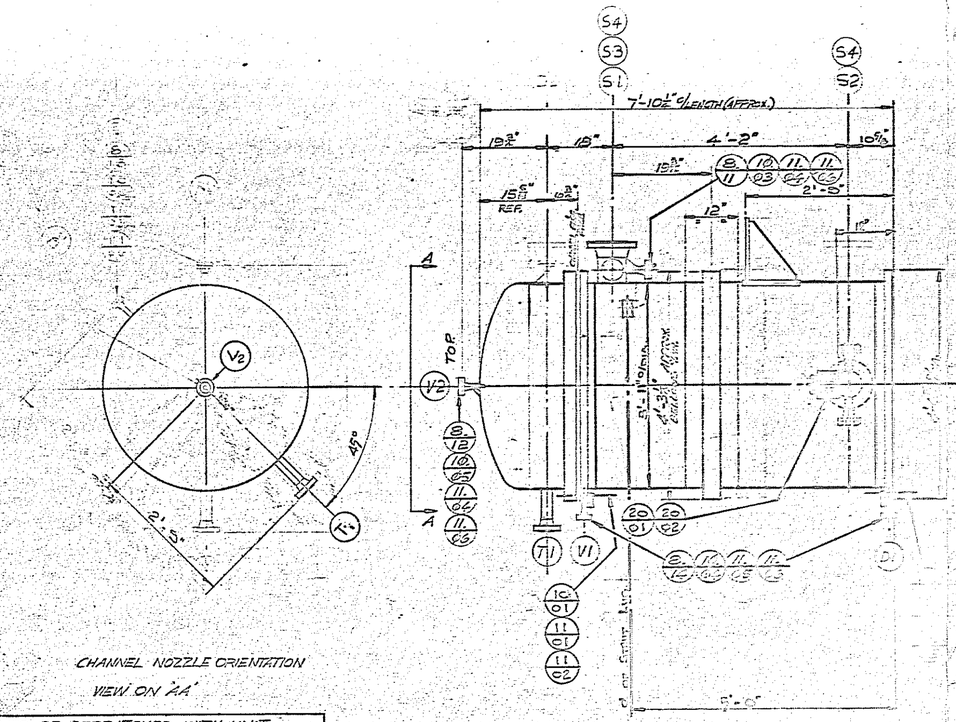

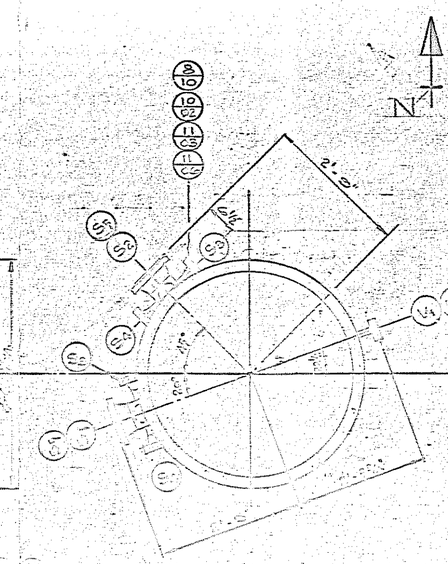

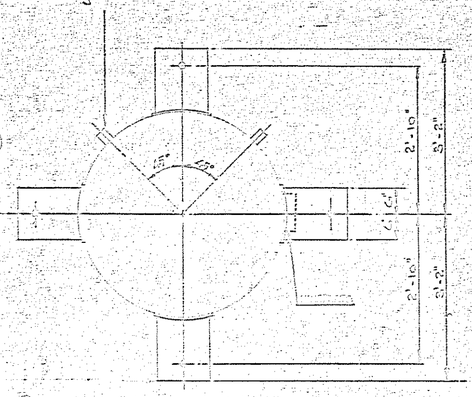

THIRD ANGLE PROJECTION

CHANNEL NOZZLE ORIENTATION

VIEW ON 'AA'

VESSEL SUPPORT ORIENTATION

View On A-A

FOR TRUE BRANCH ORIENTATION SEE PLAN VIEWS

ADDITIONAL NOTES ADDED AT REV. A.

15. TUBESHEET TO SHELL WELD-DYE PENETRANT CHECK ON ROOT RUN.

16. TUBESIDE FLANGES TO HAVE 125 RMS. FACE FINISH OR BETTER.

17. TUBE TO TUBESHEET WELD TO BE MADE USING HAYNES 25 ELECTRODES.

GENERAL NOTES

1. MACHINE FACES WHERE MARKED S TO FINISH 125 RMS.

2. ALL WELD PREPS. AS DETAILED ON SHEET 2 & PROCEDURES AS ON SEPARATE WELD DETAIL SHEETS OF CORRESPONDING FIGURE. FOR S.S. WELDS USE WELD CONSUMABLES HAVING A MAXIMUM CARBON CONTENT OF 0·025%

3. TUBES ARE TO BE ROLLER EXPANDED INTO GROOVED HOLES & SEAL WELDED. FOR TUBE FIXING PROCEDURE SEE SHEET 2.

4. 10% SPOT RADIOGRAPHY ON ALL WELDED SEAMS

5. PRIOR TO FINAL ASSEMBLY, STUDBOLT THREADS & NUT CONTACT FACES TO BE COATED WITH GREASE

6. UNIT TO BE HYDRAULICALLY TESTED TO PRESSURES SHOWN FOR A MINIMUM PERIOD OF 30 MINUTES

7. PRIOR TO DESPATCH, UNIT IS TO BE THOROUGHLY CLEANED & FREE FROM [illegible] SCALE, SPATTER, & DEBRIS.

8. MINIMUM TEST WATER TEMPERATURE 70°F.

9. TUBESHEET FACE & ALL FLANGE FACES NOT FITTED WITH BLIND FLANGES ARE TO HAVE HARDWOOD COVERS FITTED FOR TRANSPORTATION PROTECTION.

10 BELLOWS EQUIPED WITH BOLTED LOCKING BARS FOR TRANSPORTATION PROTECTION.

11. [illegible] FIT SLEEVE FAILURE RESULTING IN [illegible] OF SHELL [illegible] AND TUBE MILLING.

[illegible] CONTENT FOR S.S. IS 0·020%

12. GASKET, BOLTS & NUTS FOR TUBESHEET TO SPECIAL CHANNEL JOINT SUPPLIED BY VENDOR

14. TEST PROCEDURE:-

(a) SHELLSIDE TEST

(b) TUBESIDE TEST WITH TEST COVER (ITEM 22.01) & C.A.F. TEST GASKET (ITEM 22.[illegible]) FITTED.

LOOSE ITEMS TO BE DESPATCHED WITH UNIT INCLUDING SPARES & TEST EQUIPMENT.

No. OFF	ITEM	DESCRIPTION	No. OFF	ITEM	DESCRIPTION
5	11.01	GASKET	2	22.03	Plugs (So Head)
48	11.01	STUDBOLT			
96	11.02	NUT			
1	22.01	TEST CHANNEL			

DESIGN CODES & SPECIFICATIONS.

ASME SECTION VIII DIV. I 1968 & TEMA. CLASS R 1968

F.W. ENG. STDS.:- GN REQ 1441-1210 GENERAL NOTES
1441-21A1 (LONDON) ENG. STDS. REV. I
1441-20C4 REV. 0

SURFACE PREPARATION & PAINTING

	PREPARATION	PRIMER	FINISH
SHELL SIDE	WIRE BRUSH LOOSE SCALE ON C.S. ONLY	NONE	NONE
TUBE SIDE	WIRE BRUSH LOOSE SCALE ON C.S. ONLY	NONE	NONE
REMARKS	EXPOSED MACHINED SURFACES ARE TO BE COATED WITH AN EASILY REMOVABLE RUST PREVENTATIVE		

INSPECTION BY
FOSTER WHEELER LTD.
&/OR
I.C.I. FIBRES LIMITED.

FULL STRIP	FINAL ONLY
YES	NO

RADIOGRAPHY	10% SPOT	10% SPOT
STRESS RELIEF	NONE	NONE
CORROSION ALLOWANCE	⅛"	⅛"
No OF PASSES	ONE	ONE
TEST PRESSURE	[illegible]	[illegible]
DESIGN TEMPERATURE	[illegible]	[illegible]
DESIGN PRESSURE	[illegible]	[illegible]
	SHELLSIDE	TUBESIDE

DESIGN DATA

UNIT TYPE & SIZE	[illegible]
No OF SHELLS	ONE
NOM. SURFACE/SHELL	[illegible] SQ. FT.
WEIGHT OF TUBEBUNDLE	INTEGRAL
WEIGHT OF UNIT FLOODED	17100 LBS.
WEIGHT OF UNIT EMPTY	[illegible] LBS.

WEIGHTS PER SHELL

PACKING	NONE
PROTECTION	MACHINED FACES ONLY
INSULATION	NONE

MARK	SERVICE	SIZE	STD.	RATING	TYPE	FACING
S5	[illegible]	1½"	A.S.A.	150#	W/N	R/F
S4	[illegible]	1½"	A.S.A.	150#	W/N	R/F
S3	[illegible]	[illegible]	A.S.A.	150#	W/N	R/F
D1	DRAIN (BLANKED)	[illegible]	A.S.A.	150#	W/N	R/F
V2	VENT (BLANKED)	[illegible]	A.S.A.	150#	W/N	R/F
V1	VENT (BLANKED)	[illegible]	A.S.A.	150#	W/N	R/F
T1	TUBESIDE INLET	8"	A.S.A.	150#	W/N	R/F
S2	SHELL OUTLET	6"	A.S.A.	150#	W/N	R/F
S1	SHELL INLET	6"	A.S.A.	150#	W/N	R/F

NOZZLE DATA

SHEET 5	MATERIAL LIST
SHEET 4	GASKETS - [illegible]
SHEET 3	TUBESHEET & BAFFLE DETAILS
SHEET 2	SHELL/TUBEBUNDLE & CHANNEL FABRICATION

DRAWING LIST

REV.	DATE	DRN.	CHKD.	APPR'D	STATUS
E	6-1-72				
D	22-12-71				
C	17-12-71				
B	29-10-71				
A	[illegible]				
0	[illegible]				

REVISIONS

A. [illegible] ADDITIONAL NOTES ADDED [illegible]

B. 29.10.71 Modified in accordance with F.W. requirements

C. 15.12.71 Position of strut lug modified. Connections S1 & S2 were incorrectly shown on end elevation

D. 22.12.71 10⅞" dim added

E. 6.1.72 Conns. V1 & D1 were 20° from horizontal ℄ [illegible]

HEAT TRANSFER LTD.
CHELTENHAM
CERTIFIED: [illegible]
DATE: 12th Jan 1972

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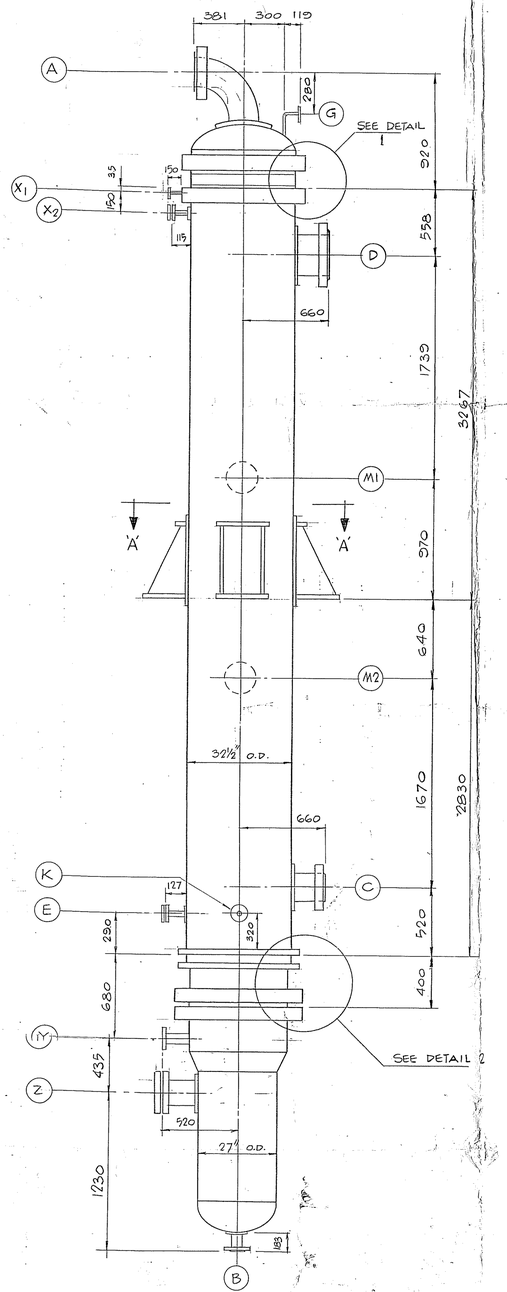
APPROVED

THIRD CRUDE T.A. CRYSTALLISER CONDENSER
FOSTER WHEELER. CONTRACT Nº 1-15-1440/1459
FOSTER WHEELER LTD. REQⁿ Nº 1441-1211-H (REV.C)
FOSTER WHEELER LTD. ORDER Nº 3017/1440
FOSTER WHEELER LTD. ITEM Nº E-416
HEAT TRANSFER LTD. ORDER Nº DN 9723
CLIENTS NAME I.C.I. FIBRES LTD.
PROJECT LOCATION WILTON TEESSIDE

