



GEC ALSTHOM POWER PLANTS ENGINEERING		DATA SHEET CONDENSER		N° B01 DS 001		SHEET 2/2 REVISION : C	
1							
2	CONSTRUCTION			Neck			
3	Construction standard			- number of sections		1	
4	DIMENSIONAL AND CONSTRUCTION CHARACTERISTICS			- thickness		mm	20
5	Exchange surface	m ²	17314	- type of turbine connection		welded	
6	- tube total number		25070	- condenser flexible supporting block		YES (Springs)	
7	normal tube number		23000	- turbine/condenser expansion joint		NO	
8	- outside diameter/thickness	mm	18/0.5	Turbine by-pass			
9	- pitch	mm	24	- type		GEC A. Delas	
10	- effective length	m	12213	- arrangement		horizontal	
11	- total length	m	12263	- thickness		mm	
12	- tubes of air cooler			MATERIALS			
13	- number		820	Normal tubes		Titanium	
14	- outside diameter/thickness	mm	18/0.5	Impact tubes		Titanium	
15	- impact tubes			Air cooler tubes		Titanium	
16	- number of rows		1	Front tube sheets		Titanium	
17	- number of tubes		1250	Intermediate tube sheets		Carbon steel	
18	- outside diameter/thickness	mm	18/0.7	Body			
19	- assembly method			Neck			
20	- inlet end		expanded	Water boxes			
21	- outlet end		expanded	Hotwell			
22	Water boxes			Spacers			
23	- number (inlet + outlet)		4	PROTECTION			
24	- bolted or welded		bolted	Internal		Sodox or equiv.	
25	- divided or non-divided		non divided	External		Primer	
26	- internal coating		Neoprene (3mm thick)	WEIGHTS AND DIMENSIONS			
27	- design pressure	bar gage	3+FV			kg	
28	- test pressure according to	bar gage	4.5	WEIGHTS			
29	- number of pipes (inlet + outlet)		4	Tubes		40000	
30	- inlet pipes diameter	mm	1800	Tube sheets		5000	
31	- outlet pipes diameter	mm	1800	Water boxes		25700	
32	Shell			Shell			
33	- number		1	Neck(s)		42500	
34	- thickness	mm	16	Turbine by-pass		12000	
35	- number of sections		-	Total weight			
36	- tube expansion device		NA	- empty		250000	
37	Hotwell			- in operating order		410000	
38	- type		integrated	- filled with water		850000	
39	- number		1	DIMENSIONS			
40	- primary well capacity	m ³	56	Distance from hotwell bottom to turbine connection	m	7940	
41	- secondary well capacity	m ³	NA	Height of neck	m	3.810	
42	- water channel - Section	mm	NA	Overall width	m	9.000	
43	- thickness	mm	16/22	Overall length	m	17.200	
44	- depth of well	mm	1100	Height of water boxes	m	3.175	
45	Tube sheets			Dimension of tube sheets	m x m	2.94x3.57	
46	- type		simple	Volume under vacuum	m ³	550	
47	- number (inlet and outlet)		4	DRAWINGS			
48	- height/width	mm	2940/3570	Floor layout and loads	: LAV04MCEXB01CG001		
49	- thickness	mm	25	Overall dimensions	: LAV04MCEXB01MD001		
50	Tube support plates			Part list	: LAV01MCEXB01MD002		
51	- number per bundle		** 20				
52	- pitch	mm	520/636				
53	- thickness	mm	20				
54							
55							
56							
57							
58	REMARKS			FV = Full Vacuum			
59							
60	** with 65 % load maxi in operation with one tube bundle						
61							

GEC ALSTHOM		DATA SHEET		N°B01 DS 001		DATE : 18.3.98		
POWER PLANTS ENGINEERING		CONDENSER		SHEET 1/2		AUTHOR TH		
		PROJECT: LAVRION ~ 550 MW COMINED CYCLE BLOCK		REVISION : C		CHECKED BY		
				MANUFACTURER		APPROVED		
				GEC ALSTHOM Deltas		Mfr's REFERENCE		
				METKA		OG 39953		
1	CLIENT	PPC						FUNCTIONAL CODE
2	QUANTITY	1						
3	INSTALLATION	Indoor						
4			MANUFACTURER					
5			GEC ALSTHOM Deltas					
6			METKA					
7	OPERATING CHARACTERISTICS							
8	Condenser load:							
9	- main turbine exhaust steam flow		t/h	650				
10	- steam enthalpy		kJ/kg	2246.8				
11	- auxiliary turbine exhaust steam flow		t/h	-				
12	- steam enthalpy		kJ/kg	-				
13	- flow of drains from		t/h	-				
14	- drain enthalpy		kJ/kg	-				
15	Absolute pressure at turbine/condenser connection		mbar abs	53				
16	- corresponding saturation temperature at condenser inlet		°C	33.9				
17	Circulating water temperature		°C	22				
18	Circulating water flow		t/h	43839				
19	Circulating water nature:							
20	- quality			Sea water				
21	- specific heat		kJ/kg°C	3.98				
22	- volume mass		kg/m ³	1027.8				
23	Circulating water temperature rise		°C	8				
24	Condensate pinch point		°C	4				
25	Water velocity through the tubes		m/s	* 2.3/2.08				
26	Number of passes			1				
27	Head loss on circulating water side: inlet/outlet flange		mWG	*5.5/4.5				
28	Cleanliness factor			0.85				
29	Exchange coefficient		kcal/m ² h°C	HEI 95				
30	Temperature difference in air cooling zone		°C	4.2				
31	Subcooling of condensate		°C	0.5				
32	Condensate reserve		m ³	56				
33	Condensate O ₂ content with normal make-up (10 t/h)		ppb	10				
34	Condensate O ₂ content at 100% load with max. make-up (50 t/h)		ppb	15				
35	Pressure reducing and desuperheating device of turbine by-pass system:			HP	LP			
36	- steam flow		t/h	3x194.2	3x45.4			
37	- steam enthalpy		kJ/kg	3443.6	2874.5			
38	- pressure of steam downstream pressure reducing valves		bar abs	15	3			
39	- max. temperature at turbine exhaust casing		°C	80	80			
40	- desuperheating water flow		t/h	3x65	3x4.6			
41	- desuperheating water temperature		°C	50	50			
42	- desuperheating water pressure		bar abs.	6 mini	6 mini			
43	Recirculating before starting:							
44	- recirculated water flow		t/h					
45	- time to bring condensate O ₂ content to 10 ppb		min					
46	- steam flow during recirculation (at bar °C)		t/h					
47	Condenser performance curves for water temperatures from 13°C to 25°C							
48	for flows versus the load:							
49	- curve No PC LA 42 01 Full condenser and 2 CW pumps in operation							
50	- curve No PC LA 42 01 Half condenser and 1 CW pump in operation							
51	The condenser is designed to operate under the following conditions:							
52	Full condenser and 2 C.W. pumps in operation							
53								
54								
55								
56	REMARKS							
57	* With 10% plugged tubes/with 10% additional tubes							
58								
59								

Itemized general layout drawing of condenser drawn to scale	LAV04 MCEX * BOI MDO01 no.
Associated elevation views and sectional drawings	* BOI MDO03 no.
Circul. water velocity within tube bundle	
at MCR	* 2,29 m/s
at TMSL	* ... 2,29... m/s
Min. admissible C.W. velocity within tubes	
occurring at (condition)	* 1.5 m/s
reason for limitation	Biological... * fouling risk
Associated hydraulic loss of C.W. taking account of tube on-load cleaning system	
at MCR	* bar
at 0.5 MCR	* bar
at TMSL	* bar
Max. admissible tolerance of the cooling water hydraulic loss	10 %
Fouling resistance on C.W. — — side of condenser tubes	* N.A. m ² sK/kJ
Basic heat transfer coefficient at MCR	* 3973... kJ/m ² sK
Correction factor for Value of factor	*
Correction factor for Value of factor	*
Correction factor for Value of factor	*
Overall heat transfer coefficient at MCR	* kJ/m ² sK
Applied cleanliness factor	* 85 %
Associated LMTD	* 7.25 °C
Condenser heat duty x overdesign	* 385710 kW
<u>Tube Bundle</u>	
<u> Tubes</u>	
Type of tubes (drawn plain/other)	* STRAIGHT
Tube Material	* TITANIUM

Designation * R338GR 2

Analysis in % by weight (see ASTM) * H₂O 0.01 / O 0.15 % / %
B338gr 2 * No₂ 0.02 / Fe 0.1 % / %
* C 0.05 / Ti Resid % / %
Thermal Conductivity * 21.6 kJ/msK
Thermal expansion coefficient * 8.82 x 10⁻³ mm/mK

Special remarks * Valinox
* 25070 (including 10% additional tubes)

Manufacturer

Number of tubes

Tube size, outer dia. x wall thickness * 18 x 0.5 mm DN x mm

Specify other tube materials and/or sizes employed in particular areas of the condenser (e.g. air extraction zone, LP bypass steam admission) * 18 x 0.7 mm

Length between tube sheets (exposed to steam) * 12213 mm

Method of tube attachment in tube sheets * EXPANDED

Special treatment of bores in tube sheets to hold tubes * Grooved

Tube pitch related to direction of steam flow see drawing/section Bo 1 MBo3 no./no.
Transverse * 24 mm
Longitudinal * 20.78 mm
Between tube centre lines * 24 mm

Shape of tube pitch (square, etc.) * TRIANGULAR

Inclination of tubes versus horizontal line * 5 mm/m
* 61 mm

Amount of Provisions made for achieving an even distribution of steam around and along the tube bundle * De las design

Air extraction zone see drawing/section * no./no. Bo 1 MBo3
~~see analogy drawing~~

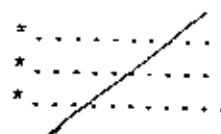
Give brief description of type of air extraction zone * Central nest
* with hood
and upper extrac.

Provisions made to avoid inadmissible thermal differential expansion/stresses between outer

and inner tubes and condenser shell and against tube buckling

..., shell without expansion joint

Specify specific forces, stresses and safety factors



Tube Sheets

Material
Thickness
Plating/coating
Material (Titanium)
Thickness (6 mm, min)
Water/steam side

* SOLID TITANIUM
* 25 mm
* N.A.
* mm
* mm

Tube Support Plates/Baffles

Material
Thickness
Spacing
Ratio of spacing to outer tube diameter
Equally spaced
Number provided
Method of avoiding tube resonance with harmonics of turbine shaft speed and excitation caused by steam flow disturbances

* CARBON STEEL
* 20 mm
* 581 mm
* 32.2 mm/mm
* NO yes/no
* 20 X 2

Delas Know how

Condenser Shell and Hotwell

Condenser Shell

Material
Width/~~diameter~~
Thickness
Incl. a corrosion allowance of
Number of expansion bellows in the shell

* CARBON STEEL
* 8400 mm
* 16 mm
* 3 mm
* N.A.

Condenser Neck

Material
Dimensions of inlet flange towards turbine exhaust, length

* CARBON STEEL

x width ~~or diameter~~ *6348 X 7528 mm x mm ~~mm~~
 Flange pressure rating *Vacuum. bar
 Connection standard *welded.
 Vertical height of connect. piece (total = upper + lower parts) *.3810. mm
 Outlet size of connect. piece at cond. shell: length x width/~~dia.~~ *11710x8400 mm x mm ~~mm~~
 Thickness of neck wall * 2.0 mm
 Location of turbine exhaust fixed point *.....
 Expansion bellows provided * NO yes/no
 Arrangement and design details of LP bypass steam spray cones see drawing/section *B.01 MD001/MD003 no./no.

Hotwell

No. of per total condenser * 1
 Material *CARBON STEEL/MD003
 Dimensions see drawing/section *.B.01 MD001/no./no.
 Length x width/~~dia.~~/height *11710/8400/1100 mm
 Wall thickness * 16/22 mm
 Capacity: residence time of main condensate related to MCR * 5 minutes
 Residence time for adverse operating conditions/failures *..... minutes
 *..... minutes
 Connection to main condensate suction pipe
 nominal bore * 400 mm DN
 pressure rating * NA NP bar
 type of connection *Butt Weld
 connection standard *..NA.....

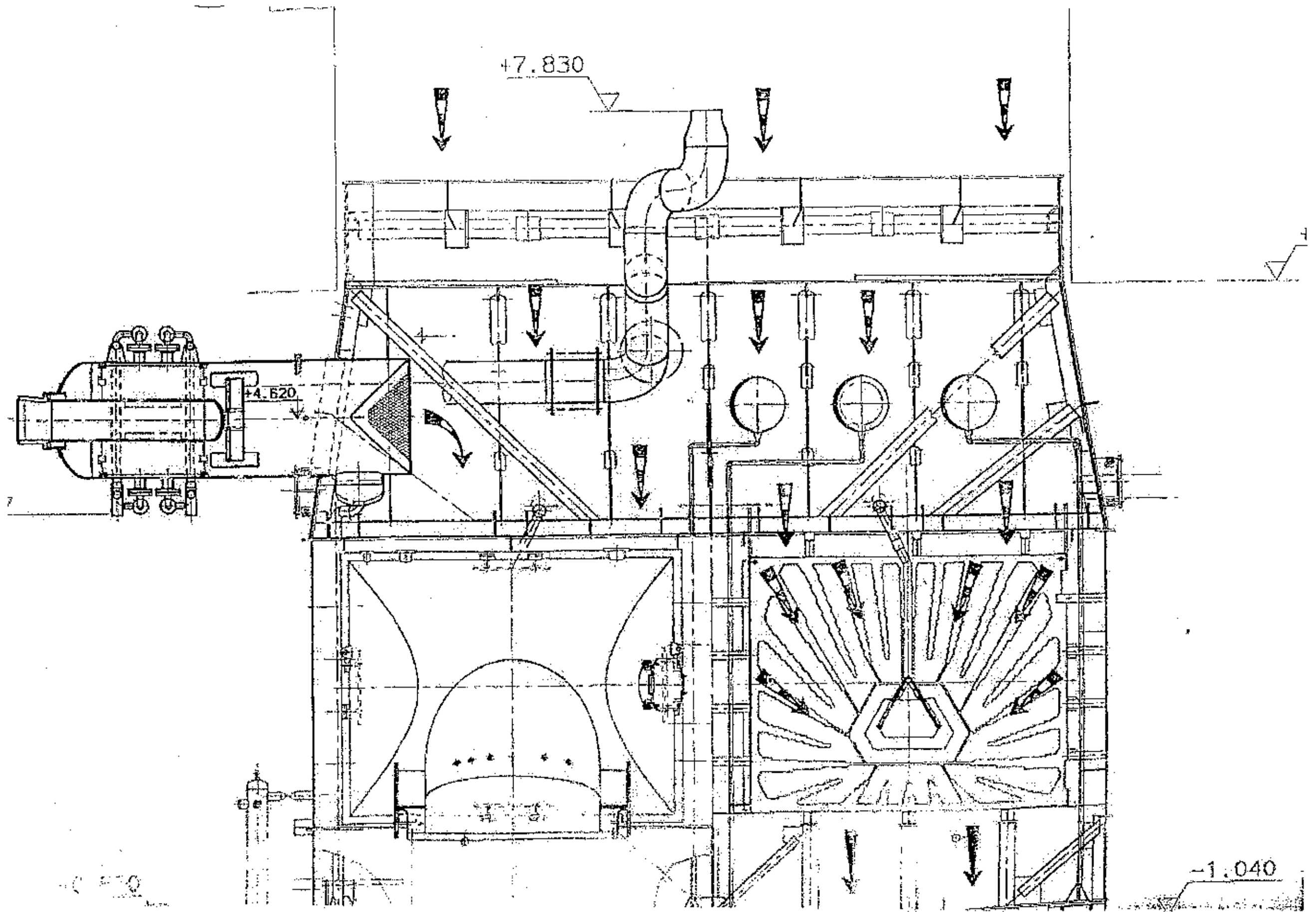
Waterboxes

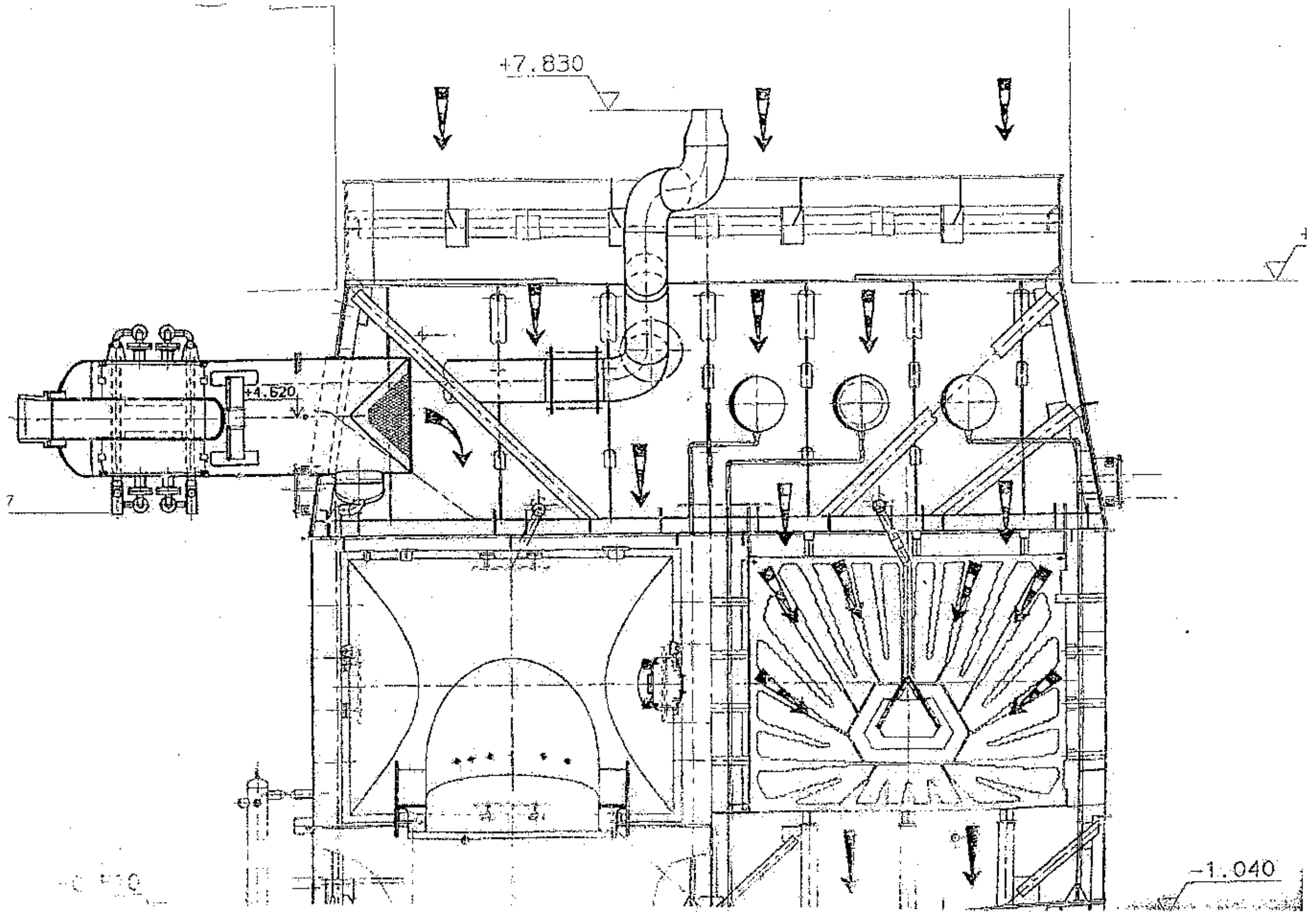
Material *CARBON STEEL
 Dimensions see drawing/section *..... no./no.
 Wall thickness * 20 mm
 Incl. a corrosion allowance of * 5 mm

Corrosion Protection Waterside

Type of protection (plating, coating, paint, etc.) *COATINGS
 Protection provided for waterboxes/tube sheets *NEOPRENE/N.A.
 Material *CARBON STEEL
 Designation *A 285
 Analysis in % by weight *..... % / %

Thickness of layer	*	% / %
Method of application	* 3	mm
Guaranteed service life (min. 2 years) of protective layer at MCR	*	years
Special remarks	*	
Type of outer surface protection	* <i>Painting</i>	
Type of attachment of waterboxes to condenser shell (welded/bolted)	* BOLTED	
Plugging of defective condenser tubes may be effected on load	* by 1/2 bundle in operation	
Withdrawal of defective condenser tubes to be effected at inlet/outlet waterbox	inlet waterbox w.b.	
Available space within opposite waterbox sufficient to assist tube withdrawal and to allow expending of new tubes	*	yes/ no
Retubing of condenser may be performed without removing the whole waterbox assembly	* no	yes/no
Hinged manhole covers provided at inlet/outlet waterbox	* yes	
Hinged inspection door provided at inlet/outlet waterbox	* no	
Connection of cooling water lines nominal bore	* 1800	mm DN
pressure rating according to result of water hammer calculation performed for C.W. system connection standard	* ³ <i>AWWA Class D</i>	bar + Full vacuum
<u>Condenser Support</u>		
Magnitude of condenser pull directed upwards at MCR	* 0	kN
at TMSL	* 0	kN
Effective loading of condenser support (Total) max.	* ... 12,600	kN
min.	* ... 3,920	kN
Type of condenser support (springs/rigid support and bellows/other)	* SPRINGS	
Manual adjustability of support possible during normal operation	* ... NA	yes/no





10. 4. 10.

2

GEC ALSTHOM		DATASHEET			DATE 03.04.98		
POWER PLANTS ENGINEERING		TUBESHEET EXCHANGER			N° C20 DS 001		
					SHEET 1/1		
					REVISION C		
					APPROVED		
1	CLIENT	PPC	PROJECT	LAVRION - 550 MW CC - BLOCK	FUNCTIONAL CODE		
2	QUANTITY	2					
3	INSTALLATION	Indoor					
4	TYPE	Horizontal	MANUFACTURER		Mtr's REFERENCE		
			GEC ALSTHOM Delas		DR 12271		
5							
6	OPERATING CHARACTERISTICS			WATERBOXES			
7	Heat to be exchanged	kW	6920	Number	2		
8	PRIMARY FLUID (inside tubes)			Shape	conical		
9	Nature	seawater		Thickness	mm	8	
10	Specific heat	kJ/kg °C	3.98	Number of water inlet and outlet pipes			
11	Volume mass	kg/m ³	1024	Diameter of water inlet pipe			
12	Flow per exchanger	m ³ /h	1380	Diameter of water outlet pipe			
13	Inlet temperature	°C	26	SHELL			
14	Outlet temperature	°C	30,5	Shape	cylindrical		
15	Velocity through the tubes	m/s	2.0	Thickness	mm	10	
16	Head loss	mWG	3.5	Number of water inlet and outlet pipes			
17	Waterbox design pressure	bar gauge	3	Diameter of water inlet pipe			
18	Waterbox test pressure	bar gauge	4.5	Diameter of water outlet pipe			
19	SECONDARY FLUID (on shell side)			TUBESHEETS			
20	Nature	demineralized water		Number	2		
21	Specific heat	kJ/kg °C	4.18	Diameter	mm	1020	
22	Volume mass	kg/m ³	994	Thickness	mm	25	
23	Flow per exchanger	m ³ /h	800	BAFFLES			
24	Exchanger inlet temperature	°C	39.5	Number	15		
25	Exchanger outlet temperature	°C	32	Spacing	mm	492	
26	Velocity on shell side (min/max)	m/s	/1	(arrangement will be confirmed at detailed design)			
27	Head loss	mWG	5.5 maxi	MATERIALS			
28	Shell design pressure	bar gauge	10				
29	Shell test pressure	bar gauge	15				
30							
31	CONSTRUCTION						
32	CONSTRUCTION AND DIMENSIONAL CHARACTERISTICS						
33	Arrangement			Type	Grade	Standards	
34	Exchange surface on tube outer diameter	m ²	378.5	ASTM			
35	Exchange coefficient (with fouling fact)	W/m ² °C	2539	ASTM			
36	Fouling factor	0,85		ASTM			
37	Number of tubes	834		ASTM			
38	Shape of tubes	straight		* WEIGHTS AND OVERALL DIMENSIONS			
39	Number of passes on tube side	1		WEIGHTS			
40	Number of passes on shell side	1		Tubes	kg	834	
41	Tube outer diameter	mm	18	Tube sheets	kg	145	
42	Tube thickness	mm	0,5	Waterboxes	kg	550	
43	Length of tubes	m	8,064	Shell	kg		
44	CONNECTION			Total weight empty	kg	6800/7250	
45	Tubes / tubesheet	expanded		Total weight in operation	kg	14300	
46	Waterbox / tubesheet	bolted		DIMENSIONS			
47	Shell / tubesheet	bolted		Overall length	m	9.992	
48	Shell / tube extension	-		Diameter	m	1.100	
49							
50							
51							
52							
53							
54							
55							
56	REMARKS :	unit weights for upper and lower exchanger					
57		with inside neoprene coating 3 mm thick					
58		shell corrosion allowance 3 mm					

10. 4. 10. 2

TECHNICAL AND PERFORMANCE DATA SHEETS
AUXILIARY COOLING WATER SYSTEM FOR STEAM CYCLE

1. Technical Data Sheets

1.1 Auxiliary Cooling Water Cooler

Manufacturer		* DELAS/METKA
Number of heat exchangers	No.	* 2
Mechanical design sketch	No.	*
Type of heat exchanger		* HORIZONTAL STRAIGHT TUBES/ 1 PASS

Operating Condition

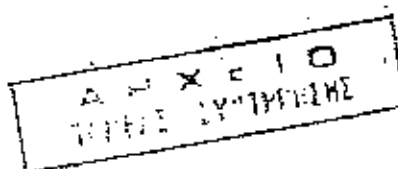
Heat duty x overdesign	KW	* 6920
Overall Heat Transfer coefficient	W/m ² K	* 2987
LMTD	°C	* 7.4
LMTD corrected	°C	* 7.4
Heat exchange area	m ²	* 378.5
Flow rate tube side/ shell side	m ³ /s	* 0.383/0.222
Pressure drop tube side/ shell side (max)	bar	* 0.35/0.55 (1)
Velocity	m/s	* 2
Temperature tube side inlet/outlet	°C	* 26/30.4
Temperature shell side inlet/outlet	°C	* 39.5 / 32
Fouling resistance	m ² K/KW	* 0.06
Volume	m ³	* 7.3

Mechanical design data

Design standards		* ASME 8 div 1
Number of passes	No.	* 1
Design pressure tube side/shell side	bar	* 3/10
Design temperature water side/ steam side	°C	* 60 / 60 (1)
Tube ^{out} side diam. x wall thickness	mm x mm	* 18 / 0.5
Corrosion allowance	mm	* 3

Materials

Shell	* CARBON STEEL
Water boxes	* C.S.+neopren coating
Tubesheets	* TITANIUM
Tubes	* TITANIUM
Flanges	* CARBON STEEL



Weights and dimensions

Empty	Kp	*3000
Operating	Kp	*14300
Overall dimensions (length x height)	mm x mm	*9992 x 3050
Flanges cooling water side	mm (sea water side)	450
Flanges aux. cool. water side	mm (demin. water side)	600

~~1.2 Auxiliary Cooling Water Booster Pump~~

Manufacturer		*.....
Number of pumps	No.	*2
Arrangement drawing	No.	*.....
Sectional drawing	No.	*.....
Type of pump		*HORIZONTAL.
Performance curve	No.	*.....

Operating condition

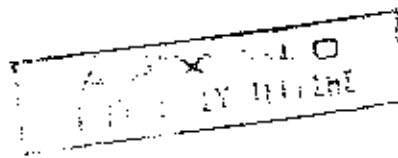
- Flow rate overdesign	m ³ /h	*1000
- Min./max., flow rate	m ³ /h	*...../.....
- Suction pressure	bar	*.....
- Discharge pressure	bar	*.....
- Total Head	bar	*3.6
- Overall efficiency acc. to DIN 1944/II	%	*77
- NPSH - required/available	bar	*5.6 /20
- Maximum speed	S ⁻¹	*1450
- Critical speed	S ⁻¹	*.....

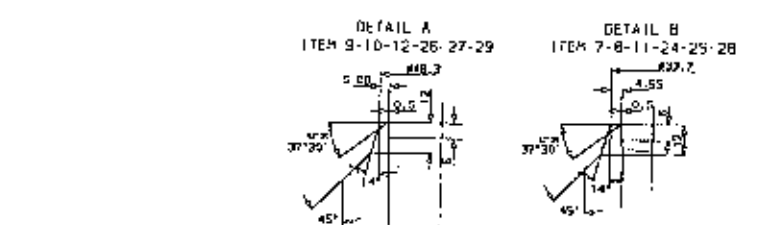
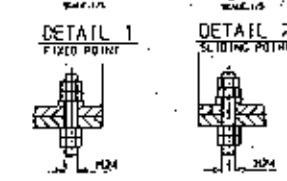
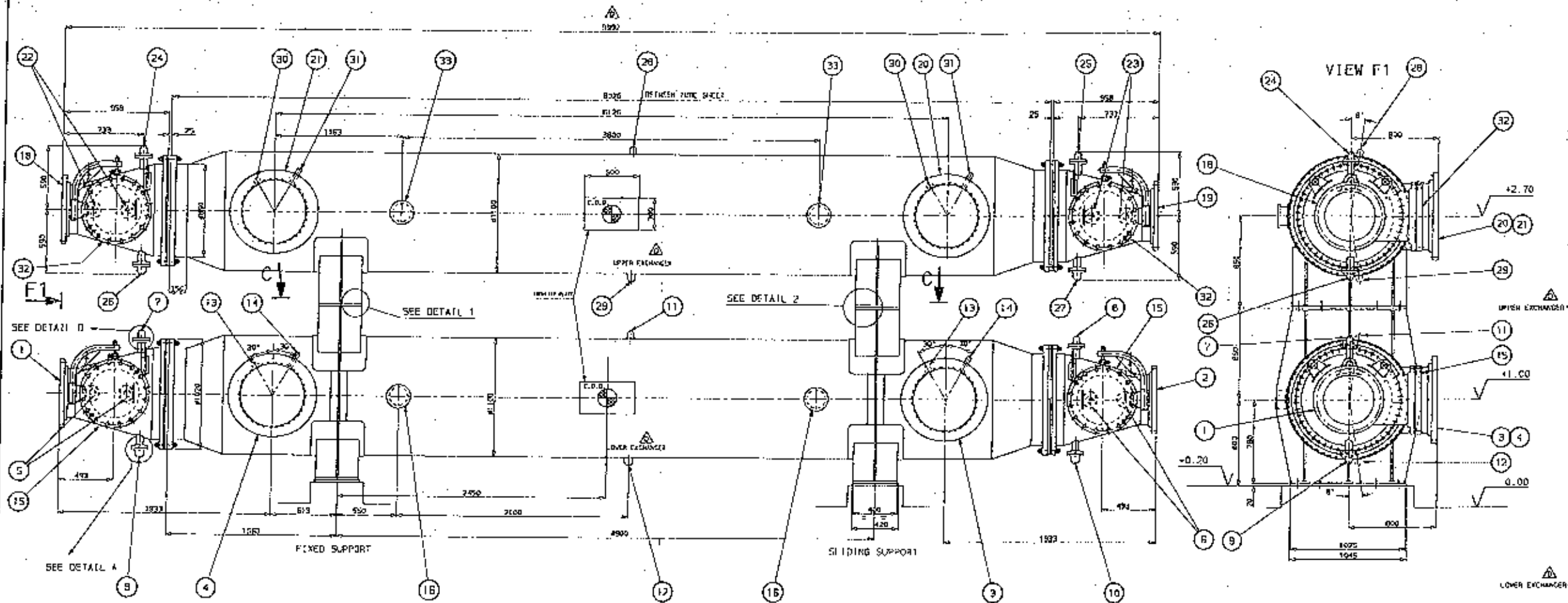
Mechanical design data

- Number of stages	No.	*1
- Type of Impeller		*.....
- Moment of gyration	kgm ²	*.....
- Discharge flange rating/facing		*...../.....
- Minimum submergence of the suction	m	*.....
- Type of cooling/lubrication		*...../.....

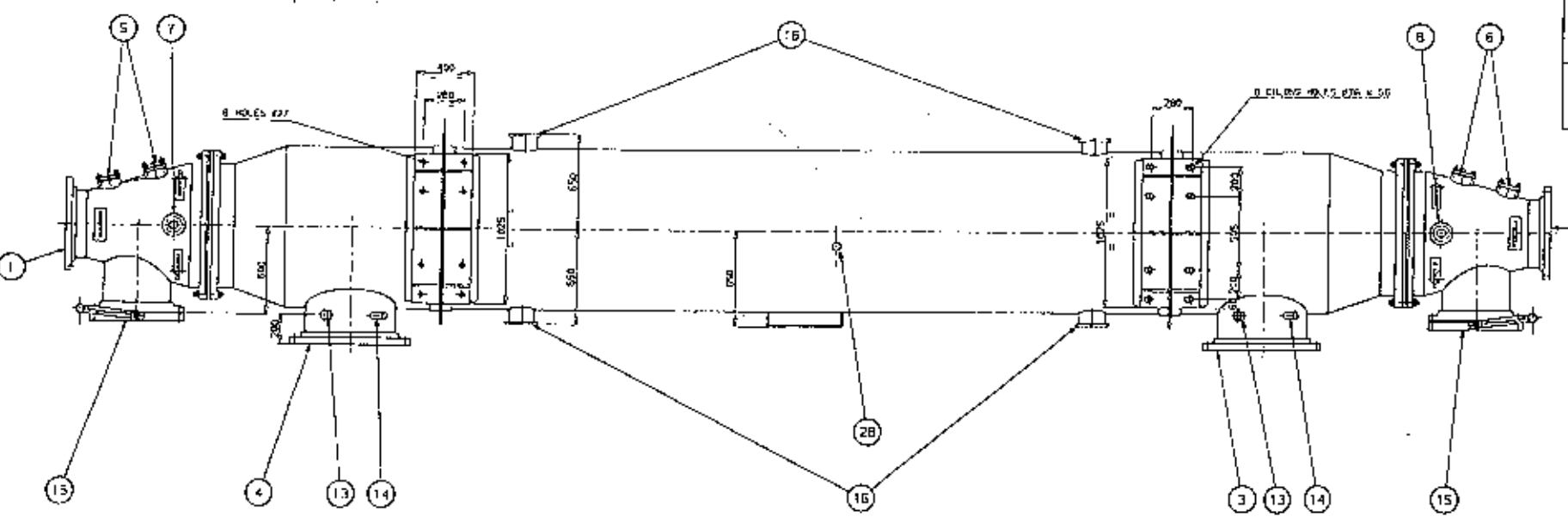
Materials

- Casing	*CARBON STEEL
- Shaft	*AISI 4140
- Impeller	*12 Cr 4 Ni
- Baseplate	*.....



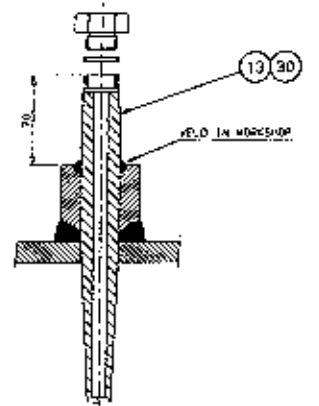


SECTION C



CODE SECTION, EDITION AND APPLICABLE ADDENDA, ASME VIII DIV. 1

TEMPERATURE	UNIT	PART	CLASSIFICATION	SYMBOL OF JOINTS
INLET	°C	25	35.54	
OUTLET	°C	30.4	30	
DIFFER	°C	40	60	
PRESSURE	DESIGN PRESSURE	1-FULL YIELDING	10	
	HYDRAULIC TEST	1.5	15	
		1.5	15	
W/ FLANGES		150 Lbs		
		150		
WEIGHT	EMPTY	UPPER EXCHANGER	1800	
		LOWER EXCHANGER	700	
		TOTAL	1400	
		UPPER EXCHANGER	1400	
		LOWER EXCHANGER	1100	
		TOTAL	2500	



ITEM NO.	DESCRIPTION	QTY	UNIT	REMARKS
1	FLANGE	2	PCS	
2	FLANGE	2	PCS	
3	FLANGE	2	PCS	
4	FLANGE	2	PCS	
5	FLANGE	2	PCS	
6	FLANGE	2	PCS	
7	FLANGE	2	PCS	
8	FLANGE	2	PCS	
9	FLANGE	2	PCS	
10	FLANGE	2	PCS	
11	FLANGE	2	PCS	
12	FLANGE	2	PCS	
13	FLANGE	2	PCS	
14	FLANGE	2	PCS	
15	FLANGE	2	PCS	
16	FLANGE	2	PCS	
17	FLANGE	2	PCS	
18	FLANGE	2	PCS	
19	FLANGE	2	PCS	
20	FLANGE	2	PCS	
21	FLANGE	2	PCS	
22	FLANGE	2	PCS	
23	FLANGE	2	PCS	
24	FLANGE	2	PCS	
25	FLANGE	2	PCS	
26	FLANGE	2	PCS	
27	FLANGE	2	PCS	
28	FLANGE	2	PCS	
29	FLANGE	2	PCS	
30	FLANGE	2	PCS	
31	FLANGE	2	PCS	
32	FLANGE	2	PCS	
33	FLANGE	2	PCS	

ANCHORING SEE DRAWING VI 469.304

SEC ALSTOM DELAS T1488.SOME

PUBLIC POWER CORPORATION
ATHENS GREECE

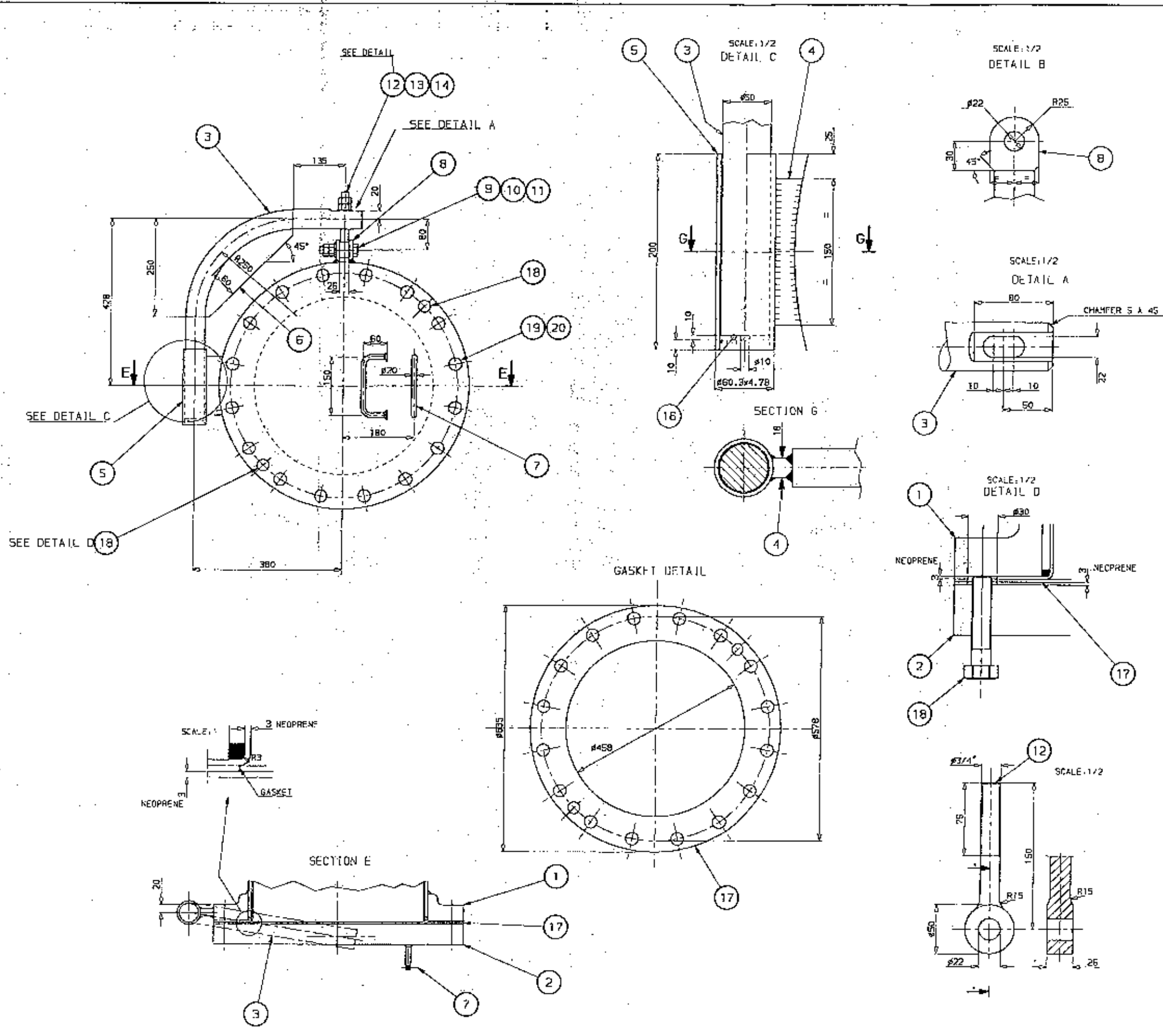
LAVRION COMBINED CYCLE BLOCK - 550 MW NET
CONTRACT NO. DUKT-152/99129

ΕΧΑΝΣΕΥΡΣ ΜΟΡΤΑ ΕΝΚΟΝΕΜΕΝΤ

ΕΝΚΟΝΕΜΕΝΤ

PGD-PPG

Customer number: LAV04/PPGCC20HD001



20	32	HEAVY NUT #1 1/8 UNC 2B	A 154 2H	
19	16	STUD BOLT #1 1/8 UNC 2A LGHT. 170	A 193 B7	
18	2	TAKING OFF SCREW #5/8" LGHT. 70	A 193 B7	
17	1	GASKET THICK. .3	NEOPRENE	
16	1	FLAT END	A 285 Gr-C	
15				
14	2	NUT #3/4" UNC 2B	A 194 2H	
13	1	WASHER L20N	A 285 Gr-C	
12	1	FORK JOINT #3/4" UNC 2A (normal series)	A 105	SEE DETAIL
11	2	NUT #3/4" UNC 2D	A 194 2H	
10	1	WASHER #38x#21 THK. 3	A 285 Gr-C	
9	1	SCREW #3/4" UNC 2A LGHT. 85	A 193 B7	
8	2	LIFTING PLATE THICK. .12	A 285 Gr-C	
7	1	HANDLE #20	A 285 Gr-C	
6	1	GUSSET THICK. .10	A 285 Gr-C	
5	1	TUBE	A 106 Gr-B	
4	1	PLATE	A 285 Gr-C	
3	1	ROUND #50	A 285 Gr-C	
2	1	SLIP: NPS 450 150Lbs F.F.	A 105	WITH NEOPRENE
1	1	FLANGE NPS 450 150Lbs SLIP ON F.F.	A 105	WITH NEOPRENE
Rep Nb		DESIGNATION	Matiere	Obs

REV	DATE	AUTH.	CHKD BY	STATUS	MODIFICATIONS
B	27.11.98	SAV	SP	UP TO DATE AFTER CHECKING	
A	09.10.96	SAV		FIRST ISSUE	

SCALE:	1/5	SUPPLIER NAME:	GEC ALSTHOM DELAS	NO:	V1476.30MB
SIZE:	A3	12, 14 RUE D'ALSACE 92532 LEVALLOIS-PERRET		SPECIFICATION NO.	
		TEL. (33) 47 56 28 28 (FRANCE)			
DESIGN: 30964					

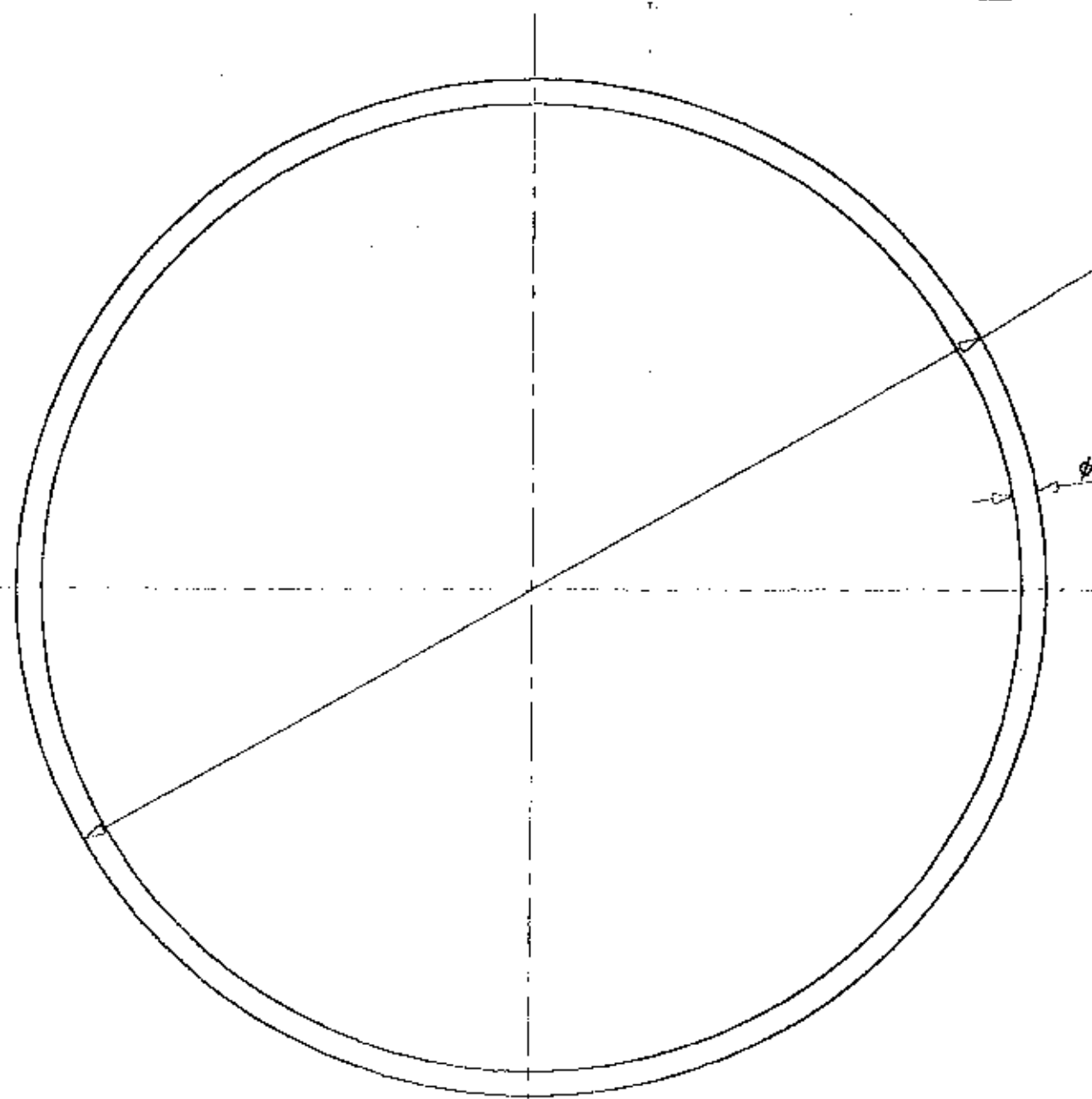
PUBLIC POWER CORPORATION
ATHENS GREECE

LAVRION COMBINED CYCLE BLOCK - 550 MW NET
CONTRACT N°ADMKT-162/99129

ECHANGEURS NORIA	CLOSED COOLING WATER HEAT EXCHANGERS
TROU D'HOMME AVEC POTENCE	MANHOLE WITH ARTICULATION SUPPORT
GEC ALSTHOM	PGD-PPG
METKA S.A.	

