PLAINTIFF'S
EXHIBIT
UC-P-127

DESIGN REPORT

PART IV - POWER OIL SYSTEM

POLYETHYLENE UNIT - PLANT CA

WP-6038

John

017239

DESIGN REPORT

PART IV - POWER OIL SYSTEM

POLYETHYLENE UNIT - PLANT CA

WP-6038

Change made as per Change #1 - 1-15-53
" " " " " #2 - 4-1-53
" " " " " #3 - 5-8-53
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" " " " " #5 - 8-20-53
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GAS PROCESS ENGINEERING AND DEVELOPMENT DEPARTMENT

CARBIDE AND CARBON CHEMICALS COMPANY

SOUTH CHARLESTON, WEST VIRGINIA

NOVEMBER 11, 1952

017240

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DESIGN REPORT

PART IV - POWER OIL SYSTEM

POLYETHYLENE UNIT - PLANT CA

WP-6038

INTRODUCTION

This report contains two sections. Section I covers the equipment, instruments, piping, and valves necessary for the installation of the Power Oil System for the Polyethylene Unit at the Seadrift Plant. Section II contains detailed specifications for all special components of the electrical control system which coordinates the Power Oil System and the High Pressure Pumping System. Section II also contains a block diagram of the complete interlock system for the entire Polyethylene Unit and detailed wiring diagrams for the control circuit on the Power Oil System.

The Power Oil System consists of five hydraulic pumping units. Each unit comprises two pairs of Vickers variable delivery piston pumps, one 700-hp double shaft extension synchronous motor for each pair of pumps, two six-inch solenoid-operated four-way valves, and one hydraulic power unit complete with accessories. Each of the five hydraulic pumping units operates in conjunction with five high pressure intensifier-type pumping units covered in Design Report, Part III, WP-6037.

The five hydraulic pumping units are housed in the north side of the High Pressure Pump Building. This side of the Pump Building shall be completely enclosed and shall contain unit heaters of capacity sufficient to keep the inside temperature above the outside ambient during cold weather or at anytime the motors are shut down. Equipment layout and process piping shall follow the pattern established in Design Report, Part III, WP-6037, covering the High Pressure Pumping System. Special provisions shall be taken in designing the equipment foundations and piping supports to withstand the sometimes severe vibratory loads of the hydraulic oil piping. The pipe supports shall utilize wooden blocks similar to those shown on C&CCC Drawing A-258160 with anchors similar to C&CCC Drawing A-258158.

The sub-floors in both the Power Oil Room and the High Pressure Pump Room shall be sloped to floor drains for the collection of oil leakage. These drains shall be run to a common header and thence to an underground tank located in the yard area at the west end of the High Pressure Pump Building. An underground storage tank for clean hydraulic oil will be located in this same area.

The operating floor in the Power Oil Room shall be made of galvanized steel grating in conformance with C&CCC Standard S-148.

INTRODUCTION (CONT'D)

Peep-holes through the fire wall similar to those on C&CCC Drawing A-258140 shall be located at eye level and approximately in the center of the bay at each unit.

An instrument panel for ten alarm signal lights, 6038E-421K through 6038E-425K and 6038E-421R through 6038E-425R, shall be located in the Power Oil Room approximately centered along the north wall.

Lighting intensity in the Power Oil Room shall conform with that given or C&CCC Standard EL-149 for Compressor Room and fixtures shall conform generally with C&CCC Standard EL-105 for hazardous locations. Yard lighting shall be in conformance with C&CCC Standards EL-103 or EL-104 with the choice dictated by the particular area to be lighted. Electrical grounding shall conform with C&CCC Standard EL-5.

The power supply to the 700-hp motors shall be interlocked with the Auxiliary Gas Supply System as described on page 3 of Design Report, Part VIII, WP-6043, for said system. The power supply to the 700-hp motors shall also be interlocked with the respective supercharge pump motor (6038E-421B, etc.) and coolant pump motor (6038E-431A, etc.) so that it may not be started unless both auxiliary pumps are running and will stop if either auxiliary pump stops.

Start - stop switches for each of the supercharge pump motors and each of the coolant pump motors shall be provided as follows:

(1) One switch for each motor located on the north wall of the Power Oil Room opposite each pumping unit.

(2) One switch for each motor located on a panel on the fire wall in the High Pressure Pump Room opposite each unit. The motors may be operated from either location.

Start - stop switches for the 700-hp motors shall be provided as follows:

(1) One emergency stop switch to stop both motors located in the Reactor Control Room on the respective Reaction Cell Panel.

(2) One emergency stop switch to stop both motors located on the north wall of the Power Oil Room opposite each unit.

(3) One start - stop switch for each motor located on a panel on the fire wall in the High Pressure Pump Room opposite each unit. These switches are to be wired so that each motor may be started independently but both motors will be stopped by either switch.

LIST OF MAJOR EQUIPMENT

Flow Diagram H3B-P1044

6038E-401, -401A thru -410, -410A	Hydraulic Oil Pumps
6038E-401B thru -410B	700-hp Synchronous Motors ✓
6038E-401C thru -410C	Hydraulic Oil Pump Base Plates
6038E-401E thru -410E	6" Solenoid-Operated Four-Way Valves
6038E-421 thru -425	Supercharge Pumps
6038E-421A thru -425A	Hydraulic Oil Reservoirs
6038E-421B thru -425B	50-hp Electric Motors ✓
6038E-421C thru -425C	2" Solenoid-Operated Four-Way Valves
6038E-421M thru -425M	Pilot Oil Pumps
6038E-431 thru -435	5/ Cooling Oil Pumps
6038E-431A thru -435A	Electric Motors ✓
6038E-441 thru -450	Oil Coolers
6038E-461	Overhead Crane (Not shown on flow diagram)
6038E-462	Clean Oil Storage Tank
6038E-463	Dirty Oil Storage Tank
6038E-464	Centrifugal Oil Separator ✓
6038E-471, -471A	Hydraulic Oil Pumps
6038E-473, -473A	6" Solenoid-Operated Four-Way Valves
6038E-475	Cooling Oil Pump
6038E-476	Supercharge Pump
6038E-477	2" Solenoid-Operated Four-Way Valve
6038E-478	Pilot Oil Pump

EQUIPMENT LIST

Flow Diagram H3B-R1044

Unless H3B Department is to direct purchase, all items will be billed from information provided in this design report.

6038E-401 THRU -410 - HYDRAULIC OIL PUMPS

Ten (10) Vickers Model No. PV-2500-FHE variable delivery piston pumps for clockwise rotation. For complete specifications, see page 73.

H3B Department to direct purchase.

Item No.	Property No.
6038E-401	CA-6306-118
6038E-402	CA-6306-119
6038E-403	CA-6306-120
6038E-404	CA-6306-121
6038E-405	CA-6306-122
6038E-406	CA-6306-123
6038E-407	CA-6306-124
6038E-408	CA-6306-125
6038E-409	CA-6306-126
6038E-410	CA-6306-127

6038E-401A THRU -410A - HYDRAULIC OIL PUMPS

Ten (10) Vickers Model No. PV-2500-FHE-LH variable delivery piston pumps for counter-clockwise rotation. For complete specifications, see page 73.

H3B Department to direct purchase.

Item No.	Property No.
6038E-401A	CA-6306-128
6038E-402A	CA-6306-129
6038E-403A	CA-6306-130
6038E-404A	CA-6306-131
6038E-405A	CA-6306-132
6038E-406A	CA-6306-133
6038E-407A	CA-6306-134
6038E-408A	CA-6306-135
6038E-409A	CA-6306-136
6038E-410A	CA-6306-137

6038E-401B THRU -410B - SYNCHRONOUS MOTORS

Ten (10) 700-hp, 720-rpm, 4160-volt, 3-phase, 60-cycle synchronous motors. For complete specifications, see page 76.

H3B Department to direct purchase.

Item No.	Property No.
6038E-401B	CA-6213-208
6038E-402B	CA-6213-209
6038E-403B	CA-6213-210
6038E-404B	CA-6213-211
6038E-405B	CA-6213-212
6038E-406B	CA-6213-213
6038E-407B	CA-6213-214
6038E-408B	CA-6213-215
6038E-409B	CA-6213-216
6038E-410B	CA-6213-217

6038E-401C THRU -410C - HYDRAULIC OIL PUMP BASE PLATES

Ten (10) hydraulic pump and motor base plates. Underside of base plate to be packed with sound absorbent material to minimize noise. For complete specifications, see page 78.

H3B Department to direct purchase.

6038E-401D THRU -410D - HYDRAULIC OIL ACCUMULATORS

Ten (10) Vickers Model A1-2050-10 hydraulic oil accumulators; 3,000 lb per sq in. working pressure, gas-oil capacity 2,050 cubic inches. Refer to detailed specifications on page 81, reference number (16).

H3B Department to direct purchase.

Item No.	Property No.	Location
6038E-401D	CA-6476-105	H-421
6038E-402D	CA-6476-106	H-431
6038E-403D	CA-6476-107	H-422
6038E-404D	CA-6476-108	H-432
6038E-405D	CA-6476-109	H-423
6038E-406D	CA-6476-110	H-433
6038E-407D	CA-6476-111	H-424
6038E-408D	CA-6476-112	H-434
6038E-409D	CA-6476-113	H-425
6038E-410D	CA-6476-114	H-435

6038E-401E THRU -410E - FOUR-WAY VALVES

Ten (10) six-inch pilot-operated, four-way valves, Vickers Model No. EO-10968-E. For complete specifications, see page 79.

H3B Department to direct purchase.

Item No.	Property No.
6038E-401E	CA-6308-33
6038E-402E	CA-6308-34
6038E-403E	CA-6308-35
6038E-404E	CA-6308-36
6038E-405E	CA-6308-37
6038E-406E	CA-6308-38
6038E-407E	CA-6308-39
6038E-408E	CA-6308-40
6038E-409E	CA-6308-41
6038E-410E	CA-6308-42

6038E-401E-1 THRU -410E-1 - SOLENOID-OPERATED PILOT FOUR-WAY VALVES

Ten (10) 1/4" solenoid-operated pilot four-way valves, Vickers Model No. DG4S4-022-20, and sub-plates, Vickers Model No. DGSM-02-10. See specifications for Items 6038E-401E thru -410E. These will be located on the fire wall in the Power Oil Room opposite the respective units.

H3B Department to direct purchase.

6038E-401E-2 THRU -410E-2 - SOLENOID AND BRACKET ASSEMBLIES (Not shown on flow diagram)

Ten (10) solenoid and bracket assemblies for Items 6038E-401E-1 thru -410E-1. To be used as spares. See specifications for Items 6038E-401E thru -410E.

H3B Department to direct purchase.

6038E-401F THRU -410F - SIGHT FLOW INDICATORS

Ten (10) Wm. W. Nugent Company 3" Figure 1366T cast iron sight flow indicators with 3" IPS threaded ends, and painted finish.

Locations follow:

Item No.	Location
6038E-401F	H-461
6038E-402F	H-461
6038E-403F	H-462
6038E-404F	H-462
6038E-405F	H-463

6038E-401F THRU -410F - SIGHT FLOW INDICATORS (CONT'D)

Item No.	Location
6038E-406F	H-463
6038E-407F	H-464
6038E-408F	H-464
6038E-409F	H-465
6038E-410F	H-465

6038E-401 THRU -410G - PRESSURE GAUGES

Ten (10) Vickers Model No. GS-3000 pressure gauges. Items 6038E-401G, -403G, -405G, -407G, and -409G located on H-401 thru -405 respectively. Items 6038E-402G, -404G, -406G, -408G, and -410G located on H-411 thru -415 respectively. Refer to detailed specifications on page 81, reference number (15).

H3B Department to direct purchase.

6038E-401H THRU -410H - SIGHT FLOW INDICATORS

Ten (10) sight flow indicators, duplicates of Items 6038E-401F thru -410F.

Locations follow:

Item No.	Location
6038E-401H	H-451
6038E-402H	H-451
6038E-403H	H-452
6038E-404H	H-452
6038E-405H	H-453
6038E-406H	H-453
6038E-407H	H-454
6038E-408H	H-454
6038E-409H	H-455
6038E-410H	H-455

6038E-401J THRU -410J - THERMOCOUPLE WELL ASSEMBLIES

Ten (10) thermocouple assemblies. To be connected to Item 6037E-352. For connections and switch designations see Item 6037E-352, Design Report, Part III, High Pressure Pumping System.

Specifications

Type	Thermocouple Assemblies

Embedded bayonet thermocouple per Drawing TE-2678-L.

6038E-401J THRU -410J - THERMOCOUPLE WELL ASSEMBLIES (CONT'D)

Specifications (Cont'd)

Element	Copper-constantan
Adapter	Stainless steel, TA-2670, 3/8-24 NF-3 threads
Insertion depth, "X" dimension	14-1/2"
Flexible metal armor	28" long

Assembly per Drawing A3E-E121 to include tube adapter and thermocouple head.

Manufacturer — Revere Corporation

18-8 Cr-Ni steel separable socket 12" below 1" mounting thread to be supplied by purchaser per Drawing A3E-E151-A, type 1.

For field installation supply adapter for 3/8 NF-3 thread to 3/4" pipe thread.

Installation Notes: Head to be mounted on end of rigid conduit at a distance of not more than two feet from point of temperature measurement.

Locations are given in the following table:

Item No.	Location	Nameplate
6038E-401J	H-401	Discharge West No. 1 Vickers
6038E-402J	H-411	Discharge East No. 1 Vickers
6038E-403J	H-402	Discharge West No. 2 Vickers
6038E-404J	H-412	Discharge East No. 2 Vickers
6038E-405J	H-403	Discharge West No. 3 Vickers
6038E-406J	H-413	Discharge East No. 3 Vickers
6038E-407J	H-404	Discharge West No. 4 Vickers
6038E-408J	H-414	Discharge East No. 4 Vickers
6038E-409J	H-405	Discharge West No. 5 Vickers
6038E-410J	H-415	Discharge East No. 5 Vickers

6038E-401J-1 - THERMOCOUPLE LEADWIRE (Not shown on flow diagram)

Specifications

Type	No. 20 B&S gage copper-constantan
Insulation	Polyvinyl each wire; weatherproof braid overall
Length	To be supplied later
Manufacturer	Industrial Pyrometer and Supply Company

Installation Note: To connect thermocouples, Items 6038E-401J thru -410J, to indicating potentiometer, Item 6037E-352.

6038E-401K THRU -410K - PURGE ASSEMBLIES

To be fabricated in the field per Drawing D-199612 using No. 70 orifice nipples and 0 - 100 psi range pressure gauges. To pass 20 scfh air with 50 psi upstream and atmospheric pressure downstream. Install in line AA-402 to Items 6038E-401B thru -410B per Drawing D-199612 for air purge on collector rings of electric motors.

6038E-401L THRU -410L - PRESSURE GAUGES

Ten (10) Vickers Model No. GS-3000 pressure gauges. Install on Items 6037E-301 thru -305 and 6037E-301A thru -305A respectively. Refer to detailed specifications on page 81, reference number (15).

H3B Department to direct purchase.

6038E-401M THRU -410M - LIMIT SWITCHES (Not shown on flow diagram)

Ten (10) Micro Switch Company Model EX-AR explosion-proof limit switches. Mount on high pressure intensifiers, Items 6037E-301, -301A thru -305, -305A, under supervision of the Operating Department. Refer to Section II for wiring diagram.

6038E-401N THRU -410N - LIMIT SWITCHES (Not shown on flow diagram)

Ten (10) Micro Switch Company Model EX-AR-30 explosion-proof limit switches. Mount on high pressure intensifiers, Items 6037E-301, -301A thru -305, -305A, under supervision of the Operating Department. Refer to Section II for wiring diagram.

6038E-401-0 THRU -410-0 - NOT USED

6038E-401P THRU -410P - SEE ELECTRICAL SECTION

6038E-411 THRU -420 - NOT USED

6038E-421 THRU -425 - SUPERCHARGE PUMPS

Five (5) Vickers Model No. VF3-60-60-M pumps, to be located on Items 6038E-421A thru -425A. For complete specifications, see page 81.

H3B Department to direct purchase.

Item No.	Property No.
6038E-421	CA-6306-138
6038E-422	CA-6306-139
6038E-423	CA-6306-140
6038E-424	CA-6306-141
6038E-425	CA-6306-142

6038E-421A THRU -425A - HYDRAULIC OIL RESERVOIRS

Five (5) 700 gallon atmospheric working pressure hydraulic oil reservoirs. For complete specifications, see page 81.

H3B Department to direct purchase.

Item No.	Property No.
6038E-421A	CA-6392-262
6038E-422A	CA-6392-263
6038E-423A	CA-6392-264
6038E-424A	CA-6392-265
6038E-425A	CA-6392-266

6038E-421B THRU -425B - 50-HP ELECTRIC MOTORS

Five (5) 50-hp, 1200-rpm, 440-volt, 3-phase, 60-cycle explosion-proof motors for Class I, Group D installation. To be supplied with Items 6038E-421 thru -425.

H3B Department to direct purchase.

Item No.	Property No.
6038E-421B	CA-6213-218
6038E-422B	CA-6213-219
6038E-423B	CA-6213-220
6038E-424B	CA-6213-221
6038E-425B	CA-6213-222

6038E-421C THRU -425C - SOLENOID-OPERATED FOUR-WAY VALVES

Five (5) Vickers Model No. DF5S4-160C-20, 2" solenoid-operated four-way valves. Refer to detailed specifications on page 81, reference number (5).

H3B Department to direct purchase.

Item No.	Property No.
6038E-421C	CA-6308-43
6038E-422C	CA-6308-44
6038E-423C	CA-6308-45
6038E-424C	CA-6308-46
6038E-425C	CA-6308-47

6038E-421D THRU -425D - VENTURI FILTERS

Five (5) Vickers Model No. OF1-16-30, 2" Venturi filters. Install in 2" lines HH-461 thru HH-465 respectively. Refer to detailed specifications on page 81, reference number (13).

H3B Department to direct purchase.

6038E-421E THRU -425E - VENTURI FILTERS

Five (5) Vickers Model No. OF1-06-20, 3/4" Venturi filters. Install in 3/4" lines HH-421 thru -425 respectively. Refer to detailed specifications on page 81, reference number (12).

H3B Department to direct purchase.

6038E-421F THRU -425F - PRESSURE GAUGES

Five (5) Vickers Model No. GS-1200 pressure gauges. Install in 2" lines HH-461 thru HH-465 respectively. Refer to detailed specifications on page 81, reference number (11).

H3B Department to direct purchase.

6038E-421G THRU -425G - PRESSURE GAUGES

Five (5) Vickers Model No. GS-1200 pressure gauges. Install in 3/4" lines HH-421 thru HH-425 respectively. Refer to detailed specifications on page 81, reference number (11).

H3B Department to direct purchase.

6038E-421H THRU -425H - SIGHT FLOW INDICATORS

Five (5) Wm. W. Nugent Company 1-1/2" Figure 1366T plain sight flow indicators with polished brass finish. Install in lines HHH-441 thru HHH-445 respectively.

6038E-421J THRU -425J - LIQUID LEVEL ALARMS (Not shown on flow diagram)

Five (5) liquid level alarms, to be mounted in hydraulic oil reservoirs, Items 6038E-421J thru -425J.

Specifications

Type	Liquid Level Alarm
Model	A-25-ST-EP
Operating conditions	54°C, atmospheric pressure
Liquid gravity	0.85 at 54°C
Construction	Bronze body with 2-1/2" thread for horizontal mounting. Stainless steel float rod and float. Explosion-proof cover.
Manufacturer	Jo Bell Products, Inc.

Furnish as per Specification.

6038E-421K THRU -425K - ALARM SIGNAL (Not shown on flow diagram)

Five (5) lights actuated by Items 6038E-421J thru -425J respectively with specifications as follows:

Type	Two lights in parallel Off - indicating normal On - red, indicating abnormal
Located	Panel in Power Oil Room
Nameplates	Low Oil - No. 1 thru No. 5 respectively

6038E-421L - ALARM HORN (Not shown on flow diagram)

One (1) horn to be actuated by any one of the following: Items 6038E-421J and R thru -425J and R and 6037E-358 thru -361. Horn to be installed with re-set and located in the High Pressure Pump Room.

6038E-422L THRU 425L - NOT USED

6038E-421M THRU -425M - PILOT OIL PUMPS

Five (5) Vickers Model No. V-124-10-LH pumps to be located on Items 6038E-421A thru -425A. For complete specifications, see page 81.

H3B Department to direct purchase.

Item No.	Property No.
6038E-421M	CA-6306-148
6038E-422M	CA-6306-149
6038E-423M	CA-6306-150
6038E-424M	CA-6306-151
6038E-425M	CA-6306-152

6038E-421N - SIGNAL LIGHT (Not shown on flow diagram)

Type	Two lights in parallel Off - indicating normal On - red, indicating abnormal
Located	Master panel in High Pressure Pump Room
Service	To indicate low oil level in any of the hydraulic oil reservoirs
Nameplate	Low Vickers Oil
Actuated by	Items 6038E-421J thru -425J

6038E-422N THRU -425N - NOT USED

6038E-421-O THRU -425-O - NOT USED

6038E-421P - RE-SET BUTTON (Not shown on flow diagram)

To function so as to permit silencing of horn, Item 6038E-421L, with lights left burning to indicate source of trouble.

Note: Lights to continue burning until trouble has been corrected at which time alarm circuit will re-set itself automatically.

6038E-422P THRU -425P - NOT USED

6038E-421Q - POWER-ON LIGHT (Not shown on flow diagram)

One (1) light to indicate whether or not power is on the level alarm systems, Items 6038E-421J and R thru -425J and R.

Type	Two lights in parallel On - green, indicating normal Off - indicating abnormal

6038E-422Q THRU -425Q - NOT USED

6038E-421R THRU -425R - LIQUID LEVEL ALARMS (Not shown on flow diagram)

Five (5) alarms duplicating Items 6038E-421J thru -425J. To be mounted on Items 6038E-421A thru -425A and serve as high level alarms and actuate alarm lights, Items 6038E-421S thru -425S respectively. Any of these alarms will also actuate alarm horn, Item 6038E-421L, and alarm light, Item 6038E-421T.

6038E-421S THRU -425S - ALARM LIGHTS (Not shown on flow diagram)

Five (5) lights duplicating Items 6038E-421K thru -425K and actuated by Items 6038E-421R thru -425R respectively.

Located	Panel in Power Oil Room
Nameplates	High Oil - No. 1 thru No. 5 respectively

6038E-421T - SIGNAL LIGHT (Not shown on flow diagram)

Duplicate of Item 6038E-421N.

Located	Master panel in High Pressure Pump Room
Service	To indicate high oil level in any of the hydraulic oil reservoirs
Nameplate	High Vickers Oil
Actuated by	Items 6038E-421R thru -425R

6038E-422T THRU -425T - NOT USED

6038E-426 THRU -430 - NOT USED

6038-421U THRU -425U - OIL FILTERS

See change #3

6038E-431 THRU -435 - OIL PUMPS

Five (5) pumping units to be billed from this design report per specifications on page 85.

Item No.	Property No.
6038E-431	CA-6306-143
6038E-432	CA-6306-144
6038E-433	CA-6306-145
6038E-434	CA-6306-146
6038E-435	CA-6306-147

6038E-431A THRU -435A - ELECTRIC MOTORS

Five (5) electric motors to drive pumps, Items 6038E-431 thru -435. To be billed from this design report per specifications on page 85.

Item No.	Property No.
6038E-431A	CA-6213-223
6038E-432A	CA-6213-224
6038E-433A	CA-6213-225
6038E-434A	CA-6213-226
6038E-435A	CA-6213-227

6038E-431B THRU -435B - BASE PLATES

Five (5) base plates for pumps and motors, Items 6038E-431 and -431A thru 6038E-435 and -435A. Included with pump specifications on page 85.

6038E-431C THRU -435C - OIL FILTERS

Five (5) filters with following specifications:

Cuno Engineering Corporation Auto-Klean No. AK-233, Type EGLF-3

Material	Standard
Filter element	Material - stainless steel Length - 8" Spacing - 0.008"
Connections	Inlet and outlet - 2" flanged Drain - 3/4" IPS

Locations and property numbers follow:

Item No.	Location	Property No.
6038E-431C	HHH-481	CA-6311-27
6038E-432C	HHH-482	CA-6311-28
6038E-433C	HHH-483	CA-6311-29
6038E-434C	HHH-484	CA-6311-30
6038E-435C	HHH-485	CA-6311-31

6038E-436 THRU -440 - NOT USED

6038E-441 THRU -450 - OIL COOLERS

Ten (10) oil coolers in accordance with detailed specifications on page 87.

H3B Department to direct purchase.

Item No.	Property No.
6038E-441	CA-6376-327
6038E-442	CA-6376-328
6038E-443	CA-6376-329
6038E-444	CA-6376-330
6038E-445	CA-6376-331
6038E-446	CA-6376-332
6038E-447	CA-6376-333
6038E-448	CA-6376-334
6038E-449	CA-6376-335
6038E-450	CA-6376-336

for addition See C. #3

6038E-441A, -443A, -445A, -447A, AND -449A - STRAINERS

Five (5) strainers as follows:

Leslie cast iron or equivalent

Working pressure	250 psi at 450°F
Size	3"
Connections	Screwed
Screen	Monel with 0.045" perforations

Install in WWWW-401 thru WWWW-405 respectively.

6038E-451 THRU -460 - NOT USED

6038E-461 - OVERHEAD CRANE (Not shown on flow diagram)
Property Nos.: Crane - [redacted] CA-6550-8
Crane Hoist - CA-6514-8

One (1) double girder, overhead, handpower, traveling crane of five (5) ton capacity for standby service. To have anti-friction bearings, hand-operated trolley, and hand-operated chain hoist of five (5) tons capacity. Runway and rails shall be furnished by Purchaser and installation shall be similar to C&CCC SK-54208B (not included in this report). Crane shall serve entire length of Power Oil Room.

6038E-462 - CLEAN OIL STORAGE TANK
Property No. CA-6392-267

One (1) 72" OD x 26' - 0" overall length, 50 psi working pressure vessel. For complete specifications, see page 89. This will be installed underground with coating per Protective Covering Specifications on page 105.

H3B Department to direct purchase.

6038E-462A - SLIP GAUGE

One (1) slip gauge fabricated in accordance with SK-27349 (not included in this report). Install in oil storage tank, Item 6038E-462.

