

PLAINTIFF'S EXHIBIT

CHV-669

VI. APPENDIX

General Fortna

SECTION VI - APPENDIX

GENERAL FORMS AND DRAWINGS

GO-453	Maintenance Material Lists
GT-2848	Classification Sheet for Refinery Piping
EF-348	Building Design Data Sheet
GB-S13870	Detail of Reinforced Concrete Gas Seal Catch Basin
GB-13990	Typical Details of Trenches, Paving, Gutters, and Installation of Tile and C.I. Catch Basins
GB-M14074	Assembly and Details of Walkways, Stiles, Short Stairs and Bents
GC-14296	Positive Shutoff Lubricant Screw for Plug Cocks
GB-14347	Guide Sheet No. 1 for Layout of Platforms and Ladders
GB-14348	Guide Sheet No. 2 for Layout of Platforms and Ladders
GB-14368	Standard Shop Wall Bench
31323	Standard Spacings for Pipe Lines
GD-L31368	Detail of Heavy Welding Boss for Connections to Vessels and Lines
GE-31554	Detail of Strainer for Bottom Outlet Nozzles
GE-31902	Instruction for Installing Corrosion Gage Point in Process Equipment
GE-33336	Standard Details, Concrete Fireproofing for Structural Members
B-51895	Standard Details of Steel Flanged Monel Channel Sections
GB-68801	Detail of 150# and 300# Raised Face and Tongue and Groove Flanged Nozzles for Pressure Vessels
GB-78876	Details of Welding, Support, Lug, Skirt Vent, and Small Connection Standards for Pressure Vessels
GB-78946	Assembly and Details of 4-inch Diameter C.I. Individually Adjustable Cap, Riser and Strongback for Fractionating Columns
GC-79186	Assembly and Detail of Steam Hose, Steam Nozzle, and Water Hose
GB-79684	Assembly and Details of Thermocouple Skin Points for 5-inch O.D. Furnace Tubes

GENERAL FORMS AND DRAWINGS (CONTINUED)

GB-87280	Details of Built-up Manholes and Covers for Vessels
GB-P87601	Detail of Enameled Sign and Post for Marking Underground Electric Cables
GC-88167	Engineering Department Design Guide Sheet for Pump Slabs
GC-88394	Standard Details of Mountings for Welding Outlets
GB-88595	Typical Lead Guards for Flanges and Valves Handling Hazardous (Vesicatory) Liquids
GA-89559	Record Book Preparation Instructions for Domestic Refineries
GE-G92043	Standard Labyrinth Bearing Housing Closure for Pumps
GE-99507	Standard Orifice Flange Assemblies
GE-K99519	Standard Guard for Flexible Coupling
GA-99549	Standard Steel Deck Bridge, Reinforced Concrete Piers and Abutments with Spread Footings or Wood Piles
GB-99561	Assembly and Details of Standard Steam Hot Plate
GB-L99596	Standard Steam Trap Manifold
GB-S99617	Standard Details of Rafts and Saddles for Vitrified Clay Pipe Sewers
GE-99618	Standard Fire Hose Box, Vertical Type for 100 ft Permanently Attached 1-1/2-inch Hose
GE-S99623	Standard Horizontal Fire Hose Reel
GD-101311	Design Guide for Refinery Lighting
GC-J88609	Details of Nameplates for Instrument Boards
GA-99544	Standard Details of Mounting for Welding Outlets with Circuit Breakers
GA-P99647	Standard Lighting Poles, Fixtures and Connections

STOCK NO.	DESCRIPTION	ORDERING REFERENCE	COST	NO. IN USE	RECOMMENDED STOCK	
					MINIMUM	MAXIMUM*
1						1
2						2
3						3
4						4
5						5
6						6
7						7
8						8
9						9
10						10
11						11
12						12
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REVISIONS					NOTES		ENG. DEPT. APP.	OPERATING DEPT. APP.	MAINTENANCE MATERIAL LISTS FOR	DATE	
1	2	3	4	5						DR.	CH.

* Check with Engineering Dept. before ordering.

GT-2848 - CLASSIFICATION SHEET FOR REFINERY PIPING

[illegible]

DEBURRIZED BUTTERWORTH SEAMLESS PIPE IS ACCEPTABLE AS EQUIVALENT TO OPEN DRAINAGE, WITH ALLOWANCE, WITH A-53 OR API 5L GRADE A OPEN HEARTH SEAMLESS FOR COLD BENDING, DO NOT USE CARBON STEEL PIPING ABOVE GROUND.

ELECTRIC RESISTANCE WELDING PIPE IS ACCEPTABLE AS EQUIVALENT TO LAP WELDED, ALL SEAMWELD OR PIPE IS "A" AND SMALLER SHALL BE CHARACTERIZED.

GT-2848

REV. NO.	STOCK NO.	DESCRIPTION	ENG. DEPT. APP.	OPERATING DEPT. APP.	NOTES	RECOMMENDED STOCK		NO. IN USE	COST	ORDERING REFERENCE	DATE	
						MINIMUM	MAXIMUM				DR.	CH.
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GD-453 (1M-CO.9-48) REV. 10-1-48

GT-2848 - CLASSIFICATION SHEET FOR REFINERY PIPING

[illegible]

ENGINEERING DEPT
OFFICE COPY
GT-2848

GT-2848

GENERAL DATA

USE _____
LOCATION _____ HAZARDOUS AREA? _____
APPROXIMATE AREA _____ PRELIMINARY OUTLINE SKETCH: _____
NUMBER FLOORS _____
HEIGHT TO EAVE _____
HEIGHT TO RIDGE _____
BUILDING CODE _____
PLANS FOR FUTURE ADDITIONS: _____

OCCUPANTS: _____
TOTAL NUMBER _____
MAXIMUM NUMBER PER SHIFT _____

MALE

FEMALE

CONSTRUCTION DATA

FOUNDATION _____ FLOOR _____
EXTERIOR WALLS _____ PARTITIONS _____
ROOF _____
FINISH _____

ROOM	FLOORS	PARTITIONS	EXTERIOR WALLS	CEILING

UTILITIES AND FACILITIES

PRESSURES

ELECTRICITY

WATER		GAS	STEAM	AIR	LIGHT	VOLTS	CYCLE	PHASE
POTABLE	NON POTABLE							
					POWER			

SANITARY

WATER CLOS.	URINALS	LAVATORIES	SHOWERS	WATER HEATER	DRINKING FTM.	SLOP SINK

LIGHTING _____ HEATING _____
INSULATION _____ AIR CONDITIONING _____
VENTILATION _____ CRANE RAIL _____

ADDITIONAL REQUIREMENTS AND REMARKS

REFERENCE DATA

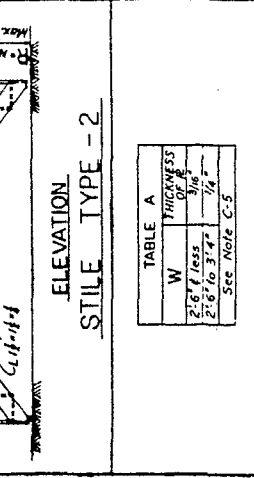
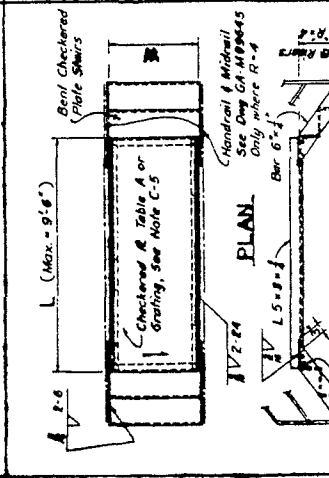
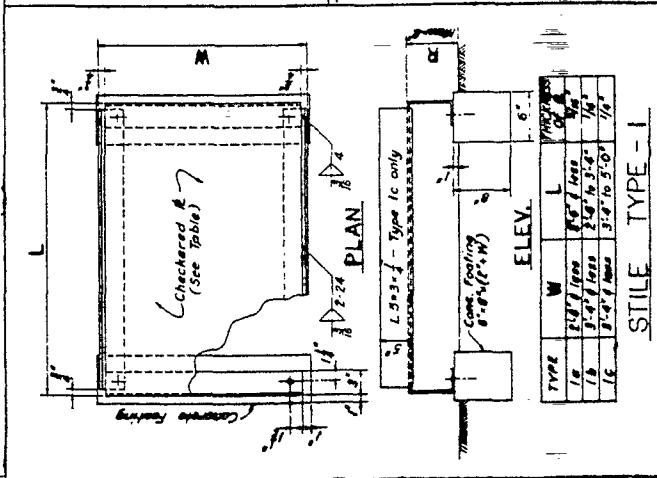
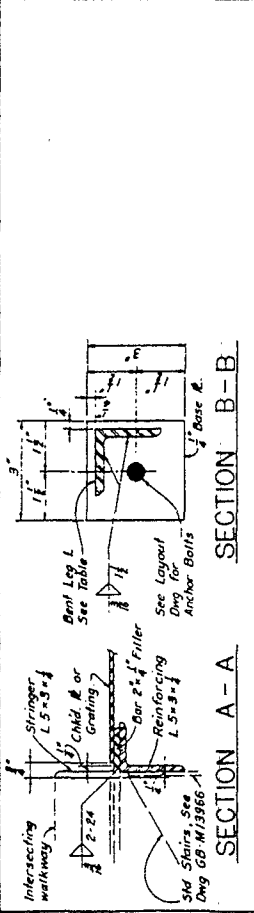
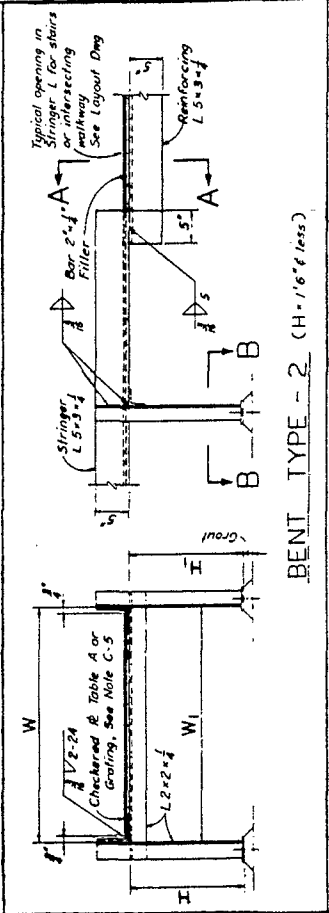
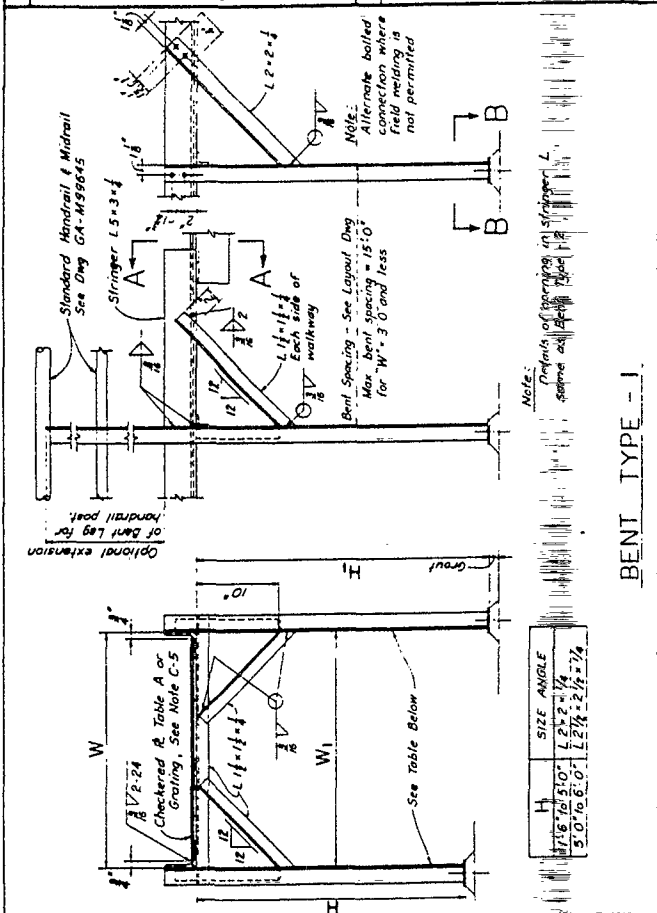
DRAWINGS: BASIC ENGINEERING DESIGN DATA SHEET _____ PLOT PLAN _____

BUILDING DESIGN DATA SHEET FOR

EF-348(100-CD-12-49)

Chevron BB
013732

DESIGN NOTES	
D-1	Standard Handrails & Midrails per Dwg. GA-M39645 are required on both sides of all walks and stairs four feet or higher above ground
D-2	Standard Handrails & Midrails are required on both sides of all stairs with four or more risers to the ground
D-3	Design live load on low walks and stairs = 40 #/sq ft.
D-4	Direction of bearing here in fabricating grating, or long dimension of diamond in expanded metal grating, shall be as indicated by arrows on layout drawing
CONSTRUCTION NOTES	
C-1	Bent dimensions W-W ₁ & H-H ₁ , unless otherwise noted on Layout Dwg
C-2	Where checkered floor plate is used drill 1/2" dia weep holes for drainage where necessary
C-3	Fabrication shall be in accordance with Specification E-398
C-4	Steel plates and shapes shall conform to ASTM Specification A-7
C-5	Fabricated grating or expanded metal grating may be used where required in place of Check plate. Grating shall be attached to stringers per manufacturer's recommendations.
C-6	Install L 1/2 x 1/2 under each joint in floor
C-7	All holes shall be 1/8" for 1/2" bolts unless noted.

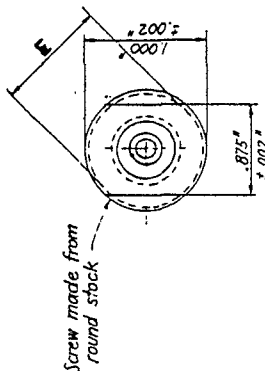


MARK NO	USE TO REPLACE	A	B	THREAD D	Notes	F
				NOMINAL PIPE SIZE	DIMENSIONS OR TYPE OF THREAD	NOTE Q
1	Merco Hardiron or Helworth Lube Screw Size B	3/4"	1 5/8"	1/4"	1/4" N.F.S. thread O.D. 0.528" ± .002" Root dia. 0.447" ± .004"	0.431"
2	Merco Hardiron or Helworth Lube Screw Size C	7/8"	2 1/4"	3/8"	1/2" N.S. Class 3 fit Parallel pipe thread O.D. 0.665" ± .002" Root dia. 0.584" ± .004"	0.567"
3	Merco Hardiron or Helworth Lube Screw Size D	1 1/8"	2 3/4"	1/2"	1/2" N.S. Class 3 fit Parallel pipe thread O.D. 0.828" ± .002" Root dia. 0.775" ± .004"	0.708"
4	Merco Hardiron or Helworth Lube Screw Size E	1 3/8"	3 3/4"	3/4"	3/4" N.S. Class 3 fit Parallel pipe thread O.D. 1.038" ± .002" Root dia. 0.934" ± .005"	0.916"
5	A.C.F. Lube Screw for 1/8" Lube stick	1 1/2"	3"	—	1" 14 N.F. 2 thread	0.875"
6	Merco Hard Lube Screw Size H for Worm gear cocks	1 1/2"	5"	1"	1" N.S. Class 3 fit Parallel pipe thread O.D. 1.300" ± .002" Root dia. 1.172" ± .006"	1.00"
7	Merco Hard Lube Screw Size H for Four gear cocks	1 1/2"	7 3/4"	1"	1" N.S. Class 3 fit Parallel pipe thread O.D. 1.300" ± .002" Root dia. 1.172" ± .006"	1.00"
8	A.C.F. Lube Screw for 1 1/2" Lube stick	1 1/2"	4 1/2"	—	1 1/2" 12 N.F. 2 thread.	1.00"
9	Merco Hardiron or Helworth Lube Screw Size J for Lubricator	1 1/2"	3 3/4"	1 1/2"	1 1/2" N.S. Class 3 fit Parallel pipe thread O.D. 1.660" ± .002"	1.00"
10	3" Ductile S.F. Plug Cock	1 1/2"	3"	—	5/8"-11-NC Class 3 fit.	0.800"
11	A.C.F. Lube Screw for 1 1/2" Lube stick	1"	2 1/8"	—	5/8"-11-NC. Class 3 fit.	0.468"

NOTES:
 ① Lead tolerance ± 0.0015" per inch.
 ② Tolerances ± 0.0005" - 0.0010"

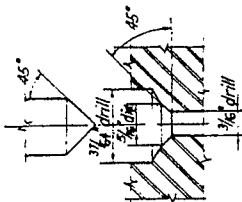
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11	Added Mark No. 11

PLAN "A-A"



Button Head Fitting
 Lincoln No. 5781

Press fit by supplier
 of lubricant screw



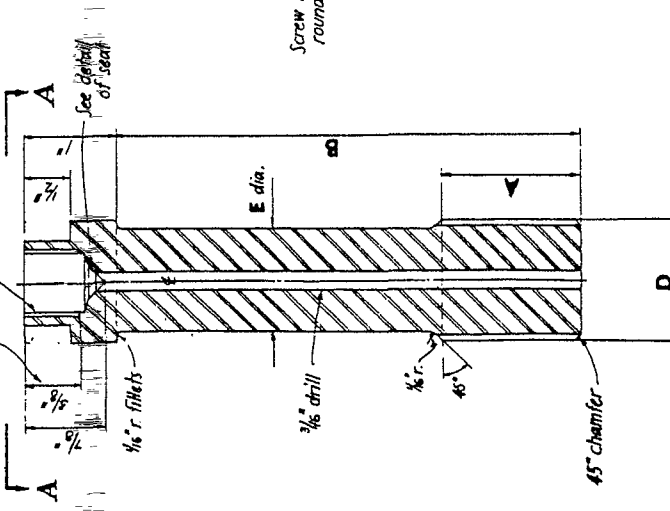
DETAIL OF SEAT & PLUG

BUTTON HEAD & PLUG

Full scale

5/8" - 18 N.F. 2
 Threads to suit button head

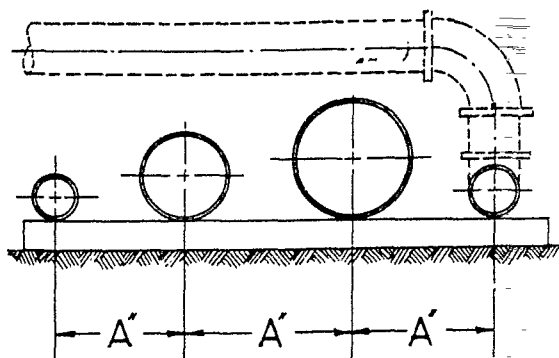
Minimum thread length



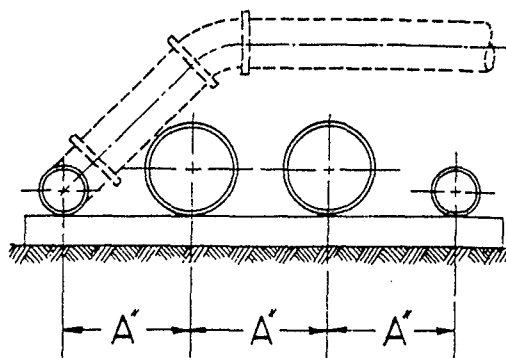
Material: Cold rolled carbon steel

No scale

GC 14288



90° JUMPOVER



45° JUMPOVER
see Note

TABLE OF SPACING "A" INCHES

NOM. PIPE SIZE	1	2	3	4	6	8	10	12
1	4*	5*	6*	6*	8	9	10	12
2	5*	5*	6*	7*	8	9	11	12
3	6*	6*	7*	8*	9*	10	11	13
4	6*	7*	8*	8*	9	10	12	13
6	8	8	9*	9	10*	12	13	14
8	9	9	10	10	12	13	14	15
10	10	11	11	12	13	14	15	16
12	12	12	13	13	14	15	16	17

D I M E N S I O N S I N I N C H E S

45° Jumpovers may be used where designated in Table thus *
Spacings "A" are for lines in pipeways, trenches etc. allowing for
making-up joints and flanges staggered on either line.

Spacings for lines in pits that tie into one manifold are determined
by the size of flanged fittings used in manifold.

For sizes less than 12" not listed use next larger size.

"L"

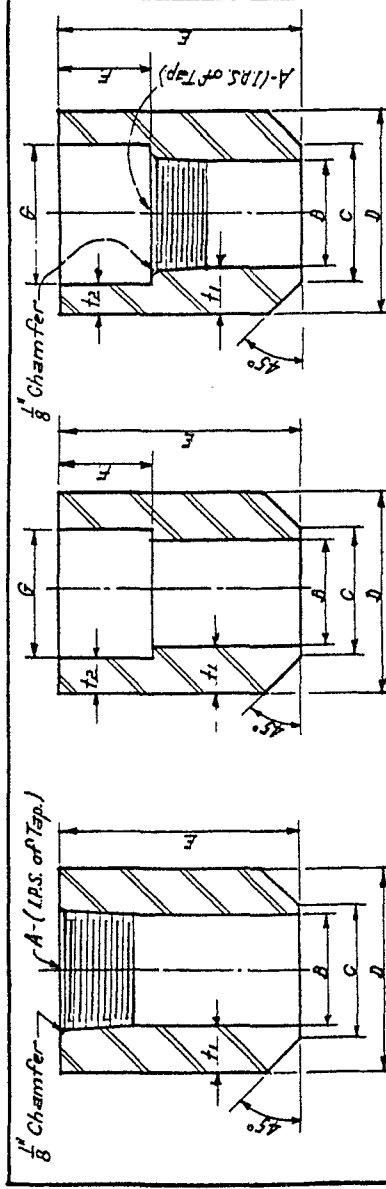
This Drawing same as Richmond Drwg. E-23910

STANDARD SPACINGS FOR PIPE LINES

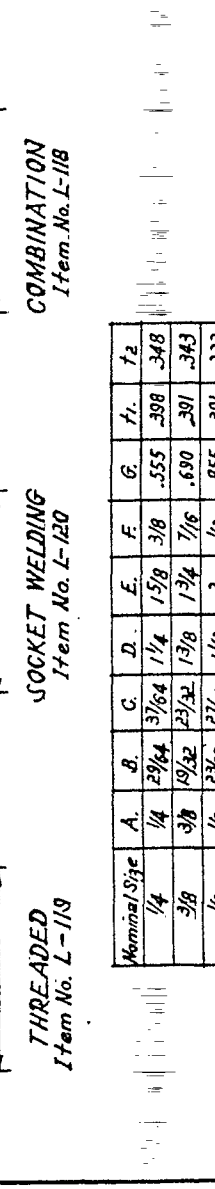
31323

CONSTRUCTION NOTES

1. Boss material shall be hot rolled carbon steel bar stock, meeting ASTM-A107, unless specified otherwise on the order.
2. All threads shall be American Standard Taper Pipe threads per ASA-B2.1-1945.
3. All welding shall be electric arc using coated electrodes of the E60 series of A.S.T.M.A-233 for carbon steel bosses.



DESIGN NOTES



Nominal Size	A	B	C	D	E	F	G	t ₁	t ₂
1/4	1/4	29/64	37/64	1 1/4	1 5/8	3/8	.555	.308	.348
3/8	3/8	19/32	23/32	1 3/8	1 3/4	7/16	.690	.301	.343
1/2	1/2	23/32	27/32	1 1/2	2	1/2	.855	.301	.323
3/4	3/4	25/16	1 1/16	1 3/4	2	9/16	1.065	.406	.343
1	1	15/32	1 9/32	2	2	5/8	1.330	.422	.335
1 1/4	1 1/4	1 1/2	1 5/8	2 1/2	2	11/8	1.675	.500	.413
1 1/2	1 1/2	1 23/32	1 23/32	2 3/4	2	3/4	1.915	.515	.418
2	2	2 3/16	2 3/16	3 1/4	2	7/8	2.405	.531	.422

All dimensions in inches.

Type 'a' Orifice Connection. Drill 1/8" hole using jig for location as indicated. Hole to be free from burrs on inside of pipe.

Type 'b' Thermometer or Pyrometer Connections. Use tap drill for size boss being installed. Drill hole through pipe after welding.

Type 'c' Pressure Gauge, Liquid Level & Others. Burn hole through pipe before welding.

Type 'd' Connection to vessel wall. Use tap drill for size boss being installed. Drill hole through wall after welding.