ISSUE REV.	A	31																		
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WATER BOX GASKET

NUMBER: 4 FOR ONE APPARATUS
 MATERIAL: NEOPRENE
 THE NEOPRENE ROUND GASKET SHALL BE EQUAL TO 55 ± 5 SHORE

GASKET INSTALLATION: SEE DRAWINGS T1471.30M 3156

SCALE: 1/5		SUPPLIER NAME: GEC ALSTHOM DELAS		DOSSIER: 39964
SIZE: A3		12, 14 RUE D'ALSACE 92932 LEVALLOIS-PERRET TEL. (1) 47 56 28 28 (FRANCE)		N°: Y1475.30MC
				SPECIFICATION N°:



PUBLIC POWER CORPORATION
 ATHENS GREECE

LAVRION COMBINED CYCLE BLOCK - 550 MW NET
 CONTRACT N° DMKT-162/99129

ECHANGEURS NORIA
 JOINTS DE BOITE A EAU

CLOSED COOLING WATER HEAT EXCHANGERS
 WATER BOX GASKETS

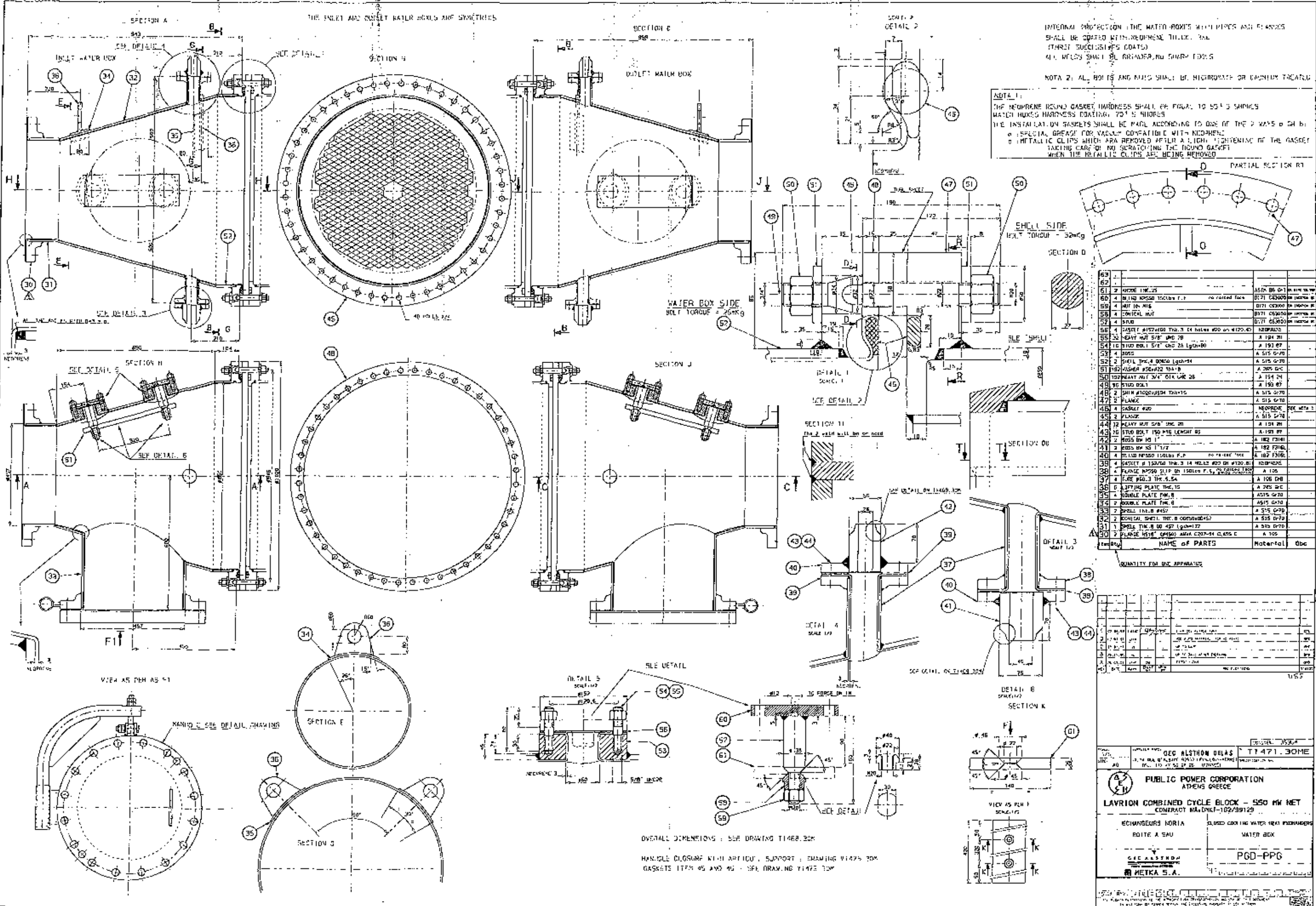


PGD-PPG

N°

REVISION	DATE	DRAWN BY	CHECKED BY	PROJECT	DESCRIPTION - REMARKS	STATUS
C	24.01.97	JO			UP TO DATE	UP
H	27.11.96	LAGN			UP TO DATE AFTER CHECKING	UP
A	02/10/96	LRI			FORM 1500	UP

ISSUE REV. A H C
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INTERNAL PROTECTION: THE WATER BOXES WITH PIPES AND FLANGES SHALL BE COATED WITH NEOPRENE THICK. 200 (THREE SUCCESSIVE COATS)
ALL WELDS SHALL BE GRINDER AND SAND PAPER

NOTE 2: ALL BOLTS AND NUTS SHALL BE HIGHGRADE OR CEMENT TREATED

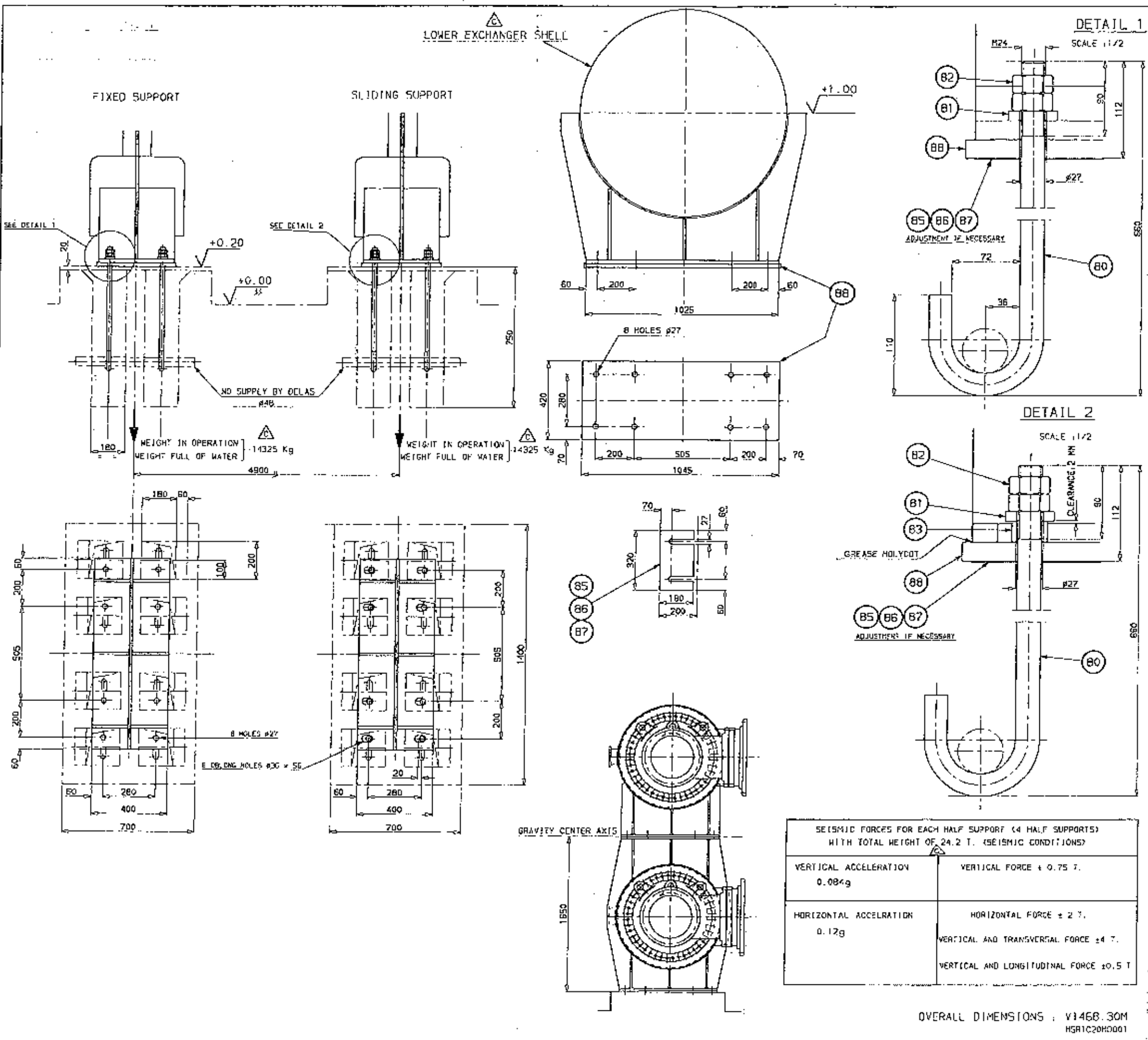
NOTE 1:
THE NEOPRENE ROUND GASKET HARDNESS SHALL BE EQUAL TO 50'S 3 SHIPING WATER BOXES HARDNESS COATING 70'S 3 SHIPING
THE INSTALLATION GASKETS SHALL BE MADE ACCORDING TO ONE OF THE 2 WAYS a OR b:
a: SPECIAL GREASE FOR VACUUM COMPATIBLE WITH NEOPRENE
b: METALLIC CLIPS WHICH ARE REMOVED AFTER A LIGHT LIGHTENING OF THE GASKET TAKING CARE OF NO SCRATCHING THE ROUND GASKET WHEN THE METALLIC CLIPS ARE BEING REMOVED

ITEM NO.	DESCRIPTION	QUANTITY	MATERIAL	REMARKS
1	FLANGE 150x150	1	A 150 20	
2	FLANGE 150x150	1	A 150 20	
3	FLANGE 150x150	1	A 150 20	
4	FLANGE 150x150	1	A 150 20	
5	FLANGE 150x150	1	A 150 20	
6	FLANGE 150x150	1	A 150 20	
7	FLANGE 150x150	1	A 150 20	
8	FLANGE 150x150	1	A 150 20	
9	FLANGE 150x150	1	A 150 20	
10	FLANGE 150x150	1	A 150 20	
11	FLANGE 150x150	1	A 150 20	
12	FLANGE 150x150	1	A 150 20	
13	FLANGE 150x150	1	A 150 20	
14	FLANGE 150x150	1	A 150 20	
15	FLANGE 150x150	1	A 150 20	
16	FLANGE 150x150	1	A 150 20	
17	FLANGE 150x150	1	A 150 20	
18	FLANGE 150x150	1	A 150 20	
19	FLANGE 150x150	1	A 150 20	
20	FLANGE 150x150	1	A 150 20	
21	FLANGE 150x150	1	A 150 20	
22	FLANGE 150x150	1	A 150 20	
23	FLANGE 150x150	1	A 150 20	
24	FLANGE 150x150	1	A 150 20	
25	FLANGE 150x150	1	A 150 20	
26	FLANGE 150x150	1	A 150 20	
27	FLANGE 150x150	1	A 150 20	
28	FLANGE 150x150	1	A 150 20	
29	FLANGE 150x150	1	A 150 20	
30	FLANGE 150x150	1	A 150 20	
31	FLANGE 150x150	1	A 150 20	
32	FLANGE 150x150	1	A 150 20	
33	FLANGE 150x150	1	A 150 20	
34	FLANGE 150x150	1	A 150 20	
35	FLANGE 150x150	1	A 150 20	
36	FLANGE 150x150	1	A 150 20	
37	FLANGE 150x150	1	A 150 20	
38	FLANGE 150x150	1	A 150 20	
39	FLANGE 150x150	1	A 150 20	
40	FLANGE 150x150	1	A 150 20	
41	FLANGE 150x150	1	A 150 20	
42	FLANGE 150x150	1	A 150 20	
43	FLANGE 150x150	1	A 150 20	
44	FLANGE 150x150	1	A 150 20	
45	FLANGE 150x150	1	A 150 20	
46	FLANGE 150x150	1	A 150 20	
47	FLANGE 150x150	1	A 150 20	
48	FLANGE 150x150	1	A 150 20	
49	FLANGE 150x150	1	A 150 20	
50	FLANGE 150x150	1	A 150 20	
51	FLANGE 150x150	1	A 150 20	
52	FLANGE 150x150	1	A 150 20	
53	FLANGE 150x150	1	A 150 20	
54	FLANGE 150x150	1	A 150 20	
55	FLANGE 150x150	1	A 150 20	
56	FLANGE 150x150	1	A 150 20	
57	FLANGE 150x150	1	A 150 20	
58	FLANGE 150x150	1	A 150 20	
59	FLANGE 150x150	1	A 150 20	
60	FLANGE 150x150	1	A 150 20	
61	FLANGE 150x150	1	A 150 20	
62	FLANGE 150x150	1	A 150 20	
63	FLANGE 150x150	1	A 150 20	

OVERALL DIMENSIONS: SEE DRAWING T1468.30M
HANDLE CLOSURE WITH ARTICUL. SUPPORT: DRAWING T1475.30M
GASKETS ITEM 45 AND 46: SEE DRAWING T1475.30M

ITEM NO.	DESCRIPTION	QUANTITY	MATERIAL	REMARKS
1	FLANGE 150x150	1	A 150 20	
2	FLANGE 150x150	1	A 150 20	
3	FLANGE 150x150	1	A 150 20	
4	FLANGE 150x150	1	A 150 20	
5	FLANGE 150x150	1	A 150 20	
6	FLANGE 150x150	1	A 150 20	
7	FLANGE 150x150	1	A 150 20	
8	FLANGE 150x150	1	A 150 20	
9	FLANGE 150x150	1	A 150 20	
10	FLANGE 150x150	1	A 150 20	
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16	FLANGE 150x150	1	A 150 20	
17	FLANGE 150x150	1	A 150 20	
18	FLANGE 150x150	1	A 150 20	
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59	FLANGE 150x150	1	A 150 20	
60	FLANGE 150x150	1	A 150 20	
61	FLANGE 150x150	1	A 150 20	
62	FLANGE 150x150	1	A 150 20	
63	FLANGE 150x150	1	A 150 20	

DESIGN: ASEA
GEC ALSTHOM DELAS T1471.30ME
PUBLIC POWER CORPORATION
ATHENS GREECE
LAVRION COMBINED CYCLE BLOCK - 550 MW NET
CONTRACT NO. DNL-102/99129
ECHANGEURS MORIA
ROUTE A SAU
WATER BOX
PGD-PPG
GEC ALSTHOM
METKA S.A.



Rep Nb	DESIGNATION	Matiere	Qba
Item Qty	NAME of PARTS	Material	Qba
88	PLATINE 420 x 1045 epais. 20	A285 GrC	
	SHEET		
87	CALE 5 mm	A285 GrC	
	SHIM		
86	CALE 2 mm	A285 GrC	
	SHIM		
85	CALE 1 mm	A285 GrC	
	SHIM		
84			
83	TUBE ENTRETOISE #33.4 EPAIS. 3.38 LONG. 22	A106 GrB	
	TUBE		
82	ECROU M124	A 194 2H	bedded or
	NUT		stretched
81	RONDELLE #26 / 50 EPAIS. 10	A285 GrC	bedded or
	WASHER		stretched
80	TIGE DE SCHELLEMENT #24	A 193 B7	bedded or
	TIE ROD		stretched

REV.	DATE	AUTH.	CHG.	APP.	MODIFICATIONS	STATUS
C	07.01.97				UP TO DATE FOLLOWING REC 11.07.0197	ENC
B	27.11.86				UP TO DATE AFTER CHECKING	ENC
A	24.06.86				FIRST ISSUE	

DOSSIER: 39954

SCALE: 1/10

SUPPLIER NAME: GEC ALSTHOM DELAS

REF: 17, 14 ALE D'ALSACE 92522 LEVALLOIS-PERRET

TEL: (33) 47 56 28 28 (FRANCE)

PUBLIC POWER CORPORATION
ATHENS GREECE

LAVRION COMBINED CYCLE BLOCK - 550 MW NET
CONTRACT NA.DMKT-162/89129

ECHANGEURS NORTA	CLOSED COOLING WATER HEAT EXCHANGERS
GENIE CIVIL	CIVIL WORK GUIDE
ANCRAGE	ANCHORING

GEC ALSTHOM
METKA S.A.

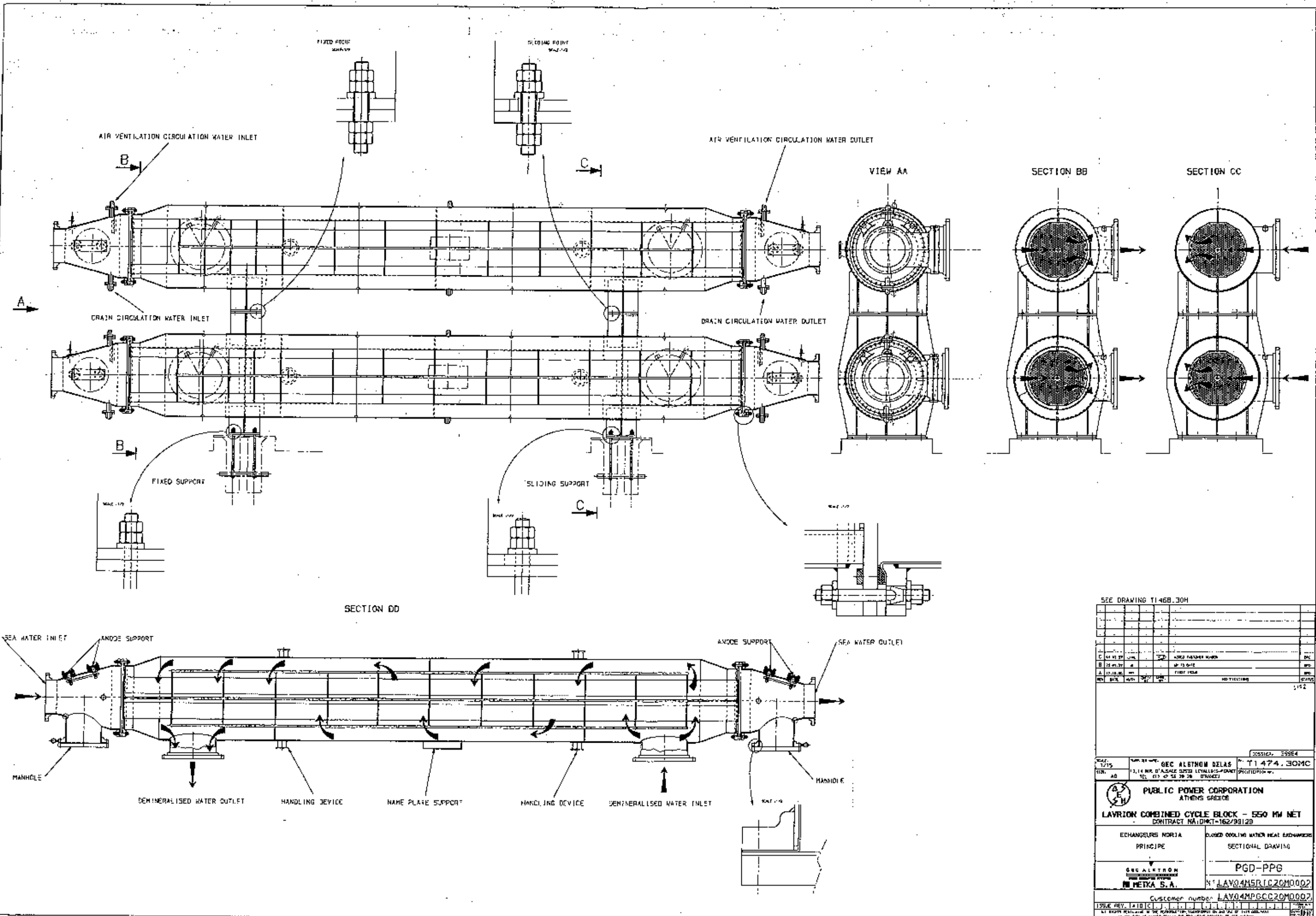
PGD-PPG

N° LAV04MSR1C20XCG01

Customer number LAV04MPGCC20XCG01

ISSUE REV. A B C

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SEE DRAWING TI-46B.30H

REV	DATE	BY	CHK	DESCRIPTION
1				
2				
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2033102-ESSE4

SCALE: 1/15

SEC ALSTHOM DELAS T1474.30MC

13,14 MR. D'ALCANTARA DESSE LEVELLING-PRONT

15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28

PUBLIC POWER CORPORATION
ATHENS GREECE

LAVRION COMBINED CYCLE BLOCK - 550 MW NET
CONTRACT N° DI/DTCT-162/88128

ECHANGEURS NORIA	CLOSED COOLING WATER HEAT EXCHANGERS
PRINCIPE	SECTIONAL DRAWING

ALSTHOM
METKA S.A.

Customer number: LAV04MPGCC20M0002

ISSUE REV. 1A [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20]

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3

GEC ALSTROM

EUROPEAN GAS TURBINES
OFF BASE COOLER
GT WATER COOLING
OPERATING AND MAINTENANCE GUIDE

SECTION
N° 181 M 002

FUJLLE
SHEET N° 4/43

1.1 EXCHANGER

T24

Specification

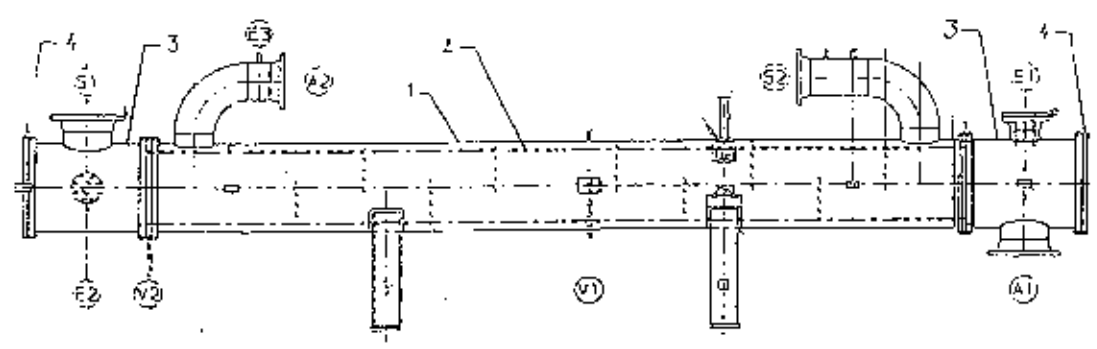
- Cooling demineralized water with sea water
- Shell side : Fluid = Demineralized water
Flow = 330 m³/h
Temperature (in/out) = 40.5 to 31 °C
- Tube side : Fluid = Sea water
Flow = 660 m³/h
Temperature (in/out) = 22 to 26.8 °C

The device has 5 main parts :

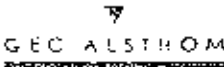
- One shell (1)
- One bundle (2)
- Two distribution box (3)
- Two box-cover (4)

Connections

- A1 Channel inlet DN 350
- S1 Channel outlet DN 350
- A2 Shell inlet DN 250
- S2 Shell outlet DN 250
- V1 Shell drain DN 1"
- V2 Channel drain DN 1/2"
- E3 Shell vent DN 1"



Modif.	A					Date : 23.10.1997	SECTION
Date	23.10.97					NQM : F.CARDOT	N° 181 M 002
Visa	F.C.					BY VISA :	FUJLLE SHEET N° 4/43

	EUROPEAN GAS TURBINES OFF BASE COOLER GT WATER COOLING OPERATING AND MAINTENANCE GUIDE	SECTION
		N° 181 M 002 FEUILLE SHEET N° 5/43

Accessories

- On the inlet channel (A1) :
- 1 Vent line with 2 valves DN 25
 - 1 Thermometer
 - 2 Anodes
- On the outlet channel (S1) :
- 1 Vent line with 2 valves DN 25
 - 1 Manometer (0-6B) with isolating valve DN 25, and manifold.
 - 1 Thermometer (0-60°C)
 - 1 Safety valve DN 1/2" (6 B)
- On the shell :
- 1 Drain line with 2 valves DN 25
 - 1 Safety valve DN 1/2" (6 B)
- On the inlet shell (A2) :
- 1 Vent line with 2 valves DN 25
 - 1 Valve DN 250 with actuator and limit switches
- On the outlet shell (S2) :
- 1 Vent line with 2 valves DN 25
 - 1 Valve DN 250 with actuator and limit switches
 - 1 Manometer (0-6 B) with isolating valve DN 25, and manifold.
 - 1 Thermometer (0-60°C)

1.2 SKID PUMP

Specification

For each pump :

Type = mono-cellular centrifugal pump

Fluid = Demineralized water

Flow = 360 m³/h

Total head = 55 mcl

Available NPSH = 6 mcl

Efficiency mini = 75%

Power = 90 kW

Voltage = 350 V / 50 Hz

Speed of rotation = 1500 rpm

Modif.	A					Date : 23.10.1997	SECTION
Date	23.10.97					NOM : F.CARDOT BY	N° 181 M 002
Visa	F.C.					VISA 	FEUILLE SHEET N° 5/43

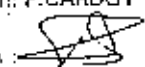
Constitution

- One frame with 4 lifting lugs and 4 earth boss
- Piping DN 250
- 2 Vent lines with 2 valves DN 25
- 2 Drain lines with 2 valves DN 25
- 2 Pumps (360 m³/h)
- 4 Butterfly valves DN 250
- 1 Orifice plate (d = 190 mm) with 2 valves DN 25
- 2 Filters (mesh = 2 mm²)
- 2 Check valves DN 250
- 4 Flexible DN 200 / 150
- 2 Differential manometers (0-1600 mB) with isolating valves DN 25, and manifolds.
- 4 Manometers (0-6 B) with isolating valves DN 25, and manifolds.
- 1 Thermometer (0-60 °C)
- 1 Pressure switch (3 B)

1.3 EXPANSION TANK

One expansion tank (2 m³) equipped of :

- 1 Drain line with 2 valves DN 25
- 1 Vent line with 2 valves DN 25
- 1 Pipe DN 50 with 1 valves DN 50
- 1 Filling pipe with 1 solenoid valve DN 25 (125 Vdc), and isolating valve DN 25
- 1 Orifice plate (d = 3mm)
- 1 Vacuum breaker (-0.05 to + 1 B)
- 1 Level switch (set points = 300 mm and 900 mm)
- 1 Level indicator (0-800 mm) with 2 isolating valves DN 25, and 2 valves DN 15

Modif.	A					Date : 23.10.1997	SECTION
Date	23.10.97					NOM : F.CARDOT BY	N° 181 M 002
Visa	F.C.					VISA : 	FEUILLE SHEET N°6/43

CHAPTER 2 : SYSTEM DESCRIPTION

This operating book concerns only the off-base cooling system. The GT. and Generator base mounted equipment is described in separate documents
GT. and Generator are cooled in series on a common water circulating closed loop.

2.1 Constitution

- The pump skid It is made up of 2 pumps of 100 % capacity each. It ensures the water circulation in the complete water loop.

Characteristics of motor-pump system

Monocellular centrifugal pump on the horizontal axis of the base

Semi elastic with spacer coupling with protection cap

Possibility of adjusting the motor/pump alignment.

The pump assembly and drive components shall be mounted on a common plate suitable for the static and dynamic loading expected from the assembly

- The Off base coolers will be made of two water/water exchangers of 120 % capacity each and will be designed for outside installation.
- The expansion tank ensures the minimal pressure in the circuit and compensates water volume variations due to dilatation and eventual leakage.
- The linking pipes, instrumentation and valves.

2.2 Mechanical characteristics

2.2.1 Shell and tube Heat exchanger

- Construction standards for design and fabrication : TEMA class C, ASME VIII Division 1 and ASTM
- Type : AEW, Horizontal axis following TEMA
 - Tube

Material :	Titanium ✓
In. Diameter (min):	16 mm
Thickness (min):	1.25 mm
Fouling resistance tube / shell :	0.00018 / 0.00009 m ² ·K / W
 - Tube sheet:

Material :	Titanium
tube / sheet assembly :	welded
 - Shell

Material :	Carbon steel
Thickness :	3 mm corrosion allowance
 - Water box

Material :	carbon steel
Internal protection :	4 mm of rubber (ebonite)
 - Waterbox connection :

Material :	Carbon steel with internal rubber (ebonite)
Size :	DN 350 mm - SO 150 #
 - Shell connection :

Material :	Carbon steel
Size :	DN 250 mm - SO 150 #
- Primary loop

Nature :	sea water
Design pressure :	1000 kPa
Pressure test :	1500 kPa
Fouling resistance :	0.00018 m ² ·K / W
Flow :	650m ³ /h
Maxi sea water temperature :	26 ° C
Number of pass :	1

Modify.	A	B	C			Date : 24.05.1996	SECTION 02
Date	24.05.96	27.06.96	21.10.96			Name : P. VALENTIN	N° 91.435.267.

- Secondary loop
 - Nature : Demineralized water with corrosion inhibitor
 - Fouling resistance : 0,00009 m²·K / W
 - Flow : 330m³/h m
 - Pressure test : 1500 kPa
 - Pressure calculation: 600 kPa (80 °C)
 - number of pass : 1

2.2.2 Motor pump groups

2.2.2.1 Pumps characteristics

- Pump design : NF EN 25-198
- Pump construction : NF E 44-121 and NF E 44-15 ; (ISO 5199)
- Speed : Max. 2900 rev/min.
- Efficiency : DIN 1944 / II
- Flow (2 x 110 %) : 360 m³/h
- HMT(Total head) : 50 m column H₂O
- Type of lubrication : oil
- Mechanical seal : Pumped water

Nota ; The pump shall be capable of operating at 110 % of the rated delivery head

2.2.2.2 Pumps metallurgy

- Shell and fittings box : SG casting (FGS)
- Impeller : bronze
- Shaft : stainless steel Z3CNDU 22 05 AZ according NF A 35-574
- Lantern : cast iron
- casing ring : bronze
- Mechanical seal : Carbide/Carbide cooled by pumped water
- Coupling : Semi elastic with spacer and protection

2.2.2.3 Electrical motor

- Power for the pump : 90 kw
- Class F - 50 Hz - IP 55

2.2.3 Expansion tank

A 2 m³ expansion tank will be provided. It will be made of a mild steel plate.

2.3 Thermic sizing

• PERFORMANCES

The supply will include 2 exchangers per GT. Each cooler must be capable of satisfying 120 % of the cooling requirements of the system at the maximum load and at the maximum cooling sea water temperature.

• Thermics

Cooled fluid.....demineralised water (See EGT specification 91 410 704 E "INSTRUCTION FOR COOLING WATER TREATMENT ") with 3 g/l of RD 11 (corrosion inhibitor)

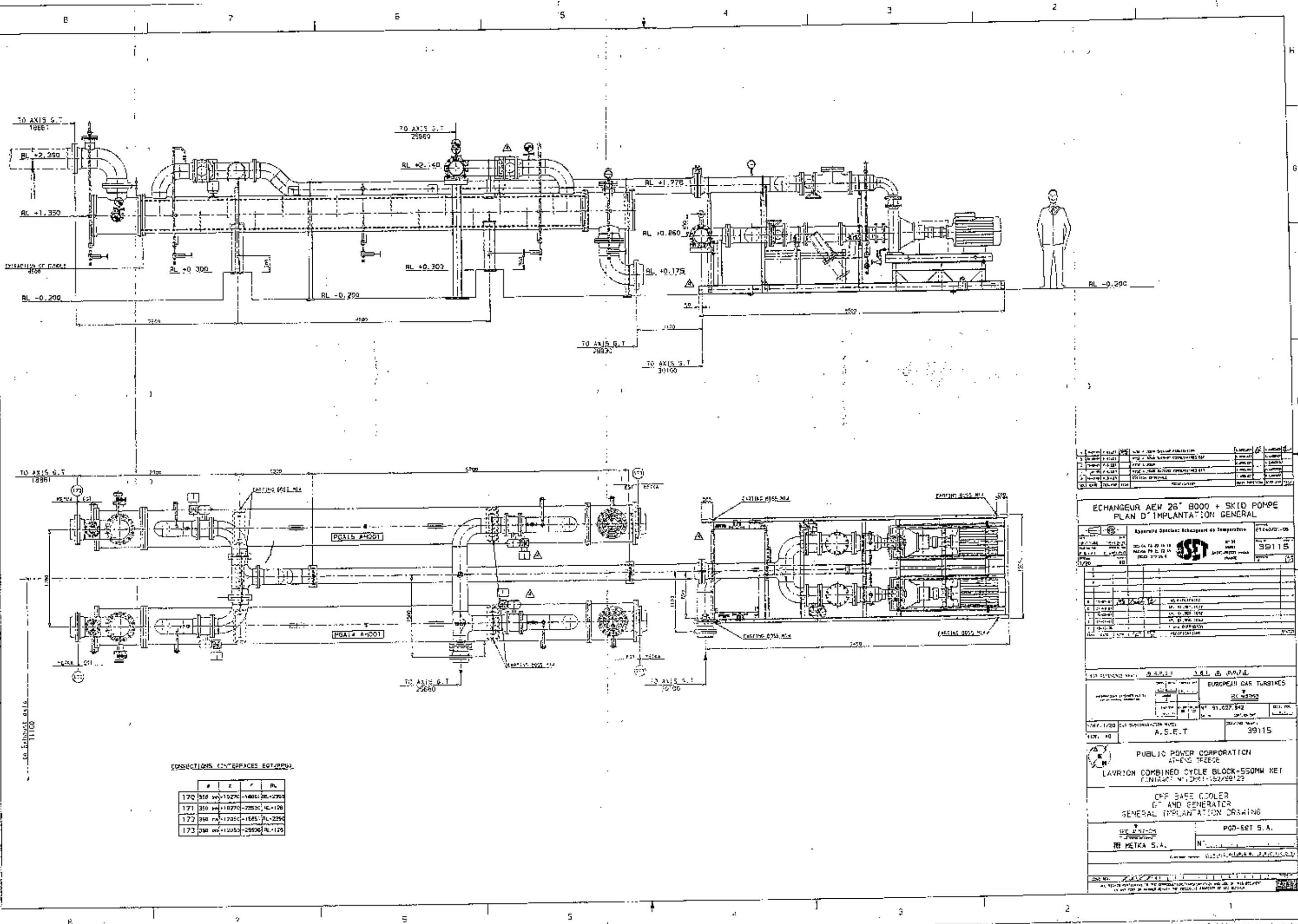
Flow at collector intake.....330 m³ / h

Water temperatures for these performances see attached sheet annex (at the end of this document).

Cleanliness factor : 0,85

Minimum surface : 231 m²

Modify.	A	B	C			Date : 24.05.1996	SECTION 02
Date	24.05.96	27.06.96	21.10.96			Name : P. VALENTIN	N° 91 435 267.



1	PROJETEUR	DATE	REVISION
2	VERIFIEUR		
3	APPRUEVE		
4	REVISION		
5	REVISION		

**ECHANGEUR AEW 26 8000 + SKID POMPE
PLAN D'IMPLANTATION GENERAL**

Appareil	Appareil	Appareil	Appareil
Appareil	Appareil	Appareil	Appareil
Appareil	Appareil	Appareil	Appareil
Appareil	Appareil	Appareil	Appareil

1			
2			
3			
4			
5			

APPAREIL	EUROPEAN GAS TURBINES
REF.	91.027.942
DATE	1991
PROJETEUR	A.S.E.T
VERIFIEUR	39115

**PUBLIC POWER CORPORATION
AT-ENG FREEZE**

LAVRION COMBINED CYCLE BLOCK-550MW NET
CONTRACT N° 12001-182/89/23

**COOLING WATER
C AND GENERATOR**

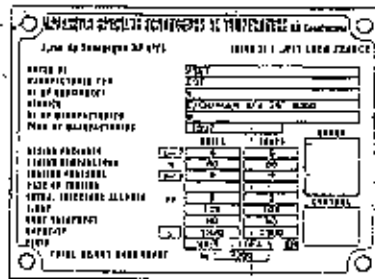
GENERAL IMPLANTATION DRAWING

PGD-EET S.A.

REF METKA S.A.

CONNECTIONS INTERFACES EGT/PPG

#	X	Y	RL
170	350	+10270	-22530 RL+2350
171	350	+10270	-22530 RL+1200
172	350	+12050	-1845 RL+2250
173	340	+12050	-29530 RL+1250



No of EQUIPMENT		No of MANUFACTURING	
1PG614	AH001 LAVQ4TPGA...F0001	B1440/2-a	
2PG614	AH001 LAVQ4TPGA...F0001	B1440/2-b	
3PG614	AH001 LAVQ4TPGA...F0001	B1440/1-a	
1PG615	AH001 LAVQ4TPGA...F0001	B1440/3-b	
2PG615	AH001 LAVQ4TPGA...F0001	B1440/2-b	
3PG615	AH001 LAVQ4TPGA...F0001	B1440/1-b	

PROTECTION INTERIEURE DES BOITES - CHANNEL INSIDE PROTECTION.
 TUYAUTES EN ALU ET EN FER - ALUMINUM AND SEA WATER PIPING

TOUTES LES ANCHES SONT RECOMMANDEES PAR LE PROJET.
 ALL WAGERS WILL BE ADVISORY FOR THIS PROJECT.
 - ACHÈVEMENT INTERIEUR COMPOSITE EP 4 x 4 mm.
 - INTERNAL COATING EPOXY 4 x 4 mm.

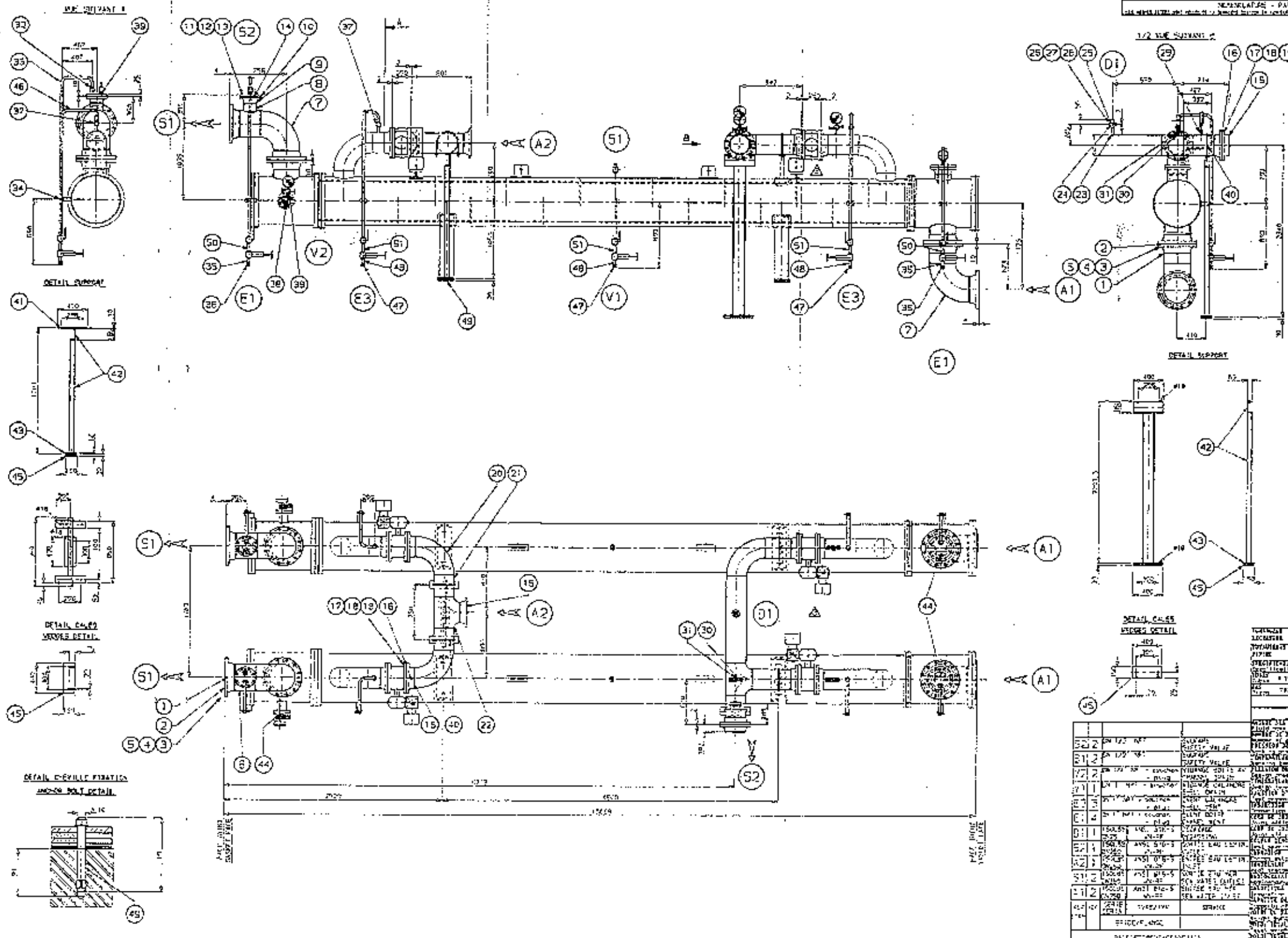
ANTI-CORROSION PROTECTION.

PELLES NON CALORIFERES
 NO INSULATED EQUIPMENT
 ISOLATEUR : 50 mm
 PVC SUPPORTING

REMARKS:

REMARQUE:
 - 1. CANTONNEMENTS INSERER DANS LES BOITES PRIMER TYPE
 - 1. FOURNEAU DE 100 x 100 mm

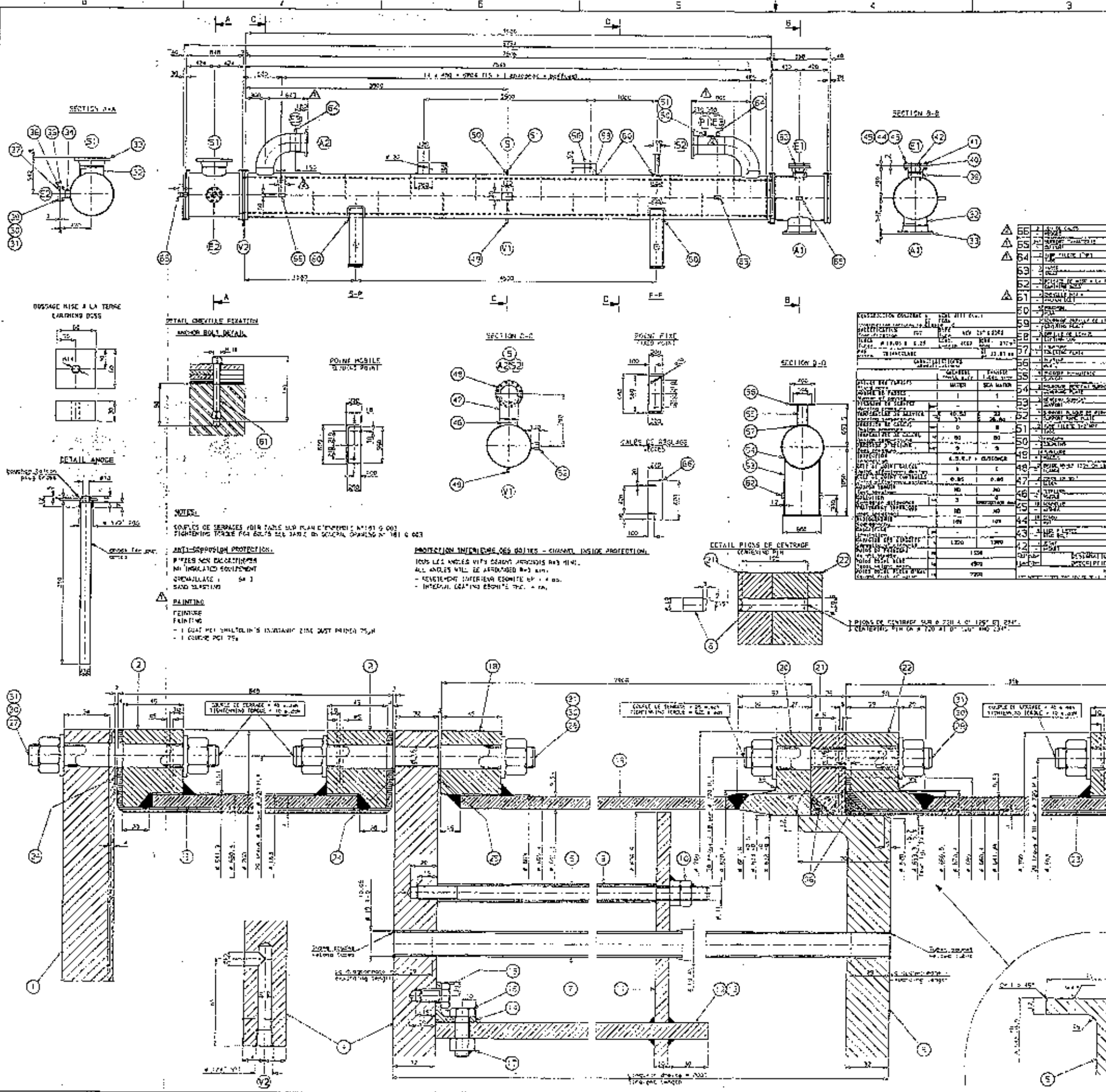
NO	DESCRIPTION	QUANTITE	UNITE	REMARKS
51
50
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37
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TUYAUTES ET ECHANGEUR AEW 20" 8000
 PLAN D'ARRANGEMENT

NO	DESCRIPTION	QUANTITE	UNITE	REMARKS
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EUROPEAN GAS TURBINES
 A.S.E.T.
 PUBLIC POWER CORPORATION
 LAYON COMBINED CYCLE BLOCK-850MW NET
 OFF BASE CONFER
 PIPING AND EXCHANGER AEW 20" 8000
 ARRANGEMENT DRAWING
 PG0-EST S.A.
 METKA S.A.



NO	DESCRIPTION	QUANTITE	UNITE	REMARKS
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NO	DESCRIPTION	QUANTITE	UNITE	REMARKS
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ECHANGEUR TYPE AEW 26" 8000
PLAN DE DETAIL

Appareil Appareil échangeur de température

38103

PUBLIC POWER CORPORATION
STATION GASTURBINE

LAVRIEN COMBINED CYCLE BLOCK-800MW NET
CONTRACT N°10MAT-152-89/28

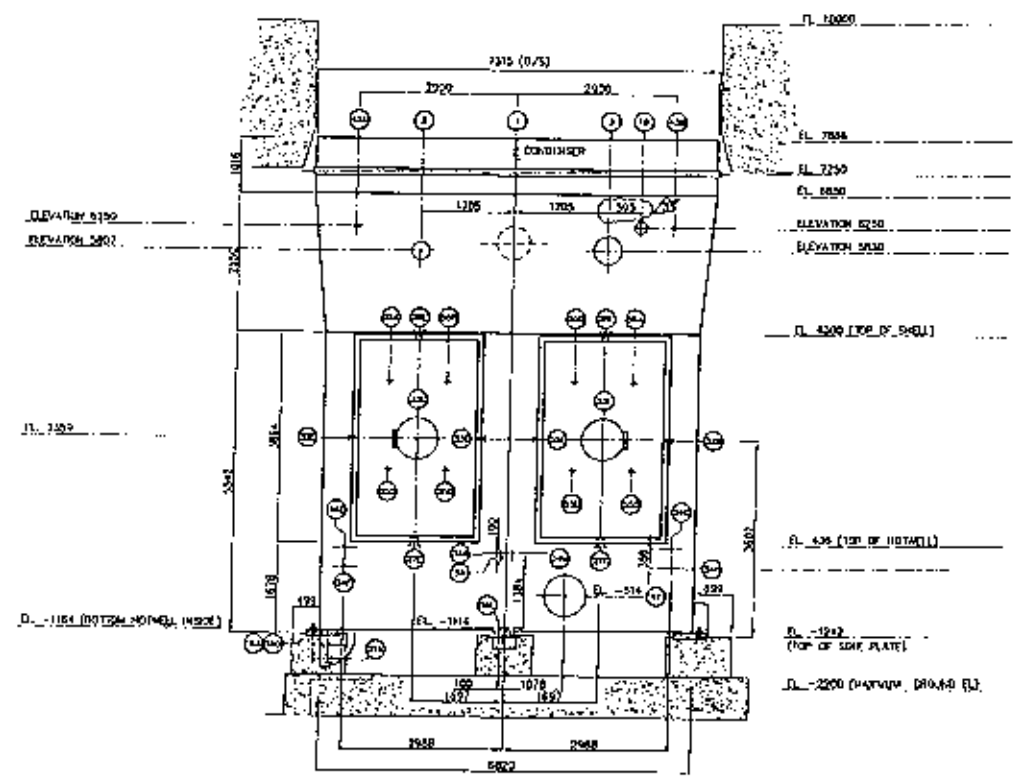
OFF BASE 003 89
GT AND GENERATOR
EXCHANGER AEW 26" 8000 - DETAIL DRAWING

PRO-EGT S.A.