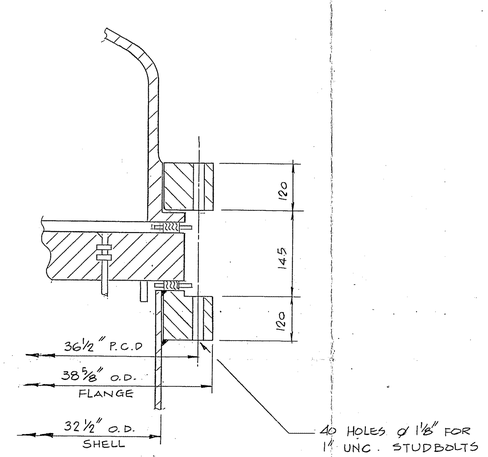
I.C.I. DRAWING NUMBER
No 5/X/A409822

HEAT TRANSFER LTD
CHELTENHAM

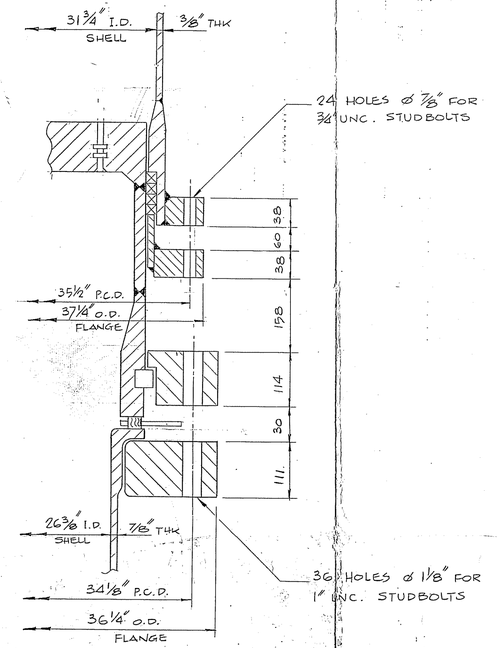
No. A1/8584/1/E



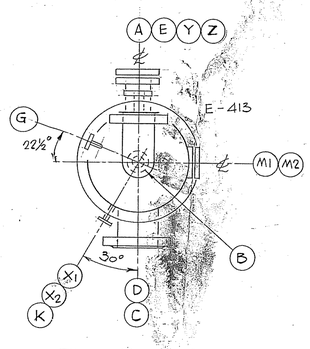
ELEVATION



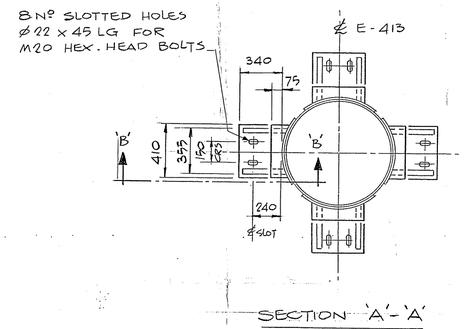
DETAIL 1



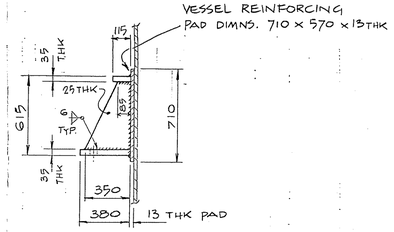
DETAIL 2



PLAN VIEW
(TRUE ORIENTATION)



SECTION 'A'-'A'



SECTION 'B'-'B'
(TYPICAL FOR 8 Nº VERTICAL GUSSET PLATES)

PART No.	No. OFF.	MATERIAL	DESCRIPTION	INDENT/CODE/ ORDER No.

GENERAL NOTES

1. ALL DIMENSIONS GIVEN ON THIS DRAWING REFLECT THE 'AS BUILT' STATUS OF VESSEL E-413/3
2. VESSEL BODY FLANGES ARE SHOWN WITH OD. AND P.C.D. IN IMPERIAL DIMENSIONS FOR PURPOSES OF RE-MATCHING

NOZZLE DATA

MARK	SIZE	RATING	FACING	WALL THK	SERVICE
A	10"NB	300#	L.J.	EX.STG	PROCESS IN
B	3"NB	300#	R.F.	SCH 40	PROGESS OUT
C	8"NB	150#	R.F.	SCH 40	CONDENSATE IN
D	14"NB	150#	R.F.	SCH 40	STEAM & WATER OUT
E	1½"NB	150#	R.F.	SCH 40	BLOWDOWN CONN. (BLANKED)
G	1"NB	300#	L.J.	SCH 160	CAUSTIC CONN. (BLANKED)
M1	6"NB	150#	R.F.	PAD	INSPECTION (BLANKED)
M2	6"NB	150#	R.F.	PAD	INSPECTION (BLANKED)
X1	1"NB	150#	R.F.	SCH 80	RELIEF
X2	1"NB	150#	R.F.	SCH 80	VENT (BLANKED)
K	1"NB	150#	R.F.	SCH 80	DRAIN CONN. (BLANKED)
Y	3"NB	300#	R.F	SCH 40	WATER INLET
Z	8"NB	300#	R.F	SCH 40	INSPECTION (BLANKED)

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-9 SEP 1991
WILL NOT BE UPDATED

K. HOME ENG. JOB Nº-90-8680

DRAWING PREPARED BY
K HOME ENGINEERING LTD
Thornaby Cleveland

DRG. No. D/A7/14/5922

ISSUE	REVISIONS	INT'L	DATE	DRAWING No.	REFERENCE DRAWINGS
A	APPROVED FOR INFORMATION (SEE NOTE 1)	CDC 16491			

I.C.I. CHEMICALS & POLYMERS LTD.
TEESSIDE OPERATIONS - ENGINEERING
-WILTON, MIDDLESBROUGH, CLEVELAND.

JOB No./ E.W.D. No.		DRAWN A. PAISLEY	25/9/90
D.O. REF. No.	900 167	CHECKED - D NASSAU	26/9/90
CALC. No.		APPROVED	16/4/91
SCALE	1:20		16-4-91

PLANT	TA - T7
BUSINESS AREA	OXIDATION
MATL. LIST	
PROJECT No.	

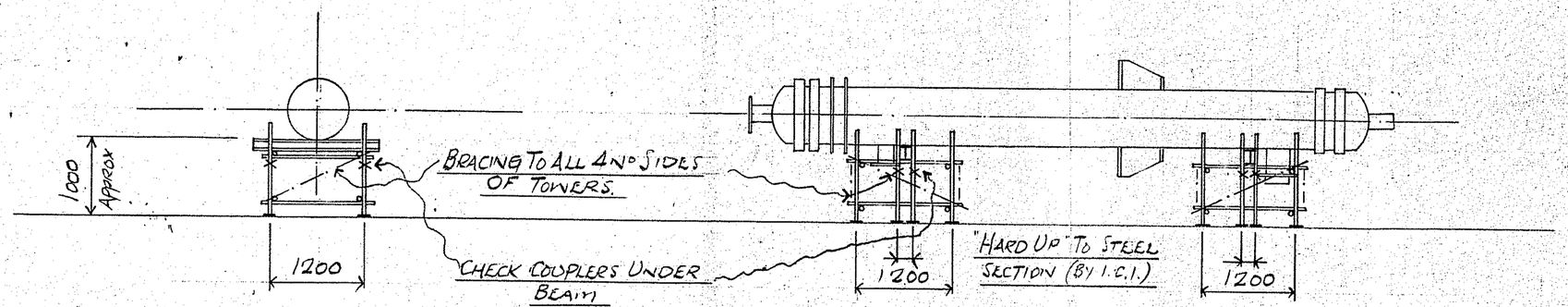
TITLE: 'AS BUILT' G.A. OF E-413 REACTOR CONDENSER

DRG. No. D/A7/14/5922

DRG. SIZE DE

ISSUE A

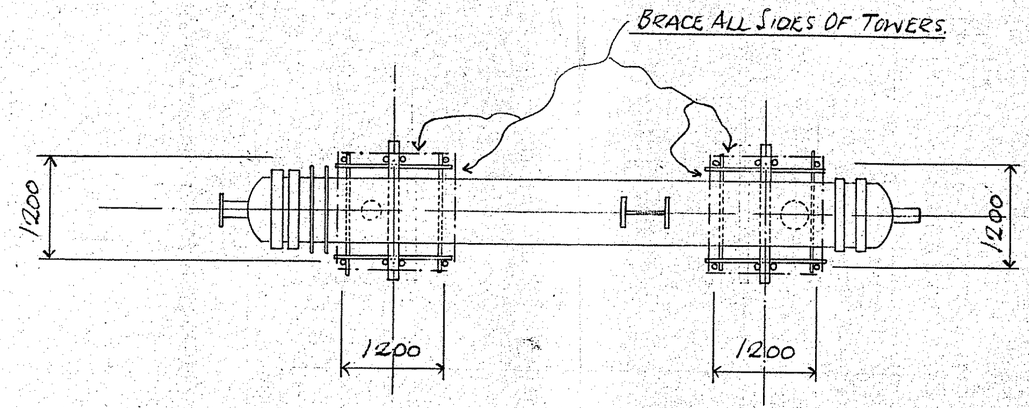
Admel F/R/040



TYPICAL SECTION

FRONT ELEVATION

NOTE!
a) I.C.I. ARE TO DESIGN SUPPLY AND PLACE INTO POSITION SUITABLE STEEL SECTION TO SUPPORT BUNDLE.
b) ALL FITTINGS TO BE LOAD BEARING.



PLAN

GENERAL NOTES

1. This drawing is confidential and is the exclusive property of Palmers' Scaffolding Limited. No unauthorised use, copy or disclosure is to be made and it is to be returned upon request.

1a. Hire Only — All plant supplied on this basis is subject to our conditions of Hire or sale as applicable.

2. This drawing has been prepared from details supplied to us by the customer, who should check that we have correctly interpreted his requirements and that all loadings, dimensions, details, erection and striking sequences, etc. are correct and practicable. No alteration in the loading to be made without reference to Palmers Design Office.

3. The following drawings, obtained on loan from the customer, have been used to prepare this scheme:—

4. The following assumptions have been made:—
MAX'M. DEAD LOAD 5T

5. The customer is to ensure that the ground and/or base provided for our scaffold is adequate to support the loads to be applied without settlement, including the provision of any necessary spreaders.
Maximum Calculated Leg Load ..... 0·6·25T
Maximum Lift Height .....

6. In the case of support scaffolds working levels are to be provided at least one week prior to commencement on site.

If foundation levels are indicated on this drawing then the customer must set our and strictly adhere to same.

7. No sheeting or wind protection should be added to the structure without reference to Palmers Scaffolding Limited.

8. Main Contractor's attention is drawn to the fact that the loading in the scheme detailed is axial to the tubes or is otherwise specially provided for and that no eccentric loads are to be applied to the structure without specific reference to Palmers Scaffolding Limited.

Our design is based on concrete weighing 156 lbs. per cubic foot, (2500 kg per cubic metre), and a combined live and shutter loading not exceeding 40 lbs. per square foot, (200 kg per square metre). The drawing has been prepared utilising the Safe Working Load of Palmers components, and no alteration in the loading must be made without reference to Palmers.

9. No timber is supplied by Palmers unless noted otherwise. Timber sizes where indicated have been calculated using a stress of 1200 lbs. per square inch (8.3 N/mm^2 or 0.85 kg/mm^2) in bending, and are intended as a guide only. All timber design is the responsibility of the customer, who should ensure that neither the permissible bearing stress on fork-heads and other supports nor the safe load on Palmers components is exceeded. Where double timber runners are used, joints should be staggered, (i.e. only 2 ends to butt over a forkhead).

10. The Main Contractor to be responsible for all final levels of the shuttering by adjusting the forkheads.

11. Where this drawing indicates a support system for new concrete, then the customer is responsible for accurately setting out the precise location of the concrete beams, diaphragms, voids, slabs etc. in order that the scaffolding can be properly positioned to support same.

12. Where Palmers equipment is supported or suspended from an existing structure (e.g. roofs, beams, balconies, upper floors etc.), the customer must ensure that the structure is of adequate strength to safely support the additional imposed loads.

When anchoring or tying is required to stabalise our structure, the customer is responsible for the adequacy of the building framework or ground to which the anchorage is made.

13. Wind loadings, where applicable have been calculated in accordance with B.S. Code CP3, Chapter V. Maximum wind pressure allowed in the design shown on this drawing is:—
..... lbs/sq. ft. (..... kg/m^2).

14. Should additional materials be added to this scheme at the request or instruction of the Customer, Main Contractor, Architect, Engineer, Consultant, or Local Authorities, then an additional charge for same will be made.

Not For Construction Until Overprinted WORKING DRAWING

ANY QUERIES REGARDING THIS DRAWING PLEASE CONTACT:—
DESIGN DEPT
PALMERS SCAFFOLDING LIMITED
211, BOROUGH ROAD
MIDDLESBROUGH
CLEVELAND TS4 2BU

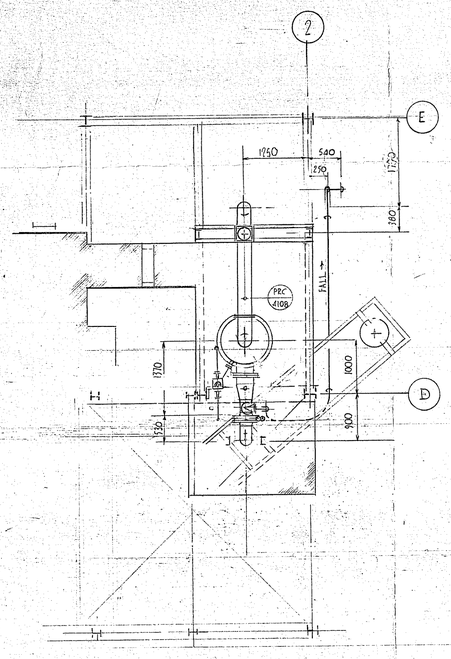
Palmers Scaffolding

TITLE
SUPPORT TO 5T BUNDLE ~ T7 PLANT
I.C.I. WILTON

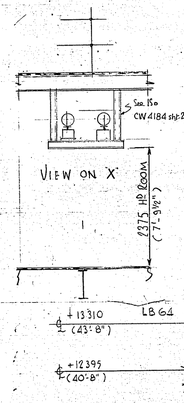
CLIENT I.C.I.