Type 'e' Connection to vessel or fabricated pipe when assembly is to be tested hydrostatically in the shop and connected to piping by socket welding in the field. For testing and shipment plug with round bar stock plug. (See Fig. GE-J31223)

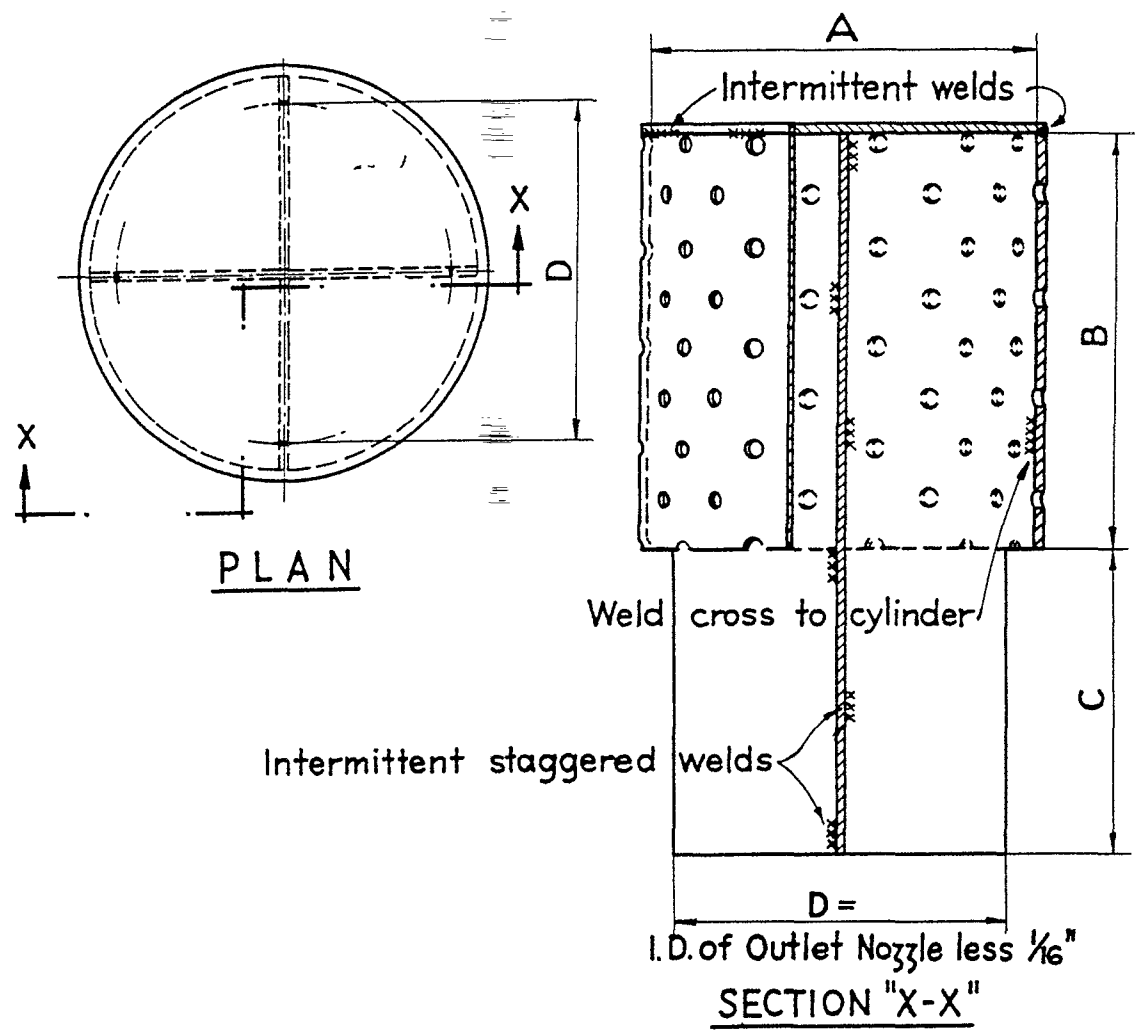
TYPICAL CONNECTIONS TO PIPE AND VESSELS.

REVISIONS		REFERENCE DRAWINGS		ENG. DESIG. APP.	
12	Redrawn, Added Socket Welding Combination	GE-J31223	GE-J31223	10/10	10/10
13	Added Boss to Vessel Attachment Detail				
14					
15					
16					

Standard Round Bar Stock Plug.

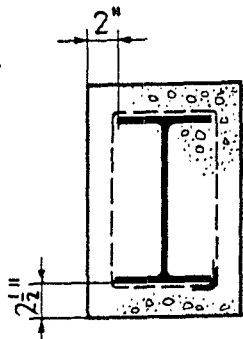
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 Redrawn with general revisions
 5 4 3
 REVISIONS
 APPROVALS
 F.L.M. 10/21/38
 E.S.W.
 E.S. 10/23/38
 ENG. DEPT.
 M.F.M. 10/25/38
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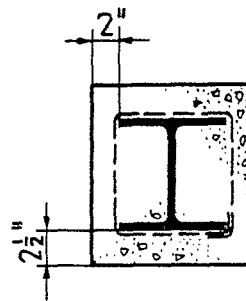


NOTE:
 Material and thickness of plate shall be specified on vessel drwg.
 Plate shall be perforated with $\frac{1}{4}" \phi$ holes spaced to give 25% - 30% hole area in relation to total strainer area. Perforations to extend from top to bottom. Omit holes in top plate.

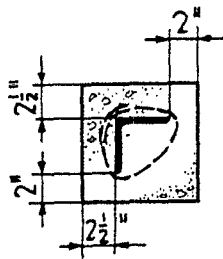
MARK NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
NOZZLE SIZE		1"	1½"	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"				
A		3"	3"	4"	5"	6"	8"	12"	14"	16"	18"	20"	24"				
B		3"	3"	4"	5"	6"	6"	6"	8"	10"	11"	14"	14"				
C		4"	4"	4"	4"	4"	4"	5"	5"	5"	6"	6"	6"				
DETAIL OF STRAINER FOR BOTTOM OUTLET NOZZLES												GE-31554-3					



B E A M



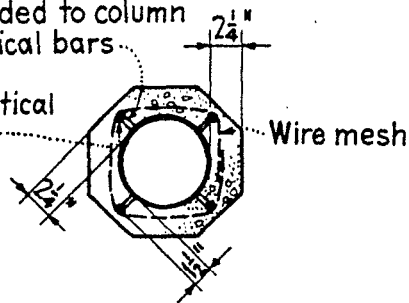
H C O L U M N



A N G L E

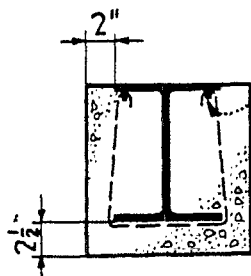
$\frac{3}{8}$ " ϕ spacers @ 3' ctrs. $\pm$
tack welded to column
and vertical bars

4- $\frac{3}{8}$ " ϕ vertical
bars



Wire mesh

P I P E C O L U M N



$\frac{3}{8}$ " ϕ bars
tack welded
@ 3' ctrs. $\pm$

B E A M

NOTE: All wire mesh shown hereon
shall be 4"x4"-10 ga. x 10 ga. or equal.

All fireproofing shall be Portland
cement concrete

STANDARD DETAILS
CONCRETE FIREPROOFING
FOR STRUCTURAL MEMBERS

GE-33336-0

1. MAX. DESIGN STRESS FOR MODEL PLATE: 10,000 PSI (AS ALLOWED IN SOME SPECIFIC CODE, TABLE 3-5, 1961)
2. RECOMMENDED PLATE THICKNESSES (SUBJECT TO MAX. DESIGN STRESS)
 - a. 3/16" FOR CHANNEL DIAMETERS LESS THAN 2"
 - b. 1/4" FOR CHANNEL DIAMETERS 2" AND GREATER
3. DESIGN VIBRATION PRESSURE AND TEST PRESSURE TO BE BASED ON INDIVIDUAL VIBRATION MODES.
4. BASES OF CARBON STEEL EQUIVALENT TO BE COMPLIANT MAY BE SUBSTITUTED FOR HIGH PRESSURE BOLTS.

1. STANDARDIZATION OF INTERNATIONAL UNITS AND SYMBOLS FOR SEVERAL PHYSICAL QUANTITIES
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THIS MARKING IS IDENTICAL WITH ANY SUPERSEDES
MARKING 4-61615 FOR TYPICAL DETAILS ONLY

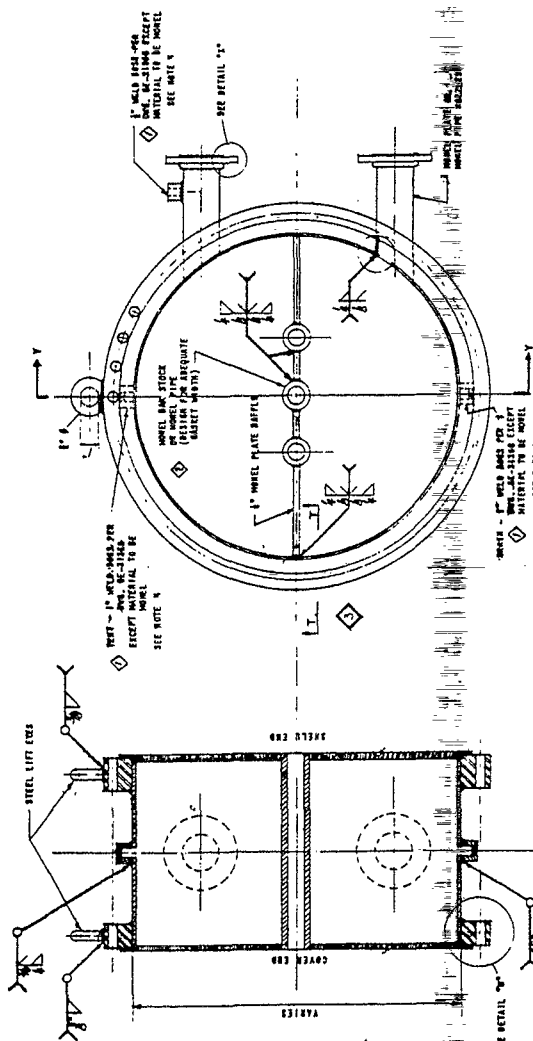
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DETAILS OF THIS STORY

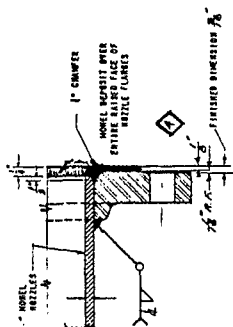
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STANDARD DETAILS OF STEEL
FLANGED MONEL CHANNEL
SECTIONS

8-51895-4



TYPICAL CHANNEL FLANGE



TYPICAL NOZZLE FLANGE
DETAIL "X"



YPICAL BAFFLE DETAIL
SECTION "T-T"

CONSTRUCTION NOTES

4. Use the Hirschel 5 or G.E. W22 rod or equal approved by purchaser on all welding.
5. Flange dimensions shall conform to A S A Standards for flaring specified.
6. Bolt holes shall straddle center lines except as noted.
7. Nozzles 1" to 6" dia inclusive may be made of X H seamless pipe. On sizes larger than 6" dia use 1" steel plate with 1/2" flange. On sizes larger than 6" dia use 1" steel plate with 1/2" flange. On sizes larger than 6" dia use 1" steel plate with 1/2" flange.
8. Steel plate for nozzles, nozzle reinforcing rings and nozzle reinforcement shall be A 513, A 514, A 515, A 516, A 517, A 518, A 519, A 520, A 521, A 522, A 523, A 524, A 525, A 526, A 527, A 528, A 529, A 530, A 531, A 532, A 533, A 534, A 535, A 536, A 537, A 538, A 539, A 540, A 541, A 542, A 543, A 544, A 545, A 546, A 547, A 548, A 549, A 550, A 551, A 552, A 553, A 554, A 555, A 556, A 557, A 558, A 559, A 560, A 561, A 562, A 563, A 564, A 565, A 566, A 567, A 568, A 569, A 570, A 571, A 572, A 573, A 574, A 575, A 576, A 577, A 578, A 579, A 580, A 581, A 582, A 583, A 584, A 585, A 586, A 587, A 588, A 589, A 590, A 591, A 592, A 593, A 594, A 595, A 596, A 597, A 598, A 599, A 600, A 601, A 602, A 603, A 604, A 605, A 606, A 607, A 608, A 609, A 610, A 611, A 612, A 613, A 614, A 615, A 616, A 617, A 618, A 619, A 620, A 621, A 622, A 623, A 624, A 625, A 626, A 627, A 628, A 629, A 630, A 631, A 632, A 633, A 634, A 635, A 636, A 637, A 638, A 639, A 640, A 641, A 642, A 643, A 644, A 645, A 646, A 647, A 648, A 649, A 650, A 651, A 652, A 653, A 654, A 655, A 656, A 657, A 658, A 659, A 660, A 661, A 662, A 663, A 664, A 665, A 666, A 667, A 668, A 669, A 670, A 671, A 672, A 673, A 674, A 675, A 676, A 677, A 678, A 679, A 680, A 681, A 682, A 683, A 684, A 685, A 686, A 687, A 688, A 689, A 690, A 691, A 692, A 693, A 694, A 695, A 696, A 697, A 698, A 699, A 700, A 701, A 702, A 703, A 704, A 705, A 706, A 707, A 708, A 709, A 710, A 711, A 712, A 713, A 714, A 715, A 716, A 717, A 718, A 719, A 720, A 721, A 722, A 723, A 724, A 725, A 726, A 727, A 728, A 729, A 730, A 731, A 732, A 733, A 734, A 735, A 736, A 737, A 738, A 739, A 740, A 741, A 742, A 743, A 744, A 745, A 746, A 747, A 748, A 749, A 750, A 751, A 752, A 753, A 754, A 755, A 756, A 757, A 758, A 759, A 760, A 761, A 762, A 763, A 764, A 765, A 766, A 767, A 768, A 769, A 770, A 771, A 772, A 773, A 774, A 775, A 776, A 777, A 778, A 779, A 780, A 781, A 782, A 783, A 784, A 785, A 786, A 787, A 788, A 789, A 790, A 791, A 792, A 793, A 794, A 795, A 796, A 797, A 798, A 799, A 800, A 801, A 802, A 803, A 804, A 805, A 806, A 807, A 808, A 809, A 810, A 811, A 812, A 813, A 814, A 815, A 816, A 817, A 818, A 819, A 820, A 821, A 822, A 823, A 824, A 825, A 826, A 827, A 828, A 829, A 830, A 831, A 832, A 833, A 834, A 835, A 836, A 837, A 838, A 839, A 840, A 841, A 842, A 843, A 844, A 845, A 846, A 847, A 848, A 849, A 850, A 851, A 852, A 853, A 854, A 855, A 856, A 857, A 858, A 859, A 860, A 861, A 862, A 863, A 864, A 865, A 866, A 867, A 868, A 869, A 870, A 871, A 872, A 873, A 874, A 875, A 876, A 877, A 878, A 879, A 880, A 881, A 882, A 883, A 884, A 885, A 886, A 887, A 888, A 889, A 890, A 891, A 892, A 893, A 894, A 895, A 896, A 897, A 898, A 899, A 900, A 901, A 902, A 903, A 904, A 905, A 906, A 907, A 908, A 909, A 910, A 911, A 912, A 913, A 914, A 915, A 916, A 917, A 918, A 919, A 920, A 921, A 922, A 923, A 924, A 925, A 926, A 927, A 928, A 929, A 930, A 931, A 932, A 933, A 934, A 935, A 936, A 937, A 938, A 939, A 940, A 941, A 942, A 943, A 944, A 945, A 946, A 947, A 948, A 949, A 950, A 951, A 952, A 953, A 954, A 955, A 956, A 957, A 958, A 959, A 960, A 961, A 962, A 963, A 964, A 965, A 966, A 967, A 968, A 969, A 970, A 971, A 972, A 973, A 974, A 975, A 976, A 977, A 978, A 979, A 980, A 981, A 982, A 983, A 984, A 985, A 986, A 987, A 988, A 989, A 990, A 991, A 992, A 993, A 994, A 995, A 996, A 997, A 998, A 999, A 1000.
9. Alternate nozzle necks may be made from seamless steel pipe conforming to A 513 specification A 106 Grade A or B with a maximum of 0.30% carbon.
10. Extend nozzle pipe one nozzle wall thickness inside vessel shell except where this would obstruct drainage or the moving of equipment inside the drum, in which case frame nozzle flush with inside of shell.

DESIGN NOTES

These details provide full reinforcement of openings in vessel shells & heads as required in the 1938 API-A S M E code but with no corrosion allowance in the shell or nozzle. The reinforcing plates are laid out in accordance with paragraph W-32.9 of the API-A S M E code 1938 edition as assumed —

- (1) 100% internal pressure in the nozzle
 - (2) 100% corrosion allowance in nozzle wall for nozzle diameter less than 36 in. (914 mm)
 - (3) 100% shell joint efficiency (no excess shell thickness has been considered as reinforcing)
 - (4) Nozzles of X-H seamless pipe (wall for sizes over 12")
- These reinforcing details can be used for vessels designed in accordance with the API-A-SME or ASME unfired pressure vessel codes.

Where working pressures are less than 300% and shell joint efficiencies are less than 100%, 1% corrosion allowance is afforded in these designs for other conditions. The required reinforcing must be determined for the particular case where Taylor Forge CO's welding neck nozzles or the equivalent, having nozzle wall thickness greater than X H pipe, are used less added reinforcing is required and shall be determined for the particular case.

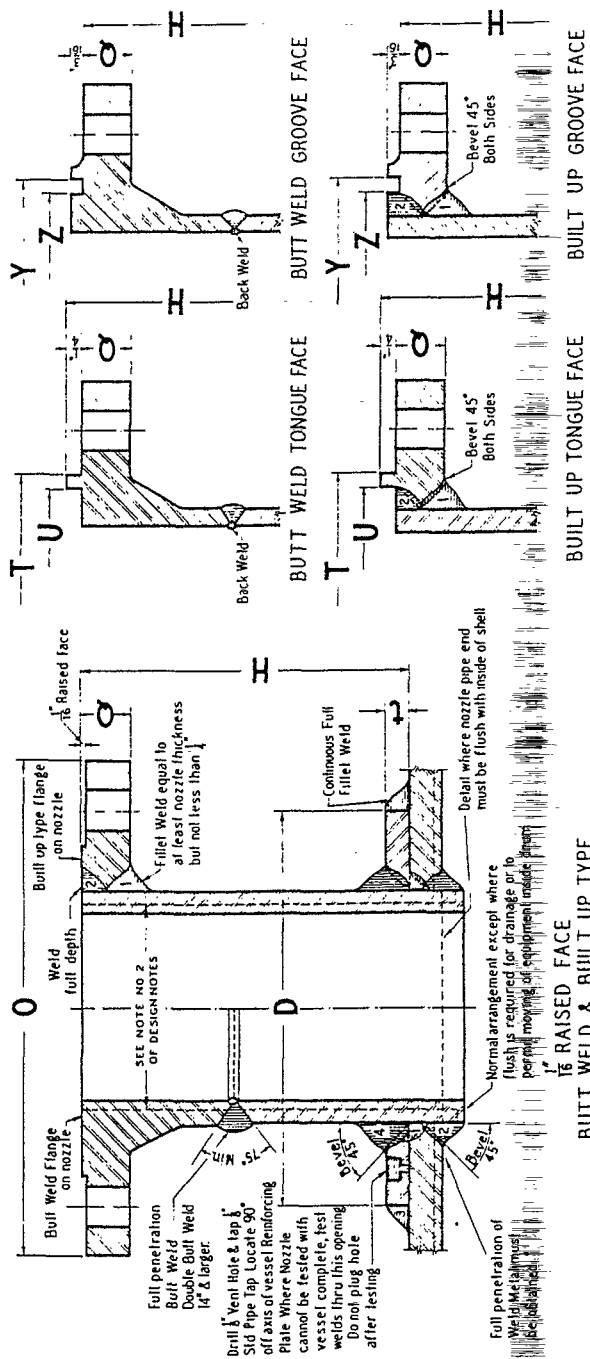
Stub nozzle ends shall be beveled $37\frac{1}{2}^{\circ}$ for welding.

17	Asked if Site	10/15/10	10/15/10
16	Received letter from EPA dated 10/15/10 regarding	10/15/10	10/15/10
15	Received letter from EPA dated 10/15/10 regarding	10/15/10	10/15/10
14	Received letter from EPA dated 10/15/10 regarding	10/15/10	10/15/10
13	Received letter from EPA dated 10/15/10 regarding	10/15/10	10/15/10
12	Received letter from EPA dated 10/15/10 regarding	10/15/10	10/15/10
11	Received letter from EPA dated 10/15/10 regarding	10/15/10	10/15/10
10	Received letter from EPA dated 10/15/10 regarding	10/15/10	10/15/10
9	Received letter from EPA dated 10/15/10 regarding	10/15/10	10/15/10
8	Received letter from EPA dated 10/15/10 regarding	10/15/10	10/15/10
7	Received letter from EPA dated 10/15/10 regarding	10/15/10	10/15/10
6	Received letter from EPA dated 10/15/10 regarding	10/15/10	10/15/10
5	Received letter from EPA dated 10/15/10 regarding	10/15/10	10/15/10
4	Received letter from EPA dated 10/15/10 regarding	10/15/10	10/15/10
3	Received letter from EPA dated 10/15/10 regarding	10/15/10	10/15/10
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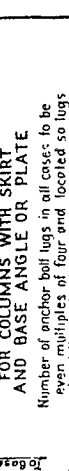
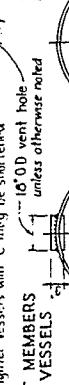
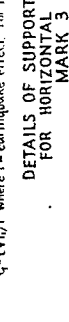
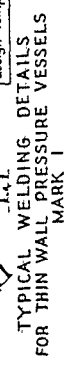
SCALE None DATE 12 23-37
DR #05 TR CAL CK L A O-3 17-36 JOB ENGR WJMS 4 12 38
OPRS DEPT. C A P-4 19 38
ENA DPT FTPL HRS FLM 2-H 36 FND 48 36 JOC 4 20 36

DETAIL OF 150" & 300"
RAISED FACE & TONGUE & GROOVE
FLANGED NOZZLES FOR
PRESSURE VESSELS

GB 68801-17



FLANGE DIMENSIONS-150"										FLANGE DIMENSIONS-300"										FLANGE FACINGS					
Nominal Size of Nozzle		DIAMETER & THICKNESS OF REINFORCING PLATE						O.D. Thick				Bolt Holes				Bolt		Baseface		Tongue		Y		Groove	
H	D	In $\frac{1}{8}$ Shell	In $\frac{1}{4}$ Shell	In $\frac{3}{8}$ Shell	In $\frac{1}{2}$ Shell	In $\frac{3}{4}$ Shell	In 1" Shell	O.D.	Thick	Number	Holes	Boil	Circle	O.D.	Thick	Number	Holes	Boil	Circle	Baseface	Tongue	Y	G	G	G
1 1/2	6	4	4	4 1/2	5	5 1/2	6	5	11 1/2	4	3	3 1/2	6 1/2	13	4	7	4 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2
2	6	4 1/2	4 1/2	5	5 1/2	6 1/2	7	6	12	4	3 1/2	4 1/2	6 1/2	14	6	8	5	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2
3	6	6	6	6	6 1/2	7 1/2	8	7 1/2	15 1/2	4	3 1/2	6	6 1/2	16	8	8	6 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2
4	6	7	7	7 1/2	8 1/2	9 1/2	10 1/2	9	15 1/2	8	3 1/2	7 1/2	10	14	8	7	7 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2
6	7	11	11	11 1/2	12 1/2	13 1/2	14 1/2	11	17 1/2	8	3 1/2	9 1/2	12 1/2	16 1/2	12	7	10 1/2	8 1/2	6	7 1/2	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2
8	8	14	14	14 1/2	15 1/2	16 1/2	17 1/2	13 1/2	20 1/2	8	3 1/2	11 1/2	15	18 1/2	12	1	13	15 1/2	12	10	9 1/2	10 1/2	10 1/2	10 1/2	10 1/2
10	8	18 1/2	18 1/2	18 1/2	19 1/2	20 1/2	21 1/2	16	23 1/2	12	1	14 1/2	17 1/2	20 1/2	16	1 1/2	16 1/2	17 1/2	15	12	11 1/2	12 1/2	13 1/2	13 1/2	13 1/2
12	8	22	22	22 1/2	23 1/2	24 1/2	25 1/2	19	27 1/2	12	1	17	20 1/2	2	16	1 1/2	19 1/2	19 1/2	14 1/2	12 1/2	11 1/2	12 1/2	13 1/2	13 1/2	13 1/2
14	9	23	23	23 1/2	24 1/2	25 1/2	26 1/2	21	29 1/2	12	1 1/2	18 1/2	21 1/2	2 1/2	17	1 1/2	20 1/2	20 1/2	15 1/2	14 1/2	13 1/2	14 1/2	14 1/2	14 1/2	14 1/2
16"	10	27	27	27 1/2	28 1/2	29 1/2	30 1/2	23 1/2	31 1/2	16	1 1/2	21 1/2	25 1/2	2 1/2	20	1 1/2	22 1/2	22 1/2	16 1/2	15 1/2	14 1/2	15 1/2	15 1/2	15 1/2	15 1/2
18"	10	30	30	30 1/2	31 1/2	32 1/2	33 1/2	25	33 1/2	16	1 1/2	22 1/2	28	2 1/2	24	1 1/2	24 1/2	24 1/2	17 1/2	16 1/2	15 1/2	16 1/2	16 1/2	16 1/2	16 1/2
20"	10	34	34	34 1/2	35 1/2	36 1/2	37 1/2	27 1/2	37 1/2	20	1 1/2	25	30 1/2	2 1/2	24	1 1/2	27	27	20 1/2	19 1/2	18 1/2	20 1/2	20 1/2	20 1/2	20 1/2
22"	12	38	38	38 1/2	39 1/2	40 1/2	41 1/2	29 1/2	41 1/2	20	1 1/2	28 1/2	33	2 1/2	24	1 1/2	29 1/2	29 1/2	21 1/2	20 1/2	19 1/2	21 1/2	21 1/2	21 1/2	21 1/2
24"	12	42	42	42 1/2	43 1/2	44 1/2	45 1/2	32	45 1/2	20	1 1/2	32 1/2	36	2 1/2	24	1 1/2	32	32	23 1/2	21 1/2	20 1/2	23 1/2	23 1/2	23 1/2	23 1/2