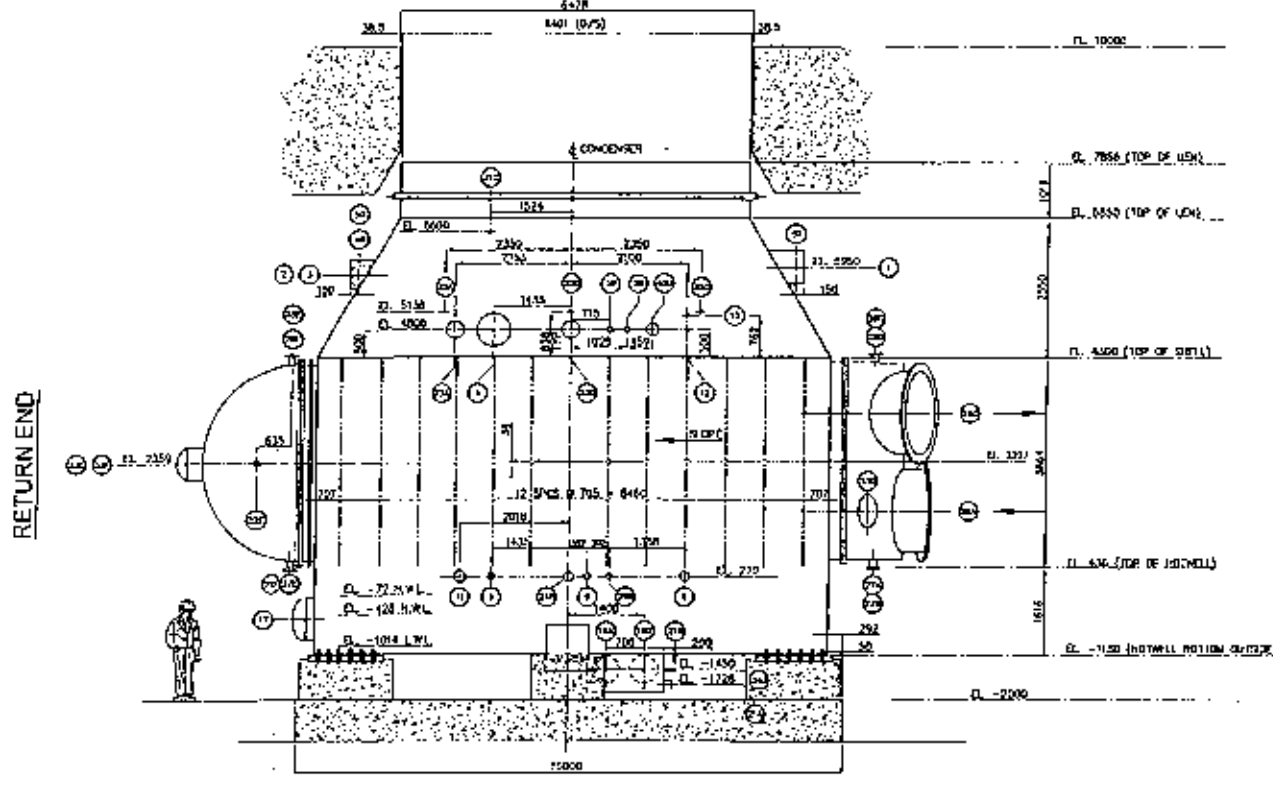
NETKA S.A.

GENERAL NOTES

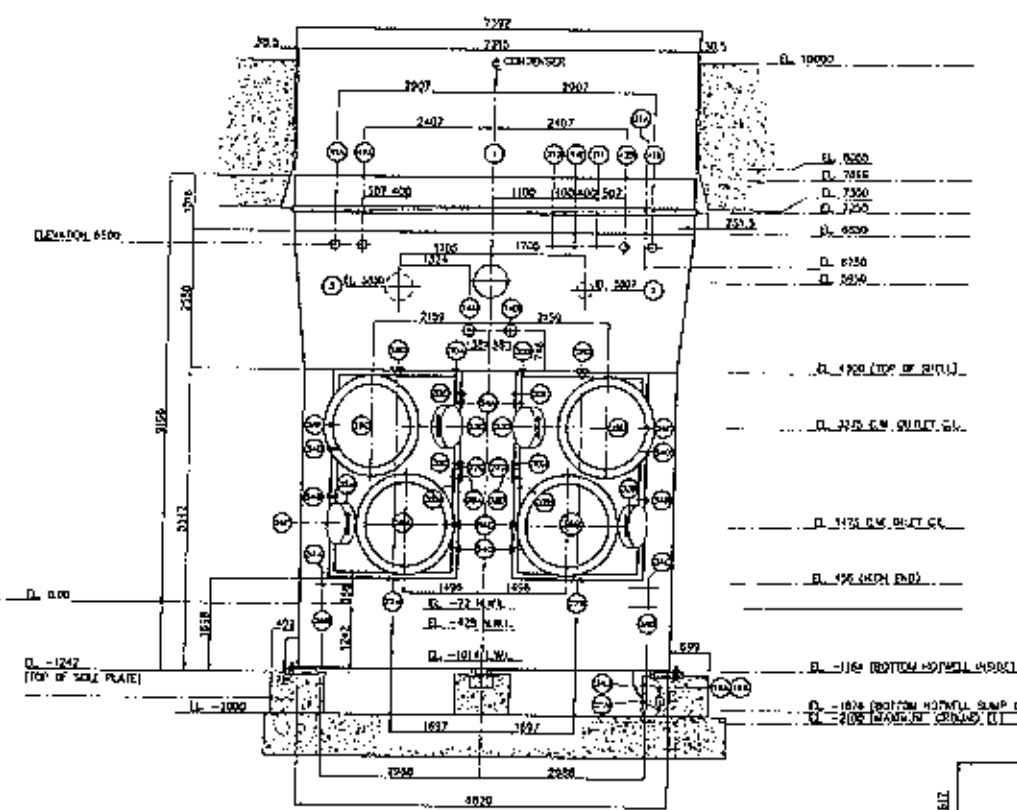
- 1- DO NOT SCALE THIS DRAWING USE COORDINATES
- 2- ALL DIMENSIONS ARE IN MM.



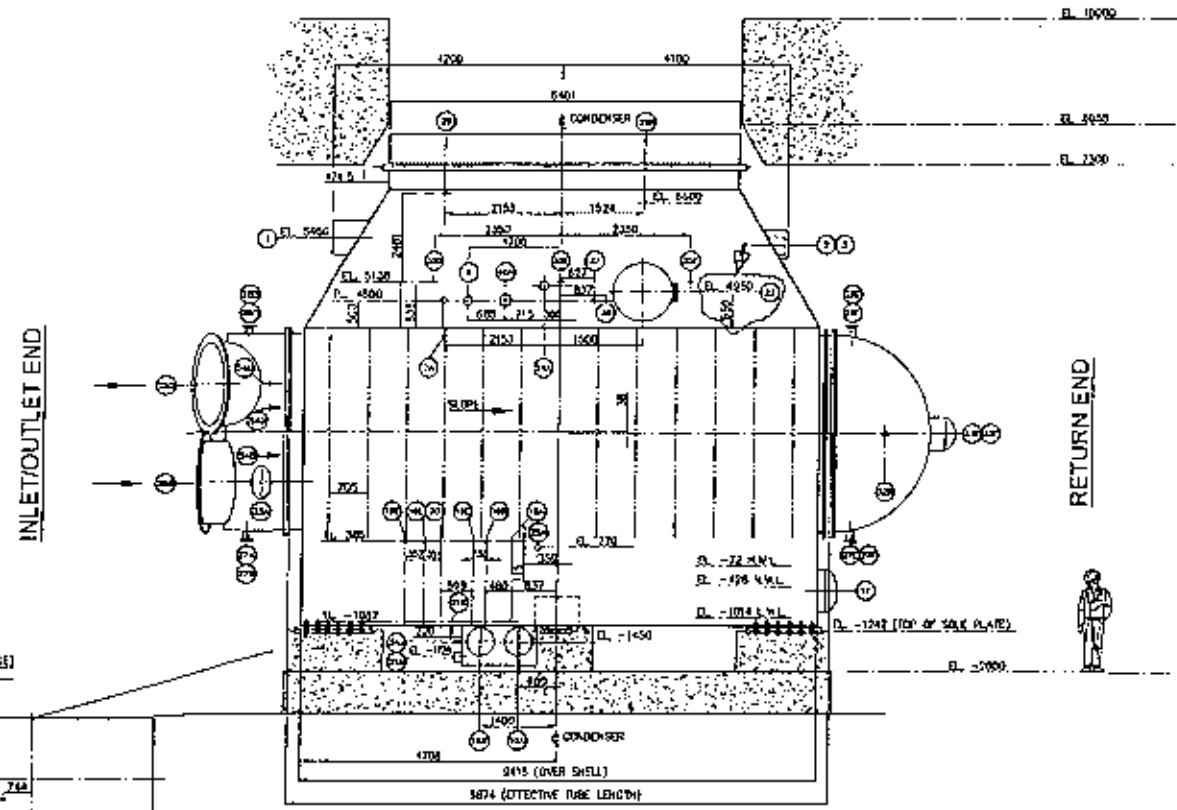
RETURN END VIEW
NORTH SIDE



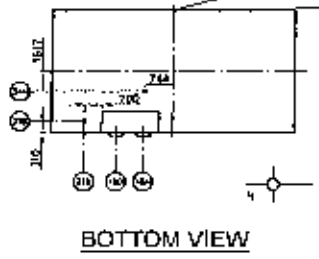
WEST SIDE ELEVATION



INLET/OUTLET END VIEW
SOUTH SIDE



EAST SIDE ELEVATION



BOTTOM VIEW

REFERENCE DRAWING

- THIS DRAWING TO BE READ IN CONJUNCTION WITH:
- 1- OUTLINE PLAN ARRANGEMENT
 - 2- FOUNDATION ARRANGEMENT
 - 3- SPILL ARRANGEMENT & DETAILS
 - 4- INLET/OUTLET WATERBOXES DETAILS
 - 5- RETURN WATERBOXES DETAILS
 - 6- EXPANSION JOINT/APPLICATOR KICK
 - 7- HOTWELL ARRANGEMENT & DETAILS
 - 8- EXHAUST KICK DETAILS
 - 9- CONNECTION LIST

NO.	DATE	DESCRIPTION
1	18-08-01	AS SUPPLIED
2	28-08-01	FOR SUBMISSION
3	29-08-01	GENERAL REVIEW
4	30-08-01	FINALIZATION
5	31-08-01	DESCRIPTION

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FW CONTRACT NO. 27028 DWG NO. 0-2

Contains information for the design systems and components

VERIFICATION N/A JUDYSLIP, D DOCUMENT CO NOT

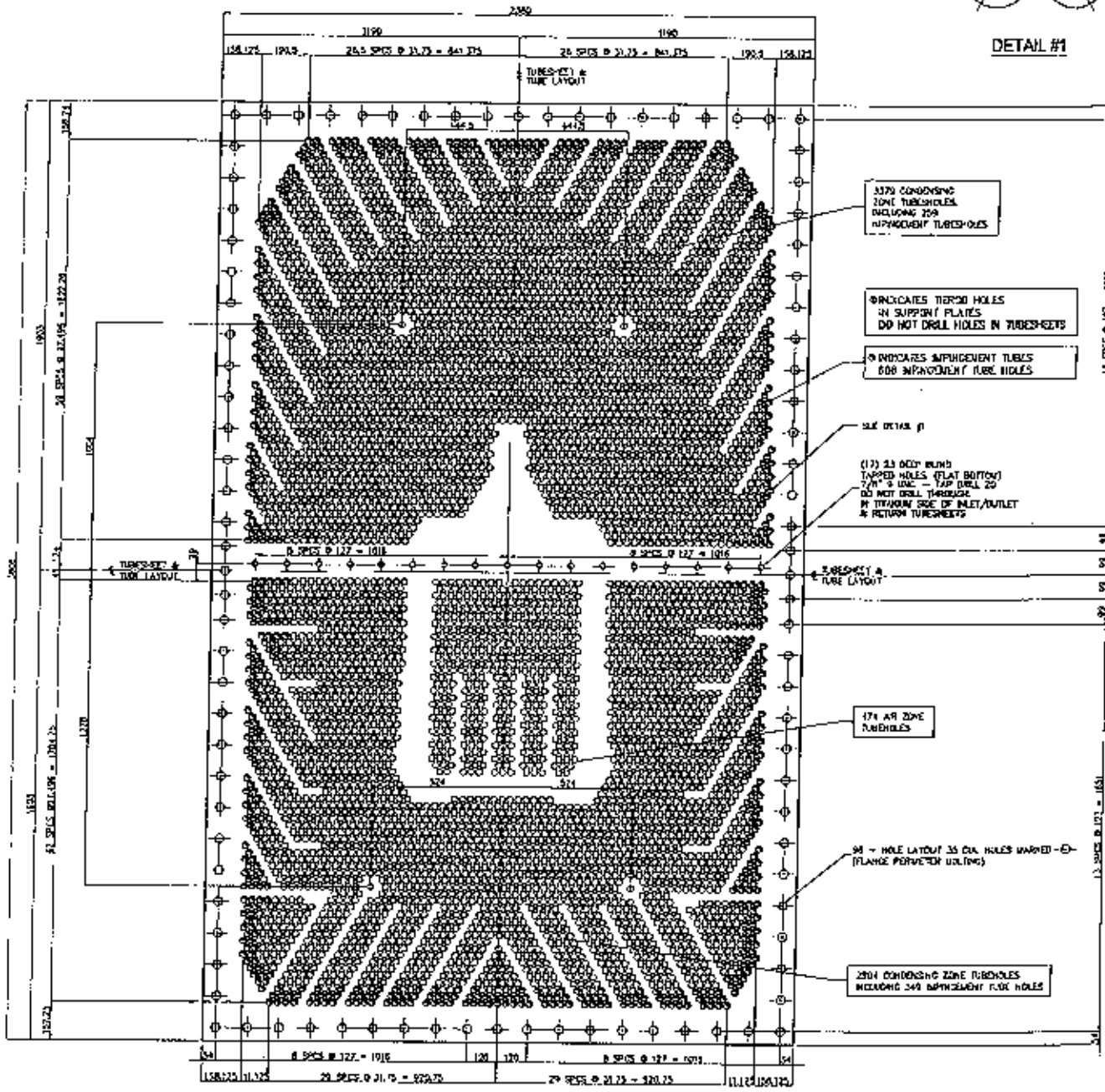
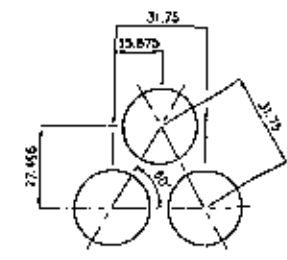
PUBLIC POWER CORPORATION

METKA OUTLINE ELEVATION

PETRA DONGAL
SAS DONGAL 10-3-01-00-2
CA DWG

PARTS LIST				
PART No.	QTY	FIELD SHOP	DESCRIPTION	PO NUM
2801	2	S	45 TUB. x 3826 x 2380 LG (BASE 40 TO A-516 OR 70 CLAD WITH (5) mm Ti B-265 Cr-1)	
2802	2	S	45 TUB. x 3826 x 2380 LG (BASE 40 TO A-516 OR 70 CLAD WITH (5) mm Ti B-265 Cr-1)	
2801	12298	S	25.4 O.D. TUBE x 9964 LG (D.022" AV WALL) TITANIUM TO B-338 Cr. 2	
2802	1216	S	25.4 O.D. TUBE x 9964 LG (D.022" AV WALL) TITANIUM TO B-338 Cr. 2	

QUANTITIES LISTED ABOVE ARE FOR TWO(2) CONDENSER TUBE MODULES

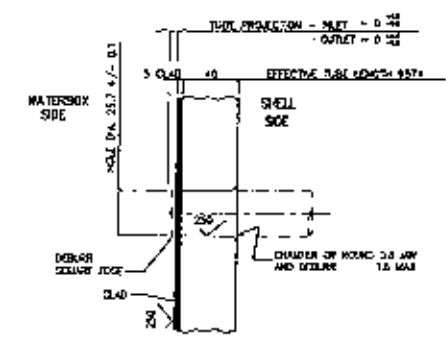


TUBESHEET LAYOUT AS VIEWED FROM INLET/OUTLET END OF CONDENSER

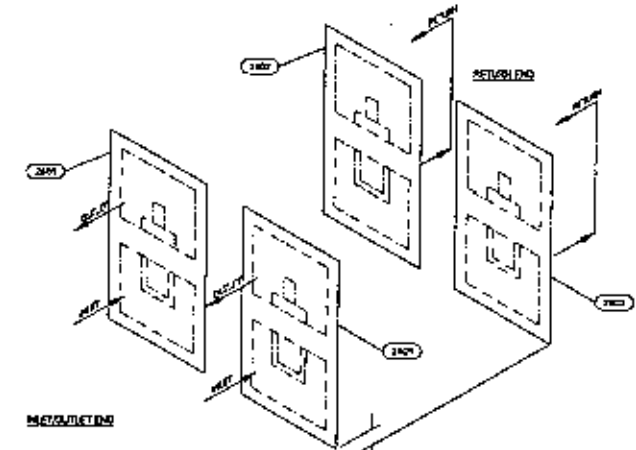
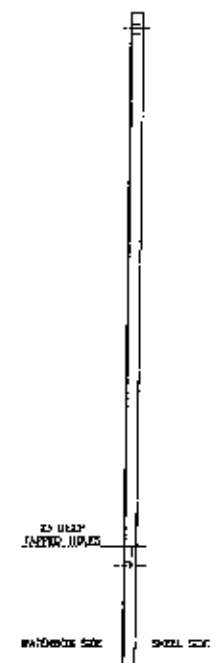
8757 HOLES FOR 25.4 (1") O/D TUBES
 (6283 COND. ZONE & 474 AIR ZONE)
 TUBES ON 31.75 (1 1/4") TRIANGULAR PITCH

2801 INLET/OUTLET TUBESHEET
 2802 RETURN TUBESHEET

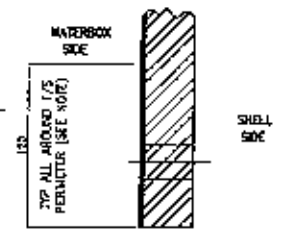
TUBESHOLES INDICATED ○ FOR TITANIUM 24 BWG TUBES
 TUBESHOLES INDICATED ⊙ FOR TITANIUM 22 BWG TUBES



TYPICAL TUBEHOLE DETAIL
 TUBES TO BE ROLLED & WELDED AT FINAL ASSEMBLY



KEY ARRANGEMENT OF TUBESHEETS



NOTE:
 TUBE SHEET SURFACE IN THE GASKET AREA TO BE SANDED TO PROVIDE A SMOOTH (250 RMS) SURFACE, FREE FROM SCALE, RUST, PITS, NICKS & COAKES WHICH COULD PROVIDE A LEAK PATH UNDER THE GASKET.

WELD SYMBOLS (ASME)	

- 1.- DO NOT DIMENSION
- 2.- DIM. S
- 3.- SEE T
- IN RE
- 4.- COLE
- (+5/
- (-10/
- 5.- MAXIM
- LESS
- 6.- IMPING
- ITS WE
- 7.- ALL DI
- 8.- ESTIMA
- BEFO
- AFFE

REV	DATE
1	12-10-78
2	12-10-78



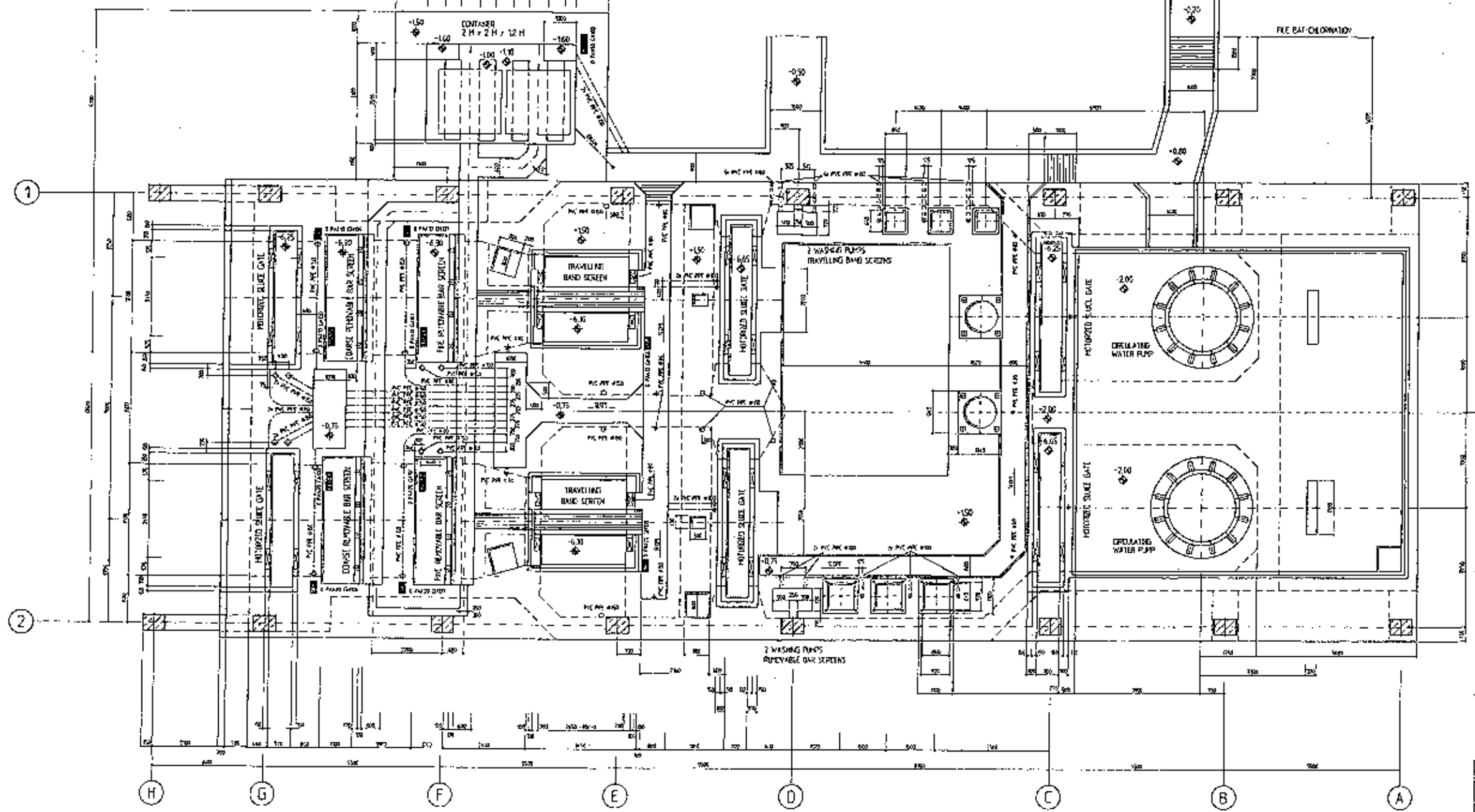
FRESA CONTRACT
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 VERIFICATION



FF METI

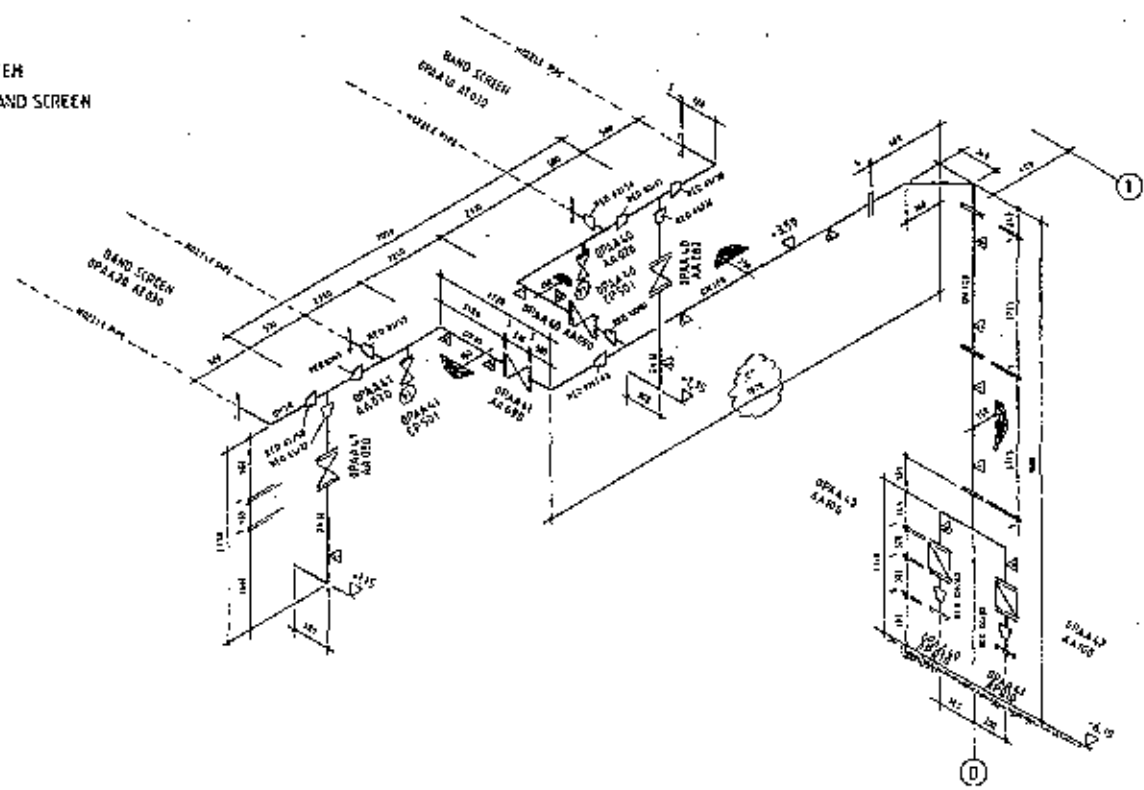


TOP VIEW

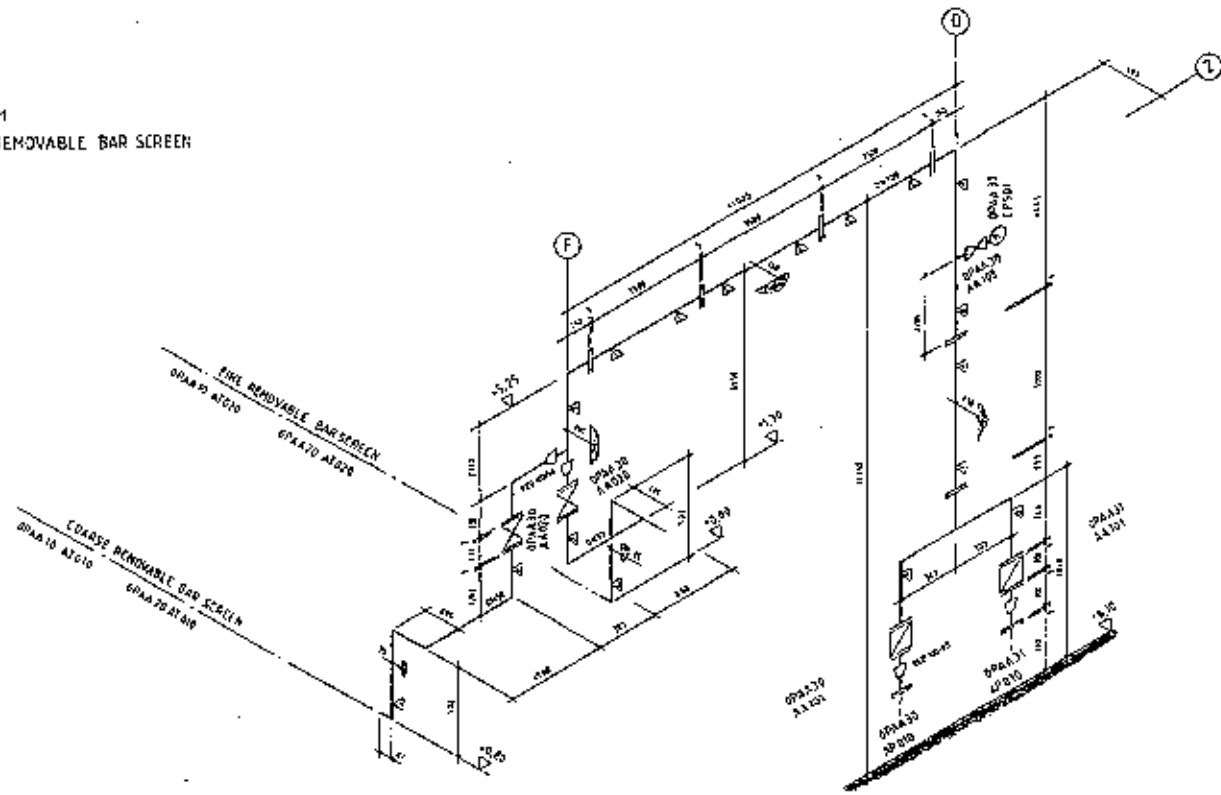


<p>SCALE: 1:50 UNIT: METERS DATE: 15/07/2011 DRAWING NO: 102/07/01/001/003</p>		
<p>CLIENT: LUREI BAHAG GmbH PROJECT: PUBLIC POWER CORPORATION ATHENS GREECE LAVRION COMBINED CYCLE BLOCK - 550 MW NET CONTRACT No: 0167-162/99129</p>		
<p>TERMINAL AND CONTROL BOXES</p>		
<p>DESIGNED BY: METKA S.A. DRAWN BY: METKA S.A.</p>		<p>PGD-PPG No: LAV00MCFIC0311003 Customer number: LAV00MFAAC011003</p>
<p>ISSUE: REV. 1.1 ALL RIGHTS RESERVED TO THE HOLDER OF THE INTELLECTUAL PROPERTY RIGHTS OF THE DRAWING IN ANY CASE IN WHICH BEING THE EXCLUSIVE PROPERTY OF METKA S.A.</p>		

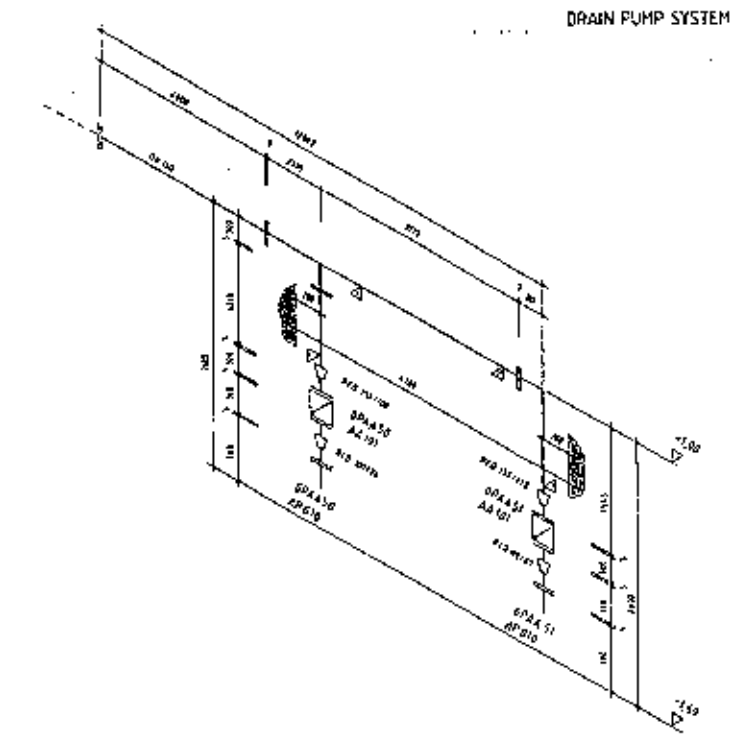
WASHING SYSTEM
TRAVELLING BAND SCREEN



WASHING SYSTEM
COARSE & FINE REMOVABLE BAR SCREEN



DRAIN PUMP SYSTEM



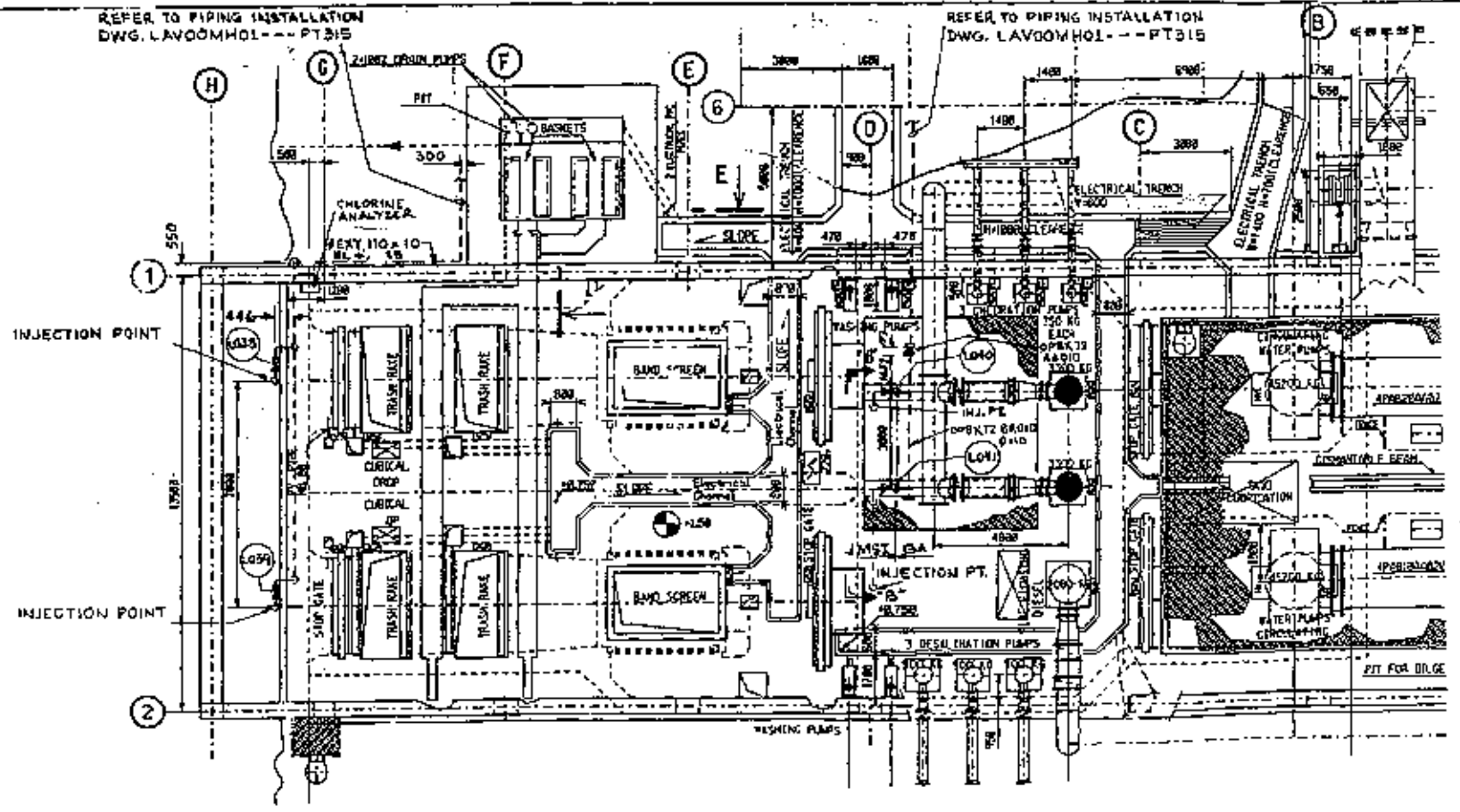
NO.	QTY	UNIT	DESCRIPTION	DN	SIZE	MATERIAL	REMARK
33	2	10	PIPE FLANGE DN=100	2517	0.50	PE-HD	
34	2	10	PIPE SUPPORT H	3500	3.00	PE-HD	
35	2	10	SPRAY WASHING PUMP	3500	3.00	PE-HD	
36	2	10	OUTLET WASHING PUMP	400	3.00	PE-HD	
37	4	10	RED GATE DN=100	2188	PE-HD		
38	2	100	RED GATE DN=125	2188	PE-HD		
39	2	100	ELBOW 90° DN=125	0.25	PE-HD		
40	2	50	PIPE SUPPORT G	1.00	AA		
41	4	50	PIPE SUPPORT E	14.00	PE-HD		
42	2	72	PIPE SUPPORT C	3.00	AA		
43	2	80	PIPE SUPPORT D	14.10	PE-HD		
44	1	80	PIPE SUPPORT C	24.00	PE-HD		
45	5	100	PIPE SUPPORT B	17.50	PE-HD		
46	1	120	PIPE SUPPORT A	24.00	AA		
47	2	10	PRESSURE GAUGE	2.00	AA		
48	1	100	CHECK VALVE	199.00	SS		
49	2	72	SHUTTER VALVE	11	SS		
50	2	50	SHUTTER VALVE	32.00	SS		
51	2	50	SHUTTER VALVE	48.00	SS		
52	1	100	WASHER BIT	120	8.75	AA	
53	1	100	HEX NUT M10	9.34	8.75	AA	
54	1	100	HEX BOLT M10x15	9.21	3.70	AA	
55	1	100	HEX BOLT M10x10	9.21	1.81	AA	
56	1	32	GASKET	3870	0.75	CR	5x5 mm
57	1	50	GASKET	2090	0.75	CR	5x5 mm
58	1	80	GASKET	2090	0.75	CR	5x5 mm
59	1	100	GASKET	2090	1.50	CR	5x5 mm
60	1	32	FLANGE ADAPTOR DN=40	0.75	PE-HD		
61	4	50	FLANGE ADAPTOR DN=80	0.50	PE-HD		
62	4	60	FLANGE ADAPTOR DN=80	1.70	PE-HD		
63	27	100	FLANGE ADAPTOR DN=125	16.00	PE-HD		
64	3	72	BACKING FLANGE DN=40	1.50	PE-HD		
65	4	50	BACKING FLANGE DN=50	3.45	PE-HD		
66	1	60	BACKING FLANGE DN=60	14.10	PE-HD		
67	1	100	BACKING FLANGE DN=125	14.10	PE-HD		
68	5	63	RED GATE DN=75	0.15	PE-HD		
69	2	65	RED GATE DN=75	0.15	PE-HD		
70	2	85	RED GATE DN=100	0.25	PE-HD		
71	4	100	RED GATE DN=125	0.41	PE-HD		
72	1	10	RED GATE DN=10	2.14	PE-HD		
73	2	85	RED GATE DN=85	0.30	PE-HD		
74	1	85	RED GATE DN=85	3.80	PE-HD		
75	2	100	RED GATE DN=125	2.00	PE-HD		
76	1	32	ELBOW 90° DN=40	0.65	PE-HD		
77	1	50	ELBOW 90° DN=50	1.75	PE-HD		
78	1	80	ELBOW 90° DN=80	1.80	PE-HD		
79	1	100	ELBOW 90° DN=125	3.70	PE-HD		
80	1	32	FLG 40x37.5x5000	8074	2.40	PE-HD	
81	1	50	FLG 45x40x11000	8074	11.50	PE-HD	
82	1	45	FLG 50x40x1800	8074	1.50	PE-HD	
83	1	45	FLG 50x40x1000	8074	27.50	PE-HD	
84	1	100	FLG 125x100x1500	8074	174.8	PE-HD	

NO.	QTY	UNIT	DESCRIPTION	DN	SIZE	MATERIAL	REMARK
38	1	10	ADHESIVE CARTRIDGE	0.70	0.70	AA	
39	1	10	STUD BOLT M10x10	4.80	AA	NO NUT/SPACER	
40	1	10	HEX BOLT M10x10	9.21	11.5	AA	
41	1	50	TEE DN=125	1.00	PE-HD		
42	2	100	DRAIN PUMP	450	240.00		
43	2	100	PIPE SUPPORT J		AA		
44	2	150	PIPE SUPPORT I		AA		
45	1	40	WASHER BIT	120	8.75	AA	
46	2	100	HEX NUT M10	9.34	8.75	AA	
47	1	100	HEX BOLT M10x15	9.21	3.70	AA	
48	1	100	HEX BOLT M10x10	9.21	1.81	AA	
49	1	150	GASKET	2090	0.75	CR	5x5 mm
50	7	150	FLANGE ADAPTOR DN=100	0.60	PE-HD		
51	7	150	BACKING FLANGE DN=100	17.30	PE-HD		
52	2	150	RED GATE DN=150	0.73	PE-HD		
53	1	150	RED GATE DN=150	2.75	PE-HD		
54	1	150	BOCET BY DN=150	1.90	PE-HD		
55	1	150	PIPE 140x140x10000	8074	104.75	PE-HD	

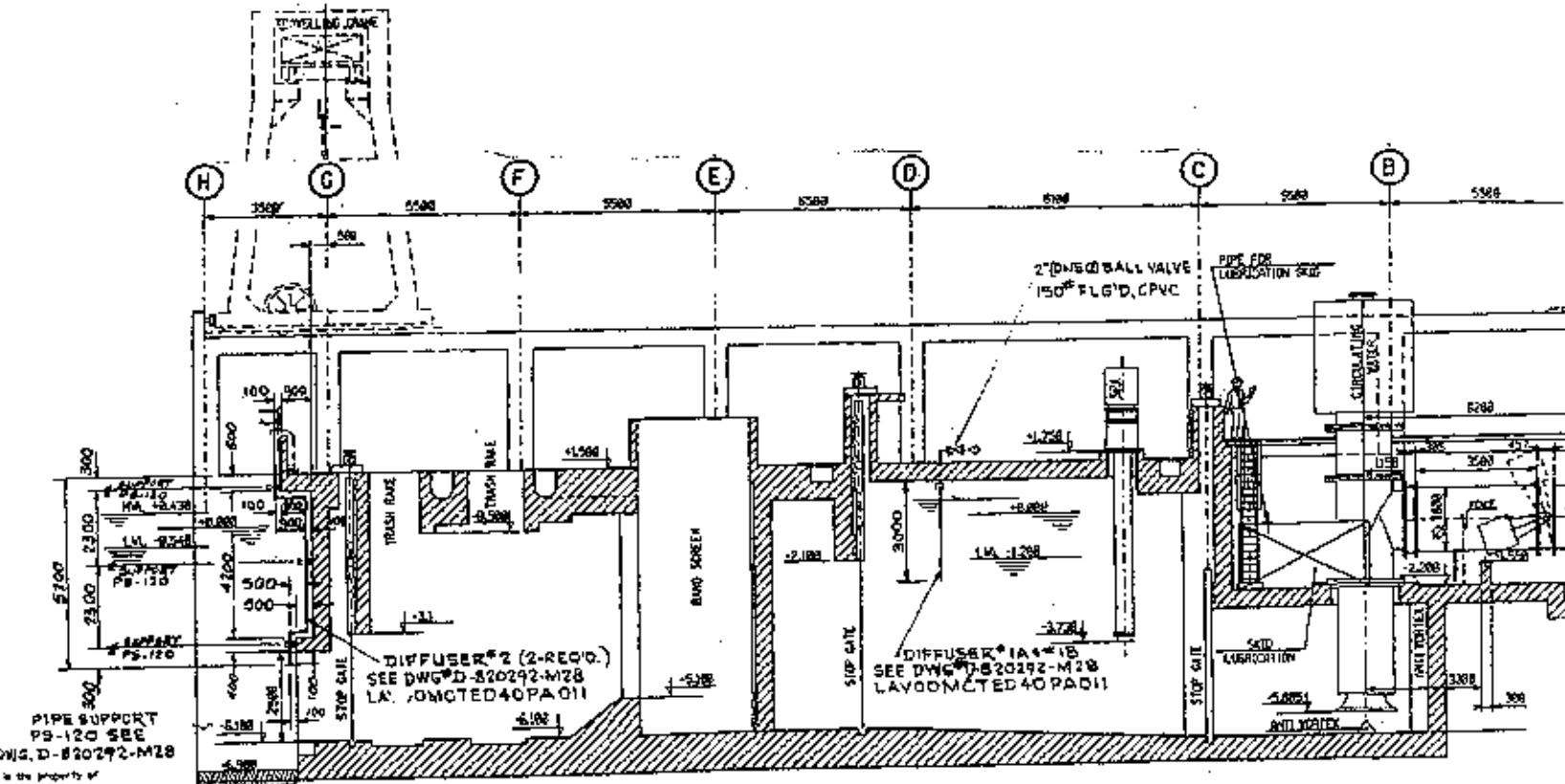
NO.	QTY	UNIT	DESCRIPTION	DN	SIZE	MATERIAL	REMARK
1	1	100	FLG 125x100x1500	8074	174.8	PE-HD	
2	1	45	FLG 50x40x1800	8074	1.50	PE-HD	
3	1	50	FLG 45x40x11000	8074	11.50	PE-HD	
4	1	45	FLG 50x40x1000	8074	27.50	PE-HD	
5	1	100	FLG 125x100x1500	8074	174.8	PE-HD	

NO.	DATE	DESCRIPTION	BY	CHECKED
1	15.01.98	LP TO DATE		
2	04.11.03	UP TO DATE		
3	13.06.97	FIRST ISSUE		

SCALE: 1:1
 PROJECT: LUPA DAMA GMBH
 PUBLIC POWER CORPORATION
 ATHENS GREECE
 LAVRION COMBINED CYCLE BLOCK - 550 MW NET
 CONTRACT NO. 010KT-162/99129
 ISOMETRIC DRAWING
 WASHING SYSTEM
 DESIGNER: PGD-PPG
 CUSTOMER NUMBER: LAVRION/PPA/01/01/001



PLAN VIEW



SECTION AA

LEGEND
 — PIPING BY JMSI
 - - - PIPING & INSTALLATION BY OTHERS

REV	DATE	BY	CHKD	APP	DESCRIPTION	STATUS
D	5-5-78	MSK	LJS	LJS	FINAL	FUS
C	1-30-78	MSK	LJS	LJS	ADDED CHLORINE ANALYZER	BPO
B	11-3-77	MSK	LJS	LJS	REVISED HOR. PIPING IN PLAN VIEW	BPO
A	12-3-77	MSK	LJS	LJS	PRELIMINARY	BPO

SCALE: SUPPLIER MAKE: NO. PRESCRIPTION NO.

