

1/2 FLUOR
SPECIFICATION SHEET
AIR COOLED HEAT
EXCHANGER

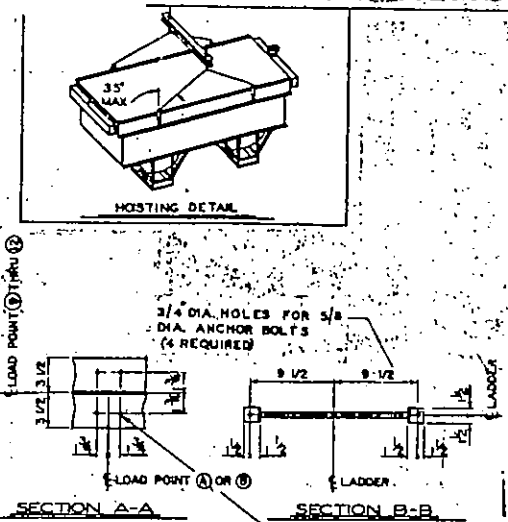
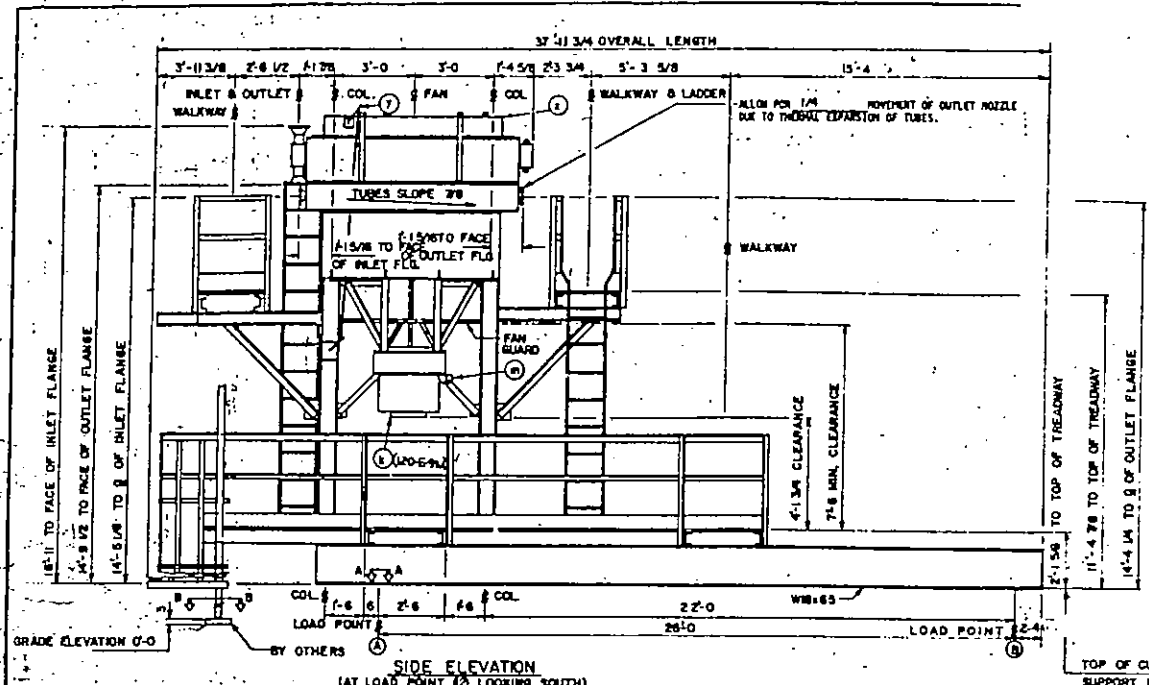
CONTRACT 475404
 ITEM NO 120-E-10
 REV 3 DATE 12/24/81
 HTE CERIONI / FAN
 PROCESS G. REBENSTORE
 SHEET 1 OF 2

1 Client UNION OIL COMPANY Vendor MAK FAB REV 1
 2 Service STABILIZER CROSSOVER Plant UNION MINER △
 3 Design Duty 5.43 MM Btu/Hr. Type (Forced Draft) △
 4 2237 Extended 47/51 Ft², No. of Bays 1 △
 5 △