FOR COLUMNS WITH SKIRT
AND BASE ANGLE OR PLATE

Number of anchor bolt lugs in all cases to be even multiples of four and located so lugs

straddle center lines

MARK 4

REFERENCE	DRWGS
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Time	Place	Remarks
10:00	1000 ft	1000 ft
10:15	1000 ft	1000 ft
10:30	1000 ft	1000 ft
10:45	1000 ft	1000 ft
11:00	1000 ft	1000 ft
11:15	1000 ft	1000 ft
11:30	1000 ft	1000 ft
11:45	1000 ft	1000 ft
12:00	1000 ft	1000 ft
12:15	1000 ft	1000 ft
12:30	1000 ft	1000 ft
12:45	1000 ft	1000 ft
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22:30	1000 ft	1000 ft
22:45	1000 ft	1000 ft
23:00	1000 ft	1000 ft
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23:30	1000 ft	1000 ft
23:45	1000 ft	1000 ft
24:00	1000 ft	1000 ft

[illegible]

C	GB-78876-11
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LIST OF MATERIAL

M/N Mag	Qz/B	Description
1	1	4" CI BUBBLE CAP ASSEMBLY:
1	1	4" AASAP Cap - Pattern #EAC-4
1	1	1" Vapor-Disc - See Table Below
1	1	1" Spring-Bolt - Pattern #EAC-0
1	1	1" Flange or 1/4" mild steel square head bolt (See table below)
1	1	Specify 1/8" thread length for 6/8 Bolt
1	1	1/8" - 7/8" - 1 1/8" - 1 5/8"
2	2	1/8" or 1/4" mild steel square nuts
1	1	Material same as specified for bolts
1	1	1/8" or 1/4" washer alloy, or mild steel
1	1	Material same as specified in bolts

Distributed on EF-372 or EF-373

See Table below

BUBBLE CAP ASSEMBLY	RISER (See Note 1)		WHENT ¹ IS		BOLT REQUIRED FROM California Dept. of Public Works	Throat Length 1" on 65" hot iron on 2 1/2" 8" below
	MIN IN	MAX IN	3/4"	1/2"		
1	1-1/4"	2 7/8"	3/4"	5/8"	3/4"	Throat length hot iron on 65" hot iron on 2 1/2" 8" below
2	1-1/4"	2 7/8"	7/8"	7/8"	7/8"	NOTE: These throats are longer than bolts normally throat
3	1-1/4"	2 7/8"	7/8"	7/8"	7/8"	
4	1-1/4"	2 7/8"	7/8"	7/8"	7/8"	

Note * Mark # 1 designative cap assembly using items in List of Material with 2" x 2 1/2" high riser and 61 or 71 g bolt. Bolt and nut material as specified on Col. drawing. The risers of Revision 16 are interchangeable by pattern.

Letter (C, B, W & D) with those of Revision 15 and earlier.

Caps shall be inspected by placing them boss down on a flat surface, the plane thru the roots of the teeth shall be parallel to the boss and to the bearing surface of the ribs within $\frac{1}{32}$.

Caps rejected on this basis may be reclaimed by grinding to meet tolerances.

Caps will be rejected if, due to imperfections in moulding, as many as six individual teeth are as much as $\frac{1}{16}$ inch or if there are imperfections at the root of as

Risers - A plane of any three points on top of the many as 3 teeth.

riser 120° apart, shall be parallel to the plane of the bearing surface of the riser within $\frac{1}{32}$ " in 4".

Where tolerances are not specified, dimensions shall conform to commercial foundry practice.

SURFACE FINISH DESIGNATIONS A TO K (f)
REFER TO GENERAL ELECTRIC CO. STANDARD
SOLUBLE COATING

Unless otherwise specified on the order, castings shall conform to ASTM A48 grade 30.

The design of this assembly is covered by Patent # 2,084,726.

④ Changed arms on strong box
⑤ Added washer when using 1/2" bolt

DATE	DESCRIPTION	AMOUNT	BALANCE
1950-1-1	Added Note for Thrashing Bolls in the General Fund	100.00	100.00
1950-1-1	Added note to savings for Assembly Table	100.00	200.00

[illegible]

Changed paper hanging from north wall; removed 1st of Memorial. Removed C.I. bottle & nuts.

2116-10

SCALE Full size DATE April 21/52
 DR. L.A. Demers CH. ECA Stibo JOB ENGR. WIM 31/52

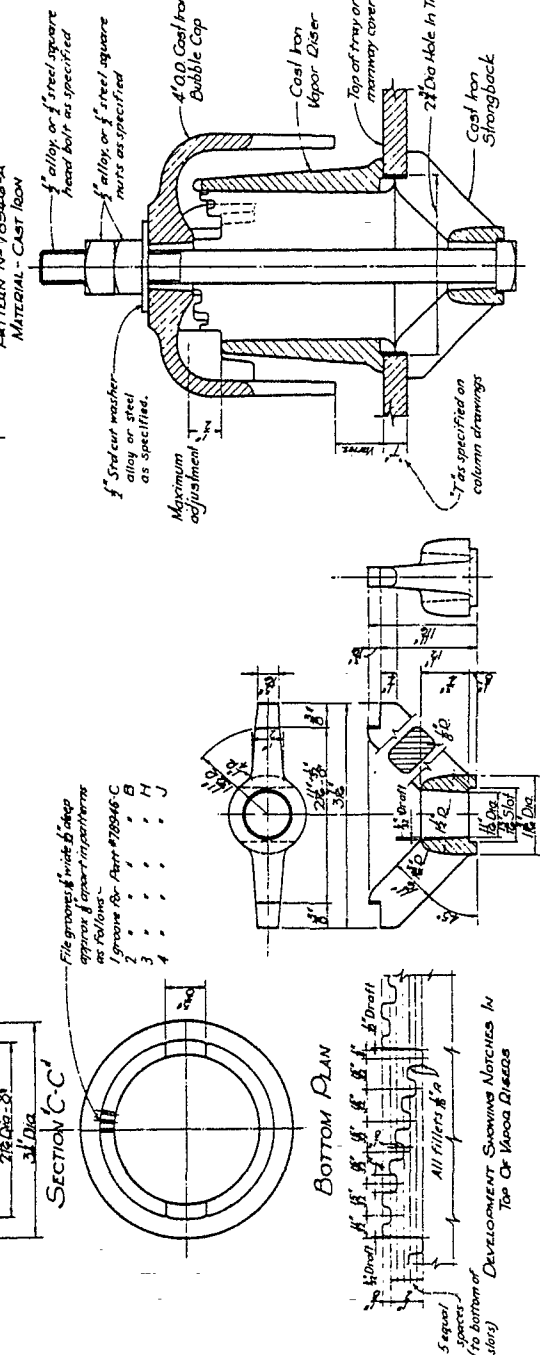
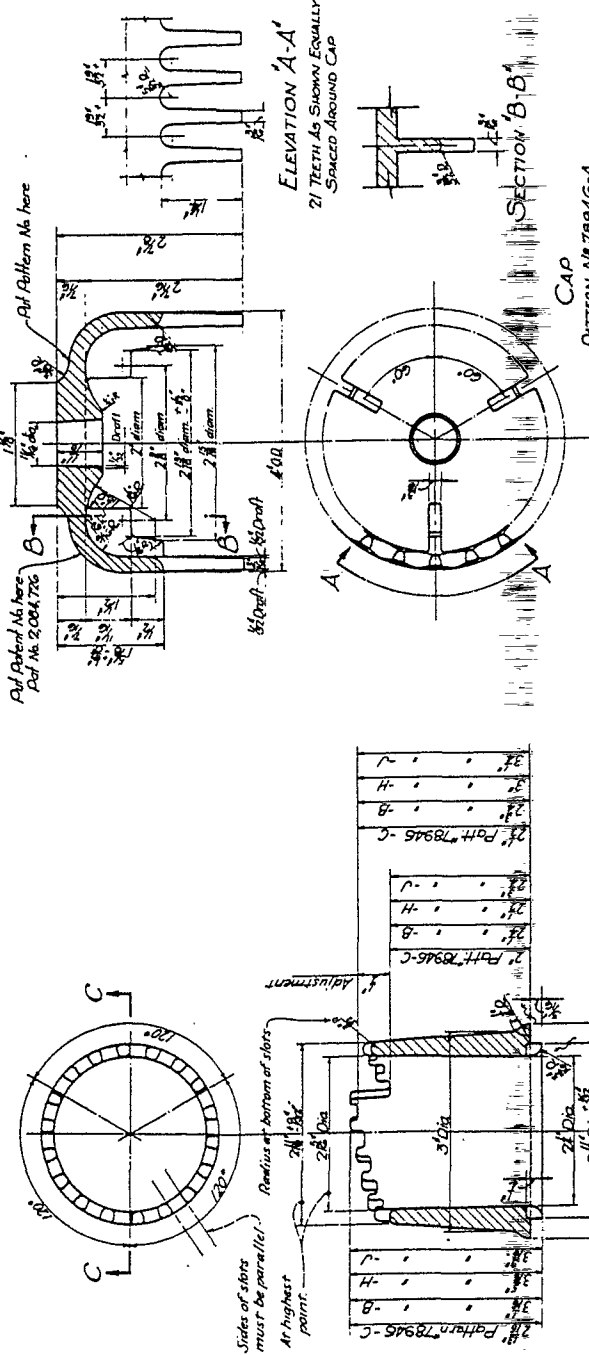
COOR'S. DEPT. ... FLM 4/7/32 FWD 4/7/32

STANDARD 4" DIA. C.I.
INDIVIDUALLY ANTI-INSTABLE CAP. DISC &

STRONGBACK FOR FUNCTIONING COUNTRIES

W.O. -	CB-C 7894C-18
/ RAC/IONAL/ING C/OLUM/NS	

NO. 10	GD 7040 10
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ASSEMBLY

STRONG BACK

Vapor Riser

- MANHOLE ARRANGEMENTS**
- Mark a With flanges only
 - Mark b With Davit only
 - Mark c With Free Handles only
 - Mark d With Side Handle only
 - Mark e With Davit and Free Handles
 - Mark f With Flanges and Side Handle
 - Mark g With Flanges and Free Handle

For alternate manhole and cover see note ****

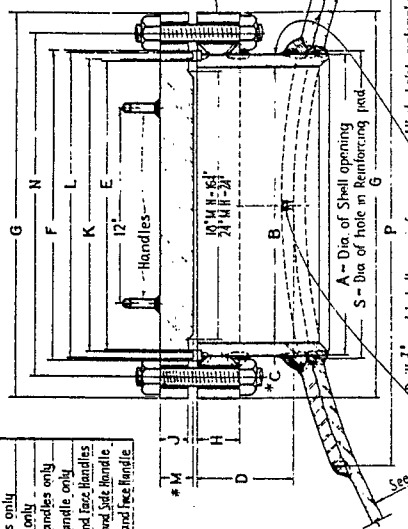


TABLE 1 - DIMENSIONS OF MANHOLES

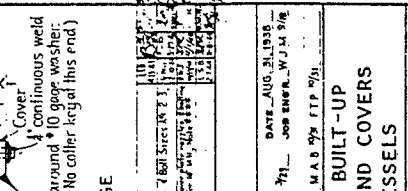
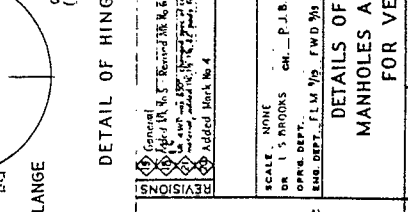
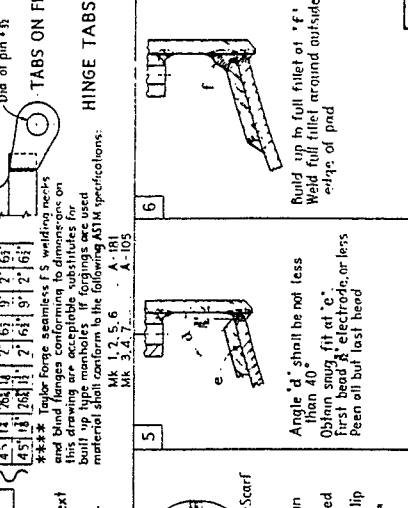
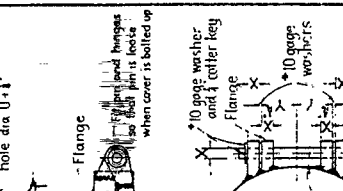
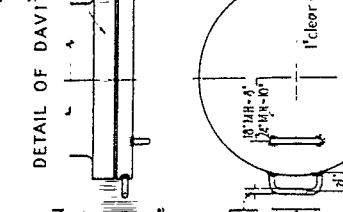
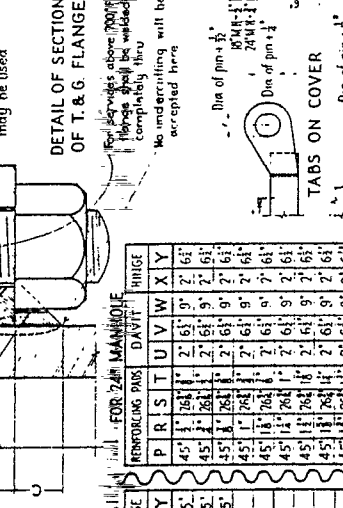
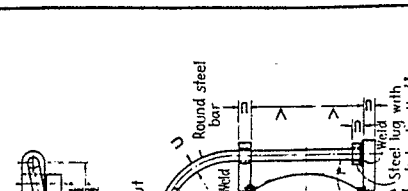
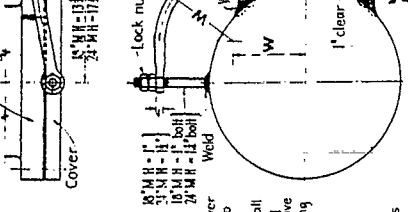
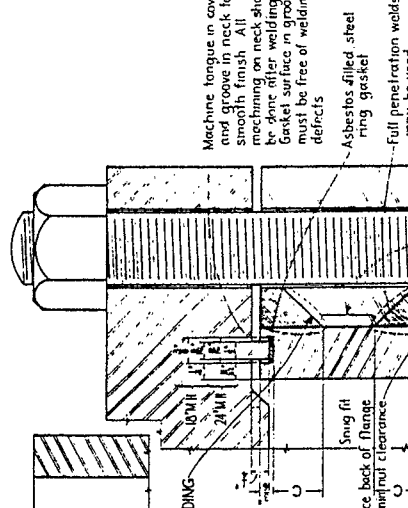
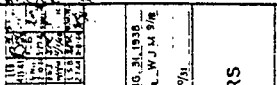
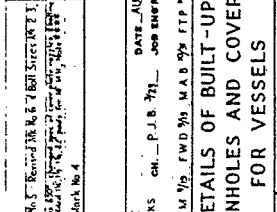
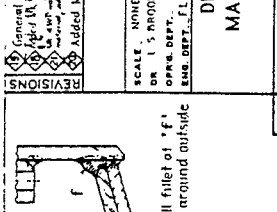
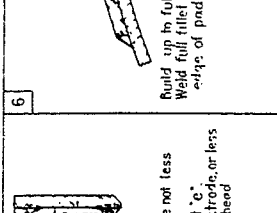
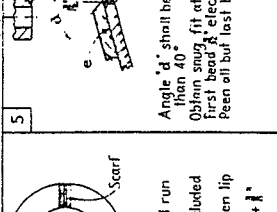
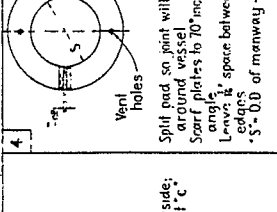
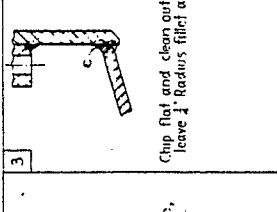
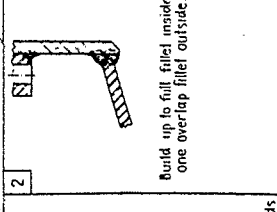
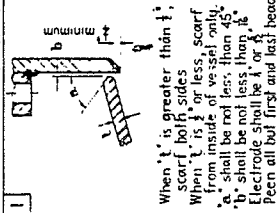
NOTE: * Dimensions C & M include 1" corrosion allowance maximum. When ordering manholes give diameter of vessel on which they are to be used. All bolting material shall be SAE 4140 alloy steel and shall conform to Specification No. 9 L. For intermediate shell thicknesses under "Reinforcing Pads" dimension R shall be that given for the next greater shell thickness listed. ** Allowable working pressures with 1" corrosion allowance for design conforming to API - ASME Code, 1943 Edition. For stresses and limiting factors see Dwg's No. GC-88410, GC-88411, GC-88412 and GC-88413. *** Mark 4 must be stress relieved and X Rayed when over 1/2" corrosion allowance is specified.

NO.	MANHOLE				COVER				HOLES				DIMENSIONS			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	10"	250	205	181	17	9"	121	104	123	18	123	18	123	18	123	18
2	10"	300	255	231	17	10"	171	154	170	18	170	18	170	18	170	18
3	10"	405	375	341	17	11"	221	204	220	18	220	18	220	18	220	18
4	10"	500	475	441	17	12"	271	254	270	18	270	18	270	18	270	18
5	10"	600	575	541	17	13"	321	304	320	18	320	18	320	18	320	18
6	10"	700	675	641	17	14"	371	354	370	18	370	18	370	18	370	18
7	10"	800	775	741	17	15"	421	404	420	18	420	18	420	18	420	18
8	10"	900	875	841	17	16"	471	454	470	18	470	18	470	18	470	18
9	10"	1000	975	941	17	17"	521	504	520	18	520	18	520	18	520	18

TABLE 2 - DIMENSIONS OF MANHOLES (Continued)

NO.	MANHOLE				COVER				HOLES				DIMENSIONS			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
10	10"	1100	1075	1041	17	18"	571	554	570	18	570	18	570	18	570	18
11	10"	1200	1175	1141	17	19"	621	604	620	18	620	18	620	18	620	18
12	10"	1300	1275	1241	17	20"	671	654	670	18	670	18	670	18	670	18
13	10"	1400	1375	1341	17	21"	721	704	720	18	720	18	720	18	720	18
14	10"	1500	1475	1441	17	22"	771	754	770	18	770	18	770	18	770	18
15	10"	1600	1575	1541	17	23"	821	804	820	18	820	18	820	18	820	18
16	10"	1700	1675	1641	17	24"	871	854	870	18	870	18	870	18	870	18
17	10"	1800	1775	1741	17	25"	921	904	920	18	920	18	920	18	920	18
18	10"	1900	1875	1841	17	26"	971	954	970	18	970	18	970	18	970	18
19	10"	2000	1975	1941	17	27"	1021	1004	1020	18	1020	18	1020	18	1020	18

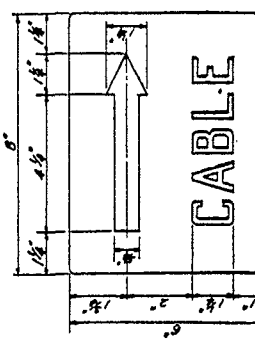
NOTE: * Dimensions C & M include 1" corrosion allowance maximum. When ordering manholes give diameter of vessel on which they are to be used. All bolting material shall be SAE 4140 alloy steel and shall conform to Specification No. 9 L. For intermediate shell thicknesses under "Reinforcing Pads" dimension R shall be that given for the next greater shell thickness listed. ** Allowable working pressures with 1" corrosion allowance for design conforming to API - ASME Code, 1943 Edition. For stresses and limiting factors see Dwg's No. GC-88410, GC-88411, GC-88412 and GC-88413. *** Mark 4 must be stress relieved and X Rayed when over 1/2" corrosion allowance is specified.



DETAILS OF BUILT-UP MANHOLES AND COVERS FOR VESSELS

DATE: AUG. 31, 1939
 SCALE: NONE
 DR: J. S. HODGINS
 CH: J. B. 711
 JOB: BKR. W. J. M. 916
 ENGR. DEPT.
 ENGR. DEPT. 111 M. 916
 F. W. D. 916
 M. A. D. 916
 F. T. P. 916

C **GB-87280-21**



MARKER "E"
Scale: 6'-1'-0"

GB-P87601-2

④	2.
③	
②	Add Concrete Markers D, E, and F to the 100' distance.
①	Constructing note changed.

SPECIAL AG. STENOGR. DATE 1-30-50
 OFFICE L-10 ON AB
 OFFICE DESK APPROVED
 DATE 1-30-50 BY
 STANDARD SIGNS & MARKERS
 FOR UNDERGROUND CABLES

DESIGN NOTES

1. On long straight runs of cable, place points of interest not to exceed 100 feet, with signs oriented so that arrows point along route of cable.
2. On turns, place post of intersection of lines with first signs oriented so that arrows point along route of cable each way.
3. Concrete markers 10" to 12" to be used where points cannot be used. Concrete to be set flush with top of pavement or ground surface.

CONSTRUCTION NOTES

1. Signs shall be made of #20 U.S. gal. steel 1/2" thick, 18" wide, 48" high, and 1/2" square. The signs shall be painted with white reflective paint.
2. Steel shall be porcelain enameled both sides. Lettering shall be baked on in second firing.
3. Horseville shall be given one coat of primer, one coat of white primer, one coat of synthetic green enamel, with white synthetic letters baked at 250° F. for 14 hours.
4. Concrete markers 10" x 8" shall be made with iron oxide pigment added to tint the concrete red.

DESIGN NOTES

- Alignment:** Centerlines of pump shafts shall be approximately 10' apart. Suction and discharge lines shall be laid out above pump slabs and shall be laid out in a straight line. Suction flanges shall be lined up, if reasonable. Ends of pump foundations shall be lined up, if possible without excessive waste of concrete.
- Slab Thickness:** Shall be increased at gutters to provide at least 5" minimum of concrete.
- Piles:** Number of piles and their arrangement will depend on size, spacing, and number of pumps, and should be studied for each case.
- Frost:** In localities subject to ground frost, design should provide for a certain wall around periphery of slab, or else a non-frost action base of granular material carried below frost depth.
- Reinforcing:** Show slab reinforcing on plan.
- Block Reinforcing:** Type A shall be used on small blocks where one layer of steel (in addition to slab reinf) is sufficient. Type B shall be used on larger blocks (see Note 1). Reinforcing shall be placed in the center of the slab, and shall be placed in the center of the slab, and shall be placed in the center of the slab.
- Base Plates:** If pump and driver are not mounted on an integral base plate, individual base plates shall be provided under both pump and driver to facilitate realignment when pump or driver has been removed and replaced.
- Design Loading:** of slab for Types 1 & 2 is 40 psf. In Type 4 it is assumed that the soil bearing pressure is uniform over entire base of slab.

REFERENCE DRAWINGS	
Details of Foundations for Pumps	EF-40
Revised & Redrawn	See Notes

SCALE: 1" = 10'-0"

DATE: 10/10/50

BY: J.C.

CHKD: J.C.

APP'D: J.C.