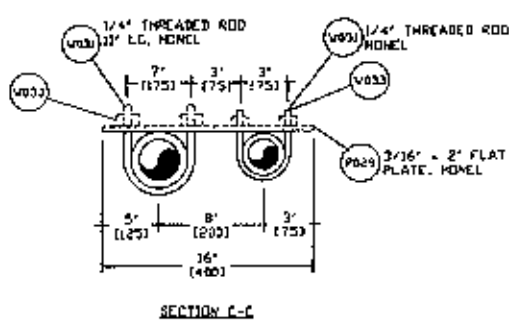
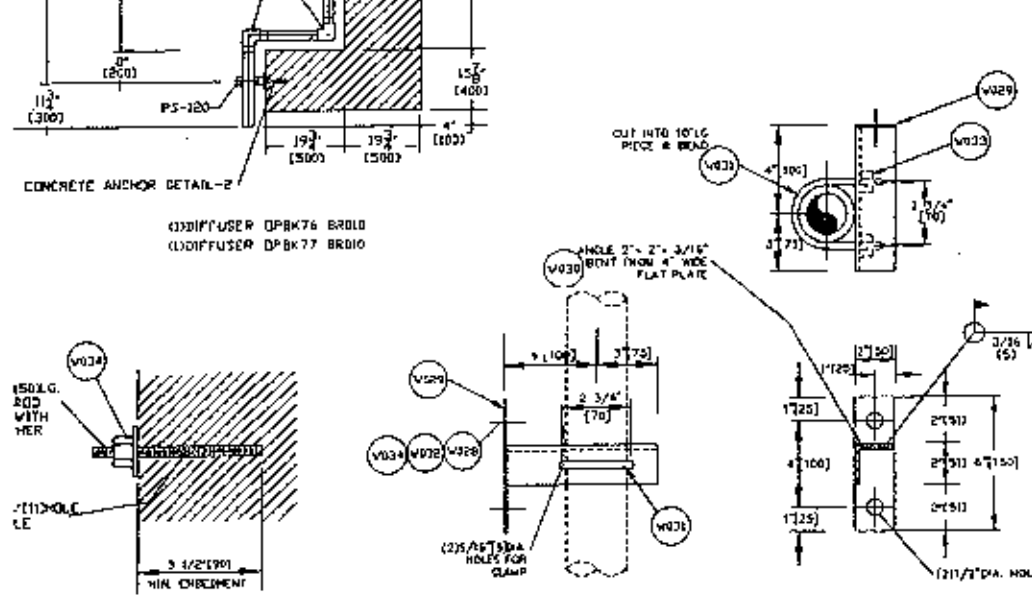
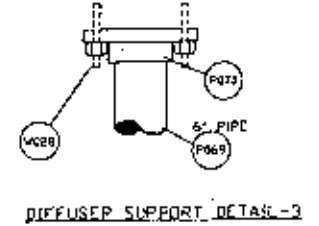
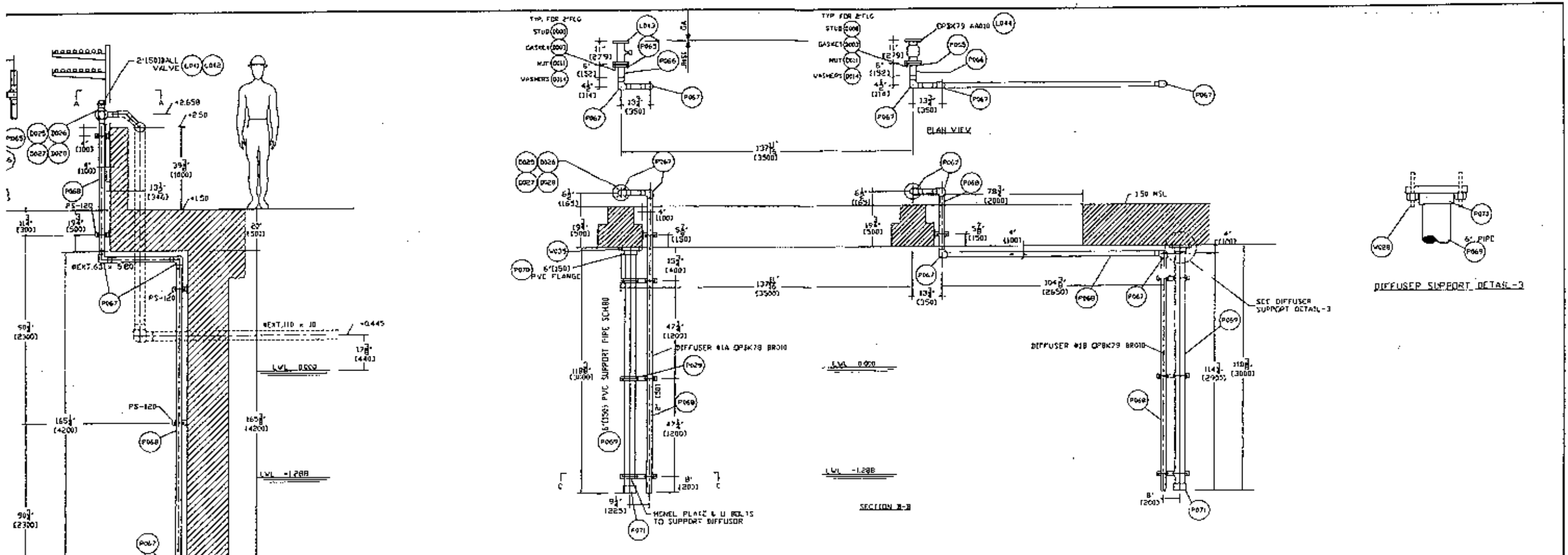
PUBLIC POWER CORPORATION
 ATHENS GREECE

LAVRION COMBINED CYCLE BLOCK - 550 MW NET
 CONTRACT No: DMKT-162/89128

ELECTROCHLORINATION SYSTEM
 COOLING WATER FILTRATION
 PUMPS STATION - PLAN AND SECTION VIEW
 MECHANICAL LAYOUT

S.O. NO. B20292	CONTRACT NO. 65.7022.0059
JOHNSON MARCH SYSTEMS, INC. 230 RAZ. RD. ST. LOUIS, MO. 63124	
DESIGNED BY: JMS DATE: 12-18-97 SCALE: 1"=1'-0"	APPR. BY: JMS DATE: 1-18-98 SCALE: 1"=1'-0"
DWG. NO. D-820292-M55	CUSTOMER NUMBER: LAVCOMFUNDOPAD10

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DIFFUSER SUPPORT DETAIL-1
MAT'L: 3/16" (5) THICK, MESH

SUPPORT NO.	PIPE SIZE	QTY.	USED ON	LINE #	DIFFUSER #
PS-120	2" (50)	5	-H55	DPBK76 BR010	#1 (DWG-H28)
	2" (50)	5	-H55	DPBK77 BR010	#1 (DWG-H28)
	2" (50)	3	-H55	DPBK78 BR010	#2 (DWG-H28)
	2" (50)	3	-H55	DPBK79 BR010	#2 (DWG-H28)

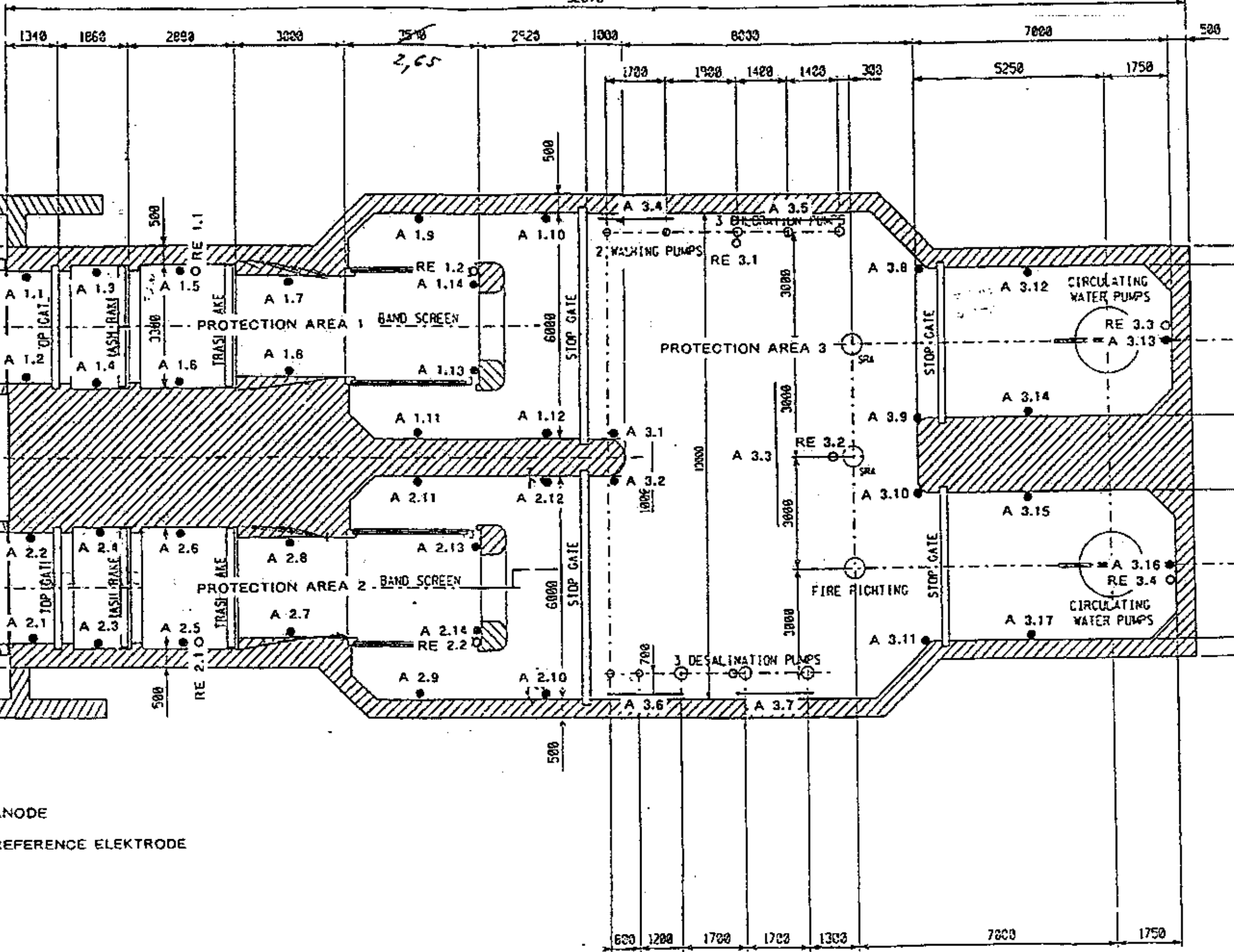
LEGEND
 PIPING BY JMS
 PIPING & INSTALLATION BY OTHERS

REV	DATE	BY	CHK	DESCRIPTION	STATUS	
B	05-05-98	GKD	LJS	LJS	ADDED HARDWARE TAG NOS.	FUS
C	02-21-98	GKD	LJS	LJS	REVISED VALVE NOS.	EPD
B	12-30-97	GKD	LJS	LJS	REVISED SECTION 'A-A', DIM. IN SEC. 'B-B'	BPD
A	12-18-97	GKD	LJS	LJS	INITIAL SUBMITTAL	BPD

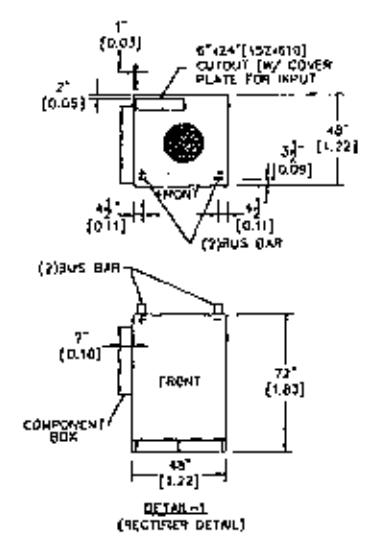
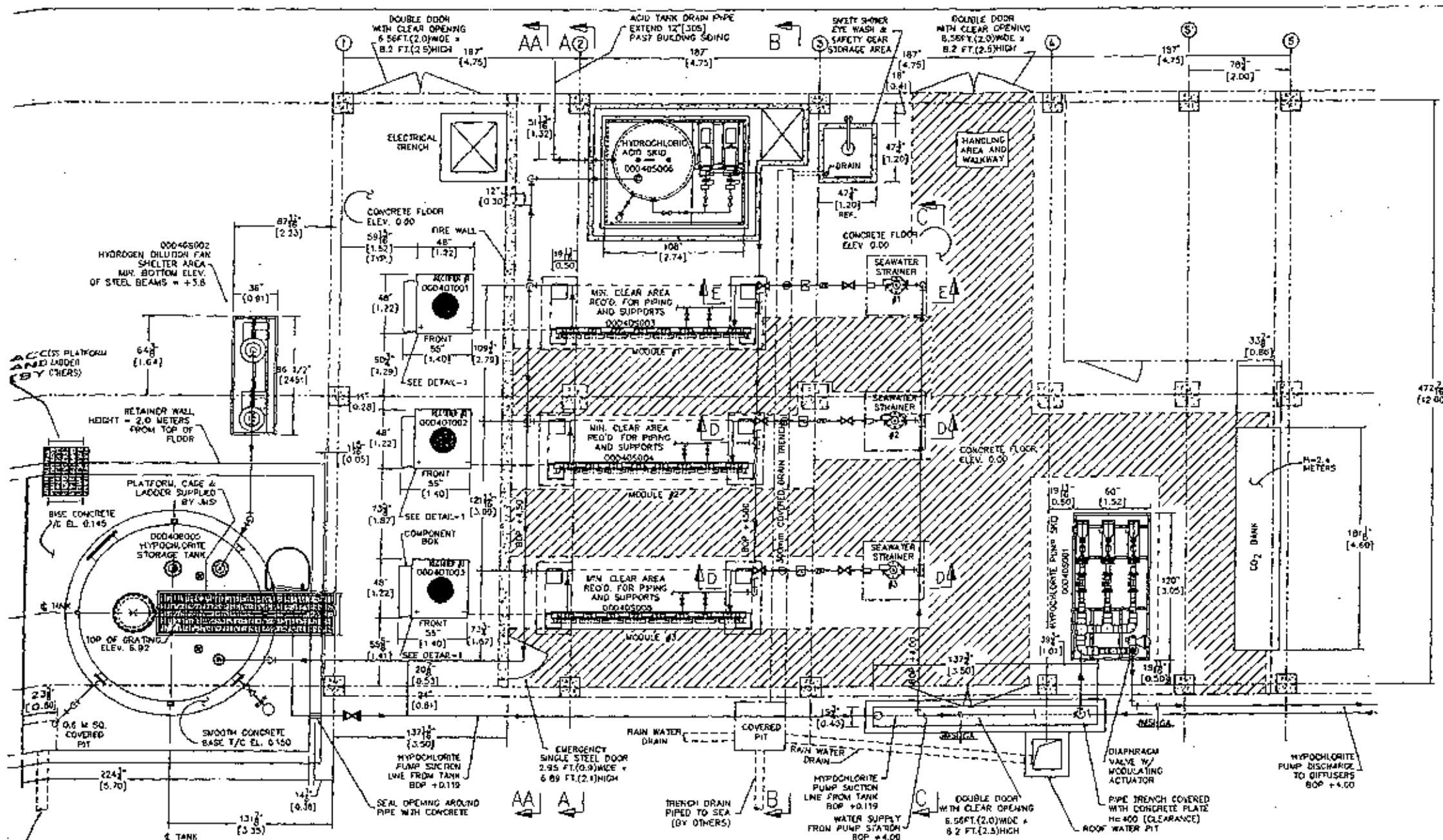
PUBLIC POWER CORPORATION
 ATHENS GREECE
 LAVRION COMBINED CYCLE BLOCK - 550 MW NET
 CONTRACT No: DMKT-162/99/29
 ELECTROCHLORINATION SYSTEM
 DIFFUSER DETAILS & SECTIONAL VIEWS

S.O. NO. B20292 | CONTRACT NO. 65.7022.0039
JOHNSON MARCH SYSTEMS, INC.
 230 BALDWIN DR. | SYCAMORE, PA 17374
 Customer number: LAVRION-PPG
 SCALE: 1/2" = 1'-0"

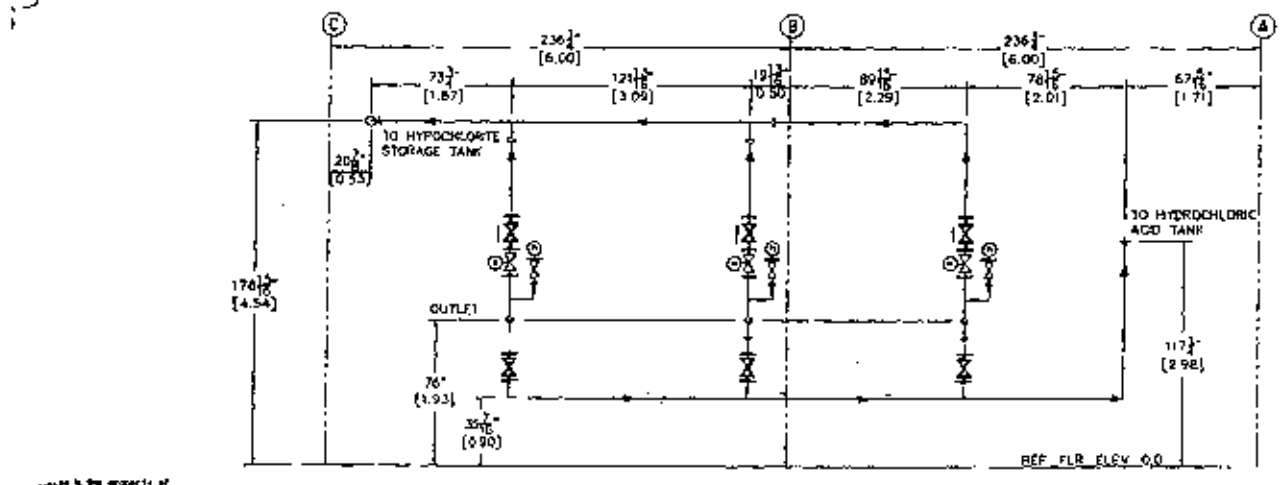
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A - ANODE
 RE - REFERENCE ELEKTRODE



PLAN VIEW
TOP OF FLOOR ELEV. = 0.00
FLOOR ELEVATION 0.00 OF THE BUILDING = +1.5 MEAN SEA LEVEL



SECTION AA-AA

REV	DATE	BY	CHKD	APP	DESCRIPTION	INDICATIONS
H	2-5-98	GRD	LJS	LJS	ADDED EQUIPMENT LMA NUMBERS	FUS
G	3/9/97	GRD	LJS	LJS	ADDED PIPE TRENCH, ROOF WATER PIT & SHOWER REEL PAD	BPO
F	4/25/97	GRD	LJS	LJS	RELDC ACID SKID, ADD DETAIL #1 OF RECTIFIER	BPO
E	7/26/97	GRD	LJS	LJS	REVISED RECTIFIER LOCATIONS PER VENDOR DWG.	BPO
D	7/7/97	JLG	LJS	LJS	INCORPORATE COMMENTS FROM FAX [7/4/97]	BPO
C	5/27/97	JLG	LJS	LJS	INCORPORATE COMMENTS FROM V. DELMAS [4/28/97]	BPO
B	4/21/97	JLG	LJS	LJS	INCORPORATE COMMENTS FROM 4/2/97 MEETING	BPO
A	3/31/97	JLG	LJS	LJS	PRELIMINARY	BPO
REV	DATE	BY	CHKD	APP	DESCRIPTION	INDICATIONS

SCALE: SUPPLIER MARK: NO. DIMENSION NO.

PUBLIC POWER CORPORATION
ATHENS GREECE

LAVRION COMBINED CYCLE BLOCK - 550 MW NET
CONTRACT NO. DMKI-162/99129

GENERAL ARRANGEMENT
ELECTROCHLORINATION SYSTEM

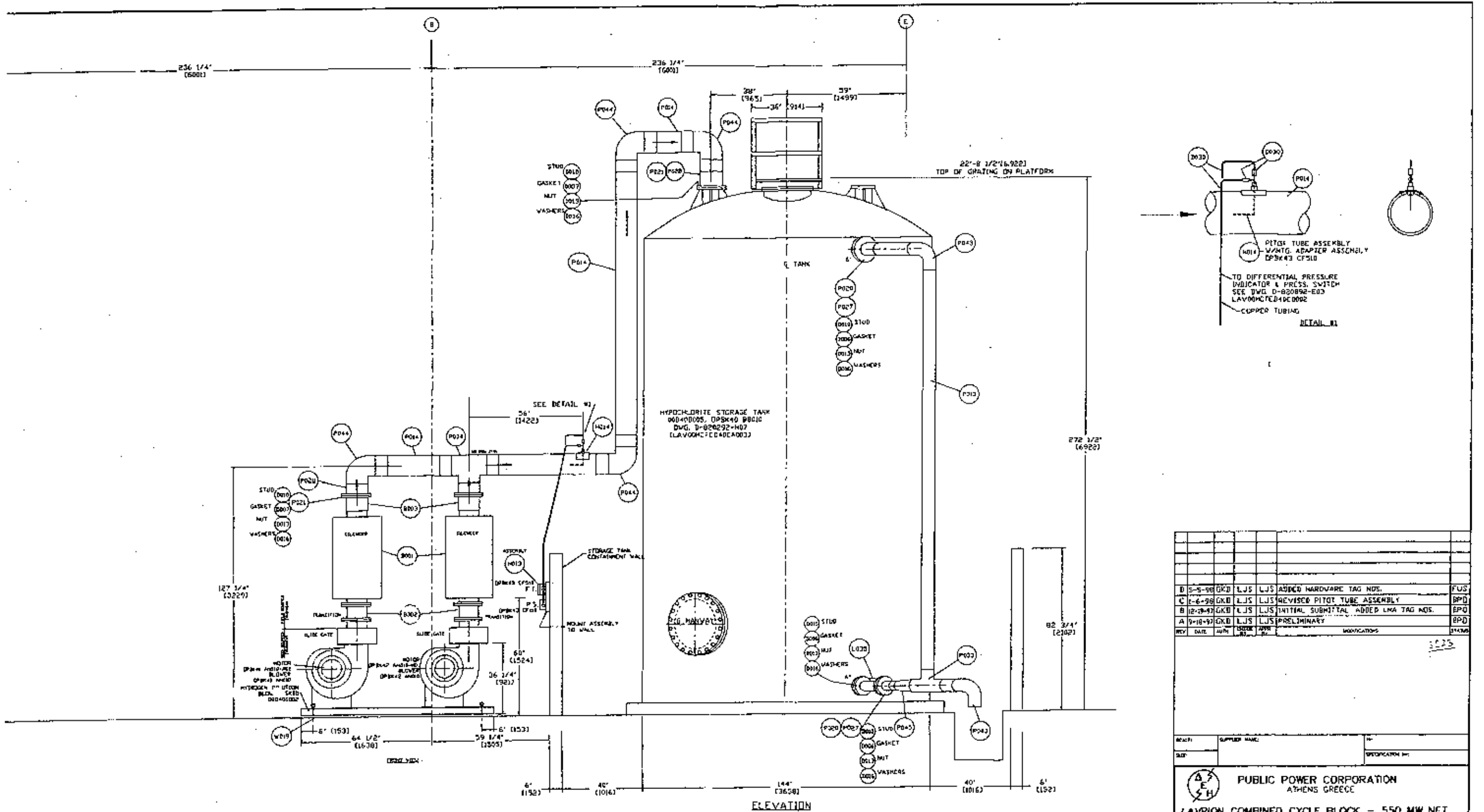
NOTE:
1. ALL PRIMARY DIMENSIONS ARE IN INCHES AND ALTERNATE DIMENSIONS (ENCLOSED IN BRACKETS) IN METERS.
2. BOTTOM OF BUILDING STEEL BEAMS SHALL NOT BE LESS THAN +4.7 METERS FROM MAIN FLOOR.
3. FOR SECTIONS A-A THRU E-E, SEE DWG. D-820292-M51 & -M52

S.O. NO. 820292 CONTRACT NO. 65.7022.0059

JOHNSON MARCH SYSTEMS, INC.
220 BALBOA DR. FAYETTE PA 15784


DR: JLG 3/31/97 APP: LJS 5/31/97 DWG. NO. REV. H
CHKD: JLG 3/31/97 APP: LJS 5/31/97 0-820292-M10
SCALE: 3/4" = 1'-0" AUTOCAD PLOT PLOT STYLE: 0-820292-M10

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REV	DATE	BY	CHKD	APP'D	DESCRIPTION	STATUS
D	5-5-98	GKD	LJS	LJS	ADDED HARDWARE TAG NOS.	FUS
C	6-4-98	GKD	LJS	LJS	REVISED PITOT TUBE ASSEMBLY	BPD
B	10-1-98	GKD	LJS	LJS	INITIAL SUBMITTAL ADDED LMA TAG NOS.	EPD
A	9-18-99	GKD	LJS	LJS	PRELIMINARY	BPD

REACT:	SUPPLIER NAME:	SI:
REV:	OPERATION IN:	


PUBLIC POWER CORPORATION
 ATHENS GREECE
LAVRION COMBINED CYCLE BLOCK - 550 MW NET
 CONTRACT NO: DMKT-162/99129

ELECTROCHLORINATION SYSTEM
PIPING ARRANGEMENT

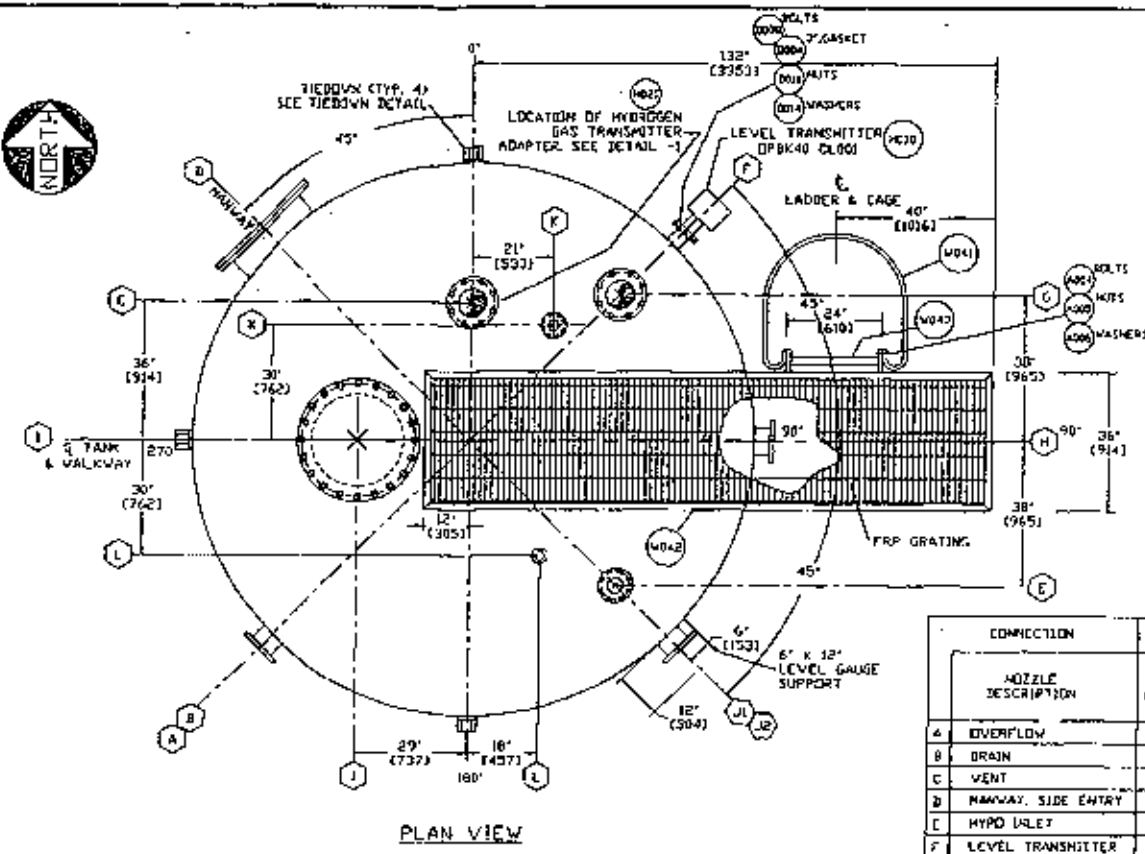
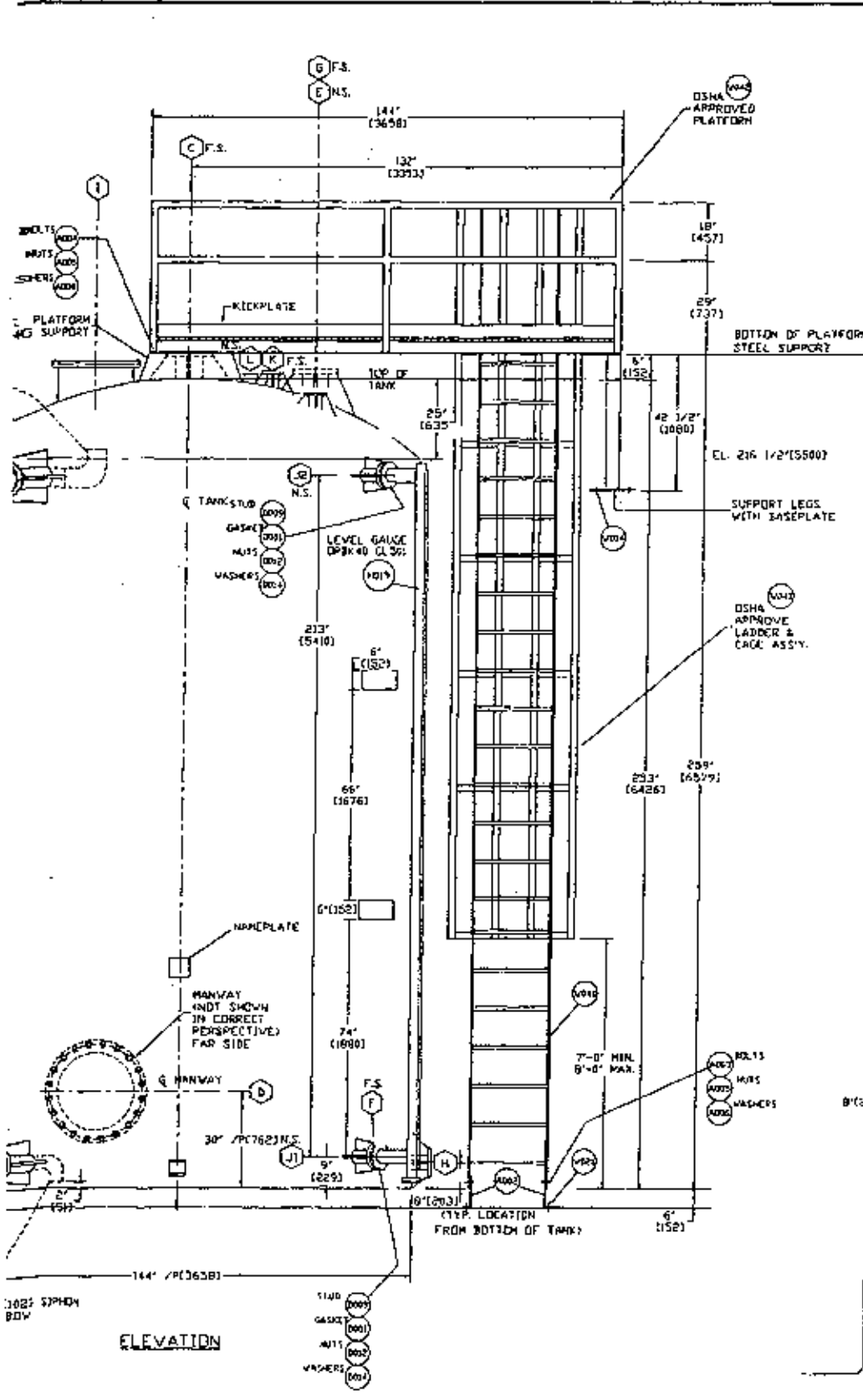
SEC ALISTON
M METKA S.A.

PGD-PPG
 NE LAVYONCCTED4DC002

Customer number: LAVYONCCTED4DC002

S.O. NO.	920292	CONTRACT NO.	65.7022.0059
JOHNSON MARCH SYSTEMS, INC.			
DR: GKD	9-18-97	APP: LJS	9-18-97
CHK: LJS	9-18-97	APP: LJS	9-18-97
SCALE:	1/2" = 1'-0"	D-820292-M50	

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NOTES:

RESIN CORROSION LINER: METRON 902 VINYL ESTER
 CORROSION LINER THICKNESS: 100 MILS NOMINAL
 INTERIOR SURFACE VIEL: SINGLE PLY NEXUS

RESIN STRUCTURE: ISOPHTHALIC ESTER

EXTERNAL GELCOAT: GRAY

DOM THICKNESS: 0.275(7) #/0.375(9.5) KNUCKLE
 FL T END THICKNESS: 0.275(7) #/0.312(7.9) KNUCKLE
 SLR WALL THICKNESS: 33(843) UP TO 70'
 265(6.7) OVER 70'

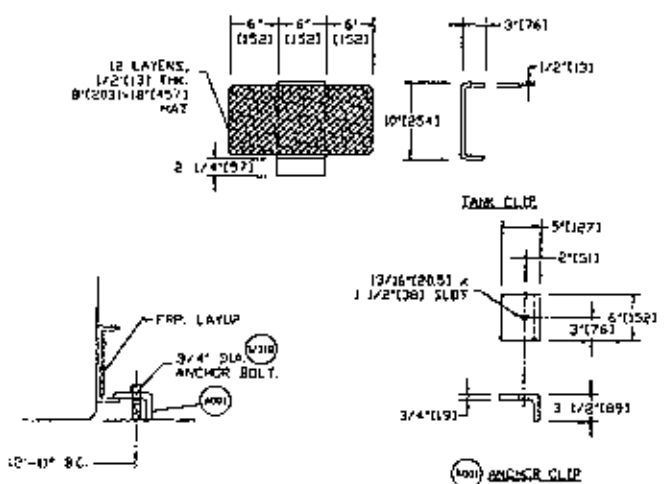
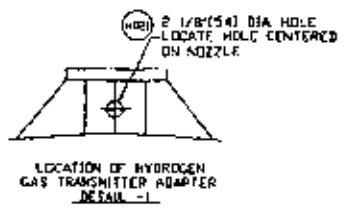
BOLT MATERIAL: ZINC-PLATED
 GASKET MATERIAL: 3/8"(9.5) EPDM

WORKING CAPACITY: 17,800 GALLONS (68 M3)
 TANK WEIGHT EMPTY: 9,073 LBS (4398 KG)
 TANK WEIGHT FULL: 140,600 LBS (63909 KG)

DESIGN PRESSURE: ATMOSPHERIC
 DESIGN TEMPERATURE: AMBIENT
 DESIGN SPECIFIC GRAVITY: 1.1
 CONTENTS: SEAWATER +/-0.25% SODIUM HYPOCHLORITE

TANK TO BE BUILT PER ASTM D2899, ASTM D6097, AND PS 15-69, AS APPLICABLE. PROPER VENTING OF THE VESSEL TO BE THE RESPONSIBILITY OF THE CUSTOMER. VENTS SHALL BE SIZED TO PREVENT ANY OCCURRENCE OF PRESSURE OR VACUUM BEYOND THE DESIGN PARAMETERS STATED ABOVE. ALL NOZZLE BOLT HOLES TO STRADDLE TANK'S MAJOR CENTERLINE'S. ALL NOZZLES TO BE COVERED WITH PLYWOOD DURING TRAVEL.

CONNECTION	NOZZLE SCHEDULE					
	NOZZLE DESCRIPTION	SIZE (INCHES)	PROJECTION (INCHES)	END CONNECTION TYPE	END CONNECTION REINFORCEMENT	COMMENTS
A	OVERFLOW	6	6	150# FLANGED	GUSSET	
B	DRAIN	4	6	150# FLANGED	GUSSET	
C	VENT	8	8	150# FLANGED	GUSSET	
D	MANWAY, SIDE ENTRY	24	8	150# FLANGED	NONE	1/2" BLIND FLANGE COVER
E	HYPO INLET	6	6	150# FLANGED	GUSSET	
F	LEVEL TRANSMITTER	3	6	150# FLANGED	GUSSET	
G	BLOWER INLET	8	8	150# FLANGED	GUSSET	
H	ODDING PUMP SUCTION	6	0	150# FLANGED	GUSSET	
I	TOP MANWAY	24	8	150# FLANGED	NONE	
J	LEVEL	3	6	150# FLANGED	GUSSET	
K	LEVEL	1	6	150# FLANGED	GUSSET	
L	HYDROGEN SENSOR	2	4	150# FLANGED	GUSSET	
M	SPARE	1	0	1" FNPT	NONE	



HYPOCHLORITE STORAGE TANK
 009#08095

REV	DATE	BY	DESCRIPTION	DATE		
D	5-5-90	GKD	LJS	LJS	ADDED FUNCTION CODE NUMBERS	FUS
C	12-17-97	DAW	LJS	LJS	ADDED LEVEL GAUGE & LEVEL TRANSMITTER	BPD
B	7-9-97	JCG	LJS	LJS	INITIAL SUBMITTAL	BPD
A	3-31-97	JCG	LJS	LJS	PRELIMINARY	BPD

SCALE: _____ SUPPLIER NAME: _____

PUBLIC POWER CORPORATION
 ATHENS GREECE

LAVRION COMBINED CYCLE BLOCK - 550 MW NET
 CONTRACT NO: DMKT-162/99129

ELECTROCHLORINATION SYSTEM
 HYPOCHLORITE STORAGE TANK (SHIPPED LOOSE)

GEC ALSTOM
 METKA S.A.

PGD-PPG
 N# LAVRION.C.T.E.D.40E.40.0.3

Customer number: LAVRION.C.T.E.D.40E.40.0.3

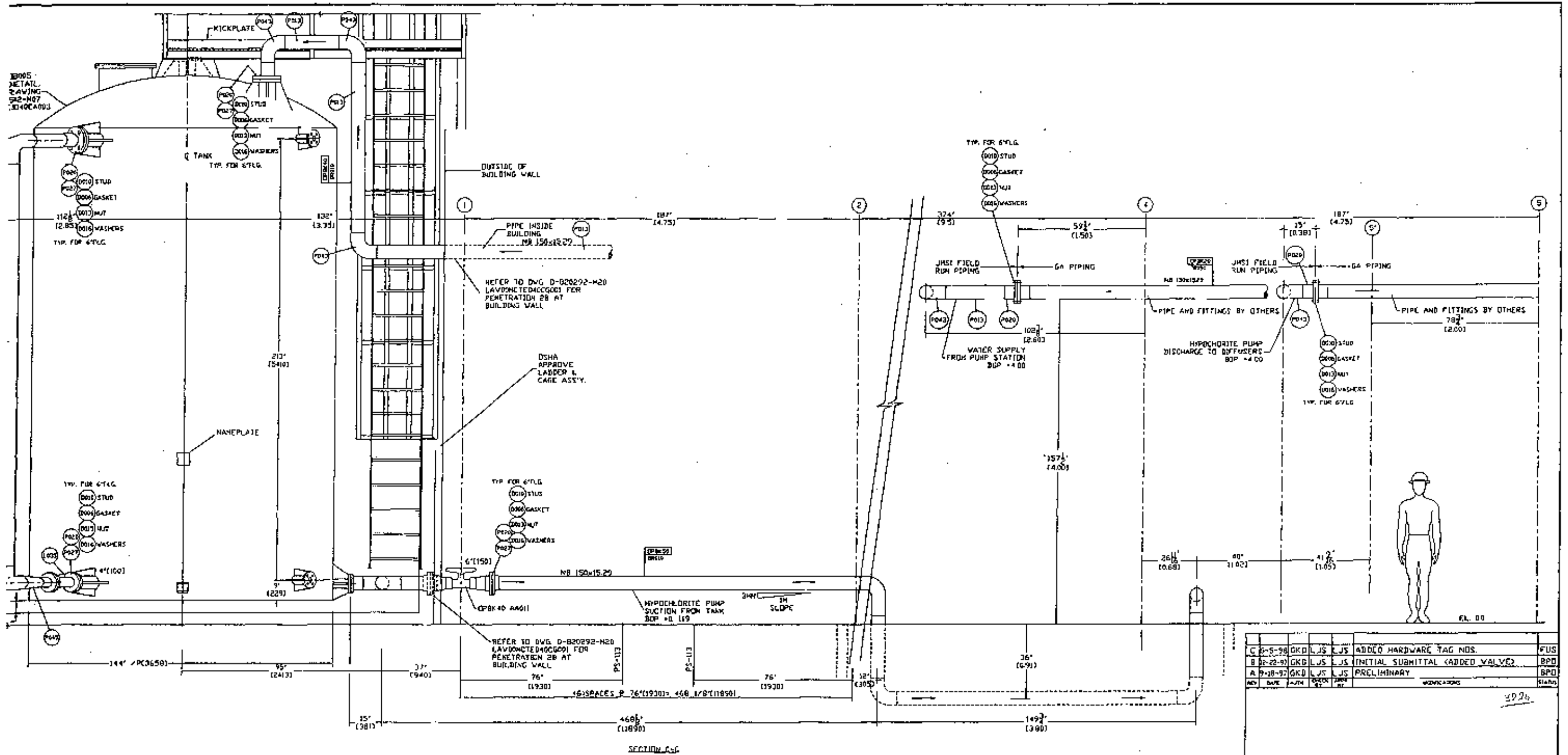
S.O. NO. 820292 CONTRACT NO. 65.7022.0059

JOHNSON MARCH SYSTEMS, INC.
 275 WALTON ST
 JEFFERSON, AL 36202

DATE: 3/29/97 APP: LJS DATE: 3/29/97 DWG. NO. D-820292-M07


SCALE: 3/8" = 1'-0" (METRIC BY AGI 202 01)

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 Systems, Inc.



REV	DATE	BY	CHK	APP	DESCRIPTION	STATUS
C	08-25-98	GKD	LJS	LJS	ADDED HARDWARE TAG NOS.	FUS
B	08-22-97	GKD	LJS	LJS	INITIAL SUBMITTAL (ADDED VALVES)	BPD
A	08-18-97	GKD	LJS	LJS	PRELIMINARY	BPD

SCALE	SUPPLIER NAME	BY
SEC		OPERATION NO.

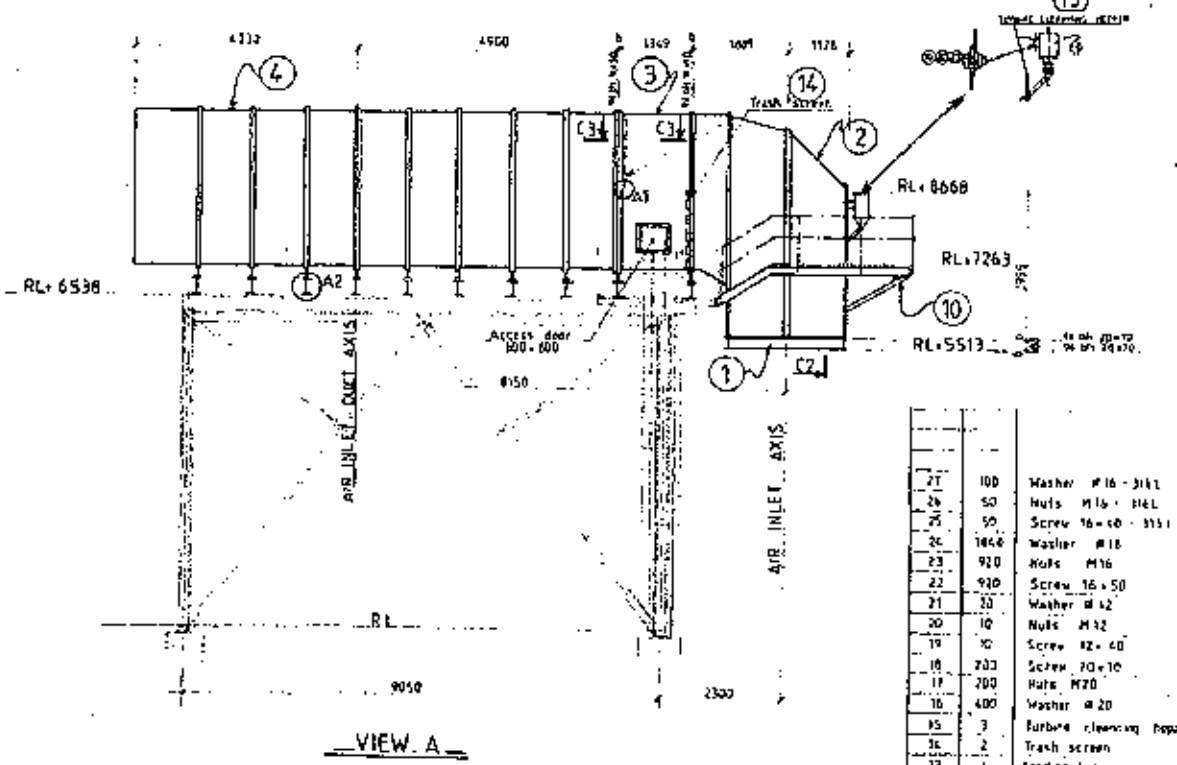
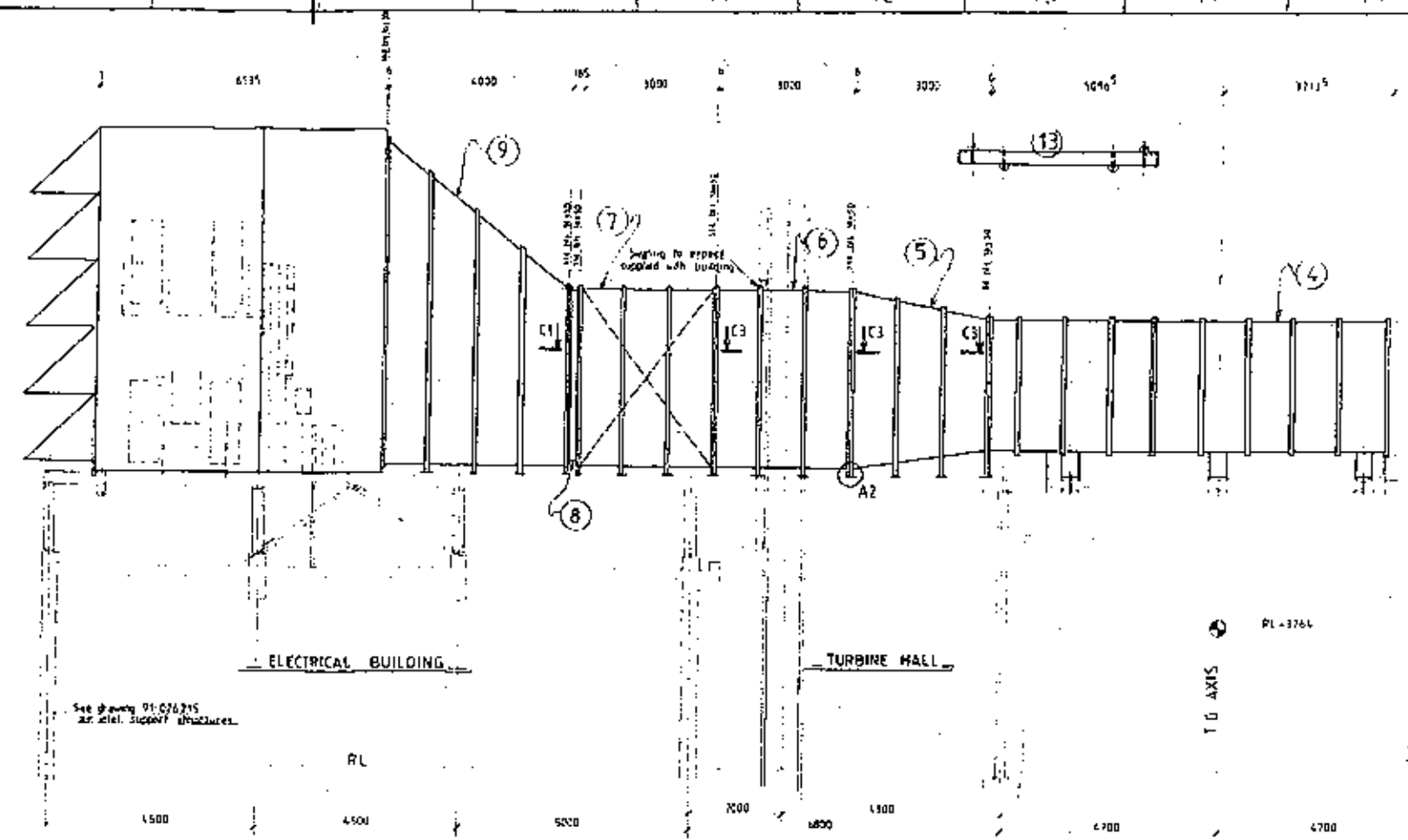
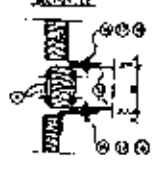
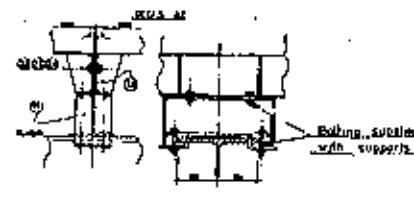
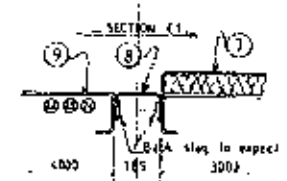
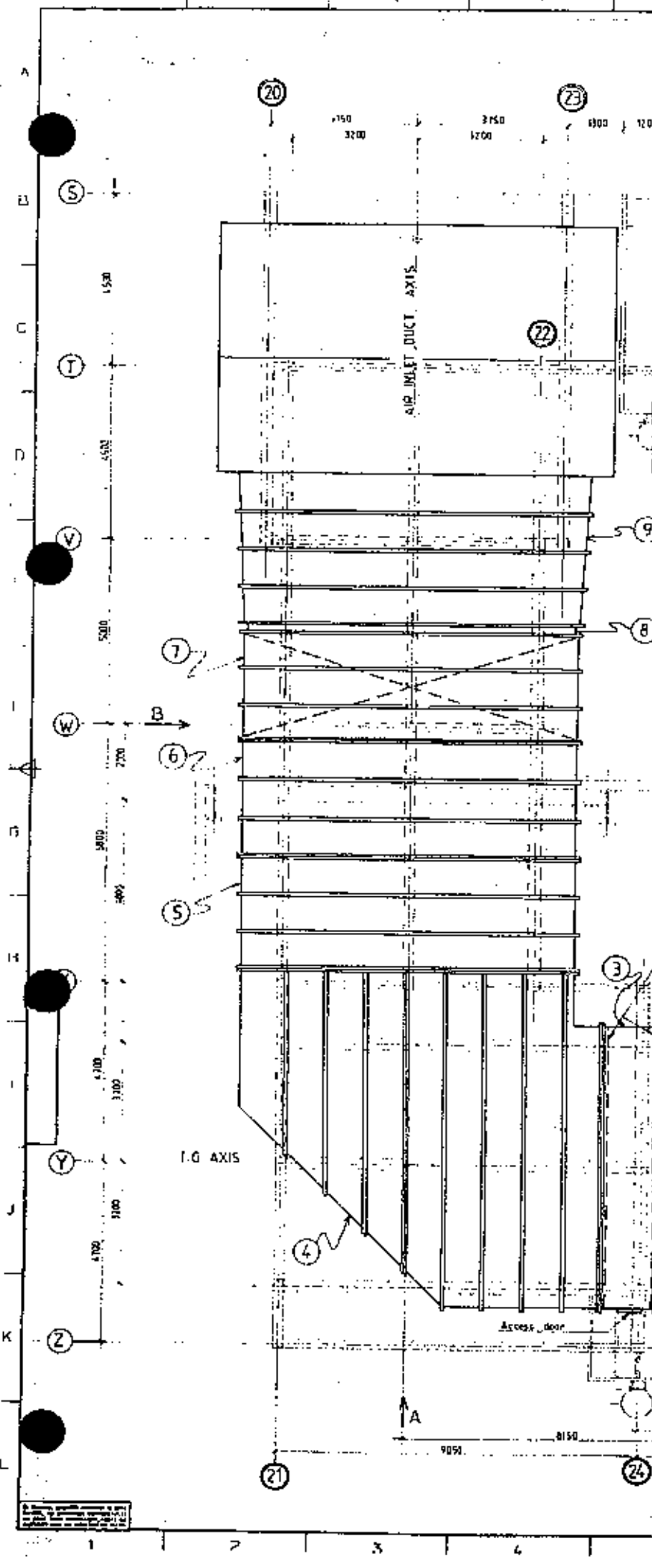

PUBLIC POWER CORPORATION
 ATHENS GREECE
LAVRION COMBINED CYCLE BLOCK - 550 MW NET
 CONTRACT No. DMKT-162/99129

ELECTROCHEMORINATION SYSTEM
 PIPING ARRANGEMENT SECTIONAL VIEWS

DESIGNER: METKA S.A.
 PROJECT NO.: PGD-PPG
 Customer number: 64200305000000000000

S.O. NO.	820292	CONTRACT NO.	63.7022.0059
JOHNSON MARCH SYSTEMS, INC.			
DWG. NO.	D-820292-M53	DATE	9/18/97
CHK: LJS	APP: LJS	DATE	9/18/97
SCALE: 1/2" = 1'-0"	ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SPECIFIED		

It is hereby acknowledged that the priority of any patent or other right in or to any invention disclosed herein shall inure to and be the property of Johnson March Systems, Inc. without the express written consent of Johnson March Systems, Inc.