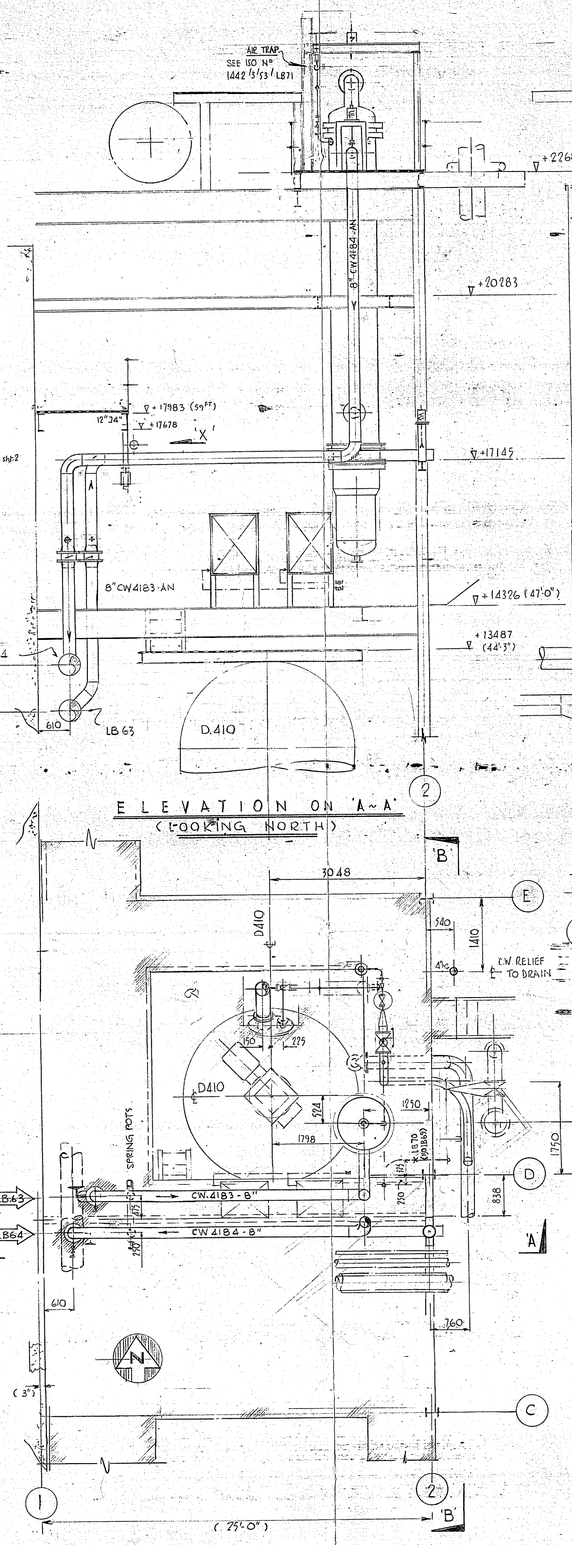
DRAWN	D. BALMER	AUG 90	CHECKED	
SCALE:	1 : 50			
BRANCH	MIDDLESBROUGH	DRAWING No.	MB/2663-1	

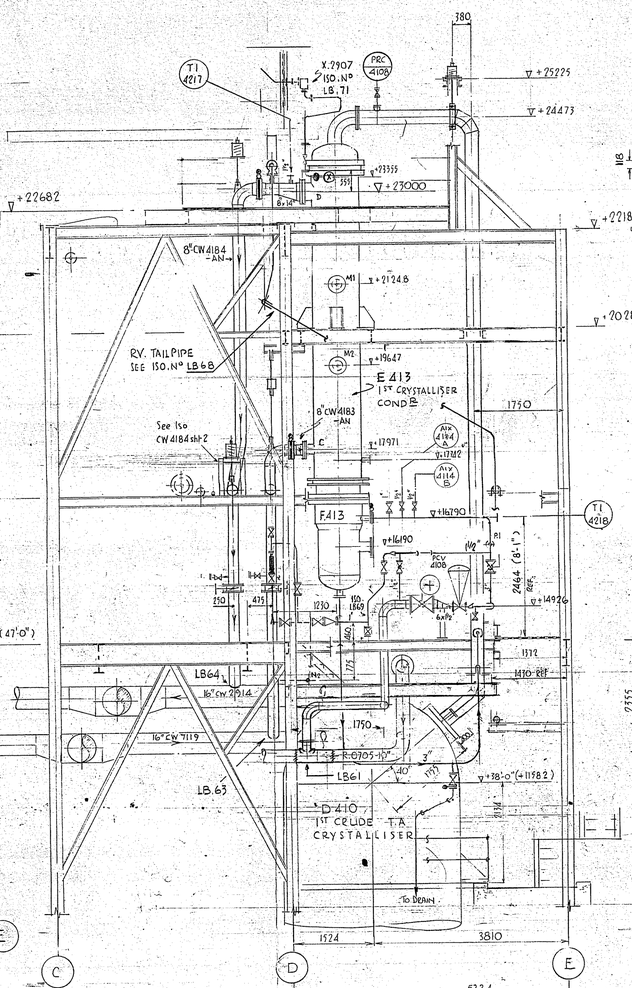
ADS'893

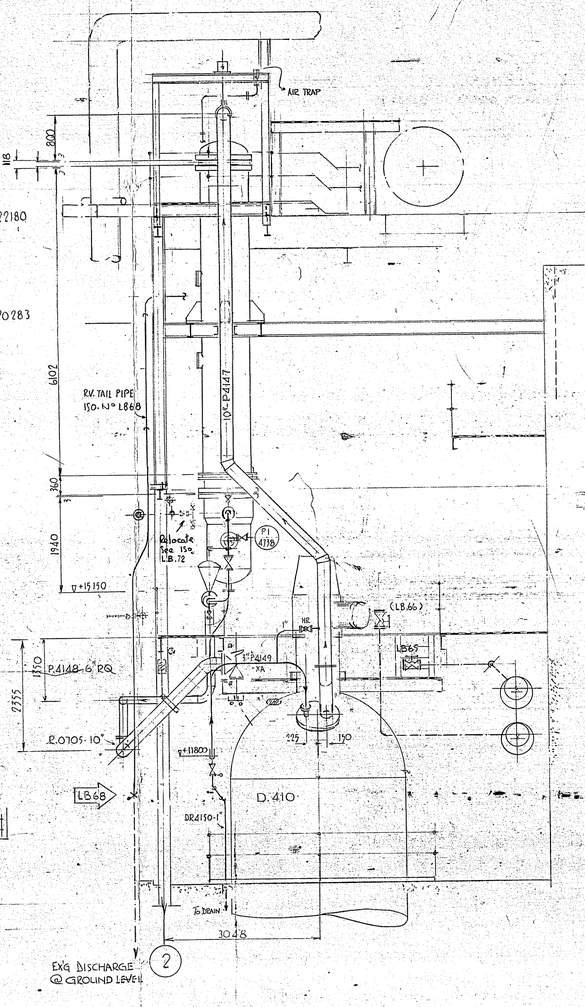


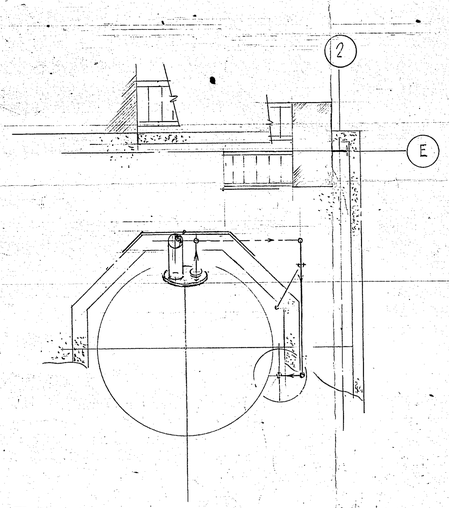
PLAN @ 22682 LV.







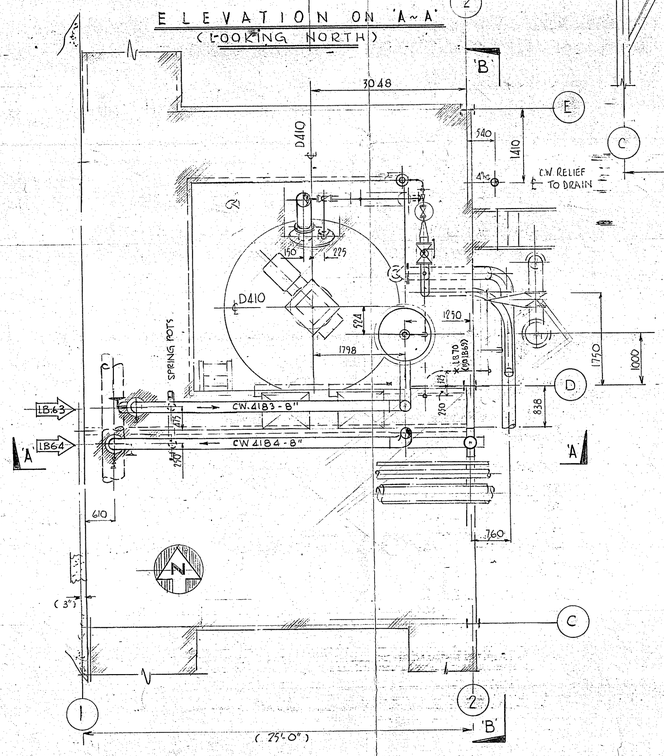




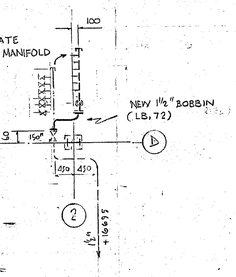
ELEVATION ON 'A~A' (LOOKING NORTH)

ELEVATION LOOKING WEST ON 'B~B'

ELEVATION LOOKING SOUTH



PLAN @ +14236 LV (47'-0")



NEW PIPEWORK / SLIPPORTS REF. NOS
ISOMETRICS 1442/3/53/1 :-

CW. 4183

CW. 4184 SHT 1/2
CW. 4184 SHT 2/2 - SLIPPORTS
DR. 4150
LB. 62 — STRIPPING OUT & BLK'ING OFF
LB. 65 — STRIPPING OUT & BLK'ING OFF

LB. 66
LB. 69
LB. 71
LB. 72
P.4148 SHT 1/2
P.4148 SHT 2/2
P.4149

W'TA 630623 — 10" TITANIUM LINE P4147

ISSUE	REVISIONS	GRID	PARTS LIST	INITIAL	DATE
(B)	FIRST OFFICIAL ISSUE				7.85

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SCALE 1:50
DRAWN SCALE

I.C.I. PLC, ENGINEERING DEPT.
NORTH EAST GROUP, BILLINGHAM, CLEVELAND.

VESSELS			DRAWN	April 85
MACHINES			CHECKED	
PIPING		7.85	APPROVED	July 85
INST.				
ELECT.				
CIVIL				
PROJECTS		18/7/85		

APPROVED

REFERENCE DRAWINGS
W/TA628922 NEW STRUCT. STEEL G.A.
W'TA 621330 LINE DIAGRAM

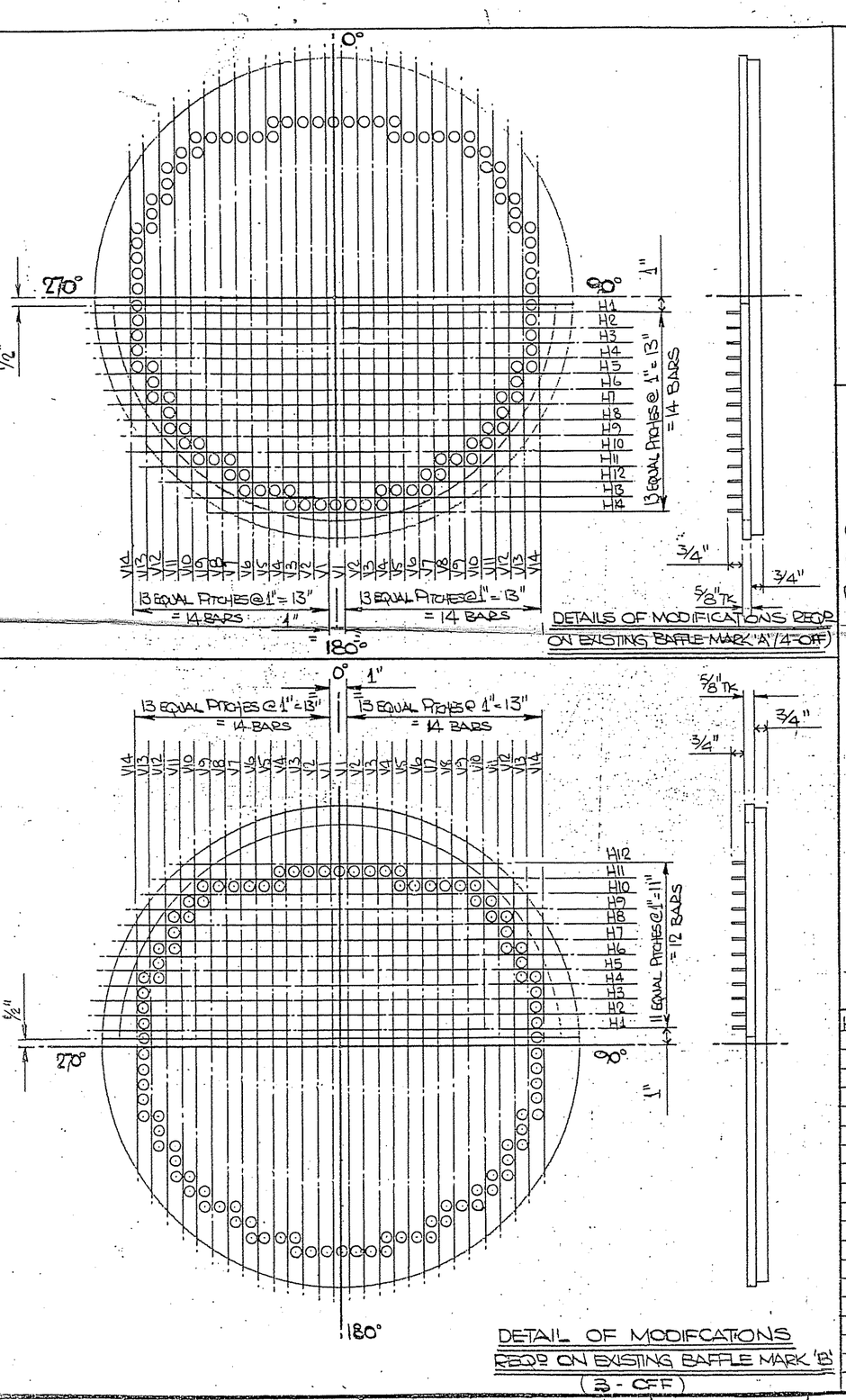
PARTS LIST YES/NO
CALC. No
JOB No.
PROJECT No. 87001