PERFORMANCE OF ONE UNIT - TUBE SIDE			
		INLET	OUTLET
Fluid		STABILIZER FEED	STABILIZER FEED
Total Flow	Lbs/Hr	20,460 (1)	20,460 (1)
Liquid	Lbs/Hr	20,460	20,460
Molecular Weight		261.8	261.8
Specific Gravity		0.708	0.846
Thermal Cond	Btu/Hr x Ft ² x°F/Ft	0.054	0.07
Specific Heat	Btu/Lb x °F	0.25	0.25
Viscosity	Centipoises	0.372	8.1
Surface Tension	Dynes/Cm		
Bubble Point	°F		
Vapor	Lbs/Hr		
Molecular Weight			
Density	Lbs/Ft ³		
Thermal Cond	Btu/Hr x Ft ² x°F/Ft		
Specific Heat	Btu/Lb x °F		
Viscosity	Centipoises		
Latent Heat	Btu/Lb		
Dew Point	°F		
Non-Condensables	Lbs/Hr		
Molecular Weight			
Steam	Lbs/Hr		
Water	Lbs/Hr		
Temperature	°F	508	120
Pressure (Atmos <u>12</u> Psia)	Psig	102	
Pressure Drop	Psi	Allow 10	Calc 5.9
Velocity	Ft/Sec	Pour Point/Freeze Point	+40 °F
Fouling Resistance	Hr x Ft ² x°F/Btu	Deg Control: Prod Outlet Temp	°F
Additional Data on Sheet No. <u>2 OF 2</u>			

PERFORMANCE - AIR SIDE			
Temperature - in	90 °F	Air Quantity	515,997 (Lbs/Hr)
Temperature - out	133.9 °F	Air Quantity/Fan	74,336 Acfm
Min Des Amb Temp	-10 °F	Face Velocity	Sfpm
Altitude	5300 Ft	Actual Static Press	0.36 in H ₂ O
Mass Velocity	Lbs/Hr Ft ²		

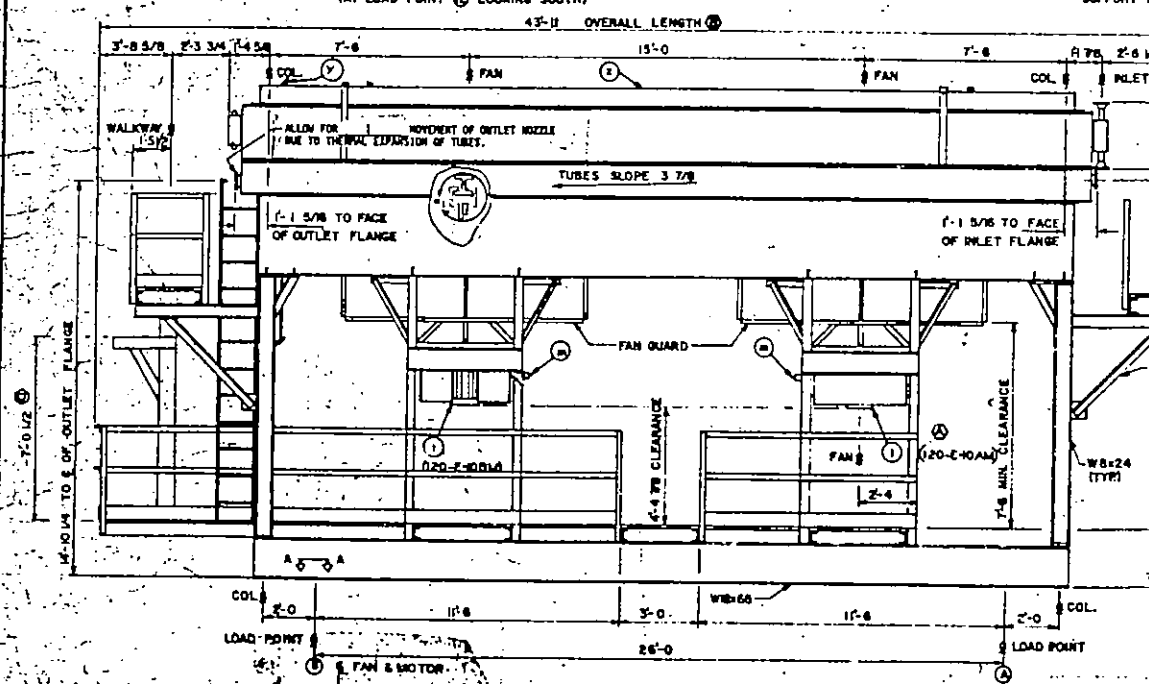
REVISION LOG			
REV	HTE	PROCESS	DESCRIPTION
1	H. H. H. H.	MAK	ADD VENDOR INFO AND REVISIT PROCESS. ISSUED FOR P. D.
2	H. H. H. H.		GENERAL REVISIONS.
3	CERIONI		GENERAL REVISIONS.
4			
5			