MATERIAL	QTY	DESCRIPTION
21	100	Washer #16 - 316L
22	50	Nuts #16 - 316L
23	50	Screw 16 x 60 - 316L
24	1648	Washer #18
25	910	Nuts #18
26	910	Screw 16 x 50
27	30	Washer #12
28	10	Nuts #12
29	10	Screw 12 x 40
30	200	Screw 20 x 40
31	200	Nuts #20
32	400	Washer #20
33	3	Turbine cleaning hopper
34	2	Trash screen
35	1	Loading box
36	1	Gaskets
37	1	Supporting system
38	1	Working on elbow
39	1	Transition duct
40	1	Expansion joint
41	1	Silencer
42	1	Inlet duct 15 x 200
43	1	Transition duct
44	1	Horizontal elbow
45	1	Inlet duct 15 x 150
46	1	Vertical elbow
47	1	Expansion joint

NOTES:
 1. ALL DIMENSIONS UNLESS OTHERWISE SPECIFIED ARE IN METERS.
 2. THE MATERIAL SPECIFICATION IS AS SHOWN IN THE DRAWING.
 3. THE WEIGHT OF MATERIAL SHALL BE AS SHOWN IN THE DRAWING.
 4. THE WEIGHT OF MATERIAL SHALL BE AS SHOWN IN THE DRAWING.
 5. THE WEIGHT OF MATERIAL SHALL BE AS SHOWN IN THE DRAWING.
 6. THE WEIGHT OF MATERIAL SHALL BE AS SHOWN IN THE DRAWING.
 7. THE WEIGHT OF MATERIAL SHALL BE AS SHOWN IN THE DRAWING.
 8. THE WEIGHT OF MATERIAL SHALL BE AS SHOWN IN THE DRAWING.
 9. THE WEIGHT OF MATERIAL SHALL BE AS SHOWN IN THE DRAWING.
 10. THE WEIGHT OF MATERIAL SHALL BE AS SHOWN IN THE DRAWING.

4-176-96-310-300-001 FIRST ISSUE

EUROPEAN GAS TURBINES
 91-026267

PUBLIC POWER CORPORATION
 ATHENS, GREECE
 LAVINON COMBINED CYCLE BLOCK - 1300 MW NET
 CONTRACT NUMBER: 91-026267

AIR INLET DUCT
 EQUIPMENT - ARRANGEMENT
 EGT
 Customer number: 44-50-3503-001

MECHANICAL PART

1. OPERATING DESCRIPTION

1.1. General description

The installation consists of dedusting atmospheric admission air for gas turbine to protect the mechanical parts against abrasion air flow.

The gas turbine inlet air passes through a soundproofed weather-hood and several filtering stages :

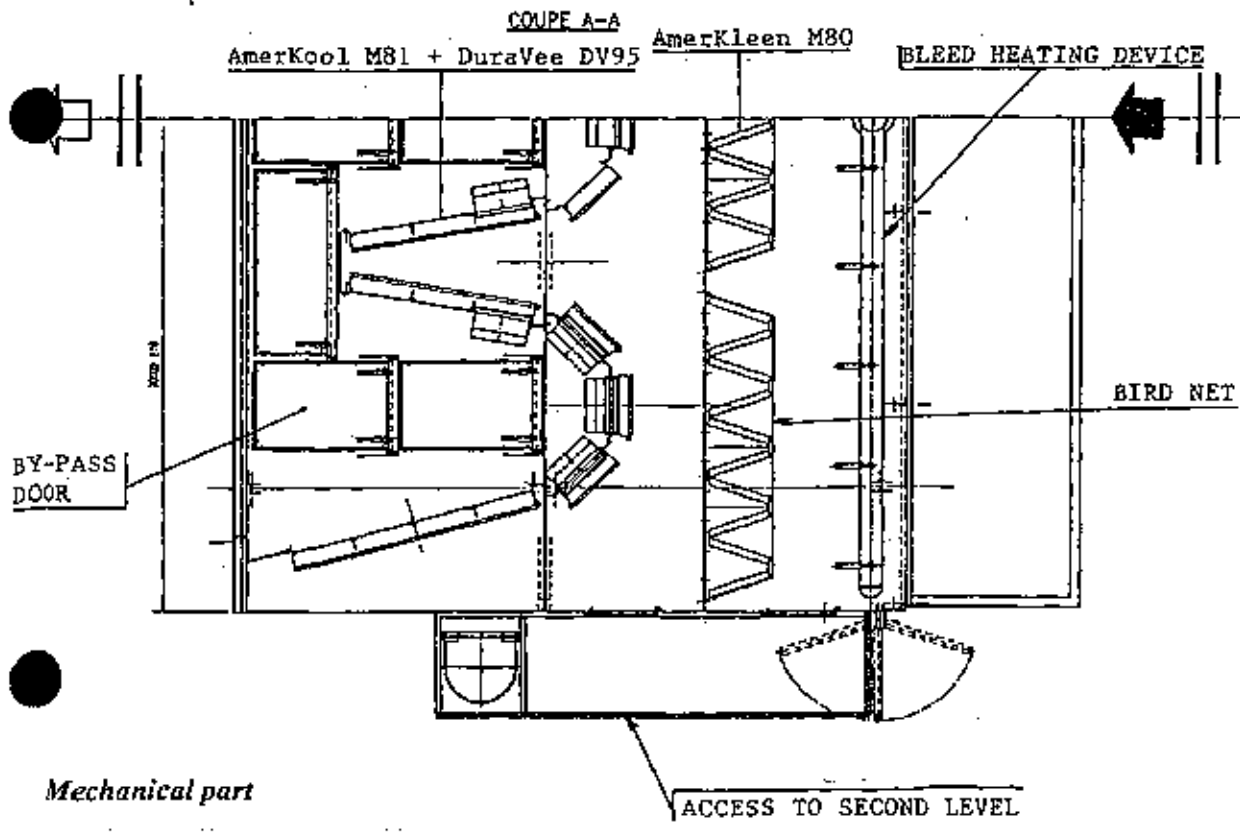
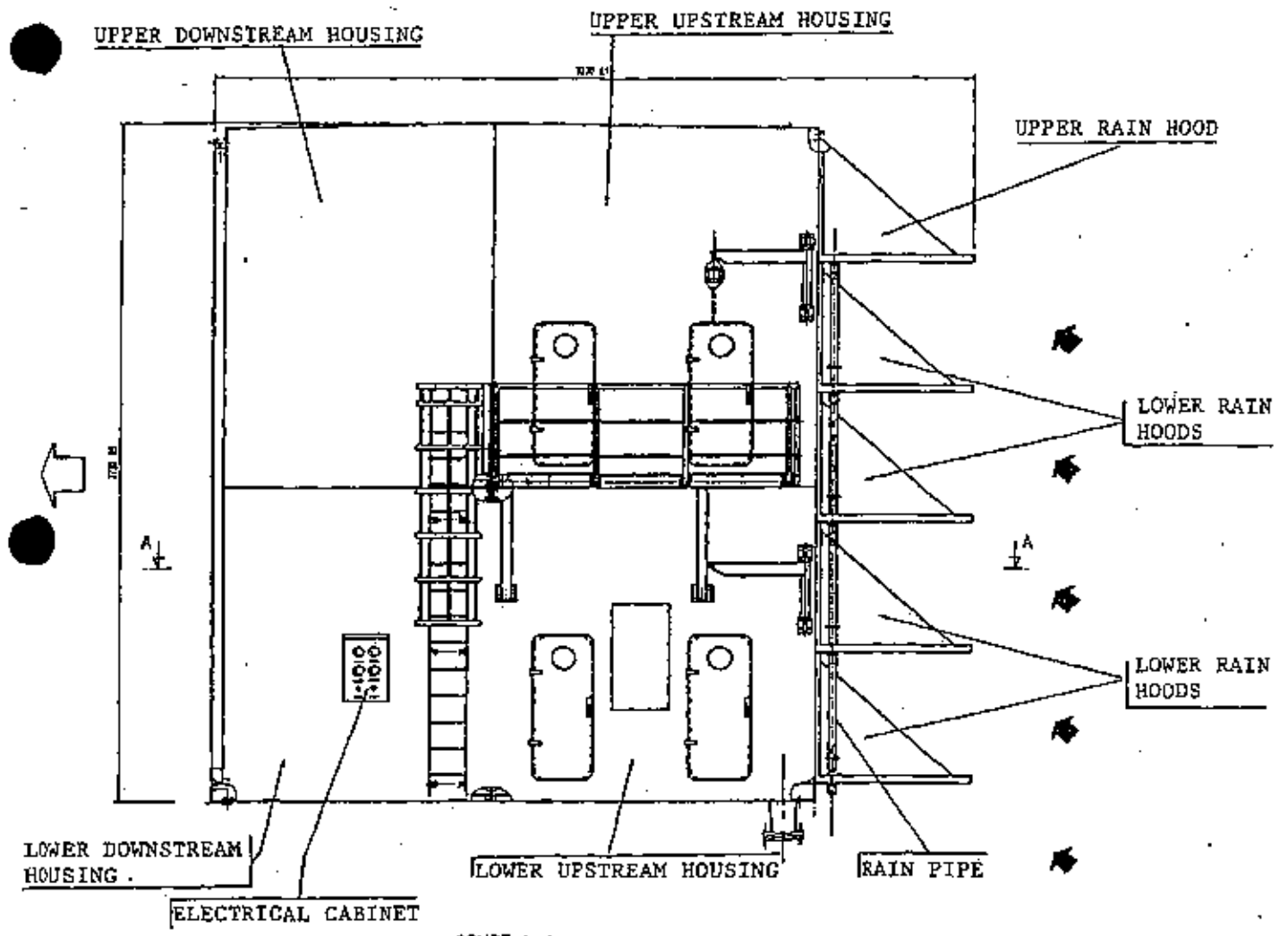
- 1 - **Bleed-heating device :** hot compressed air is extracted from the gas turbine compressor and uniformly dispatched through the housing inlet section.
When the gas turbine operates in a mode called « Premix Mode », see « OPERATION NOTICE BLEED HEATING SYSTEM » n°: 91-436.899.
- 2 - **Bird screen :** to avoid birds in the upstream housing.
- 3 - **Prefiltration :** by a disposable glass fibre pad : « AmerKleen M80 ». This pad consists of continuous glass fibres (the fibre diameters become smaller and the weave progressively tighter) impregnating with adhesive gel.
Average gravimetric efficiency : 90 %.
- 4 - **Stage coalescer :** by a disposable glass fibre pad : « AmerKool M81 ». This pad is similar of « AmerKleen M80 » but glass fibres aren't impregnating. This structure condenses and retains smog.
- 5 - **Filtration :** « DuraVee DV95 » high efficiency filter utilising a glass fibre woven media.
Average opacimetric efficiency : 95 %.

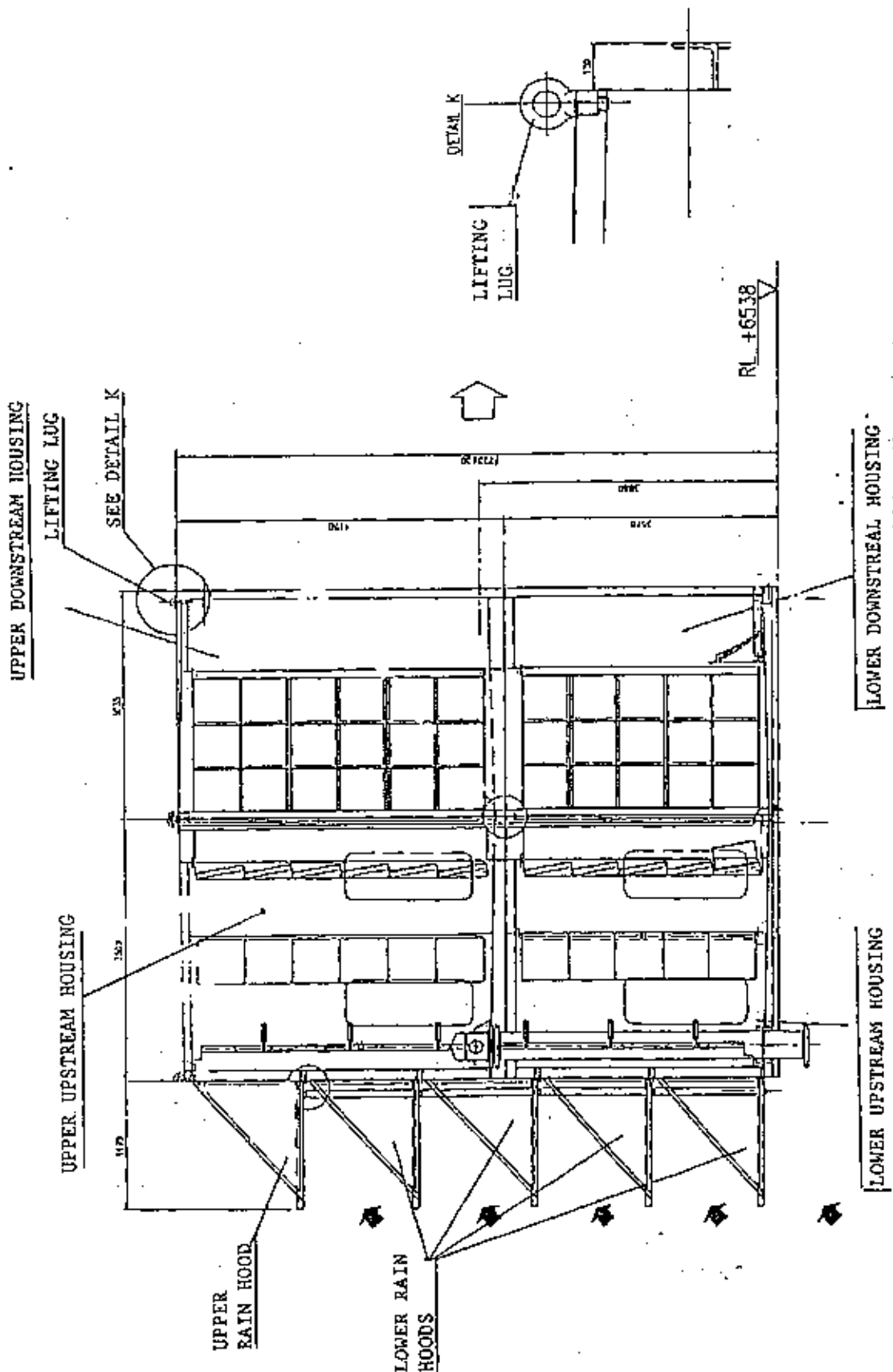
Coalescing and filtration stages, 4 and 5, are assembled together on the same frame.

The prefilter « AmerKleen » and filter « DuraVee » associated with coalescer « AmerKool » dirtiness is gauged by a respective pressure drop monitoring, PDI MBL50 CP510 and PDI MBL50 CP520.

An other differential pressure transmitter PDIT MBL50 CP001 and two differential pressure switches (doubled by safety) PDSHH MBL50 CP230 and PDSHH MBL50 CP240, are monitoring the total unit pressure drop.

As a filter unit is made of static elements (no moving piece), there is no particular operation instruction concerning possible mechanical break down. Operation and maintenance procedures will mainly concern prefilters and coalescers-filters pressure drop monitoring and possible alarms.





1.2. Technical data

- Total air volume : 327,7 m³/s
1 179 720 m³/h
- Site : LAVRION (GREECE)
- Filtration unit type : TG 9000E 93.2
- Quantity : 3 units
- See the technical specification n° 91-433.727 item 4 for other technical data.

1.3. Specific construction

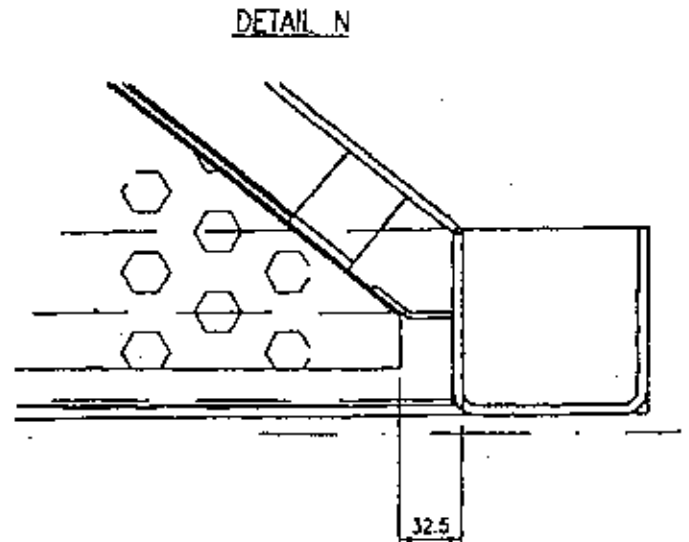
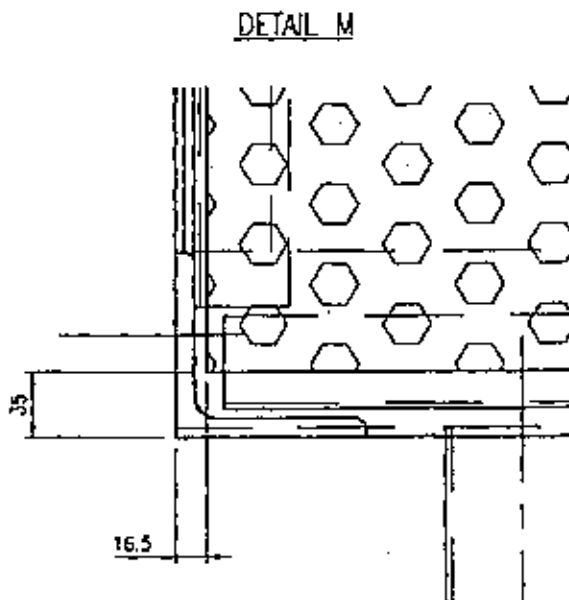
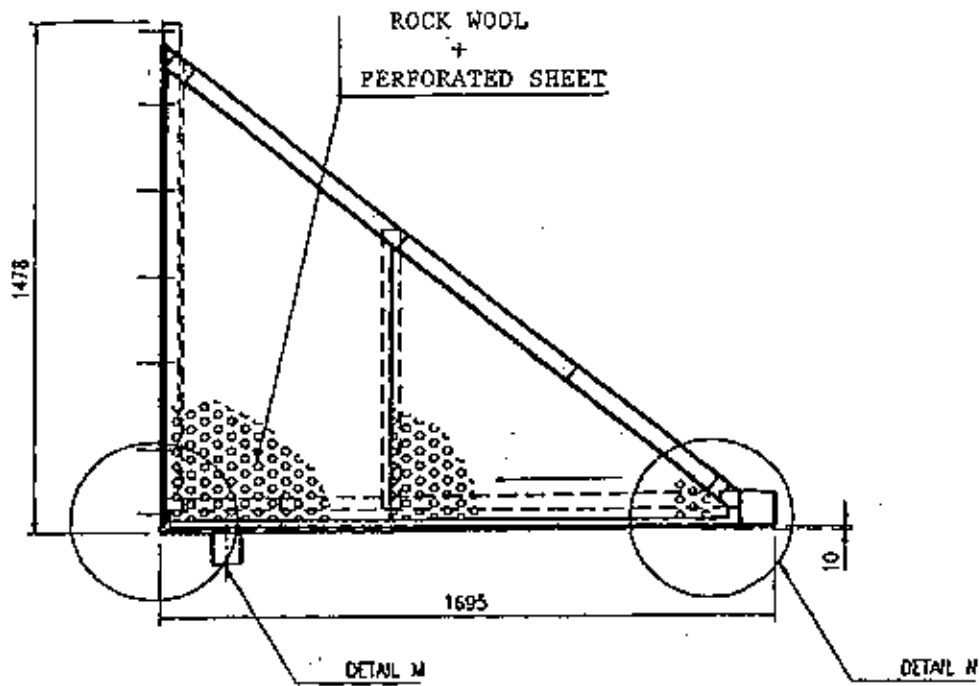
1.3.1. Disposition

The total air flow is treated in two parts in two superposed levels which compose the air filtration unit.

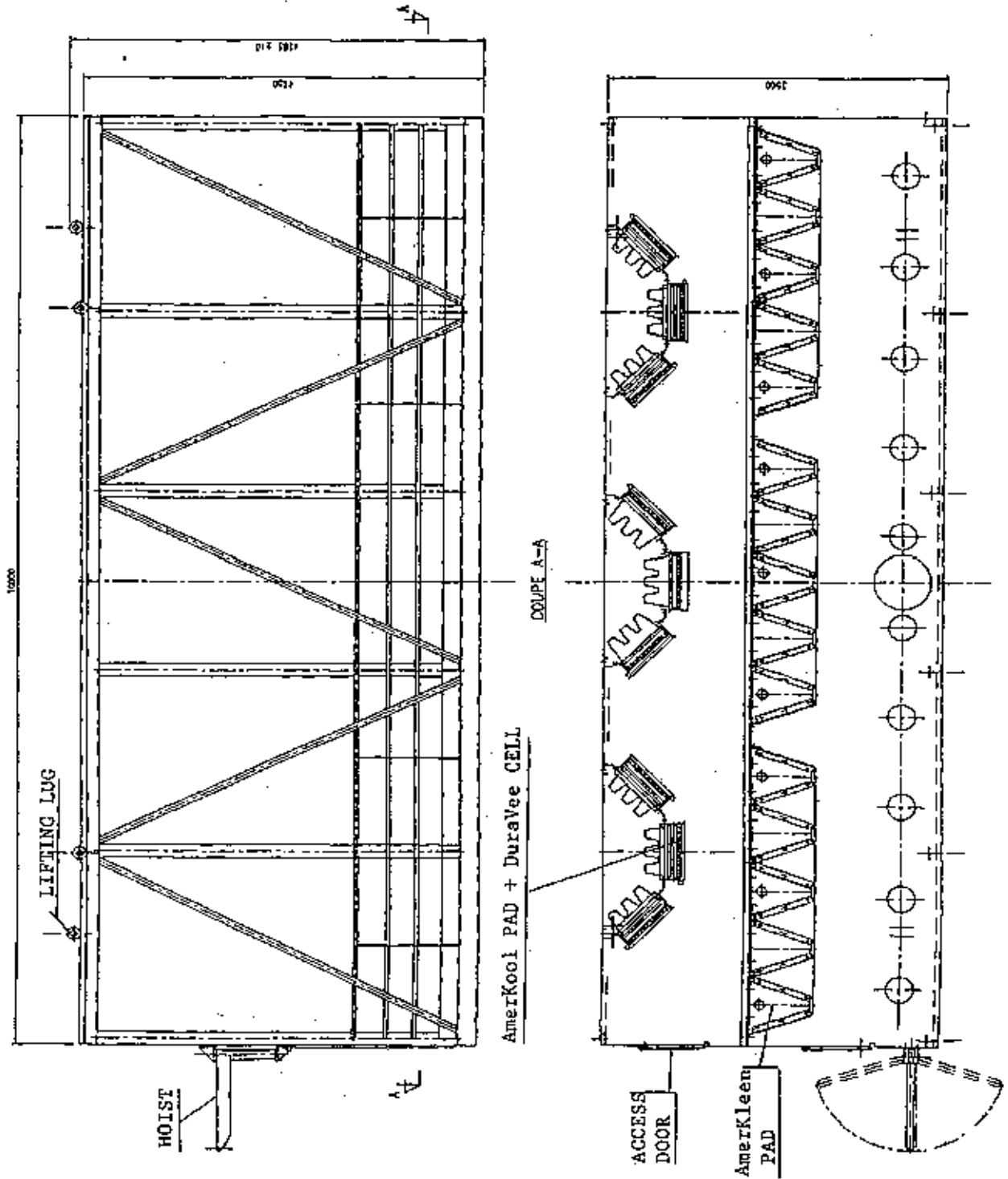
So, the air filtration unit is composed of several juxtaposed and superposed modules which are assembled together by bolts with polyurethane gasket SIKAFLEX 221 for the airtightness :

- 5 superposed soundproofed rain hoods;
- 2 superposed air filtration lines composed for each in the air flow direction with :
 - the upstream housing with :
 - the bleed heating device,
 - the bird net,
 - the prefilter stage with 330 « AmerKleen » pads,
 - a part of coalescer stage with « AmerKool » pads (54 pads for the upper upstream housing and 45 pads for the lower),
 - a part of high efficiency filter stage with « DuraVee » cells (54 cells for the upper upstream housing and 45 cells for the lower);
 - the downstream housing with :
 - the coalescer stage with « AmerKool » pads (120 pads for the upper downstream housing and 100 pads for the lower),
 - the high efficiency filter stage with « DuraVee » cells (120 cells for the upper downstream housing and 100 cells for the lower),
 - the plenum housing (8 by-pass doors are disposed on the floor of the lower plenum).

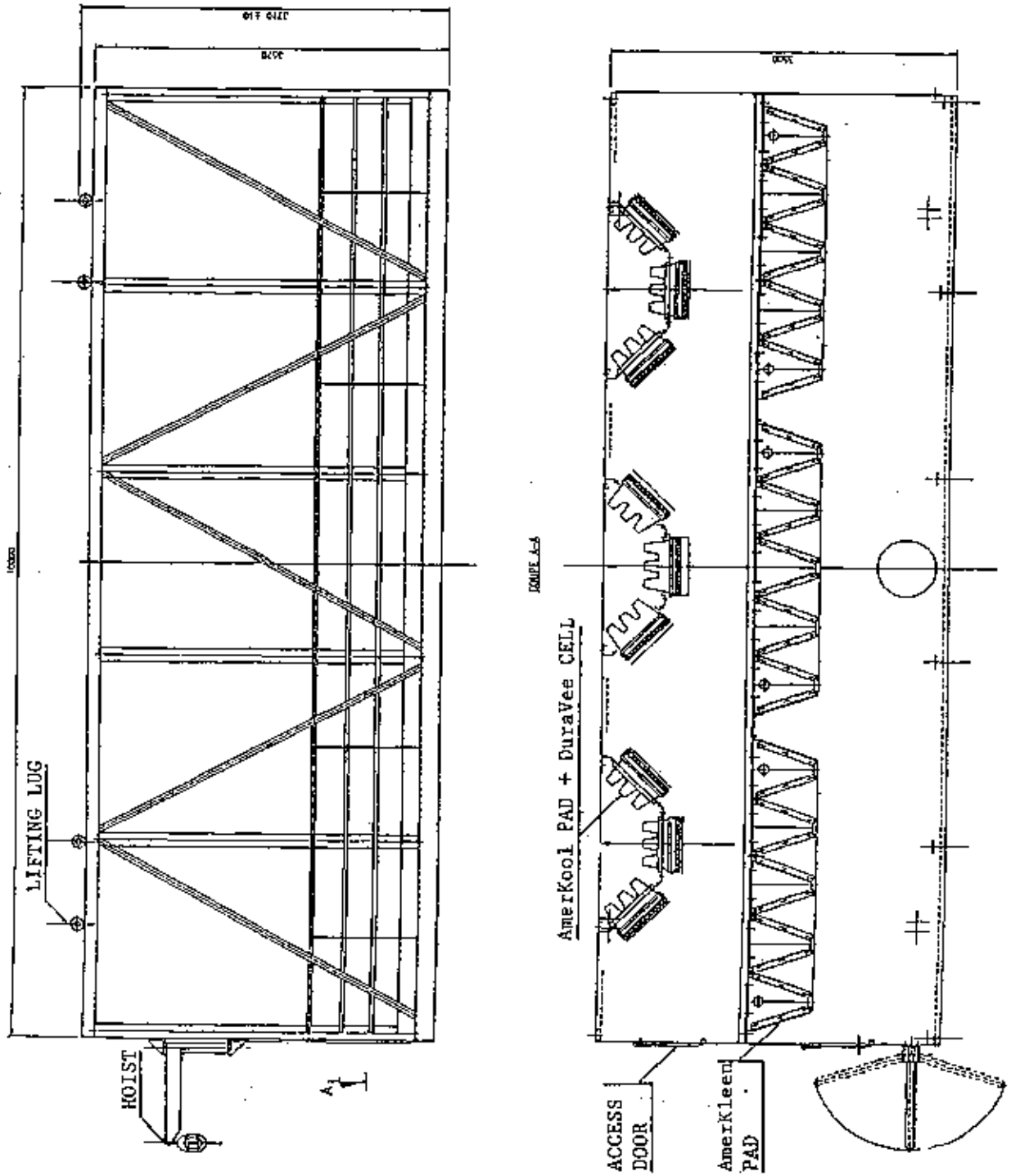
SOUNDPROOFED RAIN HOODS



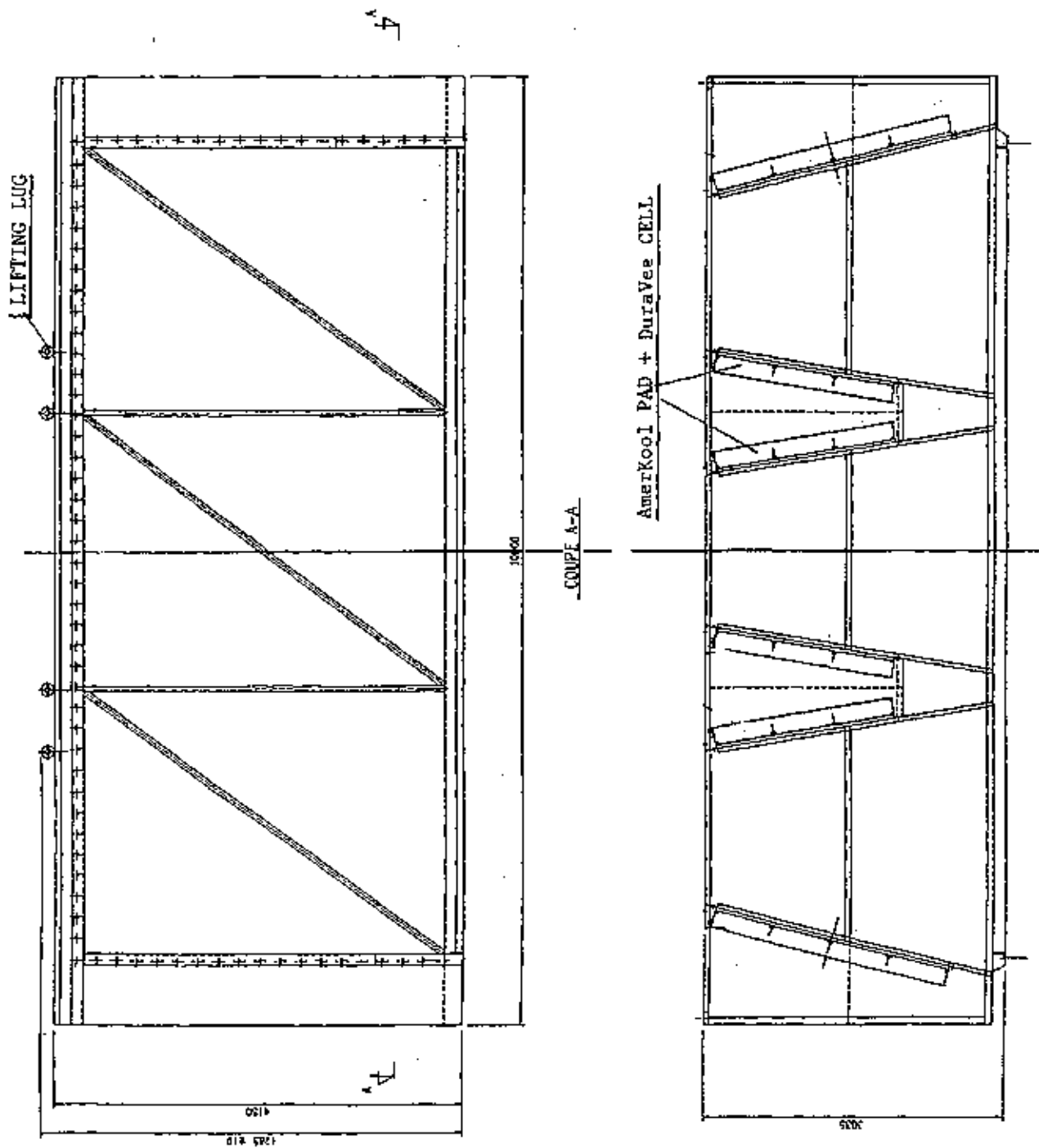
UPSTREAM UPPER HOUSING



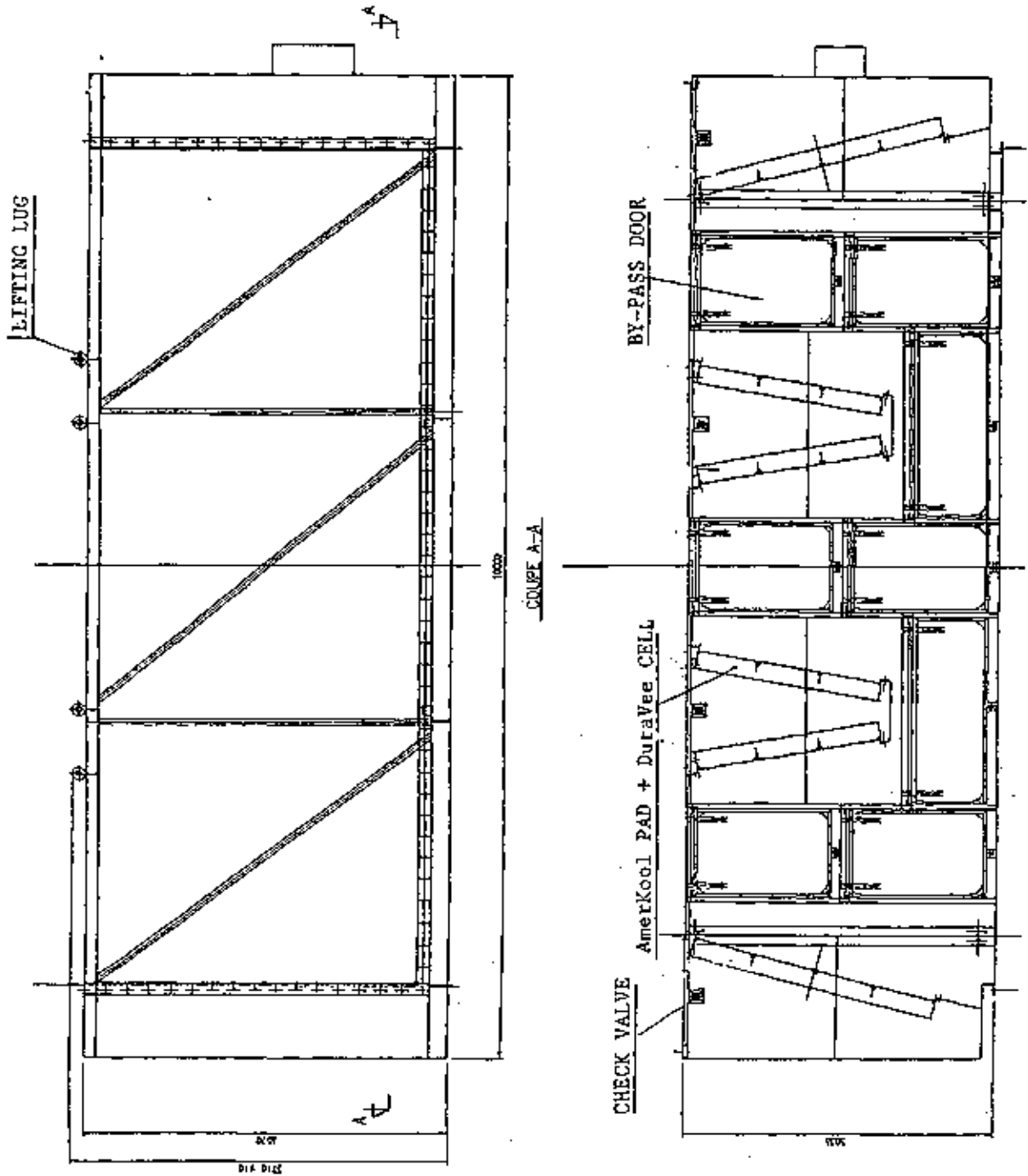
UPSTREAM LOWER HOUSING



DOWNSTREAM UPPER HOUSING



DOWNSTREAM LOWER HOUSING



3.2. Maintenance

3.2.1. General

The damage or the break down of mechanical parts of the gas turbine's air filter can have effects of various gravity for the gas turbine.

For the security of the turbine, maintenance operations on the following parts of the air filter should implicate the stop of the turbine :

- maintenance operation on « AmerKleen », « AmerKool » and « DuraVee » filters, or on their frames;
- maintenance operation on any part of the clean air plenum (by-pass doors, access man-holes);

CAUTION : After every maintenance period inside the clean air plenum of the filter, it's important to respect cleanliness procedures, refer to « Commissioning Book » 91-436.942.

3.2.2. « AmerKleen » pads replacement

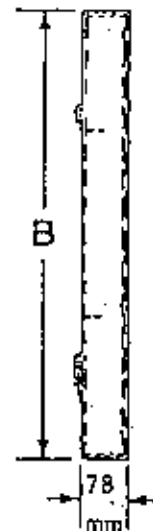
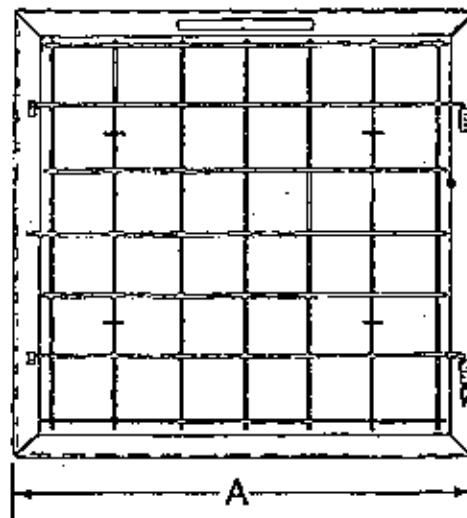
Frequency ?

Following the replacement chart given item 2.2

Initial conditions ?

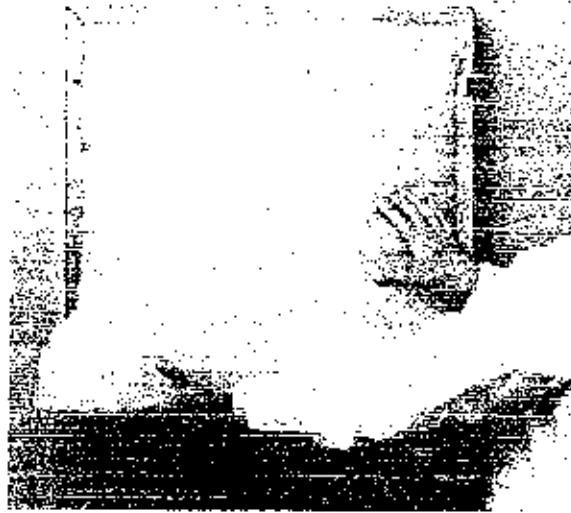
During a stop of the turbine.

Operate in team of 2 or 3 operators.



Replacement instructions ?

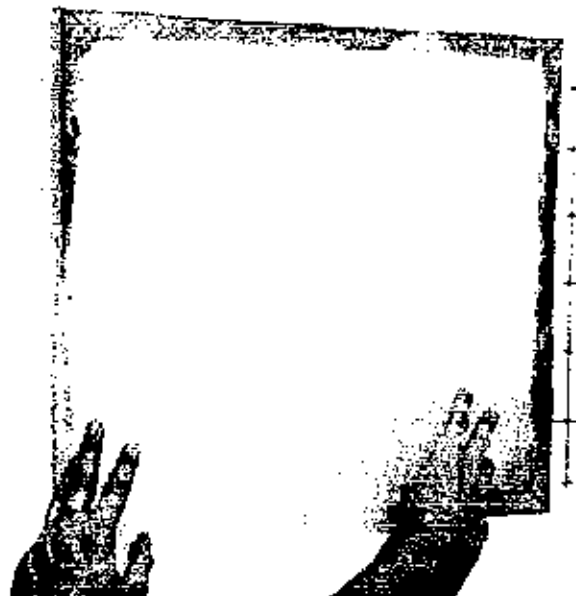
1 - Rotate the hinged grid to open it.



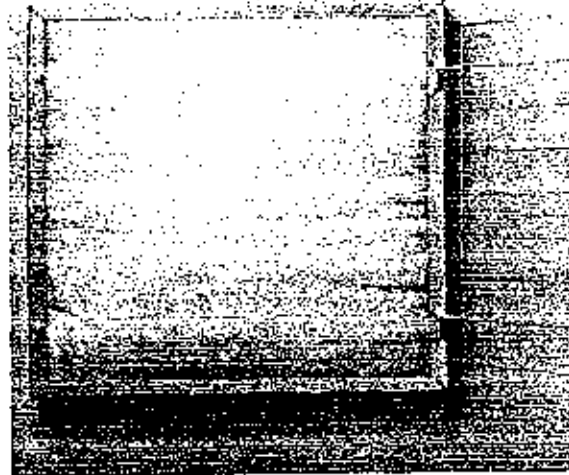
2 - Put down the « AmerKleen » pad without shaking it and shut it up in a hermetic plastic bag to avoid discharging of dust.

3 - Clean correctly the frame with a damp drag.

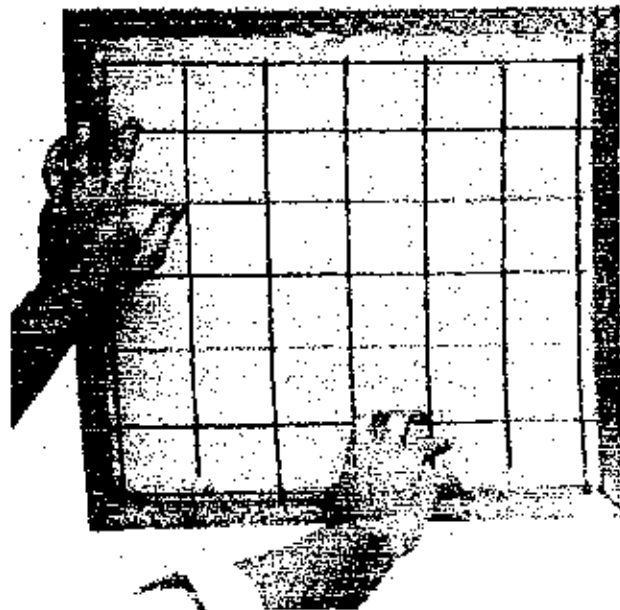
4 - Center the new « AmerKleen » pad and check that the green side of the pad is on the downstream or air leaving side.