6038E-462B - PRESSURE GAUGE

One (1) pressure gauge as follows:

Ashcroft No. 1279A with white dial.

Dial size	4-1/2"
Range	0 - 60 psi
Connection	Bottom
Located	AA-406
Mounted	Equipment

6038E-462C - PRESSURE REDUCING REGULATOR

To control downstream pressure in air line 1" AA-406.

Specifications

Type	630
Connection, size	1" IP size
Orifice size	1/2" diameter
Pressure, upstream	90 psi
downstream	17 to 30 psi
Material	Cast iron
Manufacturer	Fisher Governor Company

6038E-462D - RELIEF VALVE

One (1) 1" Lunk Figure 1045 relief valve set at 50 psi. Install on line AA-406.

6038E-462E - OIL FILTER
Property No. CA-6311-34

One (1) filter as follows:

Cuno Engineering Corporation Auto-Klean No. AK-220, Type EGL

6038E-462E - OIL FILTER (CONT'D)

Material	Standard
Filter element	Material - stainless steel Length - 6" Spacing - .015"
Inlet and outlet	1-1/2" IPS

Note: Install in HH-491.

6038E-462F - POSITIVE DISPLACEMENT METER

To meter flow in hydraulic oil supply line HH-491.

Specifications

Type	Positive Displacement Meter
Connections	1" female pipe thread
Flow conditions	20 to 25 gpm of oil at 25 psig; 300 SSU viscosity
Register	Vertical type in gallons
Model No.	ER-23
Manufacturer	Pittsburgh Equitable Meter Company

Furnish as per Specification.

6038E-463 - DIRTY OIL STORAGE TANK
Property No. CA-6392-268

One (1) 4' - 0" OD x 12' - 6" overall length 50 psi working pressure vessel. For complete specifications, see page 91. This will be installed underground with coating per Protective Covering Specifications on page 105.

H3B Department to direct purchase.

6038E-463A - PRESSURE INDICATOR RECEIVER (R)
Property No. CA-6332-492

To indicate level in dirty oil storage tank, Item 6038E-463.

Mounted	Panel in High Pressure Pump Room
Nameplate	Dirty Oil Tank Liquid Level

Specifications

Range, scale	0 to 50 inches of water
Pressure element	Receiver hydron
Manufacturer	The Foxboro Company

Furnish as per General Specification Forms A3E-F1 through A3E-F20 incl.

Installation notes: Connect to transmitter 6038E-463A-1.

(A)

6038E-463A-1 - FLOW TRANSMITTER
Property No. CA-6332-2856

Specifications

Range	0 to 50 inches of water
Manometer:	Dry type for 750 psi working pressure
material, body	Steel
material, element	Z-nickel
Connections	1/4 inch NPT
Manufacturer	The Foxboro Company

Furnish as per General Specification Forms A3E-F1 through A3E-F20 incl.

Installation notes: Install with gas blowback.

Connect to receiver 6038E-463A.

6038E-463B - PRESSURE GAUGE

One (1) pressure gauge as follows:

Ashcroft No. 1279A with white dial.

Dial size	4-1/2"
Range	0 - ~~60~~ 100 psi
Connection	Bottom
Located	AA-407
Mounted	Equipment

6038E-463C - RELIEF VALVE

Duplicate of Item 6038E-462D. Set at ~~30~~ 50 psig. Install on AA-407.

~~6038E-463D - PRESSURE REDUCING REGULATOR~~

~~Duplicate of Item 6038E-462C. To control downstream pressure in AA-407.~~

6038E-463E - OIL FILTER
Property No. CA-6311-33

One (1) filter as follows:

Cuno Engineering Corporation Auto-Klean No. AK-220, Type EGL.

Material	Standard
Filter element	Material - stainless steel
	Length - 8"
	Spacing - .015"
Inlet and outlet	1-1/2" IPS

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Note: Install in HH-404.

6038E-464 - CENTRIFUGAL OIL SEPARATOR (Not shown on flow diagram)
Property No. CA-6311-32
Motor Property No. CA-6213-228

One (1) Model No. 45-25P DeLaval Portable Uni-Matic Centrifugal Oil Purifier. Included as accessories are two (2) 20 ft lengths of 3/4" oil resistant flexible hose. For complete specifications, see page 22

6038E-465 - PRESSURE REDUCING REGULATOR (A)

Install in line PP-408.

Specifications

Type	630
Connections, size	1-inch IPS
Orifice, size	1/8 inch diameter
Pressure, upstream	600 lb per sq in.
downstream, range	46 to 95 lb per sq in.
Material, body	Cast steel/cast iron
inner valve	18-8 Cr-Ni steel
Manufacturer	Fisher Governor Company

6038E-465A - PRESSURE GAUGE (A)

Ashcroft 1279A, 4-1/2" white dial, range 0-100, bottom connection. Install in line PP-408 downstream of Item 6038E-465.

6038E-465B - RELIEF VALVE (A)

1" Lunkenheimer Figure 1045 relief valve set at 50 psi. Install in line PP-408 downstream of 6038E-465.

6038E-466 - HYDRAULIC OIL ACCUMULATOR (Not shown on flow diagram)
Property No. CA-6476-115

Duplicate of Item 6038E-401D. To be used as spare. Refer to detailed specifications on page 81, reference number (16).

H3B Department to direct purchase.

6038E-467 - VENTURI FILTER (Not shown on flow diagram)

Duplicate of Item 6038E-421D. To be used as spare. Refer to detailed specifications on page 81, reference number (13).

H3B Department to direct purchase.

6038E-468 - VENTURI FILTER (Not shown on flow diagram)

Duplicate of Item 6038E-421E. To be used as spare. Refer to detailed specifications on page 81, reference number (12).

H3B Department to direct purchase.

6038E-469 AND -469A - PRESSURE GAUGES (Not shown on flow diagram)

Duplicate of Item 6038E-421F. Two (2) pressure gauges to be used as spares. Refer to detailed specifications on page 81, reference number (11).

H3B Department to direct purchase.

6038E-470 THRU -470C INCL. - PRESSURE GAUGES (Not shown on flow diagram)

Duplicate of Item 6038E-401G. Four (4) pressure gauges to be used as spares. Refer to detailed specifications on page 81, reference number (15).

H3B Department to direct purchase.

6038E-471 - HYDRAULIC OIL PUMP (Not shown on flow diagram)
Property No. CA-6306-153

Duplicate of Item 6038E-401. To be used as spare. For complete specifications see page 73.

H3B Department to direct purchase.

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6038E-471A - HYDRAULIC OIL PUMP (Not shown on flow diagram)
Property No. CA-6306-154

Duplicate of Item 6038E-401A. To be used as spare. For complete specifications, see page 73.

H3B Department to direct purchase.

6038E-473 AND -473A - SOLENOID-OPERATED FOUR-WAY VALVES (Not shown on flow diagram)
Property Nos. CA-6308-48
CA-6308-49

Duplicate of Item 6038E-401E. To be used as spares. For complete specifications, see page 79.

H3B Department to direct purchase.

6038E-473-1 AND -473A-1 - SOLENOID-OPERATED PILOT FOUR-WAY VALVES (Not shown on flow diagram)

Duplicate of Item 6038E-401E-1. To be used as spares. See specifications for Items 6038E-401E thru -410E.

H3B Department to direct purchase.

6038E-474 - NOT USED

6038E-475 - OIL PUMP (Not shown on flow diagram)
Property No. CA-6306-155

Duplicate of Item 6038E-431. To be used as spare. For complete specifications, see page 85.

6038E-476 - SUPERCHARGE PUMP (Not shown on flow diagram)
Property No. CA-6306-156

Duplicate of Item 6038E-421 but with half-coupling only. To be used as spare. For complete specifications, see page 81.

H3B Department to direct purchase.

6038E-477 - SOLENOID-OPERATED FOUR-WAY VALVE (Not shown on flow diagram)
Property No. CA-6308-50

Duplicate of Item 6038E-421C. To be used as spare. Refer to detailed specifications on page 81, reference number (5).

H3B Department to direct purchase.

6038E-478 - PILOT OIL PUMP
Property No. CA-6306-157

Duplicate of Item 6038E-421M but with half-coupling only. To be used as spare. For complete specifications see page 81.

H3B Department to direct purchase.

6038E-479 AND -480 - SEE ELECTRICAL SECTION

6038E-481 THRU -485 - SEE ELECTRICAL SECTION

6038E-486 THRU -495 - SEE ELECTRICAL SECTION

6038E-496 - HYDRAULIC OIL (Not shown on flow diagram)

Ten-thousand (10,000) gallons, in transport truck lots, of Standard Oil Company's "Esstic 55" hydraulic oil. To be delivered at a date to be specified by the Operating Department.

6038E-497 - OIL PURIFIER
Property No. Purifier - CA-6311-57
Pump - CA-6306-238
Motor - CA-6213-329

One (1) oil purifier to be used for purification of the oil in any of the five hydraulic oil systems. Purifier to be as follows:

Manufacturer - Honan-Crane Corporation
Service - Purification of Esstic 55 hydraulic oil at 115°F
Model - 2036MB-AP equipped with insulation but without heaters.
Pump - 5 gpm pump with 440 volt, 3 phase, 60 cycle motor for Class I Group D service to be furnished. Pump to be provided with relief valve and to be self-priming and suitable for a negative suction of 10 feet.
Dolly - 28" x 40" dolly with rubber tires and drawbar with handle shall be provided to mount purifier, pump and motor.
Cartridges - Cranite filled.
Extra cartridges - Provide six (6) sets (of 8 cartridges each) to be used as spares.

6038E-498 AND -498A - OIL FILTERS (A)
Property Nos. CA-6311-58 and 6311-59 repsectively

Two (2) oil filters for use in initial flushing and cleaning of oil lines before startup. These will be transferred to the Torrance California Plant when required there.

LINE LIST

Flow Diagram H3B-R1044

Note: All underground steel lines to have coating per Protective Covering Specifications.

Number	From	To	Size	Material Handled	Spec.
H-401	6038E-401, -401A, HH-431	6038E-401E, H-406	3", 6"	Hydraulic Oil	2000# * Hydraulic Oil
H-402	6038E-403, -403A, HH-432	6038E-403E, H-407	3", 6"	Hydraulic Oil	2000# Hydraulic Oil
H-403	6038E-405, -405A, HH-433	6038E-405E, H-408	3", 6"	Hydraulic Oil	2000# Hydraulic Oil
H-404	6038E-407, -407A, HH-434	6038E-407E, H-409	3", 6"	Hydraulic Oil	2000# Hydraulic Oil
H-405	6038E-409, -409A, HH-435	6038E-409E, H-410	3", 6"	Hydraulic Oil	2000# Hydraulic Oil
H-406	H-401	H-421, H-451	1/4", 3"	Hydraulic Oil	2000# & 125# Hydraulic Oil
H-407	H-402	H-422, H-452	1/4", 3"	Hydraulic Oil	2000# & 125# Hydraulic Oil
H-408	H-403	H-423, H-453	1/4", 3"	Hydraulic Oil	2000# & 125# Hydraulic Oil
H-409	H-404	H-424, H-454	1/4", 3"	Hydraulic Oil	2000# & 125# Hydraulic Oil

*Special supports and anchors as noted in introduction for this and all similar main oil lines.

LINE LIST - H3B-R1044 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
H-410	H-405	H-425, H-455	1/4", 3"	Hydraulic Oil	2000# & 125# Hydraulic Oil
H-411	6038E-402, -402A, HH-441	6038E-402E, H-416	3", 6"	Hydraulic Oil	2000# Hydraulic Oil
H-412	6038E-404, -404A, HH-442	6038E-404E, H-417	3", 6"	Hydraulic Oil	2000# Hydraulic Oil
H-413	6038E-406, -406A, HH-443	6038E-406E, H-418	3", 6"	Hydraulic Oil	2000# Hydraulic Oil
H-414	6038E-408, -408A, HH-444	6038E-408E, H-419	3", 6"	Hydraulic Oil	2000# Hydraulic Oil
H-415	6038E-410, -410A, HH-445	6038E-410E, H-420	3", 6"	Hydraulic Oil	2000# Hydraulic Oil
H-416	H-411	H-431, H-451	1/4", 3"	Hydraulic Oil	2000# & 125# Hydraulic Oil
H-417	H-412	H-432, H-452	1/4", 3"	Hydraulic Oil	2000# & 125# Hydraulic Oil
H-418	H-413	H-433, H-453	1/4", 3"	Hydraulic Oil	2000# & 125# Hydraulic Oil
H-419	H-414	H-434, H-454	1/4", 3"	Hydraulic Oil	2000# & 125# Hydraulic Oil

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LINE LIST - H3B-R1044 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
H-420	H-415	H-435, H-455	1/4", 3"	Hydraulic Oil	2000# & 125# Hydraulic Oil
H-421	6038E-401E, H-406, HH-451	6038E-401, -401A, HH-411	6", 3"	Hydraulic Oil	2000# Hydraulic Oil
H-422	6038E-403E, H-407, HH-452	6038E-403, -403A, HH-412	6", 3"	Hydraulic Oil	2000# Hydraulic Oil
H-423	6038E-405E, H-408, HH-453	6038E-405, -405A, HH-413	6", 3"	Hydraulic Oil	2000# Hydraulic Oil
H-424	6038E-407E, H-409, HH-454	6038E-407, -407A, HH-414	6", 3"	Hydraulic Oil	2000# Hydraulic Oil
H-425	6038E-409E, H-410, HH-455	6038E-409, -409A, HH-415	6", 3"	Hydraulic Oil	2000# Hydraulic Oil
H-426	NOT USED				
H-427	NOT USED				
H-428	NOT USED				
H-429	NOT USED				
H-430	NOT USED				
H-431	6038E-402E, H-416, HH-451	6038E-402, -402A, HH-411	6", 3"	Hydraulic Oil	2000# Hydraulic Oil
H-432	6038E-404E, H-417, HH-452	6038E-404, -404A, HH-412	6", 3"	Hydraulic Oil	2000# Hydraulic Oil
H-433	6038E-406E, H-418, HH-453	6038E-406, -406A, HH-413	6", 3"	Hydraulic Oil	2000# Hydraulic Oil

LINE LIST - H3B-R1044 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
H-434	6038E-408E, H-419, HH-454	6048E-408, -408A, HH-414	6", 3"	Hydraulic Oil	2000# Hydraulic Oil
H-435	6038E-410E, H-420, HH-455	6038E-410, -410A, HH-415	6", 3"	Hydraulic Oil	2000# Hydraulic Oil
H-436	NOT USED				
H-437	NOT USED				
H-438	NOT USED				
H-439	NOT USED				
H-440	NOT USED				
H-441	6038E-442	6038E-401, -401A, -402, -402A	1-1/2", 2", 3"	Hydraulic Oil	125# Hydraulic Oil
H-442	6038E-444	6038E-403, -403A, -404, -404A	1-1/2", 2", 3"	Hydraulic Oil	125# Hydraulic Oil
H-443	6038E-446	6038E-405, -405A, -406, -406A	1-1/2", 2", 3"	Hydraulic Oil	125# Hydraulic Oil
H-444	6038E-448	6038E-407, -407A, -408, -408A	1-1/2", 2", 3"	Hydraulic Oil	125# Hydraulic Oil
H-445	6038E-450	6038E-409, -409A, -410, -410A	1-1/2", 2", 3"	Hydraulic Oil	125# Hydraulic Oil
H-446	NOT USED				
H-447	NOT USED				
H-448	NOT USED				
H-449	NOT USED				
H-450	NOT USED				

LINE LIST - H3B-21044 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
H-451	6038E-401, -402, H-406, H-416	6038E-421A	1/4", 3"	Hydraulic Oil	125# & 2000# Hydraulic Oil
H-452	6038E-403, -404, H-407, H-417	6038E-422A	1/4", 3"	Hydraulic Oil	125# & 2000# Hydraulic Oil
H-453	6038E-405, -406, H-408, H-418	6038E-423A	1/4", 3"	Hydraulic Oil	125# & 2000# Hydraulic Oil
H-454	6038E-407, -408, H-409, H-419	6038E-424A	1/4", 3"	Hydraulic Oil	125# & 2000# Hydraulic Oil
H-455	6038E-409, -410, H-410, H-420	6038E-425A	1/4", 3"	Hydraulic Oil	125# & 2000# Hydraulic Oil
H-456	NOT USED				
H-457	NOT USED				
H-458	NOT USED				
H-459	NOT USED				
H-460	NOT USED				
H-461	6038E-401A, -402A	6038E-421A	1/4", 3"	Hydraulic Oil	125# & 2000# Hydraulic Oil
H-462	6038E-403A, -404A	6038E-422A	1/4", 3"	Hydraulic Oil	125# & 2000# Hydraulic Oil

LINE LIST - H3B-R1044 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
H-463	6038E-405A, -406A	6038E-423A	1/4", 3"	Hydraulic Oil	125# & 2000# Hydraulic Oil
H-464	6038E-407A, -408A	6038E-424A	1/4", 3"	Hydraulic Oil	125# & 2000# Hydraulic Oil
H-465	6038E-409A, -410A	6038E-425A	1/4", 3"	Hydraulic Oil	125# & 2000# Hydraulic Oil
H-466	NOT USED				
H-467	NOT USED				
H-468	NOT USED				
H-469	NOT USED				
H-470	NOT USED				
H-471	6038E-401E	6037E-301 H3B-R1043	6"	Hydraulic Oil	2000# Hydraulic Oil
H-472	6038E-403E	6037E-302, H3B-R1043	6"	Hydraulic Oil	2000# Hydraulic Oil
H-473	6038E-405E	6037E-303, H3B-R1043	6"	Hydraulic Oil	2000# Hydraulic Oil
H-474	6038E-407E	6037E-304, H3B-R1043	6"	Hydraulic Oil	2000# Hydraulic Oil
H-475	6038E-409E	6037E-305, H3B-R1043	6"	Hydraulic Oil	2000# Hydraulic Oil
H-476	NOT USED				

LINE LIST - H3B-R1044 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
H-477	NOT USED				
H-478	NOT USED				
H-479	NOT USED				
H-480	NOT USED				
H-481	6038E-402E	6037E-301A, H3B-R1043	6"	Hydraulic Oil	2000# Hydraulic Oil
H-482	6038E-404E	6037E-302A, H3B-R1043	6"	Hydraulic Oil	2000# Hydraulic Oil
H-483	6038E-406E	6037E-303A, H3B-R1043	6"	Hydraulic Oil	2000# Hydraulic Oil
H-484	6038E-408E	6037E-304A, H3B-R1043	6"	Hydraulic Oil	2000# Hydraulic Oil
H-485	6038E-410E	6037E-305A, H3B-R1043	6"	Hydraulic Oil	2000# Hydraulic Oil
H-486	NOT USED				
H-487	NOT USED				
H-488	NOT USED				
H-489	NOT USED				
H-490	NOT USED				
H-491	(Header)	6038E-421A*	1/4", 3/4", 2", 3"	Hydraulic Oil	125# Hydraulic Oil

*Lines to enter tank above oil level.

LINE LIST - H3B-R1044 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
H-492	(Header)	6038E-422A*	1/4", 3/4", 2", 3"	Hydraulic Oil	125# Hydraulic Oil
H-493	(Header)	6038E-423A*	1/4", 3/4", 2", 3"	Hydraulic Oil	125# Hydraulic Oil
H-494	(Header)	6038E-424A*	1/4", 3/4", 2", 3"	Hydraulic Oil	125# Hydraulic Oil
H-495	(Header)	6038E-425A*	1/4", 3/4", 2", 3"	Hydraulic Oil	125# Hydraulic Oil
H-496	NOT USED				
H-497	NOT USED				
H-498	NOT USED				
H-499	NOT USED				
HH-401	NOT USED				
AA-402	6047A-922, H3B-R1054	(Header)	1/4", 1", 3/8" Cu	Air	96
WW-403	NOT USED				
HH-404	6038E-463	6038E-464	1-1/2"	Hydraulic Oil	12
HH-405	Charging Line	6038E-462	2", 1-1/2"	Hydraulic Oil	125# Hydraulic Oil
AA-406	6047A-922, H3B-R1054	AA-407 and 6038E-462	1"	Air	96
AA-407	AA-406	6038E-463	1"	Air	96
PP-408	6043P-861	PP-409, -410	1/2", 1"	Hydrogen Methane	55 (A)

*Lines to enter tank above oil level.

LINE LIST - H3B-R1044 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
PP-409	PP-408	6038E-462	1"	Hydrogen Methane	52 (A)
PP-410	PP-408	6038E-463	1"	Hydrogen Methane	52 (A)
HH-411	H-421, -431	6038E-441 and H-491	1-1/4", 2", 3"	Hydraulic Oil	125# & 2000# Hydraulic Oil
HH-412	H-422, -432	6038E-443 and H-492	1-1/4", 3"	Hydraulic Oil	125# & 2000# Hydraulic Oil
HH-413	H-423, -433	6038E-445 and H-493	1-1/4", 2", 3"	Hydraulic Oil	125# & 2000# Hydraulic Oil
HH-414	H-424, -434	6038E-447 and H-494	1-1/4", 2", 3"	Hydraulic Oil	125# & 2000# Hydraulic Oil
HH-415	H-425, -435	6038E-449 and H-495	1-1/4", 2", 3"	Hydraulic Oil	125# & 2000# Hydraulic Oil
HH-416	NOT USED				
HH-417	NOT USED				
HH-418	NOT USED				
HH-419	NOT USED				
HH-420	NOT USED				
HH-421	6038E-421M	(Header)	3/4", 1"	Hydraulic Oil	300# Hydraulic Oil*
HH-422	6038E-422M	(Header)	3/4", 1"	Hydraulic Oil	300# Hydraulic Oil*

*Dotted portion on flow diagram piped by Vickers and assembled on 6038E-421A thru -425A.

LINE LIST - H3B-R1044 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
HH-423	6038E-423M	(Header)	3/4", 1"	Hydraulic Oil	300# * Hydraulic Oil
HH-424	6038E-424M	(Header)	3/4", 1"	Hydraulic Oil	300# * Hydraulic Oil
HH-425	6038E-425M	(Header)	3/4", 1"	Hydraulic Oil	300# * Hydraulic Oil
HH-426	6038E-402E-1	6038E-402E	3/4"	Hydraulic Oil	300# Hydraulic Oil
HH-427	6038E-404E-1	6038E-404E	3/4"	Hydraulic Oil	300# Hydraulic Oil
HH-428	6038E-406E-1	6038E-406E	3/4"	Hydraulic Oil	300# Hydraulic Oil
HH-429	6038E-408E-1	6038E-408E	3/4"	Hydraulic Oil	300# Hydraulic Oil
HH-430	6038E-410E-1	6038E-410E	3/4"	Hydraulic Oil	300# Hydraulic Oil
HH-431	6038E-421C	H-401	2", 3"	Hydraulic Oil	300# & 2000# Hydraulic Oil
HH-432	6038E-422C	H-402	2", 3"	Hydraulic Oil	300# & 2000# Hydraulic Oil

*Dotted portion on flow diagram piped by Vickers and assembled on 6038E-421A thru -425A.

LINE LIST - H3B-R1044 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
HH-433	6038E-423C	H-403	2", 3"	Hydraulic Oil	300# & 2000# Hydraulic Oil
HH-434	6038E-424C	H-404	2", 3"	Hydraulic Oil	300# & 2000# Hydraulic Oil
HH-435	6038E-425C	H-405	2", 3"	Hydraulic Oil	300# & 2000# Hydraulic Oil
HH-436	6038E-402E-1	6038E-402E	3/4"	Hydraulic Oil	300# Hydraulic Oil
HH-437	6038E-404E-1	6038E-404E	3/4"	Hydraulic Oil	300# Hydraulic Oil
HH-438	6038E-406E-1	6038E-406E	3/4"	Hydraulic Oil	300# Hydraulic Oil
HH-439	6038E-408E-1	6038E-408E	3/4"	Hydraulic Oil	300# Hydraulic Oil
HH-440	6038E-410E-1	6038E-410E	3/4"	Hydraulic Oil	300# Hydraulic Oil
HH-441	6038E-421C	H-411	2", 3"	Hydraulic Oil	300# & 2000# Hydraulic Oil
HH-442	6038E-422C	H-412	2", 3"	Hydraulic Oil	300# & 2000# Hydraulic Oil

LINE LIST - H3B-R1044 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
HH-443	6038E-423C	H-413	2", 3"	Hydraulic Oil	300# & 2000# Hydraulic Oil
HH-444	6038E-424C	H-414	2", 3"	Hydraulic Oil	300# & 2000# Hydraulic Oil
HH-445	6038E-425C	H-415	2", 3"	Hydraulic Oil	300# & 2000# Hydraulic Oil
HH-446	6038E-401E-1	6038E-401E	3/4"	Hydraulic Oil	300# Hydraulic Oil
HH-447	6038E-403E-1	6038E-403E	3/4"	Hydraulic Oil	300# Hydraulic Oil
HH-448	6038E-405E-1	6038E-405E	3/4"	Hydraulic Oil	300# Hydraulic Oil
HH-449	6038E-407E-1	6038E-407E	3/4"	Hydraulic Oil	300# Hydraulic Oil
HH-450	6038E-409E-1	6038E-409E	3/4"	Hydraulic Oil	300# Hydraulic Oil
HH-451	6038E-421A and HH-471	H-421, -431	2", 3"	Hydraulic Oil	125#, 300# & 2000# Hydraulic Oil
HH-452	6038E-422A and HH-472	H-422, -432	2", 3"	Hydraulic Oil	125#, 300# & 2000# Hydraulic Oil

LINE LIST - H3B-R1044 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
HH-453	6038E-423A and HH-473	H-423, -433	2", 3"	Hydraulic Oil	125#, 300# & 2000# Hydraulic Oil
HH-454	6038E-424A and HH-474	H-424, -434	2", 3"	Hydraulic Oil	125#, 300# & 2000# Hydraulic Oil
HH-455	6038E-425A and HH-475	H-425, -435	2", 3"	Hydraulic Oil	125#, 300# & 2000# Hydraulic Oil
HH-456	6038E-401E-1	6038E-401E	3/4"	Hydraulic Oil	300# Hydraulic Oil
HH-457	6038E-403E-1	6038E-403E	3/4"	Hydraulic Oil	300# Hydraulic Oil
HH-458	6038E-405E-1	6038E-405E	3/4"	Hydraulic Oil	300# Hydraulic Oil
HH-459	6038E-407E-1	6038E-407E	3/4"	Hydraulic Oil	300# Hydraulic Oil
HH-460	6038E-409E-1	6038E-409E	3/4"	Hydraulic Oil	300# Hydraulic Oil
HH-461	Piped by Vickers and assembled on 6038E-421A.				
HH-462	Piped by Vickers and assembled on 6038E-422A.				
HH-463	Piped by Vickers and assembled on 6038E-423A				
HH-464	Piped by Vickers and assembled on 6038E-424A.				
HH-465	Piped by Vickers and assembled on 6038E-425A.				