LOAD TABULATIONS (LBS)
 TABULATED AT 23 PSF WIND EARTHQUAKE ZONE 4
 DL = DEAD LOAD SL = SNOW LOAD ON LOUVERS
 HL = HYDROTEST LOAD LL = LIVE LOAD ON WALKWAYS
 S = HORIZONTAL SHEAR DUE TO WIND OR EARTHQUAKE
 R = VERTICAL REACTION DUE TO WIND OR EARTHQUAKE

LOAD POINTS	DL	HL	WIND		SEISMIC		SL	LL
			S	R	S	R		
(A) (D)	12100	12580	3780	5100	875	975	3040	1630
(B) (E)	12090	12585	3790	5100	875	975	3040	1630
(A) (D)	12100	12580	3780	5100	875	975	3040	1630
(B) (E)	13090	13565	3790	5100	875	975	3040	2005
(A) (D)	8410	8485	1950	3920	375	870	845	1885
(B) (E)	2005	2075	840	85	60	40	845	1315
(A) (D)	1625	7850	1950	3920	375	870	35	895
(B) (E)	7850	1700	840	85	60	40	35	2540

TUBE BUNDLE WEIGHT: 120-E-9 120-E-9
 UNIT WEIGHT (EMPTY): 21685 3200
 UNIT WEIGHT (WATER FILLED): 49410 18500
 MAXIMUM SINGLE LIFT WEIGHT: 51320 18785
 32300 5775
 NOZZLE & CUSTOMER HYDROTEST LOADS NOT INCLUDED



7/8 DIAMETER HOLES FOR 3/4 DIAMETER ANCHOR BOLTS. WHEN ANCHOR BOLTS ARE EMBEDDED IN CONCRETE, A 1/4\"/>

NOTE: THIS UNIT HAS BEEN DESIGNED TO COMPLY WITH THE FOLLOWING CUSTOMER SPECIFICATIONS WITH EXCEPTIONS, IF ANY, AS AGREED TO: CUSTOMER SPEC. SP-4754-44-2, SP-4754-44-102, SP-4754-100-1, SP-4754-40-3, SP-4754-90-16, SP-4754-20-2, SP-4754-00-2, SP-4754-90-13, ALL REV. 1, AND SP-4754-20-1, SP-4754-46-11, SP-4754-80-7, SP-4754-60-4 ALL REV. 2 AND SP-4754-80-2 REV. 3. CUSTOMER DRAWINGS 475404-00-4-201, 475404-00-4-202 A/B, 475404-00-4-203.

- 1 SERIAL NO. 11-003-81-10-01 SERVICE: STABILIZER FEED AIR COOLER MARLEY MODEL NO. 1M1-5.5x8-10SPD ITEM NO. 120-E-9
- 2 SERIAL NO. 11-003-81-11-01 SERVICE: STEAM COIL ITEM NO. 120-E-9
- 3 SERIAL NO. 11-003-81-12-01 SERVICE: STABILIZER CROSSOVER MARLEY MODEL NO. 1M1-9.5x32x209FD ITEM NO. 120-E-10
- 4 SERIAL NO. 11-003-81-13-01 SERVICE: STEAM COIL ITEM NO. 120-E-10 STRUCTURE FINISH HDG