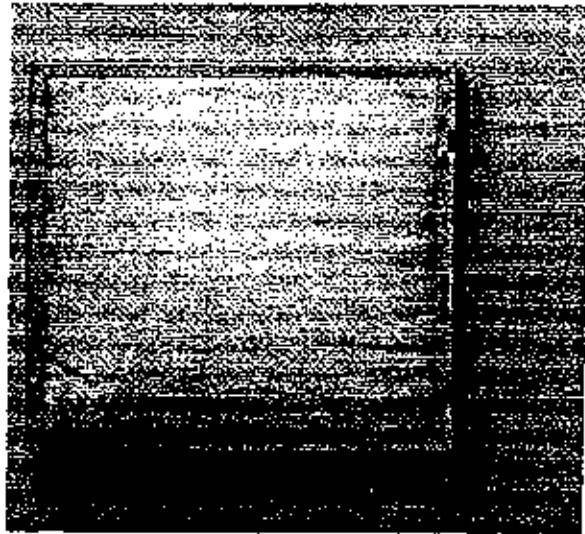
5 - Insert the new « AmerKleen » pad in frame.



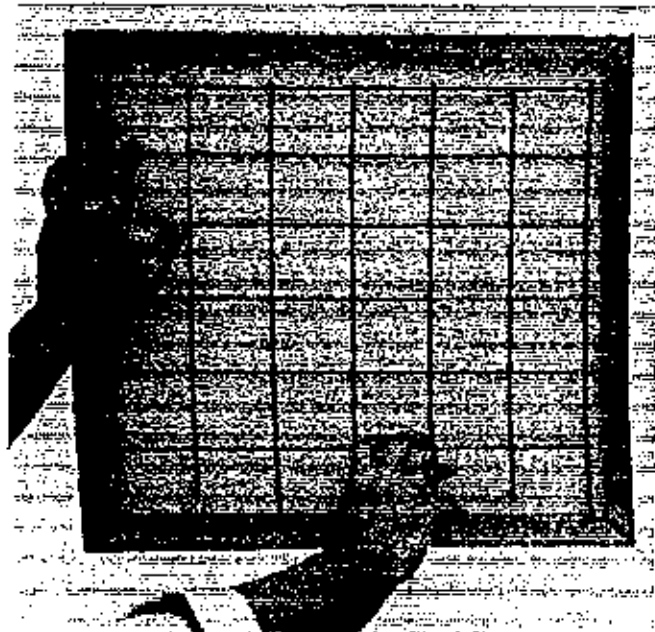
6 - Close the front hinged grid and secure the latches.



5 - Insert the new « AmerKleen » pad in frame.



6 - Close the front hinged grid and secure the latches.



3.2.3. « AmerKool » pads and « DuraVee » cells replacement

Frequency ?

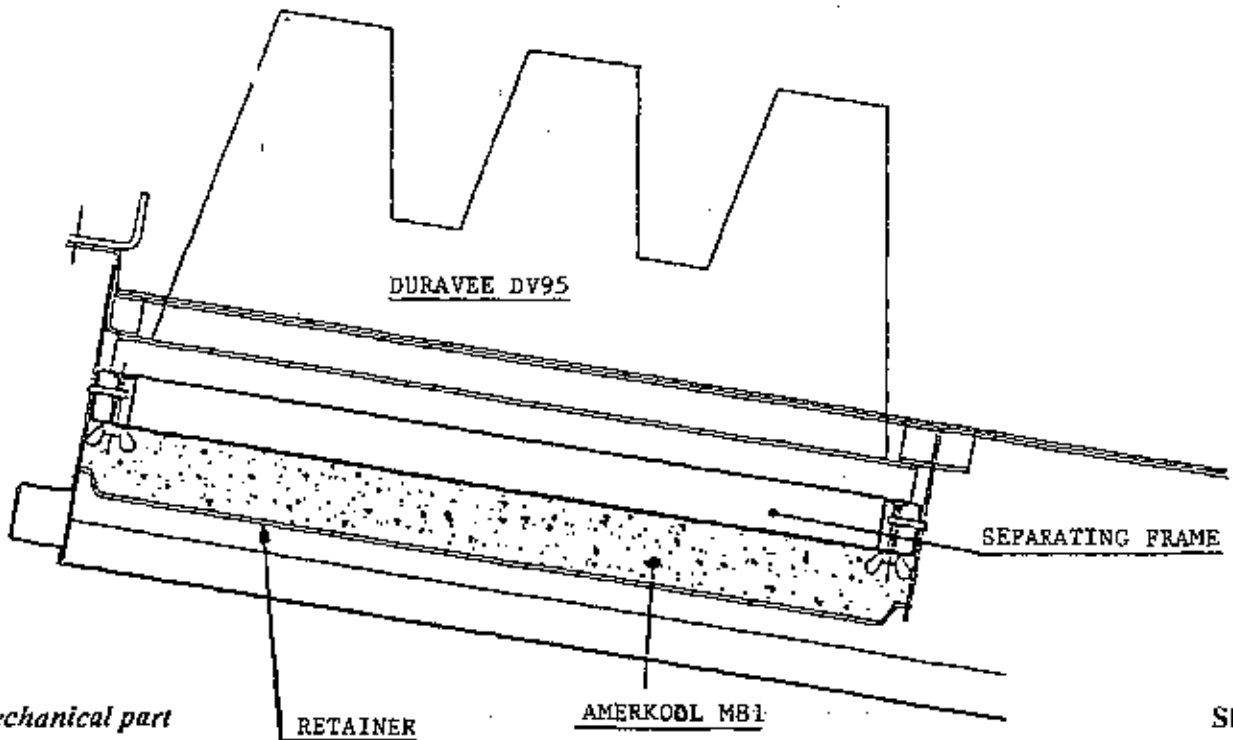
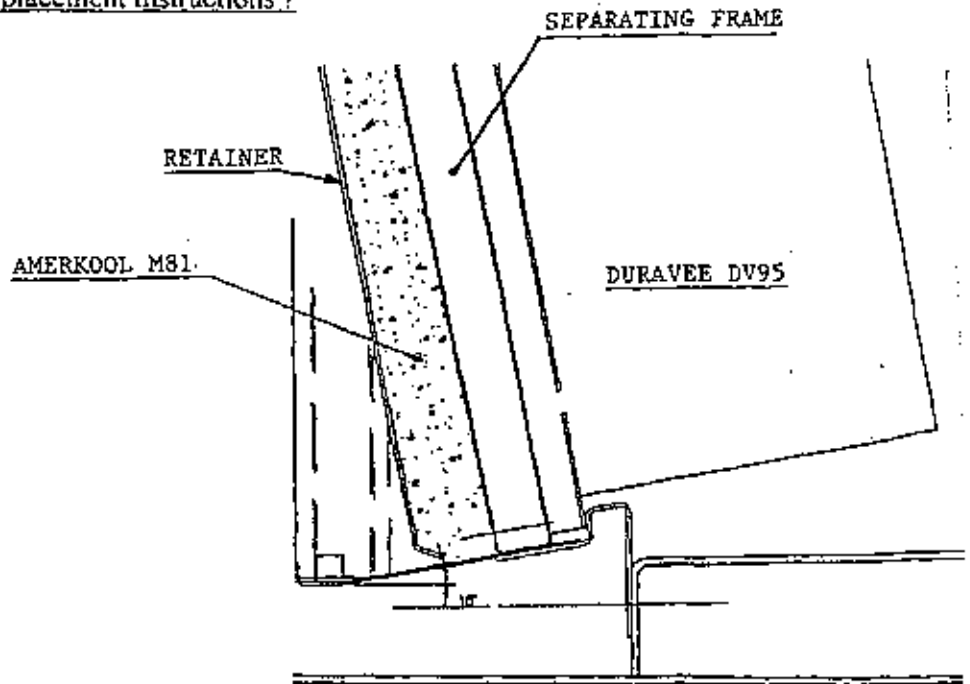
Following the replacement chart given item 2.2

Initial conditions ?

During a stop of the turbine.

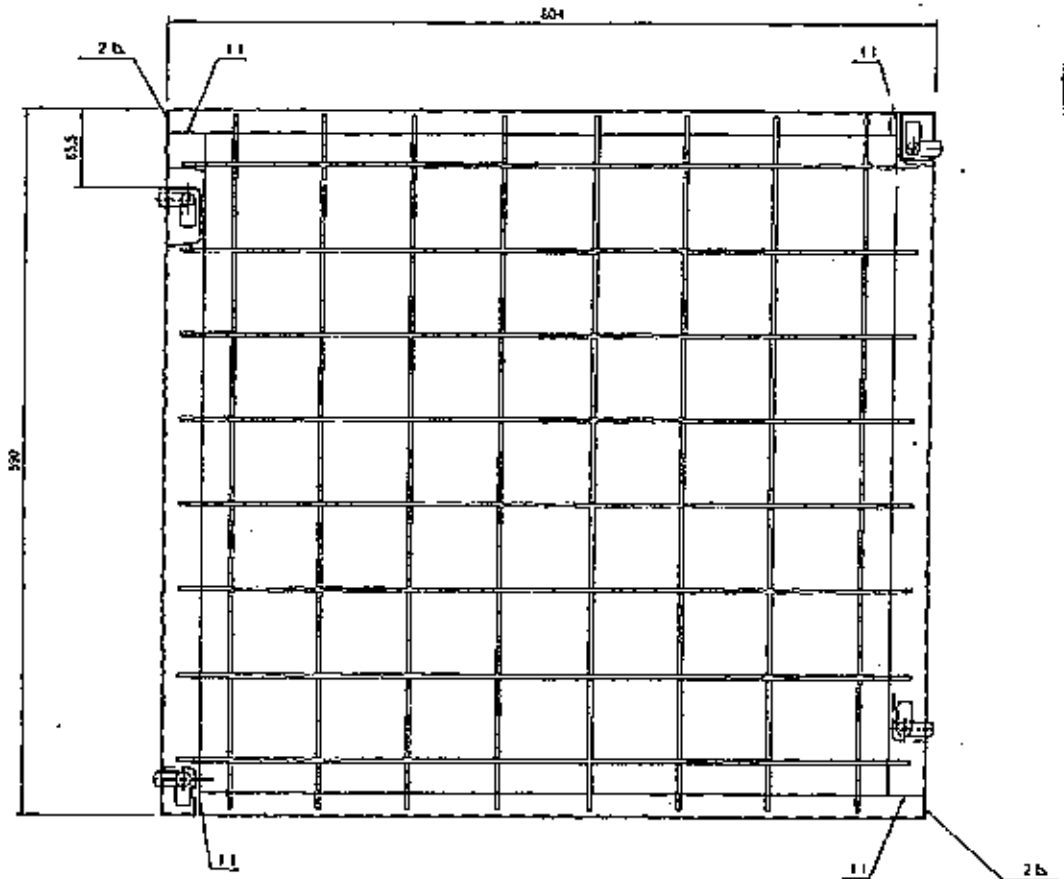
Operate in team of 2 or 3 operators.

Replacement instructions ?

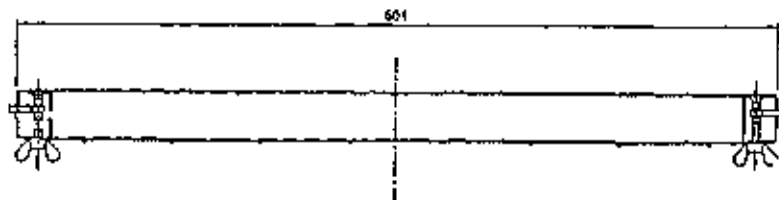


When replacing only coalescer « AmerKool » pads, steps 3 to 7 must not be followed.

1 - Remove the retainer of the « AmerKool » pad.

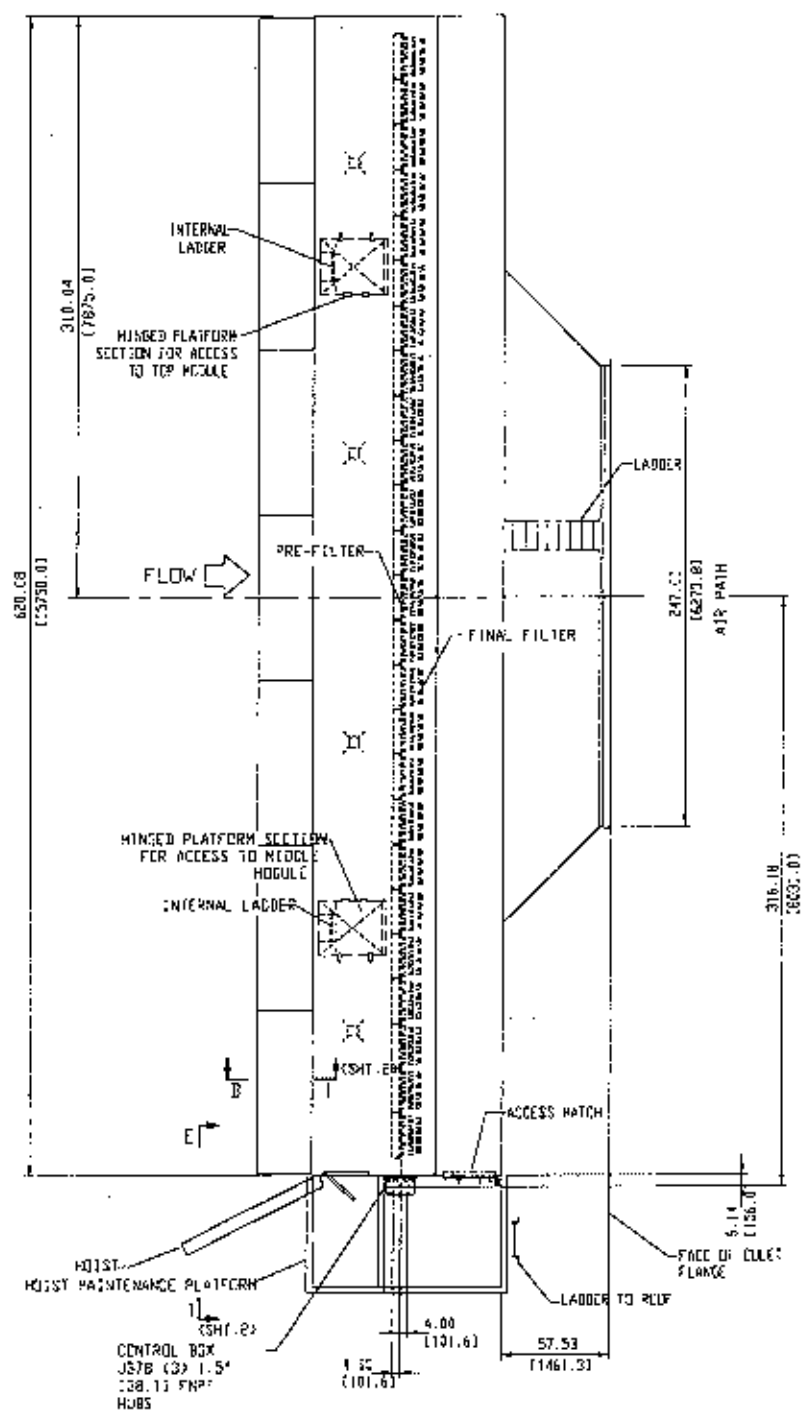
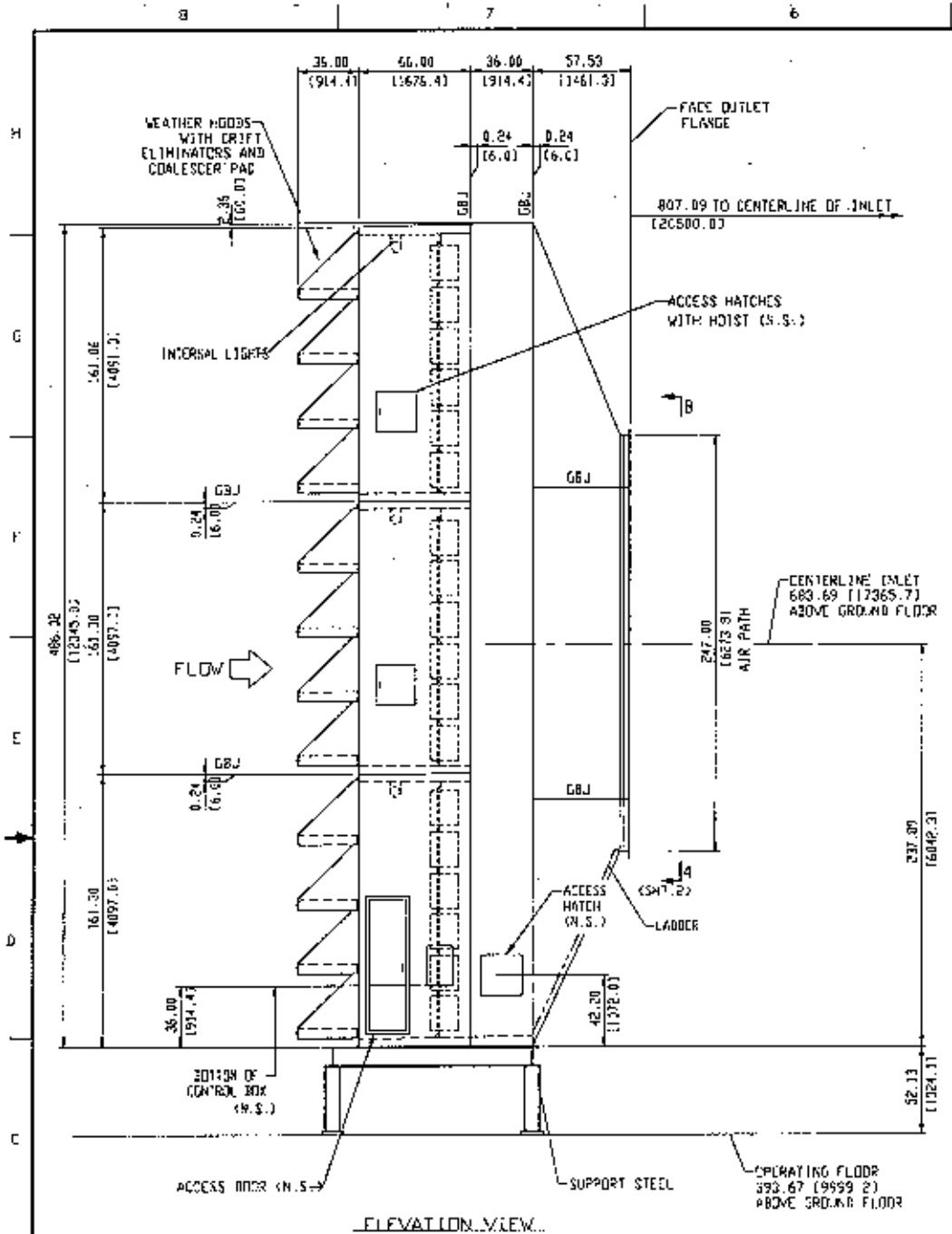


SEPARATING FRAME



- 2 - Put down the « AmerKool » pad without shaking it and shut it up in a hermetic plastic bag to avoid discharging of dust.
- 3 - Unclip the 4 latches and put down the separating frame
- 4 - Put down the high efficiency « DuraVee » cell without shaking it and shut it up in a hermetic plastic bag to avoid discharging of dust.
- 5 - Clean correctly the frame with a damp drag.
Check no part of gasket rest on the frame.
- 6 - Put into place the high efficiency « DuraVee » filter.
The neoprene gasket located on the air inlet side of the « DuraVee » filter cell must rest on the « MATRIX » bank.
CAUTION : We recommended to remove « DuraVee » filters from cartons outside the doors to prevent housing from stuffing.





GENERAL NOTES

- AIR FLOW - 1,124,693 CFM
- FILTERS - 450 EACH
 - PRE FILTERS: PFS-4
 - FINAL FILTERS: TRICEL 95
- SYSTEM PRESSURE DROP - INITIAL CLEAN

A. ENTRANCE LOSS:	0.40" WG
B. PRE FILTERS:	0.47" WG
C. FINAL FILTERS:	0.58" WG
D. EXIT LOSS:	0.15" WG
TOTAL:	1.60" WG
- MATERIALS OF CONSTRUCTION -
 - FILTER MODULES & TRANSITION ARE CARBON STEEL.
 - FILTER HOLDING FRAME: 304L STAINLESS STEEL
 - WEATHER HOODS ARE CARBON STEEL.
 - SUPPORT STRUCTURE IS CARBON STEEL.
- CLEANING -
 - SHALL BE PER P44-AL-1803-SP6 COMMERCIAL SANDBLAST.
- FINISH -
 - INTERIOR AND EXTERIOR SHALL HAVE ONE SHOP COAT ZINC RICH PRIMER PER P6C-A025 AND ONE SHOP COAT HIGH BUILD EPOXY PRIMER PER P6A-M-0013.
 - INTERNAL LADDERS AND PLATFORMS ARE HOT DIPPED GALVANIZED.
 - GALVANIZED AND STAINLESS STEEL MATERIAL IS FURNISHED WITHOUT ADDITIONAL FINISH.
- WELDING -
 - ALL SEAMS SEPARATING CLEAN AIR FROM DIRTY AIR SHALL BE CONTINUOUS "SEAL" WELDED.
 - ROOF AND WALL EXTERNAL STIFFENERS SHALL BE CONTINUOUS "SEAL" WELDED.
 - FLOOR EXTERNAL STIFFENERS SHALL BE "STITCHED" WELDED AND CAULKED.
 - ROOF AND WALL INTERNAL STIFFENERS SHALL BE "STITCHED" WELDED AND CAULKED WITH PAINTABLE CAULK. CAULKING SHALL BE APPLIED AFTER SANDBLASTING AND PRIMER HAVE BEEN APPLIED.
 - FLOOR INTERNAL STIFFENERS SHALL BE "SEAL" WELDED.
- ELECTRICAL AND INSTRUMENTATION -
 - NEKA-4 FOUR ALUMINUM JUNCTION BOXES - (NON-HAZARDOUS LOCATIONS).
 - FOUR PRESSURE GAGES - ONE PER STAGE, ONE TOTAL PRESSURE.
 - THREE PRESSURE SWITCHES - ONE TO SEND ALARM @ 6" WG, TWO TO SEND SHUT DOWN @ 8" WG.
 - INTERNAL LIGHTS IN FILTER MODULES
 - ONE THERMO COUPLE AT 10-10
 - ONE PRESSURE TRANSMITTER 96-TF-1A
- BOLTING AND GASKETS -
 - WHERE FIELD BOLTING IS UTILIZED, 0.20 (1/2") THICK NEOPRENE GASKET PER G.E. EMP'S A12C19 SHALL BE USED. GASKET SHALL COMPLETELY SEAL THE PERIMETER AND SHALL BE COMPRESSED TO 50% OF ITS THICKNESS AT FINAL ASSEMBLY STAGE.
 - ALL BOLTING ON THE DIRTY AIR SIDE OF FILTRATION SHALL BE STEEL ASTM A325 TYPE AND SHALL BE HOT DIPPED ZINC COATED (GALVANIZED) PER ASTM A153. NUTS SHALL BE TAPPED OVERSIZED.
 - ALL BOLTING HARDWARE LOCATED ON CLEAN AIR SIDE OF FILTRATION SHALL BE 304SS & SHALL BE TACK WELDED.
 - OUTLET FLANGE SHALL HAVE 0.63 x 1.25 VERTICAL SLOTTED HOLES FOR 0.5 INCH BOLTS.

GBJ = GASKETED BOLTED JOINT

REV.	REVISION DESCRIPTION	DATE	BY	CHKD.	APPV.

GE Power Generation GENERAL ELECTRIC COMPANY
 Schenectady, NY

VENDOR SUPPLIED DRAWING

GE NOT TO REVISE. GE REVISION LEVEL IS AS SHOWN IN THIS APPLICATION. THIS DOCUMENT IS FILED UNDER THE GE DRAWING NUMBER.

THIS DOCUMENT SHALL BE REVISED IN ITS ENTIRETY. ALL SHEETS OF THIS DOCUMENT ARE THE SAME REVISION LEVEL AS INDICATED IN THIS VENDOR SUPPLIED DRAWING APPLICATION.

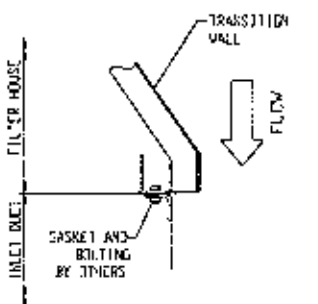
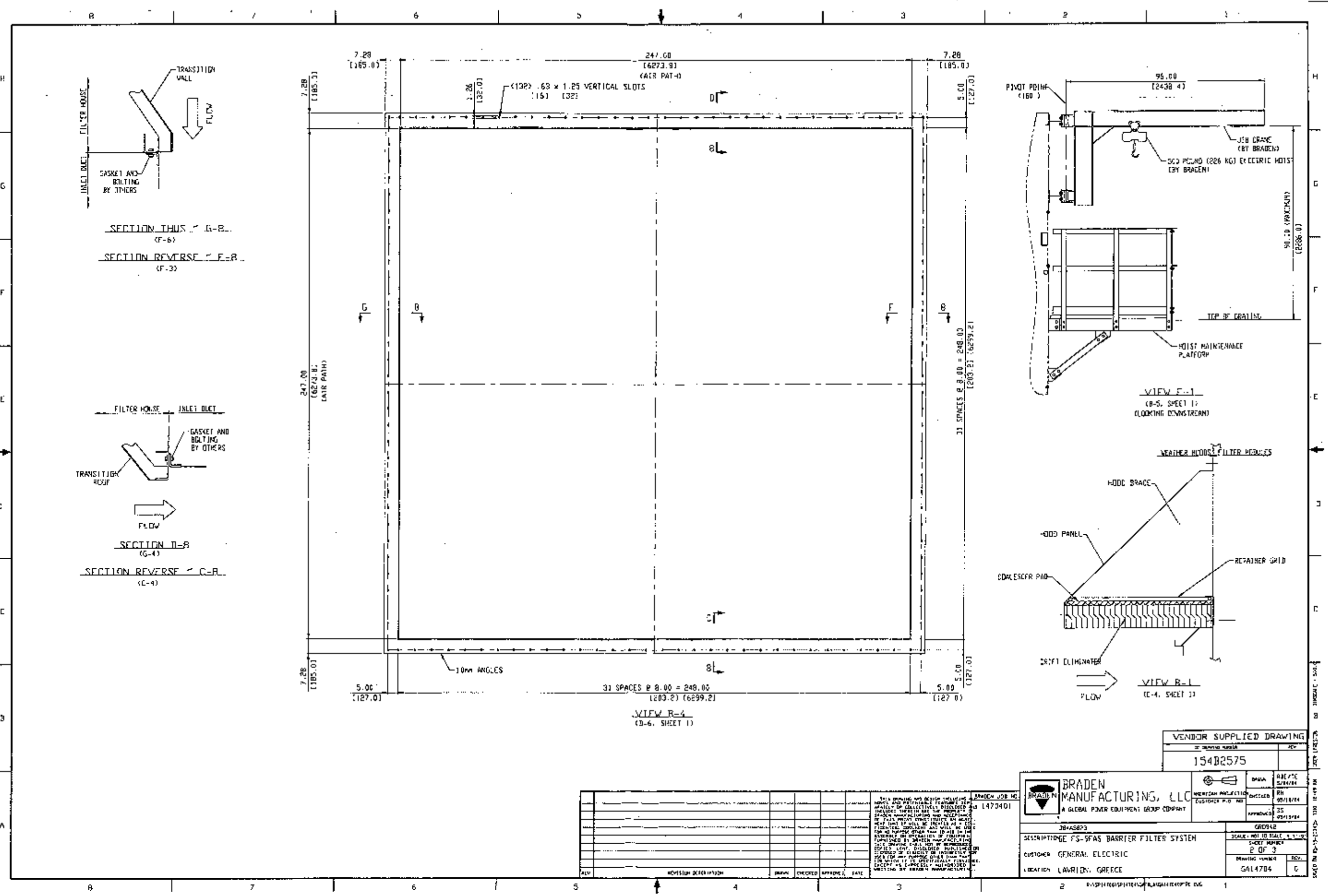
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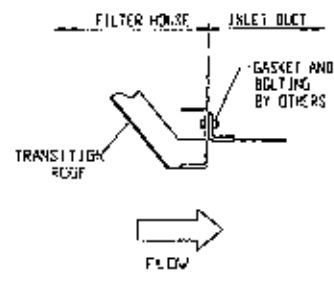
BRADEN MANUFACTURING, LLC
 A GE POWER EQUIPMENT GROUP COMPANY

DESCRIPTION: FS-9FAS BARRIER FILTER SYSTEM
 CUSTOMER: GENERAL ELECTRIC
 LOCATION: LAVRION, GREECE

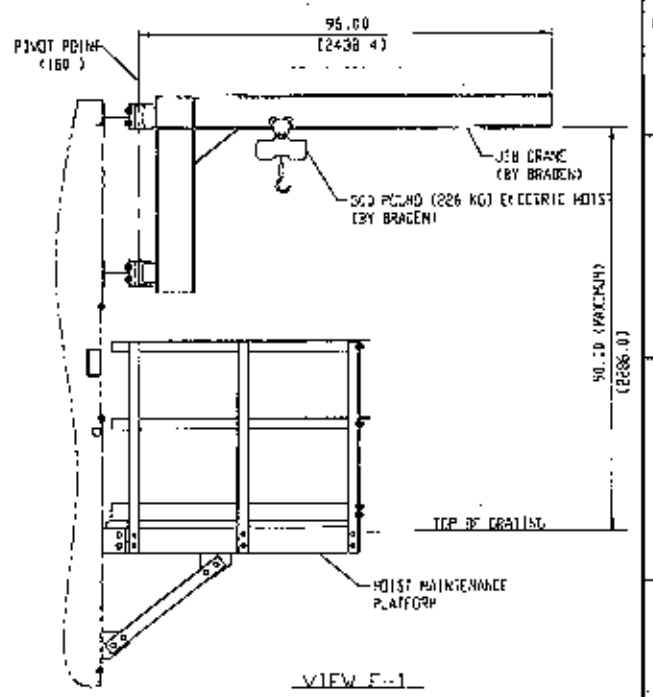
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 DRAWING NUMBER: GA14784
 REV.:



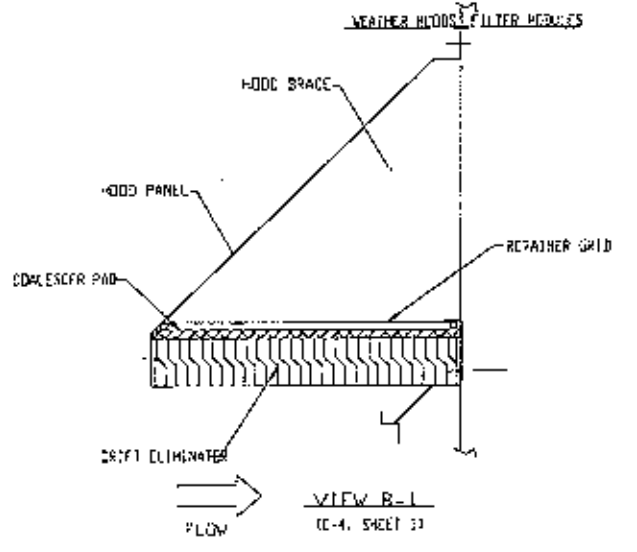
SECTION THRU G-B
(F-6)
SECTION REVERSE F-B
(F-3)



SECTION D-B
(G-4)
SECTION REVERSE C-B
(C-4)



VIEW F-1
(B-5, SHEET 1)
(LOOKING DOWNSTREAM)



VIEW B-1
(C-4, SHEET 1)

REV	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED	DATE

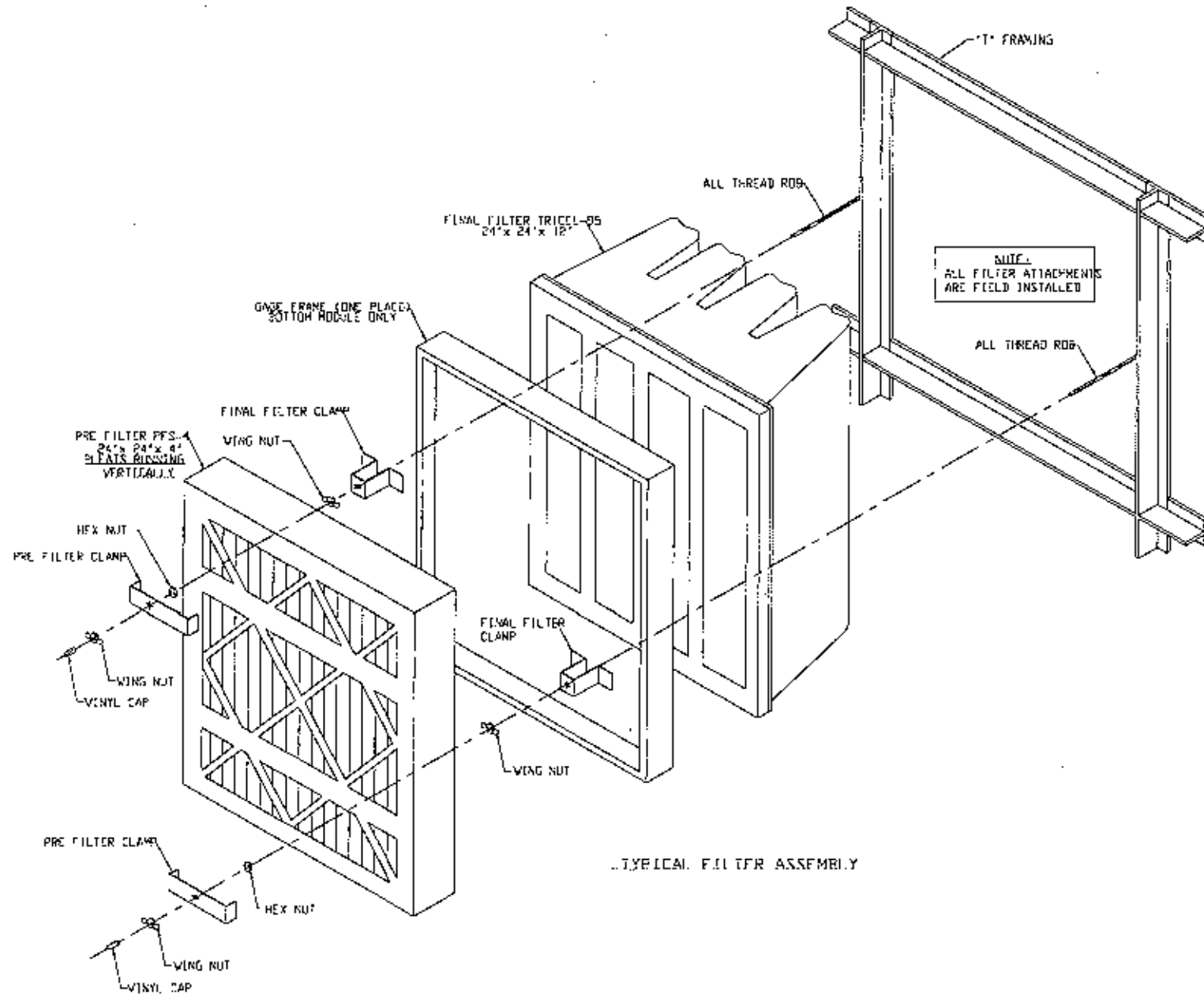
VENDOR SUPPLIED DRAWING

154B2575

BRADEN MANUFACTURING, LLC A GLOBAL POWER EQUIPMENT GROUP COMPANY	BRADEN JOB NO. 1473401	DRAWN RRE/TC	CHECKED RH
DESCRIPTION FS-SPAS BARRIER FILTER SYSTEM	CUSTOMER GENERAL ELECTRIC	LOCATION LAVRISON, GREECE	SCALE NOT TO SCALE 1:1
DRAWING NUMBER GAL4704		SHEET NUMBER 2 OF 3	

8 7 6 5 4 3 2

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G
F
E
D
C
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A



TYPICAL FILTER ASSEMBLY

REV	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED	DATE

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		DRAWN: RBE 5/24/24 CHECKED: RH 5/21/24 APPROVED: DS 5/21/24	
DESCRIPTION: FS-9FAS BARRIER FILTER SYSTEM		SCALE: 1/8" = 1'-0"	
CUSTOMER: GENERAL ELECTRIC		SHEET NUMBER: 3 OF 3	
LOCATION: LAVRION, GREECE		DRAWING NUMBER: GA14704	

VENDOR SUPPLIED DRAWING	
BY: 154B2575	REV: 0

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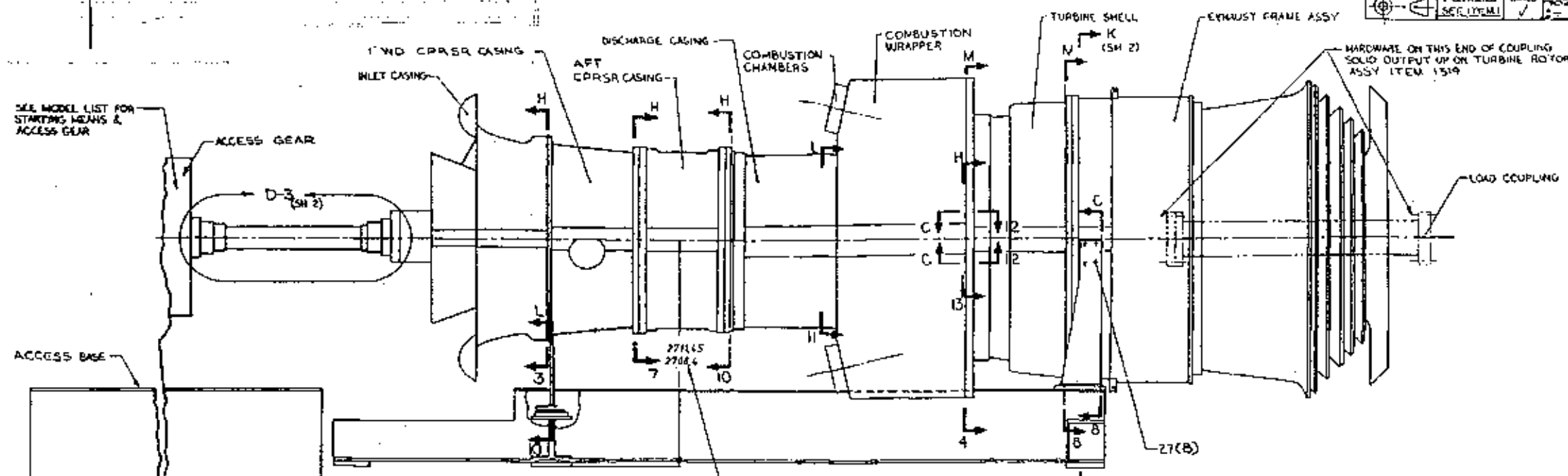
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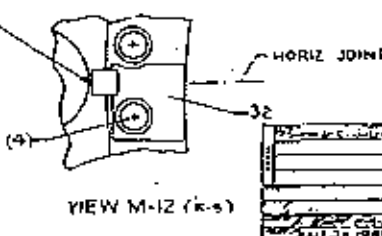
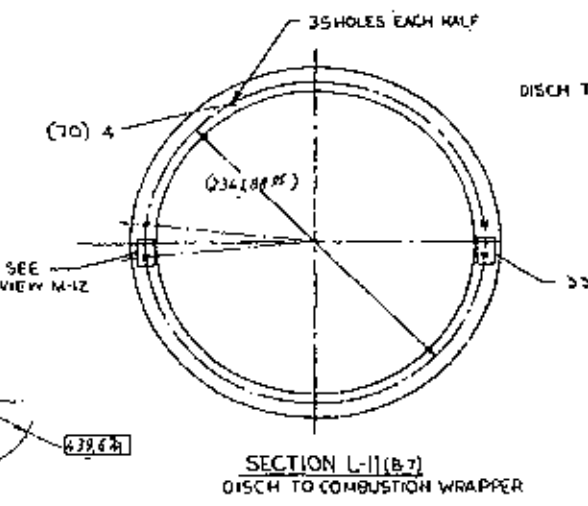
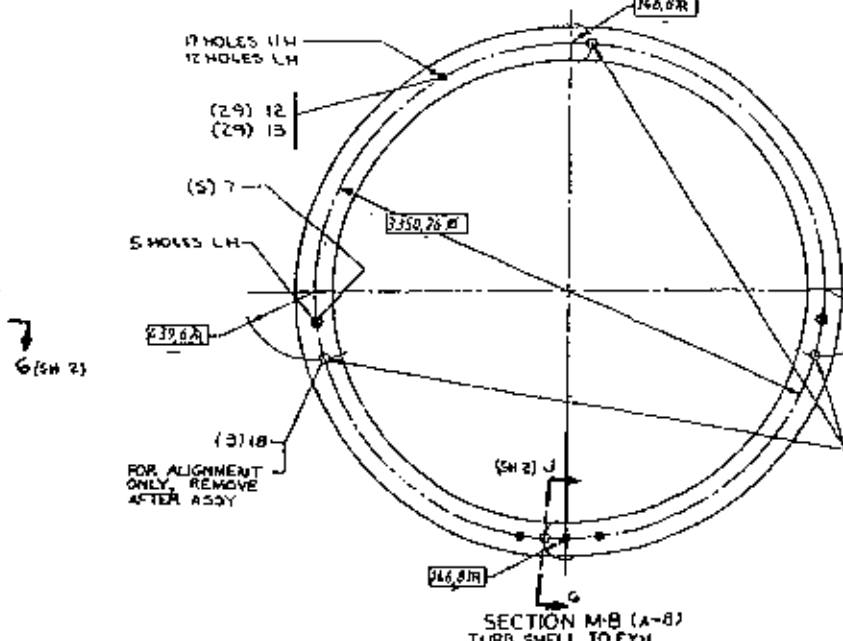
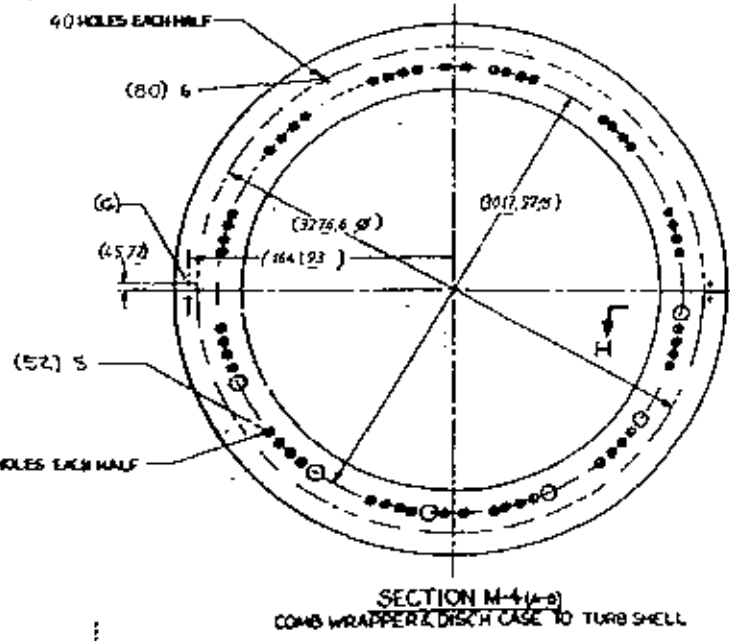
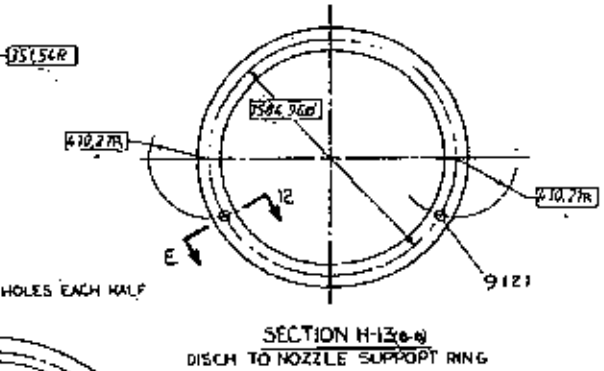
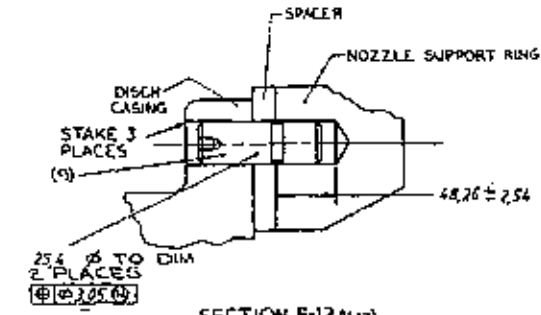
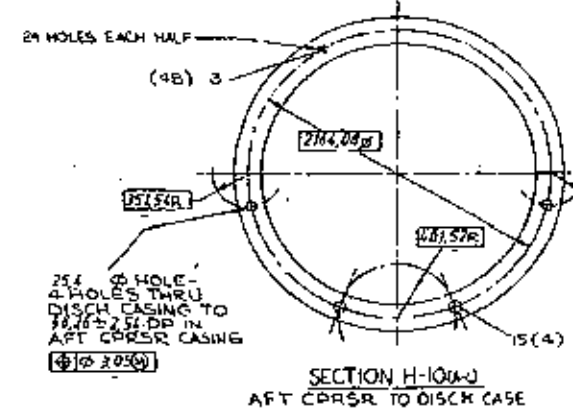
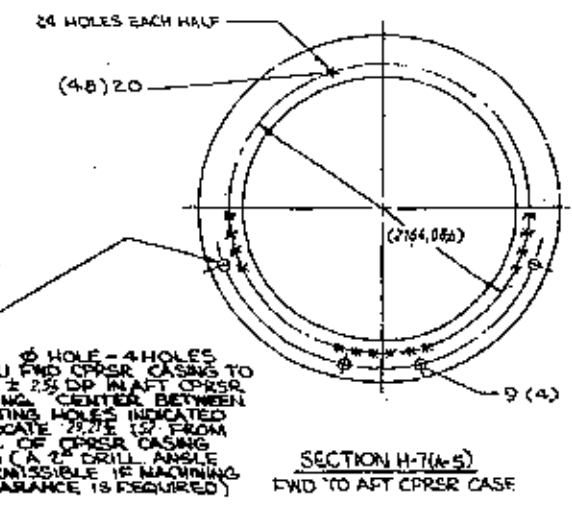
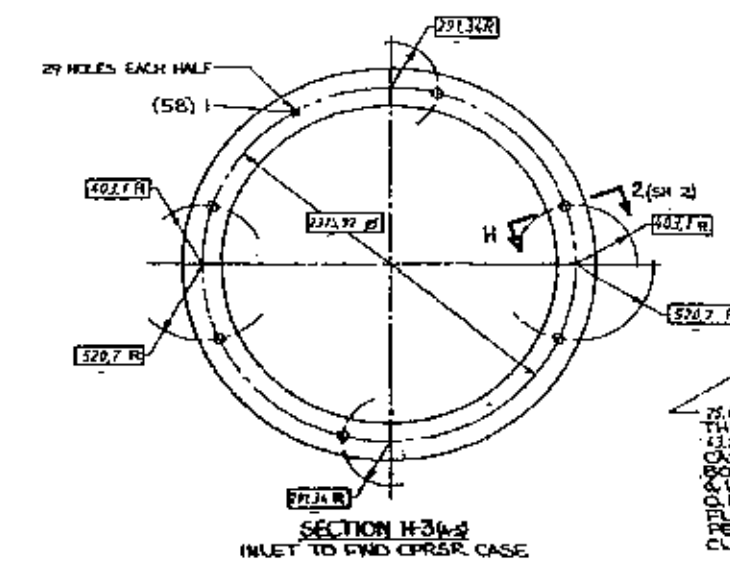
BOLTING & DOWELING ARR

SEC. ITEM	QTY	UNIT	DESCRIPTION
1			
2			
3			
4			
5			
6			
7			



- NOTE
1. SEE MODEL LIST FOR ALIGNMENT DIAG & INSTRUCTION.
 2. DOWELS SUPPLIED TO THE FIELD ARE TO BE OVERSIZE AND FITTED AT ASSY.
 3. ALL WELDS PER ITEM 2, CL III, COL AB INSPECT PER (C).
 4. BOLT & STUD TORQUING FOR AIR TIGHT JOINT PER 24BA4158.
 5. THE DIAMETRICAL FIT OF ALL DOWEL PINS TO BE .002 TIGHT TO JOG OF DOWEL DIA LOOSE.
 6. GRIND SUPPORT SHIMS TO OBTAIN THIS DIA.
 7. MFG MAY TRIM THIS EDGE IF NECESSARY FOR CLEARANCE.