STANDARD DESIGN GUIDE SHEET

FOR PUMP SLABS

SCHEMATIC ELEVATIONS

No. Scale

TYPE - 1

PILE SUPPORTED (see Note 1)

TYPE - 2

FOUNDATION CARRIED LOWER TO REST ON FIRM SOIL

TYPE - 3

SLAB RESTING ON A NON-YIELDING SUBGRADE

TYPE - 4

SLAB RESTING ON A YIELDING SUBGRADE

SCHEDULE OF SLAB STEEL

TYPES 1 & 2

GIVEN C-D	STEEL	
	LONGITUDINAL	TRANSVERSE
0'-2.0'	1/2" @ 12" c/c	1/2" @ 12" c/c
2.0'-5.0'	3/4" @ 12" c/c	3/4" @ 12" c/c
5.0'-10.0'	1" @ 12" c/c	1" @ 12" c/c
10.0'-15.0'	1 1/4" @ 12" c/c	1 1/4" @ 12" c/c
15.0'-20.0'	1 1/2" @ 12" c/c	1 1/2" @ 12" c/c
20.0'-25.0'	1 3/4" @ 12" c/c	1 3/4" @ 12" c/c
25.0'-30.0'	2" @ 12" c/c	2" @ 12" c/c
30.0'-35.0'	2 1/4" @ 12" c/c	2 1/4" @ 12" c/c
35.0'-40.0'	2 1/2" @ 12" c/c	2 1/2" @ 12" c/c

For Transverse Steel, use C or E, whichever is critical.

GRAPHS FOR SLAB STEEL - TYPE 4

No. Scale

[illegible]

MATERIAL NOTES	
Nameplates to be made from $\frac{1}{8}$ " thick Bakelite, laminated white core, black surface, dull finish.	
DESIGN NOTES	
Number of Letters per Line:	
Detail # 320, $\frac{3}{16}$ " high letters = 13	
Detail # 321, $\frac{1}{4}$ " high letters = 15	
Detail # 322 A, $\frac{2}{8}$ " high letters = 2 $\frac{1}{4}$ " x 1"	
Dimension "L" to be specified on E.F. 249	
When nameplates are to be mounted in areas where oil may be spilled or where temperatures exceed 140 °F, nameplates should be ordered drilled for mounting with drive screws.	
CONSTRUCTION NOTES	
Cement nameplates to instrument panel or other surface with white high enamel except in areas where oil spills are to be expected. In such areas, fasten nameplates with #6 x $\frac{3}{8}$ " long Parker-Kalon type "U" hardened metallic drive screws with cadmium plated heads.	

DETAIL # 320

DETAIL # 322 A

REVISIONS	
4	Revised for use with Minicore Adhesive; removed #322 A; added #322 A; changed title; added hole locations; added note # number of letters per line
3	Added note # number of letters per line
2	Changed Mark Nos
1	

SCALE Full Size

DR J.L.P.

OPRG. DEPT. 0712

ENG. DEPT. 0712

DATE 10-19-43

JOB ENG'G 10-19-43

APPROVED

STANDARD DETAILS OF NAMEPLATES

W.O. _____

S.O. _____

GC-J88609-3

Note: This drawing supersedes Dwg 6E-31241.

REVISIONS

1 CHANGED TITLE TO MAKE THIS A STD. DWG.

REVISIONS

APPROVED
H. H. K. 3/24/43
H. H. K. 3/24/43
ENG. DEPT.

OPR'S. DEPT.

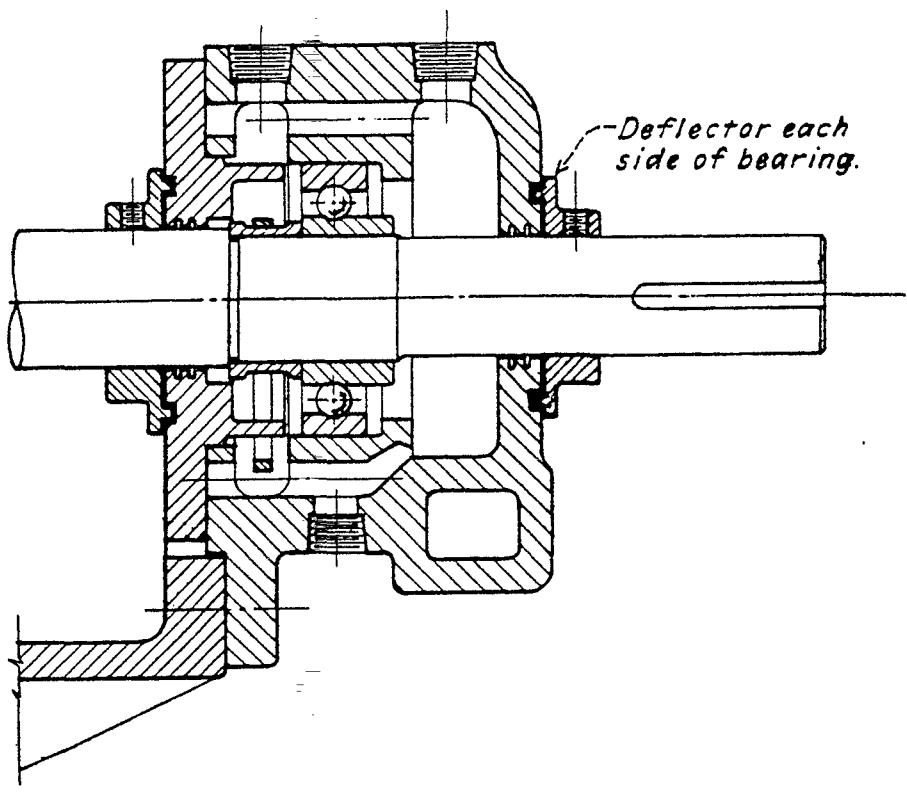
2/25

SCALE
None.

DATE
3.24.43

DR. V. H. K.
on pump.

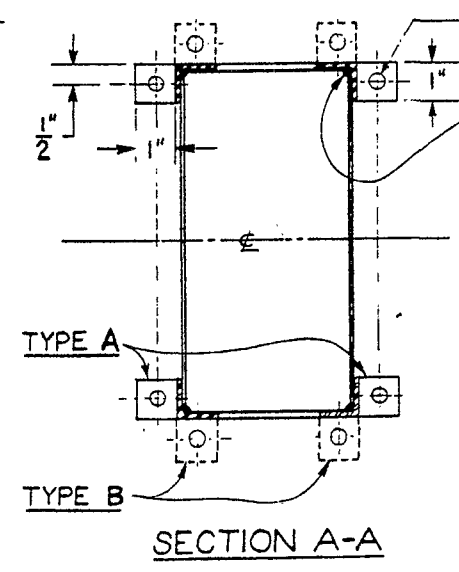
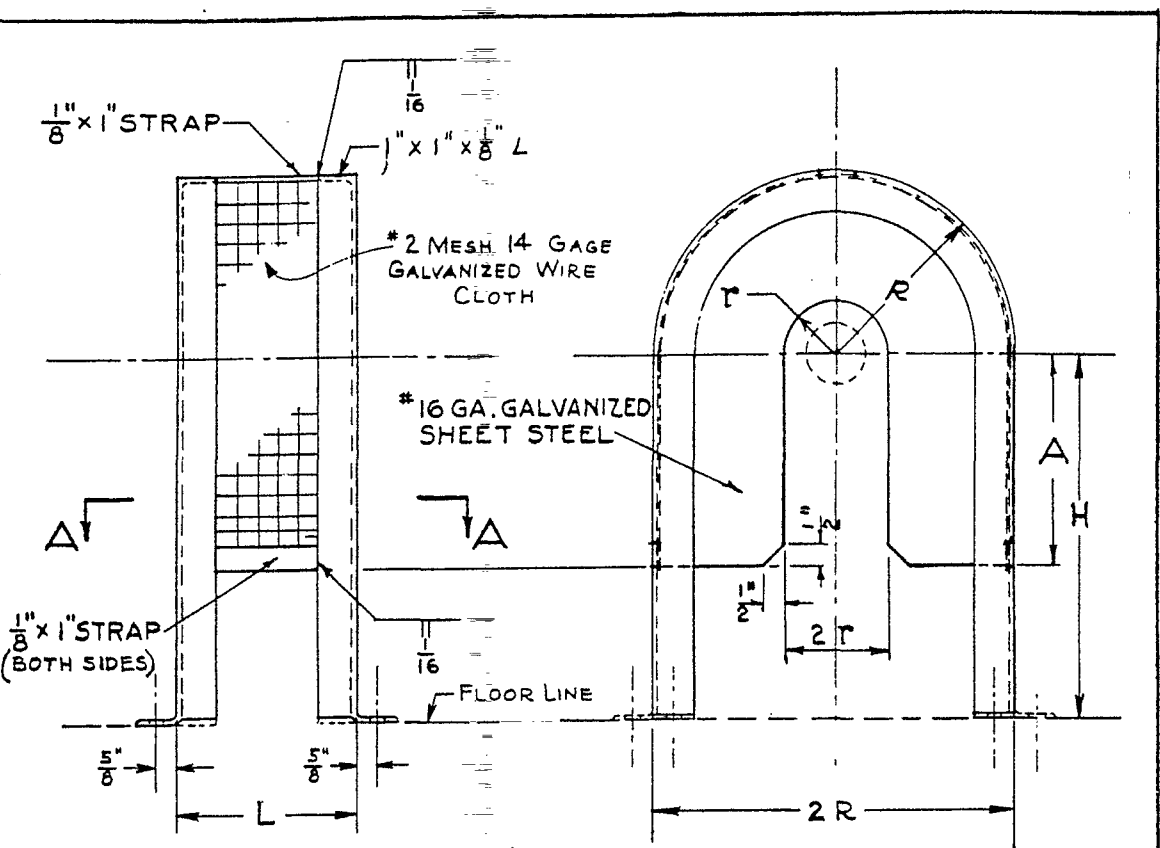
ENGR.



STANDARD LABYRINTH BEARING HOUSING CLOSURE
FOR PUMPS

GE-G92043-1

CHANGED DIM. L, ADDED "A", "H", END COVER, & HORIZONTAL STRAPS
 ADDED TYPE B SUPPORT FEET.
 REVISIONS
 APPROVALS
 ENG. DEPT.
 OPRG. DEPT.
 SCALE NONE
 DATE 7-24-44
 DR. C. C. J.
 CH. JWK 7/24
 ENGR.



3" DRILL - 4 HOLES FOR 1/2" CINCH ANCHOR BOLTS

TACK WELD WIRE CLOTH & SHEET METAL TO ANGLE FRAME

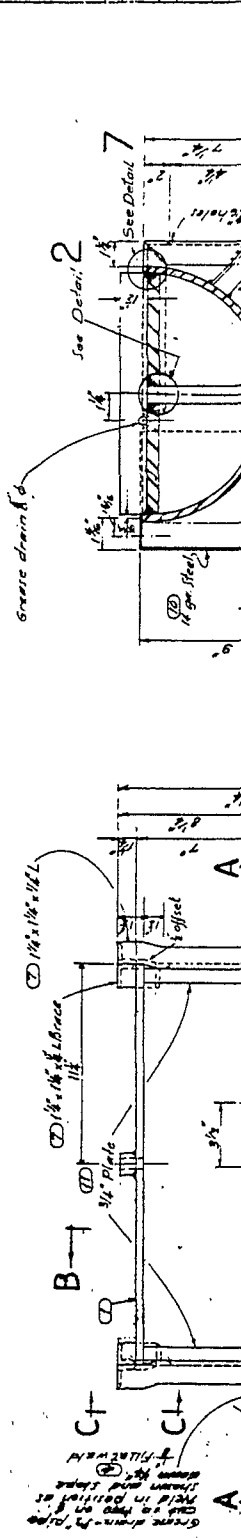
MARK NO.	SMALL STD. COUPLING SIZE NO. (SAME AS MAXIMUM BORE OF SHAFT)	R	r	A	H	L
1 A or B	1 1/2	4 1/2"	1 1/4"	5"	(As Specified On Order)	Length (L) Of Guard To Be Such That It Extends To Within 1/2" Of Each Piece Of Coupled Equipment
2	2	5"	1 1/2"	5 1/2"		
3	2 1/2	5 3/4"	1 3/4"	6 1/4"		
4	3	6 1/4"	2"	6 3/4"		
5	3 1/2	7"	2 1/4"	7 1/2"		
6	4	7 3/4"	2 1/2"	8 1/4"		
7	4 1/2	8 1/2"	2 3/4"	9"		
8	5	9 1/4"	3"	9 3/4"		

NOTE:
 A, r & R Dimensions above also apply to Fast's Std. Type Floating Shaft Couplings of the same size number. Guard is designed for Fast, Poldo or Waldron couplings.

STANDARD GUARD FOR FLEXIBLE COUPLING GE-K 99519-2

Chevron BB
013762

ITEM NO.	QTY	DESCRIPTION	ORDER NO.
1	1	1/4" x 1/2" x 1/2" L Angle	
2	1	1/4" x 1/2" x 1/2" L Angle	
3	1	1/4" x 1/2" x 1/2" L Angle	
4	1	1/4" x 1/2" x 1/2" L Angle	
5	1	1/4" x 1/2" x 1/2" L Angle	
6	1	1/4" x 1/2" x 1/2" L Angle	
7	1	1/4" x 1/2" x 1/2" L Angle	
8	1	1/4" x 1/2" x 1/2" L Angle	
9	1	1/4" x 1/2" x 1/2" L Angle	
10	1	1/4" x 1/2" x 1/2" L Angle	
11	1	1/4" x 1/2" x 1/2" L Angle	

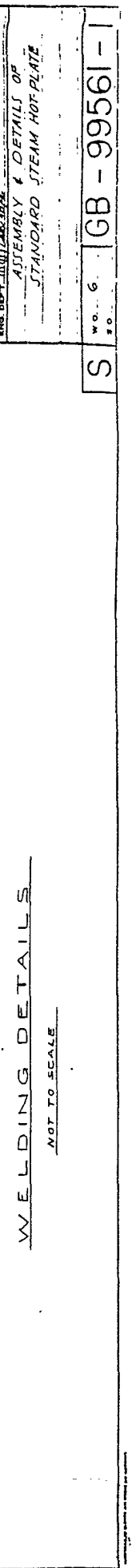
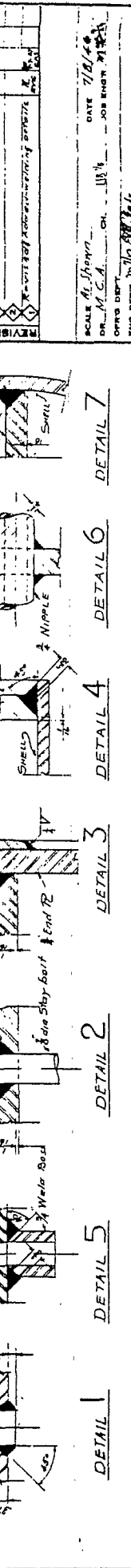
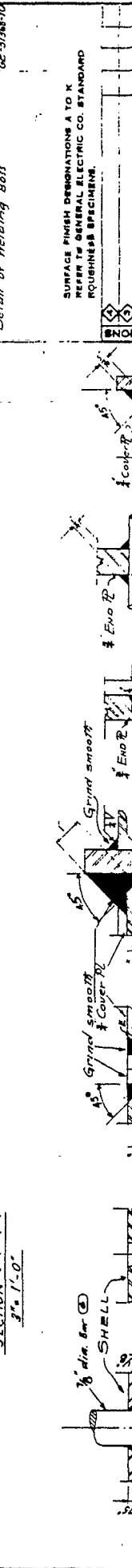
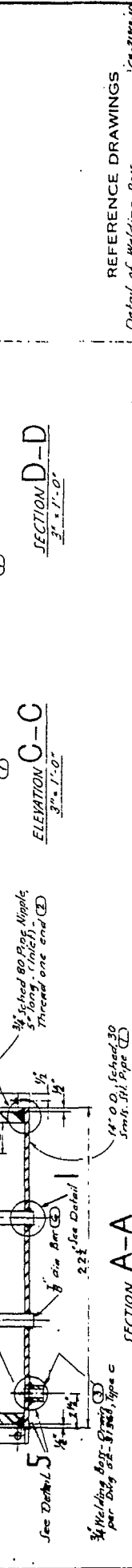
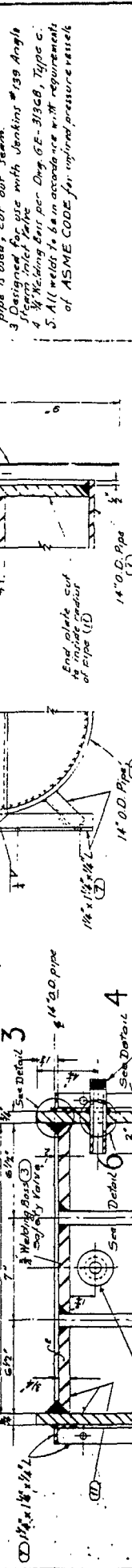
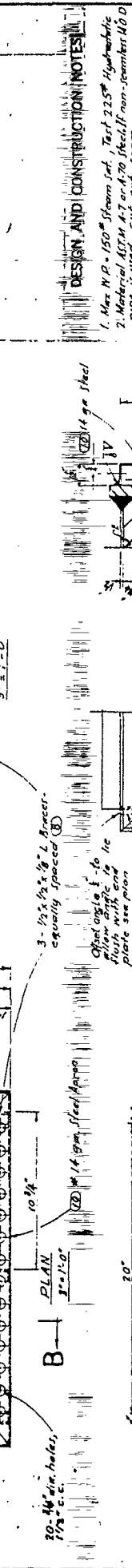


LIST OF MATERIAL

1. Max N.P. = 150° Steam sat. Test 225° Hydraulic
2. Material ASTM A17 or A70 Steel Non-ferrous 40 D
3. Designed for use with Jacking #139 Angle
4. 3/4" Welding Bolt per Eng. GE-3192B, Type C
5. All welds to be in accordance with requirements of ASME CODE for unipl. pressure vessels

DESIGN AND CONSTRUCTION NOTES

1. Max N.P. = 150° Steam sat. Test 225° Hydraulic
2. Material ASTM A17 or A70 Steel Non-ferrous 40 D
3. Designed for use with Jacking #139 Angle
4. 3/4" Welding Bolt per Eng. GE-3192B, Type C
5. All welds to be in accordance with requirements of ASME CODE for unipl. pressure vessels



REFERENCE DRAWINGS
Detail of Welding Bolt
GE-3192B-10

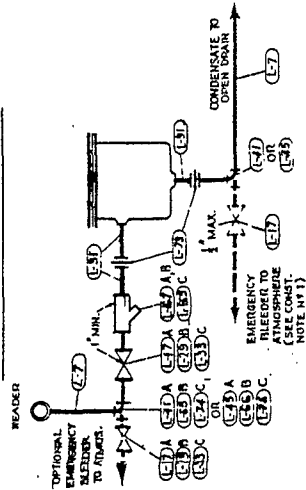
SURFACE FINISH DESIGNATIONS A TO X
REFER TO GENERAL ELECTRIC CO. STANDARD
ROUGHNESS SPECIFICATIONS

SCALE: As Shown
DATE: 7/10/44
DR: M.C.A. CH. J.W.
ENG. DEPT. 1000
ASSEMBLY & DETAILS OF
STANDARD STEAM HOT PLATE

WELDING DETAILS
NOT TO SCALE

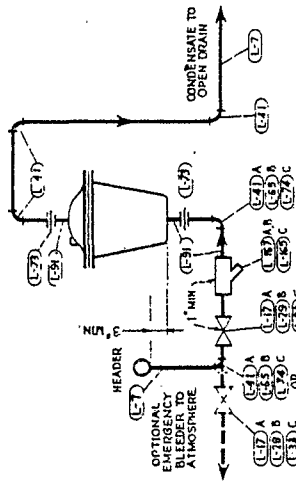
S
W. 6
GB-99561-1

NICHOLSON TRAPS



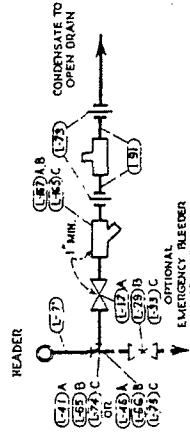
TYPE 'U'
DISCHARGING TO OPEN DRAIN

ARMSTRONG TRAPS

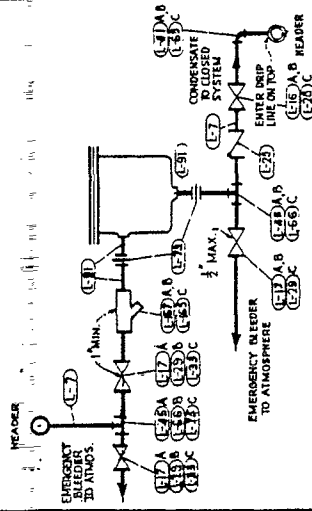


TYPE 'W'
DISCHARGING TO OPEN DRAIN

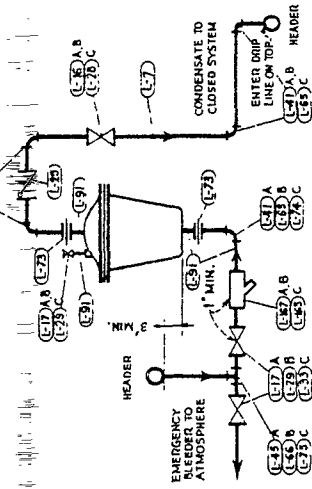
YARWAY TRAPS



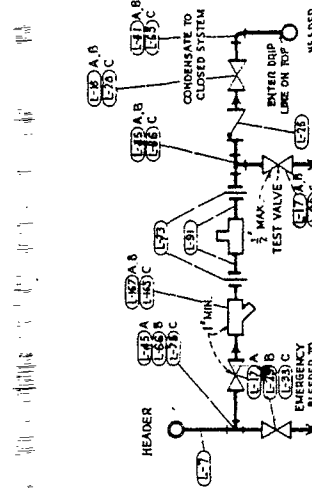
TYPE 'Y'
DISCHARGING TO OPEN DRAIN



TYPE 'V'
DISCHARGING TO CLOSED SYSTEM



TYPE 'X'
DISCHARGING TO CLOSED SYSTEM



TYPE 'Z'
DISCHARGING TO CLOSED SYSTEM

DESIGN NOTES

- 1- All nipples and pipe, 1/2" and smaller, shall be scheduled 80 seamless steel.
- 2- Use Nicholson or Yarway traps where there is any danger of freezing.
- 3- Use only Armstrong traps where discharge back pressure exceeds 25% of inlet pressure, or where actual condensate may fall as low as 5% of design condensate rate.
- 4- Do not use Yarway traps for all other traps.
- 5- Use 1/4" screen on strainers for Yarway Traps.
- 6- For 1/2" and 1" Yarway traps use 1" fittings; for 2" Yarway traps use 2" fittings.
- 7- Types 'Y', 'Z' and 'Z' trap assemblies are designed for discharge to drip lines having no block valves. If block valves are present in drip lines, the trap assembly discharge valves and fittings shall be at least equal to rating of those at trap end.

CONSTRUCTION NOTES

- 1- Where trap is discharging to open drain, install emergency bleeder only if end of line is not visible from trap.
- 2- Whenever practical use pipe bends (5 nominal pipe dia radius) in place of elbows, welded connections in place of tees and socket or butt welding unions in place of screwed unions.
- 3- Install all valves in accessible locations keeping lines close to major equipment and foundations for protection against damage and to present good appearance.
- 4- If traps are installed where Emergency Bleeder will be objectionable, install permanent by-pass around block valves of trap.