LINE LIST - H3B-R1044 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
HH-466	Piped by Vickers and assembled on 6038E-421A.				
HH-467	Piped by Vickers and assembled on 6038E-422A.				
HH-468	Piped by Vickers and assembled on 6038E-423A.				
HH-469	Piped by Vickers and assembled on 6038E-424A.				
HH-470	Piped by Vickers and assembled on 6038E-425A.				
HH-471	Piped by Vickers and assembled on 6038E-421A.				
HH-472	Piped by Vickers and assembled on 6038E-422A.				
HH-473	Piped by Vickers and assembled on 6038E-423A.				
HH-474	Piped by Vickers and assembled on 6038E-424A.				
HH-475	Piped by Vickers and assembled on 6038E-425A.				
HH-476	NOT USED				
HH-477	NOT USED				
HH-478	NOT USED				
HH-479	NOT USED				
HH-480	NOT USED				
HH-481	6038E-401, -401A	6038E-401C	1/4"	Oil (Drain)	125# Hydraulic Oil
HH-482	6038E-403, -403A	6038E-403C	1/4"	Oil (Drain)	125# Hydraulic Oil
HH-483	6038E-405, -405A	6038E-405C	1/4"	Oil (Drain)	125# Hydraulic Oil
HH-484	6038E-407, -407A	6038E-407C	1/4"	Oil (Drain)	125# Hydraulic Oil

LINE LIST - H3B-R1044 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
HH-485	6038E-409, -409A	6038E-409C	1/4"	Oil (Drain)	125# Hydraulic Oil
HH-486	NOT USED				
HH-487	NOT USED				
HH-488	NOT USED				
HH-489	NOT USED				
HH-490	NOT USED				
HH-491	6038E-462	Header	1-1/2"	Hydraulic Oil	125# Hydraulic Oil
HH-492	6038E-463	Drain	1-1/2"	Water	~~1~~ 12,54
HH-493	NOT USED				
HH-494	NOT USED				
HH-495	NOT USED				
HH-496	NOT USED				
HH-497	NOT USED				
HH-498	NOT USED				
HH-499	NOT USED				
HHH-401	6038E-402, -402A	6038E-402C	1/4"	Oil (Drain)	125# Hydraulic Oil
HHH-402	6038E-404, -404A	6038E-404C	1/4"	Oil (Drain)	125# Hydraulic Oil
HHH-403	6038E-406, -406A	6038E-406C	1/4"	Oil (Drain)	125# Hydraulic Oil

LINE LIST - H3B-R1044 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
HHH-404	6038E-408, -408A	6038E-408C	1/4"	Oil (Drain)	125# Hydraulic Oil
HHH-405	6038E-410, -410A	6038E-410C	1/4"	Oil (Drain)	125# Hydraulic Oil
HHH-406	NOT USED				
HHH-407	NOT USED				
HHH-408	NOT USED				
HHH-409	NOT USED				
HHH-410	NOT USED				
HHH-411	Header	Floor Drain	1/2", 3/4", 1", 2"	Oil (Drain)	1
HHH-412	Header	Floor Drain	1/2", 3/4", 1", 2"	Oil (Drain)	1
HHH-413	Header	Floor Drain	1/2", 3/4", 1", 2"	Oil (Drain)	1
HHH-414	Header	Floor Drain	1/2", 3/4", 1", 2"	Oil (Drain)	1
HHH-415	Header	Floor Drain	1/2", 3/4", 1", 2"	Oil (Drain)	1
HHH-416	NOT USED				
HHH-417	NOT USED				
HHH-418	NOT USED				
HHH-419	NOT USED				
HHH-420	NOT USED				

LINE LIST - H3B-R1044 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
HHH-421	NOT USED				
HHH-422	NOT USED				
HHH-423	NOT USED				
HHH-424	NOT USED				
HHH-425	NOT USED				
HHH-426	NOT USED				
HHH-427	NOT USED				
HHH-428	NOT USED				
HHH-429	NOT USED				
HHH-430	NOT USED				
HHH-431	Piped by Vickers and assembled on 6038E-421A.				
HHH-432	Piped by Vickers and assembled on 6038E-422A.				
HHH-433	Piped by Vickers and assembled on 6038E-423A.				
HHH-434	Piped by Vickers and assembled on 6038E-424A.				
HHH-435	Piped by Vickers and assembled on 6038E-425A.				
HHH-436	NOT USED				
HHH-437	NOT USED				
HHH-438	NOT USED				
HHH-439	NOT USED				
HHH-440	NOT USED				
HHH-441	HH-491	6038E-421A	1-1/2"	Hydraulic Oil	125# Hydraulic Oil
HHH-442	HH-491	6038E-422A	1-1/2"	Hydraulic Oil	125# Hydraulic Oil

LINE LIST - H3B-R1044 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
HHH-443	HH-491	6038E-423A	1-1/2"	Hydraulic Oil	125# Hydraulic Oil
HHH-444	HH-491	6038E-424A	1-1/2"	Hydraulic Oil	125# Hydraulic Oil
HHH-445	HH-491	6038E-425A	1-1/2"	Hydraulic Oil	125# Hydraulic Oil
HHH-446	NOT USED				
HHH-447	NOT USED				
HHH-448	NOT USED				
HHH-449	NOT USED				
HHH-450	NOT USED				
HHH-451	6038E-421A	6038E-431	2", 3"	Hydraulic Oil	125# Hydraulic Oil
HHH-452	6038E-422A	6038E-432	2", 3"	Hydraulic Oil	125# Hydraulic Oil
HHH-453	6038E-423A	6038E-433	2", 3"	Hydraulic Oil	125# Hydraulic Oil
HHH-454	6038E-424A	6038E-434	2", 3"	Hydraulic Oil	125# Hydraulic Oil
HHH-455	6038E-425A	6038E-435	2", 3"	Hydraulic Oil	125# Hydraulic Oil
HHH-456	NOT USED				
HHH-457	NOT USED				
HHH-458	NOT USED				

LINE LIST - H3B-R1044 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
HHH-459	NOT USED				
HHH-460	NOT USED				
HHH-461	6038E-441	6038E-421A	2", 3"	Hydraulic Oil	125# Hydraulic Oil
HHH-462	6038E-443	6038E-422A	2", 3"	Hydraulic Oil	125# Hydraulic Oil
HHH-463	6038E-445	6038E-423A	2", 3"	Hydraulic Oil	125# Hydraulic Oil
HHH-464	6038E-447	6038E-424A	2", 3"	Hydraulic Oil	125# Hydraulic Oil
HHH-465	6038E-449	6038E-425A	2", 3"	Hydraulic Oil	125# Hydraulic Oil
HHH-466	NOT USED				
HHH-467	NOT USED				
HHH-468	NOT USED				
HHH-469	NOT USED				
HHH-470	NOT USED				
HHH-471	NOT USED				
HHH-472	NOT USED				
HHH-473	NOT USED				
HHH-474	NOT USED				
HHH-475	NOT USED				
HHH-476	NOT USED				
HHH-477	NOT USED				

LINE LIST - H3B-R1044 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
HHH-478	NOT USED				
HHH-479	NOT USED				
HHH-480	NOT USED				
HHH-481	6038E-431	6038E-442	1-1/2", 2", 3"	Hydraulic Oil	125# Hydraulic Oil
HHH-482	6038E-432	6038E-444	1-1/2", 2", 3"	Hydraulic Oil	125# Hydraulic Oil
HHH-483	6038E-433	6038E-446	1-1/2", 2", 3"	Hydraulic Oil	125# Hydraulic Oil
HHH-484	6038E-434	6038E-448	1-1/2", 2", 3"	Hydraulic Oil	125# Hydraulic Oil
HHH-485	6038E-435	6038E-450	1-1/2", 2", 3"	Hydraulic Oil	125# Hydraulic Oil
HHH-486	NOT USED				
HHH-487	NOT USED				
HHH-488	NOT USED				
HHH-489	NOT USED				
HHH-490	NOT USED				
HHH-491	NOT USED				
HHH-492	NOT USED				
HHH-493	NOT USED				
HHH-494	NOT USED				
HHH-495	NOT USED				
HHH-496	NOT USED				

LINE LIST - H3B-R1044 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
HHH-497	NOT USED				
HHH-498	NOT USED				
HHH-499	NOT USED				
WWW-401	6047W-902, H3B-R1054	6038E-441, -442	2", 3"	Cooling Cycle Water	1, 21
WWW-402	6047W-902 H3B-R1054	6038E-443, -444	2", 3"	Cooling Cycle Water	1, 21
WWW-403	6047W-902, H3B-R1054	6038E-445, -446	2", 3"	Cooling Cycle Water	1, 21
WWW-404	6047W-902, H3B-R1054	6038E-447, -448	2", 3"	Cooling Cycle Water	1, 21
WWW-405	6047W-902, H3B-R1054	6038E-449, -450	2", 3"	Cooling Cycle Water	1, 21
WWW-406	NOT USED				
WWW-407	NOT USED				
WWW-408	NOT USED				
WWW-409	NOT USED				
WWW-410	NOT USED				
WWW-411	6038E-441, -442	6047W-903, H3B-R1054	2", 3"	Cooling Cycle Water	1, 21
WWW-412	6038E-443, -444	6047W-903, H3B-R1054	2", 3"	Cooling Cycle Water	1, 21
WWW-413	6038E-445, -446	6047W-903, H3B-R1054	2", 3"	Cooling Cycle Water	1, 21
WWW-414	6038E-447, -448	6047W-903, H3B-R1054	2", 3"	Cooling Cycle Water	1, 21
WWW-415	6038E-449, -450	6047W-903, H3B-R1054	2", 3"	Cooling Cycle Water	1, 21

LINE LIST - H3B-R1044 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
WWW-416	NOT USED				
WWW-417	NOT USED				
WWW-418	NOT USED				
WWW-419	NOT USED				
WWW-420	NOT USED				
HHHH-421	6038E-421A	Drain	1-1/2"	Oil	125# Hydraulic Oil
HHHH-422	6038E-422A	Drain	1-1/2"	Oil	125# Hydraulic Oil
HHHH-423	6038E-423A	Drain	1-1/2"	Oil	125# Hydraulic Oil
HHHH-424	6038E-424A	Drain	1-1/2"	Oil	125# Hydraulic Oil
HHHH-425	6038E-425A	Drain	1-1/2"	Oil	125# Hydraulic Oil

VALVE LIST

Flow Diagra. H3B-R1044

Number	Location	Service	Size	C&CCC No.
4001	6038E-401A	Check	1/2"	201
4002	6038E-403A	Check	1/2"	201
4003	6038E-405A	Check	1/2"	201
4004	6038E-407A	Check	1/2"	201
4005	6038E-409A	Check	1/2"	201
4006	H-406	Check	1/4"	Vickers C2-800*
4007	H-407	Check	1/4"	Vickers C2-800*
4008	H-408	Check	1/4"	Vickers C2-800*
4009	H-409	Check	1/4"	Vickers C2-800*
4010	H-410	Check	1/4"	Vickers C2-800*
4011	6038E-402A	Check	1/2"	201
4012	6038E-404A	Check	1/2"	201
4013	6038E-406A	Check	1/2"	201
4014	6038E-408A	Check	1/2"	201
4015	6038E-410A	Check	1/2"	201
4016	H-416	Check	1/4"	Vickers C2-800*
4017	H-417	Check	1/4"	Vickers C2-800*
4018	H-418	Check	1/4"	Vickers C2-800*
4019	H-419	Check	1/4"	Vickers C2-800*
4020	H-420	Check	1/4"	Vickers C2-800*
4021	6038E-401	Check	1/2"	201
4022	6038E-403	Check	1/2"	201

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VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4024	6038E-407	Check	1/2"	201
4025	6038E-409	Check	1/2"	201
4026	H-406	Check	1/4"	Vickers C2-800*
4027	H-407	Check	1/4"	Vickers C2-800*
4028	H-408	Check	1/4"	Vickers C2-800*
4029	H-409	Check	1/4"	Vickers C2-800*
4030	H-410	Check	1/4"	Vickers C2-800*
4031	6038E-402	Check	1/2"	201
4032	6038E-404	Check	1/2"	201
4033	6038E-406	Check	1/2"	201
4034	6038E-408	Check	1/2"	201
4035	6038E-410	Check	1/2"	201
4036	H-416	Check	1/4"	Vickers C2-800*
4037	H-417	Check	1/4"	Vickers C2-800*
4038	H-418	Check	1/4"	Vickers C2-800*
4039	H-419	Check	1/4"	Vickers C2-800*
4040	H-420	Check	1/4"	Vickers C2-800*
4041	6038E-401A	Shutoff	3/4"	1
4042	6038E-403A	Shutoff	3/4"	1
4043	6038E-405A	Shutoff	3/4"	1
4044	6038E-407A	Shutoff	3/4"	1
4045	6038E-409A	Shutoff	3/4"	1
4046	H-406	Relief	1/4"	Vickers C-175-C-10 +
4047	H-407	Relief	1/4"	Vickers C-175-C-10 +

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* Reference No. (21) on H3B-B1359-1, purchased with 6038E-421 etc.
+ Reference No. (20) on H3B-B1359-1, purchased with 6038E-421 etc.

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4048	H-408	Relief	1/4"	Vickers C-175-C-10 +
4049	H-409	Relief	1/4"	Vickers C-175-C-10 +
4050	H-410	Relief	1/4"	Vickers C-175-C-10 +
4051	6038E-402A	Shutoff	3/4"	1
4052	6038E-404A	Shutoff	3/4"	1
4053	6038E-406A	Shutoff	3/4"	1
4054	6038E-408A	Shutoff	3/4"	1
4055	6038E-410A	Shutoff	3/4"	1
4056	H-416	Relief	1/4"	Vickers C-175-C-10 +
4057	H-417	Relief	1/4"	Vickers C-175-C-10 +
4058	H-418	Relief	1/4"	Vickers C-175- -10 +
4059	H-419	Relief	1/4"	Vickers C-175-C-10 +
4060	H-420	Relief	1/4"	Vickers C-175-C-10 +
4061	6038E-401	Shutoff	3/4"	1
4062	6038E-403	Shutoff	3/4"	1
4063	6038E-405	Shutoff	3/4"	1
4064	6038E-407	Shutoff	3/4"	1
4065	6038E-409	Shutoff	3/4"	1
4066	H-401	Pressure gauge	1/4"	Vickers #134641*
4067	H-402	Pressure gauge	1/4"	Vickers #134641*
4068	H-403	Pressure gauge	1/4"	Vickers #134641*
4069	H-404	Pressure gauge	1/4"	Vickers #134641*
4070	H-405	Pressure gauge	1/4"	Vickers #134641*
4071	6038E-402	Shutoff	3/4"	1

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+ Reference No. (20) on H3B-B1359-1, purchased with 6038E-421 etc.
* Reference No. (18) on H3B-B1359-1, purchased with 6038E-421 etc.

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4072	6038E-404	Shutoff	3/4"	1
4073	6038E-406	Shutoff	3/4"	1
4074	6038E-408	Shutoff	3/4"	1
4075	6038E-410	Shutoff	3/4"	1
4076	H-411	Pressure Gauge	1/4"	Vickers #134641*
4077	H-412	Pressure Gauge	1/4"	Vickers #134641*
4078	H-413	Pressure Gauge	1/4"	Vickers #134641*
4079	H-414	Pressure Gauge	1/4"	Vickers #134641*
4080	H-415	Pressure Gauge	1/4"	Vickers #134641*
4081	H-441	Control	1-1/2"	1
4082	H-442	Control	1-1/2"	1
4083	H-443	Control	1-1/2"	1
4084	H-444	Control	1-1/2"	1
4085	H-445	Control	1-1/2"	1
4086	~~HHH-411 NOT USED~~	SHUTOFF	3/4"	1
4087	~~HHH-411 NOT USED~~	SHUTOFF	3/4"	1
4088	~~HHH-412 NOT USED~~	SHUTOFF	3/4"	1
4089	~~HHH-412 NOT USED~~	SHUTOFF	3/4"	1
4091	H-441	Control	1-1/2"	1
4092	H-442	Control	1-1/2"	1
4093	H-443	Control	1-1/2"	1
4094	H-444	Control	1-1/2"	1
4095	H-445	Control	1-1/2"	1

* Reference No. (18) on H3B-B1359-1, purchased with 6038E-421 etc.

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4096	~~HHH-413 NOT USED~~	SHUTOFF	3/4"	1
4097	~~HH-N-413 NOT USED~~	SHUTOFF	3/4"	1
4098	~~HHH-414 NOT USED~~	SHUTOFF	3/4"	1
4099	~~HHH-414 NOT USED~~	SHUTOFF	3/4"	1
4100	NOT USED			
4101	H-441	Control	1-1/2"	1
4102	H-442	Control	1-1/2"	1
4103	H-443	Control	1-1/2"	1
4104	H-444	Control	1-1/2"	1
4105	H-445	Control	1-1/2"	1
4106	~~HHH-415 NOT USED~~	SHUTOFF	3/4"	1
4107	~~HHH-415 NOT USED~~	SHUTOFF	3/4"	1
4108	NOT USED			
4109	NOT USED			
4110	NOT USED			
4111	H-441	Control	1-1/2"	1
4112	H-442	Control	1-1/2"	1
4113	H-443	Control	1-1/2"	1
4114	H-444	Control	1-1/2"	1
4115	H-445	Control	1-1/2"	1
4116	NOT USED			
4117	NOT USED			
4118	NOT USED			
4119	NOT USED			

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4120	NOT USED			
4121	H-461	Shutoff	1/4"	Vogt 1871
4122	H-462	Shutoff	1/4"	Vogt 1871
4123	H-463	Shutoff	1/4"	Vogt 1871
4124	H-464	Shutoff	1/4"	Vogt 1871
4125	H-465	Shutoff	1/4"	Vogt 1871
4126	NOT USED			
4127	NOT USED			
4128	NOT USED			
4129	NOT USED			
4130	NOT USED			
4131	H-461	Shutoff	1/4"	Vogt 1871
4132	H-462	Shutoff	1/4"	Vogt 1871
4133	H-463	Shutoff	1/4"	Vogt 1871
4134	H-464	Shutoff	1/4"	Vogt 1871
4135	H-465	Shutoff	1/4"	Vogt 1871
4136	NOT USED			
4137	NOT USED			
4138	NOT USED			
4139	NOT USED			
4140	NOT USED			
4141	H-461	Check	3"	Powell 1561
4142	H-462	Check	3"	Powell 1561
4143	H-463	Check	3"	Powell 1561

VALVE LIST - H3D-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4144	H-464	Check	3"	Powell 1561
4145	H-465	Check	3"	Powell 1561
4146	NOT USED			
4147	NOT USED			
4148	NOT USED			
4149	NOT USED			
4150	NOT USED			
4151	H-451	Shutoff	1/4"	Vogt 1871
4152	H-452	Shutoff	1/4"	Vogt 1871
4153	H-453	Shutoff	1/4"	Vogt 1871
4154	H-454	Shutoff	1/4"	Vogt 1871
4155	H-455	Shutoff	1/4"	Vogt 1871
4156	NOT USED			
4157	NOT USED			
4158	NOT USED			
4159	NOT USED			
4160	NOT USED			
4161	H-451	Shutoff	1/4"	Vogt 1871
4162	H-452	Shutoff	1/4"	Vogt 1871
4163	H-453	Shutoff	1/4"	Vogt 1871
4164	H-454	Shutoff	1/4"	Vogt 1871
4165	H-455	Shutoff	1/4"	Vogt 1871
4166	NOT USED			
4167	NOT USED			

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4168	NOT USED			
4169	NOT USED			
4170	NOT USED			
4171	H-451	Check	3"	Powell 1561
4172	H-452	Check	3"	Powell 1561
4173	H-453	Check	3"	Powell 1561
4174	H-454	Check	3"	Powell 1561
4175	H-455	Check	3"	Powell 1561
4176	NOT USED			
4177	NOT USED			
4178	NOT USED			
4179	NOT USED			
4180	NOT USED			
4181	H-406	Relief	3"	Vickers No. CF-24-F-10*
4182	H-407	Relief	3"	Vickers No. CF-24-F-10*
4183	H-408	Relief	3"	Vickers No. CF-24-F-10*
4184	H-409	Relief	3"	Vickers No. CF-24-F-10*
4185	H-410	Relief	3"	Vickers No. CF-24-F-10*
4186	H-406	Relief	3"	Vickers No. CF-24-F-10*
4187	H-407	Relief	3"	Vickers No. CF-24-F-10*
4188	H-408	Relief	3"	Vickers No. CF-24-F-10*
4189	H-409	Relief	3"	Vickers No. CF-24-F-10*
4190	H-410	Relief	3"	Vickers No. CF-24-F-10*
4191	H-416	Relief	3"	Vickers No. CF-24-F-10*

* Reference No. (3) on H3B-B1359-1, purchased with 6038E-421, etc.

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Servi	Size	C&CCC No.
4192	H-417	Relief	3"	Vickers No. CF-24-F-10*
4193	H-418	Relief	3"	Vickers No. CF-24-F-10*
4194	H-419	Relief	3"	Vickers No. CF-24-F-10*
4195	H-420	Relief	3"	Vickers No. CF-24-F-10*
4196	H-416	Relief	3"	Vickers No. CF-24-F-10*
4197	H-417	Relief	3"	Vickers No. CF-24-F-10*
4198	H-418	Relief	3"	Vickers No. CF-24-F-10*
4199	H-419	Relief	3"	Vickers No. CF-24-F-10*
4200	H-420	Relief	3"	Vickers No. CF-24-F-10*
4201	HH-461	Relief	2"	Vickers No. CF-16-B-10+
4202	HH-462	Relief	2"	Vickers No. CF-16-B-10+
4203	HH-463	Relief	2"	Vickers No. CF-16-B-10+
4204	HH-464	Relief	2"	Vickers No. CF-16-B-10+
4205	HH-465	Relief	2"	Vickers No. CF-16-B-10+
4206	NOT USED			
4207	NOT USED			
4208	NOT USED			
4209	NOT USED			
4210	NOT USED			
4211	HH-421	Relief	3/4"	Vickers No. CT-06-B-10**
4212	HH-422	Relief	3/4"	Vickers No. CT-06-B-10**
4213	HH-423	Relief	3/4"	Vickers No. CT-06-B-10**
4214	HH-424	Relief	3/4"	Vickers No. CT-06-B-10**
4215	HH-425	Relief	3/4"	Vickers No. CT-06-B-10**

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* Reference No. (3) on H3B-B1359-1, purchased with 6038E-421, etc.
+ Reference No. (8) on H3B-B1359-1, purchased with 6038E-421, etc.
** Reference No. (10) on H3B-B1359-1, purchased with 6038E-421, etc.

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4216	NOT USED			
4217	NOT USED			
4218	NOT USED			
4219	NOT USED			
4220	NOT USED			
4221	6037E-301	Pressure Gauge	1/4"	Vickers No. 134641*
4222	6037E-302	Pressure Gauge	1/4"	Vickers No. 134641*
4223	6037E-303	Pressure Gauge	1/4"	Vickers No. 134641*
4224	6037E-304	Pressure Gauge	1/4"	Vickers No. 134641*
4225	6037E-305	Pressure Gauge	1/4"	Vickers No. 13464[illegible]
4226	NOT USED			
4227	NOT USED			
4228	NOT USED			
4229	NOT USED			
4230	NOT USED			
4231	6037E-301A	Pressure Gauge	1/4"	Vickers No. 134641*
4232	6037E-302A	Pressure Gauge	1/4"	Vickers No. 134641*
4233	6037E-303A	Pressure Gauge	1/4"	Vickers No. 134641*
4234	6037E-304A	Pressure Gauge	1/4"	Vickers No. 134641*
4235	6037E-305A	Pressure Gauge	1/4"	Vickers No. 134641*
4236	NOT USED			
4237	NOT USED			
4238	NOT USED			
4239	NOT USED			

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* Reference No. (12) on H3B-B1359-1, purchased with 6038E-421, etc.

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4240	NOT USED			
4241	HH-411	Flow Control	1-1/4"	Vickers No. FGY-10-50-10+
4242	HH-412	Flow Control	1-1/4"	Vickers No. FGY-10-50-10+
4243	HH-413	Flow Control	1-1/4"	Vickers No. FGY-10-50-10+
4244	HH-414	Flow Control	1-1/4"	Vickers No. FGY-10-50-10+
4245	HH-415	Flow Control	1-1/4"	Vickers No. FGY-10-50-10+
4246	NOT USED			
4247	NOT USED			
4248	NOT USED			
4249	NOT USED			
4250	NOT USED			
4251	HH-411	Flow Control	1-1/4"	Vickers No. FGY-10-50-10+
4252	HH-412	Flow Control	1-1/4"	Vickers No. FGY-10-50-10+
4253	HH-413	Flow Control	1-1/4"	Vickers No. FGY-10-50-10+
4254	HH-414	Flow Control	1-1/4"	Vickers No. FGY-10-50-10+
4255	HH-415	Flow Control	1-1/4"	Vickers No. FGY-10-50-10+
4256	NOT USED			
4257	NOT USED			
4258	NOT USED			
4259	NOT USED			
4260	NOT USED			
4261	HH-421	Pressure Gauge	1/4"	Vickers No. 8071*

\+ Reference No. (7) on H3B-B1359-1, purchased with 6038E-421, etc.
* Reference No. (19) on H3B-B1359-1 purchased with 6038E-421, etc.