TITLE TA-T7 OXIDATION AREA UPRATING - WILTON
PIPING G.A. FOR 1ST CRYSTALLISER COND.R E413 / P413

DRAWING SIZE B1
ISSUE B

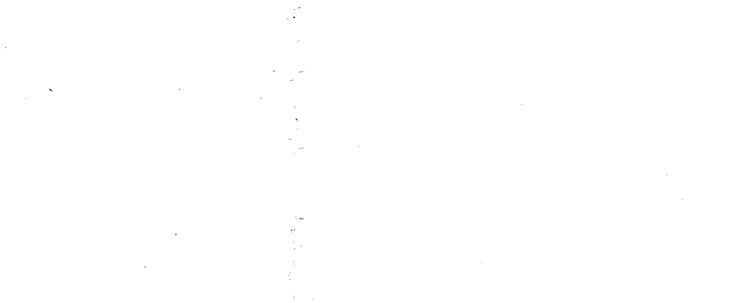
Nº W/TA 630479

ISSUE 65 281/83

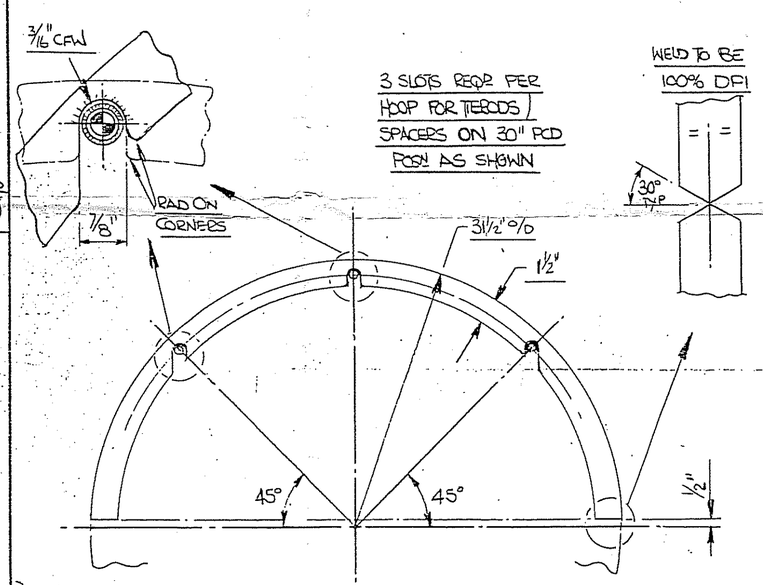


DETAILS OF MODIFICATIONS REQD ON EXISTING BAFFLE MARK 'A' (4-OFF)

DETAIL OF MODIFCATIONS REQD ON EXISTING BAFFLE MARK 'B' (3-OFF)

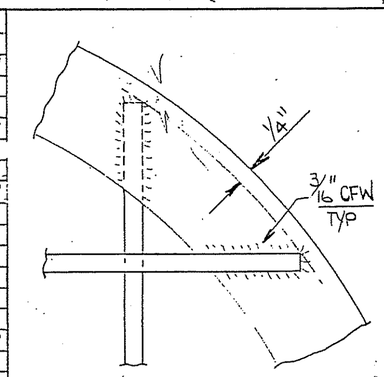


ASSEMBLY OF TUBEBUNDLE



DETAIL OF BAFFLE SUPPORT HOOPS T48 (7-OFF)

HORIZONTAL BARS 'T55'			VERTICAL BARS 'T56'		
REF	Nº OFF	LENGTH	REF	Nº OFF	LENGTH
H1	7	30.918"	V1	14	30.975"
H2	7	30.707"	V2	14	30.829"
H3	7	30.363"	V3	14	30.552
H4	7	29.888"	V4	14	30.140"
H5	7	29.256"	V5	14	29.588"
H6	7	28.477"	V6	14	28.887"
H7	7	27.531"	V7	14	28.026"
H8	7	26.400"	V8	14	26.990"
H9	7	25.059"	V9	14	25.757"
H10	7	23.472"	V10	14	24.299"
H11	7	21.586"	V11	14	22.571"
H12	7	19.312"	V12	14	20.505"
H13	4	16.491"	V13	14	17.984"
H14	4	12.765"	V14	14	14.780"
		②			②



TYPICAL DETAIL OF T2 & T3 TO T1

BILL OF MATERIAL FOR ONE ASSEMBLY AS DRAWN

REF Nº	Nº OFF	MATERIAL	TYPE	DESCRIPTION	REQD Nº
T48	7	TP 316 L	SISI	BAFFLE SUPPORT HOOPS	301/1
T55	98	TP 316 L	SISI	HORIZONTAL SUPPT RODS :- 3/8" x 1/4" LENGTH AS TABLE	301/2
② T56	196	TP 316 L	SISI	VERTICAL SUPPT RODS :- 3/4" x 1/4" LENGTH AS TABLE	301/2
① T33	1	TP 316	SISI	VENT PLUG :- SEE MBT DRG 85/1908 SK2	251/1
T34	1	CAF	—	GASKET :- 1 1/8" O/D x 3/4" I/D x 1/8" THK	295/1

GENERAL NOTES

1, ONE ASSEMBLY REQD AS DRAWN MARK :- E413
2, FOR DETAILS OF SHELL & KNOCK OUT POT SEE MBT DRG Nº :- 85/1908/EF 21
3, INSPECTION BY : MBT / ICI &/OR THEIR APPOINTED REP.
4, T/SHT T1 TO HAVE 1/2" DIA VENT HOLE @ 0° ① X 2 1/2" DEEP TO COME OUT ON SHELLSIDE. TOP 1" OF HOLE TO BE TAPPED 3/8" BSP & PLUGGED WITH "T33" & "T34"
5, BUNDLE TO BE CLEANED USING A HIGH ① PRESSURE WATER JET.

MOTHERWELL BRIDGE THERMAL LTD

PURCHASER	ICI Drg Nº D/A7/15/4092
CONTRACT	BILLINGHAM
TITLE	DETAILS OF MODIFICATIONS REQUIRED ON TUBEBUNDLE FOR UNIT Nº E413

REVISION	0	TO CLIENT FOR APPROVAL	1	VENT HOLE ADDED TO T1 NOTE 4, T33 & T34 ADDED TO SUIT NOTE 5 ADDED.	2	AS PER CLIENT RETURN PRINTS 25-3-85
DATE	11/3/85	RELEASED FOR CONSTRUCTION	25/3/85		1-4-85	T55 & T56 LENGTHS ALTERED
ALTERED BY	CDK		CDK		CDK	
APPROVED BY	LH		LH	STATUS UNCHANGED LH	LH	STATUS UNCHANGED

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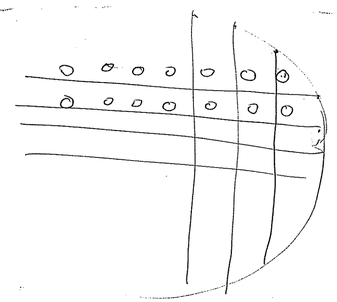
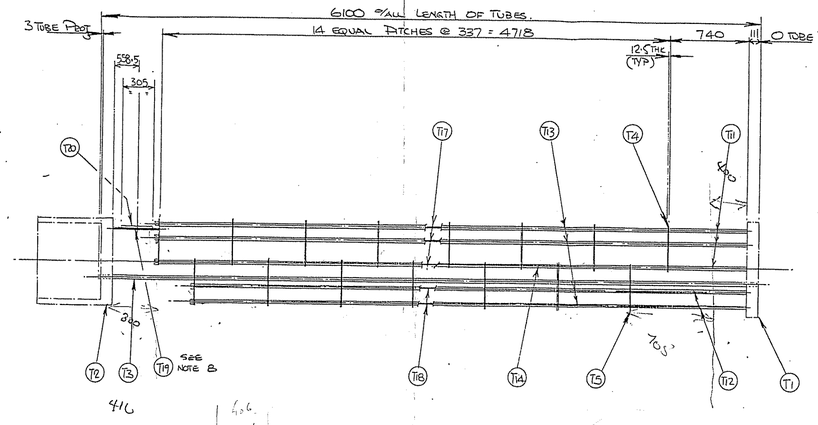
PURCHASERS ORDER NO.

CONTRACT NO.	DRAWING NO.			
85/1908	85/1908 EF 22	DRAWN BY	CDK	28-2-85
Project 87001.		CHECKED BY	LH	1-3-85
		APPROVED BY	LH	1-3-85
		SCALE	N.T.S.	
		REVISIONS	1	2

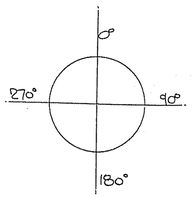
10½"

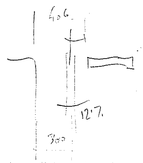
DFI / 15 / 4092

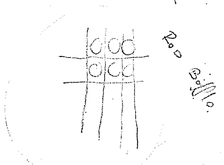


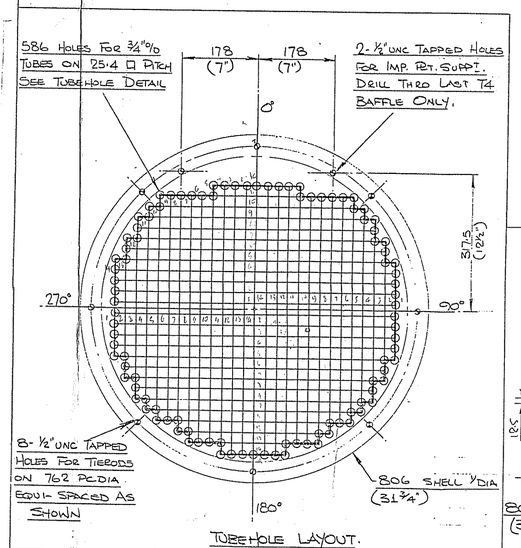


Elevation

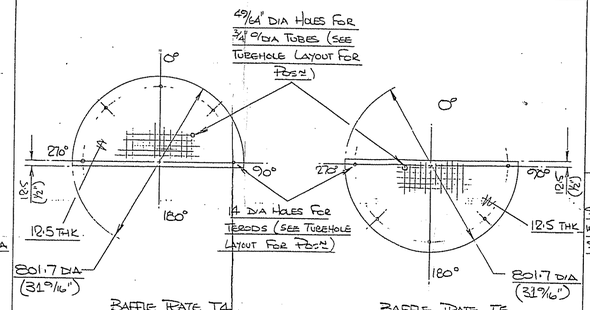




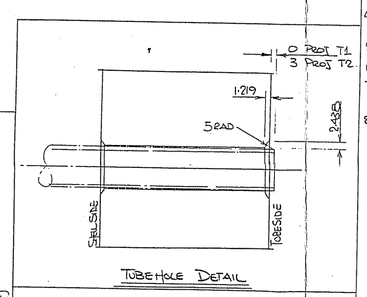




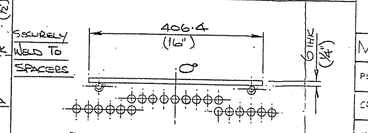
Tubehole Layout.