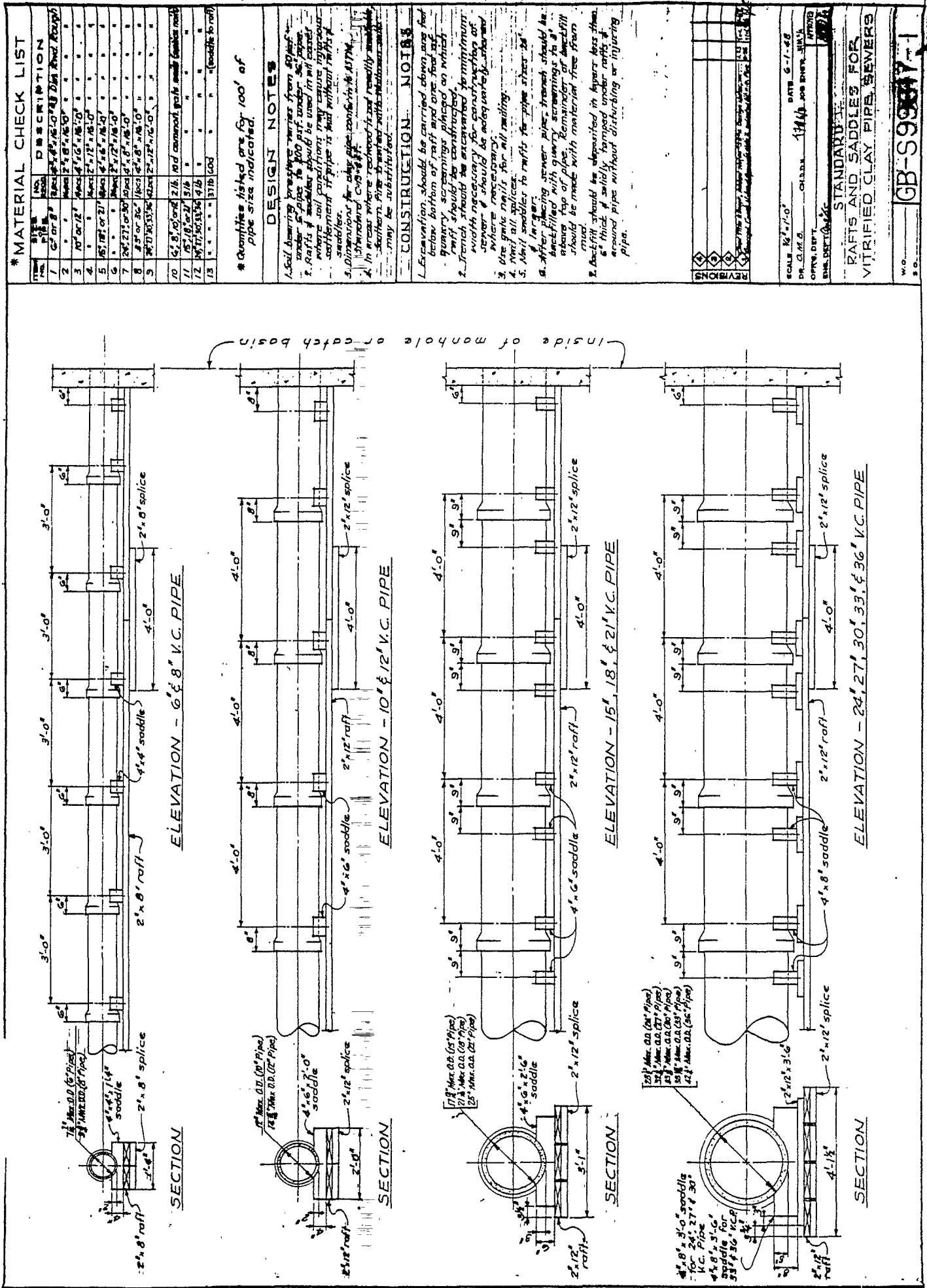
Letters following Code Nos. indicate Pressure Ratings:
A - 0-175 psi.
B - 176-225 psi.
C - 226-600 psi.
For Material refer to EF-302
This drawing supersedes Drawg. No. GB-48481.

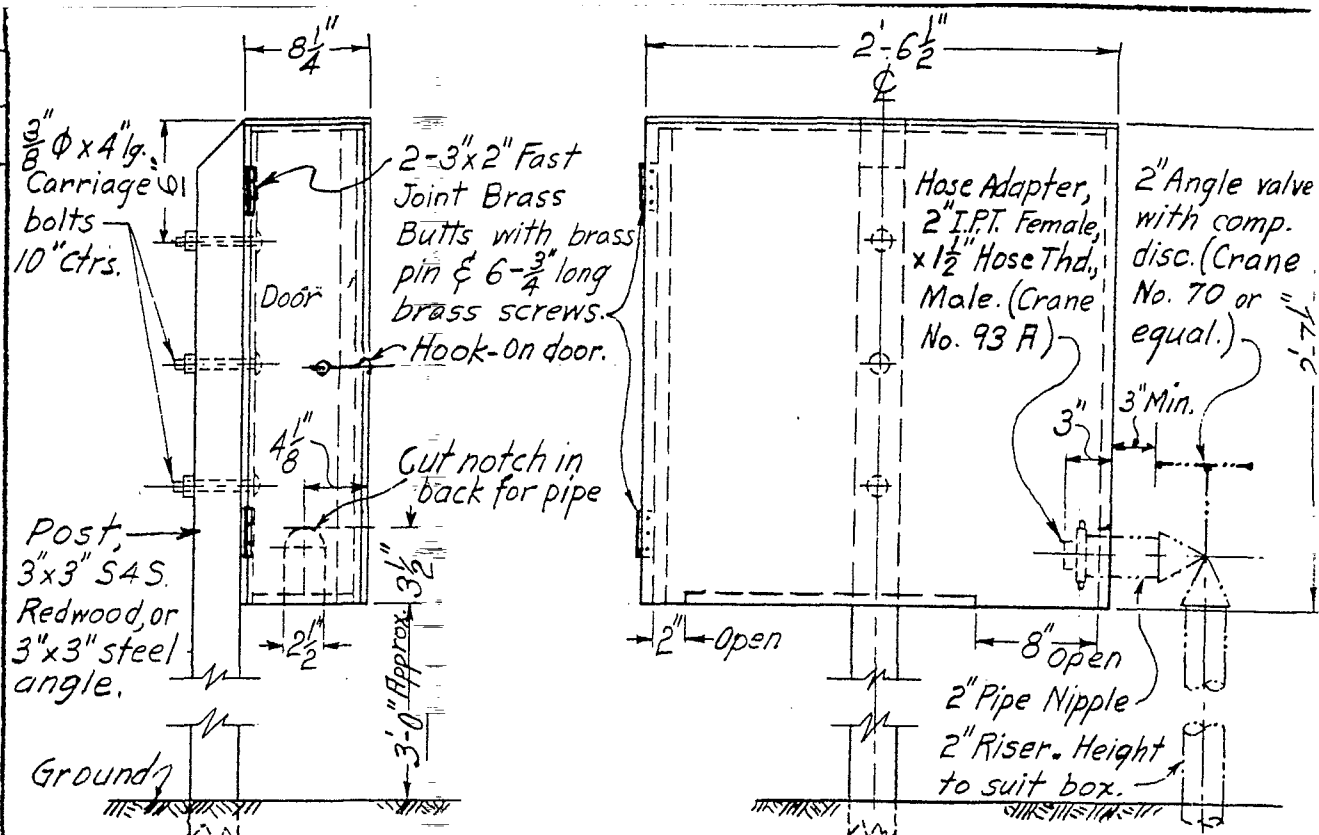
REVISIONS	DATE	BY	CHKD
1	10/1/54	W.H.	W.H.
2	10/1/54	W.H.	W.H.
3	10/1/54	W.H.	W.H.
4	10/1/54	W.H.	W.H.
5	10/1/54	W.H.	W.H.
6	10/1/54	W.H.	W.H.
7	10/1/54	W.H.	W.H.
8	10/1/54	W.H.	W.H.
9	10/1/54	W.H.	W.H.
10	10/1/54	W.H.	W.H.

SCALE: 1" = 1'-0"
OR: 1" = 1'-0"
OR: 1" = 1'-0"
OR: 1" = 1'-0"
OR: 1" = 1'-0"
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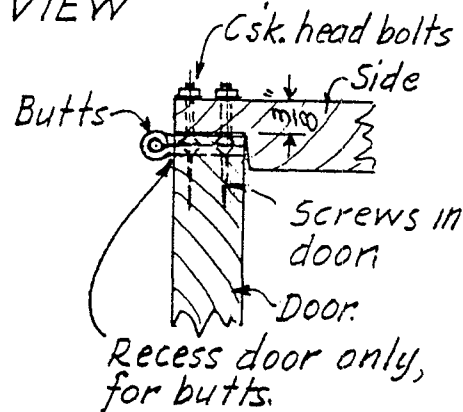
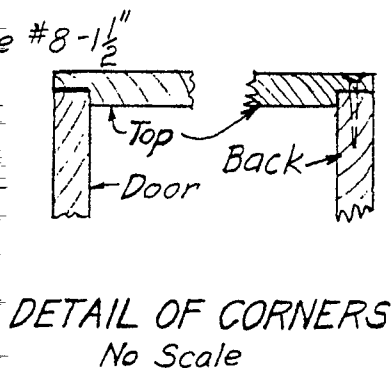
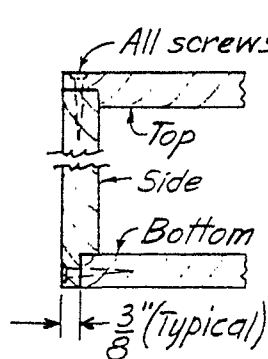
STANDARD
STEAM TRAP
MANIFOLD

GB-L-99596





FRONT VIEW Scale: 1"=1'-0" SIDE VIEW



CONSTRUCTION NOTES

- 1- For wall mounting omit post and fasten to wall or studs with bolts or lag screws. Hinge door on side nearest to wall.
- 2- For outdoor use protect top with 26 gage galvanized sheet, bent down 1" over side and back. Hinge door on either side.
- 3- Supply complete with 2-50 ft. lengths single jacket rubber lined hose, gaskets, nozzle and spanner wrench.
- 4- Supply hose, nozzle, and hose thread adapter for 1 1/2" Nat. Std. fire hose thread unless specified, otherwise to conform to local customs.
- 5- Make box from 3/4"-5 ply waterproof plywood. Paint red all outside surfaces.
- 6- Provide one 3" brass wire hook & eye.

S

STANDARD FIRE HOSE BOX, VERTICAL TYPE
FOR 100 FT. PERMANENTLY ATTACHED 1 1/2" HOSE

GE-99618-0

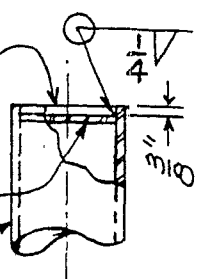
6- $\frac{1}{4}$ " x $\frac{1}{2}$ " x $1\frac{1}{2}$ " lg. bars,
equally spaced

REEL CAPACITY:

38" Dia. = 100' $1\frac{1}{2}$ " hose.
28" Dia. = 50' " " "

Burn ventilating
slots $\frac{1}{2}$ " x 4" lg.
on 28" dia. plate
and $\frac{1}{2}$ " x 6" lg. on
38" dia. plate.

Smooth
bearing
surface



DETAIL "X"

SECTION A-A

Weld, solder, or rivet
handle to top.

Bearing surface
(Reel removable)
 $\frac{3}{16}$ " x 3" dia. stl. pl.

Weld, solder or rivet
side to top.

18 Ga. (.0478") stl. side

Handle - $\frac{1}{8}$ " x 1" Flat stl.

22 Ga. (.0299") stl. top

Removable hood

$2\frac{1}{2}$ " Std.
Pipe

$\frac{1}{4}$ " Clear.

Detail "X"

A 2" Sch. 40 Pipe

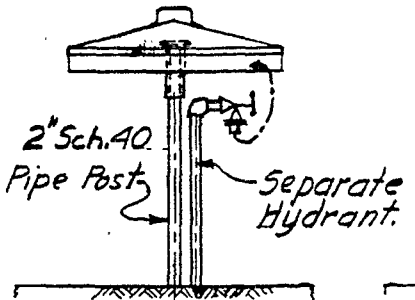
300# 2" X 2" X 2" Black M.I. Tee

2" x $1\frac{1}{2}$ " 200# Scd.
Brass Angle Hose
Valve with comp. disc
Greenberg #119 or equal

NOTE:

Supply Nat. Std. Hose
thread on valve, hose,
and nozzle unless
otherwise specified
to meet local customs.

*Composition disc required
for tight closure
in this service



ALTERNATE CONSTRUCTION

STANDARD HORIZONTAL FIRE HOSE REEL
FOR $1\frac{1}{2}$ " HOSE

GE-S 99623-1

APPROVALS
1304/12
ENG. DEPT.

OPR'G. DEPT.

SCALE
 $1\frac{1}{2}$ " = 1'-0"

DATE
6-8-48
DR. P.S.S.
CH. J.P.L.
ENGR.

[illegible]

TABLE I

CONDING RULES (GENERAL LIMITING)	2-3	① THE FOLLOWING VAPOR-PROOF LIGHTING FIXTURES ONLY IN CLASS) DIV. 2 AREAS OR WHERE SHAL. TO MECHANICAL RANGE OF ON SYSTEM CONNECTION. IN NON-HAZARDOUS AREAS NOT NEAR VAPOR PROOF LIGHTS WITH SIMILAR REFLECTIONS (C-F EN OR EMC SERIES)	REVISION 2-9-60	60-1013
		INCORPORATE AND DO NOT HAVE ANY OTHER TYPE OF CAR HEAD PLACED TO LIGHT UNDERNEATH SIDE OF CAR		

FORM 100-1

SECTION VI - APPENDIX

EF FORMS

12	Power Pump Data Sheet
13	Steam Pumps
18	Design Data for Shell and Tube Heat Transfer Equipment
18a	Design Data for Air-Cooled Heat Transfer Equipment
36	Reference Data for Relief Valves
42	Schedule of Reference Data and Material for Recording and Controlling Instruments
43	Schedule of Reference Data and Material for Pressure Gauges, Temperature Points, and Gauge Glasses
53	Orifice Plate Data
65	API-ASME Code Pressure Vessel Design Sheet
66	Design Sheets for Vertical Vessel Supports
68	Painting Specification and Reference Data
69	Centrifugal, Rotary, and Steam Pump Packing Specification
121	Initial Field Hydrostatic Test Specification
153	Centrifugal Pump Data Sheet
154	Drawing Index Form
168	Fireproofing Specification for Column and Vessel Skirt
176	Motor Data Sheet
194	Furnace Design Data Sheet
221	Steam Turbine Data Sheet
222	Standard Details and List of Material for Insulation of Hot Lines
224	Standard Details and List of Material - Insulation for Hot Vessels and Lines Over 36 inches
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EF FORMS (CONTINUED)

264	Rotary Pump Data Sheet
294	Standard Item List
302	List of Material and Schedule for Steam Traps
335	Expenditure Control Statement
363	Standard Conduit Connections and Wiring at Motors

POWER PUMP DATA SHEET

THIS SHEET IS PART OF SPECIFICATION NO. _____

FILE NO. _____

PUMP NUMBER		FILE NO.	
A. SERVICE LIQUID PUMPED _____ SPECIFIC GRAVITY AT FLOW TEMPERATURE _____ FLOW TEMPERATURE _____ (CENTIGRADES) _____ VAPOR PRESSURE AT FLOW TEMPERATURE _____ PSIA		G. CONSTRUCTION -- POWER END MAXIMUM ALLOWABLE PLUNGER LOAD _____ LB GEAR FACE WIDTH _____ IN. GEAR DESIGN (SERVICE FACTOR) (AGMA CLASS) _____ PISTON SHAFT BEARINGS: TYPE _____ CRANK SHAFT BEARINGS: TYPE _____ BEARING HOUSING CLOSURES: TYPE _____ GEAR LUBRICATION: F = FLOOD, S = SPLASH, P = PRESS., G = GREASE BEARING LUBRICATORS: TYPE _____ VISIBLE LUBRICATORS: TYPE _____ CAPACITY _____ OUNCES FLEXIBLE COUPLING (TYPE) REQUIRED _____ GUARD REQUIRED FOR (COUPLING) (V-BELT DRIVE) (CHAIN DRIVE) _____	
B. LIQUID CHARACTERISTICS VISCOSITY AT FLOW TEMPERATURE _____ (CENTISTOKES) _____ VAPOR PRESSURE AT FLOW TEMPERATURE _____ PSIA		H. CONNECTIONS SUCTION: SIZE _____ RATING _____ ASA DISCHARGE: SIZE _____ RATING _____ ASA VENTS AND DRAINS: SIZE _____	
C. CAPACITY AND PRESSURES GPM AT FLOW TEMPERATURE _____ SUCTION PRESSURE AT PUMP _____ PSI DIFFERENTIAL _____ PSI DISCHARGE _____ PSIA NPSH AVAILABLE _____ PSI NPSH REQUIRED BY PUMP _____ PSI MAXIMUM ALLOWABLE WORKING PRESSURE _____ PSIG		J. STUFFING BOX DIMENSIONS LENGTH OF STUFFING BOX _____ IN. INSIDE DIAMETER OF BOX _____ IN. DIAMETER OF ROD OR PLUNGER _____ IN. WIDTH OF LANTERN RING _____ IN. LANTERN RING TO OPEN END OF BOX _____ IN. SIZE PACKING _____ IN. NO. RINGS OF PACKING PER BOX _____ NO. BOXES PER PUMP _____	
D. MANUFACTURER'S SIZE AND TYPE PUMP MFR'S MODEL NO. OR CATALOG REFERENCE _____ DIAMETER OF PISTON OR PLUNGER _____ IN. STROKE _____ IN. PISTON OR PLUNGER _____ HORIZONTAL OR VERTICAL _____ SIMPLEX, DUPLEX OR TRIPLEX _____ PUMP SERIAL NO. (ON FINAL DATA SHEET) _____		K. TESTING PERFORMANCE TEST (WITNESSED) (NOT WITNESSED) _____ HYDROSTATIC TEST OF ASSEMBLED LIQUID END _____ PSIG HYDROSTATIC TEST (WITNESSED) (NOT WITNESSED) _____ INSPECTION REQUIRED _____ RUNNING TEST WITH ACTUAL DRIVER _____	
E. OPERATING DATA OVERALL EFFICIENCY AT RATING _____ % BRAKE HORSEPOWER AT RATING _____ HP RPM OF CRANK AT RATED CAPACITY _____ MAXIMUM ALLOWABLE CRANK SPEED _____ RPM PISTON SPEED AT RATED CAPACITY _____ FT/MIN PISTON SPEED AT RATED CAPACITY _____ RPM ROTATION FACING PUMP COUPLING _____ (CW) (CCW) VELOCITY THRU SUCTION VALVES AT RATED CAPACITY _____ FT/MIN TOTAL SUCTION VALVE AREA _____ SQ IN. PRESSURE REQUIRED TO LIFT SUCTION VALVES _____ PSI		L. MISCELLANEOUS PRICE, EACH (FOB) (FAS) (NOT INCL. DRIVER) _____ EXTRA COST FOR _____ EXTRA COST FOR _____ TYPE OF DRIVER: (DIRECT-CONNECTED) (GEAR REDUCER) (V-BELT) (CHAIN DRIVE) _____ TYPE OF DRIVER: (MOTOR) (TURBINE) (ENGINE) _____ DRIVER HP _____ DRIVER SPEED _____ RPM WEIGHT OF BARE PUMP _____ LB SHIPMENT FROM RECEIPT OF ORDER _____ WEEKS OUTLINE DIMENSION DRAWING NO. _____ CROSS-SECTIONAL DRAWING NO. _____ INSTALLATION AND OPERATING INSTRUCTION, DRAWING NO. _____	
F. CONSTRUCTION AND MATERIAL - LIQUID END CYLINDER MATERIAL _____ CYLINDER LINER MATERIAL _____ CYLINDER GASKET MATERIAL _____ STUFFING BOX (JACKETED) (PLAIN) _____ GLAND _____ GLAND BOLTS _____ CYLINDER STUDS _____ PISTON OR PLUNGER _____ PISTON PACKING _____ PISTON ROD _____ THROAT WASHING _____ VALVES: MATERIAL _____ VALVES: TYPE _____ VALVE SEATS _____ VALVE STEMS _____ VALVE SPRINGS _____		APPROVALS: _____ _____ _____	
MANUFACTURER: _____ PLANT: _____		REV.: _____ REV.: _____ REV.: _____	

EF-12 (100-CD - 4-50)

DIRECT - ACTING STEAM PUMP DATA SHEET

THIS SHEET IS A PART OF SPECIFICATION NO. _____

FILE NO. _____

PUMP NUMBER		FILE NO.	
A. SERVICE B. LIQUID CHARACTERISTICS LIQUID PUMPED _____ SPECIFIC GRAVITY AT FLOW TEMPERATURE _____ FLOW TEMPERATURE _____ (CENTIGRADES OR °F) VISCOSITY AT FLOW TEMPERATURE _____ VAPOR PRESSURE AT FLOW TEMPERATURE _____ PSIA C. CAPACITY AND PRESSURES GPM AT FLOW TEMPERATURE _____ SUCTION PRESSURE AT PUMP _____ PSIA DIFFERENTIAL _____ PSI DISCHARGE _____ PSI NET POSITIVE SUCTION HEAD AVAILABLE _____ PSI NET POSITIVE SUCTION HEAD REQUIRED BY PUMP _____ PSI STALLING PRESSURE AT RATED SUCTION PRESSURE _____ PSI MAX. ALLOWABLE LIQUID END WORKING PRESSURE _____ PSIG MAX. ALLOWABLE STEAM END WORKING PRESSURE _____ PSIG D. STEAM CHARACTERISTICS INLET STEAM _____ PSIG QUALITY _____ % SUPERHEAT _____ °F EXHAUST PRESSURE _____ PSIG		N. CONNECTIONS STEAM END: TYPE _____ VALVE AND SIZE OF LUMINATOR _____ SUCTION: SIZE _____ RATING _____ ASA FACING _____ DISCHARGE: SIZE _____ RATING _____ ASA FACING _____ STEAM INLET: SIZE _____ RATING _____ ASA FACING _____ EXHAUST: SIZE _____ RATING _____ ASA FACING _____ COMPANION FLANGES (WELDING) (SCREWED) - INDICATE IF FURNISHED VENTS, SIZE _____ DRAINS, SIZE _____	
E. MANUFACTURER'S SIZE AND TYPE PUMP SIZE: DIM STEAM X DIM LIQUID X STROKE _____ IN. MFR'S MODEL NO. OR CATALOG REFERENCE _____ SIMPLEX OR DUPLEX _____ PISTON OR PLUNGER _____ VALVE PLATE (VP), SIDE POT (SP), CLOSE CLEARANCE (CC) _____ PUMP SERIAL NO. (OR FINAL DATA SHEET) _____		J. STUFFING BOX DIMENSIONS LIQUID END: LENGTH OF STUFFING BOX _____ IN. INSIDE DIAMETER OF STUFFING BOX _____ IN. DIAMETER OF ROD _____ IN. WIDTH OF LANTERN RING _____ IN. LANTERN RING TO OPEN END OF BOX _____ IN. SIZE PACKING _____ IN. NO. RINGS PACKING PER BOX _____ STEAM END: LENGTH OF STUFFING BOX _____ IN. INSIDE DIAMETER OF STUFFING BOX _____ IN. DIAMETER OF ROD _____ IN. SIZE OF PACKING _____ IN. NO. RINGS PACKING PER BOX _____ VALVE RODS: LENGTH OF STUFFING BOX _____ IN. INSIDE DIAMETER OF BOX _____ IN. DIAMETER OF ROD _____ IN. SIZE PACKING _____ IN. NO. RINGS PACKING PER BOX _____ NO. BOXES PER PUMP _____ K. TESTING HYDROSTATIC TEST OF ASSEMBLED LIQUID END _____ PSIG (WITNESSED) (NOT WITNESSED)	
F. OPERATING DATA VELOCITY THRU VALVES _____ FT/MIN TOTAL SUCTION VALVE AREA _____ SQ. IN. RPM AT RATING _____ MAX. ALLOWABLE RPM _____ PISTON SPEED AT RATING _____ FT/MIN PRESSURE REQUIRED TO LIFT SUCTION VALVES _____ PSI G. CONSTRUCTION AND MATERIAL LIQUID END CYLINDER MATERIAL _____ CYLINDER LINER: [REMOVABLE] OR [REPLACEABLE (PRESSED IN)] CYLINDER GASKETS MATERIAL _____ STUFFING BOX (JACKETED) (PLAIN) GLAND _____ GLAND BOLTS _____ CYLINDER STUDS _____ PISTON (OR PLUNGER) _____ PISTON PACKING _____ PISTON ROD _____ VALVES: MATERIAL _____ VALVE SEATS _____ VALVE STEMS _____ VALVE SPRINGS _____		L. MISCELLANEOUS INSPECTION REQUIRED _____ PRICE, EACH (FOB) (FAS) _____ EXTRA COST FOR _____ EXTRA COST FOR _____ WEIGHT OF BARE PUMP _____ SHIPPING WEIGHT _____ SHIPMENT FROM RECEIPT OF ORDER _____ WEEKS OUTLINE DIMENSION DRAWING NO. _____ CROSS-SECTION DRAWING NO. _____	
PLANT: _____ MANUFACTURER: _____ REV. _____ REV. _____ REV. _____		APPROVALS: _____ _____ _____	

EF-13 (500-CD - 6-50)

DESIGN DATA FOR SHELL & TUBE HEAT TRANSFER EQUIPMENT

SERVICE _____ ORDER NO. _____
 DUTY BTU/HR. _____ MFR. _____

PERFORMANCE DATA

	HOT FLUID	COLD FLUID
Shell or Tubes		
Fluids & Quantities		
Density or Gravity at 60°F.		
Average Molecular Weight		
Viscosity at °F.		
Viscosity at °F.		
Liquid Evaporated		
Vapor Condensed		
Temperature In °F.		
Temperature Out °F.		
Max. Working Temperature °F.		
Inlet Pressure Lbs./sq.in.ga.		
Max. Work. Press. Lbs./sq.in.ga.		
Computed Press.Drop Lbs./sq.in.		
Max.Press.Drop Lbs./sq.in.		
Nozzle Sizes, Inches		
Nozzle Ratings & Facings		
Req'd.Corrosion Allowance, In.		
Confined Gaskets Req'd.		
Stress Relief Req'd.		
Theo.Clean Transfer Factor -	Corrected Mean Temp. Diff. -	
Min.Trans.Factor for Spec.Service-	Transfer Area,Sq.Ft.(Ext.TubeSurf.)-	
Min.Overall Fouling Resistance (1)	Based on Outside Tube Surface	----- 0.0

CONSTRUCTION

Horizontal or Vertical Setting		Minimum Number of Units 1 2 3			
Tubes-3/4" OD 14, 16, 18 BWG, 80 or 120 or 155 or 192 or 240 inches long					
Tube Layout -- 60° Triangular or Rectangular with 1/4" minimum Cleaning Lanes					
No.Shell Passes		No.Tube Passes		Shell Dia.	
Length of Unit		No.of Tubes		Tube Pitch	
PART	MATERIAL	THICKNESS INCHES	CORROSION ALLOWANCE	PART	MATERIAL
Shell				Tubes	
Shell Cover				Bolting (2)	
Channel				Gaskets (3)	
Chan.Cover				Chan.Cover	
Float.Head				Chan-Fixed T.S.	
Float. T.S.				Shell Fixed T.S.	
Fixed T.S.				Shell Cover	
Baffles				Floating Head	

NOTES (1) Units $\frac{1}{\text{BTU/Sq.Ft.} \times \text{Hr.} \times \text{°F.}}$

- (2) Refer to Spec. _____ for Bolting Materials
 (3) Refer to Spec. _____ for Gasket Materials

DESIGN DATA FOR
 FOR
 SPECIFICATION NO.