- DRICOOLES FEATURES**
- 1 INLET; FLANGE 4 DIA. 300 x RFWN
 - 2 OUTLET; FLANGE 4 DIA. 300 x RFWN
 - 3 INLET; FLANGE 2 DIA. 300 x RFWN
 - 4 OUTLET; FLANGE 2 DIA. 300 x RFWN
 - 5 INLET; FLANGE 2 DIA. 150 x RFWN
 - 6 VENT; CPLG. 1 DIA. 6000 x w/PLUG
 - 7 DRAIN; CPLG. 1 DIA. 6000 x w/PLUG
 - 8 VENT; ELBOWLET 1 DIA. 6000 x w/PLUG
 - 9 DRAIN; ELBOWLET 1 DIA. 6000 x w/PLUG
 - 10 ELECTRIC MOTOR; 15 H.P., 256T FRAME, 1800 RPM 1.15 S.F. 460 VOLT 3 PHASE, 60 CYCLE, TEFC, SEVERE DUTY MFR. SIEMENS ALLIS
 - 11 ELECTRIC MOTOR; 10 H.P., 254T FRAME, 1800 RPM 1.15 S.F. 460 VOLT 3 PHASE, 60 CYCLE, TEFC, SEVERE DUTY MFR. SIEMENS ALLIS
 - 12 VIBRATION SWITCH; MURPHY VS-2EX
 - 13 MOTOR SHEAVE 6.0 O.D. 3 GROOVES
 - 14 MOTOR SHEAVE 5.0 O.D. 3 GROOVES
 - 15 FAN SHEAVE 14.0 O.D. 3 GROOVES
 - 16 FAN SHEAVE 25.0 O.D. 3 GROOVES
 - 17 V-BELT 3/3V710 SOLID BACK
 - 18 V-BELT 3/3V1120 SOLID BACK
 - 19 AUTO VARIABLE PITCH FAN; 5'-0 DIA., HUDSON MODEL AVT-5 3-4 WITH POSITIONER, TO OPERATE ON 1-15 PSIG, SIGNAL AIR AND 100 PSIG. SUPPLY AIR. BLADES TO GO TO FULL PITCH ON AIR FAILURE.
 - 20 AUTOMATIC VARIABLE PITCH FAN; 9'-0 DIA., MARLEY MODEL 108-H3-B AV144 WITH REGULATOR TO OPERATE ON 100 PSIG SUPPLY AIR AND 3-15 PSIG SIGNAL AIR. BLADES GO TO FULL PITCH ON AIR FAILURE.
 - 21 THERMOCELL CONNECTION; CPLG. 1 DIA. 6000 x w/PLUG.
 - 22 PRESSURE GAGE CONNECTION; CPLG. 3/4 DIA. 6000 x w/PLUG.
 - 23 REMOTE MANUAL LOUVER OPERATOR
 - 24 EXHAUST LOUVERS WITH OPERATOR
 - 25 OUTLET; FLANGE 2 DIA. 150 x RFWN

NOTE: FACING OF ALL FLANGED CONNECTIONS TO HAVE 125-200 AARH FINISH.

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PROJ. NO. 81-41336
 475404-100402-6-4
 120-E-9, 120-E-10

SIDE ELEVATION
 (AT LOAD POINT (C) LOOKING NORTH)

ITEM	API	YR DN1	DESIGN PRES.	DESIGN TEMP.	TEST PRES.	C.A.
120-E-9	1978	1980	-14.7 153 & PSIG	125 790	272 PSIG	1/8
120-E-10	1978	1980	-14.7 153 & PSIG	125 790	272 PSIG	1/8

