	1 set
1-6 Valve (globe valve)	1 set
1-7 Valve (sluice valve)	1 set
1-8 Valve (check valve)	1 set
1-9 Valve (needle valve)	1 set
1-10 Flange	1 set
1-11 Bolt, nut & washer (hexagon)	1 set
1-12 Bolt, nut & washer (U- type)	1 set
1-13 Reducer	1 set
1-14 Packing	1 set
1-15 Plug, tie & cap	1 set
1-16 Elbow	1 set
1-17 Cloth tape	1 set
1-18 Steel tape	1 set
1-19 Asbestos cloth	1 set
1-20 Asbestos plate	1 set
1-21 Asbestos yarn	1 set
2. Maintenance tools	
2-1 Grinder	1 set
2-2 Grind stone	1 set
2-3 Polishing machine	1 set
2-4 Pipe bender	1 set
2-5 Pipe cutter	1 set
2-6 Pipe threading machine	1 set
2-7 Scaling hammer	1 set
2-8 Oxy-acetylene cutter	1 set
2-9 Oxy-acetylene torch	1 set
2-10 Oxygen gas	1 set
2-11 Acetylene gas	1 set
2-12 Reducing valve	1 set
2-13 Bomb hose	1 set
2-14 Bomb packing	1 set
2-15 Electrode Arc weld	1 set
2-16 Electrode holder	1 set
2-17 Electric hand drill	1 set
2-18 Monky wrench	1 set
2-19 Pipe wrench	1 set
2-20 Maule hammer	1 set
2-21 Chipping hammer	1 set
2-22 Pincers	1 set
2-23 Anvil block	1 set
2-24 Box hammer	1 set
2-25 Calipers	1 set

Table.4-4-5.(2) List of Maintenance Tools & Materials  
Supplied by Counterpart

ITEMS	Q'TY
2-26 Punch	1 set
2-27 Clearance gauge	1 set
2-28 Dial gauge	1 set
2-29 Dividers	1 set
2-30 Flat gauge	1 set
2-31 Plate gauge	1 set
2-32 Ruler	1 set
2-33 Vice	1 set
2-34 Key drift	1 set
2-35 Rubber cap	1 set
2-36 Coupling	1 set
2-37 Hose clamp	1 set
2-38 Wire clip	1 set
2-39 Bend	1 set
2-40 Bib	1 set
2-41 Blank flange	1 set
2-42 Chock plug	1 set
2-43 Chock union	1 set
2-44 Nail	1 set
2-45 Table tap	1 set
2-46 Bayonet socket	1 set
2-47 Electric cable	1 set
2-48 Turnbuckle	1 set
2-49 Plusthread	1 set
2-50 Screw cap	1 set

\* The specification of maintenance tools, etc. are appended  
the report presented on December in 1985.

Table.4-4-6 Power source Capacity in Analysis Room  
supplied by Counterpart

ITEM	CAPACITY (AC)	VOLTAGE	PHASE
1. Coal analyzer (Ash)	4.5 kw	220 V	3
2. Coal analyzer (C,H2,N2)	1.8 kw	220 V	3
3. Coal analyzer (S)	3.5 kw	230 V	1
4. Slag analyzer	30 A 30 A	100 V 200 V	1 1
5. Iron analyzer	3.0 KVA	220 V	
6. Pulverizer	0.4 kw	200 V	1
7. Automatic motor	0.4 kw	200 V	1
8. Sieve shaker	0.4 kw	200 V	1
9. Drying oven	1.2 KVA	200 V	1
10.Press	2.0 kw	220 V	3
11.Crusher	1.0 kw	200 V	3
12.Jaw crasher	0.75 kw	200 V	3

\* Slag analyzer needs ground resistance under 10 ohm and  
50 liters of distilled water.

## 5. SURVEY ON COAL QUALITY

### PART SUMMARY

1. The objectives of the survey on coal quality in FY 1985 are as follows:
  - 1) To find out the outcrop lines in North West Banko and West Banko
  - 2) To grasp coal quality in above areas
  - 3) To study coal sampling method and places for 200 kg/sample to be tested in coal gasification test facilities
  
2. For above objectives, the following studies were successfully carried out in NW Banko and West Banko (partially).
  - reconnaissance
  - topographic survey
  - shallow holes drilling
  - deep hole drilling
  
3. 28 of deep boring data in NW Banko and West Banko (partilly) were provided by the Counterpart, including coal analysis data. Also additional data and information such as topographic maps, geological maps and outcrop/sub-outcrop maps were provided by the Counterpart.
  
4. All of the data and information, including these of FY 1984, were analyzed and integrated as follows:
  - 1) The outcrop lines and coal seam structure in depth 250 m were clarified in NW Banko and West Banko (partially): see page 5-30
  
  - 2) Sodium content in ash (consequently in coal) is
    - i) increased in proportion to vertical depth from the surface: see page 5-50
    - ii) increased in inverse proportion to total ash in coal, resulting maximum sodium content in coal is 6,000 ppm (0.6% in coal): see page 5-49
    - iii) however sodium content in ash is in the range of 0-40%.

- 3) Bulk coal sampling method using large diameter core drilling machine is most economical and reliable. 10 samples of 200 kg/sample of coal samples will be taken from NW Banko in FY 1986, according to the following sampling plan.

Boring machines	:	1 unit (core diameter 101 mm $\phi$ )
max depth of boreholes	:	20.0 m
total drilling length	:	359 m
sampling places	:	10 places
total weight of samples	:	2 tons (200 kg x 10 samples)
working system	:	three shifts/day
working period	:	3 months

5. As far as NW Banko, all geological data which are needed to review the result of the preliminary mining cost estimation are obtained by the study in FY 1985. Therefore it is recommended to study the mining cost of NW Banko coal in FY 1986.
6. It is recommended that the coal sampling study in FY 1986 will be carried out in accordance with the following plan.
- i) Coal sampling work at NW Banko (200 kg/sample, 10 samples)
  - ii) Reconnaissance and topographic survey in West Banko (partially), North Suban Jeriji, and others.