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4262	HH-422	Pressure Gauge	1/4"	Vickers No. 8071*
4263	HH-423	Pressure Gauge	1/4"	Vickers No. 8071*
4264	HH-424	Pressure Gauge	1/4"	Vickers No. 8071*
4265	HH-425	Pressure Gauge	1/4"	Vickers No. 8071*
4266	NOT USED			
4267	NOT USED			
4268	NOT USED			
4269	NOT USED			
4270	NOT USED			
4271	HH-461	Pressure Gauge	1/4"	Vickers No. 8071*
4272	HH-462	Pressure Gauge	1/4"	Vickers No. 8071*
4273	HH-463	Pressure Gauge	1/4"	Vickers No. 8071*
4274	HH-464	Pressure Gauge	1/4"	Vickers No. 8071*
4275	HH-465	Pressure Gauge	1/4"	Vickers No. 8071*
4276	NOT USED			
4277	NOT USED			
4278	NOT USED			
4279	NOT USED			
4280	NOT USED			
4281	HH-431	Check	2"	Vickers No. DF10P1-16-5-20 +

* Reference No. (19) on H3B-B1359-1, purchased with 6038E-421, etc.
\+ Reference No. (1) on H3B-B1359-1, purchased with 6038E-421, etc. must be installed with ports of valve in horizontal plane.

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4282	HH-432	Check	2"	Vickers No. DF10P1-16-5-20 +
4283	HH-433	Check	2"	Vickers No. DF10P1-16-5-20 +
4284	HH-434	Check	2"	Vickers No. DF10P1-16-5-20 +
4285	HH-435	Check	2"	Vickers No. DF10P1-16-5-20 +
4286	NOT USED			
4287	NOT USED			
4288	NOT USED			
4289	NOT USED			
4290	NOT USED			
4291	HH-441	Check	2"	Vickers No. DF10P1-16-5-20 +
4292	HH-442	Check	2"	Vickers No. DF10P1-16-5-20 +
4293	HH-443	Check	2"	Vickers No. DF10P1-16-5-20 +
4294	HH-444	Check	2"	Vickers No. DF10P-16-5-20 +
4295	HH-445	Check	2"	Vickers No. DF10P1-16-5-20 +
4296	NOT USED			
4297	NOT USED			
4298	NOT USED			
4299	NOT USED			
4300	NOT USED			
4301	HH-451	Check	2"	Vickers No. DF10P1-16-5-20 +

+ Reference No. (1) on H3B-B1359-1, purchased with 6038E-421, etc. must be installed with ports of valve in horizontal plane.

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4302	HH-452	Check	2"	Vickers No. DF10P1-16-5-20 +
4303	HH-453	Check	2"	Vickers No. DF10P1-16-5-20 +
4304	HH-454	Check	2"	Vickers No. DF10P1-16-5-20 +
4305	HH-455	Check	2"	Vickers No. DF10P1-16-5-20 +
4306	NOT USED			
4307	NOT USED			
4308	NOT USED			
4309	NOT USED			
4310	NOT USED			
4311	HH-451	Check	2"	Vickers No. DF10P1-16-5-20 +
4312	HH-452	Check	2"	Vickers No. DF10P1-16-5-20 +
4313	HH-453	Check	2"	Vickers No. DF10P1-16-5-20 +
4314	HH-454	Check	2"	Vickers No. DF10P1-16-5-20 +
4315	HH-455	Check	2"	Vickers No. DF10P1-16-5-20 +
4316	NOT USED			
4317	NOT USED			

+ Reference No. (1) on H3B-B1359-1, purchased with 6038E-421,etc. must be installed with ports of valve in horizontal plane.

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4318	NOT USED			
4319	NOT USED			
4320	NOT USED			
4321	HH-451	Check	2"	Lunk 624
4322	HH-452	Check	2"	Lunk 624
4323	HH-453	Check	2"	Lunk 624
4324	HH-454	Check	2"	Lunk 624
4325	HH-455	Check	2"	Lunk 624
4326	NOT USED			
4327	NOT USED			
4328	NOT USED			
4329	NOT USED			
4330	NOT USED			
4331	HH-451	Shutoff	2"	Nordstrom 1924
4332	HH-452	Shutoff	2"	Nordstrom 1924
4333	HH-453	Shutoff	2"	Nordstrom 1924
4334	HH-454	Shutoff	2"	Nordstrom 1924
4335	HH-455	Shutoff	2"	Nordstrom 1924
4336	NOT USED			
4337	NOT USED			
4338	NOT USED			
4339	NOT USED			

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.	
4340	NOT USED				
~~4341~~	~~HH-471~~	~~Shutoff~~	~~2"~~	~~Supplied by Vickers with 6038E-421A, etc.~~	(K)4/16/53
~~4342~~	~~HH-472~~	~~Shutoff~~	~~2"~~	~~Supplied by Vickers with 6038E-421A, etc.~~	
~~4343~~	~~HH-473~~	~~Shutoff~~	~~2"~~	~~Supplied by Vickers with 6038E-421A, etc.~~	
~~4344~~	~~HH-474~~	~~Shutoff~~	~~2"~~	~~Supplied by Vickers with 6038E-421A, etc.~~	
~~4345~~	~~HH-475~~	~~Shutoff~~	~~2"~~	~~Supplied by Vickers with 6038E-421A, etc.~~	
4346	HH-471	Relief Valve	1-1/4"	Vickers No. CT-10-B-10*	
4347	HH-472	Relief Valve	1-1/4"	Vickers No. CT-10-B-10*	
4348	HH-473	Relief Valve	1-1/4"	Vickers No. CT-10-B-10*	
4349	HH-474	Relief Valve	1-1/4"	Vickers No. CT-10-B-10*	
4350	HH-475	Relief Valve	1-1/4"	Vickers No. CT-10-B-10*	
~~4351~~	~~H-491~~	~~Shutoff~~	~~3"~~	~~Nordstrom 1925~~	(K)6/16/53
~~4352~~	~~H-492~~	~~Shutoff~~	~~3"~~	~~Nordstrom 1925~~	
~~4353~~	~~H-493~~	~~Shutoff~~	~~3"~~	~~Nordstrom 1925~~	
~~4354~~	~~H-494~~	~~Shutoff~~	~~3"~~	~~Nordstrom 1925~~	
~~4355~~	~~H-495~~	~~Shutoff~~	~~3"~~	~~Nordstrom 1925~~	
4356	Spare +	Relief Valve	1-1/4"	Vickers No. CT-10-B-10*	

* Reference No. (22) on H3B-B1359-1, purchased with 6038E-421, etc.
+ Not shown on flow diagram.

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4357	NOT USED			
4358	NOT USED			
4359	NOT USED			
4360	NOT USED			
4361	~~NOT USED~~ HHH-441	SHUTOFF	1"	1
4362	~~NOT USED~~ HHH-442	SHUTOFF	1"	1
4363	~~NOT USED~~ HHH-443	SHUTOFF	1"	1
4364	~~NOT USED~~ HHH-444	SHUTOFF	1"	1
4365	~~NOT USED~~ HHH-445	SHUTOFF	1"	1 (R) 6/16/53
4366	~~NOT USED~~ WWWW-401	SHUTOFF	½"	1
4367	~~NOT USED~~ WWWW-401	SHUTOFF	½"	1
4368	~~NOT USED~~ WWWW-402	SHUTOFF	½"	1
4369	~~NOT USED~~ WWWW-402	SHUTOFF	½"	1
4370	~~NOT USED~~ WWWW-403	SHUTOFF	½"	1
4371	~~NOT USED~~ WWWW-403	SHUTOFF	½"	1
4372	~~NOT USED~~ WWWW-404	SHUTOFF	½"	1
4373	~~NOT USED~~ WWWW-404	SHUTOFF	½"	1
4374	~~NOT USED~~ WWWW-405	SHUTOFF	½"	1
4375	~~NOT USED~~ WWWW-405	SHUTOFF	½"	1
4376	~~NOT USED~~ WWWW-	SHUTOFF	½"	1
4377	NOT USED			
4378	NOT USED			
4379	NOT USED			
4380	NOT USED			

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.	
4381	PP-408	Shutoff	1/2"	55	(R)
4382	PP-408	Shutoff	1/2"	55	(R)
4383	PP-408	Instrument	1/2"	115	(R)
4384	PP-408	Pressure Gauge	1/2"	115	(R)
4385	PP-408	Vent	1/2"	55	(R)
4386	PP-408	Shutoff	1"	55	(R)
4387	PP-408	Shutoff	1"	55	(R)
4388	PP-408	Shutoff	1"	55	(R)
4389	PP-409	Pressure Gauge	1/2"	196	(R)
4390	PP-410	Pressure Gauge	1/2"	196	(R)
4391	PP-410	Vent	1"	1	(R)
4392	HH-492	Shutoff	1-1/2"	1	(R)
4393	HH-492	Check	1-1/2"	213	(R)
4394	HH-492	Shutoff	1-1/2"	24	(R)
4395	NOT USED				
4396	NOT USED				
4397	NOT USED				
4398	NOT USED				
4399	NOT USED				
4400	NOT USED				
4401	AA-402	Shutoff	1/4"	1	
4402	AA-402	Shutoff	1/4"	1	
4403	AA-402	Shutoff	1/4"	1	
4404	AA-402	Shutoff	1/4"	1	

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4405	AA-402	Shutoff	1/4"	1
4406	NOT USED			
4407	NOT USED			
4408	NOT USED			
4409	NOT USED			
4410	NOT USED			
4411	AA-402	Shutoff	1/4"	1
4412	AA-402	Shutoff	1/4"	1
4413	AA-402	Shutoff	1/4"	1
4414	AA-402	Shutoff	1/4"	1
4415	AA-402	Shutoff	1/4"	1
4416	NOT USED			
4417	NOT USED			
4418	NOT USED			
4419	NOT USED			
4420	NOT USED			
4421	HHH-441	Shutoff	1-1/2"	1
4422	HHH-442	Shutoff	1-1/2"	1
4423	HHH-443	Shutoff	1-1/2"	1
4424	HHH-444	Shutoff	1-1/2"	1
4425	HHH-445	Shutoff	1-1/2"	1
4426	NOT USED			
4427	NOT USED			
4428	NOT USED			

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4429	NOT USED			
4430	NOT USED			
4431	HHH-461	Check	2"	201
4432	HHH-462	Check	2"	201
4433	HHH-463	Check	2"	201
4434	HHH-464	Check	2"	201
4435	HHH-465	Check	2"	201
4436	NOT USED			
4437	NOT USED			
4438	NOT USED			
4439	NOT USED			
4440	NOT USED			
4441	WWW-401	Shutoff	3"	5
4442	WWW-402	Shutoff	3"	5
4443	WWW-403	Shutoff	3"	5
4444	WWW-404	Shutoff	3"	5
4445	WWW-405	Shutoff	3"	5
4446	NOT USED			
4447	NOT USED			
4448	NOT USED			
4449	NOT USED			
4450	NOT USED			
4451	6038E-441A	Shutoff	1-1/4"	1
4452	6038E-443A	Shutoff	1-1/4"	1

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4453	6038E-445A	Shutoff	1-1/4"	1
4454	6038E-447A	Shutoff	1-1/4"	1
4455	6038E-449A	Shutoff	1-1/4"	1
4456	NOT USED			
4457	NOT USED			
4458	NOT USED			
4459	NOT USED			
4460	NOT USED			
4461	WWW-401	Control	2"	Powell Fig. 957 or equal
4462	WWW-402	Control	2"	Powell Fig. 957 or equal
4463	WWW-403	Control	2"	Powell Fig. 957 or equal
4464	WWW-404	Control	2"	Powell Fig. 957 or equal
4465	WWW-405	Control	2"	Powell Fig. 957 or equal
4466	NOT USED			
4467	NOT USED			
4468	NOT USED			
4469	NOT USED			
4471	WWW-401	Control	2"	Powell Fig. 957 or equal
4472	WWW-402	Control	2"	Powell Fig. 957 or equal
4473	WWW-403	Control	2"	Powell Fig. 957 or equal

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4474	WWWW-404	Control	2"	Powell Fig. 957 or equal
4475	WWWW-405	Control	2"	Powell Fig. 957 or equal
4476	NOT USED			
4477	NOT USED			
4478	NOT USED			
4479	NOT USED			
4480	NOT USED			
4481	HHH-481	Shutoff	1/2"	1
4482	HHH-482	Shutoff	1/2"	1
4483	HHH-483	Shutoff	1/2"	1
4484	HHH-484	Shutoff	1/2"	1
4485	HHH-485	Shutoff	1/2"	1
4486	NOT USED			
4487	NOT USED			
4488	NOT USED			
4489	NOT USED			
4490	NOT USED			
4491	HHH-481	Shutoff	1-1/2"	1
4492	HHH-482	Shutoff	1-1/2"	1
4493	HHH-483	Shutoff	1-1/2"	1
4494	HHH-484	Shutoff	1-1/2"	1
4495	HHH-485	Shutoff	1-1/2"	1

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4496	NOT USED			
4497	NOT USED			
4498	NOT USED			
4499	NOT USED			
4500	NOT USED			
4501	HHH-411	Shutoff	3/4"	1
4502	HHH-412	Shutoff	3/4"	1
4503	HHH-413	Shutoff	3/4"	1
4504	HHH-414	Shutoff	3/4"	1
4505	HHH-415	Shutoff	3/4"	1
4506	HHH-411	Shutoff	3/4"	1
4507	HHH-412	Shutoff	3/4"	1
4508	HHH-413	Shutoff	3/4"	1
4509	HHH-414	Shutoff	3/4"	1
4510	HHH-415	Shutoff	3/4"	1
4511	HHH-481	Check	2"	201
4512	HHH-482	Check	2"	201
4513	HHH-483	Check	2"	201
4514	HHH-484	Check	2"	201
4515	HHH-485	Check	2"	201
4516	HHH-411	Shutoff	3/4"	1
4517	HHH-412	Shutoff	3/4"	1
4518	HHH-413	Shutoff	3/4"	1
4519	HHH-414	Shutoff	3/4"	1

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4520	HHH-415	Shutoff	3/4"	1
4521	WWW-411	Shutoff	3"	5
4522	WWW-412	Shutoff	3"	5
4523	WWW-413	Shutoff	3"	5
4524	WWW-414	Shutoff	3"	5
4525	WWW-415	Shutoff	3"	5
4526	NOT USED			
4527	NOT USED			
4528	NOT USED			
4529	NOT USED			
4530	NOT USED			
4531	HHH-451	Shutoff	3"	Nordstrom 1925
4532	HHH-452	Shutoff	3"	Nordstrom 1925
4533	HHH-453	Shutoff	3"	Nordstrom 1925
4534	HHH-454	Shutoff	3"	Nordstrom 1925
4535	HHH-455	Shutoff	3"	Nordstrom 1925
4536	NOT USED			
4537	NOT USED			
4538	NOT USED			
4539	NOT USED			
4540	NOT USED			
4541	HHHH-421	Shutoff	1-1/2"	1
4542	HHHH-422	Shutoff	1-1/2"	1
4543	HHHH-423	Shutoff	1-1/2"	1

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VALVE LIST - H3R-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4544	HHHH-424	Shutoff	1-1/2"	1
4545	HHHH-425	Shutoff	1-1/2"	1
4546	NOT USED			
4547	NOT USED			
4548	NOT USED			
4549	NOT USED			
4550	NOT USED			
4551	HH-491	Shutoff	1-1/2"	1
4552	6038E-462E	Drain	3/4"	1
4553	HH-491	Shutoff	1-1/2"	1
~~4554~~	~~AA-406~~	~~Shutoff~~	~~1"~~	~~1~~
~~4555~~	~~AA-406~~	~~Pressure Gauge~~	~~1/2"~~	~~109~~
4556	PP-409 ~~AA-406~~	Shutoff	1"	1
4557	6038E-462	Shutoff	1"	1
4558	HH-405	Shutoff	2"	1
4559	NOT USED			
4560	HH-405	Shutoff	1-1/2"	1
4561	HH-405	Check	1-1/2"	201
4562	6038E-463	Shutoff	4"	5
4563	HH-404	Shutoff	1-1/2"	1
4564	6038E-463	Instrument	1/2"	109
4565	6038E-463	Instrument	1/2"	109
4566	HH-492	Shutoff	1-1/2"	1
~~4567~~	~~AA-407~~	~~Pressure Gauge~~	~~1/2"~~	~~109~~

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
~~4568~~	~~AA-407~~	~~Shutoff~~	~~1"~~	~~1~~
4569	Spare	Check	2"	Vickers No. DF10P1-16-5-20 +
4570	Spare	Check	2"	Vickers No. DF10P1-16-5-20 +
4571	Spare	Relief	3"	Vickers No. CF-24-F-10*
4572	Spare	Relief	3"	Vickers No. CF-24-F-10*
4573	Spare	Relief	3"	Vickers No. CF-24-F-10*
4574	Spare	Relief	3"	Vickers No. CF-24-F-10*
4575	Spare	Flow Control	1-1/4"	Vickers No. FGY-10-50-10 ++
4576	Spare	Flow Control	1-1/4"	Vickers No. FGY-10-50-10 ++
4577	Spare	Relief	2"	Vickers No. CF-16-B-10**
4578	NOT USED			
4579	Spare	Relief	3/4"	Vickers No. CT-06-B-10 ***
4580	NOT USED			

+ Reference No. (1) on H3B-B1359-1, purchased with 6038E-421, etc.; not shown on flow diagram must be installed with ports of valve in horizontal plane.

++ Reference No. (7) on H3B-B1359-1, purchased with 6038E-421, etc.; not shown on flow diagram.

* Reference No. (3) on H3B-B1359-1, purchased with 6038E-421, etc.; not shown on flow diagram.

** Reference No. (8) on H3B-B1359-1, purchased with 6038E-421, etc.; not shown on flow diagram.

*** Reference No. (10) on H3B-B1359, purchased with 6038E-421, etc.; not shown on flow diagram.

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4581	H-451	Vent	1/4"	1
4582	H-451	Vent	1/4"	1
4583	H-452	Vent	1/4"	1
4584	H-452	Vent	1/4"	1
4585	H-453	Vent	1/4"	1
4586	H-453	Vent	1/4"	1
4587	H-454	Vebt	1/4"	1
4588	H-454	Vent	1/4"	1
4589	H-455	Vent	1/4"	1
4590	H-455	Vent	1/4"	1
4591	NOT USED			
4592	NOT USED			
4593	NOT USED			
4594	NOT USED			
4595	NOT USED			
4596	NOT USED			
4597	NOT USED			
4598	NOT USED			
4599	NOT USED			
4600	NOT USED			
4601	H-461	Vent	1/4"	1
4602	H-461	Vent	1/4"	1
4603	H-462	Vent	1/4"	1
4604	H-462	Vent	1/4"	1

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4605	H-463	Vent	1/4"	1
4606	H-463	Vent	1/4"	1
4607	H-464	Vent	1/4"	1
4608	H-464	Vent	1/4"	1
4609	H-465	Vent	1/4"	1
4610	H-465	Vent	1/4"	1
4611	Spare	Pressure Gauge	1/4"	Vickers #134641*
4612	Spare	Pressure Gauge	1/4"	Vickers #134641*
4613	Spare	Pressure Gauge	1/4"	Vickers #134641*
4614	Spare	Pressure Gauge	1/4"	Vickers #134641*
4615	Spare	Relief Valve	1/4"	Vickers #C-175-C-10 +
4616	Spare	Check	1/4"	Vickers #C2-800**
4617	Spare	Check	1/4"	Vickers #C2-800**
4618	NOT USED			
4619	NOT USED			
4620	NOT USED			
4621	6038E-463	Shutoff	4"	5
4622	WW-411	Control	2"	Powell Fig. 957 or equal
4623	WW-411	Control	2"	Powell Fig. 957 or equal

* Reference No.(18) on H3B-B1359-1, purchased with 6038E-421, etc.; not shown on flow diagram.

\+ Reference No. (20) on H3B-B1359-1, purchased with 6038E-421, etc.; not shown on flow diagram.

** Reference No. (21) on H3B-B1359-1, purchased with 6038E-421, etc.; not shown on flow diagram.

VALVE LIST - H3B-R1044 (CONT'D)

Number	Location	Service	Size	C&CCC No.
4624	WW-412	Control	2"	Powell Fig. 957 or equal
4625	WW-412	Control	2"	Powell Fig. 957 or equal
4626	WW-413	Control	2"	Powell Fig. 957 or equal
4627	WW-413	Control	2"	Powell Fig. 957 or equal
4628	WW-414	Control	2"	Powell Fig. 957 or equal
4629	WW-414	Control	2"	Powell Fig. 957 or equal
4630	WW-415	Control	2"	Powell Fig. 957 or equal
4631	WW-415	Control	2"	Powell Fig. 957 or equal
4632	NOT USED			
4633	NOT USED			
4634	NOT USED			
4635	NOT USED			
4636	NOT USED			
4637	NOT USED			
4638	NOT USED			
4639	NOT USED			
4640	NOT USED			
4641	NOT USED			
4642	6038E-463E	Drain	3/4"	1
4643	~~AA-407~~ PP-410	Shutoff	1"	1
4644	6038E-463	Check	4"	204
4645	~~AA-406~~ PP-409	Vent	1"	1

Sheet 1 of 3
6038E-401 thru -410,
-471
6038E-401A thru -410A,
-471A
Revised August 22, 1952

SPECIFICATIONS FOR HYDRAULIC OIL PUMPS

ITEMS 6038E-401 THRU -410, -471
ITEMS 6038E-401A THRU -410A, -471A

Items 6038E-401 thru -410, and -471

Eleven (11) Vickers Model No. PV-2500-FHE variable delivery piston pumps with specifications of each to be as listed below. Clockwise rotation facing drive shaft. (R)

Items 6038E-401A thru -410A, and -471A

Eleven (11) Vickers Model No. PV-2500-FHE variable delivery piston pumps with specifications of each to be as listed below. Counter-clockwise rotation facing drive shaft. (R)

OPERATING DATA

Maximum delivery	450 gallons per minute
Maximum discharge pressure	2,000 lb per sq in.
Speed	720 rpm
Fluid	Teresso 52 or equivalent oil
Drive	Synchronous motor
Supercharge pressure range to	225 lb per sq in. (R)

GENERAL DESIGN

The pump is to be a variable delivery axial piston pump of suitable design and materials to permit 24 hours per day continuous operation under the above operating conditions. Pump should be capable of change to opposite direction of rotation by minor field alteration. Pumps will be mounted in pairs for direct drive by double shaft extension synchronous motors. Handwheel control of pump delivery is to be provided, with a lock screw to serve for locking the control at any desired setting. An indicator calibrated for the per cent delivery should be included with this control.

Each pump except as noted below is to be equipped with a Thomas Flexible Coupling for connecting to 700 hp motor. Motor half of coupling to be bored to fit motor shaft. Purchaser will supply pump manufacturer with certified motor print for this purpose. (R)

Spare pumps 6038E-471, and -471A are each to be provided with the pump half of the above-mentioned Thomas coupling.

Forty-four (44) Vickers 154960 Flanges complete with insert, gaskets, studs, lockwashers, and nuts shall be supplied with these pumps. Flanges to be machined for socket welding of Schedule 160 steel pipe, size as determined from suction connection. (R)

INSPECTION AND TESTING (R)

The Purchaser or his agent shall have the privilege of inspection at all times during the manufacture and testing of the equipment.

No parts shall be repaired without the written approval of the Purchaser or his agent.

All pressure tests of the equipment or of its parts shall be witnessed by the Purchaser or his agent. Advance notice of at least two days of such testing shall be given.

TESTS

Pump is to pass a performance test at the Manufacturer's shop before shipment. The conditions of the test, which are to be mutually acceptable to the Purchaser and to the Manufacturer, are to be of sufficient severity to insure the meeting of the pump operating requirements without excessive oil leakage or loss of efficiency. The conditions of the test are to be such as to guarantee the pumps meeting the requirements for standard of quality.

CERTIFICATE OF TEST

Manufacturer shall provide Purchaser with a certificate covering the results of the tests.

GUARANTEE

The Manufacturer agrees to replace without charge, fob factory shipping point, or at his option, to allow credit for any articles of his manufacture which under recommended use and service, in his judgment prove to be defective in material or workmanship within a period of one year from the date the material is placed in service. Warranties on materials supplied by others than the pump manufacturer are to be assigned to the Purchaser.

DRAWINGS (A)

Five copies of Manufacturer's outline dimension drawings shall be furnished for approval and shall be approved before fabrication is started.

Eleven copies of certified drawings shall be furnished.

EXPEDITING (A)

Expediting will be performed by Brown and Root, Inc., Houston, Texas.

CORRESPONDENCE (A)

All correspondence pertaining to this equipment, including drawings, test notices, etc., shall be addressed to Mr. J. C. Sillin, Brown and Root, Inc., P. O. Box 3, Houston 1, Texas.

SPECIFICATIONS FOR SYNCHRONOUS MOTORS

ITEM 6038E-401B THRU -410B

Ten (10) 700-hp, 720-rpm, 4160-volt, 3-phase, 60-cycle, 100% power factor 40°C rise continuous sleeve bearing synchronous horizontal motors with standard torque (40% starting, 60% pull-in, 150% pull-out at normal load inertia). Supply manually operated motor field rheostats suitable for back of panel mounting. Press on drive half-coupling supplied by purchaser. In-rush current not to exceed 500% of normal. Further detailed specifications for each are as follows:

SERVICE

Motor will be coupled to two variable delivery constant speed hydraulic oil pumps. Motor is to be provided with a double shaft extension for coupling to pumps. Shaft extensions are to be equal.

EXCITATION

Field winding is to be for 125 volts separate excitation. Exciter lead shall not enter through end bell.

FRAME AND HOUSING

Drip-proof type housing.

ENCLOSED COLLECTOR RINGS

Collector rings are to be enclosed in vapor-tight box. Box is to be of suitable working pressure for maintaining of adequate higher pressure of neutral atmosphere around the rings.

BEARINGS

Ring-oiled sleeve bearings shall have a length not less than the shaft diameter.

DIMENSIONS

Overall length, tip to tip of shaft (including extension)	- 79-7/8"
Shaft extension, each end	- 10-1/2"
Dimension across feet transverse to shaft	- 45" max.
Centerline of shaft to bottom of feet	- 38"
Shaft diameter	- 4.375"

Motor shall be symmetrical insofar as practical. The junction box for the 4160-volt wiring and exciter wiring should not extend beyond limits of motor housing.

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LOADING

The pump loading capacity will be adjusted to the load capacity of the motors.