CAUTION
 DO NOT SUPPORT PIPING FROM DRICOOLES STRUCTURE EXCEPT FOR APPROVED NOZZLE AND HYDROTEST LOADS

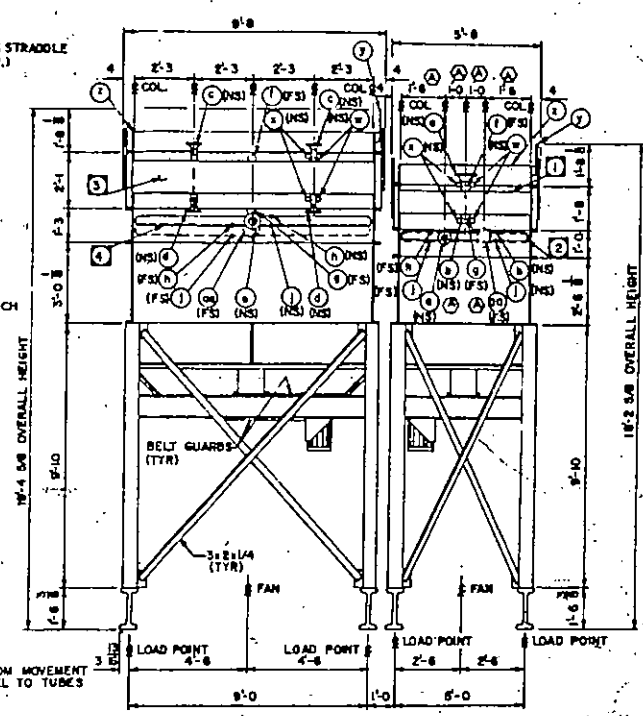
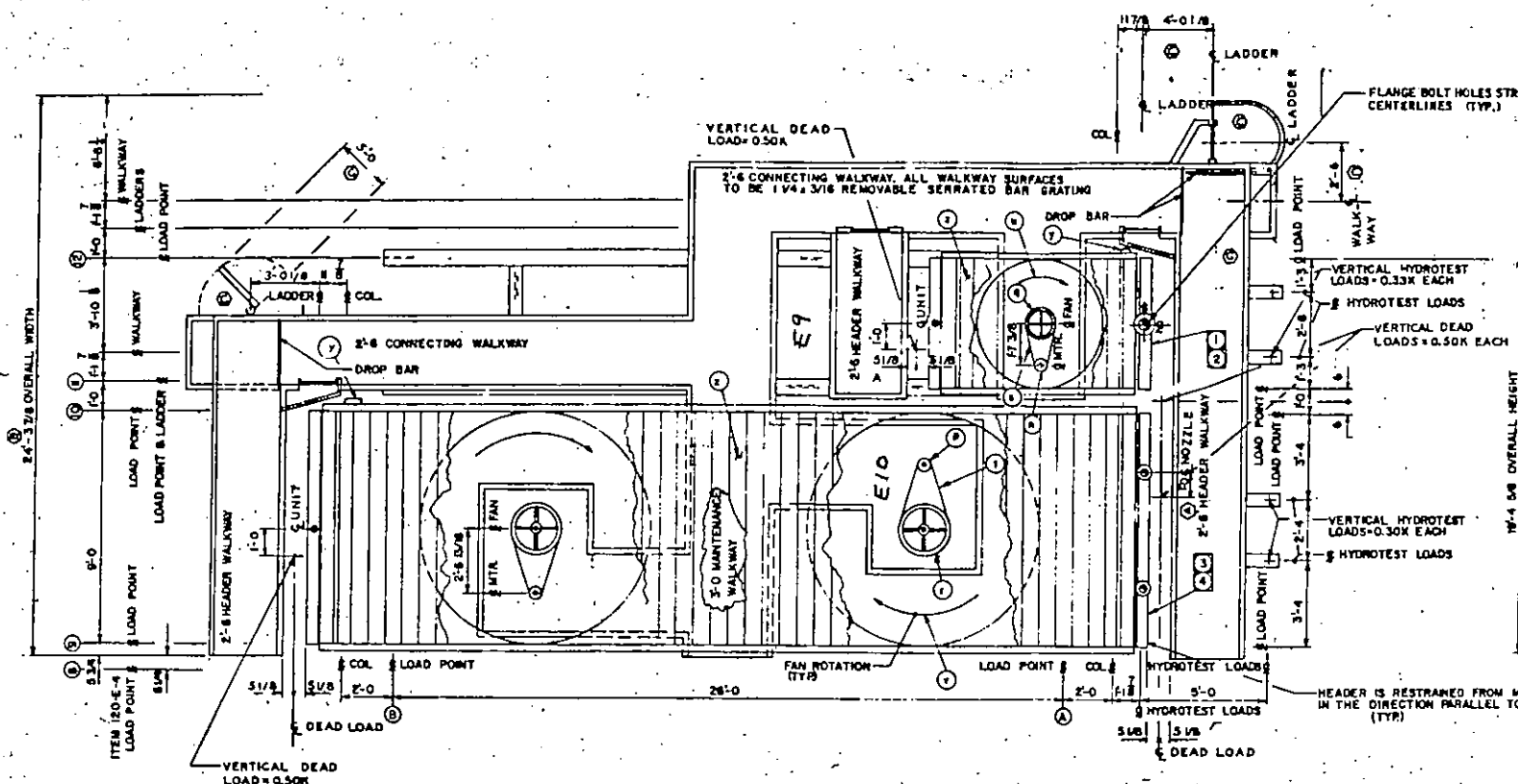
SEE Dwg. 81-41336 FOR PLAN VIEW AND END ELEVATION