AT

FLOW DIAGRAM NO. E-

EF-18(200-CD-10-48)

Chevron BB
 013775

DESIGN DATA FOR AIR COOLED HEAT TRANSFER EQUIPMENT

SERVICE _____ ORDER NO. _____
 DUTY BTU/HR. _____ MFR. _____ F.P. No. _____

PERFORMANCE DATA

HOT FLUID	COOLING MEDIUM DATA
FLUIDS & QUANTITIES	ALTITUDE
DENSITY OR GRAVITY AT 60°F.	INLET AIR TEMP.
AVERAGE MOLECULAR WEIGHT	OUTLET AIR TEMP.
VISCOSITY AT °F.	SCFM AIR (TOTAL)
VISCOSITY AT °F.	FANS
LIQUID EVAPORATED	NUMBER
VAPOR CONDENSED	DIAMETER
TEMPERATURE IN °F.	RPM
TEMPERATURE OUT °F.	HP PER FAN
DESIGN TEMPERATURE	DRIVER
INLET PRESSURE LBS./SQ. IN. GA.	HP RATING, EACH
DESIGN PRESS. LBS./SQ. IN. GA.	RPM
COMPUTED PRESS. DROP LBS./SQ. IN.	VOLTS
MAX. PRESS. DROP LBS./SQ. IN.	PHASE
NOZZLE SIZES, INCHES	CYCLES
NOZZLE RATINGS & FACINGS	XP (YES)(NO)
CONFINED GASKETS REQ'D.	INLET STEAM PRESS.
STRESS RELIEF REQ'D.	OUTLET STEAM PRESS.
	LBS. STEAM/HR TOTAL

REVISIONS

SCALE

DATE

DR. _____
 CH. _____
 ENGR. _____

ENGR. DEPT.

OPRG. DEPT.

CONSTRUCTION

TUBES-HORIZONTAL OR VERTICAL	AIR FLOW-HORIZONTAL OR VERTICAL
TUBES OD BWG	INCHES LONG
FORCED OR INDUCED DRAFT	INSTALLED WEIGHT (EMPTY)
TOTAL NUMBER OF REPLACEABLE IDENTICAL HEAT EXCHANGE SECTIONS AND ARRANGEMENT	

PART	MATERIAL	THICKNESS	CORR. ALLOW.
TUBES			
FINS			
HEADER			
HEADER PLUGS			
FAN BLADES			
AIR CHAMBER			
RETURN BENDS			

NOTES (1) UNITS BTU/SQ. FT. x HR. x °F.

APPROVED

DESIGN DATA FOR
 FOR

FLOW DIAGRAM NO. E
 AT

LEGEND	
PC - SCRAMBLING PLANT CONTINENTAL	F2 - FILM STRIPS

LEGEND	
PC - SCRAMBLING PLANT CONTINENTAL	F2 - FILM STRIPS

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----

[illegible]

REFERENCE DRAWINGS

REFERENCE DRAWINGS

USE EF-43 FOR COMMON CAGES ETC	EF-42 (200-8-49)
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DESIGN SHEET FOR VERTICAL VESSEL SUPPORTS

1. DETERMINATION OF CENTER GRAVITY:

	Weight	Distance to Cent. of Grav.	Moment
Shell.....ft. at.....lbs./ft. =	x	ft. =	ft. lbs.
Heads at.....lbs. ea. =	x	ft. =	ft. lbs.
Trays at.....lbs. ea. =	x	ft. =	ft. lbs.
Manways & Nozzles	x	ft. =	ft. lbs.
Skirt.....ft. at lbs./ft. =	x	ft. =	ft. lbs.

Sub-Totals =

*Multiplying Factor (.....)

Weight of normal contents:

(.....cu. ft. x.....lbs./cu. ft. =	x	ft.	ft. lbs.
Reboiler (full)	=	ft.	ft. lbs.
Insulation	=	ft.	ft. lbs.
Walkways & Piping	=	ft.	ft. lbs.

TOTALS, W = M =

2. EARTHQUAKE MOMENT, M_1

EARTHQUAKE FACTOR, $f = 0.1$ (.....)

$M_E = M_f =$ft. lbs.

Eccentric Moment =lb. xft. =ft. lbs.
(Reboiler, etc.)

TOTAL, $M_1 =$

3. WIND MOMENT, M_2

WIND FORCE, $F_1 = (15)$ (.....) lb./sq. ft. $F_2 = (20)$ (.....) lb./sq. ft.

$$M_W = \left(\frac{D h_1^2}{24} \right) F_1 + \frac{D h_2}{12} \left(h_1 + \frac{h_2}{2} \right) F_2 = \text{.....ft. lbs.}$$

Eccentric Momentlb. xft. =ft. lbs.

TOTAL, $M_2 =$ft. lbs.

(D = Vessel outside diameter, inches, h_1 = 60 ft. max. height over which F_1 is effective, h_2 = height above 60 ft. over which F_2 is effective, feet).

4. MAXIMUM MOMENT, M

(M_1, M_2) =ft. lbs.

5. SKIRT THICKNESS, t , =in. Max. allow. Stress. 10,000 psi. Min. $t = \frac{D}{400} =$or 1/4".

$$\text{Stress} = \frac{1}{t} \left(\frac{\pi D^2}{4} - \frac{YD}{2} + \frac{W}{\pi D - Y} \right) = \text{.....psi.}$$

Y Circumferential width (in inches) of openings in skirt at horizontal plane representing greatest cross sectional metal area removed. Skirts operating above 400° F. should have special consideration to allow for decrease in yield point stress (Yield Point at 400° = 25,000 psi at 600° = 16,000 psi at 800° = 13,000 psi).

Check tall slim structures for period of vibration, T, (see Recommended Practice No. 57).

$$\frac{12L}{D} = \text{.....} = \frac{WD}{t_s L} = \text{.....}, T(\text{From 87613} = \text{.....Sec.}$$

L = Vessel height in feet.

t_s = Shell thickness

6. ANCHOR BOLTS. No. of Bolts, N, = Bolt circle dia., D_1 =in.

$$\text{Load per bolt, } B = \frac{1}{N} \left(\frac{48M}{D_1} - W \right) = \text{.....ps}$$

Allow. stress for combined vertical operating load and earthquake or wind 1.33 x normal stresses; therefore to choose proper bolts from Drwg. GC - 68922 divide above calculated load by 1.33

$$\frac{B}{1.33} = \text{.....} = \text{.....lbs.}$$

Bolt Sizes =in.

*From Standard Drawing 32084

VESSEL:

DWG.

ORDER

PLANT:

LOCATION

EQUIPMENT		SURFACE PREPARATION			PAINT SCHEDULE			FIELD INSTRUCTIONS		BILL OF MATERIAL		
		SAND BLAST	WIRE BRUSH	ALLOW TO WEATHER	PRIMER	FINISH COATS	NO PAINT		DESCRIPTION	QUANTITY	ITEM NUMBER	UNIT NUMBER
G. COLUMNS D. VESSELS (A) INSULATED, UNDER 250°. (B) INSULATED, OVER 250°. (C) INSULATED, BULK, NON COVERED (D) INSULATED, LAYERED WEATHERCOAT COVERED TRAYS (A) HEAT EXCHANGER (HEAT EXCHANGER AND WATER) (B) HEAT EXCHANGER (HEAT EXCHANGER AND WATER) (C) HEAT EXCHANGER (HEAT EXCHANGER AND WATER) (D) HEAT EXCHANGER (HEAT EXCHANGER AND WATER) (E) ALL TRAYS, 12 IN. WIDE STRIP ALONG BOTTOM E. HEAT EXCHANGERS (A) INSULATED, UNDER 250°. (B) INSULATED, OVER 250°. (C) INSULATED, LAYERED WEATHERCOAT COVERED F. PIPES (A) INSULATED, UNDER 250°. (B) INSULATED, OVER 250°. (C) INSULATED, LAYERED WEATHERCOAT COVERED (D) INSULATED, LAYERED WEATHERCOAT COVERED (E) INSULATED, LAYERED WEATHERCOAT COVERED (F) INSULATED, LAYERED WEATHERCOAT COVERED (G) INSULATED, LAYERED WEATHERCOAT COVERED (H) INSULATED, LAYERED WEATHERCOAT COVERED (I) INSULATED, LAYERED WEATHERCOAT COVERED (J) INSULATED, LAYERED WEATHERCOAT COVERED (K) INSULATED, LAYERED WEATHERCOAT COVERED (L) INSULATED, LAYERED WEATHERCOAT COVERED (M) INSULATED, LAYERED WEATHERCOAT COVERED (N) INSULATED, LAYERED WEATHERCOAT COVERED (O) INSULATED, LAYERED WEATHERCOAT COVERED (P) INSULATED, LAYERED WEATHERCOAT COVERED (Q) INSULATED, LAYERED WEATHERCOAT COVERED (R) INSULATED, LAYERED WEATHERCOAT COVERED (S) INSULATED, LAYERED WEATHERCOAT COVERED (T) INSULATED, LAYERED WEATHERCOAT COVERED (U) INSULATED, LAYERED WEATHERCOAT COVERED (V) INSULATED, LAYERED WEATHERCOAT COVERED (W) INSULATED, LAYERED WEATHERCOAT COVERED (X) INSULATED, LAYERED WEATHERCOAT COVERED (Y) INSULATED, LAYERED WEATHERCOAT COVERED (Z) INSULATED, LAYERED WEATHERCOAT COVERED G. PUMPS AND DRIVERS (A) INSULATED, UNDER 250°. (B) INSULATED, OVER 250°. (C) INSULATED, LAYERED WEATHERCOAT COVERED (D) INSULATED, LAYERED WEATHERCOAT COVERED (E) INSULATED, LAYERED WEATHERCOAT COVERED (F) INSULATED, LAYERED WEATHERCOAT COVERED (G) INSULATED, LAYERED WEATHERCOAT COVERED (H) INSULATED, LAYERED WEATHERCOAT COVERED (I) INSULATED, LAYERED WEATHERCOAT COVERED (J) INSULATED, LAYERED WEATHERCOAT COVERED (K) INSULATED, LAYERED WEATHERCOAT COVERED (L) INSULATED, LAYERED WEATHERCOAT COVERED (M) INSULATED, LAYERED WEATHERCOAT COVERED (N) INSULATED, LAYERED WEATHERCOAT COVERED (O) INSULATED, LAYERED WEATHERCOAT COVERED (P) INSULATED, LAYERED WEATHERCOAT COVERED (Q) INSULATED, LAYERED WEATHERCOAT COVERED (R) INSULATED, LAYERED WEATHERCOAT COVERED (S) INSULATED, LAYERED WEATHERCOAT COVERED (T) INSULATED, LAYERED WEATHERCOAT COVERED (U) INSULATED, LAYERED WEATHERCOAT COVERED (V) INSULATED, LAYERED WEATHERCOAT COVERED (W) INSULATED, LAYERED WEATHERCOAT COVERED (X) INSULATED, LAYERED WEATHERCOAT COVERED (Y) INSULATED, LAYERED WEATHERCOAT COVERED (Z) INSULATED, LAYERED WEATHERCOAT COVERED H. INSTRUMENTS I. COMPRESSORS (A) INSULATED, UNDER 250°. (B) INSULATED, OVER 250°. (C) INSULATED, LAYERED WEATHERCOAT COVERED (D) INSULATED, LAYERED WEATHERCOAT COVERED (E) INSULATED, LAYERED WEATHERCOAT COVERED (F) INSULATED, LAYERED WEATHERCOAT COVERED (G) INSULATED, LAYERED WEATHERCOAT COVERED (H) INSULATED, LAYERED WEATHERCOAT COVERED (I) INSULATED, LAYERED WEATHERCOAT COVERED (J) INSULATED, LAYERED WEATHERCOAT COVERED (K) INSULATED, LAYERED WEATHERCOAT COVERED (L) INSULATED, LAYERED WEATHERCOAT COVERED (M) INSULATED, LAYERED WEATHERCOAT COVERED (N) INSULATED, LAYERED WEATHERCOAT COVERED (O) INSULATED, LAYERED WEATHERCOAT COVERED (P) INSULATED, LAYERED WEATHERCOAT COVERED (Q) INSULATED, LAYERED WEATHERCOAT COVERED (R) INSULATED, LAYERED WEATHERCOAT COVERED (S) INSULATED, LAYERED WEATHERCOAT COVERED (T) INSULATED, LAYERED WEATHERCOAT COVERED (U) INSULATED, LAYERED WEATHERCOAT COVERED (V) INSULATED, LAYERED WEATHERCOAT COVERED (W) INSULATED, LAYERED WEATHERCOAT COVERED (X) INSULATED, LAYERED WEATHERCOAT COVERED (Y) INSULATED, LAYERED WEATHERCOAT COVERED (Z) INSULATED, LAYERED WEATHERCOAT COVERED J. INSTRUMENTS K. COMPRESSORS (A) INSULATED, UNDER 250°. (B) INSULATED, OVER 250°. (C) INSULATED, LAYERED WEATHERCOAT COVERED (D) INSULATED, LAYERED WEATHERCOAT COVERED (E) INSULATED, LAYERED WEATHERCOAT COVERED (F) INSULATED, LAYERED WEATHERCOAT COVERED (G) INSULATED, LAYERED WEATHERCOAT COVERED (H) INSULATED, LAYERED WEATHERCOAT COVERED (I) INSULATED, LAYERED WEATHERCOAT COVERED (J) INSULATED, LAYERED WEATHERCOAT COVERED (K) INSULATED, LAYERED WEATHERCOAT COVERED (L) INSULATED, LAYERED WEATHERCOAT COVERED (M) INSULATED, LAYERED WEATHERCOAT COVERED (N) INSULATED, LAYERED WEATHERCOAT COVERED (O) INSULATED, LAYERED WEATHERCOAT COVERED (P) INSULATED, LAYERED WEATHERCOAT COVERED (Q) INSULATED, LAYERED WEATHERCOAT COVERED (R) INSULATED, LAYERED WEATHERCOAT COVERED (S) INSULATED, LAYERED WEATHERCOAT COVERED (T) INSULATED, LAYERED WEATHERCOAT COVERED (U) INSULATED, LAYERED WEATHERCOAT COVERED (V) INSULATED, LAYERED WEATHERCOAT COVERED (W) INSULATED, LAYERED WEATHERCOAT COVERED (X) INSULATED, LAYERED WEATHERCOAT COVERED (Y) INSULATED, LAYERED WEATHERCOAT COVERED (Z) INSULATED, LAYERED WEATHERCOAT COVERED L. PIPING (A) INSULATED, UNDER 250°. (B) INSULATED, OVER 250°. (C) INSULATED, LAYERED WEATHERCOAT COVERED (D) INSULATED, LAYERED WEATHERCOAT COVERED (E) INSULATED, LAYERED WEATHERCOAT COVERED (F) INSULATED, LAYERED WEATHERCOAT COVERED (G) INSULATED, LAYERED WEATHERCOAT COVERED (H) INSULATED, LAYERED WEATHERCOAT COVERED (I) INSULATED, LAYERED WEATHERCOAT COVERED (J) INSULATED, LAYERED WEATHERCOAT COVERED (K) INSULATED, LAYERED WEATHERCOAT COVERED (L) INSULATED, LAYERED WEATHERCOAT COVERED (M) INSULATED, LAYERED WEATHERCOAT COVERED (N) INSULATED, LAYERED WEATHERCOAT COVERED (O) INSULATED, LAYERED WEATHERCOAT COVERED (P) INSULATED, LAYERED WEATHERCOAT COVERED (Q) INSULATED, LAYERED WEATHERCOAT COVERED (R) INSULATED, LAYERED WEATHERCOAT COVERED (S) INSULATED, LAYERED WEATHERCOAT COVERED (T) INSULATED, LAYERED WEATHERCOAT COVERED (U) INSULATED, LAYERED WEATHERCOAT COVERED (V) INSULATED, LAYERED WEATHERCOAT COVERED (W) INSULATED, LAYERED WEATHERCOAT COVERED (X) INSULATED, LAYERED WEATHERCOAT COVERED (Y) INSULATED, LAYERED WEATHERCOAT COVERED (Z) INSULATED, LAYERED WEATHERCOAT COVERED M. STRUCTURAL STEEL (A) INSULATED, UNDER 250°. (B) INSULATED, OVER 250°. (C) INSULATED, LAYERED WEATHERCOAT COVERED (D) INSULATED, LAYERED WEATHERCOAT COVERED (E) INSULATED, LAYERED WEATHERCOAT COVERED (F) INSULATED, LAYERED WEATHERCOAT COVERED (G) INSULATED, LAYERED WEATHERCOAT COVERED (H) INSULATED, LAYERED WEATHERCOAT COVERED (I) INSULATED, LAYERED WEATHERCOAT COVERED (J) INSULATED, LAYERED WEATHERCOAT COVERED (K) INSULATED, LAYERED WEATHERCOAT COVERED (L) INSULATED, LAYERED WEATHERCOAT COVERED (M) INSULATED, LAYERED WEATHERCOAT COVERED (N) INSULATED, LAYERED WEATHERCOAT COVERED (O) INSULATED, LAYERED WEATHERCOAT COVERED (P) INSULATED, LAYERED WEATHERCOAT COVERED (Q) INSULATED, LAYERED WEATHERCOAT COVERED (R) INSULATED, LAYERED WEATHERCOAT COVERED (S) INSULATED, LAYERED WEATHERCOAT COVERED (T) INSULATED, LAYERED WEATHERCOAT COVERED (U) INSULATED, LAYERED WEATHERCOAT COVERED (V) INSULATED, LAYERED WEATHERCOAT COVERED (W) INSULATED, LAYERED WEATHERCOAT COVERED (X) INSULATED, LAYERED WEATHERCOAT COVERED (Y) INSULATED, LAYERED WEATHERCOAT COVERED (Z) INSULATED, LAYERED WEATHERCOAT COVERED N. ELECTRICAL EQUIPMENT (A) INSULATED, UNDER 250°. (B) INSULATED, OVER 250°. (C) INSULATED, LAYERED WEATHERCOAT COVERED (D) INSULATED, LAYERED WEATHERCOAT COVERED (E) INSULATED, LAYERED WEATHERCOAT COVERED (F) INSULATED, LAYERED WEATHERCOAT COVERED (G) INSULATED, LAYERED WEATHERCOAT COVERED (H) INSULATED, LAYERED WEATHERCOAT COVERED (I) INSULATED, LAYERED WEATHERCOAT COVERED (J) INSULATED, LAYERED WEATHERCOAT COVERED (K) INSULATED, LAYERED WEATHERCOAT COVERED (L) INSULATED, LAYERED WEATHERCOAT COVERED (M) INSULATED, LAYERED WEATHERCOAT COVERED (N) INSULATED, LAYERED WEATHERCOAT COVERED (O) INSULATED, LAYERED WEATHERCOAT COVERED (P) INSULATED, LAYERED WEATHERCOAT COVERED (Q) INSULATED, LAYERED WEATHERCOAT COVERED (R) INSULATED, LAYERED WEATHERCOAT COVERED (S) INSULATED, LAYERED WEATHERCOAT COVERED (T) INSULATED, LAYERED WEATHERCOAT COVERED (U) INSULATED, LAYERED WEATHERCOAT COVERED (V) INSULATED, LAYERED WEATHERCOAT COVERED (W) INSULATED, LAYERED WEATHERCOAT COVERED (X) INSULATED, LAYERED WEATHERCOAT COVERED (Y) INSULATED, LAYERED WEATHERCOAT COVERED (Z) INSULATED, LAYERED WEATHERCOAT COVERED O. BUILDINGS (A) INSULATED, UNDER 250°. (B) INSULATED, OVER 250°. (C) INSULATED, LAYERED WEATHERCOAT COVERED (D) INSULATED, LAYERED WEATHERCOAT COVERED (E) INSULATED, LAYERED WEATHERCOAT COVERED (F) INSULATED, LAYERED WEATHERCOAT COVERED (G) INSULATED, LAYERED WEATHERCOAT COVERED (H) INSULATED, LAYERED WEATHERCOAT COVERED (I) INSULATED, LAYERED WEATHERCOAT COVERED (J) INSULATED, LAYERED WEATHERCOAT COVERED (K) INSULATED, LAYERED WEATHERCOAT COVERED (L) INSULATED, LAYERED WEATHERCOAT COVERED (M) INSULATED, LAYERED WEATHERCOAT COVERED (N) INSULATED, LAYERED WEATHERCOAT COVERED (O) INSULATED, LAYERED WEATHERCOAT COVERED (P) INSULATED, LAYERED WEATHERCOAT COVERED (Q) INSULATED, LAYERED WEATHERCOAT COVERED (R) INSULATED, LAYERED WEATHERCOAT COVERED (S) INSULATED, LAYERED WEATHERCOAT COVERED (T) INSULATED, LAYERED WEATHERCOAT COVERED (U) INSULATED, LAYERED WEATHERCOAT COVERED (V) INSULATED, LAYERED WEATHERCOAT COVERED (W) INSULATED, LAYERED WEATHERCOAT COVERED (X) INSULATED, LAYERED WEATHERCOAT COVERED (Y) INSULATED, LAYERED WEATHERCOAT COVERED (Z) INSULATED, LAYERED WEATHERCOAT COVERED												

DESIGN NOTES

1. LETTERS REPRESENT SUCCESSIVE PROCEDURES ON TYPES OF PAINT TO BE APPLIED.

2. LETTER SYMBOLS ABOVE MEANS TO APPLY BY SPRAY. LETTER CIRCLED ① MEANS APPLY BY BRUSH OR ROLL.

3. IN AREAS WHERE THERE IS RAIN OR SPRAYING PARTICLES FROM SPRAYING PAINT, INSIDE-OUT 232 OR SIMILAR FAST-DRYING PAINT IS RECOMMENDED.

CONSTRUCTION NOTES

1. PAINTING SHOULD BE DONE IN DRY WEATHER ON SURFACES FREE FROM DIRT, OIL, AND MOISTURE.

2. ZINC AND LEAD-BASED PAINTS SHOULD NOT BE APPLIED BY SPRAYING UNLESS THE PROCEDURES IN U.S. CO. ACCIDENT PREVENTION BULLETIN 210 ARE FOLLOWED.

3. WHERE ONE COAT OF PRIMER IS SPECIFIED, EQUIPMENT WHICH HAS SHOP COAT SHOULD BE TOUCHED UP ONLY.

4. WHERE TWO COATS OF PRIMER ARE SPECIFIED, EQUIPMENT WHICH HAS SHOP COAT SHOULD BE TOUCHED UP WITH ONE ADDITIONAL PRIMER COAT.

REFERENCE DRAWINGS

DESIGN INSTRUCTIONS 1-7

DESIGN INSTRUCTIONS 1-7

ACCIDENT PREVENTION BULLETIN 210

REVISIONS

NO.	DESCRIPTION	DATE
1		
2		
3		
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PAINTING SPECIFICATION FOR

SCALE: 1"=10' DATE: 1-1-50

DR: CH: JOB NO: 1000

ENG. DEPT: PAINTING SPECIFICATION FOR

W.D. S.O.