GUARANTEE

The Manufacturer shall guarantee the above equipment against defects in material or workmanship for a period of one year. In the event of mechanical defect or failure within this period the Manufacturer shall repair or replace the equipment or parts thereof, as may be required, fob shipping point.

DRAWINGS (A)

Five copies of Manufacturer's outline dimension drawings shall be furnished for approval and shall be approved before fabrication is started.

Eleven copies of certified drawings shall be furnished.

EXPEDITING (A)

Expediting will be performed by Brown and Root, Inc., Houston Texas.

CORRESPONDENCE (A)

All correspondence pertaining to this equipment, including drawings, test notices, etc., shall be addressed to Mr. J. C. Sillin, Brown and Root, Inc., P. O. Box 3, Houston 1, Texas.

Sheet 1 of 1
6038E-401C thru -410C
Revised August 22, 1952

SPECIFICATIONS FOR HYDRAULIC OIL PUMP BASE PLATES

ITEMS 6038E-401C THRU -410C

Ten (10) hydraulic oil pumps and motor base plates each to be suitable for mounting a 700 hp double shaft extension synchronous motor (R) connected through flexible couplings to drive two hydraulic oil pumps (see "Specifications for Hydraulic Oil Pumps, Item 6038E-401"). Base plates to be of welded steel construction, suitably reinforced. Base plates to be sloped to permit collection of oil leakage from pumps and connecting piping, and should be provided with suitable collecting troughs. Sufficient machined surfaces shall be provided on the base plate for accurate alignment and assembly of the pumps and motors. They shall be smooth finished and have a good workmanlike appearance.

Motor and pumps to be aligned on base plate. Base plates to be shipped less pumps and motors.

Manufacturer shall advise Purchaser whether he will need one of the 700 hp motors to properly align pumps and motor on base plates or (R) whether a certified motor print will suffice.

DRAWINGS (A)

Five copies of Manufacturer's outline dimension drawings shall be furnished for approval and shall be approved before fabrication is started.

Eleven copies of certified drawings shall be furnished.

EXPEDITING (A)

Expediting will be performed by Brown and Root, Inc., Houston, Texas.

CORRESPONDENCE (A)

All correspondence pertaining to this equipment, including drawings, test notices, etc., shall be addressed to Mr. J. C. Sillin, Brown and Root, Inc., P. O. Box 3, Houston 1, Texas.

Sheet 1 of 2
6038E-401E thru -410E,
-473 and -473A
6038E-401E-2 thru -410E-2
Revised October 28, 1952

SPECIFICATIONS FOR SOLENOID-OPERATED FOUR-WAY VALVES

ITEMS 6038E-401E THRU -410E, -473 AND -473A
6038E-401E-2 THRU -410E-2

Twelve (12) double-solenoid, pilot-operated, four-way valves; 6" 4-way Model EO-10968-E; 1/4" pilot 4-way Model DG4S4-022-20; sub-plate DGSM-02-10. Specifications follow:

OPERATING CONDITIONS

Working pressure	2,000 psi
Fluid	Teresso 52 or an equivalent oil
Power supply	110-volt, 60-cycle, a.c.
Maximum operating volume	Approximately 900 gpm

GENERAL DESIGN

Valve is to be indirectly operated by pilot valves actuated by solenoids. Valve to have following characteristics:

Position 1 - Pressure Port connected to Port A
Port B connected to Tank
Position 2 - Pressure Port connected to Port B
Port A connected to Tank

Reversals of the valve are to be shock-free and essentially instantaneous.

The valve is to be furnished with sealing elements and suitable forged steel flanges. Alloy steel bolt studs are to be furnished as per ASTM Spec. A-193-46T, Grade B4 or B7. Steel lockwashers and nuts to be furnished. Mating flanges to be machined for socket welding of Schedule 160 steel pipe.

6038E-401E-2 THRU -410E-2 (A)

Supply ten (10) solenoid and bracket assemblies for the 1/4" pilot 4-way valve. These assemblies will be used as spares.

TESTS

Valve must pass a satisfactory performance test and a 4,000 lb hydrostatic test at the Manufacturer's shop before shipment. The conditions of test, which are to be mutually acceptable to the Purchaser and to the Manufacturer, are to be sufficiently severe to insure the meeting of the operating requirements.

CERTIFICATE OF TESTS

Manufacturer shall provide Purchaser with a certificate covering the results of tests.

GUARANTEE

The Manufacturer agrees to replace, fob factory shipping point, or at his option, to allow credit for any articles of his manufacture which under recommended use and service, in his judgment, prove to be defective in material or workmanship within a period of one year from the date the material is placed in service.

DRAWINGS

Five copies of Manufacturer's outline dimension drawings shall be furnished for approval and shall be approved before fabrication is started.

Eleven copies of certified drawings shall be furnished.

EXPEDITING

Expediting will be performed by Brown and Root, Inc., Houston, Texas.

CORRESPONDENCE

All correspondence pertaining to this equipment, including drawings, test notices, etc., shall be addressed to Mr. J. C. Sillin, Brown and Root, Inc., P.O. Box 3, Houston 1, Texas.

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Sheet 1 of 4
6038E-421 thru -425, -476
6038E-421A thru -425A
6038E-421B thru -425B
6038E-421M thru -425M, -478
Revised September 15, 1952

SPECIFICATIONS FOR SUPERCHARGE PUMP TANK UNITS AND MISCELLANEOUS ACCESSORIES

ITEMS 6038E-421 THRU -425, -476
ITEMS 6038E-421A THRU -425A
ITEMS 6038E-421B THRU -425B
ITEMS 6038E-421M THRU -425M, -478

Reference Drawing H3B-B1359-1

Five (5) supercharge pump tank units completely assembled for connecting to Customer's piping each to include pumps, motor, tank, and accessories in accordance with the following specifications. Inching pressure range to 425 psig; pilot oil pressure range to 325 psig. (R)

ITEMS 6038E-421 THRU -425

Five (5) Vickers VF3-60-60-M pumps mounted on Items 6038E-421A thru -425A described below. Fluid pumped - Teresso 52 or an equivalent oil. Each pump to be equipped with a Falk "Steelflex" coupling for connecting to motor drive described below. Motor half of coupling to be bored for motor shaft. (R)

ITEMS 6038E-421M THRU -425M (A)

Five (5) Vickers V-124-10-LH pumps mounted on Items 6038E-421A thru -425A. Fluid pumped - Teresso 52 or an equivalent oil. Each pump to be equipped with a Falk "Steelflex" coupling for connecting to motor. Motor half of coupling to be bored for motor shaft.

ITEMS 6038E-421A THRU -425A

Five (5) atmospheric working pressure hydraulic oil reservoirs with a capacity of 700 gallons. Tank to have two 3" and one 2" connection in each end, one 1-1/2" connection in top for filling, and openings for cleanout. Exact locations of end connections to be given on approval drawings. An oil level sight gage is to be provided. Tank top to be provided with a means of collecting oil leakage, and piping away of same. (R)

Cleaning - Before testing, the inside of tank is to be sand-blasted to remove all rust and scale. After testing, tank is to be wiped out, and coated with turbine oil. Protection is to be provided so that water will not enter the tank subsequent to cleaning and oiling, during handling and transit.

ITEMS 6038E-421A THRU -425A (CONT'D)

Tests - After complete fabrication, tank is to be set level and filled with kerosene. Allow to set for several hours until inspection is made and there is assurance that no leaks are present. Any leaks discovered are to be repaired after which the kerosene test must be repeated.

ITEM 6038E-476

One (1) Vickers VF3-60-60-M pump only, duplicate of Items 6038E-421 thru -425, but with half coupling only. (R)

ITEM 6038E-478 (A)

One (1) Vickers V-124-10-LH pump only, duplicate of Items 6038E-421M thru -425M, but with half coupling only.

ITEMS 6038E-421B THRU -425B

Five (5) 50-hp, 440-volt, 3-phase, 60-cycle, explosion-proof motors for Class I, Group D service to be supplied by Vickers, Incorporated for driving Supercharge Units. Motors to be mounted on tank unit. (R)

ACCESSORIES AND ARRANGEMENT

Provided with the tank unit are to be suitable pump suction piping and Purolator type filters, hydraulic valves for the control of the pressure and flow from the previously mentioned pumps as well as accumulator, valves, filters, and other items necessary to provide a satisfactory hydraulic circuit for driving a pair of double-acting pressure intensifiers when combined with the hydraulic oil pumps and solenoid-operated four-way valves described in accompanying specifications, see "Specifications for Hydraulic Pumps, Items 6038E-401, etc." and "Specifications for Solenoid-Operated Four-Way Valves, Items 6038E-401E, etc."

Piping on Tank Unit (A)

All piping shall be schedule 160 seamless steel ASTM A-106 Grade A. Pipe fittings shall be forged steel socket weld type ASTM A-105, Grade 1 for schedule 160 pipe. Ells to be Vogt Figures C-232, etc., or equivalent. Tees to be Vogt Figures C-246, etc., or equivalent. Completely assembled unit (excluding tank) shall be hydrostatically tested at 1500 psi and shown to be free of leaks. The piping arrangement shall be subject to the Purchaser's approval.

Sheet 3 of 4
6038E-421 thru -425, -476
6038E-421A thru -425A
6038E-421B thru -425B
6038E-421M thru -425M, -478
Revised October 14, 1952

ACCESSORIES AND ARRANGEMENT (CONT'D)

A detailed listing of accessories follows: (reference numbers are shown on H3B-B1359-1) (R)

Ref. No.	No. Req'd.	Description	Model No.
(1)	22	Vickers Check Valves	DF10P1-16-5-20 (2")
(2)	42	Vickers Flanges - bored for Schedule 160 pipe	FL-16-TS-20-Spec
(3)	24	Vickers Relief Valve	CF-24-F-10 (3")
(4)	66	Vickers Flanges - 44 bored for Schedule 160 pipe - 22 blank	FL-24-TS-20-Spec (44 required) FL-24-OS-20 (22 required) (R)
(5)	6	Vickers Solenoid-Operated 4-way valves	DF5S4-160C-20 (2")
(6)	22	Vickers Flanges - bored for Schedule 160 pipe	FL-16-TL-20-Spec (16 required) FL-16-TS-20-Spec (6 required)
(7)	12	Vickers Flow Control Valves and Sub Plates	FGY-10-50-10 (1-1/4")
(8)	6	Vickers Relief Valves	CF-16-B-10 (2")
(9)	18	Vickers Flanges - bored for Schedule 160 pipe	FL-16-TS-20-Spec
(10)	6	Vickers Relief Valves	CT-06-B-10
(11)	12	Vickers Pressure Gauges	GS-1200
(12)	6	Vickers Venturi Filters	OF1-06-20 (3/4")
(13)	6	Vickers Venturi Filters	OF1-16-30 (2")
(14)	12	Vickers Flanges - bored for Schedule 160 pipe	FL-16-TS-20-Spec
(15)	24	Vickers Pressure Gauges	GS-3000
(16)	11	Vickers Hydraulic (Oil) Accumulators	A1-2050-10
(17)	1	Vickers Precharging Hose Assembly	129312
(18)	24	Vickers Needle Valves	134641
(19)	10	Vickers Needle Valves	8071
(20)	11	Vickers Relief Valves	C-175-C-10 (1/4")
(21)	22	Vickers Check Valves	C2-800 (1/4")
(22)	6	Vickers Relief Valves	CT-10-B-10 (A)

Valves are to be furnished with sealing elements. Alloy steel bolt studs are to be furnished as per ASTM Specification A-193-46T, Grade B4 or B7. All studs shall be marked as required by the ASTM Specification. Steel lockwashers and nuts to be furnished. Flanges to be machined for socket welding of Schedule 160 steel pipe. (R)

GUARANTEE

The Manufacturer agrees to replace without charge, fob factory shipping point, or at his option to allow credit for any articles of his manufacture which under recommended use and service, in his judgment, prove to be defective in material or workmanship within a period of one year from the date the material is placed in service.

DRAWINGS

Five copies of Manufacturer's outline dimension drawings shall be furnished for approval and shall be approved before fabrication is started.

Eleven copies of certified drawings shall be furnished.

EXPEDITING

Expediting will be performed by Brown and Root, Inc., Houston, Texas.

CORRESPONDENCE

All correspondence pertaining to this equipment, including drawings, test notices, etc., shall be addressed to Mr. J. C. Sillin, Brown and Root, Inc., P. O. Box 3, Houston 1, Texas.

Sheet 1 of 2
6038E-431 thru -435, and -475; 6038E-431A thru -435A
November 5, 1952

SPECIFICATIONS FOR OIL PUMPS

PUMPS - ITEMS 6038E-431 THRU -435, AND -475
MOTORS - ITEMS 6038E-431A THRU -435A

Five (5) pumping units comprising centrifugal pumps, motors, and bases for pumps and motors. Pumps are to be ball bearing, single-stage with bronze impeller and mechanical shaft seal, to be directly connected to an electric motor by means of Falk flexible coupling, including the coupling.

One (1) pump as above without base plate or motor but with half coupling.

The pumps are to be designed to meet the following Performance Specifications and Guarantee:

PERFORMANCE SPECIFICATIONS

Fluid	Teresso 52 Oil
Net positive suction head	1 ft above pump suction
Discharge head	75 ft above suction head
Capacity	100 gpm
Motor	3600-rpm, 440-volt, 3-phase, 60-cycle for operation in Class I, Group D hazardous atmosphere
Characteristics	To be non-overloading under all conditions of operation
Operation	24 hours per day
Oil temperature	130°F
Connections	Sizes 1-1/2" and larger

GUARANTEE

Manufacturer shall guarantee the pump to operate satisfactorily and continuously in accordance with the specifications contained herein. If the pump fails to meet the guarantee, the Manufacturer agrees to furnish a new pump or redesign the pump furnished so that the guaranteed operating conditions will be met without cost to the Purchaser, fob factory shipping point. The Manufacturer shall guarantee the pump to be free from all defects in design, workmanship, and/or material and shall agree to replace at his own expense, any part of the equipment proving defective within one year of the date of acceptance, provided that the defect existed at the time of acceptance or was caused by poor design, workmanship and/or material.

INSPECTION AND TESTING

The Purchaser or his agent shall have the privilege of inspection at all times during the manufacture and testing of the equipment.

Five copies of certified hydrostatic test reports shall be furnished.

DRAWINGS

Five copies of Manufacturer's outline dimension drawings shall be furnished for approval and shall be approved before fabrication is started.

Ten copies of certified drawings shall be furnished.

OPERATING INSTRUCTIONS AND PERFORMANCE CURVES

Eleven copies of certified operating instructions and performance curves shall be furnished.

INSTALLATION INSTRUCTIONS AND REPAIR PARTS LISTS

Seven copies of certified installation instructions and repair parts lists shall be furnished.

EXPEDITING

Expediting will be performed by Brown and Root, Inc., Houston, Texas.

CORRESPONDENCE

All correspondence pertaining to this equipment, including drawings, test notices, etc., shall be addressed to Mr. J. C. Sillin, Brown and Root, Inc., P.O. Box 3, Houston 1, Texas.

Sheet 1 of 2
6038E-441 thru -450
Revised December 9, 1952

SPECIFICATIONS FOR OIL COOLERS

ITEMS 6038E-441 THRU -450

Ten (10) single-pass shell four-pass tube oil coolers with removable bundles, two piece channel, and shell supports all in conformance with T.E.M.A. Standards and equivalent to U-69 construction. Coolers to operate continuously in accordance with the following performance data: (R)

PERFORMANCE DATA

	Shell Side	Tube Side	
Fluid	Hydraulic oil	Water	
Quantity of fluid	100 gpm	100 gpm maximum	
Specific gravity	0.85	—	
Viscosity	300 SSU	—	
Temperature in	128°F	95°F	(R)
Temperature out	103°F	105°F	
Number of passes	One	Four	(R)
Maximum allowable pressure drop	10 psi	2 psi	
Heat transferred	500,000 btu/hr	500,000 btu/hr	
Operating pressure	27 psi	25 psi	
Working pressure	75 psi	75 psi	

CONNECTIONS

Shell and channel connections to be Manufacturer's standard but Purchaser shall have the privilege of specifying orientation on approval drawings.

GUARANTEE

The Manufacturer shall guarantee the equipment to operate satisfactorily and continuously in accordance with the specifications contained herein. If the equipment fails to meet the guarantee, the Manufacturer agrees to furnish new equipment or redesign the equipment furnished so that the guaranteed operating conditions will be met without cost to the Purchaser fob factory shipping point. The Manufacturer shall guarantee the equipment to be free from all defects in design, workmanship, and/or material. He agrees to replace at his own expense any part of the equipment proving defective within one year of the date of acceptance provided the defect existed at the time of acceptance or was caused by faulty design, workmanship, and/or material.

DRAWINGS

Five copies of Manufacturer's outline dimension drawings shall be furnished for approval and shall be approved before fabrication is started.

Ten copies of certified drawings shall be furnished. (R)

INSPECTION AND TESTING (A)

The Purchaser or his agent shall have the privilege of inspection at all times during the manufacture and testing of the equipment.

Advance notice of at least one week that fabrication is to begin shall be given.

All pressure tests of the equipment or of its parts shall be witnessed by the Purchaser or his agent. Advance notice of at least three days of such testing shall be given.

EXPEDITING (A)

Expediting will be performed by Brown and Root, Inc., Houston, Texas.

CORRESPONDENCE (A)

All correspondence pertaining to this equipment, including drawings, test notices, etc., shall be addressed to Mr. J. C. Sillin, Brown and Root, Inc., P.O. Box 3, Houston 1, Texas.

Sheet 1 of 2
6038E-462+
Revised June 19, 1952

SPECIFICATIONS FOR PRESSURE VESSEL

ITEM 6038E-462

One (1) 72" OD x 26' - 0" overall length pressure vessel with ASME flanged and dished heads to be fabricated in accordance with these specifications and the following design data:

DESIGN DATA

Working pressure	50 psig
Drawing	C&CCC H3B-B1080
Construction	Class B per C&CCC Standard Specifications PVD-101, PVF-101, PVM-100, and PVT-101

Stress relief, radiography, and magnetic particle inspection not required.

Joint efficiency 80%

CONNECTIONS

Nozzle	No.	Size	WP	Type	Facing
A*	1	20"	150#	ASA welding neck	1/16" raised face
B	1	2"	150#	ASA welding neck	1/16" raised face
C, D	2	1-1/2"	150#	ASA welding neck	1/16" raised face
E	1	3"	150#	ASA welding neck	1/16" raised face

*Supply one 20", 150 psi ASA blind flange.

MATERIALS OF CONSTRUCTION

Per PVF-101, Table 11, Group 1 and following:

1 - Shell and heads - ASTM A-285-49T, Grade C, Firebox Quality.
2 - Nozzles - ASTM A-181-49, Grade 1.
3 - Pipe - ASTM A-106-48T, Grade A.
4 - Bolts and nuts - PVM-100, Class 1.
5 - Gaskets - U. S. Rubber No. 4899 or equal.

INSPECTION AND TESTING (R)

The Purchaser or his agent shall have the privilege of inspection at all times during the manufacture and testing of the equipment.

Advance notice of at least one week that fabrication is to begin shall be given.

All pressure tests of the equipment or of its parts shall be witnessed by the Purchaser or his agent. Advance notice of at least two days of such testing shall be given.

+Item was E-462.

DRAWINGS (A)

Five copies of Manufacturer's shop drawings shall be furnished for approval, and shall be approved by Purchaser before fabrication is started.

Eleven copies of certified drawings shall be furnished.

EXPEDITING (A)

Expediting will be performed by Brown and Root, Inc., Houston, Texas.

CORRESPONDENCE (A)

All correspondence pertaining to this equipment, including drawings, test notices, etc., shall be addressed to Mr. J. C. Sillin, Brown and Root, Inc., P. O. Box 3, Houston 1, Texas.

Sheet 1 of 2
6038E-463*
Revised June 19, 1952

SPECIFICATIONS FOR PRESSURE VESSEL

ITEM 6038E-463

One (1) 4' - 0" OD by 12' - 6" long horizontal pressure vessel with ASME flanged and dished heads to be fabricated in accordance with these specifications and the following design data:

DESIGN DATA

Working pressure	50 psi
Drawing	C&CCC H3B-C1081
Construction	Class B per C&CCC Standard Specifications PVD-101, PVF-101, PVM-100, and PVW-101

Stress relief, radiography, and magnetic particle inspection not required.

Joint efficiency 80%

CONNECTIONS

No.	Size	WP	Type	Facing
Shell				
1	20"	150#	ASA welding neck with cover	1/16" raised face
2	4"	150#	ASA welding neck	1/16" raised face
Cover				
1	3"	150#	ASA welding neck	1/16" raised face
1	2"	150#	ASA welding neck	1/16" raised face
2	1-1/2"	150#	ASA welding neck	1/16" raised face

MATERIALS OF CONSTRUCTION

Per PVF-101, Table 11, Group 1 and following:

1 - Shell and heads - ASTM A-285-49T, Grade C, Firebox Quality.
2 - Nozzles - ASTM A-181-49, Grade 1.
3 - Pipe - ASTM A-106-48T, Grade A.
4 - Bolts and nuts - PVM-100, Class 1.
5 - Gaskets - U. S. Rubber No. 4099 or equal.

*Item was E-463.

INSPECTION AND TESTING (R)

The Purchaser or his agent shall have the privilege of inspection at all times during the manufacture and testing of the equipment.

Advance notice of at least one week that fabrication is to begin shall be given.

All pressure tests of the equipment or of its parts shall be witnessed by the Purchaser or his agent. Advance notice of at least two days of such testing shall be given.

DRAWINGS (..)

Five copies of Manufacturer's shop drawings shall be furnished for approval, and shall be approved by Purchaser before fabrication is started.

Eleven copies of certified drawings shall be furnished.

EXPEDITING (..)

Expediting will be performed by Brown and Root, Inc., Houston, Texas.

CORRESPONDENCE (..)

All correspondence pertaining to this equipment, including drawings, test notices, etc., shall be addressed to Mr. J. C. Sillin, Brown and Root, Inc., P. O. Box 3, Houston 1, Texas.

Sheet 1 of 2
6038E-464
November 5, 1952

SPECIFICATIONS FOR OIL PURIFIER

ITEM 6038E-464

GENERAL DESIGN

One (1) portable centrifugal oil purifier, DeLaval Model No. 45, complete with constant efficiency, corrosion-resistant, disc-type bowl, hinged covers, inspection ports, test cocks, built-in intake and discharge pumps, and an automatically and thermostatically controlled heater. To be mounted on a portable steel platform with four rubber-tired wheels and drawbar. To be direct-driven by a 1/2 hp 440-volt, 3-phase, 60-cycle electric motor. Heater, motor and starters to be designed for use in Class I, Group D, hazardous locations.

SERVICE

To purify Teresso 52 hydraulic oil for use with hydraulic pumps.

ACCESSORIES

To be supplied with two (2) 20 ft lengths of 3/4" oil-resistant flexible hose for use in the transfer of oil to and from purifiers.

GUARANTEE

The Manufacturer shall guarantee the unit to operate satisfactorily in accordance with the recommended service. In the event the unit fails to meet this guarantee, the Manufacturer agrees to furnish, without cost to the Purchaser, a new unit or alter the unit furnished so that the guaranteed operating performance will be obtained. The Manufacturer shall also guarantee the unit to be free from all defects in design, workmanship, and/or material, and shall agree to replace, at his own expense, fob factory shipping point, any part of the equipment proving defective within one year of acceptance date, provided that the defect existed at the time of acceptance, or was caused by poor design, workmanship, and/or material.

DRAWINGS

Five copies of Manufacturer's outline dimension drawings shall be furnished for approval and shall be approved before fabrication is started.

Ten copies of certified drawings shall be furnished.

INSTALLATION INSTRUCTIONS AND REPAIR PARTS LISTS

Seven copies of certified installation instructions and repair parts lists shall be furnished.

EXPEDITING

Expediting will be performed by Brown and Root, Inc., Houston, Texas.

CORRESPONDENCE

All correspondence pertaining to this equipment, including drawings, test notices, etc., shall be addressed to Mr. J. C. Sillin, Brown and Root, Inc., P.O. Box 3, Houston 1, Texas.

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Sheet 1 of 2
6038E-498 and -498A
Revised May 7, 1954

SPECIFICATIONS FOR OIL FILTERS

ITEMS 6038E-498, -498A

Two (2) Hilco Hyflow Oil Filters, Model HFC-18-FF, complete with cover-lifting device, internal relief valves, inlet and outlet pressure gauges and Type FW-718 cellulose disc cartridges. The filter shall meet the following specifications: (R)

OPERATING CONDITIONS

Service - Continuous filtering of hydraulic fluid
Fluid - Standard Oil Company's Esstic 55
Fluid gravity - 0.85 at 54°C
Viscosity - 430 SSU at 100°F; 120 SSU at 150°F
Operating temperature - 100°F to 150°F
Minimum size particle to pass - 0.001" (R)
Volume of fluid - 300 gpm
Permissible pressure drop across filter - 30 psi

DESIGN

Working pressure - 75 psi
Materials: head and sump - Manufacturer's standard
filter elements - Cellulose cartridge (R)
Connections: inlet and outlet - 6" flanged

DRAWINGS

Five copies of Manufacturer's outline dimension drawings shall be furnished for approval and shall be approved before fabrication is started.

Eleven copies of certified drawings shall be furnished.

INSTALLATION AND OPERATING INSTRUCTIONS

Seven copies of certified installation and operating instructions shall be furnished.

EXTRAS TO BE FURNISHED (A)

A total of two (2) extra sets of 18 Type FW-718 cellulose disc cartridges shall be furnished.

GUARANTEE

Manufacturer guarantees the units to operate satisfactorily and continuously in accordance with the operating conditions contained herein. If units fail to meet the guarantee the Manufacturer agrees at his own expense fob shipping point, to furnish new units or to redesign the units furnished so that they operate satisfactorily in accordance with the operating conditions in this specification.

Manufacturer guarantees the units to be free from all defects in design, workmanship and/or material and agrees to repair or replace at his own expense, fob shipping point, any part of the equipment proving defective within one year of the date of acceptance, provided the defect existed at the time of acceptance or was caused by poor design, workmanship and/or material.