FLUOR EYG & CONSTR. INC. P.O. NO. 475404-0402
 FOR UNION OIL ITEM NO. 120-E-9, 120-E-10
 PARACHUTE CREEK, COLO.

PLAN, ELEVATION AND LOADS
 FORCED DRAFT AIR COOLED HEAT EXCHANGER

THE MARLEY COOLING TOWER CO. (MARLEY)
 WESLINGTON, KANSAS 66201

11003-81 81-41336



LET THE CONTRACTOR AND
SITE SUPERVISOR VERIFY
THESE DIMENSIONS AND CONDITIONS
ON THE JOB. THE CONTRACTOR SHALL
BE RESPONSIBLE FOR THE ACCURACY
OF THE DIMENSIONS AND CONDITIONS
SHOWN ON THIS DRAWING. THE CONTRACTOR
SHALL BE RESPONSIBLE FOR THE
ACCURACY OF THE DIMENSIONS AND
CONDITIONS SHOWN ON THIS DRAWING.
DATE: 7.22.61

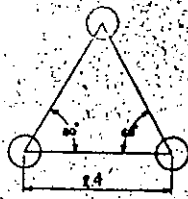
A-PROCEED PLUMB

REV 11 1961
FLUOR
475404-4-0402-4-3
ITEM 120-E-9
120-E-10

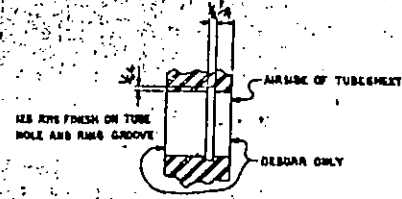
SEE DWG. 81-41336 FOR SIDE ELEVATIONS AND TABLES
FLUOR ENG. & CONSTR. INC. PO NO. 475404-4-0402
FOR UNION OIL ITEM NO. 120-E-9, 120-E-10
PARACHUTE CREEK, COLO.

PLAN, ELEVATION & LOADS FORCED DRAFT AIR COOLED HEAT EXCHANGER		THE MARLEY COOLING TOWER CO. (MARLEY)	
C 10-18-B PER MFG 81-251 E	CHANGE ORDER 28	REVISED DATES	DATE
B 9-2-61 ERM NO. 81-1950	RF 275	D.RENO	MAS
A 8-22-61 ERM 81-1464	RDS/MMS	DATE	BY
178	DATE	REVISION	BY
11-003-B1	81-41335		

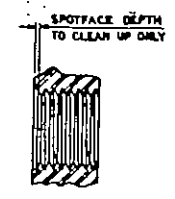
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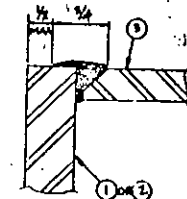
TUBE PITCH