Baffle Plate T4 — Baffle Plate T5



Tubehole Detail



Detail of Impingement Pt T20

BILL OF MATERIAL FOR ONE ASSEMBLY AS DRAWN

REF No	No OFF	MATERIAL	TYPE	DESCRIPTION	REQ No
T1	1	IMI-125 (5765 GR1)	T1	STATIONARY TUBESHEET	—
T2	1	IMI-125 (5765 GR2)	T1	FLOATING TUBESHEET	—
T3	586	R 22E. GR 2	T1	TUBES : ¾"OD x 18 SWG (MIN) x 6100 LG	13/1
T4	8	A 240 TP 304	SST	BAFFLE PLATE	12/1
T5	7	A240 TP 304	SST	BAFFLE PLATE	12/1
T11	5	A213 TP 316	SSTL	SPACER: ¾"OD x 18SWG x 740 LG	23/1
T12	3	A213 TP 316	SSTL	SPACER: ¾"OD x 18SWG x 1077 LG	23/1
T13	39	A213 TP 316	SSTL	SPACER: ¾"OD x 18SWG x 6615 LG	23/1
T14	88	A213 TP 316	SSTL	SPACER: ¾"OD x 18SWG x 324.5 LG	23/1
T17	5	TP 304	SSTL	TIERODS 12.5 DIA x 5510 LG	24/1
T18	3	TP 304	SSTL	TIERODS 12.5 DIA x 5175 LG	24/1
T19	2	TP 304	SSTL	TIERODS 12.5 DIA x 475 LG	24/1
T20	1	A240 TP 304	SSTL	IMPINGEMENT PLATE	12/2

GENERAL NOTES

1 For shell/channel, test details & design data see MBT Drg. No 85/1908/EF21
2 ONE ASSEMBLY REQ'D AS DRAWN MARK- E413.
3 MACHINE FINISH AS FOLLOWS:-
▽▽▽ 63 c.l.a MICROINCHES (GASKET FINISH)
▽▽ 125 250 c.l.a MICROINCHES (SMOOTH FINISH)
▽ 500-1000 c.l.a MICROINCHES (MACHINE FINISH)
4 BAFFLE PLATE EDGES TO BE DEBURRED & TUBEHOLES TO HAVE A WORKMANLIKE FINISH
5 TUBE END ATTACHMENT :- STRENGTH WELDED.
6 WEIGHT OF TUBEBUNDLE =
7, Materials marked thus * have to be salvaged from existing bundle & re-used.
8, Tierods "T19" to run from TSHT "T2" to last "T4" baffle only. Ends to be free in baffle.

REVISION	0	TO CLIENT FOR APPROVAL
DATE		
ALTERED BY		RELEASED FOR CONSTRUCTION
APPROVED BY		

MOTHERWELL BRIDGE THERMAL LTD

PURCHASER	ICI Dyn. N°: D/117/12/4[illegible]
CONTRACT	BILLINGHAM
TITLE	DETAILS OF REPLACEMENT TUBEBUNDLE FOR UNIT No E413.
PURCHASERS' ORDER NO	62/2645416/IN1/WS.
CONTRACT NO.	85/1908
DRAWING NO	85/1908 EF24.
DRAWN BY	C.P.KING 28-5-85
CHECKED BY	CPK 28-5-85
APPROVED BY	[illegible] 28-5-85
SCALE	
REVISIONS	0.

4107C1C4510

Mill Suction Filter.

Pre Filter.

Main Filter.

E 118 Intercool Cooler.

TP-2714

TP-2715

2415 Silencer

For casing cooling Lube oil pumping & coding seal Drwg FHA-408286

Drg. F/H/A 408251 Instrumentation & Lube oil distribution.

10,000 kw- C 112 Air Compressor. - 51000 m³/hr max.

L.P. casing. H.P. casing. Labyrinth seal line.

M-111	G-311 A-B-C
8'0 x 9'-0" x 27'-0"	Ti 45/22 kw
E-217	E-312 A-B-C
8'x 16'-0" SHELL-C/STEEL TUBES-Ti	3'-11" x 16'-0" SHELL-C/STEEL TUBES-Ti
D-311 ABC	E-314 ABC
9'0" x 19'-6" Ti/Ti Ti CLAD C/STEEL	3'-8" x 12'-0" SHELL-C/STEEL TUBES-Ti
F-315 ABC	
3'-8" x 10'-0" 317-L-SS Ti-ENTRY PIPE	

LEGEND.

- Plug Cock
- Globe valve
- Ball valve
- Butterfly valve
- Diaphragm valve
- Needle valve
- Parallel Slide Valve.
- Non-return valve.
- Flush bottom valve
- Pressure Seal
- Bursting disc.
- Sample point.

- I.A. Fails open.
- I.A. Fails closed.
- I.A. Fail Locked/ Stayput.
- Pump & Agitator notes 1-2-3 & 4 on sheet 2 of 3.

27 Bar Steam

E 217 A/B/C Start up heaters.

Condrs.

Start up line

P-0207-2" SL (104°C)

P-0208-2" XB (204°C)

P-0224-2" RB

P-0203-4" SL (104°C)

P-0204-4" SL (104°C)

P-0239-2" XB (204°C)

P-0205-3" SL (104°C)

P-0203-4" SL (104°C)

R-3417-3" Vent hdr. (130°C)

D519

I-D-0431-RQ. I-D-0438-RQ.

SL-0501-3" XB (224°C)

SL-0301-3" XB (224°C)

SV-0221-4" RT (104°C)

SV-0217-3" RQ (104°C)

SV-0221-4" RT (104°C)

SV-0219-4" RQ (104°C)

SV-0219-4" RQ

P-0207-2" SL (104°C)

P-0207-3" SL (104°C)

P-0238-2" SL (104°C)

SV-0238-4" RQ (104°C)

SV-0219-4" RQ

SV-0221-4" RT (104°C)

SV-0217-3" RQ (104°C)

SV-0221-4" RT (104°C)

SV-0235-4" RQ (104°C)

SV-0238-4" RQ (104°C)

SV-1304-2" RQ (99°C)

SV-1307-3" RQ (104°C)

SV-0220-4" RQ (104°C)

SV-0389-1" (104°C)

SV-2010-2" RT (104°C)

SV-1218-2" RT (104°C)

SV-1607-4" RQ (104°C)

SL-1304-2" RQ (119°C)

Gravity Flow

Catalyst Solution Battery Limit.

Dumin. water.

Cat. Sol. Make up Tanks

F719 Water Measure.

F213 Feed Mixing Drum.

F714 A & B

F211 Solvent Charge Drum

PC 2102

PC 2113

PC 2112

PC 2101.

Metering Pot.

G 212 A/B Solvent Charge Pumps.

G 216 A/B Reactor Feed Pumps.

G-716 A/B Catalyst Solution Doping Pumps. Sht 2003

G-620 A/B Drg. 3 of 3

M 418 A/B Drg. 2 of 3

G 513 A/B Drg. 2 of 3

E 514 Drg 2 of 3

Paraxylene Insert

From Storage Drg 3 of 3

F-210	G-211	F-213	E-219	F-714 AB	G-716 AB	F-787
12'9" x 4'-0" T/T 316-L-SS	316-L-SS TI HUB 11·0 kw	12'-0" x 19'0-T/T 316-L-SS	2'-6" x 12'-0" SHELL-C/STEEL TUBES 316-L-SS	6'-0" x 10'-0" T/T TI-CLAD C/STEEL	TI 1·8 m³/hr 3·0 kw	3'-0" x 7'-6" CARBON STEEL
F-211	G-212 A-B	G-213	G-216 A-B	G-714 A-B	F-719	
10'-6" x 16'-0" T/T 316-L-SS	316-L-SS 48·6 m³/hr 7·5 kw	316-L-SS TI HUB 22·0 kw	316-SS 30·67 m³/hr 152·0 kw	TI 22·0 kw	5'-0" x 7'-6" 321-SS	

D-410	D-411	D-412
11'-0" x 20'-0" T/T TI CLAD C/STEEL	11'-0" x 20'-0" T/T TI CLAD C/STEEL	11'-0" x 20'-0" T/T 316-L-SS INTERNAL BOLTS
G-410	G-411	G-412
TI 37·0 kw	TI 37·0 kw	317-L-SS TI HUB 37·0 kw
E-413	E-414	E-415
21'-8" x 6'-0" SHELL-C/STEEL TUBES-316-L-SS	3'-10" x 6'-0" SHELL-C/STEEL TUBES-TI	
G-416 AB	F/H/A 408251 — 58	F/W/B. 405121
316-L-SS 82·0 m³/hr 11·0 kw	F/H/A 408271	

WARNING!!

This diagram will not be SERVICED and may be out of date within six months from (Date of last Plant E.C.N. Revision)

Water.		
Steam	"	(22, 23 & 24)
Condensate.	INST.	(25/26)
Nitrogen/Air.	ELECT.	27
Caustic.	CIVIL	30
	PROJECT	

REFERENCE DRAWINGS FOR DRG. 1/3

APPROVED BY

I.C.I. LTD. PETROCHEMICALS DIVISION. BILLINGHAM DIVISION WORKS MIDDLESBROUGH TEESSIDE

E	UPDATED TO SHOW AS DESIGNED	LWH	NOV 85
D	SEE CHANGE NOTICE Nº 1	LWH	19/9/85
C	UPDATED FOLLOWING LD REVIEW	AWH	
B	REDESIGNED BY PROCESS ENGINEERING FOR PROJECT B7001	LWH	19/9/84

SCALE:			
DRAWN	D.T. Mc Allister		19/9/84
CHECKED	D.C.A. A.J.U.		19/9/84
TRACING PASSED	D.J.M.A		19/9/84
APPROVED R.H.			19/9/84
PARTS LIST	CALC. No.		
YES/NO			

PROJECT B7001

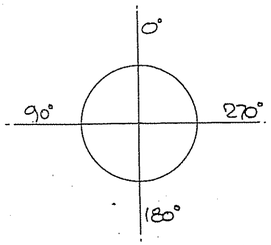
S	UPDATED	
R	UPDATED	
F	Equipment data added	
E	Minor revisions.	
D	Design changes & general revision.	
C	Revised & approved by Divisn works	
B	Updated to Foster Wheeler revision D-E	
A	Preliminary.	
ISSUE	REVISION	

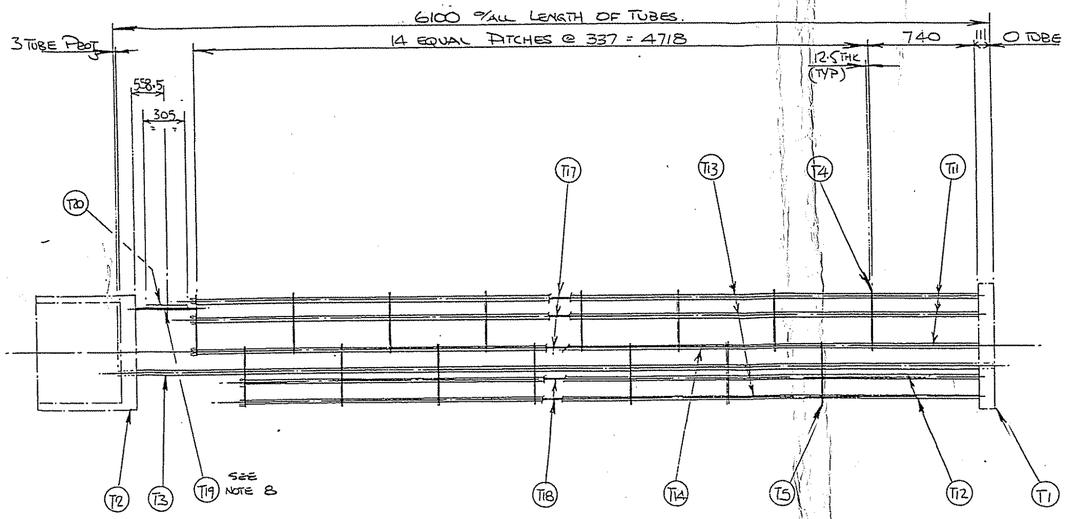
W/TA 621370 E

Nº 7 TA PLANT. OXIDATION SECTION

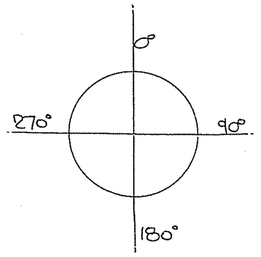
MODIFICATION TO CRYSTALLISER CONDENSATION