VALVE AND PIPING SPECIFICATION

NO. 1

Revised July 25, 1951

Maximum Pressure: 125 psi (1)
Temperature Range: 32°F to 450°F (1)
0°C to 232°C

PIPING

Item		Size, incl.	Specification
Construction		To 2½"	Screwed.
		3" to 8"	Screwed and flanged. (2)
		10" to 30"	Welded and flanged.
Pipe	- Material	To 1½"	Galvanized steel: ASTM A-120, butt-welded.
		2" to 30"	Galvanized steel: ASTM A-120, lap-welded.
	Thickness	To 6"	Schedule 40.
		8" to 12"	Schedule 20.
		14" to 30"	Schedule 10.
Fittings	- Elbows, tees, etc.	To 2½"	Cast iron: ASA 125 lb., screwed.
		3" to 8"	Cast iron: ASA 125 lb., flanged. (2)
	Elbows	10" to 24"	Cast iron: ASA 125 lb., flanged. (2)
		30"	Shop fabricated from pipe; reinforced if necessary.
	Tees	10" to 30"	Shop fabricated from pipe; reinforced if necessary.
	Unions	To 2½"	Petro or equal.
Flanges	- Type	To 8"	Cast iron: ASA 125 lb., screwed.
		10" to 30"	Cast steel: ASA 150 lb., slip-on.
	Facing	To 30"	Manufacturer's standard.
Gaskets		To 8"	U.S. No. 4009 "Rainbow" or equal; 1/16", full face.
		10" to 30"	U.S. No. 4009 "Rainbow" or equal; 1/8", full face.
Dope	- Threads and Gaskets	-	Red lead.
Bolts and Nuts		-	Square head machine bolts, hex nuts.

VALVES

Service	Size, incl.	Carbide Number	Make and Figure Number	Materials Body	Materials Trim	Type of Ends
Shut-off	¼" to 2½"	GA-1	Lunk. 2125	Br	Br	Screwed
	3" to 8"	GA-5	Powell 1444	CI	Br	Flanged
	10" to 30"	GA-6	Crane 465½	CI	Br	Flanged
V-Port Control	3" to 8"	GA-50	Powell 1793	CI	Br	Flanged
	¼" to 2½"	GL-104	Lunk. 1021	CI	NA	Screwed
	3" to 12"	GL-102	Lunk. 1123	CI	Br	Flanged
Cock (3)	½" to 2"	CO-411	Crane 334	CI	CI	Screwed
	2½" to 8"	CO-412	Crane 329	CI	Br	Flanged
Check	½" to 2½"	CK-201	Crane 34	Br	Br	Screwed
	3" to 30"	CK-204	Crane 373	CI	Br	Flanged
Gauge Column	1½"	GA-17	Lunk. 2152	Br	Br	Flanged
Gauge Glass	½"	GC-603	Lunk. 460	Br	Br	Screwed
Valve Stem Packing	To 3"		Garlock 117 or equal.			
	4" up		Garlock 150 or equal.			

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Notes: (1) Pressure and temperature limits are reduced for pipe in sizes over 20", for cast iron fittings and valves in sizes over 12". At 150°F pipe is rated for following maximum pressures: 24"-113 psi; 30"-122 psi. For ratings of fittings and valves refer to manufacturer's catalog.

VALVE AND PIPING SPECIFICATION NO. 4

Revised July 25, 1951

Maximum Pressure: 125 psi
Maximum Temperature: 406°F
208°C

PIPING

Item	Size, incl.	Specification
Construction	To 2"	Screwed.
Pipe	To 2"	Red Brass: Std. IPS, ASTM B43.
Fittings - Elbows, Tees, etc.	To 2"	Red brass: ASA 125 lb., screwed.
Unions	To 2"	Red brass: Crane Fig. 523½ or equal.
Flanges - Type	To 2"	Red brass: ASA 125 lb., screwed.
Facing	To 2"	Manufacturer's standard.
Gaskets	-	U. S. No. 4899 or equal; 1/16" thick.
Dope - Threads	-	White lead.
Gaskets	-	Graphite and oil.
Bolts and Nuts	-	Square head machine bolts, hex nuts.

VALVES

Service	Size, incl.	Carbide Number	Make and Figure Number	Materials Body	Materials Trim	Type of Ends
Shut-off	¼" to 2"	GA-1	Lunk. 2125	Br	Br	Screwed
Control	¼" to 2"	GL-108	Crane 70	Br	Br	Screwed
Check	¼" to 2"	CK-210	Lunk. 554	Br	Br	Screwed
Valve Stem Packing	To 2"		Garlock 117 or equal.			

VALVE AND PIPING SPECIFICATION

Revised July 25, 1951

Maximum Pressure: 125 psi
Temperature Range: 32°F to 450°F
0°C to 232°C

PIPING

Item		Size, incl.	Specification
Construction		To ¼"	Screwed.
		1" - 24"	Welded and flanged.
Pipe	- Material	To 1½"	Steel; ASTM A-53, Grade A, butt-welded.
		2" - 24"	Steel; ASTM A-106, Grade A, seamless.
	Thickness	To 6"	Schedule 40.
		8" to 12"	Schedule 20.
		14" - 24"	Schedule 10.
Fittings	- Elbows, tees, etc.	To ¾"	Forged steel: 2000 lb. (min.) screwed.
	Elbows, stub ends	1" - 24"	Steel: butt-welding, seamless, to match pipe.
	Tees	1" - 24"	Shop fabricated from pipe; reinforced if necessary.
Flanges	- Type	1" - 24"	Forged steel: ASA 150 lb., slip-on or lap-joint type.
	Facing	-	Manufacturer's standard.
	Unions	To 2"	Petro or equal.
Gaskets		-	U.S. No. 4899 or equal; 1/16" thick.
Dope	- Threads	-	Red lead.
	Gaskets	-	Graphite and oil.
Bolts and Nuts		-	Square head machine bolts, hex nuts.

VALVES

Service	Size, incl.	Carbide Number	Make and Figure Number	Material Body	Material Trim	Type of Ends
Shut-off	¼" to 2"	GA-1	Lunk. 2125	Br	Br	Screwed
	2½" to 3"	GA-17	Lunk. 2152	Br	Br	Flanged
	4" to 24"	GA-59	Powell 1503-P-140	CS	CrS	Flanged
Control	¼" to 2"	GL-109	Lunk. 73	Br	NA	Screwed
	2½" to 3"	GL-110	Lunk. 70	Br	NA	Flanged
	4" to 12"	GL-143	Powell 1531-P-140	CS	CrS	Flanged
Check	¼" to 2"	CK-210	Lunk. 554	Br	Br	Screwed
	2½" to 3"	CK-222	Lunk. 1305	Br	Br	Flanged
	4" to 16"	CK-203	Powell 1561-P-140	CS	CrS	Flanged
Gauge Glass	½"	GC-603	Lunk. 460	Br	Br	Screwed
Gauge Column	1½"	GA-17	Lunk. 2152	Br	Br	Flanged
Valve Stem Packing	To 3"		Garlock 111 or equal.			
	4" up		Garlock 150 or equal.			

VALVE AND PIPING SPECIFICATION NO. 21

Revised July 25, 1951

Maximum Pressure: 86 psi

PIPING

Item	Size, incl.	Specification
Pipe	3" to 12"	Cast iron: centrifugally cast, cement lined, Class 150, bell and spigot, Federal Spec. WWP-421, 18 ft. lengths.
	14" to 24"	Cast iron: centrifugally cast, cement lined, Class 100, bell and spigot, Federal Spec. WWP-421, 18 ft. lengths.
	30" to 54"	Cast iron: pit cast, cement lined, Class 100, bell and spigot, ASA A-21.2.
Elbows	3" to 12"	Cast iron, cement lined: AWWA Std. Class D, with bells only and underwriters lugs.
	14" to 54"	Cast iron, cement lined: AWWA Std. Class B, with bells only and AWWA lugs.
Tees & Crosses	3" to 12"	Cast iron, cement lined: AWWA Std. Class D, with bells only.
	14" to 54"	Cast iron, cement lined: AWWA Std. Class B, with bells only.
Reducers	3" to 12"	Cast iron, cement lined: AWWA Std. Class D, bell and spigot.
	14" to 54"	Cast iron, cement lined: AWWA Std. Class B, bell and spigot.
Flange & Spigot Fitting	3" to 12"	Cast iron, cement lined: Class 250 pipe. length to be specified, Flg. 125 lb. Std.
	14" to 54"	Cast iron, cement lined: Class 100 pipe, length to be specified, Flg. 125 lb. Std.
Gaskets	3" to 8"	U.S. No. 4009 "Rainbow" or equal, 1/16" thick, full face.
	10" to 54"	U.S. No. 4009 "Rainbow" or equal, 1/8" thick, full face.
Clamps & Rods	14" to 36"	Carbide Std. P-109, P-110.
	3" to 12"	Carbide Std. P-105, P-106.
Caulking	All	Lead and Oakum.
Bolts and Nuts	All	Square head machine bolts, hex nuts.

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VALVE AND PIPING SPECIFICATIONS

125 LB HYDRAULIC OIL SERVICE

Operating Temperature Range	0°C to 100°C
Maximum Pressure	125 psi gauge
Pipe, Fittings, and Flanges	Steel
Valves	Steel and bronze

PIPING

Item	Size (Incl.)	Specification
Pipe	1/4"	3/8" OD x 0.035" wall seamless steel tubing
	1/2" to 3"	Schedule 80 seamless steel pipe, ASTM Spec. A-106, Grade A
Construction	1/2" to 3"	Welded and flanged. Welding rings, if used for sizes 1" and over are to be Wedge Protectors Inc. Type P-446A. Do not seal-weld valves.
Pipe Fittings	1/4"	Weatherhead steel fittings
	1/2" x 3/4"	Elbows and tees shall be forged steel socket-weld type, ASTM Spec. A-105, Grade I for Schedule 80 pipe, Vogt Figs. B-232, etc., or equivalent.
	1" to 3"	Elbows, tees, reducing tees, and straight-through reducers shall be conventional welding fittings; to be ASTM Spec. A-106, Grade A, seamless steel fittings for Schedule 80 pipe.
Couplings Welded into Lines	1-1/2" to 3"	3/4" 3000 lb forged steel couplings with outside end reduced to the required pipe size.
Flanges	1/2" to 3"*	ASA 150 lb forged steel welding neck flanges bored for Schedule 80 pipe.
Flange Facing	All*	Ring joint groove facing, ASA-B16e-1939
Gaskets	All*	Soft Armco iron rings
Dope		None
Bolting	All	Bolt studs shall be alloy steel to ASTM Spec. A-193-46T, Grade B7 or B7a, with two nex nuts each, and threaded full length in accordance with C&GSC Standard Specification PVH-10C, Class I. Lock washers shall be used on all bolt studs.
Valve Stem Packing	All	Garlock No. 117

*Note: Where special flanges are required for mating to hydraulic equipment, these flanges and the necessary gaskets shall be supplied by the hydraulic equipment manufacturer bored for socket welding.

VALVES

Service	Sizes (Incl.)	Make	Fig. No.	C&CCC	Type Ends
Shutoff	1/4" to 2"	Lunk	2125	1	Screwed
	2"	Nordstrom	1924	-	Screwed
	3"	Nordstrom	1925	-	Flanged
Control	1/4" to 2"	Lunk	2125	1	Screwed
Check	1/4" to 2"	Crane	34	201	Screwed
	3"	Powell	1561	-	Flanged

All other valves to be Vickers, Inc., valves as specified in the Valve List.

NOTE

All pipe is to be hammered and blown clear after welding and is to be pickled by the following procedure:

(1) Prepare solution of 50% water and 50% muriatic acid by weight. Add 0.1% to 0.2% by weight of inhibitor (R) to dampen action of acid on steel pipe while retaining action on welding scale. Use Alkyl Pyridine - HB (R) (methyl ethyl pyridine residues) from C&CCC sales. Dissolve Alkyl Pyridine - HB in 32% hydrochloric acid (commercial hydrochloric; i.e. muriatic) before dilution with water.

(2) Fill pipe section with solution and let stand until welding scale is noted to be dissolved (15 minutes to 1 hour depending upon amount of scale. 15 minutes usually sufficient.)

(3) Wash pipe thoroughly with water. Dry with air. Flush with alcohol or acetone immediately for complete drying.

(4) Oil inside of all pipe thoroughly with hydraulic oil following drying.

VALVE AND PIPING SPECIFICATIONS

300 LB HYDRAULIC OIL SERVICE

Operating Temperature Range	0° to 100°C
Maximum Pressure	300 psi gauge
Pipe, Fittings, and Flanges	Steel
Valves	Steel and Bronze

PIPING

Item	Size (Incl.)	Specifications
Pipe	1/4"	3/8" OD x 0.035" wall seamless steel tubing
	1/2" to 3"	Schedule 80 seamless steel pipe, ASTM Spec. A-106, Grade A
Construction	1/2" to 3"	Welded and flanged. Welding rings, if used for sizes 1" and over are to be Wedge Protectors, Inc. Type P-446A. Do not seal-weld valves.
Pipe Fittings	1/4"	Weatherhead steel fittings
	1/2" and 3/4"	Elbows and tees shall be forged steel socket-weld type, ASTM Spec. A-105, Grade I for Schedule 80 pipe, Vogt Figs. B-232, etc., or equivalent.
	1" to 3"	Elbows, tees, reducing tees, and straight-through reducers shall be conventional welding fittings; to be ASTM Spec. A-106, Grade A, seamless steel fittings for Schedule 80 pipe.
Couplings Welded into Lines	1-1/2" to 3"	3/4" 3000 lb forged steel couplings with outside end reduced to the required size.
Flanges	1/2" to 3"*	ASA 300 lb forged steel welding neck flanges bored for Schedule 80 pipe.
Flange Facing	All*	Ring joint groove facing, ASA-B16c-1939
Gaskets	All*	Soft Armco iron rings
Dope		None
Bolting	All	Bolt studs shall be alloy steel to ASTM Spec. A-193-46T, Grade B7 or B7a, with two hex nuts each, and threaded full length in accordance with C&CCC Standard Specification PWH-100, Class I. Lock washers shall be used on all bolt studs.
Valve Stem Packing	All	Garlock No. 117

*Note: Where special flanges are required for mating to hydraulic equipment, these flanges and the necessary gaskets shall be supplied by the hydraulic equipment manufacturer bored for socket welding.

VALVES

Service	Sizes (Incl.)	Make	Fig. No.	C&CCC	Type Ends
Shutoff	1/4" to 2"	Vogt	9851-9858	55	Screwed
	2" to 3"	Nordstrom	2025	-	Flanged
Control	1" to 2"	Vogt	3435-3438	171	Screwed
Check	1/2" to 2"	Lunk	624	212	Screwed
	3"	Powell	3061	241	Flanged

All other valves to be Vickers, Inc. valves as specified in the Valve List.

NOTE

All pipe is to be hammered and blown clear after welding and is to be pickled by the following procedure:

(1) Prepare solution of 50% water and 50% muriatic acid by weight. Add 0.1% to 0.2% by weight of inhibitor (R) to dampen action of acid on steel pipe while retaining action on welding scale. Use Alkyl Pyridine - HB (R) (methyl ethyl pyridine residues) from C&CCC sales. Dissolve Alkyl Pyridine - HB in 32% hydrochloric acid (commercial hydrochloric; i.e. muriatic) before dilution with water.

(2) Fill pipe section with solution and let stand until welding scale is noted to be dissolved (15 minutes to 1 hour depending upon amount of scale. 15 minutes usually sufficient.)

(3) Wash pipe thoroughly with water. Dry with air. Flush with alcohol or acetone immediately for complete drying.

(4) Oil inside of all pipe thoroughly with hydraulic oil following drying.

VALVE AND PIPING SPECIFICATIONS

2000 LB HYDRAULIC OIL SERVICE

Operating Temperature Range	0° to 100°C
Maximum Pressure	2000 psi gauge
Pipe, Fittings, and Flanges	Steel
Valves	Forged steel

PIPING

Item	Sizes (Incl.)	Specification
Pipe	1/4"	3/8" OD x 0.035" wall seamless steel tubing
	1/2" to 6"	Schedule 160 seamless steel pipe, ASTM Spec. A-106, Grade A
Construction	1/2" to 6"	Welded and flanged. Welding rings, if used for sizes 1" and over are to be Wedge Protectors Inc. Type P-446A. Do not seal-weld valves.
Pipe Fittings	1/4"	Weatherhead steel fittings
	1/2" and 3/4"	Elbows and tees shall be forged steel socket-weld type, ASTM Spec. A-105, Grade I, for Schedule 160 pipe, Vogt Figs. C-232, etc., or equivalent.
	1" to 6"	Elbows, tees, reducing tees, and straight-through reducers shall be conventional welding fittings. To be ASTM Spec. A-106, Grade A, seamless steel fittings for Schedule 160 pipe.
Couplings Welded into Lines	1-1/2" to 6"	3/4" 3000 lb forged steel couplings with outside end reduced to the required size.
Flanges	1/2" to 6"*	ASA 1500 lb forged steel welding neck flanges bored for Schedule 160 pipe.
Flange Facing	All*	Ring joint groove facing, ASA-B16e-1939
Gaskets	All*	Soft Armco iron rings
Dope		None
Bolting	All	Bolt studs shall be Alloy steel to ASTM Spec. A-193-46T, Grade B-7 or B7a, with two hex nuts each, and threaded full length in accordance with C&CSC Standard Specification PVM-100, Class I. Lock washers shall be used on all bolt studs.
Valve Stem Packing	All	Garlock No. 117

*Note: Where special flanges are required for mating to hydraulic equipment, these flanges and the necessary gaskets shall be supplied by the hydraulic equipment manufacturer bored for socket welding.

VALVES

Service	Sizes (Incl.)	Make	Fig. No.	Type Ends
Shutoff or Control	1/4" to 2"	Vogt	1871-1879	Screwed

All other valves to be Vickers, Inc. valves as specified in the Valve List.

NOTE

All pipe is to be hammered and blown clear after welding and is to be pickled by the following procedure:

(1) Prepare solution of 50% water and 50% muriatic acid by weight. Add 0.1% to 0.2% by weight of inhibitor (R) to dampen action of acid on steel pipe while retaining action on welding scale. Use Alkyl Pyridine - HB (R) (methyl ethyl pyridine residues) from C&CCC sales. Dissolve Alkyl Pyridine - HB in 32% hydrochloric acid (commercial hydrochloric; i.e. muriatic) before dilution with water.

(2) Fill pipe section with solution and let stand until welding scale is noted to be dissolved (15 minutes to 1 hour depending upon amount of scale. 15 minutes usually sufficient.)

(3) Wash pipe thoroughly with water. Dry with air. Flush with alcohol or acetone immediately for complete drying.

(4) Oil inside of all pipe thoroughly with hydraulic oil following drying.

Sheet 1 of 1
November 5, 1952

PROTECTIVE COVERING SPECIFICATIONS

FOR UNDERGROUND STEEL LINES AND TANKS

This special protection shall apply only to short runs of piping where lines are placed underground between various units of the plant or within a unit. Extended pipe lines shall be protected with the standard Barrett pipe line enamel.

The special protection desired shall be applied in the field as follows:

1) Clean all metal parts thoroughly.

2) Apply one coat of Barrett Superservice cement 3/8" thick.

3) Cover with a wrapper of 15 pound tarred felt.

4) Apply a second coat of Barrett Superservice cement 1/4" thick.

5) Cover with a wrapper of 15 pound tarred felt.

This protection shall also be applied to all rods, clamps, and steel anchors.

VALVE AND PIPING SPECIFICATION

NO 9?

Issued April 30, 1953

Maximum Pressure: 125 psi
Temperature Range: 32°F to 450°F
0°C to 232°C

PIPING

Item		Size, incl.	Specification
Construction		To 2½"	Screwed.
Pipe -	Material	To 2½"	Galvanized steel: ASTM A-120, butt-welded.
	Thickness	To 2½"	Schedule 40.
Fittings -	Elbows, tees, etc.	To 2½"	Galvanized malleable iron: ASA 150 lb., screwed.
	Unions	To 2½"	Petro or equal.
Flanges -	Type	To 2½"	Cast iron: ASA 125 lb., screwed.
	Facing	To 2½"	Manufacturer's standard.
Gaskets		-	U. S. No. 4899 or equal; 1/16" thick.
Dope -	Threads	-	White lead.
	Gaskets	-	Graphite and oil.
Bolts and Nuts		-	Square head machine bolts, hex nuts.

VALVES

Service	Size, incl.	Carbide Number	Make and Figure Number	Materials Body	Materials Trim	Type of Ends
Shut-off	¼" to 2½"	GA-1	Lunk. 2125	Br.	Br.	Screwed
Control	¼" to 2½"	GL-108	Crane 70	Br.	Br.	Screwed
Check	¼" to 2½"	CK-210	Lunk. 554	Br.	Br.	Screwed
Valve Stem Packing	To 2½"		Garlock 117 or equal.			

ELECTRICAL REPORT

SECTION II

Prepared by H2B Electrical Department

Mr. G. O. Wardrop
Mr. J. C. Norton
Mr. J. R. Cooper
Mr. J. F. Paden

POWER OIL SYSTEM

SECTION II

This part of the design report covers the "High Pressure Intensifier Controls," which electrically controls the oil flow from the power oil units to the high pressure pumping units, Part III, WP-6037.

The pumping units consist of two cylinders each, physically arranged as "West" and "East." In operation the east cylinder is the lead cylinder and is 90° ahead of and is also timed by the west cylinder.

Limit switches are mounted on the cylinders and are operated by mechanical guides. These switches control, through special relay assemblies SK-50889, the main control solenoid valves. The valves control the direction of the oil flow.

Inching switches are provided for each cylinder for maintenance purposes. These switches control the oil flow from the supercharge oil pump to the pumping units through the inching valve and the main control valves. For wiring diagram see SK-50890.

LIST OF EQUIPMENT

6038E-401E-1 THRU -410E-1

Solenoid-operated 1/4" pilot four-way valves. Main control valves for pumping units. See Section I for specifications.

Operating coils	Two - "A" and "B"
Operating positions	Two - No. 1 - "A" coil energized No. 2 - "B" coil energized

6038E-401M THRU -410M

Limit switches - see Section I for specifications. See SK-50890 for wiring diagram.

6038E-401N THRU -410N

Limit switches - see Section I for specifications. See SK-50890 for wiring diagram.

6038E-401P THRU -410P

Inching switches. General Electric Company Type SB-1, or equal, oil immersed, manually-operated, 6-pole, 3-position, with contacts arranged in accordance with SK-50890.

Note: Mount one on west side of each cylinder of pumping units.

6038E-421C THRU -425C

Solenoid-operated 2" four-way valves. Inching valves for pumping units, see Section I for specifications.

Operating coils	Two - "A" and "B"
Operating positions	Three - No. 1 - No coil energized No. 2 - "A" coil energized No. 3 - "B" coil energized

See SK-50890 for wiring diagram.

6038E-479, -479A, -480 AND -480A (R)

Spare relay mounting chassis. Each chassis to include the following:

(1) Two (2) Cinch Jones molded octal socket number 8 AM. To mount in 1" hole on chassis.

(2) One (1) Cinch Jones 6 point Barrier Type Terminal Strip Catalogue No. 6-142.

6038E-479, -479A, -480 AND -480A (CONT'D)

(3) Two (2) push-button Micro Switch Catalogue No. BZ-2RQ1

(4) Two (2) 600 volt, two micro-farad condensers, Sprague Products Co. Catalogue No. BP-206.

(5) One (1) removable chassis wired in accordance with SK-56458.

Note: Enclosure not required.

Panels are to be delivered to the Plant CA Operating Department.

6038E-481 THRU -485 (R)

Relay assemblies in accordance with SK-56458. Each assembly to include the following:

(1) Two (2) removable chassis duplicating 6038E-479 etc.

(2) Two (2) Electro-Seal Corporation Advance Type 964-B relays with octal plug base, drawing A-1180-06, series 18E. Supplied by Electro-Seal Corporation, 946 North Avenue, Des Plaines, Illinois.

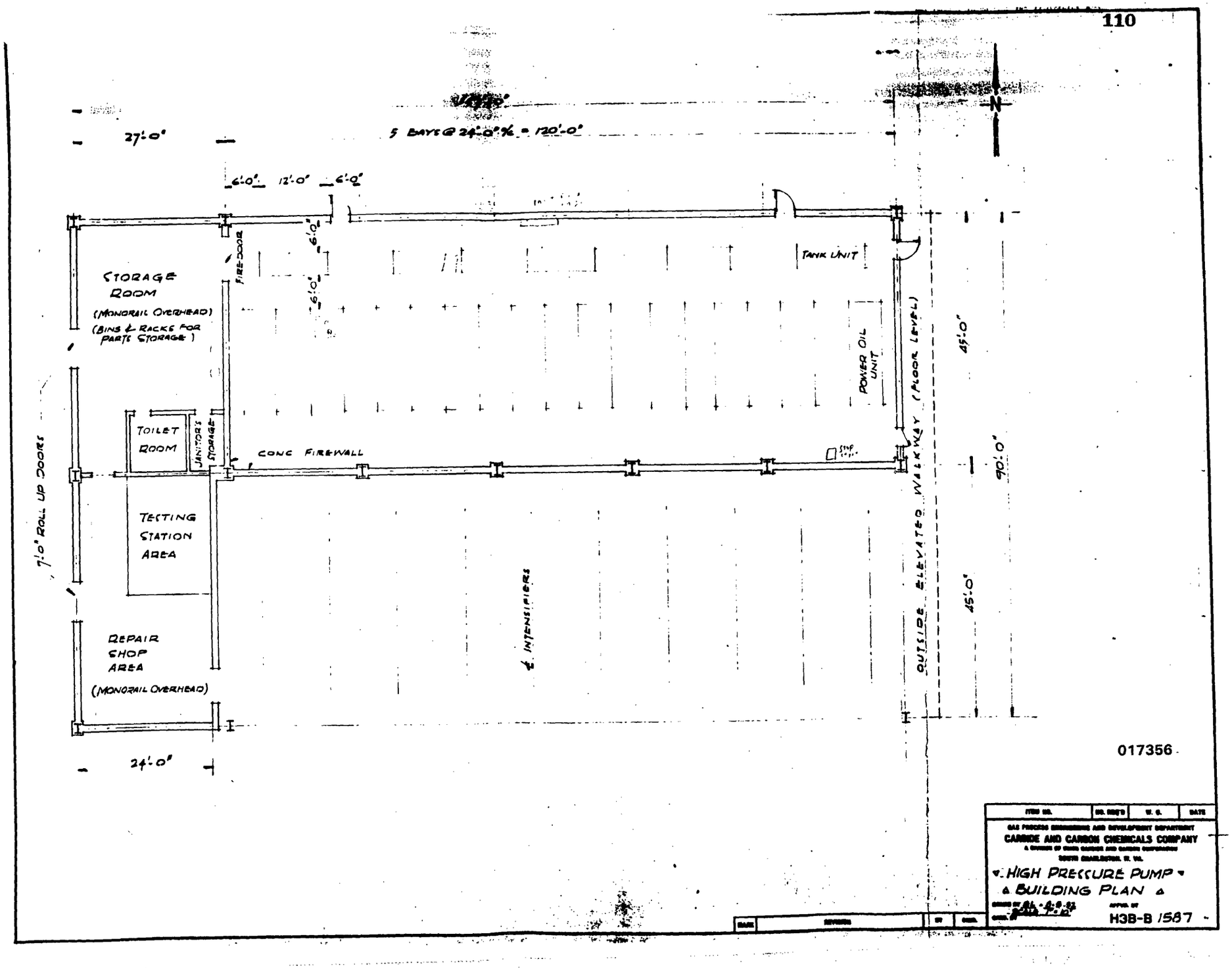
(3) Master terminal strip fastened to enclosure. Use Cinch Jones 12 point Barrier Type Terminal Strip, Catalogue No. 12-142 or equal.