SEE NOTE 6 GRINDING APPLIES TO PART 26 ONLY

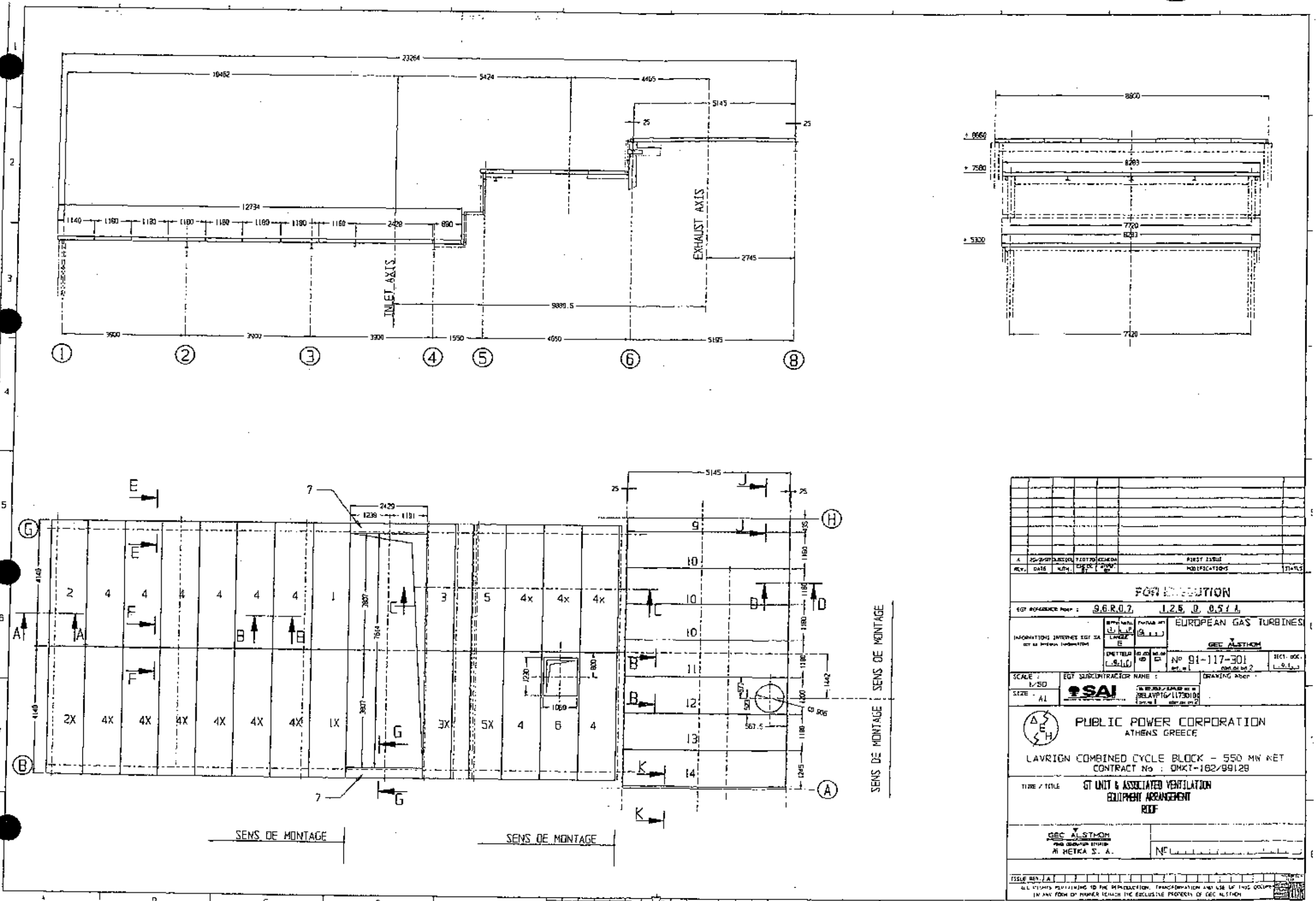


7.1 Ø HOLE - 4 HOLES THRU FWD CPRSR CASING TO 13.8 ± .25 DP IN AFT CPRSR CASING - CENTER BETWEEN BOLTING HOLES INDICATED & LOCATE 7.1E (2" FROM O.D. OF CPRSR CASING FLG (A 2" DRILL ANGLE PERMISSIBLE IF MACHINING CLEARANCE IS REQUIRED)

25.4 Ø HOLE - 2 HOLES THRU DISCH CASING TO 48.26 ± .25 DP IN AFT CPRSR CASING
(2) 2

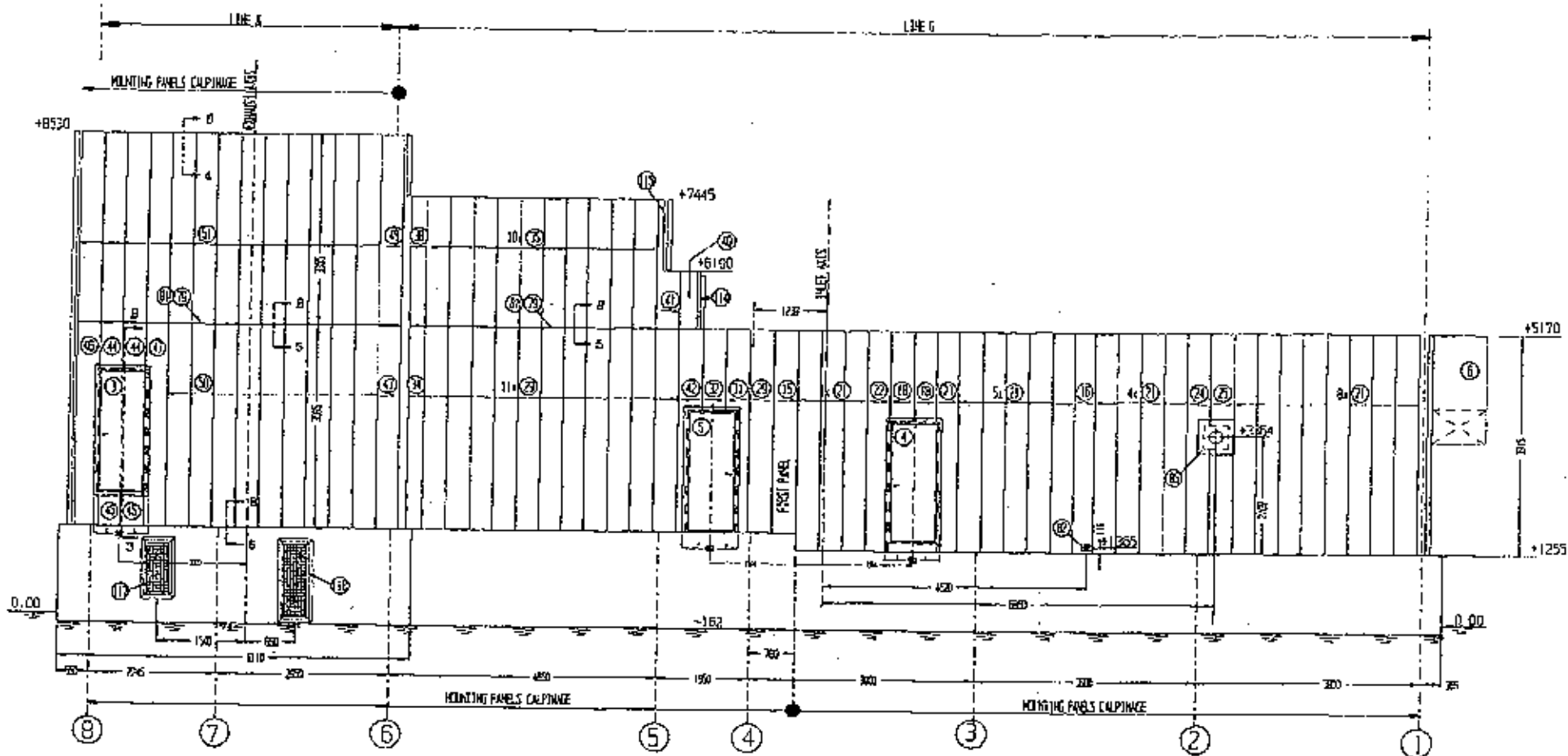
SEE NOTE 7

1	DISCH WRAPPER	304A-2525	
2	NOZZLE SUPPORT RING	91.24A-1118	
3	DISCH CASING	91.24A-1118	
4	COMB WRAPPER	91.24A-1118	
5	NOZZLE SUPPORT RING	91.24A-1118	
6	DISCH CASING	91.24A-1118	
7	COMB WRAPPER	91.24A-1118	
8	NOZZLE SUPPORT RING	91.24A-1118	
9	DISCH CASING	91.24A-1118	
10	COMB WRAPPER	91.24A-1118	
11	NOZZLE SUPPORT RING	91.24A-1118	
12	DISCH CASING	91.24A-1118	
13	COMB WRAPPER	91.24A-1118	
14	NOZZLE SUPPORT RING	91.24A-1118	
15	DISCH CASING	91.24A-1118	
16	COMB WRAPPER	91.24A-1118	
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21	DISCH CASING	91.24A-1118	
22	COMB WRAPPER	91.24A-1118	
23	NOZZLE SUPPORT RING	91.24A-1118	
24	DISCH CASING	91.24A-1118	
25	COMB WRAPPER	91.24A-1118	
26	NOZZLE SUPPORT RING	91.24A-1118	
27	DISCH CASING	91.24A-1118	
28	COMB WRAPPER	91.24A-1118	
29	NOZZLE SUPPORT RING	91.24A-1118	
30	DISCH CASING	91.24A-1118	
31	COMB WRAPPER	91.24A-1118	
32	NOZZLE SUPPORT RING	91.24A-1118	
33	DISCH CASING	91.24A-1118	
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39	DISCH CASING	91.24A-1118	
40	COMB WRAPPER	91.24A-1118	
41	NOZZLE SUPPORT RING	91.24A-1118	
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43	COMB WRAPPER	91.24A-1118	
44	NOZZLE SUPPORT RING	91.24A-1118	
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46	COMB WRAPPER	91.24A-1118	
47	NOZZLE SUPPORT RING	91.24A-1118	
48	DISCH CASING	91.24A-1118	
49	COMB WRAPPER	91.24A-1118	
50	NOZZLE SUPPORT RING	91.24A-1118	

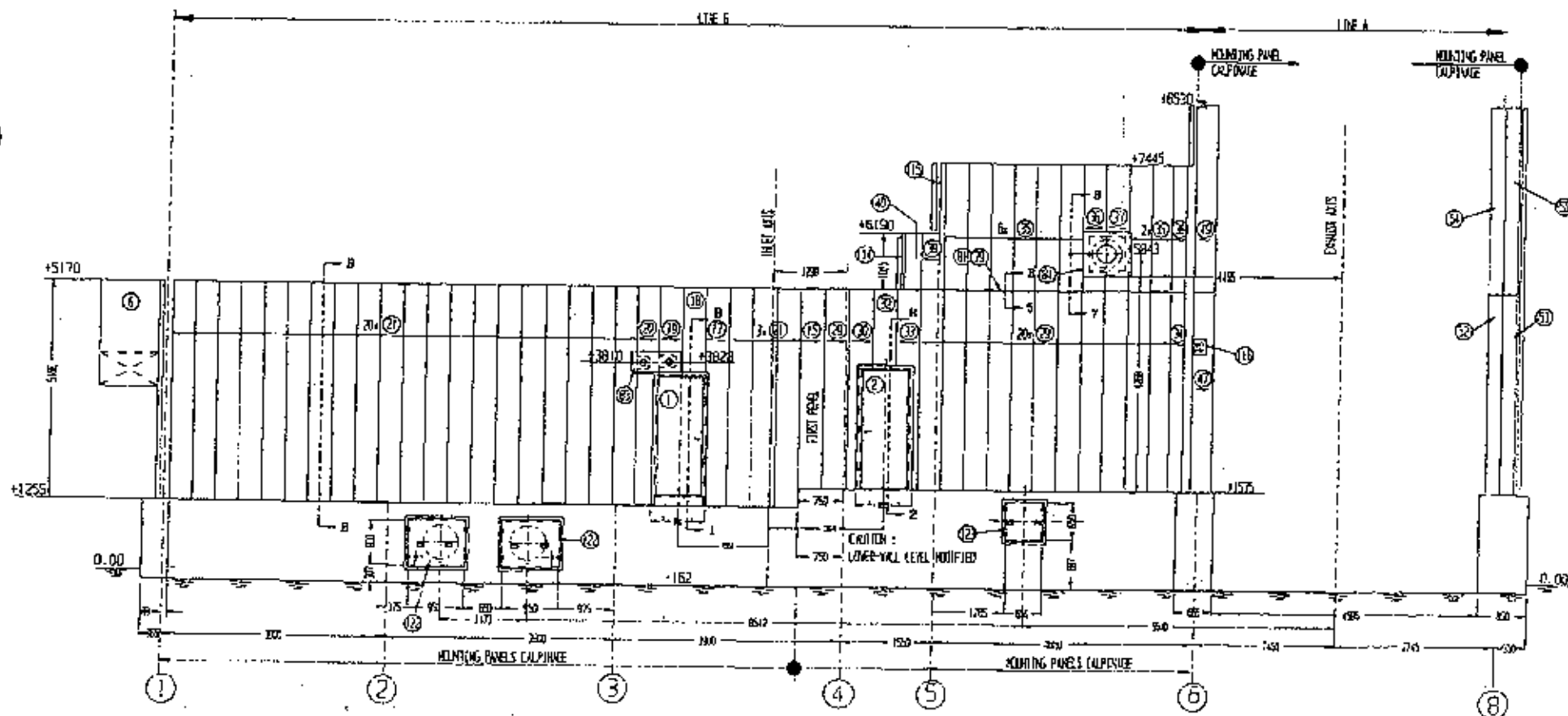


REV.		DATE	BY	CHKD.	APP'D.	DESCRIPTION	STATUS
FOR EXECUTION							
EGT REFERENCE NO.:		96R07		J.25. D. 0.51A			
INFORMATION INTERNES EGT SA		LARGE E		GEC ALSTOM		EUROPEAN GAS TURBINES	
D'ETAT		L.9.10		N° 91-117-301		SECT. OCC. L.9.12.1	
SCALE:		EGT SUBCONTRACTOR NAME:		DRAWING NO.:			
L/SD		SAI		BELAVP/1173010			
SIZE:		A1					
PUBLIC POWER CORPORATION		ATHENS GREECE					
LAVRIGN COMBINED CYCLE BLOCK - 550 MW NET		CONTRACT No. : DMKT-162/99129					
TITLE / TITRE		GT UNIT & ASSOCIATED VENTILATION		EQUIPMENT ARRANGEMENT		RIEF	
GEC ALSTOM		SAI		BELAVP/1173010		N°	
ISSUE NO. 1							
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LINE G and H



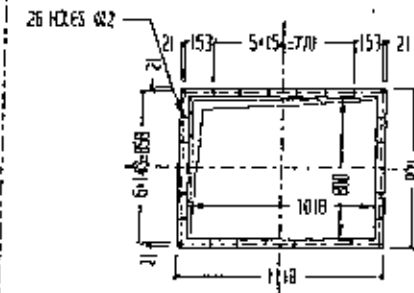
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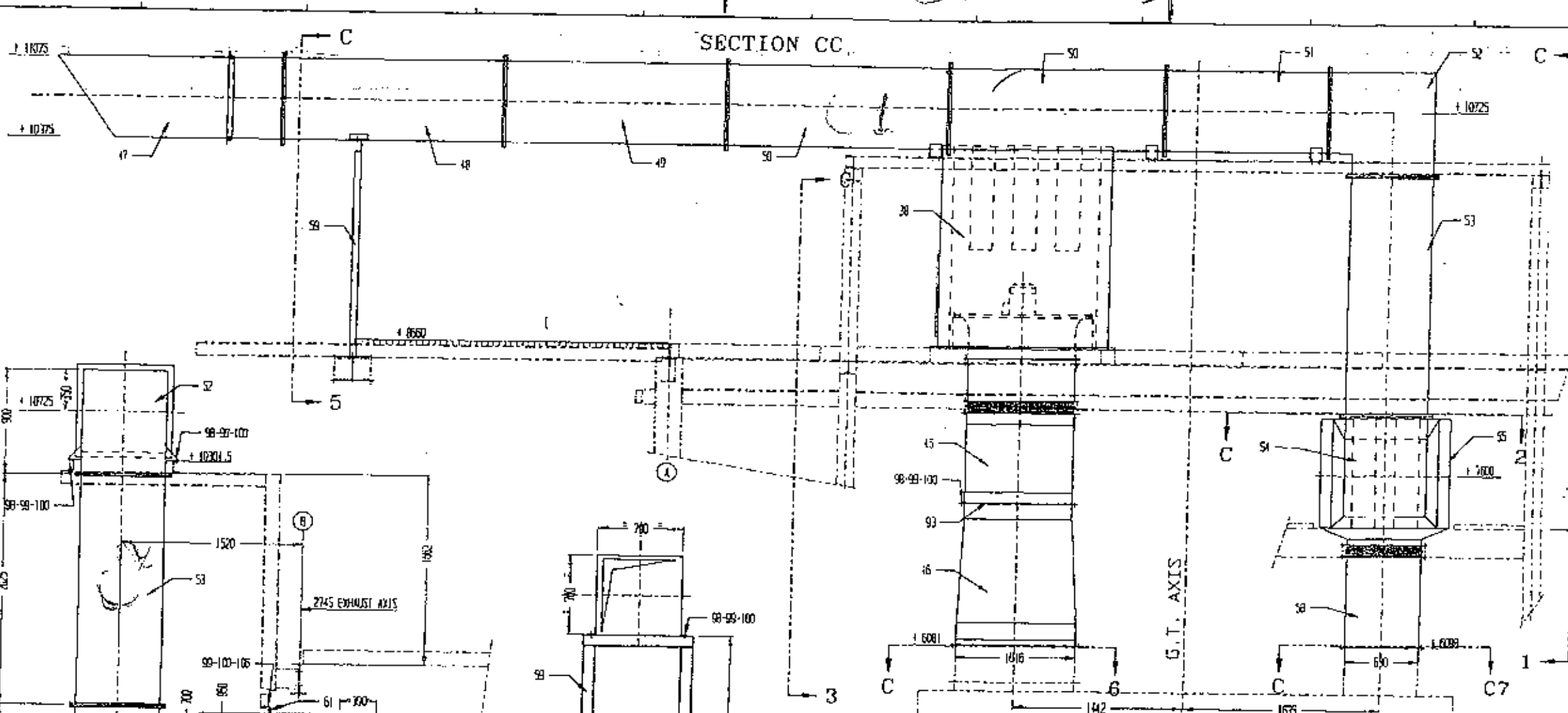
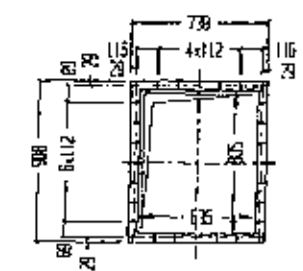
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NO. 91-117 295		SEC. 1.0.1.1		L.O.A.L.	
SCALE:	EST. SUBCONTRACTOR NAME:		DRAWING NO.:		
1/50	SAI		GEC ALSTHOM		
PUBLIC POWER CORPORATION ATHENS GREECE					
LAVRION COMBINED CYCLE BLOCK - 550 MW NET CONTRACT No.: DMKT-162/99129					
GT UNIT & ASSOCIATED VENTILATION EQUIPMENT ARRANGEMENT SIDE PANEL ASSEMBLY					
GEC ALSTHOM 15, METKA S. A.					

SECTION CC

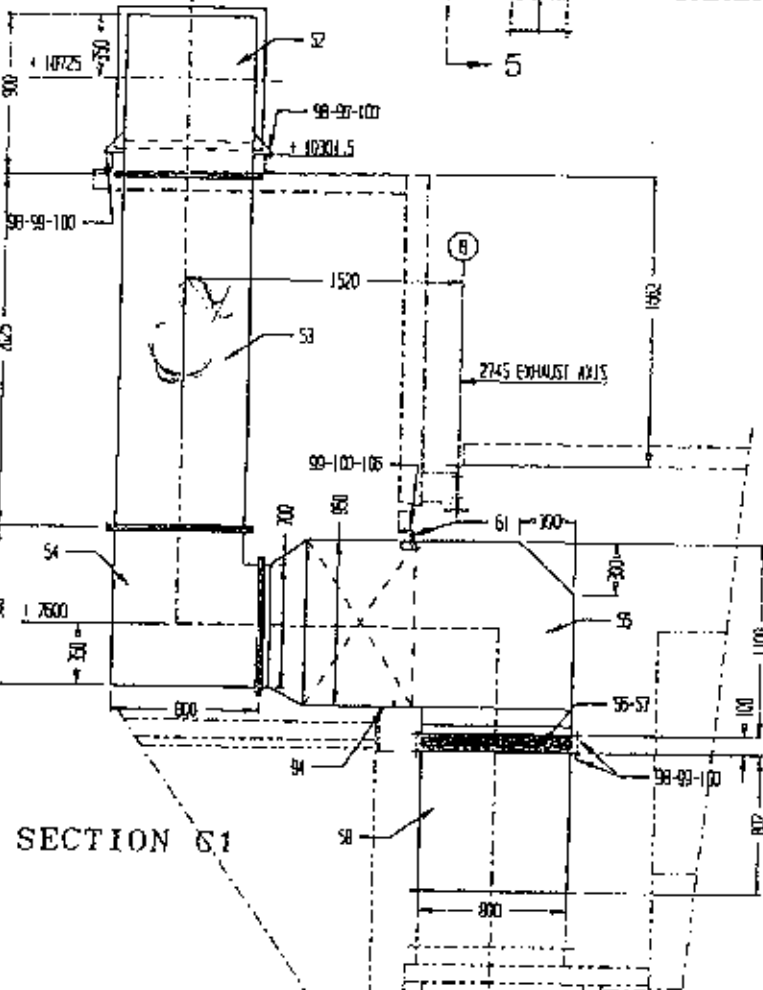
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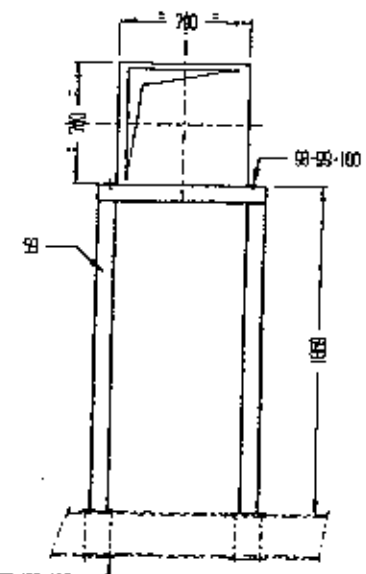
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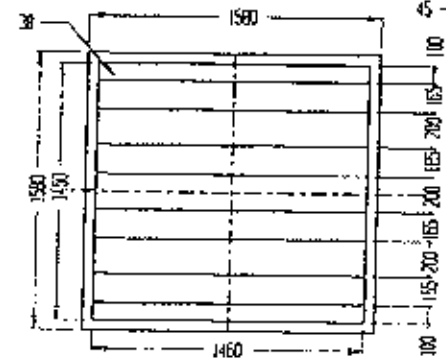
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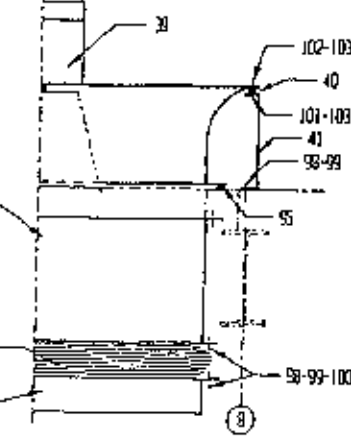
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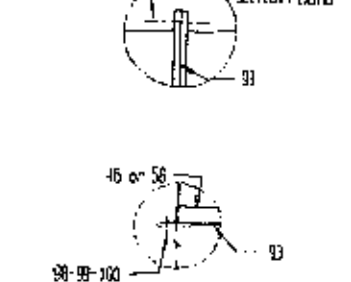
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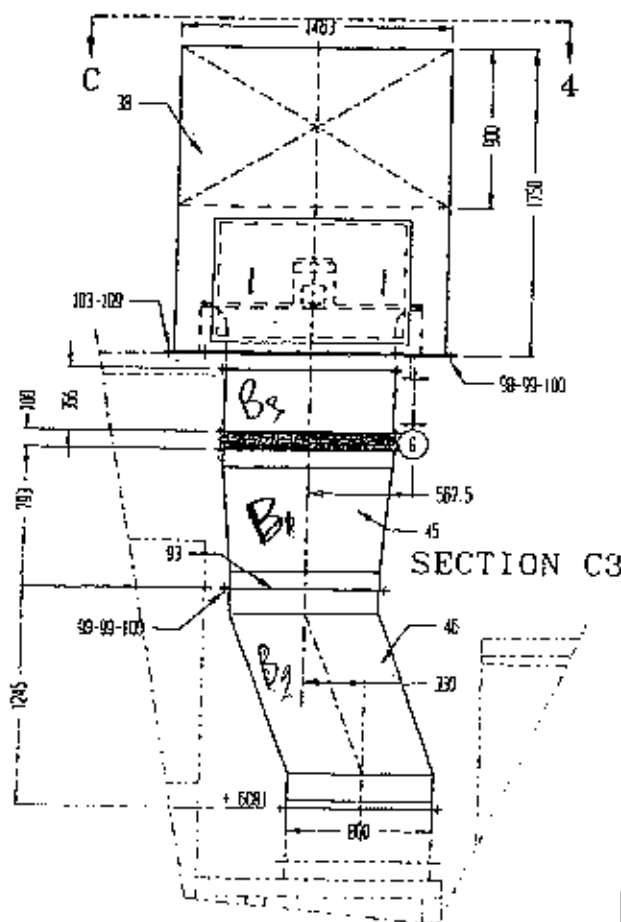
FIXING (ITEM 39) DETAIL



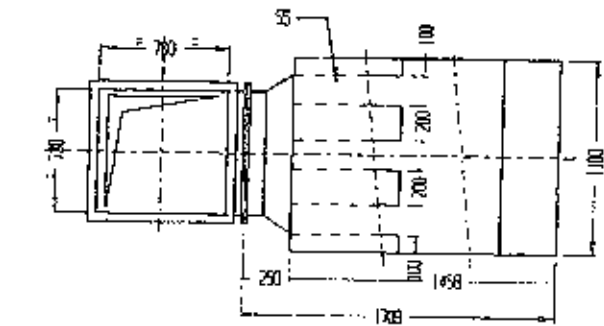
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SECTION C3

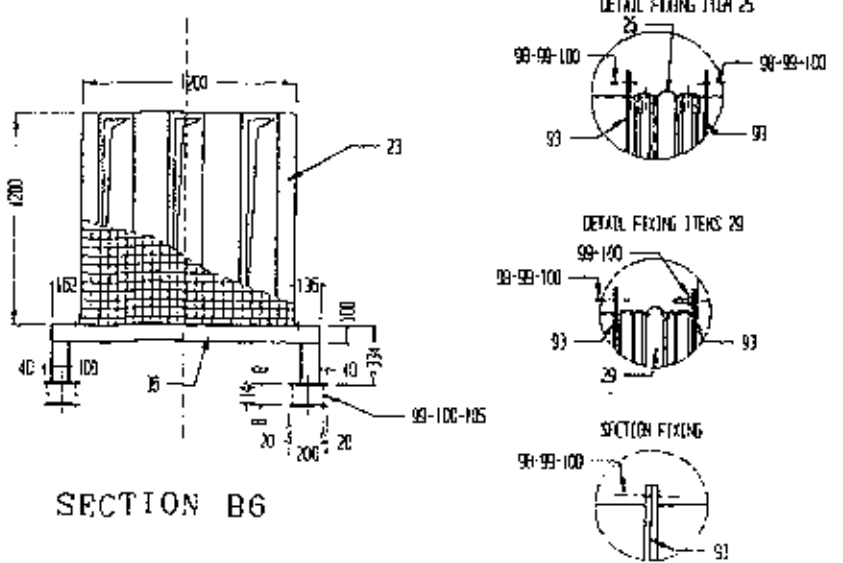
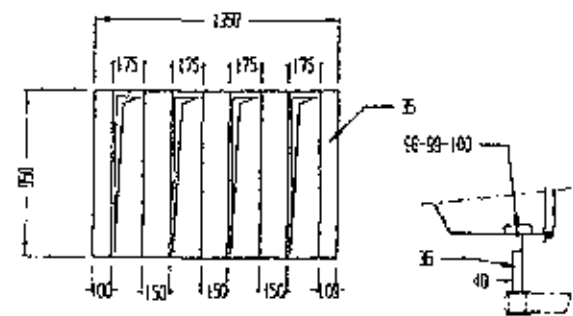
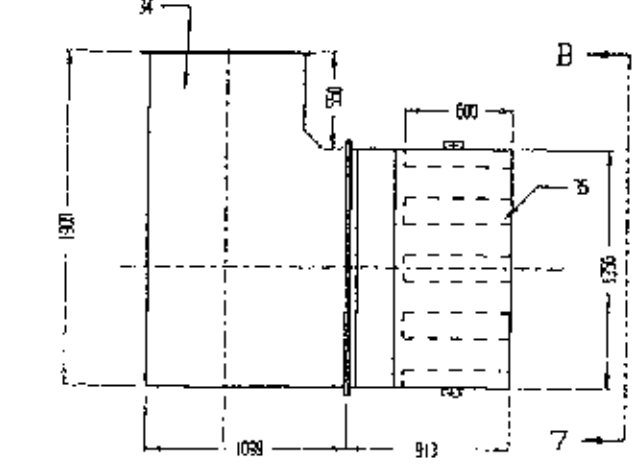
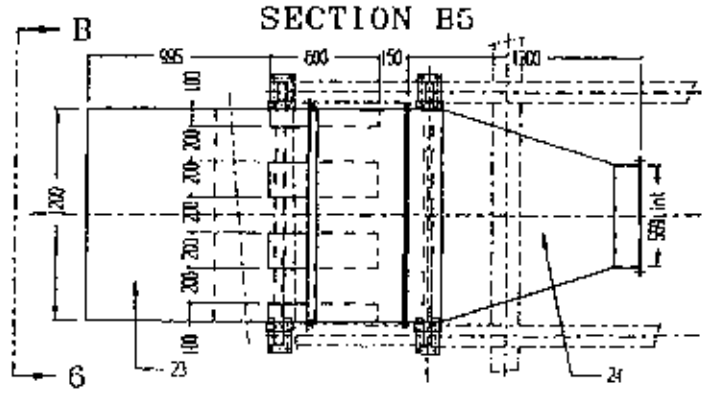
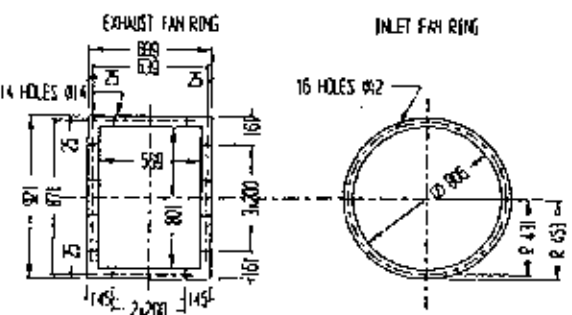
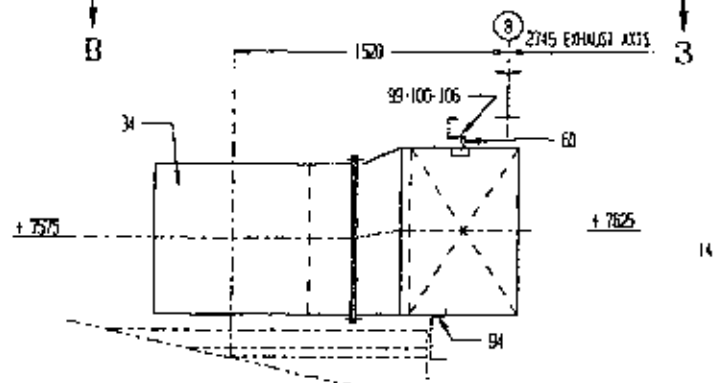
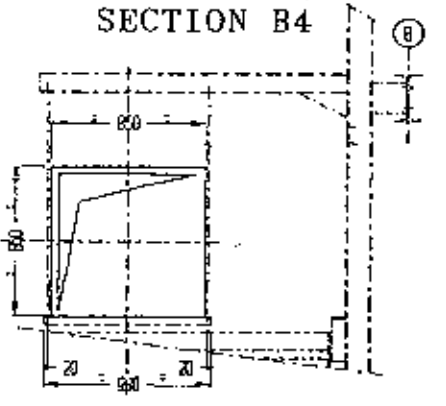
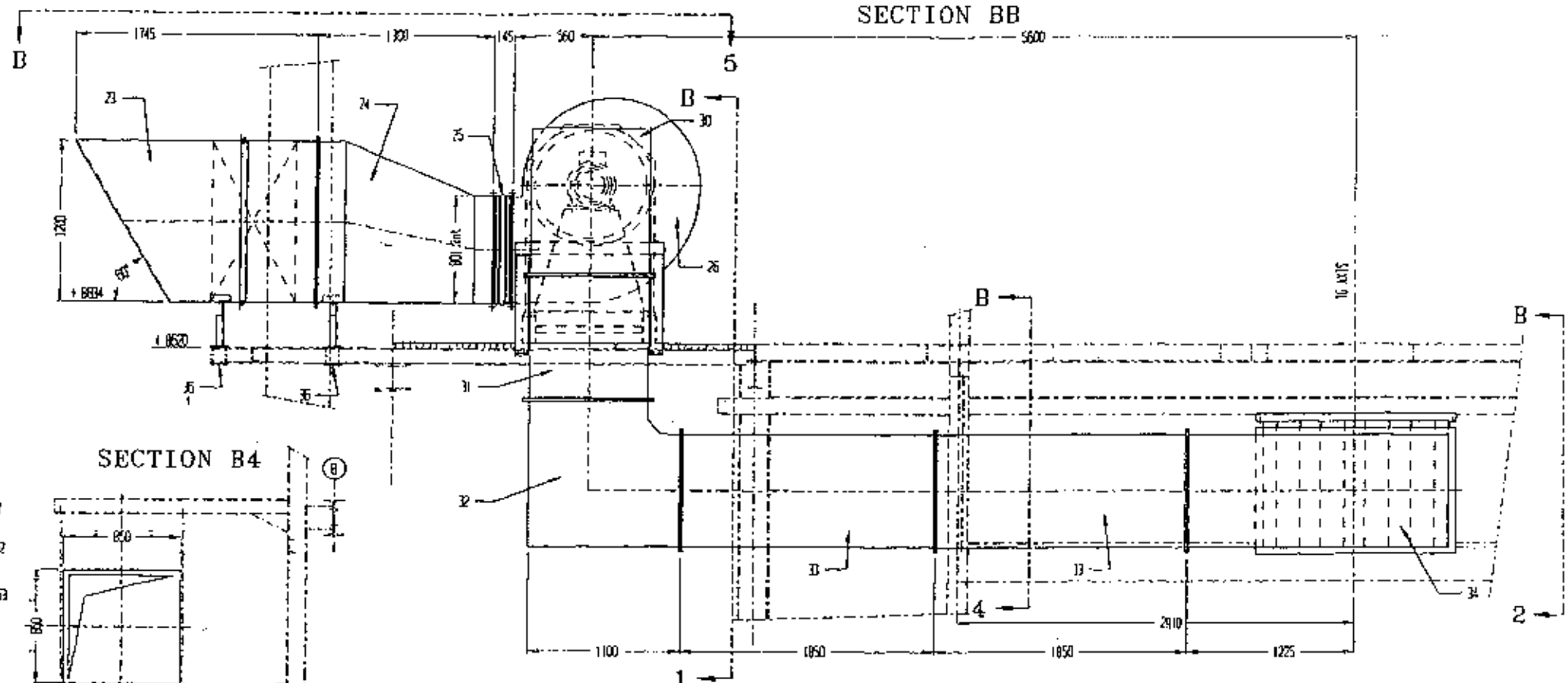
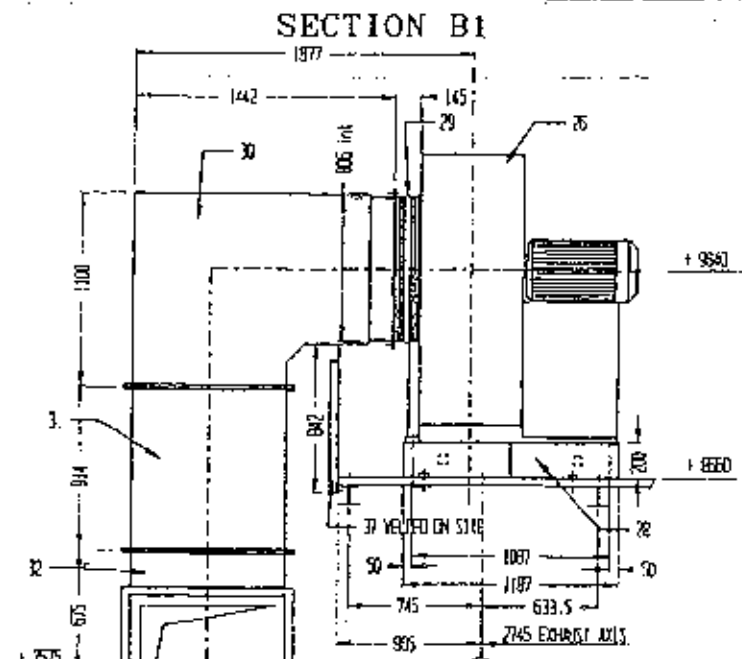


SECTION C2



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					MODIFICATIONS	

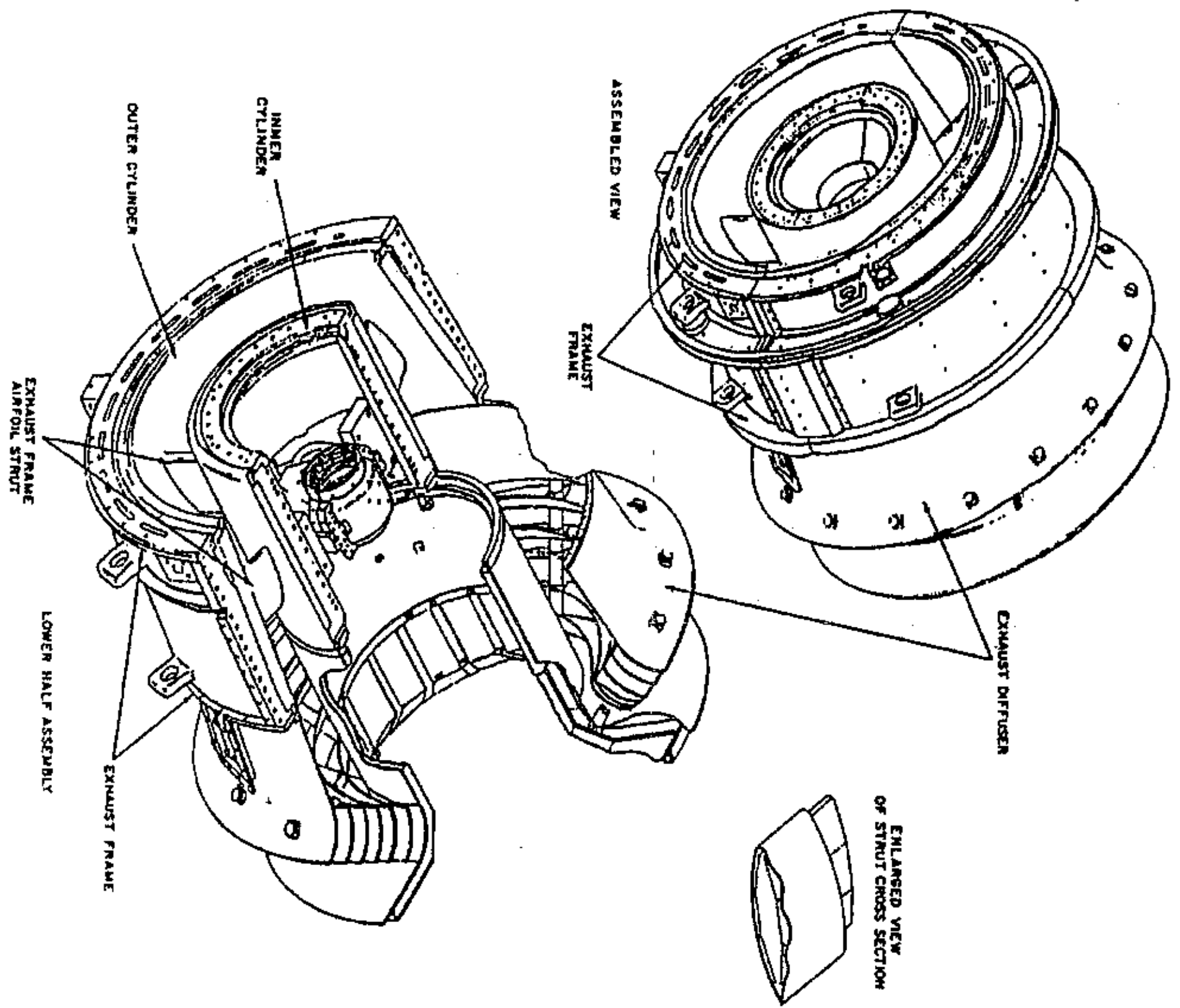
SAI
 PUBLIC POWER CORPORATION
 ATHENS GREECE
 LAVRION COMBINED CYCLE BLOCK - 350 MW NET
 CONTRACT No : DMKT-162/99129
 TITLE / TITLE
 G1 UNIT & ASSOCIATED VENTILATION
 EQUIPMENT ARRANGEMENT
 VENTILATION
 GEC ALSTHOM
 H. METKA S. A.



15/2/97		DIMITRI		CONSOLE		FIRST ISSUE	
REV	DATE	NUM	DESCR	BY	CHK	MODIFICATIONS	STATUS
FOR INFORMATION							
REV REFERENCE NO. 1		95.R.0.7		J.26.0.043.4			
INFORMATION INTERNET EST 33				EUROPEAN GAS TURBINES			
REV 1				GEC ALSTHOM			
L.811.0				N° 91-117-304			
SCALE: 1/20				SUBCONTRACTOR NAME: SAI		DRAWING No.:	
SITE: A1				SAI			
PUBLIC POWER CORPORATION				ATHENS GREECE			
LAVRION COMBINED CYCLE BLOCK - 550 MW NET				CONTRACT No.: DMCT-162/99129			
TITRE / TITLE				GT UNIT & ASSOCIATED VENTILATION EQUIPMENT ARRANGEMENT VENTILATION			
GEC ALSTHOM				METKA S. A.			