THIRD ANGLE PROJECTION





ELEVATION

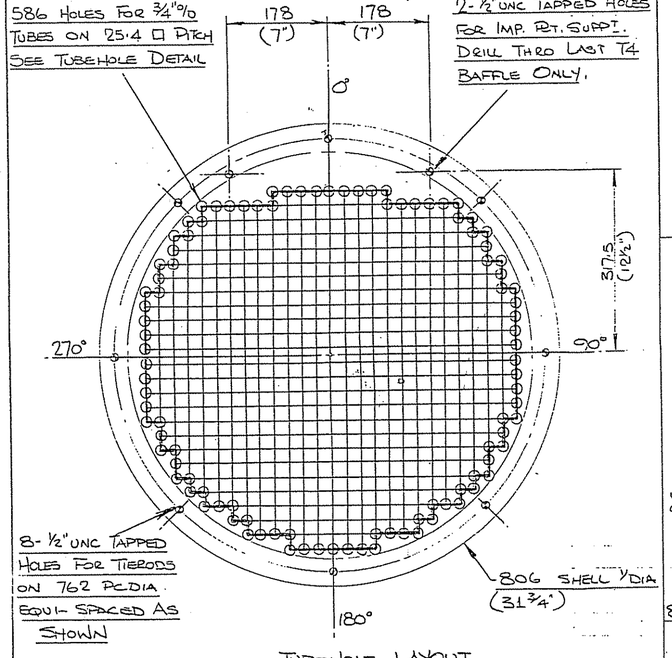


BILL OF MATERIAL FOR ONE ASSEMBLY AS DRAWN

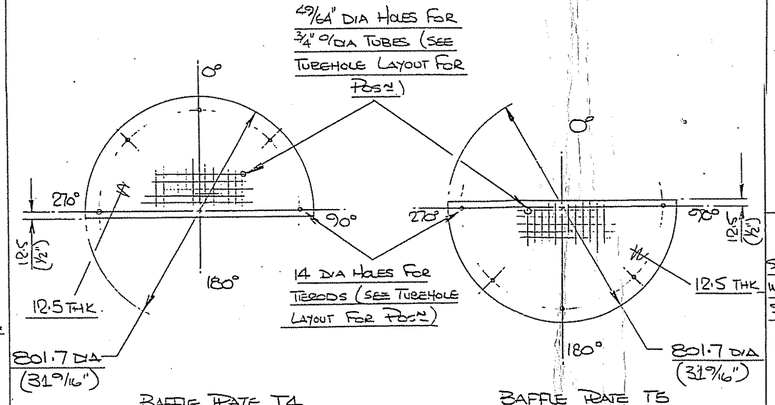
REF N°	N° OFF	MATERIAL	TYPE	DESCRIPTION	REQ N°
*T1	1	IMI-125(5265GR1)	T1	STATIONARY TUBESHEET	—
*T2	1	IMI-125(5265GR2)	T1	FLOATING TUBESHEET	—
T3	586	B 338 GR 2	T1	TUBES :- ¾"o/o x 18 SWG(MIN) x 6100 LG	131/1
T4	8	A 240 TP 304	S/ST	BAFFLE PLATE	12/1
T5	7	A 240 TP 304	S/ST	BAFFLE PLATE	12/1
T11	5	A 213 TP 316	S/ST	SPACER: ¾"o/o x 18SWG x 710 LG	231/1
T12	3	A 213 TP 316	S/ST	SPACER: ¾"o/o x 18SWG x 1077 LG	231/1
T13	39	A 213 TP 316	S/ST	SPACER: ¾"o/o x 18SWG x 6615 LG	231/1
T14	28	A 213 TP 316	S/ST	SPACER: ¾"o/o x 18SWG x 324.5 LG	231/1
T17	5	TP 304	S/ST	TIERODS 12.5 DIA X 5510 LG	241/1
T18	3	TP 304	S/ST	TIERODS 12.5 DIA X 5175 LG	241/1
T19	2	TP 304	S/ST	TIERODS 12.5 DIA X 475 LG	241/1
T20	1	A 240 TP 304	S/ST	IMPINGEMENT PLATE	12/2

GENERAL NOTES

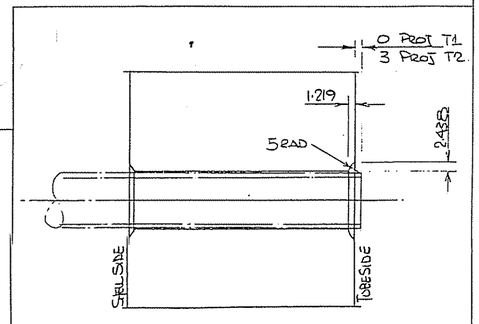
1 For Shell/Channel, Test Details & Design Data see MBT Drg No 85/1908/EF21
2 ONE ASSEMBLY REQD AS DRAWN MARK- E413.
3 MACHINE FINISH AS FOLLOWS -
▽▽▽ 63 cla MICROINCHES (GASKET FINISH)
▽▽ 125 250 cla MICROINCHES (SMOOTH FINISH)
▽ 500-1000 cla MICROINCHES (MACHINE FINISH)
4 BAFFLE PLATE EDGES TO BE DEBURRED & TUBEHOLES TO HAVE A WORKMANLIKE FINISH
5 TUBE END ATTACHMENT :- STRENGTH WELDED.
6 WEIGHT OF TUBEBUNDLE =
7, Materials Marked Thus * Have To Be Salvaged From Exsisting Bundle & Re-Used.
8, Tierods "T19" To Run From Tsht "T2" To Last "T4" Baffle Only. Ends To Be Free In Baffle.



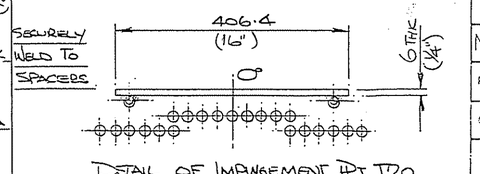
TUBEHOLE LAYOUT.



BAFFLE PLATE T4. BAFFLE PLATE T5



TUBEHOLE DETAIL



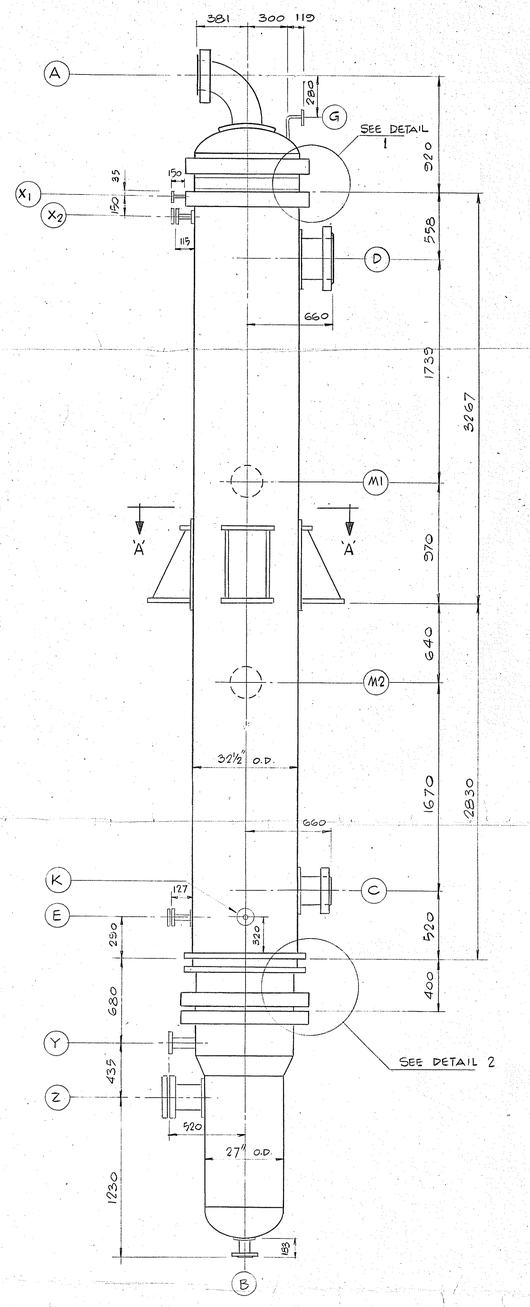
DETAIL OF IMPINGEMENT PLT T20

REVISION	0	TO CLIENT FOR
DATE	23/5/85	APPROVAL
ALTERED BY	RDW	RELEASED FOR
APPROVED BY	CPK	CONSTRUCTION

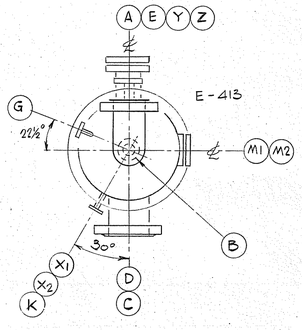
MOTHERWELL BRIDGE THERMAL LTD

PURCHASER	ICI Ltd Nº D/M/15/4100
CONTRACT	BILLINGHAM
TITLE	DETAILS OF REPLACEMENT TUBEBUNDLE FOR UNIT Nº E413.
PURCHASERS' ORDER NO	62/2645416/IN1/WS.

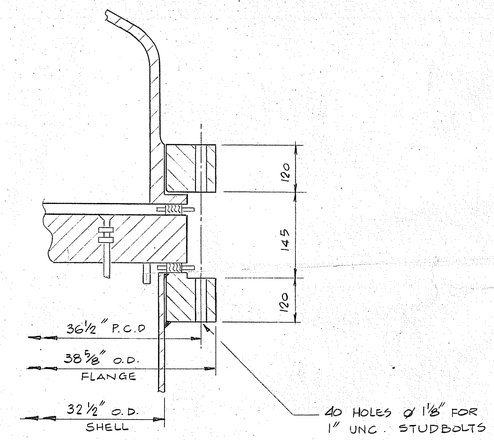
CONTRACT NO	DRAWING NO			
85/1908	85/1908 EF24.	DRAWN BY	C.P.KING	18-5-85
		CHECKED BY	CPK	22-5-85
		APPROVED BY	CPK	22-5-85
		SCALE		
		REVISION	0	



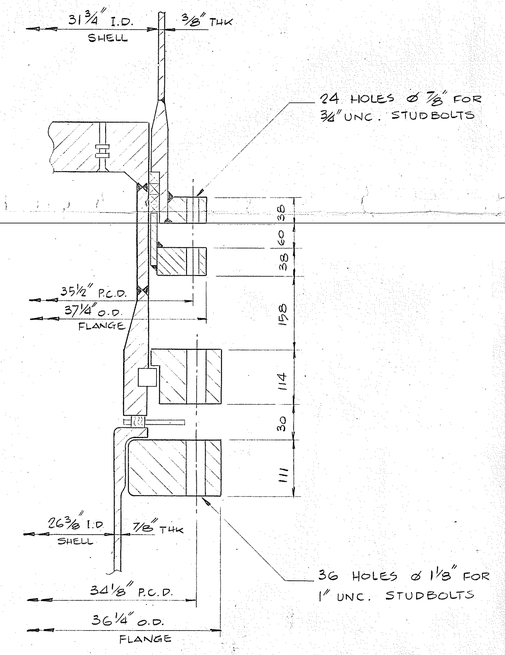
ELEVATION



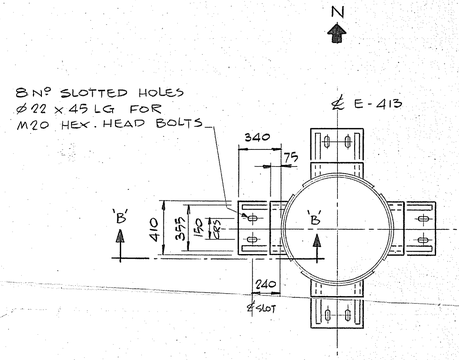
PLAN VIEW
(TRUE ORIENTATION)



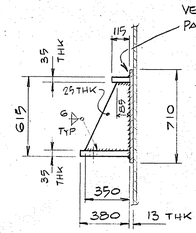
DETAIL 1



DETAIL 2



SECTION 'A'-'A'



SECTION 'B'-'B'
(TYPICAL FOR 3 No.
VERTICAL GUSSET PLATES)

PART No.	No. OFF	MATERIAL	DESCRIPTION	INDENT/CODE/ ORDER No.
			71801581 71801659 71801660	

GENERAL NOTES

1. ALL DIMENSIONS GIVEN ON THIS DRAWING REFLECT THE 'AS BUILT' STATUS OF VESSEL E-413
2. VESSEL BODY FLANGES ARE SHOWN WITH OD. AND P.C.D. IN IMPERIAL DIMENSIONS FOR PURPOSES OF RE-MATCHING

NOZZLE DATA

MARK	SIZE	RATING	FACING	WALL THK	SERVICE
A	10"NB	300#	L.J.	EX. STG	PROCESS IN
B	3"NB	300#	R.F.	SCH 40	PROCESS OUT
C	8"NB	150#	R.F.	SCH 40	CONDENSATE IN
D	14"NB	150#	R.F.	SCH 40	STEAM & WATER OUT
E	1½"NB	150#	R.F.	SCH 40	BLOWDOWN CONN. (BLANKED)
G	1"NB	300#	L.J.	SCH 160	CAUSTIC CONN. (BLANKED)
M1	6"NB	150#	R.F.	PAD	INSPECTION (BLANKED)
M2	6"NB	150#	R.F.	PAD	INSPECTION (BLANKED)
X1	1"NB	150#	R.F.	SCH 80	RELIEF
X2	1"NB	150#	R.F.	SCH 80	VENT (BLANKED)
K	1"NB	150#	R.F.	SCH 80	DRAIN CONN. (BLANKED)
Y	3"NB	300#	R.F.	SCH 40	WATER INLET
Z	8"NB	300#	R.F.	SCH 40	INSPECTION (BLANKED)

PRELIMINARY

ISSUE	REVISIONS	INT'L	DATE	DRAWING No.	REFERENCE DRAWINGS

I.C.I. CHEMICALS & POLYMERS LTD. - TEESSIDE OPERATIONS - ENGINEERING -WILTON, MIDDLESBROUGH, CLEVELAND.

JOB No./ E.W.O. No.		DRAWN A. PAISLEY	25/9/90
D.O. REF. No.	900 167	CHECKED D NASSAU	26/9/90
CALC. No.		APPROVED	
SCALE	1:20		

PLANT	TA-T7
BUSINESS AREA	OXIDATION
MATL. LIST	
PROJECT No.	