THIS SHEET IS PART OF SPECIFICATION NO. _____ FILE NO. _____

HORIZONTAL CENTRIFUGAL PUMP DATA SHEET

PUMP NUMBER		REV.										MANUFACTURER		APPROVALS	
		1	2	3	4	5	6	7	8	9	10				
A. SERVICE															
B. LIQUID CHARACTERISTICS															
LIQUID PUMPED _____															
SPECIFIC GRAVITY AT FLOW TEMP _____ F															
FLOW TEMP _____ (CENTIGRADES) (RSU) _____															
VISCOSITY AT FLOW TEMP _____ (CENTIGRADES) (RSU) _____															
VAPOR PRESSURES AT FLOW TEMP _____ PSIA															
C. CAPACITY AND PRESSURES															
GPM AT FLOW TEMP _____															
SUCTION PRESSURE AT PUMP _____ PSIA															
DIFFERENTIAL _____ PSI															
DISCHARGE _____ PSIA															
DIFFERENTIAL HEAD _____ FT															
NPSH AVAILABLE _____ FT															
NPSH REQUIRED BY PUMP _____ FT															
ENTRANCE VEL. AT IMPELLER EYE AT RATING _____ FT/SEC															
IMPELLER SPEED (RPM) _____															
MAX. CASE WORKING PRESSURE _____ PSIG															
D. MANUFACTURER'S SIZE AND TYPE PUMP															
NUMBER OF STAGES _____															
SERIAL NO. (ON PUMP DATA SHEET) _____															
E. OPERATION															
EFFICIENCY AT RATING _____ %															
BHP AT RATING _____															
MAX. BHP FOR BID IMPELLER DIAMETER _____															
DRIVER HORSEPOWER _____															
IMPELLER DIAMETER, MINIMUM / MAXIMUM _____ IN															
IMPELLER DIAM FOR RATING _____ IN															
RPM _____															
ROTATION FACING PUMP COUPLING _____ (CW) (CCW)															
DRIVER: INTEGRAL OR COUPLED SHAFT _____															
TYPE DRIVER: MOTOR OR TURBINE _____															
DRIVER TO BE FURNISHED BY _____															
MOTOR DATA SHEET NO. _____															
BEMA FRAME NO. OF MOTOR _____															
F. CONSTRUCTION AND MATERIAL															
CASE: OUTER _____															
CASE: INNER _____															
IMPELLER _____															
CASE WEAR RINGS _____															
IMPELLER WEAR RINGS _____															
NOMINAL DIAM OF LARGEST WEAR RING _____ IN															
DIAMETRAL WEAR RING CLEARANCE _____ IN															
SHAFT _____															
SHAFT SLEEVES _____															
DO SHAFT SLEEVES EXTEND THROUGH GLAND? _____															
STAGE PIECES _____															
G. STUFFING BOX DETAILS															
STUFFING BOX, JACKETED OR PLAIN _____															
MECHANICAL SEAL - TYPE _____															
NO. RINGS OF PACKING _____															
DIMENSIONS: LENGTH OF STUFF BOX _____ IN															
INSIDE DIAM _____ IN															
DIAM SHAFT OR SHAFT SLEEVE _____ IN															
WIDTH LANTERN RING _____ IN															
CLAMP RING TO OPEN END BOX _____ IN															
SIZE PACKING _____															
H. BEARINGS & LUBRICATION															
RADIAL - TYPE _____ (SAE NO.) _____															
THRUST - TYPE _____ (SAE NO.) _____															
TYPE OF CLOSURES _____															
LUBRICATION: F = FLOOD, N = RING, G = GREASE															
VISIBLE LUBRICATORS, ALVON OR TRICO: CAP. _____ OZ															
I. CONNECTIONS															
SUCTION: SIZE _____															
FACING _____ ASA															
ROZELLE DIRECTION _____															
DISCHARGE: SIZE _____															
FACING _____ ASA															
ROZELLE DIRECTION _____															
J. TESTING															
DYNAMIC BALANCING OF IMPELLER AT RATED SPEED _____															
PERFORMANCE TEST (WITNESSED) (NOT WITNESSED) _____															
HYDROSTATIC TEST (WITNESSED) (NOT WITNESSED) _____															
HYDROSTATIC TEST PRESSURE _____ PSIG															
INSPECTION REQUIRED? _____															
RUNNING TEST WITH ACTUAL DRIVER _____															
K. MISCELLANEOUS															
PRICE EACH (FOR) (FAS) (NOT INCL. DRIVER) _____															
EXTRA COST FOR DRIVER _____															
EXTRA COST FOR _____															
EXTRA COST FOR _____															
WEIGHT OF BARE PUMP _____ LB															
SHIPMENT FROM RECEIPT OF ORDER _____															
OUTLINE DIMENSION DRAWING NO. _____															
CROSS SECTION DRAWING NO. _____															
PERFORMANCE CURVE _____															

INDEX OF _____ FOR _____ PROJECT, W.O.
 _____ PLANT

ENGR. DEPT. DWG. NUMBER	TITLE	RECORD BL. DISTRIB.	ORDER NO.	SUPPLIER	SUPPLIER'S DWG. NO.	DWB. NO. REQUESTED	REVISION RECORD																		
							COMPLETED OR RECEIVED																		
							SENT TO																		
							0	1	2	3	4	5	6	7	8		0	1	2	3	4	5	6	7	8
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OWB, NO-

INDEX OF CONSTRUCTION DRAWINGS
EF-15a (2M-CO-12-49)

DETAIL 'E'

1/4" Nut Blanks tack weld to skirt 12" c. to c. 1/4" galv. wire mesh 1/2" from skirt See Detail 'E'

2" x 2" x 14 ga. wire mesh furred out 1/2" from skirt See Types A, B, C & D.

1/2" x 45° notch, fill with Grade D Asphalt for seal. Bevel top edge of fireproofing.

Cork Insulation See EF-225

Block Type Insulation See EF-224

Plastic Insulation See EF-224

Fireproof to top of lugs and to base ring between lugs. No fireproofing inside lugs.

Float finish.

Cut mesh around skirt openings.

MATERIAL DATA

Concrete for this fireproofing shall be prepared of the following material:

DOMESTIC

1 part Portland cement
3 1/2 parts 0"-3/16" pre-wetted Haydite aggregate.
1 part No. 1 Bank Sand.
1/2 part slaked lime.
It is essential that the aggregate be thoroughly pre-wetted before mixing.
Mix with distilled water, if necessary, to prevent corrosion of mesh.

FOREIGN

Concrete shall be applied in two layers to a total finish thickness of 2" on the inside and outside. Fireproofing shall be damp cured at least seven days after placing the last layer.

NOTES

Concrete shall be applied in two layers to a total finish thickness of 2" on the inside and outside. Fireproofing shall be damp cured at least seven days after placing the last layer.

MATERIALS ORDER DATA

QUAN	UNIT	DESCRIPTION	QUAN PER SKIRT-FT. MIN.	ORDER NO.
1	Sq. Ft.	2" x 2" x 14 ga galv welded reinf. mesh	1.59 ft.	
1	Sq. Ft.	1/4" x 1/4" sq nut blanks	1 per sq ft.	
1	Sacks	Portland Cement	0.042 Sk.	
1	Cu Yds	0"-3/16" pre-wetted Haydite Aggregate	0.0054 Cu Yd	
1	Cu Yds	No. 1 Bank Sand	0.00156 Cu Yd	
1	Sacks	Slaked lime	0.021 Sk.	

REVISIONS

NO.	DATE	DESCRIPTION
1		

FIREPROOFING SPECIFICATION FOR COLUMN AND VESSEL SKIRT

SQUIRREL CAGE INDUCTION MOTOR DATA SHEET

Date _____

File No. _____

MOTOR NO. _____

A. PURCHASER'S SPECIFICATIONS

1. Horsepower Rating (Continuous) (____ Min.) _____
2. Synchronous Speed, RPM _____
3. Voltage _____
4. Frequency _____
5. Phase _____
6. Enclosure (DP - Dripproof, SP - Splashproof, TEFC - Totally Enclosed Fan Cooled, XP - Explosion Proof. See C-2) _____
7. Temperature Rise - °C _____
8. NEMA Design Letter _____
9. Locked Rotor KVA Code Letter _____
10. Frame Number _____
11. Mounting (H - Horizontal, V - Vertical Solid Shaft, VH - Vertical Hollow Shaft) _____
12. Bearing Type _____
13. Bearing Lubrication (See C-3) _____
14. Insulation Class _____
15. Direction of Rotation (viewed from end opposite shaft extension) _____
16. Built-in Thermal Protection Required (See C-4) _____
17. _____
18. _____
19. _____

B. SUPPLIER'S DATA

1. Manufacturer _____
2. Manufacturer Type Designation _____
3. Full Load Speed, RPM _____
4. Full Load Current, AMP _____
5. Outline Dimension Drawing No. _____
6. _____
7. _____
8. _____

C. GENERAL SPECIFICATIONS

1. Motor shall be designed and fabricated in accordance with NEMA Publication No. MG 1-1949, "Standards for Motors and Generators."
2. Explosion-proof motors shall comply with the Requirements of Underwriters' Laboratories for Class I Group D hazardous locations and shall bear their label. Motors designed with additional protection for use in the chemical industry are preferred.
3. Oil lubricated bearings shall be equipped with a device for maintaining constant oil level with visible indication of oil level.
4. Settings for thermal protection:
Class A insulation - 100°C; Class B insulation - 120°C.
5. Motor shall be designed for full voltage starting unless otherwise specified.

REVISIONS

SCALE

DATE

ENG. DEPT.

OPR'G. DEPT.

APPROVED

Furnace Designation: _____

Service _____

GENERAL OPERATING CONDITIONS

Total Duty, Btu/hr
Max. Allowable Radiant Absorption Rate } Btu
Actual Radiant Absorption Rate } hr/ft²
Actual Convection Absorption Rate }
Max. Allowable Pressure Drop, Psi
Calculated Pressure Drop, Psi

Case	Case	Case

FEED

Composition	Case	Case	Case	Mol. Wt.	Case	Case	Case
				Gravity, ° API			
				Density, lb/gal °F			
				Quantity, lb/hr.			
				Quantity, GPM °F			
				Dist. Curve Dwg. No.			

OPERATING CONDITIONS

Temperature, °F
Pressure, Psi (Gage) (Absolute)
Weight Percent Vaporized
Viscosity, Liquid; Centipoise
Viscosity, Vapor, Centipoise
Enthalpy, Btu/lb. above 60°F

Inlet			Outlet		
Case	Case	Case	Case	Case	Case

TUBES - - - Designation

Effective Length, Ft.
Diam. & Thickness, ins.
Material
Max. Allowable Skin Temp., °F
Radiant Area, Sq. ft.
Convection Area, Sq. ft.
Total Area, Sq. ft.

HEADERS - - - Designation

Type
Material: Header Body & Plug
Holding Member
Screw
Screw Diameter, ins.
Screw Thread

BURNERS Type:

Fuel gas: L.H.V. _____ Btu./cu.ft.; Mol. wt. _____; Pressure at Burner _____ psig.
Fuel Oil: L.H.V. _____ Btu./lb.; Gravity: _____ °API at _____ °F
Viscosity, _____ SUS at _____ °F; Temp. _____ °F; Press. _____ psig.
Atomizing Provision: _____

Miscellaneous Design Data: _____

DESIGN DATA SHEET FOR FURNACE F - _____

Section _____

Plant at _____

EF-194 (200-CD-8-48)

Chevron BB
013789

STEAM TURBINE DATA SHEET

THIS SHEET IS PART OF SPECIFICATION NO. E

FILE NO.

TURBINE NUMBER		EXHAUST FACING		EXHAUST ON RT. OR LEFT SIDE FACING COY. END		SHAFTS ON TURBINE CASEY SIZE		INSPECTION REQUIRED		MFG'S ROUTINE TESTS FOR SETTING GOVERNOR AND CHECKING BEARINGS TO BE WITNESSED BY INSPECTOR		MOTOR DYNAMICALLY BALANCED		MISCELLANEOUS		(THE ITEMS BELOW REFER TO TURBINE AND REDUCTION GEAR AS A UNIT IF A GEAR IS TO BE FURNISHED)		PRICE EACH: (FOB) (FAS)		SHIPMENT FROM RECEIPT OF ORDER		EXTRA COST FOR		EXTRA COST FOR		EXTRA COST FOR		WEIGHT UNBOXED		OUTLINE DIMENSION DRAWING		PARTS LIST AND CROSS-SECTION DRAWING		INSTALLATION AND OPERATING INSTRUCTIONS		MARK TURBINE: DRIVER FOR		MANUFACTURER'S SERIAL NUMBER		REDUCTION GEAR		GEAR MANUFACTURER AND MODEL NO.		GEAR RATIO		OUTPUT SHAFT RPM		OUTPUT SHAFT ROTATION VIEWED FROM TURBINE GOVERNOR END		RATED HP OF GEAR SET AT LOW SPEED COUPLING		ACTIVE GEAR FACE		CENTER DISTANCE BETWEEN GEAR SHAFTS		TYPE LUBRICATION - SPLASH OR FORCED		TYPE OIL COOLER FOR GEAR (SHELL & TUBE)		TYPE OF FLEXIBLE COUPLING BETWEEN TURBINE & GEAR		COUPLING GUARD BETWEEN TURBINE AND GEAR		GEAR PARTS LIST AND CROSS-SECTION DRAWING		INSTALLATION AND OPERATING INSTRUCTIONS FOR GEAR		NOTES																							
A. PRINCIPAL DESIGN CONDITIONS		DRIVER MACHINE		SERVICE (CONTINUOUS) (STAND-BY)		HORSEPOWER OUTPUT REQUIRED (GEAR LOSS DEDUCTED IF ANY)		SPEED OF TURBINE WHEEL: RPM		ROTATION VIEWED FROM COY. END: (CW) (CCW)		STEAM SUPPLY: INITIAL PRESSURE PSIG		(QUALITY %) (TOTAL TEMP. F)		BACK PRESSURE: (PSIG) (INCHES HG VAC.)		HORIZONTAL OR VERTICAL TYPE		B. TURBINE DESIGN FEATURES		MANUFACTURER'S MODEL NO.		PITCH DIAMETER OF TURBINE WHEEL INCHES		NUMBER OF PRESSURE STAGES		MAX. HP WHEN NEW (NOMINAL STEAM CONDITIONS & SPEED)		MAX. HP OF MACHINE WITHOUT MAJOR ALTERATIONS (NOZZLE & GOVERNOR CHANGES ONLY - SAME SIZE)		NUMBER OF WINDMILLS		MAX. HP AT RATED SPEED AT EACH INADVALVE OPENING		TYPE OF GOVERNOR (MECHANICAL, ORIFICE, ETC.)		SPEED ADJUSTABLE VALVE RATING: 5 ABOVE / 5 BELOW		GOVERNOR ADAPTABLE TO AUTOMATIC SPEED CHANGE CONTROL		TYPE SPEED CONTROL REQUIRED OR PROPOSED		MAX. ALLOWABLE OPERATING BACK PRESS. OR CASE PSIG		MAX. SAFE SPEED WITH GOVERNOR FURNISHED		MAX. ALLOWABLE STEAM TEMP. AT RATED INLET PRESSURE FULL LOAD		STEAM RATE AT RATED SPEED, LB/HP/HR: 1/2 LOAD		C. CONSTRUCTION DETAILS		DOES OVERSPEED TRIP OPERATE VALVE SEPARATELY FROM GOVERNOR VALVE		OVERSPEED TRIP GOVERNOR SET AT		STEAM STRAINER PROVIDED? INTEGRAL OR SEPARATE		CARRYING RELIEF OR SENTINEL WARNING VALVE: TYPE/SIZE		RELIEF OR WARNING VALVE SETTING		STEAM RING AND VALVE CHEST MATERIAL		TYPE OF SHAFT PACKING		NUMBER OF RINGS IN EACH PACKING BOX		TYPE THRUST BEARING (SEE NO. IF BALL TYPE)		TYPE RADIAL BEARING (SEE NO. IF BALL TYPE)		BEARING LUBRICATION - (FORCED) (RING) (SPLASH)		CONSTANT LEVEL OILERS, 4 OZ. ALLOY OR TRICO (IF SPLASH OR RING OILED)		TYPE OIL COOLING - (SHELL AND TUBE) (COIL IN RESERVOIR) (CORED JACKET)		E. CONNECTIONS		INLET SIZE		INLET RATING		INLET FACING		EXHAUST SIZE		EXHAUST RATING	

APPROVALS: _____

REV. _____

MANUFACTURER'S: _____

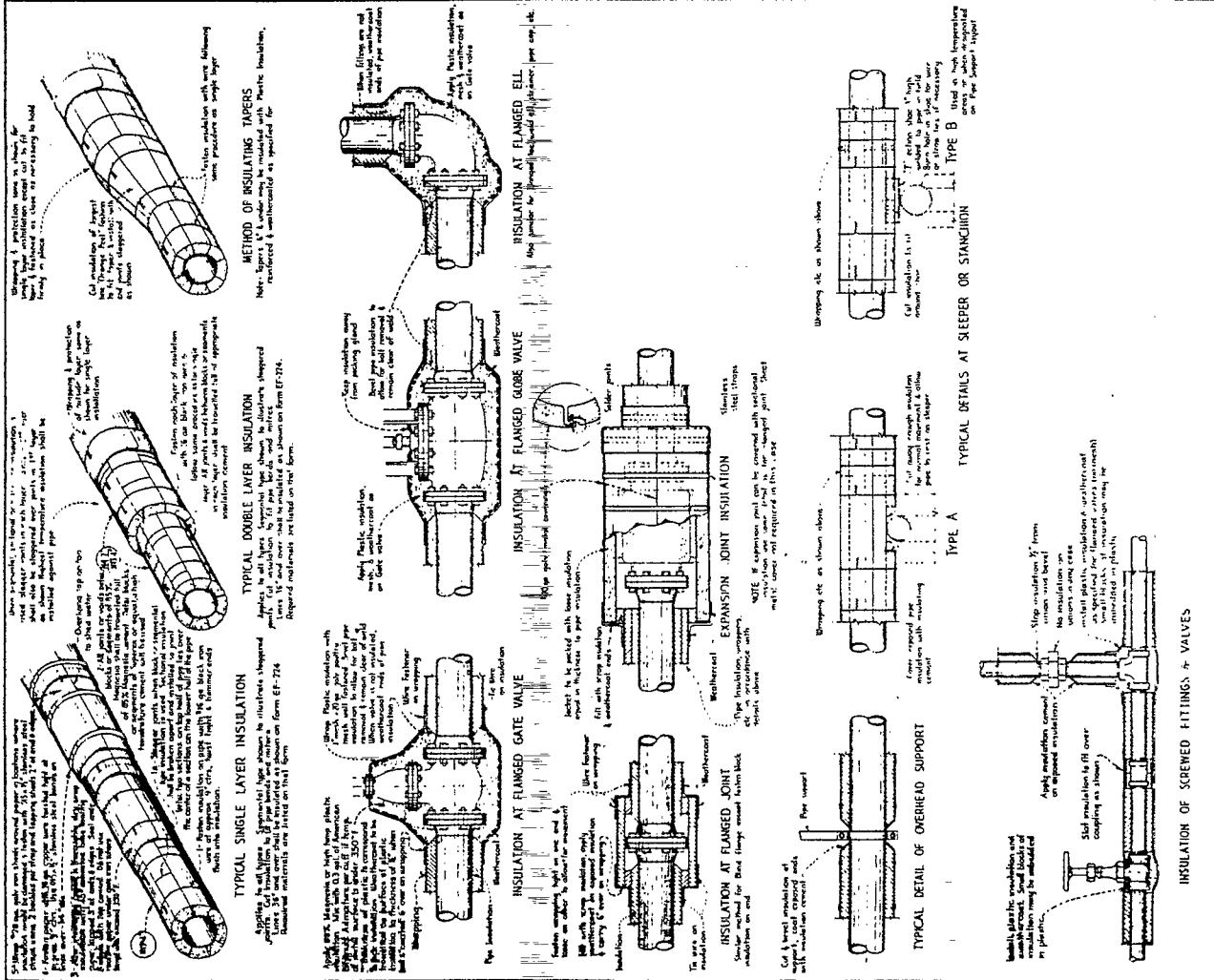
PLANT: _____

17-221 (808-03 - 4-90)

LIST OF MATERIAL REQUIRED FOR INSULATION SHOWN ON DWG.

ITEM NO.	SECTIONAL DESCRIPTION	QUANTITY	UNIT	REMARKS	ORDER NO.
N1	85% MAGNESIA	19'	LINEAL FEET		
N2	85% MAGNESIA	19'	LINEAL FEET		
N3	85% MAGNESIA	19'	LINEAL FEET		
N4	85% MAGNESIA	19'	LINEAL FEET		
N5	85% MAGNESIA	19'	LINEAL FEET		
N6	85% MAGNESIA	19'	LINEAL FEET		
N7	85% MAGNESIA	19'	LINEAL FEET		
N8	85% MAGNESIA	19'	LINEAL FEET		
N9	85% MAGNESIA	19'	LINEAL FEET		
N10	85% MAGNESIA	19'	LINEAL FEET		
N11	85% MAGNESIA	19'	LINEAL FEET		
N12	85% MAGNESIA	19'	LINEAL FEET		
N13	85% MAGNESIA	19'	LINEAL FEET		
N14	85% MAGNESIA	19'	LINEAL FEET		
N15	85% MAGNESIA	19'	LINEAL FEET		
N16	85% MAGNESIA	19'	LINEAL FEET		
N17	85% MAGNESIA	19'	LINEAL FEET		
N18	85% MAGNESIA	19'	LINEAL FEET		
N19	85% MAGNESIA	19'	LINEAL FEET		
N20	85% MAGNESIA	19'	LINEAL FEET		
N21	85% MAGNESIA	19'	LINEAL FEET		
N22	85% MAGNESIA	19'	LINEAL FEET		
N23	85% MAGNESIA	19'	LINEAL FEET		
N24	85% MAGNESIA	19'	LINEAL FEET		
N25	85% MAGNESIA	19'	LINEAL FEET		
N26	85% MAGNESIA	19'	LINEAL FEET		
N27	85% MAGNESIA	19'	LINEAL FEET		
N28	85% MAGNESIA	19'	LINEAL FEET		
N29	85% MAGNESIA	19'	LINEAL FEET		
N30	85% MAGNESIA	19'	LINEAL FEET		
N31	85% MAGNESIA	19'	LINEAL FEET		
N32	85% MAGNESIA	19'	LINEAL FEET		
N33	85% MAGNESIA	19'	LINEAL FEET		
N34	85% MAGNESIA	19'	LINEAL FEET		
N35	85% MAGNESIA	19'	LINEAL FEET		
N36	85% MAGNESIA	19'	LINEAL FEET		
N37	85% MAGNESIA	19'	LINEAL FEET		
N38	85% MAGNESIA	19'	LINEAL FEET		
N39	85% MAGNESIA	19'	LINEAL FEET		
N40	85% MAGNESIA	19'	LINEAL FEET		
N41	85% MAGNESIA	19'	LINEAL FEET		
N42	85% MAGNESIA	19'	LINEAL FEET		
N43	85% MAGNESIA	19'	LINEAL FEET		
N44	85% MAGNESIA	19'	LINEAL FEET		
N45	85% MAGNESIA	19'	LINEAL FEET		
N46	85% MAGNESIA	19'	LINEAL FEET		
N47	85% MAGNESIA	19'	LINEAL FEET		
N48	85% MAGNESIA	19'	LINEAL FEET		
N49	85% MAGNESIA	19'	LINEAL FEET		
N50	85% MAGNESIA	19'	LINEAL FEET		
N51	85% MAGNESIA	19'	LINEAL FEET		
N52	85% MAGNESIA	19'	LINEAL FEET		
N53	85% MAGNESIA	19'	LINEAL FEET		
N54	85% MAGNESIA	19'	LINEAL FEET		
N55	85% MAGNESIA	19'	LINEAL FEET		
N56	85% MAGNESIA	19'	LINEAL FEET		
N57	85% MAGNESIA	19'	LINEAL FEET		
N58	85% MAGNESIA	19'	LINEAL FEET		
N59	85% MAGNESIA	19'	LINEAL FEET		
N60	85% MAGNESIA	19'	LINEAL FEET		
N61	85% MAGNESIA	19'	LINEAL FEET		
N62	85% MAGNESIA	19'	LINEAL FEET		
N63	85% MAGNESIA	19'	LINEAL FEET		
N64	85% MAGNESIA	19'	LINEAL FEET		
N65	85% MAGNESIA	19'	LINEAL FEET		
N66	85% MAGNESIA	19'	LINEAL FEET		
N67	85% MAGNESIA	19'	LINEAL FEET		
N68	85% MAGNESIA	19'	LINEAL FEET		
N69	85% MAGNESIA	19'	LINEAL FEET		
N70	85% MAGNESIA	19'	LINEAL FEET		
N71	85% MAGNESIA	19'	LINEAL FEET		
N72	85% MAGNESIA	19'	LINEAL FEET		
N73	85% MAGNESIA	19'	LINEAL FEET		
N74	85% MAGNESIA	19'	LINEAL FEET		
N75	85% MAGNESIA	19'	LINEAL FEET		
N76	85% MAGNESIA	19'	LINEAL FEET		
N77	85% MAGNESIA	19'	LINEAL FEET		
N78	85% MAGNESIA	19'	LINEAL FEET		
N79	85% MAGNESIA	19'	LINEAL FEET		
N80	85% MAGNESIA	19'	LINEAL FEET		
N81	85% MAGNESIA	19'	LINEAL FEET		
N82	85% MAGNESIA	19'	LINEAL FEET		
N83	85% MAGNESIA	19'	LINEAL FEET		
N84	85% MAGNESIA	19'	LINEAL FEET		
N85	85% MAGNESIA	19'	LINEAL FEET		
N86	85% MAGNESIA	19'	LINEAL FEET		
N87	85% MAGNESIA	19'	LINEAL FEET		
N88	85% MAGNESIA	19'	LINEAL FEET		
N89	85% MAGNESIA	19'	LINEAL FEET		
N90	85% MAGNESIA	19'	LINEAL FEET		
N91	85% MAGNESIA	19'	LINEAL FEET		
N92	85% MAGNESIA	19'	LINEAL FEET		
N93	85% MAGNESIA	19'	LINEAL FEET		
N94	85% MAGNESIA	19'	LINEAL FEET		
N95	85% MAGNESIA	19'	LINEAL FEET		
N96	85% MAGNESIA	19'	LINEAL FEET		
N97	85% MAGNESIA	19'	LINEAL FEET		
N98	85% MAGNESIA	19'	LINEAL FEET		
N99	85% MAGNESIA	19'	LINEAL FEET		
N100	85% MAGNESIA	19'	LINEAL FEET		