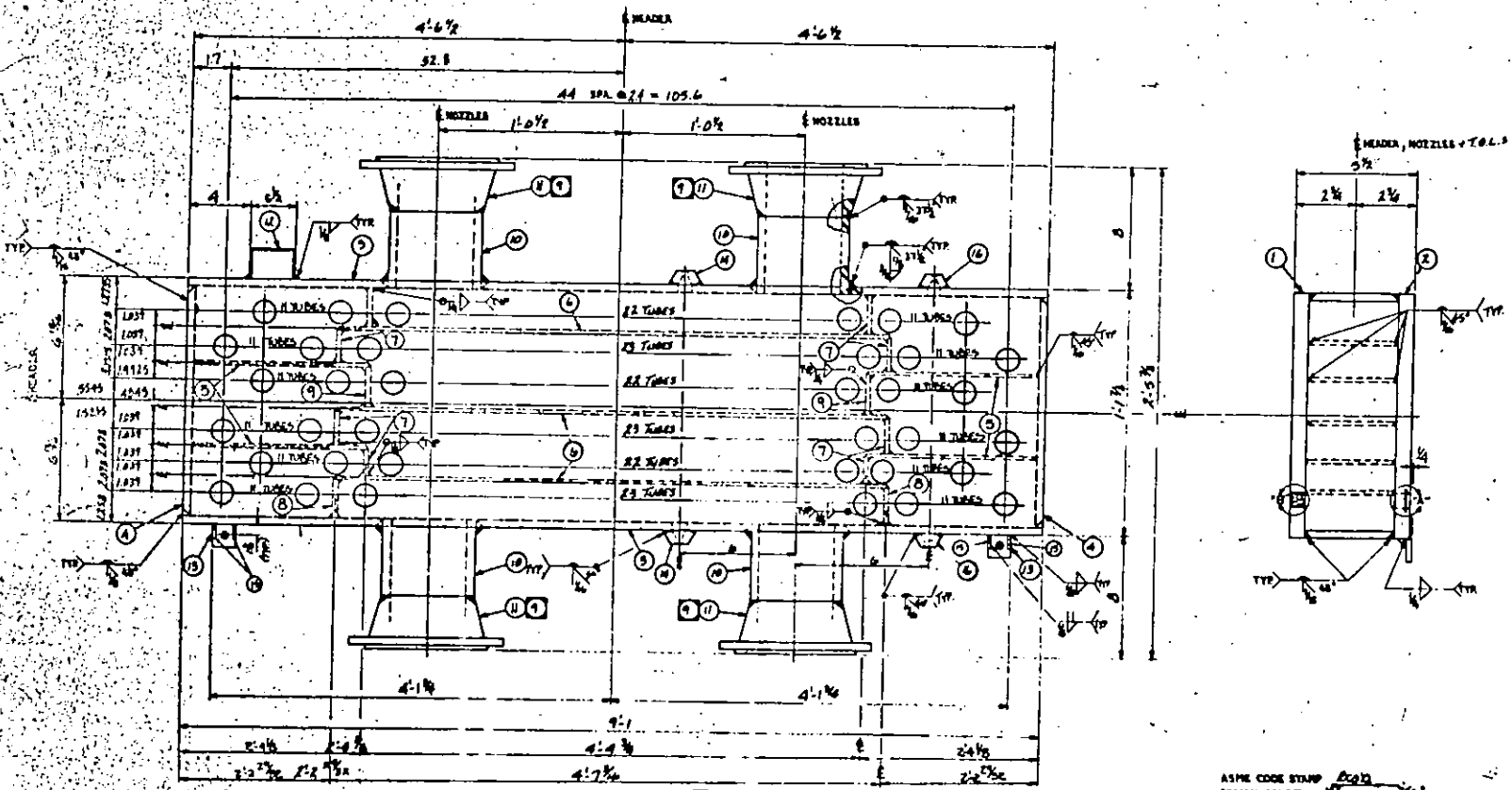
DETAIL A
(TUBE HOLE)



DETAIL B
(PLUG HOLE)



WELD CAP-OFF DETAIL



INLET-OUTLET HEADER ASSY-1 (VIEWED PLUG SIDE)