(4) Suitable enclosure (not oil immersed).

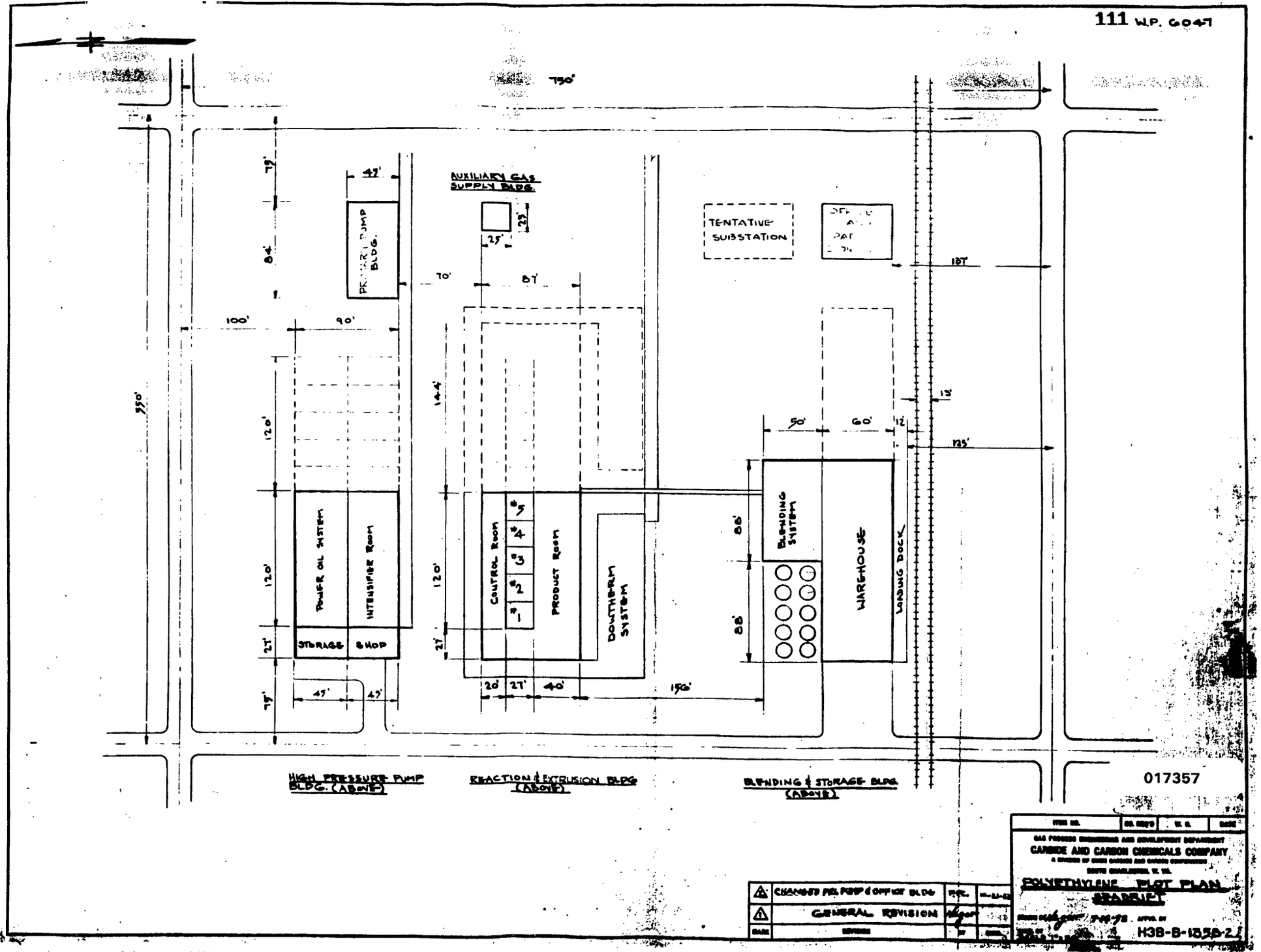
6038E-486 THRU -495 (R)

Spare relays.

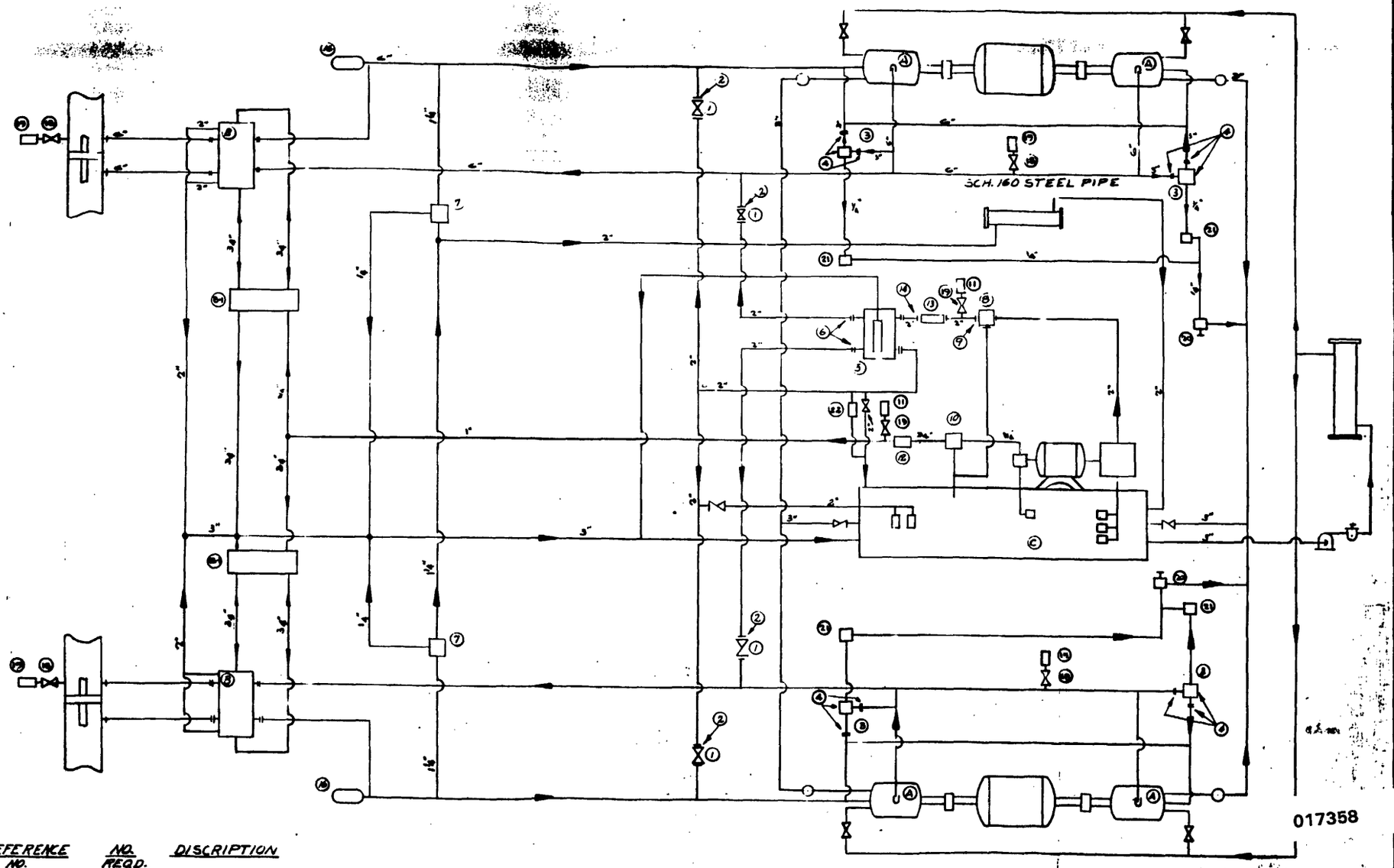
Ten (10) Electro-Seal Corporation Advance Type 964-B relays with octal plug base, drawing A-1180-06, series 18E.


27'-0"
5 BAYS @ 24'-0" o/c = 120'-0"
6'-0"
12'-0"
6'-0"
6'-0"
6'-0"
FIRE DOOR
STORAGE ROOM
(MONORAIL OVERHEAD)
(BINS & RACKS FOR PARTS STORAGE)
TOILET ROOM
JANITOR'S STORAGE
CONC FIREWALL
TESTING STATION AREA
REPAIR SHOP AREA
(MONORAIL OVERHEAD)
7'-0" ROLL UP DOORS
℄ INTENSIFIERS
TANK UNIT
POWER OIL UNIT
OUTSIDE ELEVATED WALKWAY (FLOOR LEVEL)
45'-0"
45'-0"
90'-0"
24'-0"
N
017356
GAS PROCESS ENGINEERING AND DEVELOPMENT DEPARTMENT
CARBIDE AND CARBON CHEMICALS COMPANY
SOUTH CHARLESTON, W. VA.
HIGH PRESSURE PUMP
BUILDING PLAN
H3B-B 1587

111 W.P. 6047



750'
550'
AUXILIARY GAS SUPPLY BLDG.
TENTATIVE SUBSTATION
PRIMARY PUMP BLDG.
POWER OIL SYSTEM
INTENSIFIER ROOM
STORAGE
SHOP
CONTROL ROOM
PRODUCT ROOM
DOWTHERM SYSTEM
BLENDING SYSTEM
WAREHOUSE
LOADING DOCK
HIGH PRESSURE PUMP BLDG. (ABOVE)
REACTION & EXTRUSION BLDG (ABOVE)
BLENDING & STORAGE BLDG (ABOVE)
017357
CHANGED PRI. PUMP & OFFICE BLDG
GENERAL REVISION
GAS PROCESS ENGINEERING AND DEVELOPMENT DEPARTMENT
CARBIDE AND CARBON CHEMICALS COMPANY
POLYETHYLENE PLOT PLAN
SEADRIFT
H3B-B-1358-2



017358

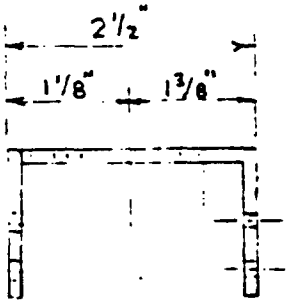
REFERENCE NO.	NO. REQD.	DISCRIPTION
1	22	VICKERS CHECK VALVE
2	42	VICKERS FLANGES
3	24	VICKERS RELIEF VALVE
4	44	VICKERS FLANGES 22 BORED. 11 BLANK
5	6	VICKERS 4 WAY VALVES
6	22	VICKERS FLANGES
7	18	VICKERS FLOW CONTROL VALVES
8	6	VICKERS RELIEF VALVES
9	18	VICKERS FLANGES
10	6	VICKERS RELIEF VALVES
11	12	VICKERS PRESSURE GAUGES
12	6	VICKERS VENTURI FILTERS
13	6	VICKERS VENTURI FILTERS
14	12	VICKERS FLANGES
15	24	VICKERS PRESSURE GAUGES
16	11	VICKERS HYDRAULIC ACCUMULATORS
17	2/1	RECHARGING HOSE ASSY.
18	2	VICKERS 1346 G1 NEEDLE VALVES
19	10	VICKERS 8011 NEEDLE VALVES
20	11	VICKERS C-172-C VALVE
21	22	VICKERS C2-200 VALVES
22	6	VICKERS CT-10-B-10 RELIEF VALVES

(A) 22 VICKERS VARIABLE DELIVERY PUMPS
(B) 12 VICKERS 4 WAY VALVES
(B-1) 12 VICKERS SOLENOID PILOT VALVES & SUB-BASES
(C) 2 VICKERS SUPERCHARGE UNITS

CARBIDE AND CARBON CHEMICALS COMPANY

TENTATIVE CIRCUIT DIAGRAM
POWER OIL SYSTEM

PFC 4/11/52 H3B-B/557



END

HIGH PRESSURE INTENSIFIERS
CONTROL RELAY ASSEMBLY

THIS SKETCH SUPERCEDES SK.# 50889
WITH SAME TITLE.

ENGINEERING DEPARTMENT
CARBIDE AND CARBON CHEMICALS COMPANY
A DIVISION OF UNION CARBIDE AND CARBON CORPORATION
SOUTH CHARLESTON, WEST VA.

DRAWN DENNIE FOR APP'D

DATE 6-16-53 SKETCH NO. 56458

017359

LOCKS

PRESSURE CONTROL SYSTEM AND EMERGENCY BLOWDOWN SYSTEM PER DESIGN REPORT PART V, REACTION SYSTEM, WP-6040. INTERLOCKED TO THE 700 HP PUMPS SPECIFIED IN PART IV, POWER OIL SYSTEM, WP-6038. FOR ELECTRICAL CONNECTION DIAGRAM, SEE SK-50892.

5-80 KW. ELECTRIC DOWTHERM HEATERS PER DESIGN REPORT PART VI, DOWTHERM SYSTEM, WP-6040. FOR WIRING DIAGRAM, SEE SK-50893.

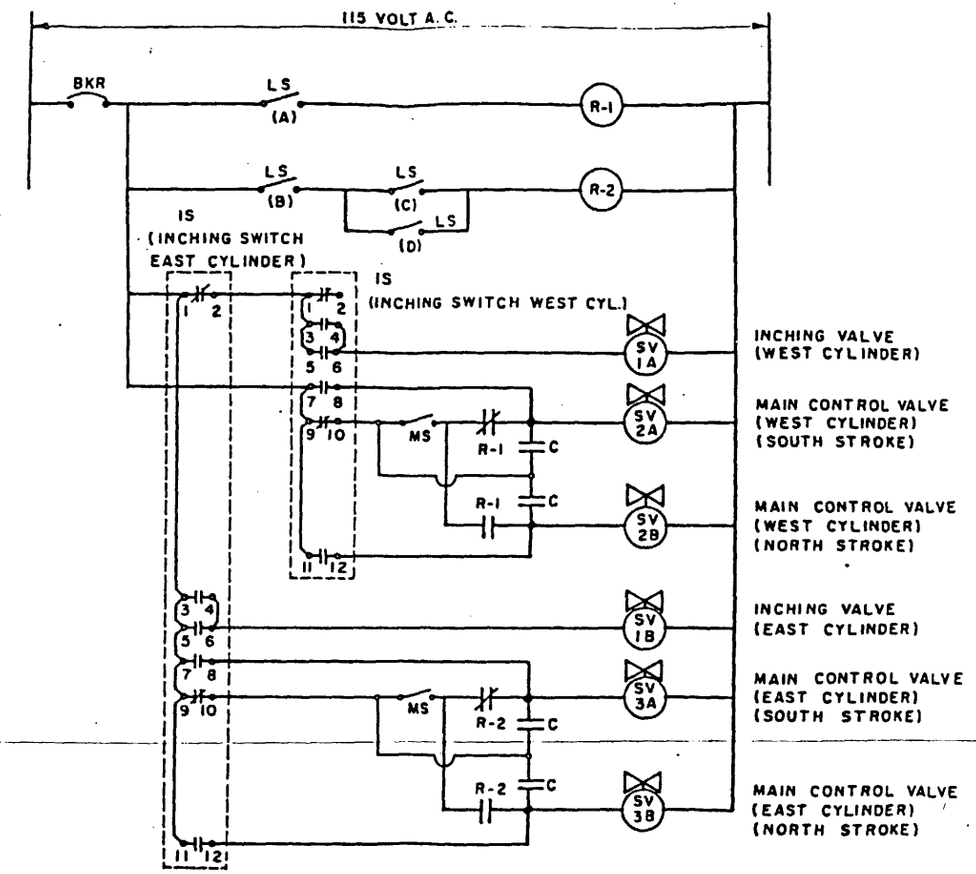
017360

DEPARTMENT OF CONSTRUCTION AND DESIGN
CARBIDE AND CARBON CHEMICALS COMPANY
A DIVISION OF
UNION CARBIDE AND CARBON CORPORATION
SOUTH CHARLESTON, WEST VIRGINIA
PLANT C-A

BLOCK DIAGRAM OF ELECTRICAL CONNECTIONS - POLYETHELENE UNIT

DRAWN SHAWVER
TRACED TAYLOR CH'K'D
DATE 10-10-52 SCALE

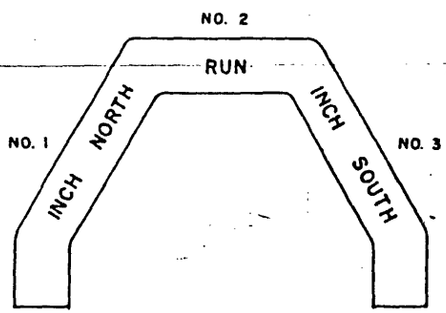
SK-50891



CONTACTS		POSITIONS 1	2	3
1 — 2	1		X	
	2		X	
3 — 4	3			X
	4			X
5 — 6	5	X		
	6	X		
7 — 8	7			X
	8			X
9 — 10	9		X	
	10		X	
11 — 12	11	X		
	12	X		

"X" DENOTES CLOSED CONTACT

NORMAL RUNNING POSITION NO. 2
SPRING RETURN FROM POSITIONS NO. 1 & 3



ESCUTCHEON ENGRAVING
INCHING SWITCH

G.E. CO. TYPE SB-1 OR EQUAL

MS - MICRO SWITCH - SEE SK-56458
IS - INCHING SWITCH - ITEMS 6038E-401P THRU 410P.
R - RELAY - SEE SK-56458
C - CAPACITOR.
2MFD 600V.
L.S. - LIMIT SWITCH - ITEMS 6038E-401M THRU 410M & 401N THRU 410N.
(A) CONTROL SWITCH FOR WEST CYL. - MOUNT ON WEST CYL. - S.E. END.
(B) CONTROL SWITCH FOR EAST CYL - MOUNT ON EAST CYL. - S.W. END.
(C) TIMING SWITCH FOR EAST CYL. - MOUNT ON WEST CYL. - S.W. END.
(D) EMERGENCY SWITCH EAST CYL. - MOUNT ON EAST CYL. - S.E. END.
SV-1 - ITEMS 6038E-421C THRU 425C.
SV-2 & SV3 - ITEMS 6038E - 401E-1 THRU 410E-1.

017361

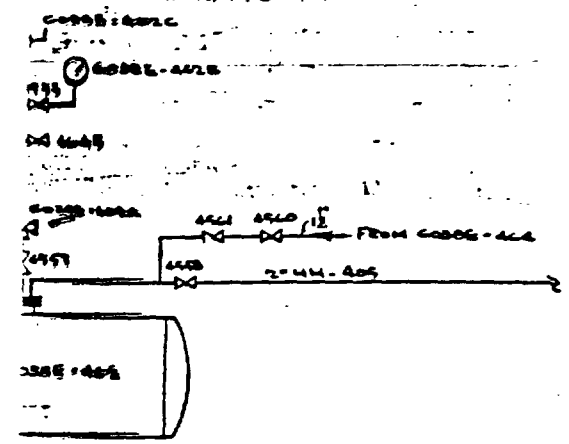
DEPARTMENT OF CONSTRUCTION AND DESIGN
CARBIDE AND CARBON CHEMICALS COMPANY
A DIVISION OF
UNION CARBIDE AND CARBON CORPORATION
SOUTH CHARLESTON, WEST VIRGINIA

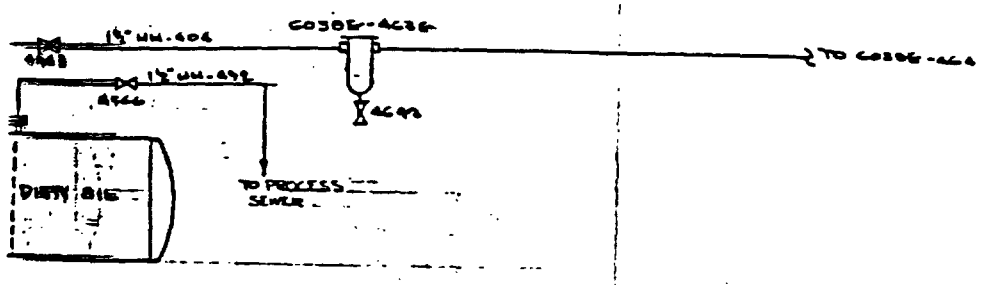
HIGH PRESSURE INTENSIFIER CONTROLS
SCHEMATIC WIRING DIAGRAM

DRAWN S. A. LUPEY
TRACED D MOORE CH'K'D
DATE 9-11-52 SCALE

SK-50890

REVISED 6-16-53





REVISED 8-19-53
REVISED 6-15-53
REVISED 5-7-53

CARBIDE AND CARBON CHEMICALS COMPANY

POWER OIL SYSTEM

H3B-R1044-3

017362

Fahrenthold

DESIGN REPORT CHANGE

POLYETHYLENE UNIT, PLANT CA
PART IV, POWER OIL SYSTEM
WP-6038

Jan. 15, 1953
Change No. 1

(A) in right hand margin indicates an addition, (R) indicates a revision.

EQUIPMENT LIST

6038E-461 - OVERHEAD CRANE (R)

Change Property No. of Crane to CA-6550-8.

The following pages are attached and should be inserted in the subject Design Report:

p. 100 125# Hydraulic Oil Specifications revised 1/14/53.

p. 102 300# Hydraulic Oil Specifications revised 1/14/53.

p. 104 2000# Hydraulic Oil Specifications revised 1/14/53.

By FFC Approved RAP

r

Fabrice Shield

DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT 6A
PART IV - POWER OIL SYSTEM
WP-6038

Sheet 1 of 1
April 1, 1953
Change No. 2

Please find attached, pages 100, 102, and 104 revised April 1, 1953 which are to be inserted in the report.

BY FFC APPROVED RAP

am

017364

B&R

DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT CA
PART IV - POWER OIL SYSTEM
WP-6038

1 of 1
May 8, 1953
Formal Change No. 3

(A) in right hand margin indicates an addition, (R) indicates a revision.

Reference Drawing H3B-R1044 (Revised 5-7-53, attached).

EQUIPMENT LIST

✓6038E-421U THRU -425U - OIL FILTERS p. 13 (A)

Five (5) filters with the following specifications:

Cuno Engineering Corporation Auto-Klean No. AK-232, Type EGF-2

Material - Standard
Element: - Material - Stainless Steel
Length - 6"
Spacing - 0.012"
Connections - 2" ASA 125 psi flanges inlet and outlet.

Locations and property numbers follow:

Item No.	Location	Property No.
6038E-421U	HHH-411	CA-6311-52
6038E-422U	HHH-412	CA-6311-53
6038E-423U	HHH-413	CA-6311-54
6038E-424U	HHH-414	CA-6311-55
6038E-425U	HHH-415	CA-6311-56

017365

VALVE LIST

✓4086	HHH-411	Shutoff	3/4"	C&CCC No. 1	p. 47	(R)
✓4087	HHH-411	Shutoff	3/4"	C&CCC No. 1	p. 47	(R)
✓4088	HHH-412	Shutoff	3/4"	C&CCC No. 1	p. 47	(R)
✓4089	HHH-412	Shutoff	3/4"	C&CCC No. 1	p. 47	(R)
✓4096	HHH-413	Shutoff	3/4"	C&CCC No. 1	p. 48	(R)
✓4097	HHH-413	Shutoff	3/4"	C&CCC No. 1	p. 48	(R)
✓4098	HHH-414	Shutoff	3/4"	C&CCC No. 1	p. 48	(R)
✓ 4099	HHH-414	Shutoff	3/4"	C&CCC No. 1	p. 48	(R)
✓4106	HHH-415	Shutoff	3/4"	C&CCC No. 1	p. 48	(R)
✓4107	HHH-415	Shutoff	3/4"	C&CCC No. 1	p. 48	(R)

vb

By FFC Approved RAP

H. Fahrenthold

DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT CA
PART IV - POWER OIL SYSTEM
WP-6038

June 16, 1953
Formal Change No. 4

(A) in right hand margin indicates an addition, (R) indicates a revision.

Reference Drawing H3B-R1044 (revised 6-16-53, attached).

Attachments: Table of Contents,
Page 87 and 88 - Specifications for 6038E-441 thru -450 Revised 12-9-52.
Page 108 - Revised 6-16-53.
Page 109 - Revised 6-16-53.
Page 113 - SK-56458 (to replace SK-50889, 50889 is voided).
Page 114 - SK-50890 (revised 6-16-53)

EQUIPMENT LIST

6038E-421L - ALARM HORN p. 12 (R)

Actuated by Items 6038E-421J and R thru -425J and R and 6037E-358 and 359.

6038E-497 - OIL PURIFIER p. 21 (A)
Property No. Purifier - CA-6311-57
Pump - CA-6306-238
Motor - CA-6213-329

One (1) oil purifier to be used for purification of the oil in any of the five hydraulic oil systems. Purifier to be as follows:

Manufacturer - Honan-Crane Corporation
Service - Purification of Esstic 55 hydraulic oil at 115°F
Model - 2036M8-AP equipped with insulation but without heaters.
Pump - 5 gpm pump with 440 volt, 3 phase, 60 cycle motor for Class I Group D service to be furnished. Pump to be provided with relief valve and to be self-priming and suitable for a negative suction of 10 feet.
Dolly - 28" x 40" dolly with rubber tires and drawbar with handle shall be provided to mount purifier, pump and motor.
Cartridges - Cranite filled.
Extra cartridges - Provide six (6) sets (of 8 cartridges each) to be used as spares.

DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT CA
PART IV - POWER OIL SYSTEM
WP-6038

June 16, 1953
Formal Change No. 4

VALVE LIST

4341 thru 4345 - CANCEL					p. 59	(R)
4351 thru 4355 - CANCEL					p. 59	(R)
4361	HHH-441	Shutoff	1"	1	p. 60	(R)
4362	HHH-442	Shutoff	1"	1	p. 60	(R)
4363	HHH-443	Shutoff	1"	1	p. 60	(R)
4364	HHH-444	Shutoff	1"	1	p. 60	(R)
4365	HHH-445	Shutoff	1"	1	p. 60	(R)

By FFC Approved RAP

vb

Fahrenthold

DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT CA
PART IV - POWER OIL SYSTEM
WP-6038

Sheet 1 of 1
August 20, 1953
Formal Change No. 5

(A) in right-hand margin indicates an addition, (R) indicates a revision.

Reference Drawing: H3B-R1044-3 (revised 8-19-53, attached)

Attachment: p. 105A - Valve and Piping Specification No. 96

EQUIPMENT LIST

6038E-441B thru -450B - RELIEF VALVES (A) p. 15

Ten (10) relief valves as follows:

Lunkenheimer - Fig. No. 658
Size 1/2"
Set at ~~100~~ 75 psi

Install in lines WWWW-401 thru -405 inside shutoff valves to coolers 6038E-441 thru -450 respectively.

017368

LINE LIST

AA-402 - Change spec to 96. (R) p. 29

AA-406 - Change spec to 96. (R) p. 29

AA-407 - Change spec to 96. (R) p. 29

VALVE LIST

4366	WWWW-401	Shutoff	1/2"	1	(A) p. 60
4367	WWWW-401	Shutoff	1/2"	1	(A) p. 60
4368	WWWW-402	Shutoff	1/2"	1	(A) p. 60
4369	WWWW-402	Shutoff	1/2"	1	(A) p. 60
4370	WWWW-403	Shutoff	1/2"	1	(A) p. 60
4371	WWWW-403	Shutoff	1/2"	1	(A) p. 60
4372	WWWW-404	Shutoff	1/2"	1	(A) p. 60
4373	WWWW-404	Shutoff	1/2"	1	(A) p. 60
4374	WWWW-405	Shutoff	1/2"	1	(A) p. 60
4375	WWWW-405	Shutoff	1/2"	1	(A) p. 60

jt

By FEC Approved PAF

H. Fahrenthold

DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT CA
PART IV - POWER OIL SYSTEM
WP-6038

Sheet 1 of 1
October 19, 1953
Formal Change No. 6

(A) in right hand margin indicates an addition, (R) indicates a revision.

Parts revised or wanted emphasized are underlined.

Reference Drawing H3B-R1044 (Not issued at this time).

EQUIPMENT LIST

6038E-401J THRU -410J - THERMOCOUPLE ASSEMBLIES (R) p. 8

Correct the drawing number for the separable socket from A3E-E151-4 type 1 to A3E-E151-9 type 1.

6038E-463A - PRESSURE INDICATOR RECEIVER (R) p. 17
Property No. CA-6332-492

(Note change in title.)

Change specifications to read as follows:

Type - Pressure Indicator Receiver

6038E-463A-1 - FLOW TRANSMITTER (A) p. 18
Property No. CA-6332-2856

Range	0 to 50 inches of water
Manometer	Dry type for 750 psi WP
Material, body	Steel
element	Z-nickel
Connections	1/4 inch NPT
Manufacturer	The Foxboro Company

Install with a gas blowback.

Connect to receiver 6038E-463A.

Changed by: RGZ Approved by: RAP

017369

L. Fahrenkrug

DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT CA
PART IV - POWER OIL SYSTEM
WP-6038

Sheet 1 of 1
January 4, 1954
Formal Change No. 6

(A) In right hand margin indicates an addition, (R) indicates a revision.

Parts revised or wanted emphasized are underlined.

Reference Drawing H3B-R1044 (Not issued at this time).

Attachments: Pages 17 and 18

EQUIPMENT LIST

✓ 6038E-401J THRU -410J - THERMOCOUPLE ASSEMBLIES (R) p. 8

Change drawing number for the separable socket from A3E-E151-4, type 1 to A3E-E151-9, type 1.

LINE LIST

✓ HH-404 - Change spec. to 12. (R) p. 29

Changed by: RGZ Approved by: RAP

/am

Fahrenthold

DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT CA-510
PART IV - POWER OIL SYSTEM
WP-6038

May 12, 1954
Formal Change No. 8

This change covers Informal Design Report Changes Nos. 5 and 6.

(A) in right hand margin indicates an addition, (R) indicates a revision.

Parts revised or wanted emphasized are underlined.

Attachments: Pages 19, 19A, 21, 29, 30, 61 - revised 5-12-54
Pages 94a, 94b - added 5-12-54
Page 100 - p. 2 of 125# Hydraulic Oil Specs. - revised 4-6-54
Page 102 - p. 2 of 300# Hydraulic Oil Specs. - revised 4-6-54
Page 104 - p. 2 of 2000# Hydraulic Oil Specs. - revised 4-6-54.

EQUIPMENT LIST

✓ 6038E-441B THRU -450B - RELIEF VALVES (R) p. 15

Change set pressure to 75 psi.

✓ 6038E-462B - PRESSURE GAUGE (R) p. 16

Change range to 0-100.

✓ 6038E-462C - PRESSURE REDUCING REGULATOR (R) p. 16

Cancel.

✓ 6038E-462D - RELIEF VALVE (R) p. 16

Change set pressure to 50 psi.

✓ 6038E-463B - PRESSURE GAUGE (R) p. 18

Change range to 0-100.

✓ 6038E-463C - RELIEF VALVE (R) p. 18

Change set pressure to 50 psi.

✓ 6038E-463D - PRESSURE REDUCING REGULATOR (R) p. 18

Cancel.

DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT CA-510
PART IV - POWER OIL SYSTEM
WP-6038

May 12, 1954
Formal Change No. 8

LINE LIST

✓ AA-406 and -407 - Cancel.	(R) p. 29
✓ HH-492 - Change spec. to read: 12, 54	(R) p. 36

VALVE LIST

✓ 4554 - Cancel.	(R) p. 68
✓ 4555 - Cancel.	(R) p. 68
✓ 4556 - Change location to: PP-409.	(R) p. 68
✓ 4567 - Cancel.	(R) p. 68
✓ 4568 - Cancel.	(R) p. 69
✓ 4643 - Change location to: PP-410.	(R) p. 72
✓ 4645 - Change location to: PP-409.	(R) p. 72

Changed by: FFC Approved by: RAP

DESIGN REPORT

930-6039

DATA - NOT
A FULL REPORT

017373

OFFICE MEMO
BROWN & ROOT, INC.

TO: Mr. Ed Haas
FROM: A. J. Huddleston
SUBJECT: EXHAUST FAN SPECIFICATIONS

DATE March 1, 1954

Attached please find requested specifications on Items 6039E-100 thru 104; 6039E-110 thru 114; 6039E-115, 116, 117 and 6039E-118, 119 & 120.

A. J. Huddleston

AJH:gmc

attach.

SPECIFICATION FOR ROOF EXHAUST AND SUPPLY AIR FANS

ITEMS 6039E-100 THRU 104; 6039E-110 THRU 114.

SERVICE:

Fans 6039E-100 through 104 to supply vent air to Product Room 110; 6039E-110 through 113 to exhaust air from Control Room 108; 6039E-114 to supply air to Electrical Control Room 101.

CONSTRUCTION:

Fans shall be of the low type roof supply and exhaust units, equipped with removable weather-proof hood, hinged for access to fan motor and drives from roof. Fan units shall be rigidly braced and shall be constructed of best quality galvanized sheet steel having minimum gauge thickness, as follows:

	TOP	SIDES
Item 6039E-100 thru 104	18 Ga.	16 Ga.
Item 6039E-110 thru 113	18 Ga.	18 Ga.
Item 6039E-114	20 Ga.	18 Ga.

Galvanized bolts and nuts shall be used throughout. Items 6039E-110 through 113 shall be furnished with automatic tight closing, weighted, louver dampers to open by force of discharge air when fan is energized and to close when fan is de-energized. Fan units shall be furnished with removable bird screens over outlet and/or inlet and shall be of 1/2" mesh galvanized wire. Fan unit shall be factory coated, both inside and out, with weather protective coating similar and equal to Insul-Mastic 4010 or Nokorode Seal-Kote. Coating shall be a minimum of 1/16 inch thickness, spray applied in accordance with manufacturers recommendations. The outer surface of fan unit shall have an aluminum gray finish.

FAN WHEELS:

Fan wheel shall be of the axial flow air foil type, rigidly constructed of a spark-proof nonferrous metal.

DRIVE:

Belt driven units shall have heavy duty, spark-resistant adjustable V-belt drives with integral fan and motor base. Fan bearings shall be self-aligning, heavy duty ball bearing, designed for continuous operation. Motors shall be explosion proof for Class I, Group D, Division 2 installation and shall be of the size and having the electrical characteristics as listed in performance schedule below.

MOUNTING:

Fans shall be suitable for curb mounting on roof.

017375

PERFORMANCE:

The fans as complete units, including hood shall be of the capacities as listed in the following performance schedule:

ITEM NO.	CAPACITY C.F.M.	MOTOR H.P.	MOTOR R.P.M.	DRIVE	ELECTRIC CHAR.	MIN. FAN DIAM.	DUTY
6039E-100	15000/7500	3/1-2	1800/900	Belt	440/3/60	36"	Supply
6039E-101	"	"	"	"	"	"	"
6039E-102	"	"	"	"	"	"	"
6039E-103	"	"	"	"	"	"	"
6039E-104	"	"	"	"	"	"	"
6039E-110	6575	1/2	1750	"	"	30"	Exhaust
6039E-111	"	"	"	"	"	"	"
6039E-112	"	"	"	"	"	"	"
6039E-113	"	"	"	"	"	"	"
6039E-114	3850	1/3 1/2	1140	Direct	"	22"	Supply

ALTERNATE:

Fan supplier shall quote as an alternate, the furnishing of Items 6039E-100 through 104 as direct drive fan units having the capacities in C.F.M. as listed in performance schedule above.

GUARANTEE:

See attached sheet for details concerning guarantee, drawing distribution, inspection and service.

SPECIFICATION FOR ROOF VENTILATING SETS

ITEMS 6039E-115, 116, 117

SERVICE:

Fans to be located on roof of product area and are to supply ventilation air to area below product room 110 and electrical control room 101.

CONSTRUCTION:

Fans shall be self-contained packaged S.W.S.I., counter-clock wise, T.H.D. ventilating units, consisting of centrifugal fan, weather-proof housing and hood, motor and spark-resistant adjustable V-belt drive. Fans shall have nonferrous metal spark-proof wheel, inlet cone and inlet ring. Unit shall be similar and equal to utility sets as manufactured by Sturtevant, American Blower and Trane Company. Unit shall have self-aligning bearings equipped with bronze bushings. Fan unit shall be factory coated, both inside and out, with weather protective coating similar and equal to Insul-Mastic 4010 or Nokorode Seal-Kote. Coating shall be a minimum of 1/16 inch thickness, spray applied in accordance with manufacturers recommendations. The outer surface of fan unit shall have an aluminum gray finish.

MOTORS:

Fan motors shall be 1 H.P., 1750 R.P.M. for 440 volt, 3-phase, 60 cycle electrical service. They shall be explosion proof, suitable for Class 1, Group D, Division 2 installation.

FAN PERFORMANCE:

Units shall deliver 3,060 CFM each against total static pressure of 5/8" W.G. Minimum fan wheel size shall be 18" diameter.

GUARANTEE:

See attached sheet for details concerning guarantee, drawing distribution, inspection and service.

SPECIFICATIONS FOR UTILITY VENT SETS

ITEMS 6039E - 118, 119 & 120

SERVICE:

Fans to ventilate vacuum cleaning room 103, toilet and janitor rooms 104 and 105, and space below office 107.

CONSTRUCTION:

Fans shall be self-contained packaged ventilating units, consisting of centrifugal fan, housing and motors. Fans shall have spark-proof wheels of nonferrous metal and nonferrous inlet cone. Units shall be direct driven and shall be similar and equal to utility sets as manufactured by Sturtevant, American Blower and Trane Company.

MOTORS:

Fan motors shall be of size as indicated in performance schedule below and shall be explosion proof suitable for Class I, Group D, Division 2 installations.

PERFORMANCE:

Vent sets shall be quiet in operation and have operating characteristics as listed below.

FAN NO.	C.F.M.	TOTAL STATIC PRESS "W.G."	MIN. MOTOR H.P.	MOTOR R.P.M.	ELEC. SERV.	MIN. WHEEL DIAM.
6039E-118	430	1/8"	1/6	1725	110/1/60	6
6039E-119	400	1/4"	1/6	1725	110/1/60	6
6039E-120	900	1/4"	1/4	860	110/1/60	9

GUARANTEE:

See attached sheet for details concerning guarantee, drawing distribution, inspection and service.

PROJECT

REACTION & EXTRUSION BUILDING NO. 102
POLYETHYLENE UNIT
SEADRIFT PLANT

PROJECT #40-E | PLANT CA | W. O. NO. WP-6039

ACCOUNT	DESCRIPTION
2	CONCRETE SUBSTRUCTURE: All concrete below elevation of first or grade line floor. Includes slab at finish grade line. Includes walls of reaction cells below grade line.
5	CONCRETE SUPERSTRUCTURE: All concrete above elevation of grade line floor.
6	SPECIAL FLOORING:
9	STRUCTURAL STEEL: All structural steel, including interior & exterior stairs, hand rails, ladders, stair treads, thresholds, toe plates, walkways, platforms, skylights, hatch framing, steel doors and steel sash, door & sash steel lintels, plate and grating floors. Includes sand blasting if required. Also includes labor only in painting of all steel.
10	WALLS-EXTERIOR: All exterior walls, except poured reinforced concrete walls. Includes sills, sash, door frames, casing & doors other than steel. Includes glazing, plastering, coping & ornamental trim.
11	FIRE PROOFING: Tile, gypsum, concrete, and plastering, when applied for fireproofing purposes only.

OPENED: 12-31-51
ISSUED: 4-14-53

ENGINEERING: B & R
CONSTRUCTION: B & R

W. O. NO. WP-6039
PLANT CA
SHEET 1 of 3

Revised 8/31/53

017379

PROJECT

REACTION & EXTRUSION BUILDING NO. 102
POLYETHYLENE UNIT
SEADRIFT PLANT

PROJECT #40-E PLANT CA W. O. NO. WP-6039

ACCOUNT	DESCRIPTION
20	WALLS-INTERIOR PARTITION: Comparable construction & materials to that covered under Account 10.
26	PAINTING: Walls, ceilings, floors, sash & doors. Includes material only for structural steel, equipment, or piping. Labor to be charged to specific accounts covering steel, equipment, or piping to be painted.
35	ROOF: Built up or other type roof. DOES NOT include ventilators. Includes gutters, flashing, down spouts & scuppers.
39	PLUMBING: All plumbing service for building, including wash fountains, water coolers, toilet and shower partitions.
~~40~~	~~SEWERS: All process and sanitary sewer lines to manholes.~~ } Canceled Addendum #1
~~41~~	~~MANHOLES-SEWER:~~
43	BUILDING LIGHTING: Includes telephone conduit & lead wire.
44	POWER FOR BUILDING: Includes controllers for motors on unit heaters, sump pumps, ventilating fans or other power units for building use only.

OPENED: 12-31-51
ISSUED: 4-14-53

ENGINEERING: B & R
CONSTRUCTION: B & R

W. O. NO. WP-6039
PLANT CA
SHEET 2 of 3

017380

PROJECT

REACTION & EXTRUSION BUILDING NO. 102
POLYETHYLENE UNIT
SEADRIFT PLANT

PROJECT #40-E PLANT CA W. O. NO. WP-6039

ACCOUNT	DESCRIPTION
45	HEATING & VENTILATION: Includes piping, heating units, ventilating fans & blowers, ducts & louvres.
46	AIR CONDITIONING: All materials & installation incident to air conditioning.
50	FIRE PROTECTION: Sprinkler syster, CO_2 flooding system, hose racks, hose reels, engines, foamite equipment and fire line piping in building.
56	FILL: Includes grading of outside fill.
64	FINAL JOB CLEANUP:
66	MISCELLANEOUS OPERATING EQUIPMENT: Office furniture and equipment, auxiliary operating equipment, safety equipment, lockers.
153	PAVEMENTS: Concrete access drives & sidewalks.
155	DUCTS & CHUTES: Does NOT include heating, ventilating and air conditioning ducts.
159	LIGHT FEEDERS: From substation to lighting panel. Includes lighting panel.
160	FIRE ALARM SYSTEM:
162	INSTRUMENTS: Includes only those instruments installed for building use only.

OPENED: 12-31-51
ISSUED: 4-14-53

ENGINEERING: B & R
CONSTRUCTION: B & R

W. O. NO. WP-6039
PLANT CA
SHEET 3 of 3

017381

PROJECT

REACTION & EXTRUSION BUILDING NO. 102
POLYETHYLENE UNIT
SEADRIFT PLANT

PROJECT NO. 40-E PLANT CA W. O. NO. WP-6039

ACCOUNT	DESCRIPTION
	ADDENDUM NO. 1 TO ACCOUNT BREAKDOWN DATED 4-14-59
	PLEASE CANCEL THE FOLLOWING ACCOUNTS:
40	SEWERS:
41	MANHOLES: Sewer.

OPENED: 12-31-51
ISSUED: 4-14-52
ADDENDUM NO. 1
5-6-59

ENGINEERING: B & R
CONSTRUCTION: B & R

W. O. NO. WP-6039
PLANT CA
SHEET 1 of 1

017382

WORK ORDER AUTHORIZATION

ENGINEERING DEPARTMENT

[redacted]
COMPANY NAME

TO [redacted] WORK ORDER NO. 6039

LOCATION [redacted] BUDGET CLASSIFICATION NO. [redacted]

REQUEST NO. [redacted]

THE FOLLOWING WORK IS TO BE DONE AND CHARGED TO THIS ORDER

TITLE

[redacted]

DISTRIBUTION OF CHARGES: [redacted]

[redacted]

Surrendered
See Revised Estimate

017383

COPIES TO: [redacted]

AMOUNT AUTHORIZED [redacted]

ACTUAL COST

DATE OPENED DEC 31 1951

DATE COMPLETED

DATE CLEARED

CS 4821

AUTHORIZED BY H. E. THOMPSON

CARBIDE AND CARBON CHEMICALS COMPANY
A DIVISION OF
UNION CARBIDE AND CARBON CORPORATION
ENGINEERING DEPARTMENT
ESTIMATE OF COST

LOCATION Seadrift, Texas PLANT

REQUEST NO. 39 | WORK ORDER NO. EP 6039 | BUDGET 49-E

TITLE

REACTION AND EXTRUSION BUILDING
POLYETHYLENE UNIT
SEADRIFT PLANT

ACCOUNT	ITEM	PCS.	DESCRIPTION	LABOR	MATERIAL	TOTAL
			This is a preliminary estimate which will be revised and accounts set up when information is available.			

017384

APPROVED	DATE

TOTAL	$13200	$146600	159800
EXPENSE	75 % OF LABOR		160200
SUB-TOTAL			620000
ENGINEERING	10 % OF SUB-TOTAL		62000
SUB-TOTAL			682000
CONTINGENCIES	10 % OF SUB-TOTAL		68200
DOE 114 12-17-51	GRAND TOTAL		750000

ESTIMATED BY Preliminary DATE 12-19-51
CHECKED BY DATE
SHEET 1 OF 1

BROWN AND ROOT, INC.
CARBIDE & CARBON CHEMICALS CO.
SEADRIFT PLANT

89161

WP No. 6039 Part _____
Dwg. No. A276543 A276549
A276544 _____
A276545 _____

Bill of Material No. _____
Sheet 1 of 1
Prepared by AHK Date 4-5-5
Checked by DSS Date 4-5-5

Description: Filters for Air Conditioning Systems - Reaction Building

Rev.	No.										
	Date										

To be Purchased by: ☒ Houstc ☐ Field

	Req'd.	Unit	Description	Acct.	Req.	Price	Amount
1			Furnish and install replaceable type air	45	✓		
2			filters in air conditioning units as listed				
3			below.				
4			Filters shall contain a glass fiber filtering				
5			media similar and equal to "Dust Stop" air				
6			filters as manufactured by Owens-Corning				
7			Fiberglass Corp.				
8							
9	2		16" x 20" x 2" Unit 6039E-121				
10							
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017385

WORK ORDER AUTHORIZATION

ENGINEERING DEPARTMENT

CARBIDE & CARBON CHEMICALS COMPANY
COMPANY NAME

TO MR. J. H. WARE — WORK ORDER NO. WP-6039

LOCATION 4600 CLINTON DRIVE — PROJECT BUDGET CLASSIFICATION NO. 40-E

HOUSTON, TEXAS — REQUEST NO. 510-39A

THE FOLLOWING WORK IS TO BE DONE AND CHARGED TO THIS ORDER

TITLE

REACTION AND EXTRUSION BUILDING
POLYETHYLENE UNIT
SEADRIFT PLANT

DISTRIBUTION OF CHARGES:

ACCOUNT	ITEM	PCS.	DESCRIPTION	ACCOUNT	ITEM	PCS.	DESCRIPTION
2			CONCRETE SUBSTRUCTURE	45			HEATING & VENTILATION
5			CONCRETE SUPERSTRUCTURE	46			AIR CONDITIONING
6			SPECIAL FLOORING	50			FIRE PROTECTION
9			STRUCTURAL STEEL	56			FILL
10			WALLS-EXTERIOR	64			FINAL JOB CLEANUP
20			WALLS-INTERIOR PARTITION	66			MISC. OPERATING EQUIP.
26			PAINTING	153			PAVEMENTS
35			ROOF	159			LIGHT FEEDERS
39			PLUMBING	160			FIRE ALARM SYSTEM
43			BUILDING LIGHTING				
44			POWER FOR BUILDING				

NOTE: THIS WORK WILL BE PERFORMED BY BROWN & ROOT, INC.

ORIGINAL AUTHORIZATION 12/31/51	750,000.00
DECREASED AUTHORIZATION SEP 22 1953	93,900.00
TOTAL AUTHORIZATION	656,100.00

017386

COPIES TO: Mr. H. E. Thompson, Mr. J. T. Donahoe, Mr. M. D. Kinsey, Dr. C. M. Blair, Mr. S. V. Clarke, Mr. W. S. Brackett, Mr. R. N. Shepard, Mr. C. B. Mastin, Mr. F. J. Crumbaker

AMOUNT AUTHORIZED 656,100.00

ACTUAL COST

DATE OPENED SEE ABOVE

DATE COMPLETED

DATE CLEARED

CS 4821

AUTHORIZED BY H. E. THOMPSON

CARBIDE AND CARBON CHEMICALS COMPANY

ENGINEERING DEPARTMENT

ESTIMATE OF COST

LOCATION SEADRIFT, TEXAS PLANT 510

REQUEST NO. 510-39A | WORK ORDER NO. WP-6039 | BUDGET PROJECT NO. 40-E

TITLE REACTION AND EXTRUSION BUILDING
POLYETHYLENE UNIT
SEADRIFT PLANT

ACCOUNT	ITEM	PCS.	DESCRIPTION	LABOR	MATERIAL	TOTAL
2			CONCRETE SUBSTRUCTURE	26,850	42,890	69,740
5			CONCRETE SUPERSTRUCTURE	74,150	47,870	122,020
6			SPECIAL FLOORING	320	400	720
9			STRUCTURAL STEEL	26,730	111,710	138,440
10			WALLS-EXTERIOR	1,170	2,800	3,970
20			WALLS-INTERIOR PARTITION	980	740	1,720
26			PAINTING	1,000	6,700	7,700
35			ROOF	5,320	7,790	13,110
39			PLUMBING	940	1,560	2,500
43			BUILDING LIGHTING	8,670	12,400	21,070
44			POWER FOR BUILDING	2,000	5,500	7,500
45			HEATING & VENTILATION	3,300	19,280	22,580
46			AIR CONDITIONING	250	2,220	2,470
50			FIRE PROTECTION	490	11,430	11,920
56			FILL	40	100	140
64			FINAL JOB CLEANUP	4,690	3,130	7,820
66			MISCELLANEOUS OPERATING EQUIPMENT	200	1,290	1,490
153			PAVEMENTS	3,400	5,100	8,500
159			LIGHT FEEDERS	1,000	3,160	4,160
160			FIRE ALARM SYSTEM	600	830	1,430

017387

CARBIDE AND CARBON CHEMICALS COMPANY

ENGINEERING DEPARTMENT

ESTIMATE OF COST

LOCATION SEADRIFT, TEXAS PLANT 510

REQUEST NO. 510-39A | WORK ORDER NO. WP-6039 | BUDGET PROJECT NO. 40-E

TITLE REACTION AND EXTRUSION BUILDING
POLYETHYLENE UNIT
SEADRIFT PLANT

ACCOUNT	ITEM	PCS.	DESCRIPTION	LABOR	MATERIAL	TOTAL
			ORIGINAL AUTHORIZATION 12/31/51 750,000.00			
			DECREASED AUTHORIZATION SEP 22 1953 93,900.00			
			TOTAL AUTHORIZATION 656,100.00			
			NOTE: THIS WORK WILL BE PERFORMED BY BROWN & ROOT, INC.			

APPROVED	DATE

TOTAL	162,100	286,900	449,000
EXPENSE 60 % OF LABOR			97,300
SUB-TOTAL			546,300
ENGINEERING 6 % OF SUB-TOTAL			32,800
SUB-TOTAL			579,100
CONTINGENCIES 10 % OF SUB-TOTAL			57,900
Fee 3			19,100
GRAND TOTAL			656,100

ESTIMATED BY B&R DATE 7-15-53

CHECKED BY DATE

SHEET 2 OF 2

017388