TITLE 'AS BUILT' G.A. OF E-413 REACTOR CONDENSER

DRG. No. D/A7/14/5922

DRG. SIZE DE

ISSUE P1

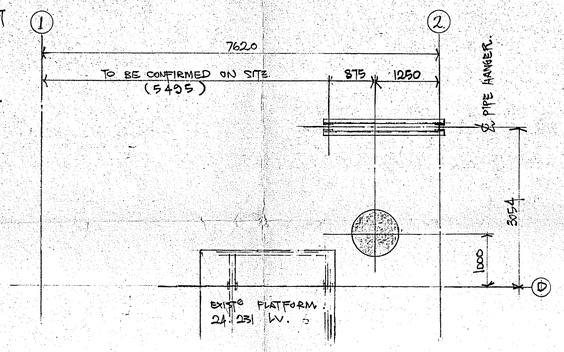
DRG. No. D/A7/14/5922

Admel F/R/ 040

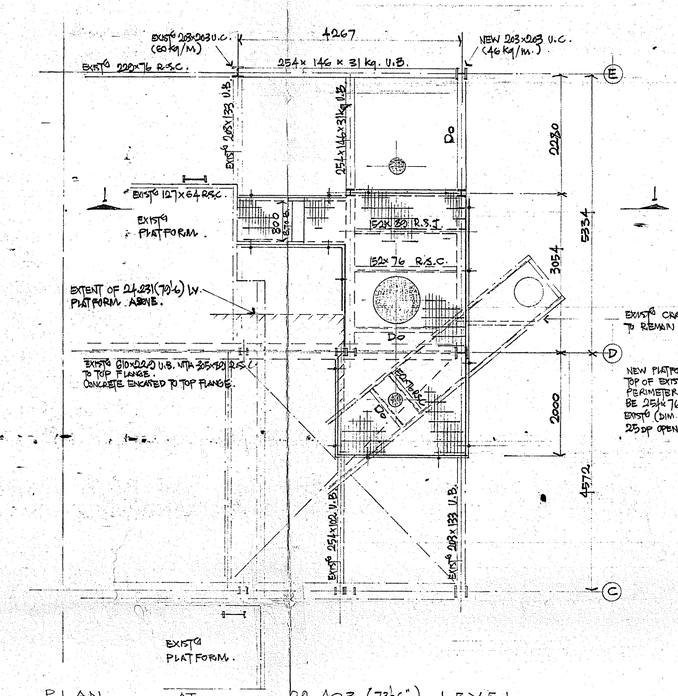
GENERAL NOTES.

ALL STEELWORK TO BS 4360 GRADE 43 A.
END CONNECTIONS TO BE 4-M16 GRADE 4.6 BOLT MINIMUM UNLESS NOTED OTHERWISE.
HANDRAILING, STANDARDS & TOE BOARDS TO BE IN ACCORDANCE WITH I.C.I. REP MISC 2310.

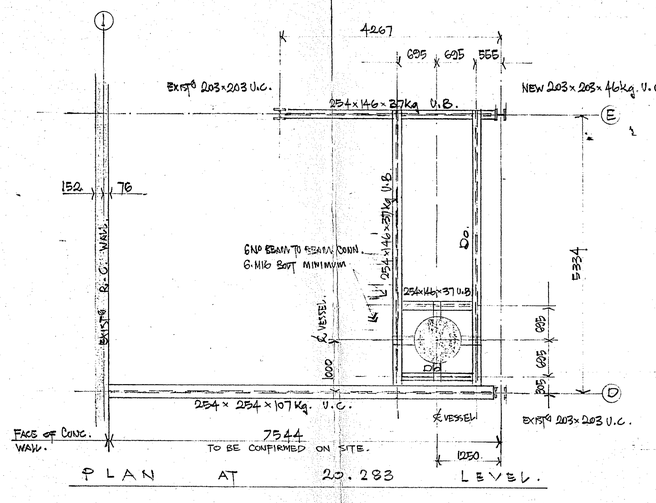
REFER TO SEPARATE SPECIFICATION FOR PAINTING.



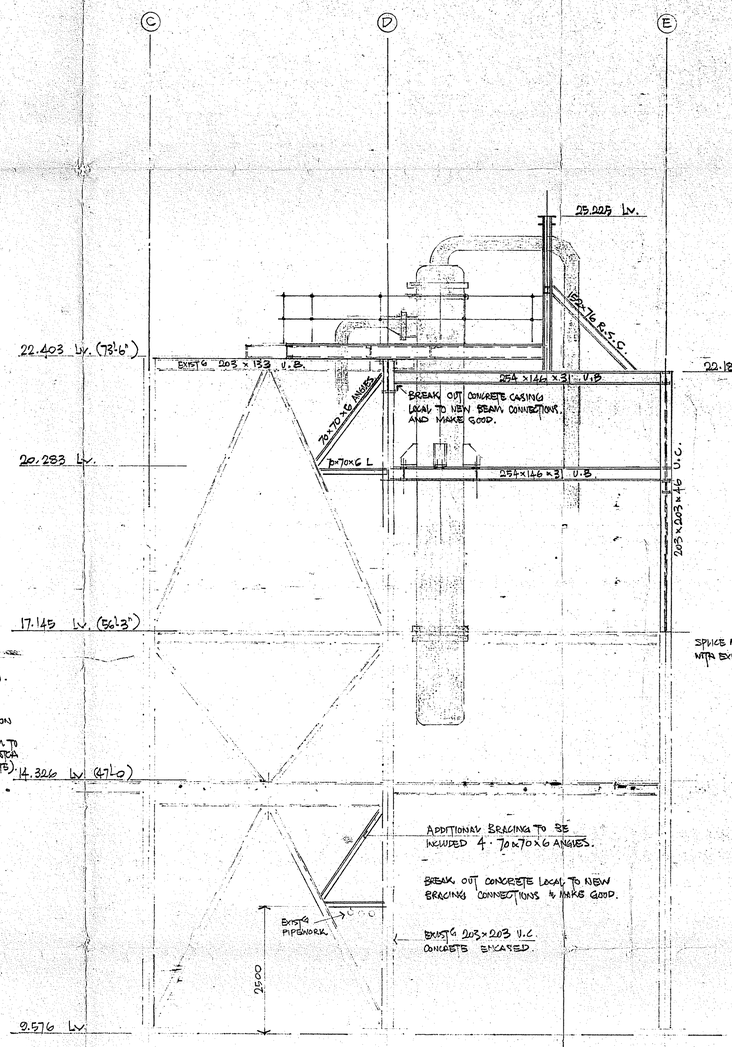
PLAN AT 24.231 (79'6") LEVEL.



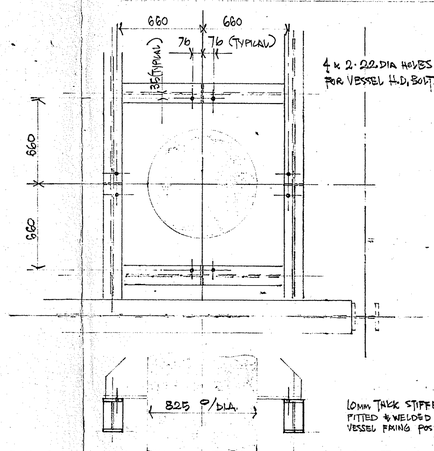
PLAN AT 22.403 (73'6") LEVEL.



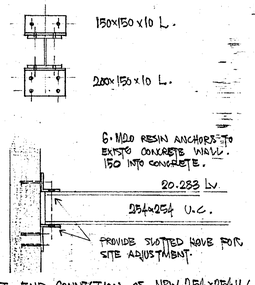
PLAN AT 20.283 LEVEL.



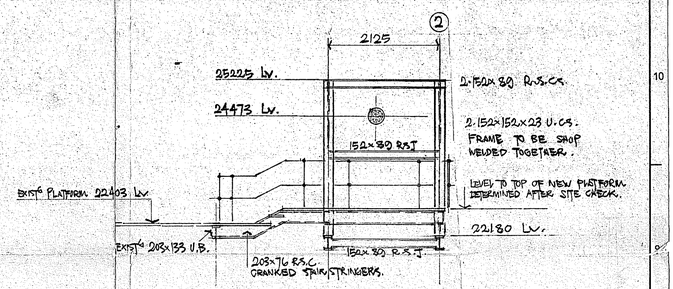
ELEVATION ON LINE 2.



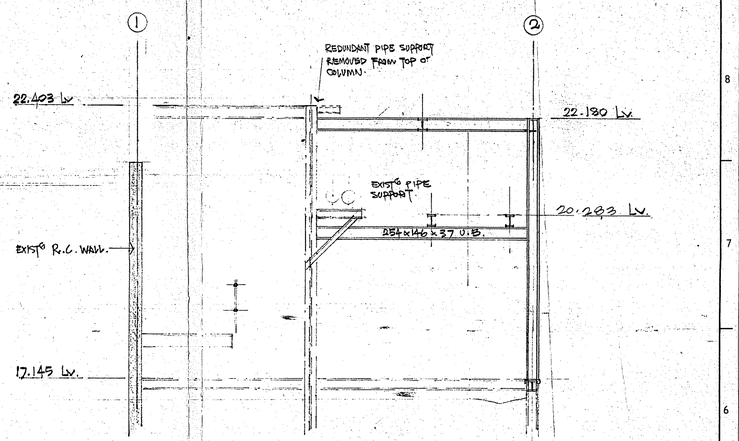
ENLARGED DETAIL AT VESSEL SEATING.



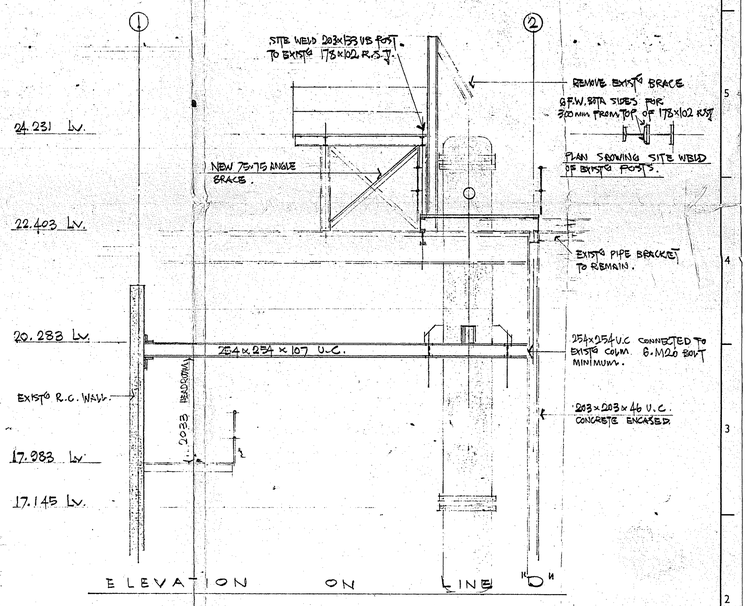
DETAIL AT END CONNECTION OF NEW 254x254 U.C BEAM & EXISTING CONCRETE WALL.



SECTION 1·1



ELEVATION ON LINE "E"



ELEVATION ON LINE "D"

ENGINEERING DEPT. N. E. GROUP
APPROVED FOR CONSTRUCTION

ISSUE	REVISIONS	GRID	PARTS LIST	INITIAL	DATE
C	CONDENSER LOWERED & ACCESS PLATFORM HEIGHT ADJUSTED			MB	9/4/85
B	PLATFORM AT 24.231 LV EXTENDED. LEVEL OF NEW BEAMS ADJUSTED TO 22.180 LV.			MB	15/3/85

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SCALE 1:50, 1:20
DRAWN
SCALE

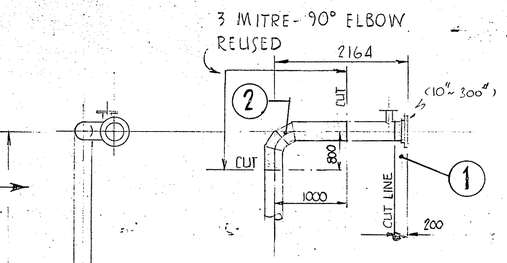
I.C.I. PLC., ENGINEERING DEPT.,
NORTH EAST GROUP, BILLINGHAM, CLEVELAND.

REFERENCE DRAWINGS	APPROVED
VESSELS	
MACHINES	
PIPING	
INST.	
ELECT.	
CIVIL	
PROJECTS	

DRAWN	MB.	12/3/85	PARTS LIST YES/NO
CHECKED	RA		CALC. No.
APPROVED	JW	15/3/85	JOB No.
			PROJECT No. 87001

TITLE: JA - J7 UPRATING OXIDATION AREA w. CRYSTALLISER STRUCTURE SUPPORTING STEELWORK FOR CONDENSER TO D410
WILTON
DRAWING SIZE: B1
No W/TA 628322.
ISSUE: C

3 MITRE - 90° ELBOW
RELISED



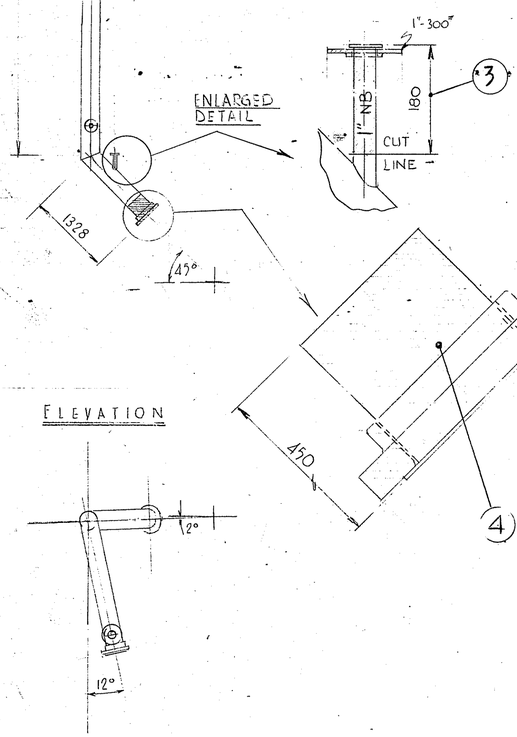
TRUE VIEW ON 'A'

'A'