9E'

EXHAUST FRAME ASSEMBLY



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GEC ALSTHOM

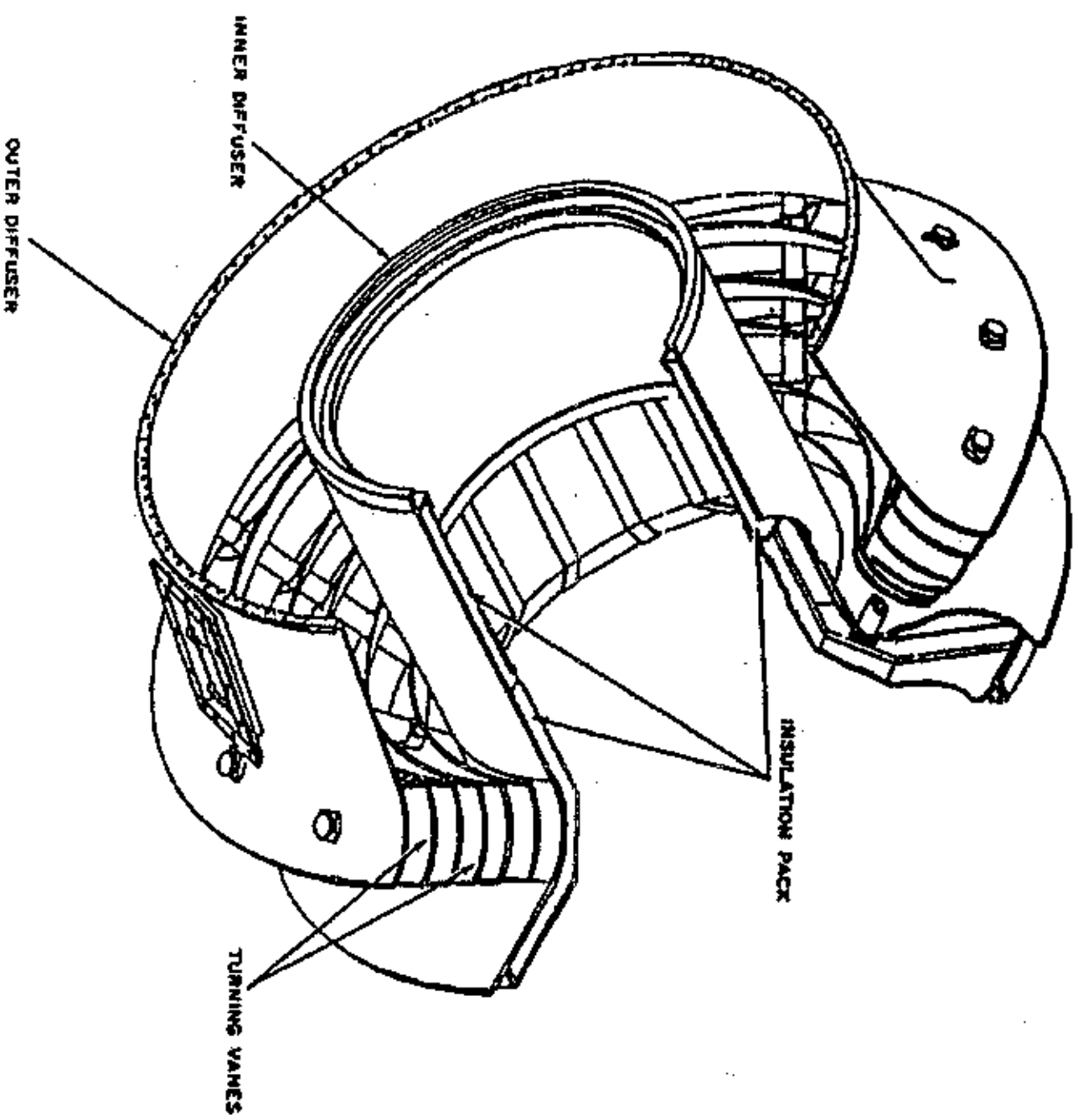
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OPERATION AND MAINTENANCE GUIDE
DESCRIPTIVE GUIDE

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9E'

EXHAUST DIFFUSER



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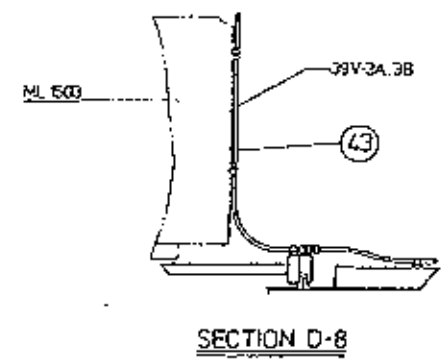
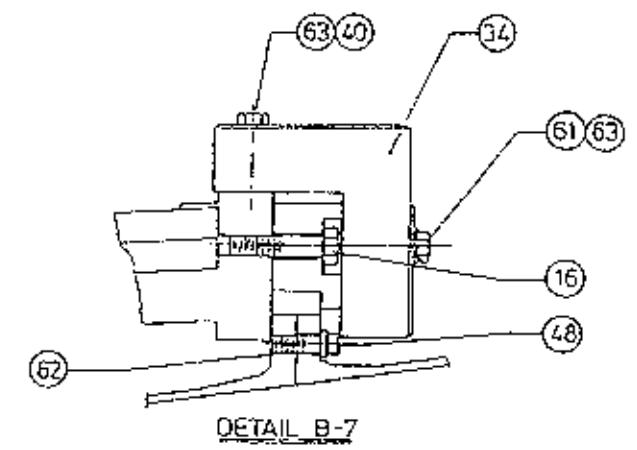
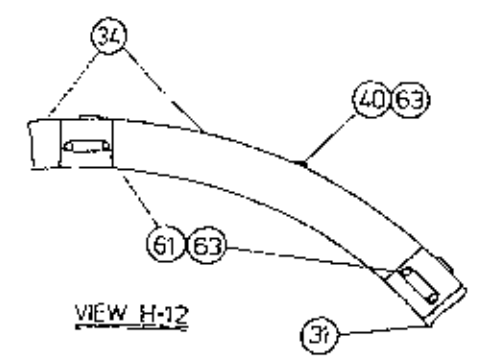
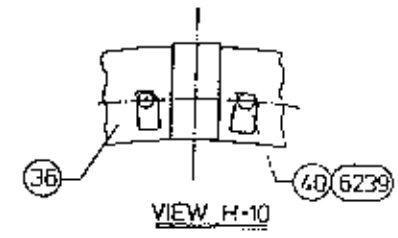
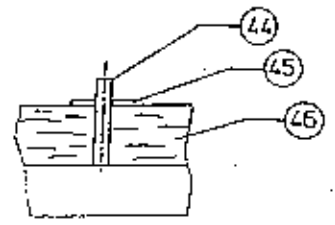
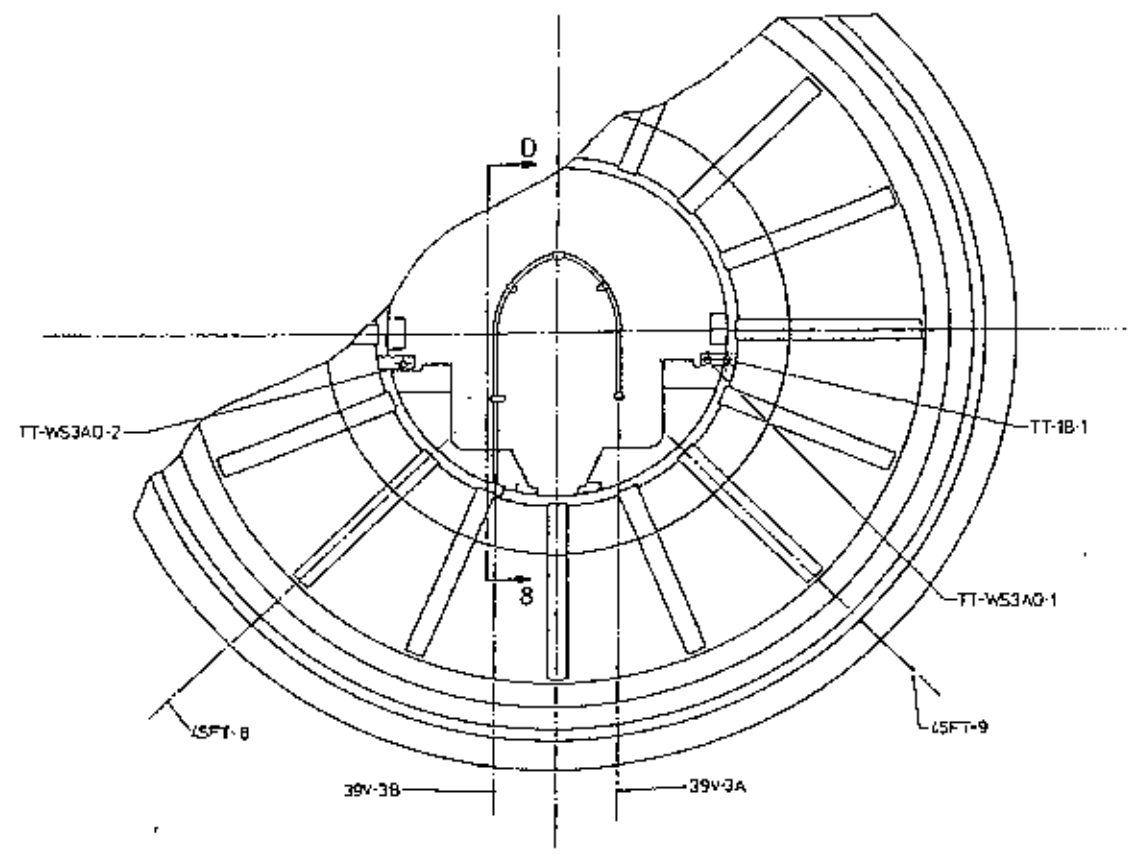
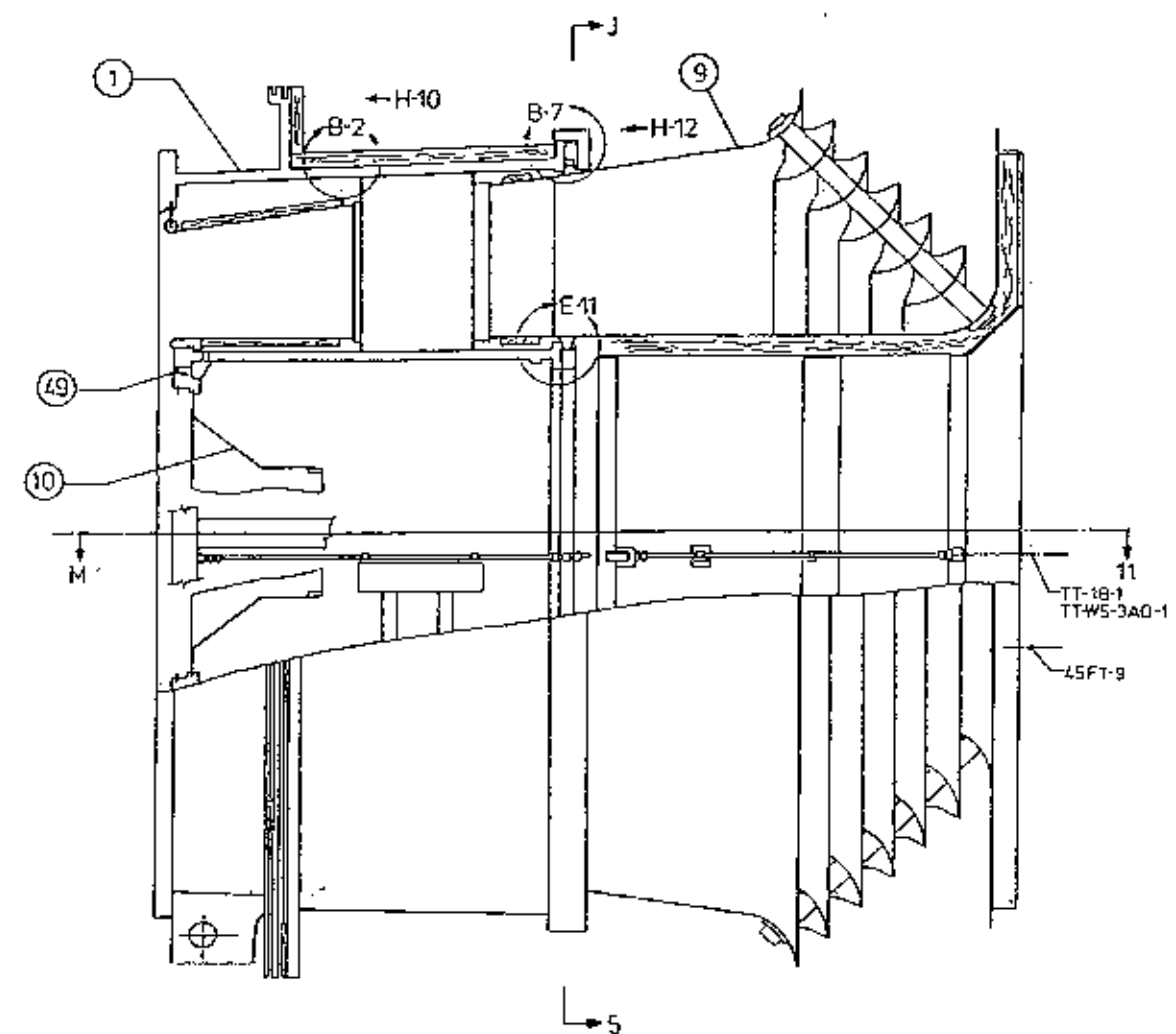
GE **ALSTHOM**

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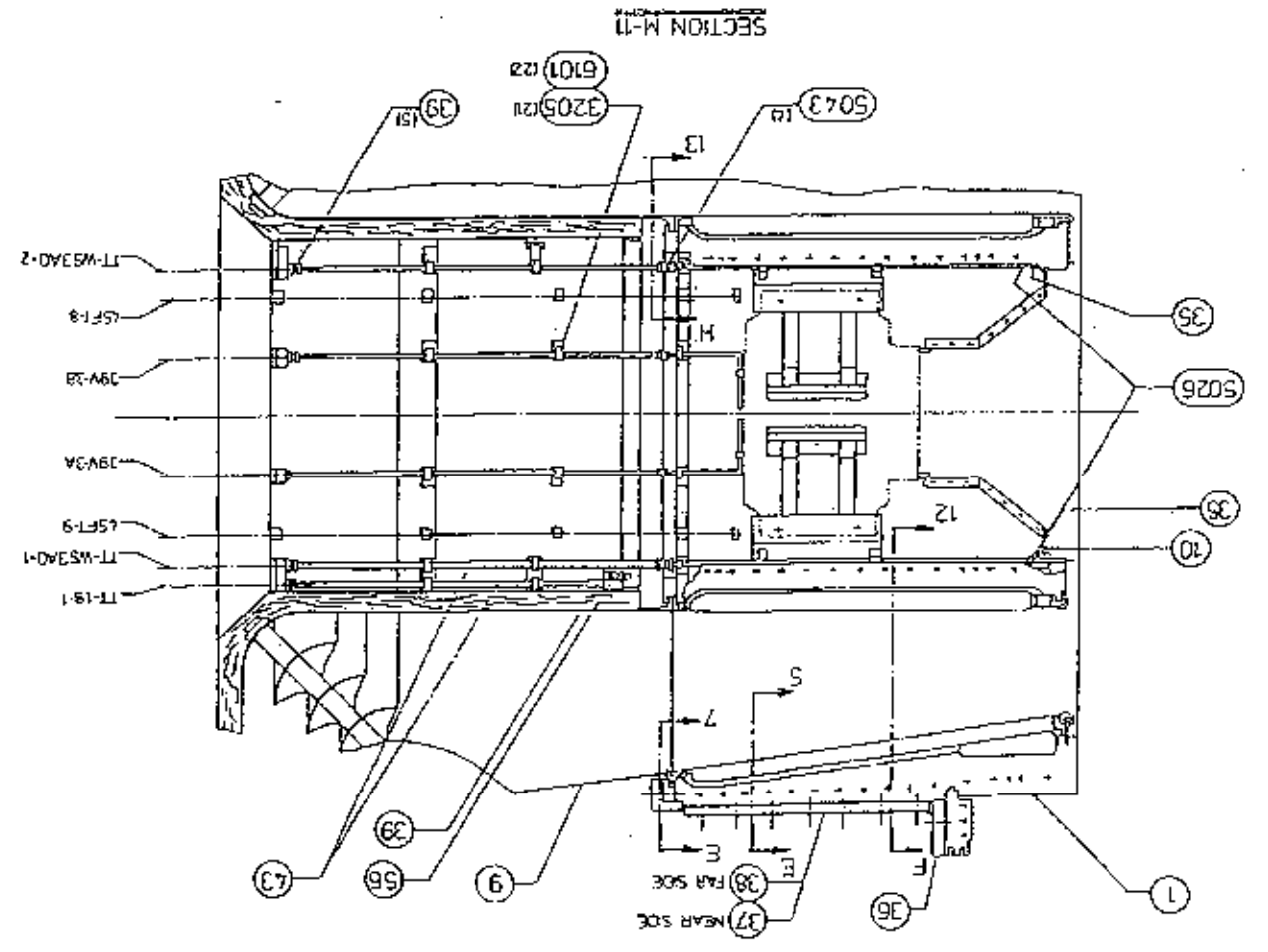
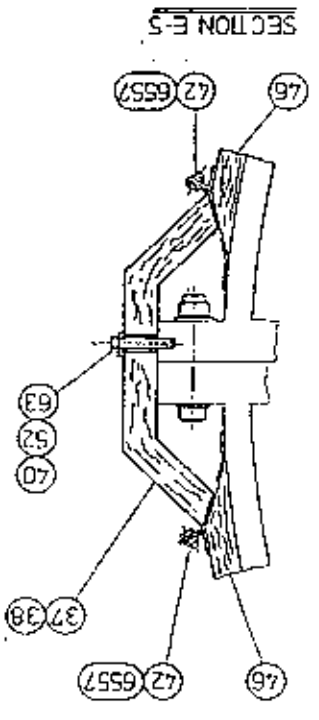
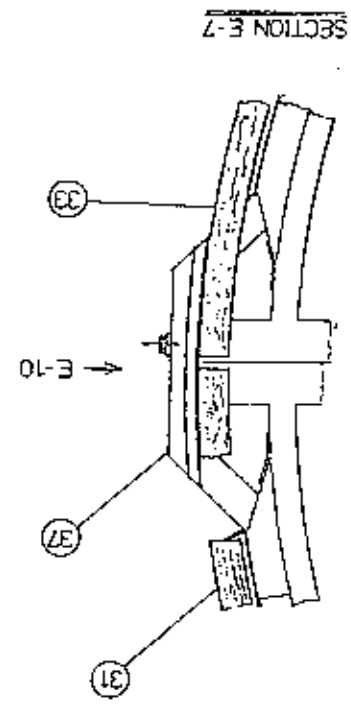
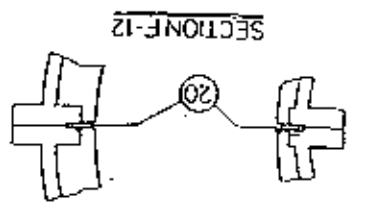
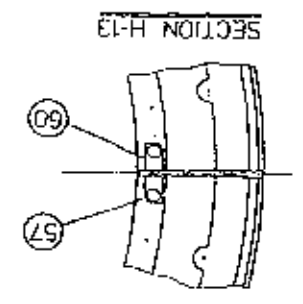
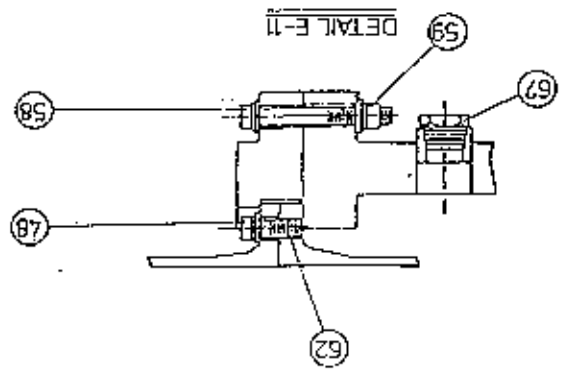
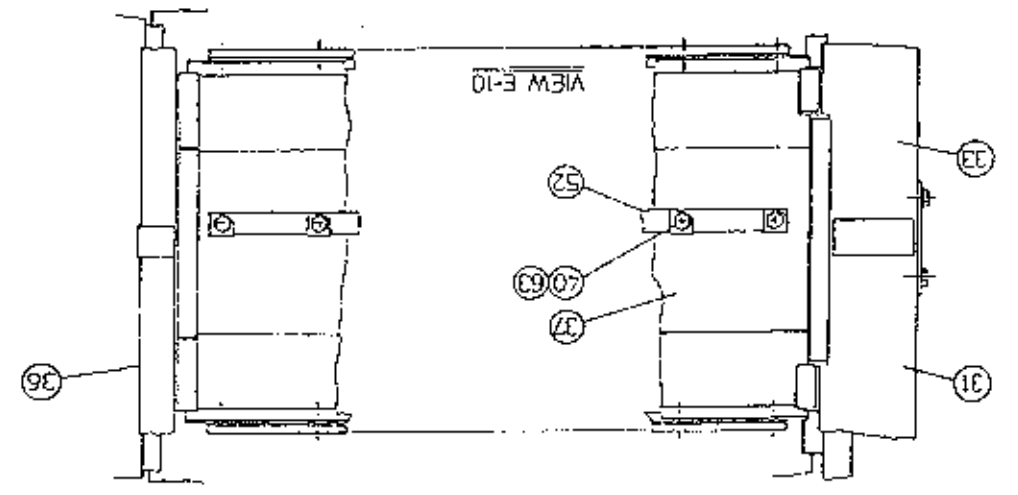
<p>EUROPEAN GAS TURBINES</p> <p>GEALSTHOM</p> <p>90018 BELFORT Cedex - FRANCE Télex 360 965 F - Fax 84 57 74 73</p>	<p>ENS. CADRE & DIFFUSEUR ECHAPT FRAME ASSY. EXHAUST.</p> <p>91R-012150</p>	<p>PAGE : 1 SHEET : 1 SUITE : 2 CONT. : 2 ITEM N°: 0706</p>
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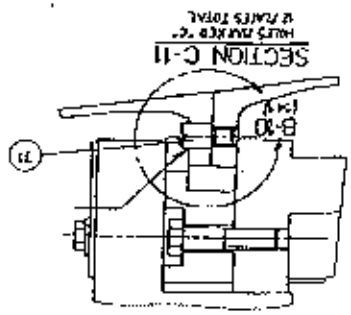
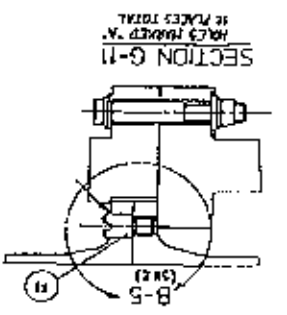
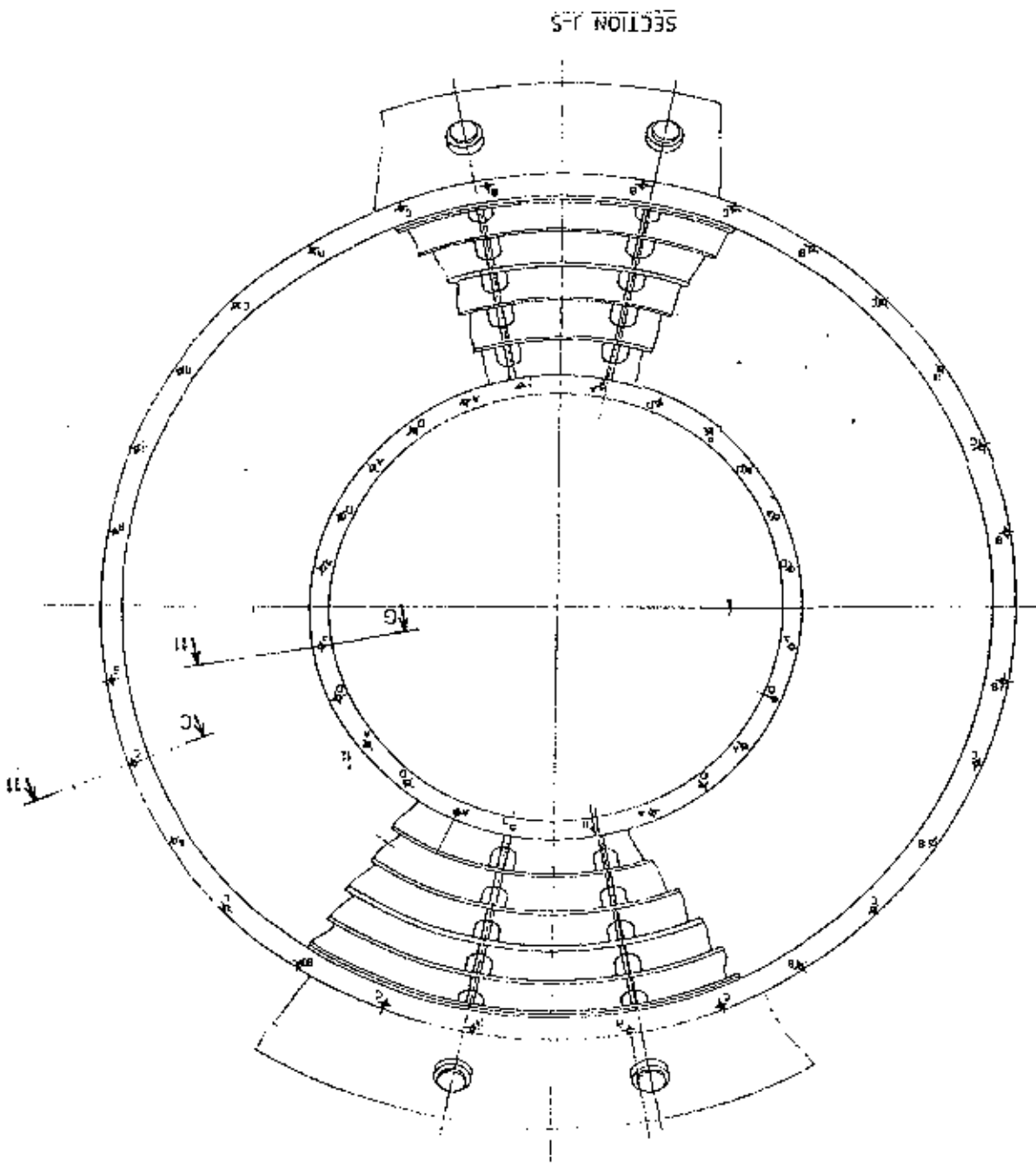
ITEM N°: 0706		91R-012150		90018 BELFORT Cedex - FRANCE Télex 360 965 F - Fax 84 57 74 73	
PAGE : 2		FRAME ASSY EXHAUST		DECALSTROM	
SHEET : 3		ENS CADRE & DIFFUSEUR ECHAP		EUROPEAN GAS TURBINES	
SUITE : 3					



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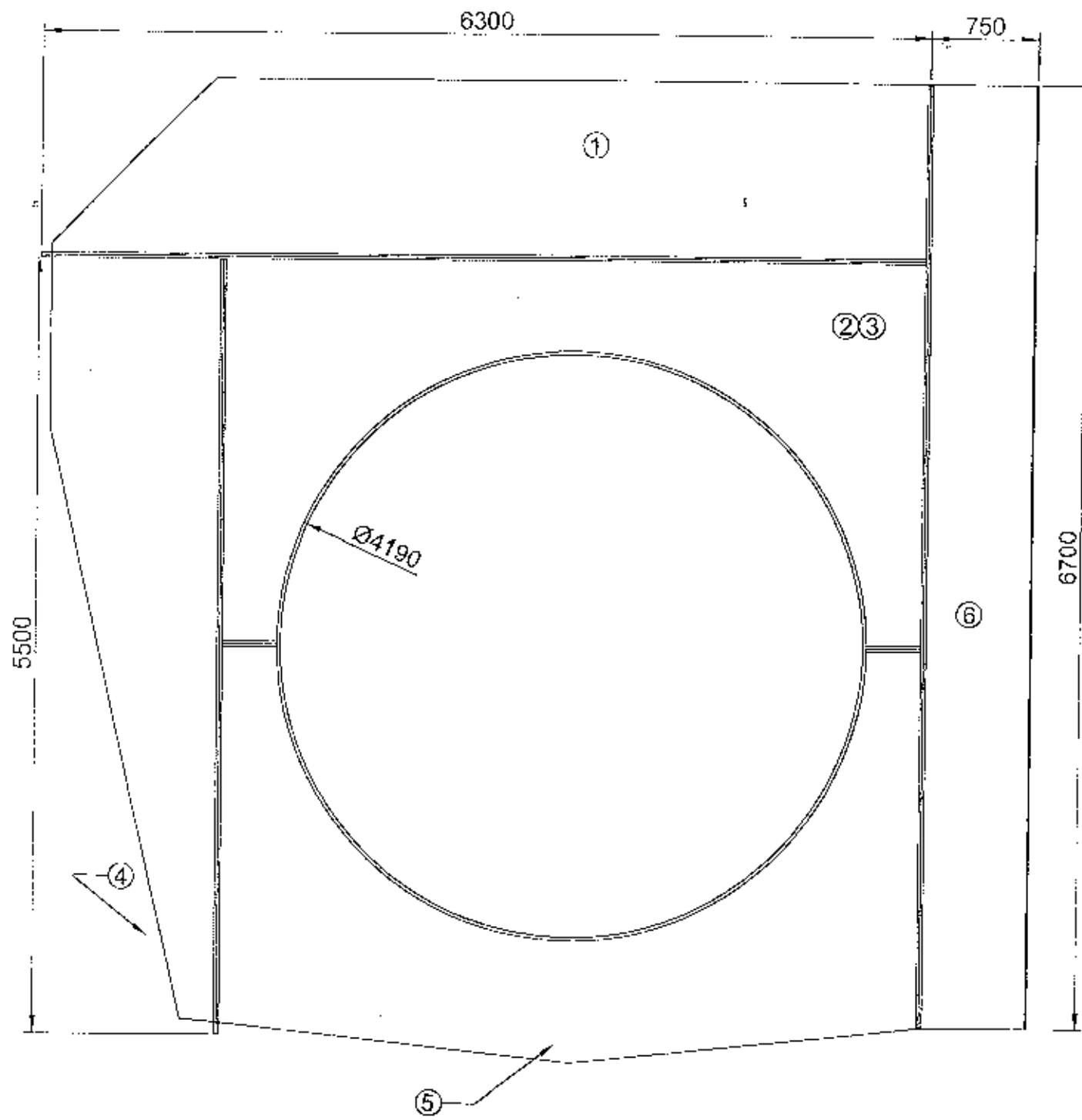
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EUROPEAN GAS TURBINES
 DECALSTROM
 90018 BELFORT Cedex - FRANCE
 Tél. 360 965 F - Fax 84 57 74 73

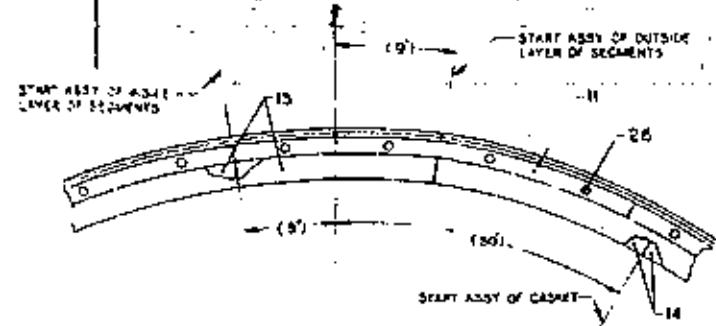
ENS. CADRE & DIFFUSEUR ECHAPÉ
 FRAME ASSY EXHAUST
 91R-012150

PAGE : 3
 SHEET : 3
 SUITE : F
 CONT. :
 ITEM NO: 0706

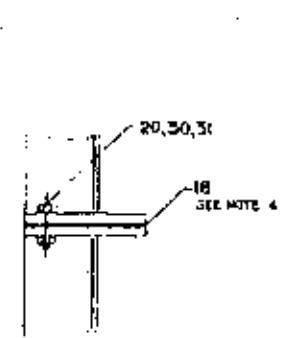


6	Μεταβατικό τεμάχιο στήριξης πρώτου διαστολικού
5	Πυθμένας
4	Κεκλιμένο τμήμα
3	Αψίδα πλευράς στροβίλου
2	Αψίδα πλευράς γεννήτριας
1	Οροφή
α/α	Περιγραφή
ΔΕΗ ΑΕ/ΔΕΘ ΑΗΣ Κερατέας-Λαυρίου	Γενική εξωτερική διάταξη Exhaust plenum
	Rev. 0
	ΚΑΣ 29052010-5

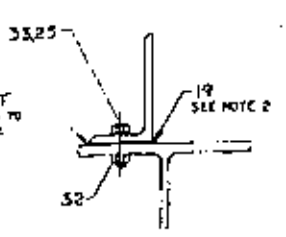
PLENUM ASSY EXHAUST
REV. 15



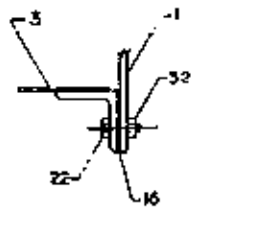
VIEW C-3 (1-5)



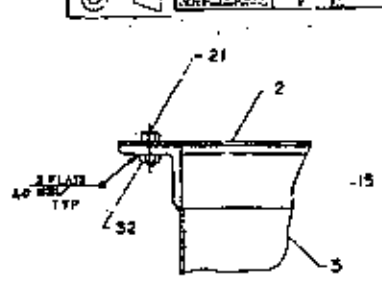
SECTION C-6 (1-4)
TYPICAL 2 PLACES



DETAIL B-8 (1-1)
TYPICAL 2 PLACES

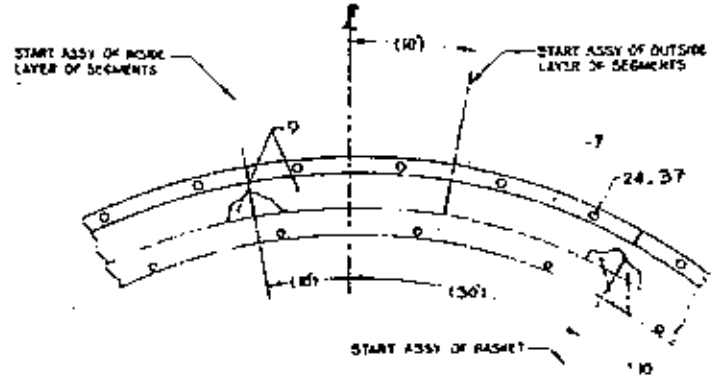


SECTION B-10 (1-1)
TYPICAL 2 PLACES

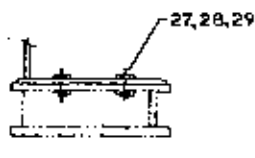


DETAIL C-12 (1-1)

- NOTES:**
1. ALL WELDS PER ITEM 2, CA 48, CLASS III PER PL, UNLESS OTHERWISE SPECIFIED
 2. USE SHIMS UNDER ANGLES AT (1) & (2) TO SQUARE EXHAUST PLENUM WITHIN 2' FROM TO EACH END TO OBTAIN CONCENTRICITY BETWEEN EXHAUST FRAME & PLENUM
 3. COVER SEGMENTS WITH SHIMS AND WELDED
 4. CUT HOLES IN CASSET PT II (1) & (2) ALSO CUT SHIMS TO AGREE WITH PLATE
 5. ALL GROUPS SHIMS A FINISH PER PACKAGES MUST HAVE A WARNING STENCILED WITH MIN 5/8" HIGH LETTERS IN 3 CONSPICUOUS PLACES BUILT IS EX-11 AND MUST BE GROUPED OFF BEFORE WELDING
 6. AT MONTAGE AFTER VERIFICATION USHER LES SEGMENTS PER B POUR CONTRA LA COTE DE 25.6



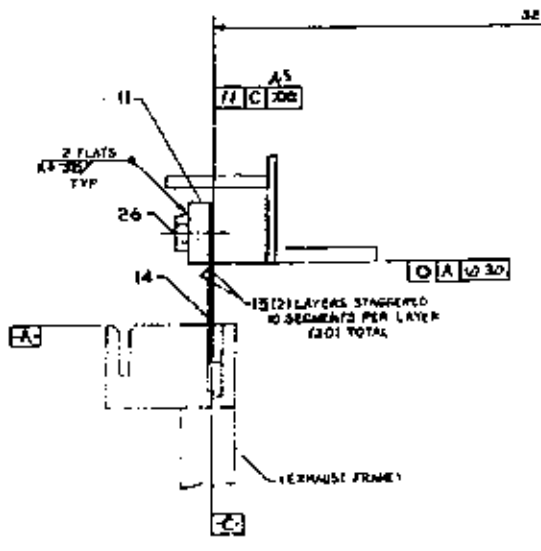
VIEW E-3 (1-1)



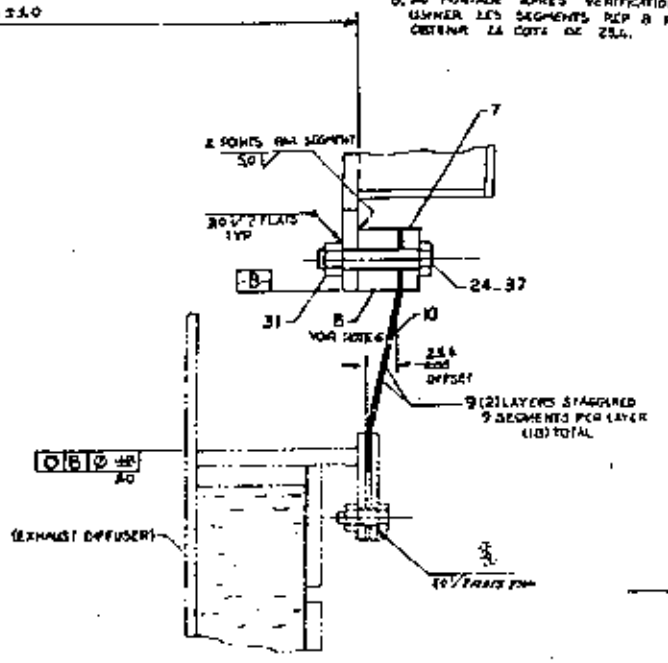
DETAIL D-5 (1-1)



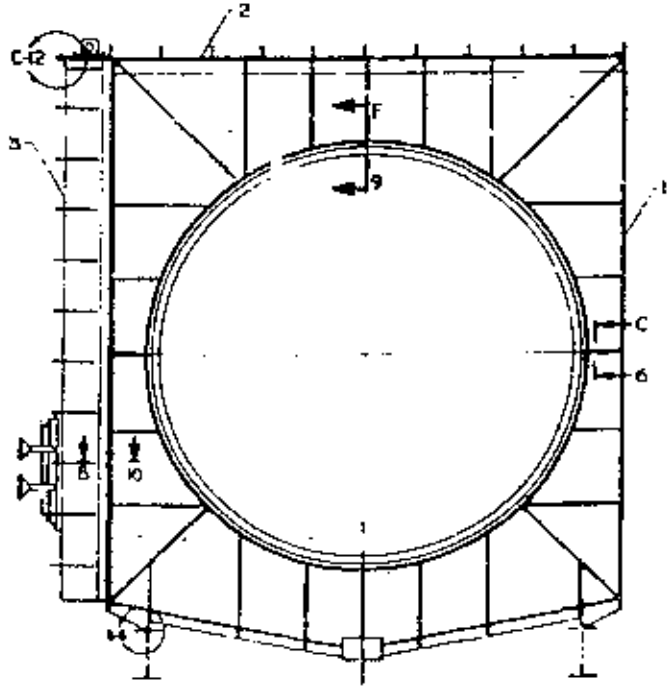
DETAIL F-6 (1-1)



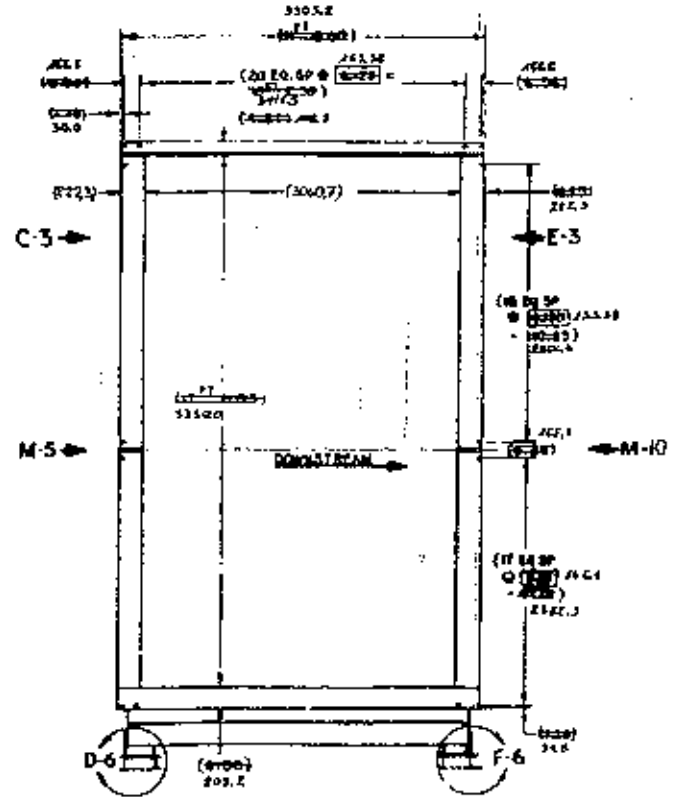
SECTION E-9 (1-3)



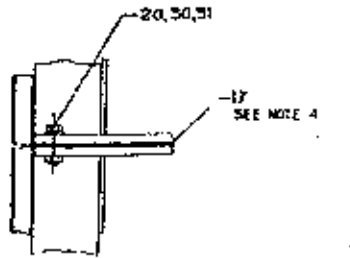
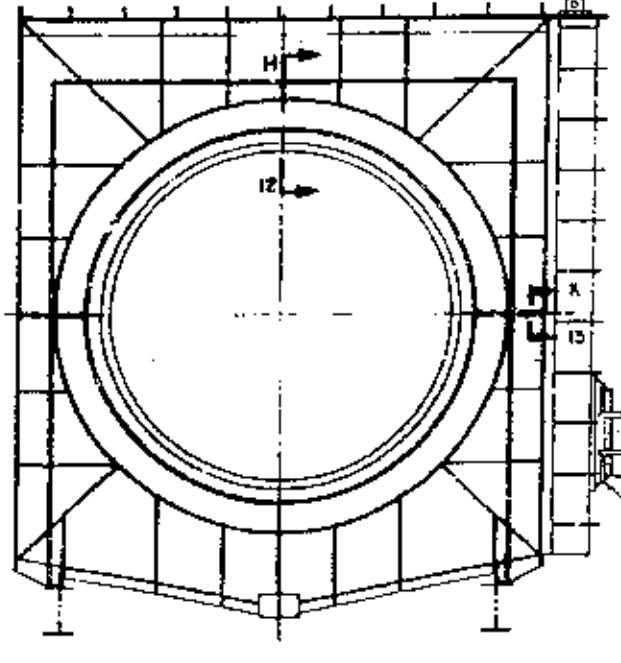
SECTION H-12 (1-1)



VIEW M-3 (1-5)



VIEW M-10 (1-1)



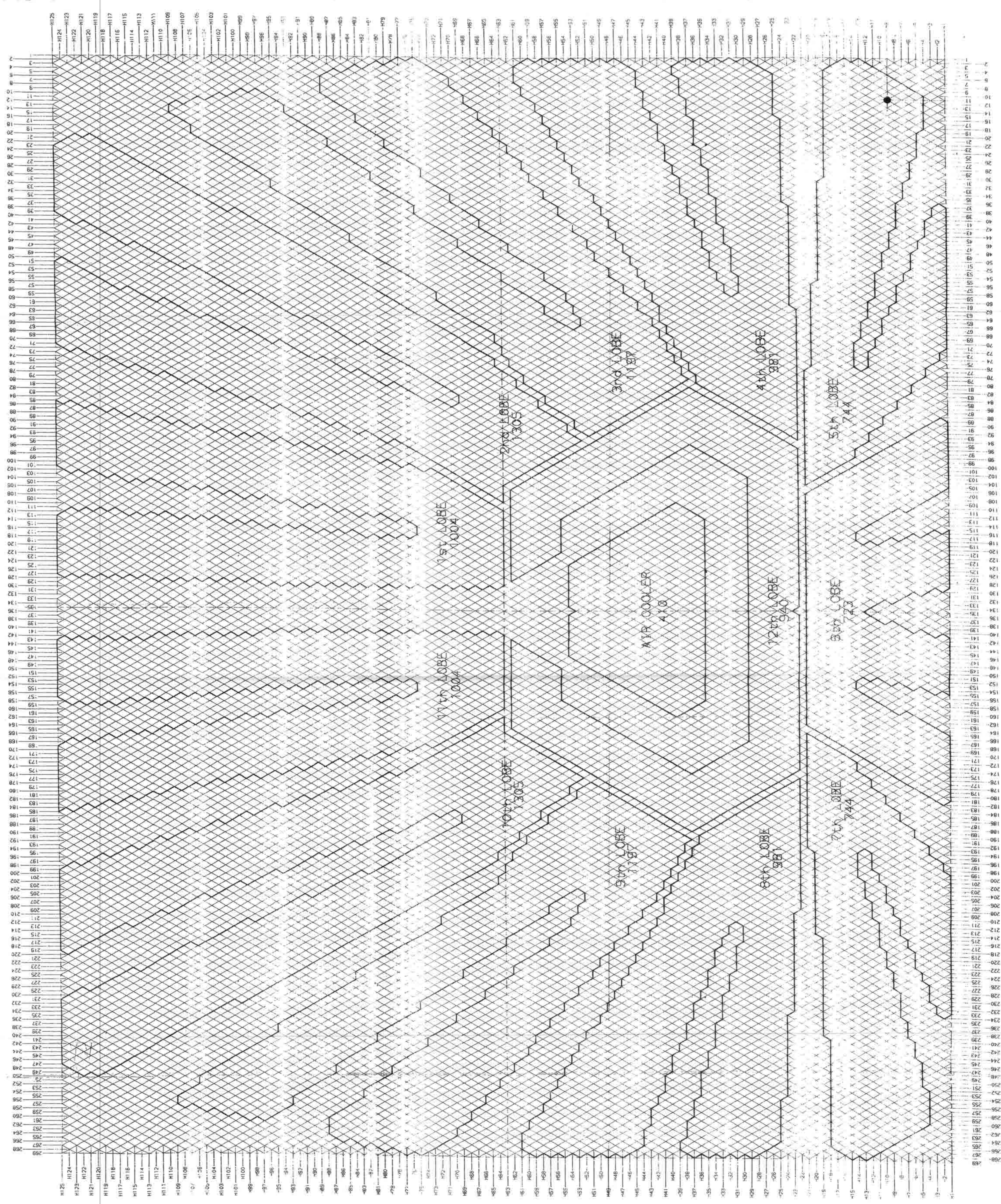
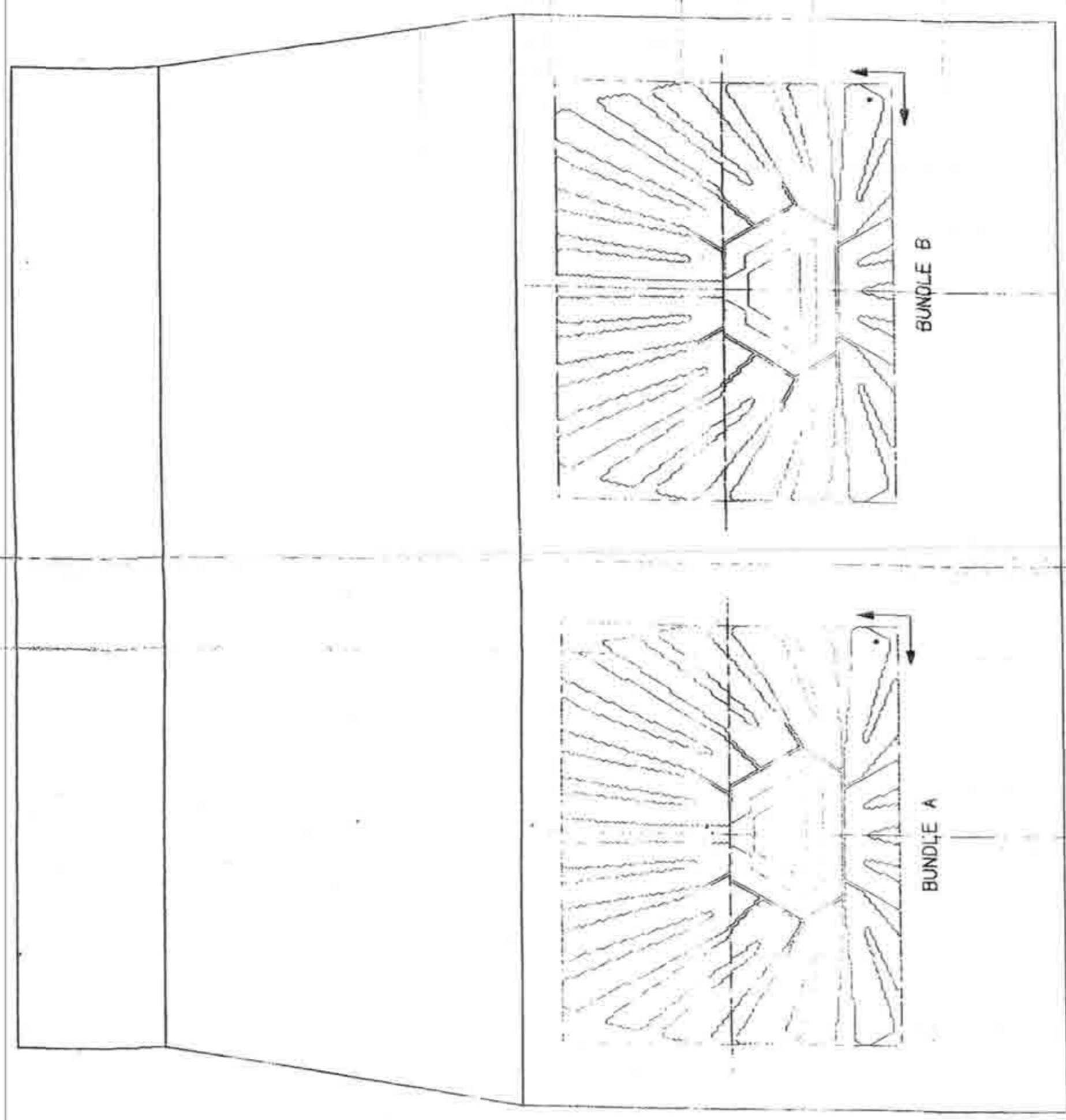
SECTION K-13 (1-1)
TYPICAL 2 PLACES

REP	LONGUEUR	SUBVANT	SPEC.
45	18000	287A 1191 P001	
16	35000	312A 1192 P001	

- (G1) ACC. MONTAGE ACQUISITION
- (G2) ACC. MONTAGE ACQUISITION
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- (G100) ACC. MONTAGE ACQUISITION

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VIEW FROM INLET COOLING WATER SIDE



TUBE NUMBER PER LINE (AS PER NUMERICAL ORDER)

LINES ORDER

EXAMPLE OF TUBE IDENTIFICATION

TUBE LOCATION • H9 -11

LINE NUMBER

NUMERICAL NUMBER PER LINE

REV.	DATE	BY	CHKD.	DESCRIPTION
1	12.12.88
2	20.08.89
3	01.10.89

DOSSIER: 39563
 SCALE: 1/5
 SUPPLIER NAME: GEC ALSTHOM DELAS
 ADDRESS: 13, 14, RUE D'ALBES-ROBERT (FRANCE)
 REGISTRATION No.:
 TEL.: (33) 47 55 28 28 (FRANCE)

PUBLIC POWER CORPORATION
 ATHENS GREECE

LAVRION COMBINED CYCLE BLOCK - 550 MW NET
 CONTRACT N°A.D.M.K.T.-162/99129

CONDENSEUR
 REPERAGE DES TUBES
 COTE ENTREE D'EAU

CONDENSEUR
 BUNDLE TUBE LOCATION
 ON INLET WATER SIDE

GEC ALSTHOM
 METKA S.A.

N° LAVO.4MCEXB01MD...
 Customer number: LAVO.4M.CBB01MD...
 ISSUE REV. 1 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
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VIEW FROM OUTLET COOLING WATER SIDE