ITEM NO.	SECTIONAL DESCRIPTION	QUANTITY	UNIT	REMARKS	ORDER NO.
N101	85% MAGNESIA	19'	LINEAL FEET		
N102	85% MAGNESIA	19'	LINEAL FEET		
N103	85% MAGNESIA	19'	LINEAL FEET		
N104	85% MAGNESIA	19'	LINEAL FEET		
N105	85% MAGNESIA	19'	LINEAL FEET		
N106	85% MAGNESIA	19'	LINEAL FEET		
N107	85% MAGNESIA	19'	LINEAL FEET		
N108	85% MAGNESIA	19'	LINEAL FEET		
N109	85% MAGNESIA	19'	LINEAL FEET		
N110	85% MAGNESIA	19'	LINEAL FEET		
N111	85% MAGNESIA	19'	LINEAL FEET		
N112	85% MAGNESIA	19'	LINEAL FEET		
N113	85% MAGNESIA	19'	LINEAL FEET		
N114	85% MAGNESIA	19'	LINEAL FEET		
N115	85% MAGNESIA	19'	LINEAL FEET		
N116	85% MAGNESIA	19'	LINEAL FEET		
N117	85% MAGNESIA	19'	LINEAL FEET		
N118	85% MAGNESIA	19'	LINEAL FEET		
N119	85% MAGNESIA	19'	LINEAL FEET		
N120	85% MAGNESIA	19'	LINEAL FEET		
N121	85% MAGNESIA	19'	LINEAL FEET		
N122	85% MAGNESIA	19'	LINEAL FEET		
N123	85% MAGNESIA	19'	LINEAL FEET		
N124	85% MAGNESIA	19'	LINEAL FEET		
N125	85% MAGNESIA	19'	LINEAL FEET		
N126	85% MAGNESIA	19'	LINEAL FEET		
N127	85% MAGNESIA	19'	LINEAL FEET		
N128	85% MAGNESIA	19'	LINEAL FEET		
N129	85% MAGNESIA	19'	LINEAL FEET		
N130	85% MAGNESIA	19'	LINEAL FEET		
N131	85% MAGNESIA	19'	LINEAL FEET		
N132	85% MAGNESIA	19'	LINEAL FEET		
N133	85% MAGNESIA	19'	LINEAL FEET		
N134	85% MAGNESIA	19'	LINEAL FEET		
N135	85% MAGNESIA	19'	LINEAL FEET		
N136	85% MAGNESIA	19'	LINEAL FEET		
N137	85% MAGNESIA	19'	LINEAL FEET		
N138	85% MAGNESIA	19'	LINEAL FEET		
N139	85% MAGNESIA	19'	LINEAL FEET		
N140	85% MAGNESIA	19'	LINEAL FEET		
N141	85% MAGNESIA	19'	LINEAL FEET		
N142	85% MAGNESIA	19'	LINEAL FEET		
N143	85% MAGNESIA	19'	LINEAL FEET		
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N147	85% MAGNESIA	19'	LINEAL FEET		
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N149	85% MAGNESIA	19'	LINEAL FEET		
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N151	85% MAGNESIA	19'	LINEAL FEET		
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N160	85% MAGNESIA	19'	LINEAL FEET		
N161	85% MAGNESIA	19'	LINEAL FEET		
N162	85% MAGNESIA	19'	LINEAL FEET		
N163	85% MAGNESIA	19'	LINEAL FEET		
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N182	85% MAGNESIA	19'	LINEAL FEET		
N183	85% MAGNESIA	19'	LINEAL FEET		
N184	85% MAGNESIA	19'	LINEAL FEET		
N185	85% MAGNESIA	19'	LINEAL FEET		
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N193	85% MAGNESIA	19'	LINEAL FEET		
N194	85% MAGNESIA	19'	LINEAL FEET		
N195	85% MAGNESIA	19'	LINEAL FEET		
N196	85% MAGNESIA	19'	LINEAL FEET		
N197	85% MAGNESIA	19'	LINEAL FEET		
N198	85% MAGNESIA	19'	LINEAL FEET		
N199	85% MAGNESIA	19'	LINEAL FEET		
N200	85% MAGNESIA	19'	LINEAL FEET		



THIS SHEET IS A PART OF SPECIFICATION NO.

FILE NO.

[illegible]

IF-268 (900-CD - 6-30)

(Standard) ITEM LIST
 (FOR PROCESS PLANTS)
 (Specific for Manufacturing Department Projects)

(Project Title) _____ (Location) _____
 PLANT NO. _____ (Project Division) _____

APPROP. NO.

S.O.

ACCT.

ITEM NO.

DESCRIPTION

ITEM

LABOR

MAT'L

TOTAL

(FOR DEFINITIONS OF ITEMS SEE SPECIFICATION NO. E-977)

GROUP I - TECHNICAL SERVICES & PRORATE ITEMS

A - Technical Services

a. Engineering Department Service

1	Engineering & Drafting	93
2	Photoreproduction Serv. & Direct Chgs.	93
3	Project Record Books	93
11	Outside Engineering Services	93

b. Manufacturing Department Service

30	Home Office Manufacturing Engineering Dept.	93
31	Refinery Engineering	93
32	Field Engineering Supervision & Inspection	93
33	Design Consultation by Operating Department	93
34	Fire Watch and Gas Testing	94

c. Miscellaneous Technical Services

40	California Research Corporation	99
41	Training Operators	01
42	Materials Inspection by Purch. & Stores Dept.	99

Technical Services Subtotal -

B. Prorate Items

50	Erection Contractors Fee	01
51	Contractors Field Office Expense	01
52	Workmen's Compensation, Public Liability and property damage insurance, builder's risk insurance, and payroll taxes	01
53	Construction Equipment Rental & Expense	01
54	Purchase & Maintenance of Hand Tools	01
55	Purchase Of Consumable Tool Supplies	01
56	Temporary Lines & Structures	01
57	Cleanup	01

Issue Date _____

EF-294 (200-CD-7-50)
 Sheet 1

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ACCT.</u> <u>ITEM</u>	<u>LABOR</u>	<u>MAT'L</u>	<u>TOTAL</u>
58	Utilities Used During Construction	01			
59	Staging & Form Lumber	01			
60	Material Handling	01			
61	Motor Transport Department	99			
62	Consumable Construction Materials	01			

Prorates Subtotal -

TOTAL GROUP I -

GROUP II - PLANT EQUIPMENT ITEMS

C - Columns, Strippers, Absorbers & Reactors
 (Inc. Internals and Packing)
 (Examples listed below)

General Instructions for Allocating Charges

100	Alterations to Existing Columns, etc.	05			
101	Repairs to Existing Columns, etc.	06			
102	Dismantling Existing Columns, etc.	07			
103	Atmospheric Column - C-101	44			
104	Vacuum Column - C-205	44			
105	Vacuum Column Side Cut Stripper C-206	44			
106	Catalytic Reactor Tower C-301	44			
100					
101					
102					
103					
104					
105					
106					
107					
108					
109					
110					
111					

Issue Date _____

EF-294 (200-CD-7-50)
 Sheet 2

Chevron BB
 013796

W.O. or S.O. No. _____
 Plant _____
 Page 3 of 14

ITEM NO.	DESCRIPTION	ACCT.			
		ITEM	LABOR	MAT'L	TOTAL
112					
120					
121					
122					
123					
124					
to 129					

D - Drums, Tanks and Other Containers
 (Incl. Internals and Packing)
 (Examples listed below)

130	Alterations to Existing Containers(Enumerate)	05
131	Repairs to Existing Containers (Enumerate)	06
132	Dismantling Existing Containers (Enumerate)	07
133	Atmospheric Column Overhead Reflux Drum V-101	33
134	1st Stage Acid Treater V-205	34
135	2nd Stage Acid Settler V-206	34
136	Primary Agitator V-301	32
137	Secondary Acid Retort V-102	50
138	Storage Tanks and Drums (Atmospheric or Pressure Type)	31
139		
140	Storage Bins	26
130		
131		
132		
133		
134		
135		
136		
137		
138		

Issue Date _____

EF-294 (200-CD-7-50)
 Sheet 3

Chevron BB
 013797

W.O. or S.C. No. _____
Plant _____
Page 4 of 14

ITEM NO.	DESCRIPTION	ACCT.			
		ITEM	LABOR	MAT'L	TOTAL
139					
140					
141					
142					
143					
144					
to 159					

E - Exchangers, Condensers, Coolers, Heaters, & Cooling Towers
(Examples listed below)

160	Alterations to Existing Exchangers	05
161	Repairs to Existing Exchangers	06
162	Dismantling Existing Exchangers	07
163	Crude Asphalt Exchanger E-101	45
164	Rerun Column Reboiler E-303	45
165	Side Cut Cooler E-201	45
166	Feedwater Heater and Other Water Heaters	80
167	Cooling Tower	54

160		
161		
162		
163		
164		
165		
166		
167		
168		
169		
170		
171		
172		

Issue Date _____

EF-294 (200-CD-10-48)
Sheet 4

Chevron BB
013798

W.O. or S.O. No. _____
Plant _____
Page 5 of 14

ITEM NO.	DESCRIPTION	ACCT.			
		ITEM	LABOR	MAT'L	TOTAL
173					
174					
175					
176					
177					
178					
179					
to 209					

F - Furnaces and Boilers, incl. Stacks & Flues
(Examples Listed Below)

210	Alteration of Existing Furnaces, etc. (Enumerate)	05
211	Repair Existing Furnaces, etc. (Enumerate)	06
212	Dismantling Existing Furnaces, etc. (Enumerate)	07

Furnace F-1

213	Brickwork and Burners	47
214	Steelwork (Frame, walks & stairs, etc.)	47
215	Tubes & Headers, tube support castings	43
216	Stack	46
217	Flues & Ducts	46

Boiler F-201

218	Brickwork and Burners	47
219	Steel Work (including tubes and drums)	43
220	Stacks	46
221	Flues & Ducts	46
222	Inert Gas Generator F3	47
223	Kilns & Driers	52
224	Addition of Side Wall Tubes, etc.	43
210		

211		
212		

Issue Date _____

EF-294 (200-CD-7-50)
Sheet 5

W.O. or S.C. No. _____
Plant _____
Page 6 of 14

ITEM NO.	DESCRIPTION	ACCT.			
		ITEM	LABOR	MAT'L	TOTAL
213	_____				
214	_____				
215	_____				
216	_____				
217	_____				
218	_____				
219	_____				
220	_____				
221	_____				
222	_____				
to 239	_____				

G - Pumping Equipment and Drivers, Incl. Centrifugal,
Reciprocating, Rotary, Jet & Ejector Types
(Examples listed below)

240	Alterations to Existing Pumps and Drivers	05
241	Repairs to Existing Pumps and Drivers	06
242	Dismantling Existing Pumps and Drivers	07
243	All Pumps	57
244	All Pump Drive Motors	58
245	All Pump Drive Turbines	56
246	All Pump Drive Engines	56
247	All Vacuum Pumps and Ejectors	80
240	_____	
241	_____	
242	_____	
243	_____	
244	_____	
245	_____	
246	_____	

Issue Date _____

EF-294 (200-CD-7-50)
Sheet 6

Chevron BB
013800

W.O. or S.O. No. _____
 Plant _____
 Page 7 of 14

ITEM NO.	DESCRIPTION	ACCT.			
		ITEM	LABOR	MAT'L	TOTAL
247					
248					
249					
250					
251					
252					
253					
254					
255					
256					
257					
258					
259					

J - Instrumentation
 (Examples listed below)

260	Alterations to Existing Instrumentation	05
261	Repairs to Existing Instrumentation	06
262	Dismantling Existing Instrumentation	07
263	New Instruments and Equipment (including piping, wiring, conduit, and appliances)	59
264	Control Valves	59
265	Instrument Panel Boards	59
266	Safety Valves Relieving Columns	44
267	Safety Valves Relieving Tanks	31
268	Safety Valves Relieving Agitators (Wash Tanks) and Bleachers	32
269	Safety Valves Relieving Miscellaneous Vessel	33
270	Safety Valves Relieving Continuous Treaters and Settling Drums	34
271	Safety Valves Relieving Retorts	50
272	Safety Valves Relieving Exchangers	45
273	Safety Valves Relieving Pumps	57
274	Safety Valves in Combination Relief System	39

Issue Date _____

EF-294 (200-CD-10-48)
 Sheet 7

Chevron BB
 013801

ITEM NO.	DESCRIPTION	ACCT.			
		ITEM	LABOR	MAT'L	TOTAL
260					
261					
262					
263					
264					
265					
266					
267					
268					
269					
270					
271					
272					
273					
274					
to 279					

K - Compressors, Blowers, and Other Mechanical Equipment - (Examples Listed Below)

280	Alterations to Existing Equipment	05
281	Repairs to Existing Equipment	06
282	Dismantling Existing Equipment	07
283	Feed Compressor K101	55
284	Oil, Grease & Misc. Mixers	35
285	Filters, filter presses and centrifuges	36
286	Cranes, derricks, and hoists	63
287	Screening & Pulverizing Equipment	60
288	Conveyors & Elevators	67
289	Permanent Shop or Portable Tools & Machinery	68
290	Ventilating Fans	55
292	"Package" Refrigeration Unit	80
293	"Package" Air Conditioning Unit	80

Issue Date _____

EF-294 (200-DC-7-50)
 Sheet 8

Chevron BB
 013802

W&O. or S.O. No. _____
Plant _____
Page 9 of 14

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ACCT.</u> <u>ITEM</u>	<u>LABOR</u>	<u>MAT'L</u>	<u>TOTAL</u>
280					
281					
282					
283					
284					
285					
286					
287					
288					
289					
290					
291					
292					
293					
294					
295					
296					
297					
298					
299					

L - Lines (Piping)

300	Alterations to Existing Piping	05
301	Repairs to Existing Piping, Valves	06
302	Dismantling Existing Piping	07
303	Process Piping (incl. off-plot Transfer Lines)	39
304	Utility piping	40

Issue Date _____

EF-294 (200-CD-7-50)
Sheet 9

Chevron BB
013803

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ACCT.</u> <u>ITEM</u>	<u>LABOR</u>	<u>MAT'L</u>	<u>TOTAL</u>
305	Fire Protection Lines	38			
306	Vapor Recovery & Breathing Piping	41			
307	(If "On Plot" and "Off Plot") lines are both included in one item list, assign separate item No's.)				
309	_____				
310	_____				
to 319	_____				
M - <u>Steel and Concrete Structures (Excl. Foundations)</u>					
320	Alterations to Existing Structures	05			
321	Repairs to Existing Structures	06			
322	Dismantling Existing Structures	07			
323	Support Structures for Columns	44			
324	Support Structures for Tanks	31			
325	Support Structures for Agitators and Bleachers	32			
326	Support Structures for Miscellaneous Single Containers	33			
327	Support Structures for Continuous Treeters and Settling Drums	34			
328	Support Structures for Retorts	50			
329	Support Structures for Exchangers	45			
330	Support Structures for Filters, Centrifuges, etc.	36			
331	Platforms, ladders, and stairs affixed to a single column	44			
332	Platforms, ladders, and stairs affixed to a single tank	31			
333	Platforms, ladders, and stairs affixed to a single agitator	32			
334	Platforms, ladders, and stairs affixed to a single miscellaneous container	33			
335	Platforms, ladders and stairs affixed to a single continuous treater or settling drum	34			
336	Platforms, ladders, and stairs affixed to a single retort	50			
337	Platforms, ladders, and stairs affixed to a single exchanger	45			
338	Elevated walks, stairs and ladders serving more than one unit of equipment	71			
339	Low walks, stairs or stiles (steel or wood)	14			
340	Loading racks and unloading racks for tank cars	27			

Issue Date _____

EF-294 (200-CD-7-50)
 Sheet 10

Chevron BB
 013804

ITEM NO.	DESCRIPTION	ACCT.			
		ITEM	LABOR	MAT'L	TOTAL
341	Loading racks and unloading racks for trucks	27			
342	Shelters for pumps, starter panels and other equipment (includes shelters with roof, without four walls)	80			
343	Pipe supports(brackets, hangers, stanchions, sleepers), trestles and bridges for overhead pipeways	42			
344	Retaining walls (except earth firewalls)	17			
345	Bridges and trestles (excl. those for pipe lines and excluding R.R. trackage)	16			
346	Wharves and Docks	28			
347	Davits	63			
348	_____				
349	_____				
350	_____				
351	_____				
to 359	_____				
N - <u>Insulation (Excl. Furnaces)</u>					
360	Alterations to Existing Insulation	05			
361	Repairs to Existing Insulation	06			
362	Dismantling Existing Insulation	07			
363	Insulation on Columns	44			
364	Insulation on Tanks	31			
365	Insulation on Agitators and bleachers	32			
366	Insulation on Miscellaneous containers	33			
367	Insulation on continuous treaters or settling drums	34			
368	Insulation on retorts	50			
369	Insulation on exchangers	45			
370	Insulation on process oil, and vapor piping	39			
371	Insulation on Utility Piping	40			
372	Insulation on Fire Protection Lines	38			
373	Fireproofing	02			
374	_____				
375	_____				
376	_____				
377	_____				

Issue Date _____

EF-294 (200-CD-7-50)
 Sheet 11

Chevron BB
 013805

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ACCT.</u> <u>ITEM</u>	<u>LABOR</u>	<u>MAT'L</u>	<u>TOTAL</u>
378	_____				
379	_____				
<u>P - Power & Lighting</u>					
380	Alterations to Existing Power & Lighting	05			
381	Repairs to Existing Power & Lighting	06			
382	Dismantling Existing Power & Lighting	07			
383	Power & Electric Light Poles incl. crossarms, guys, supports, insulators and hardware (Trunk line to substation)	21			
384	Telephone & Communication System incl. wire, conduit, instruments and signaling equipment	22			
385	Power & Lighting wiring on poles incl. pole top switches, cutouts, etc.	23			
386	Power transformers, switchgear, substation and distribution panels but not motor branch circuit breakers or switches	23			
387	Conduit systems incl. fittings, pull boxes, manholes, etc. for feeder wiring	23			
388	Feeder wiring, substation to distribution panels	23			
389	Lighting transformers, wiring, conduit and fittings, switches and lighting fixtures outside buildings, (include control houses and small buildings)	23			
390	Lighting transformers, wiring, conduit and fittings, switches and lighting fixtures inside buildings having feeder circuits separate from general plant lighting	25			
391	Motor Control Conduit Systems between distribution panels and motors, incl. conduit fittings and pull boxes	58			
392	Motor wiring, incl. power and control circuits between distribution panels and motors	58			
393	Motor controls, including circuit breakers, push buttons, safety devices, etc. between distribution panels and motors	58			
<u>Q - Foundations</u>					
400	Alterations to Existing Foundations	05			
401	Repairs to Existing Foundations	06			
402	Dismantling Existing Foundations	07			
403	Foundations for columns	44			
404	Foundations for tanks	31			
405	Foundations for agitators & bleachers	32			

Issue Date _____

EF-294 (200-CD-7-50)
 Sheet 12

ITEM NO.	DESCRIPTION	ACCT.		
		ITEM	LABOR	MAT'L TOTAL
406	Foundations for miscellaneous containers	33		
407	Foundations for continuous treaters or settling drums	34		
408	Foundations for exchangers	45		
409	Foundations for pumps	57		
410	Foundations for buildings (includes floor slab)	25		
411	Foundations for stanchions, sleepers and over-head pipeway bridges	42		
412	Foundations for loading and unloading racks	27		
413	Concrete foundations serving more than one unit of equipment	02		
414	Piling (prorate at completion of job)	09		
415				
to 419				
R - <u>Control Rooms and Other Buildings</u>				
420	Alterations to Existing Buildings	05		
421	Repairs to Existing Buildings	06		
422	Dismantling Existing Buildings	07		
423	Control house or gager's house	25		
424	Office and locker room building	25		
425	Shop buildings, warehouses, pump houses, starter houses, garages, & misc. buildings	25		
426	Bunkhouses, cottages	25		
427	Furniture for control house	77		
428	Furniture for office & locker room buildings	77		
429				
S - <u>Services, Sewers, Roads & Misc.</u>				
430	Alterations to existing equipment (misc. & minor not affecting plant valuation)	05		
431	Repairs to existing equipment	06		
432	Dismantling (general for clearing site)	07		
433	Grading & filling (NOTE: Large grading & filling jobs that add available acreage to plant site charge to "land" Acct. Item 12)	11		
434	Roads, walks and pavements including associated gutters & curbs (excluding steel walks see "M")	14		
435	Pipe trenches, culverts, pits, earth reservoirs	42		
436	Painting	04		

Issue Date _____

EF-294 (200-CD-7-50)
 Sheet 13

Chevron BB
 013807

ITEM NO.	DESCRIPTION	ACCT.		
		ITEM	LABOR	MAT'L TOTAL
437	Equipment, fire protection	72		
438	Equipment, First Aid Cabinets, Blankets, Gas Masks, etc.	75		
439	Equipment, employee welfare & safety (Recreation facilities & equipment; general safety equipment)	76		
440	Equipment, laboratory excluding glassware	92		
441	Equipment, operator's handtools	95		
442	Equipment, perishable, including lab. glassware	96		
443	Hydrostatic testing	93		
444	Fencing	15		
445	Firewalls (earth only)	72		
446	Railroad spur trackage	18		
447	Sewers, oil & sanitary, excluding separators	37		
448	Separators, Settling Basins & Sumps	30		
449	Water Wells	53		
T - <u>Chemicals</u>				
460	Chemical charges to plant, incl. catalysts	91		

Issue Date _____

EF-294 (200-CD-7-50)
 Sheet 14

Chevron BB
 013808

[illegible]

REFERENCE DRAWINGS-

[illegible]

NOTES FOR MATERIAL ORDERING

① Indicates one fitting of this size required for each size assembly

② Indicates one fitting of this size required for each larger size assemblies late

③ thru ⑤ assembly

line size fittings

* Refer to Design Note N96, Dwg G8-1.99596

see Dwg G8-1.99596 for material:

(1) Reducers around 1" minimum valve and strainers for "1" & 1 1/4" assemblies

(2) Bushings for "1" - 1 1/4" & 2" Yarrow traps

(3) Flanges for "1" - 1 1/4" & 2" Yarrow traps

(1) Material for optional emergency bleeders. If installed N° 6, Dwg G8-1.99596

see Dwg G8-1.99596 for material:

(1) Reducers around 1" minimum valve and strainers for "1" & 1 1/4" assemblies

(2) Bushings for "1" - 1 1/4" & 2" Yarrow traps

(3) Flanges for "1" - 1 1/4" & 2" Yarrow traps

(1) Material for optional emergency bleeders. If installed N° 6, Dwg G8-1.99596

REPORT
LIST OF MATERIAL AND
SCHEDULE FOR STEAM TRAPS

SCALE _____ DATE _____
DR. _____ CH. _____ ENO'R _____
OPN'S DEPT. _____

EF-302, (10-CD-4-5Q)

REFINERY
APPR. NO.

PROJECT

S.O. NO.

S.O. NO.

[illegible]

REFINERY
APPR. NO.

S. O. NO.

DATE _____

[illegible]

EF-33.