10" ('¼" THK RT) PIPE

Ex'G PIPE MAT'LS REF	Taken from Scientific Design Company Spec No 3 HS
PIPE	
10" NB - FAB'D FROM 1/4" RT ~ WELDED TITANIUM I.C.I. GRADE 130	
1" NB - " " 12 SWG PLATE (0·104") - ditto -	
STUB ENDS RINGS	
TITANIUM PLATE TI.130 ~ SPEC BS.1640 PART 2	
BACKING FLANGES.	
18/8/TI (1ST QTY) ~ BS.1503-821 TI	

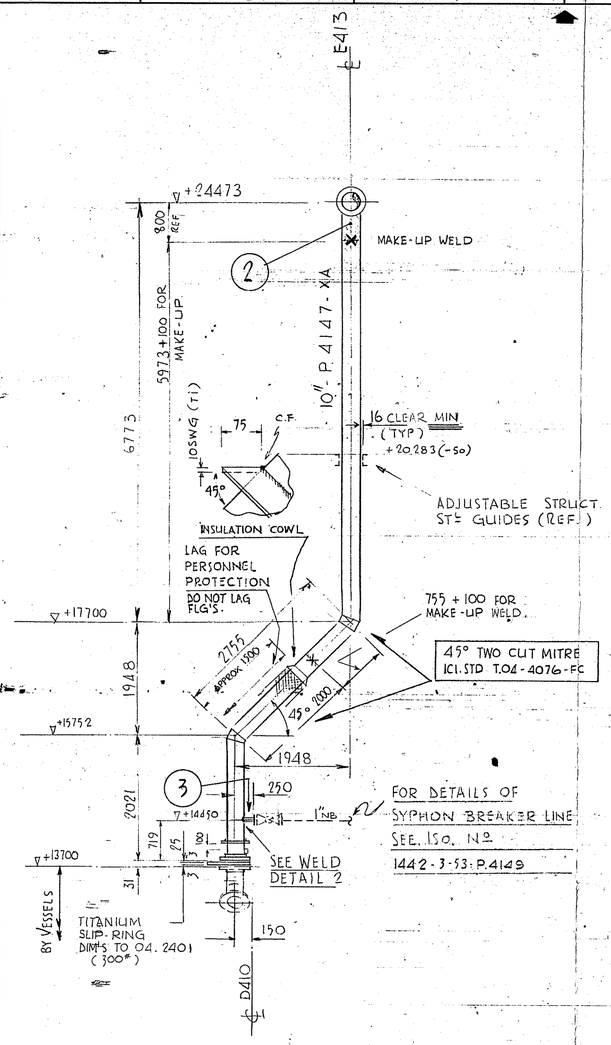
10008 (REF.)



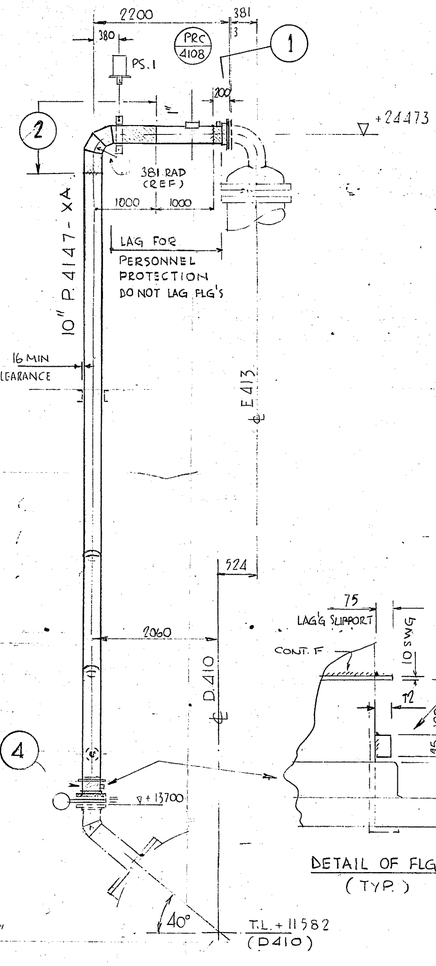
ELEVATION

PLAN

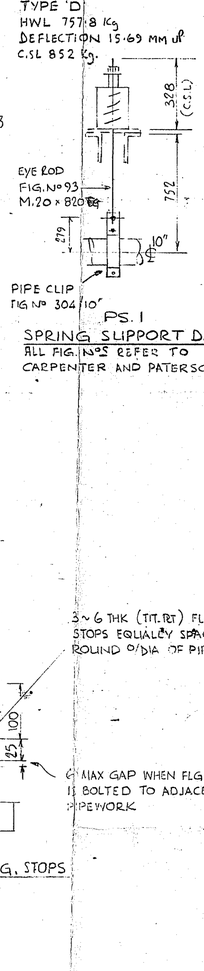
EXISTING PIPELINES (2 OFF) AS REMOVED FROM TA T6
SPOOLS MKD 1, 2, 3 & 4 TO BE CUT AND REUSED AS INDICATED
STRAIGHT LENGTHS OF PIPEWORK TO BE CUT AS REQ'D TO FAB NEW LINE.

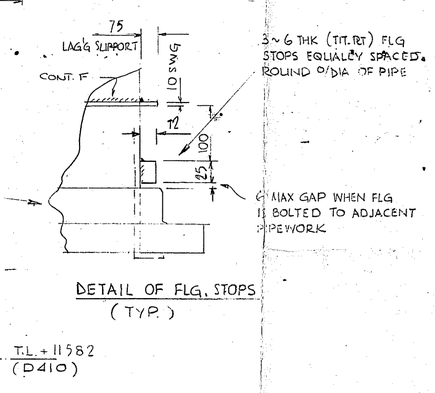


ELEVATION
(LOOKING NORTH)

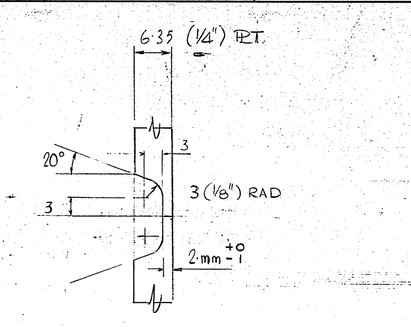


ELEVATION
(LOOKING EAST)



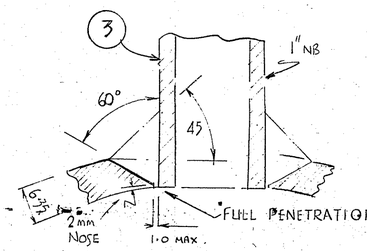


DETAIL OF FLG. STOPS
(TYP.)



B.W. DETAIL FOR 6·35 (¼") RT.

DETAIL 1



1" NB NOZZLE TO 10" NB PIPE WELD DETAIL

DETAIL 2

PLANNING PURPOSE ONLY

DETAILS OF NEW PIPELINE No 10"-P4147

FABRICATE NEW LINE FROM EXISTING PIPEWORK (SEE L.H. SIDE OF THIS DRG.)

SPOOLS MARKED 1, 2, 3 & 4, INCLUDING BACKING FLANGES, CUT FROM EXISTING PIPEWORK AS SHOWN

STRAIGHT LENGTHS TO BE CUT AS NECESSARY KEEPING BUTT WELDS TO A MINIMUM AND LOCATED SO AS TO CLEAR OPENINGS (E.G. 2" SYPHON BREAKER NOZZLE).

LINE TO BE ANODISED AT SITE. I.C.I. ENG.

WORKS TO ARRANGE.

PIPE SHOP HYD. TEST	-	LINE SPEC	XA
MAX ATTAIN PRESS	13·5 BAR'G	FAB'N SPECS	B140, B141
MAX OPER'G TEMP	200°C		
LINE TEST	See Schedule.	STRESS RELIEVE	NIL
		RADIOGRAPHY	100%
MATERIAL	FAB'N ERECTION	INSTRUMENT CHECKED BY	

JOB NUMBERS

	MATERIAL		SIZE 1"	SIZE 10"	REMARKS
PIPING	MAT'L RATING	TYPE			
	Ti 1(¼RT)			15M	EXISTING
	" 0·104THK			0·23M	"
BACKING	150#/TI 3.00" S.S.F.	LOOSE	1	2	EXISTING "
STUB ENDS RINGS	Ti RPT.	Gr.130	1	2	EXISTING STUB ENDS RELISED
	TI RT	10 SWG x 75 WIDE ~2m req'd.			
GASKETS	S WND CORR-WTD TITANIUM TYPE 129 STRIP WITH RESIN FILLER TI Gr 125 COMPRESSION RING, C.S. OUTER GUIDE RING.		1	3	
BOLTING	1% CrMo LINC STUD BOLTS 1" DIA x 7¼ LG			16	
	1" DIA x 6" LG.			16	
	⅝ DIA x 3" LG			4	
	1" 300ø ON 10" NB PAD (INST. SUPPLY)		1 OFF		SUPPLIED BY INSTS.
	10" NB. 300ø TITANIUM SLIP-RING			1 OFF	

PLANNING PURPOSE

ISSUE	REVISIONS	GRID	PARTS LIST	INITIAL	DATE
B					

SCALE
DRAWN
SCALE

I.C.I. PLC., ENGINEERING DEPT.,
NORTH EAST GROUP, BILLINGHAM, CLEVELAND.

LINE DIAGRAM No W/TA 621370
PIPING ARRGT DRG No W/TA 630479
REFERENCE DRAWINGS.

VESSELS		DRAWN	April 85
MACHINES		CHECKED	
PIPING		APPROVED	
INST.			
ELECT.			
CIVIL			
PROJECTS.			
APPROVED			

PARTS LIST YES/NO
CALC No.
JOB No.
PROJECT No. 87001

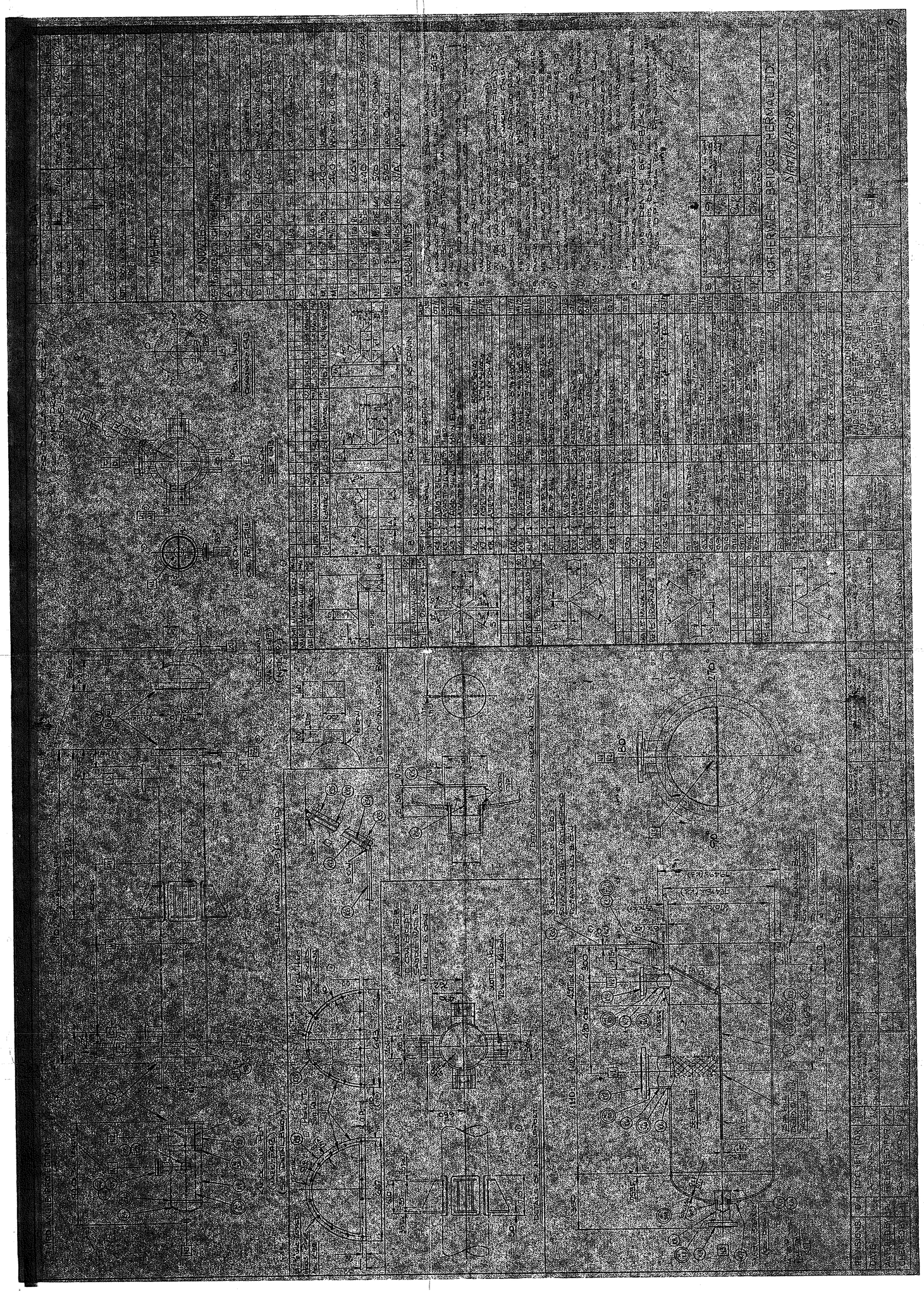
TITLE TA.T7 OXIDATION AREA UPRATING - WILTON
DETAIL OF 10" TITANILIM LINE No P.4147-XA FROM D410 TO E.413

DRAWING SIZE A1

No W/TA 630623

ISSUE A 8/1/85

AAROUE 3769/83


NORTHERN BRIDGE THERMAL LTD.