QTY.	PART NO.	DESCRIPTION		
INLET-OUTLET HEADER ASSY-1				
7	-2	1/2" x 1 3/8" x 107	SA-64-70	1
1	-3	3/4" x 1 3/8" x 107	SA-64-70	2
2	-4	1/2" x 3/8" x 107	SA-64-70	3
2	-5	3/8" x 3/8" x 12 1/2	SA-64-70	4
4	-6	1/2" x 3/8" x 27 1/2	SA-64-70	5
5	-7	3/8" x 3/8" x 27 1/2	SA-64-70	6
2		1/2" x 1 1/2" x 4	SA-64-70	7
2		3/8" x 1 1/2" x 4	SA-64-70	8
2		1/2" x 3/8" x 4	SA-64-70	9
4		10" x 2 1/2" x 10" (S.S. 304)	SA-1048	10
4		FLG. 2 Dia. - 500" (S.S. 304) 2 1/2" x 10"	SA-1048	11
1	71-2727-1	10 Dia. - 4" x 8"	SA-64	12
2	81-2299-6	1/2" x 3" x 1/2"	SA-56	13
2		TAL. FLAT 1/4" x 6" x 10"	SA-1048	14
4	81-2299-1	3/8" x 1/2" x 2 1/2"	SA-56	15
2		TAL. FLAT 1/4" x 6" x 10"	SA-1048	16

GENERAL NOTES

- DRILL 3/16" DIA. PILOT HOLES IN TUBESHEET & PLUGSHEET.
- REAM TUBE HOLES TO 1.012 ± .002-.004 TEMA R STANDARD FIT.
- RING GROOVE TUBE HOLES PER DETAIL "A".
- REAM PLUG HOLES TO 1 3/64 DIA. & TAP 1/8" - 12 UNF ARCH THREADS.
- SPOTFACE PLUGHOLES 1 7/16 DIA. PER DETAIL "B".
- LEVEL FLANGES FROM TUBE SIDE.
- USE MARFAB WELD PROCEDURES NOS. 27, 30 & 31.
- X-RAY PER A.P.I. 641. (15)
- HOLES IN FLANGE TO STRABOLE CENTERLINE OF HEADER.
- P.W.H.T. AT 1100 FOR 1 HOUR.
- FINISH TO BE TO COMMERCIAL SANDBLAST - POINT 2.5 TO 60 Mesh (S.P.T.) OF TUBESHEET ANCHOR 547-T-41 INCREASE END FLG FLANGE PL. FLANGE. SPEC. SA-4754-00-1, EN. 3.
- BEFORE WELDING TEST OF PENETRANT MUST BE DONE FOR EACH LONGITUDINAL, CIRCUMFERENTIAL AND RADIAL WELD TO BE PERFORMED ABOVE POINT.
- WELD BACKLOG SHALL NOT EXCEED 276 INCH.
- Flange Grade Form: 725-800 4400.

ASME CODE STAMP
DESIGN CONDITION 150 PSIA @ 150°F
WITH 1/8" CORROSION ALLOWANCE
HYDROTEST PRESSURE 225 PSIG

ASME CODE STAMP
DESIGN CONDITION 150 PSIA @ 150°F
WITH 1/8" CORROSION ALLOWANCE
HYDROTEST PRESSURE 225 PSIG

FASTENING TOLERANCES
UNLESS OTHERWISE SPECIFIED

DRILL	± .005
REAM	± .002
WELD	± .005
FLANGE	± .005
PLUG	± .005
FLAT	± .005
FLANGE	± .005
PLUG	± .005
FLAT	± .005

FASTENING TOLERANCES
UNLESS OTHERWISE SPECIFIED

DRILL	± .005
REAM	± .002
WELD	± .005
FLANGE	± .005
PLUG	± .005
FLAT	± .005
FLANGE	± .005
PLUG	± .005
FLAT	± .005

NO. 404004-A-5402		ITEM 11	
INLET-OUTLET HEADER ASSY		BRUCCOOLER	
SERIAL NO. 6-000-31-3-01		SECTION SIZE 21-1/2" x 21-1/2"	
THE MARLEY COOLING TOWER CO.		MARLEY	
MICHIGAN, KANSAS BRIDGE			