PLAINTIFF'S
EXHIBIT
UC-P-126

DESIGN REPORT

PART III - HIGH PRESSURE PUMPING SYSTEM POLYETHYLENE UNIT PLANT CA WP - 6037

Poly A

017144

DESIGN REPORT

PART III - HIGH PRESSURE PURIFYING SYSTEM

POLYETHYLENE UNIT - PLANT CA

WP-6037

Changes made as per Change # 1 - 10-6-52
" " " " " # 2 - 10-28-52
" " " " " # 3 - 11-6-52
" " " " " # 4 - 11-21-52
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" " " " " # 6 - 4-22-53
" " " " " # 7 - 5-4-53
" " " " " # 8 - 6-23-53
" " " " " # 9 - 8-6-53
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GAS PROCESS ENGINEERING AND DEVELOPMENT DEPARTMENT

CARBIDE AND CARBON CHEMICALS COMPANY

SOUTH CHARLESTON, WEST VIRGINIA

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DESIGN REPORT

PART III - HIGH PRESSURE PUMPING SYSTEM

POLYETHYLENE UNIT - PLANT CA

WP-6037

INTRODUCTION

This design report contains specifications for the purchase and installation of equipment, instruments, piping, and valves for the High Pressure Pumping System of the Polyethylene Unit at the Seadrift Plant.

The high pressure pumping system comprises five units, each serving one of the five reactor units covered in Part V (Reaction System, WP-6040). Each unit consists of a pair of double-acting high pressure intensifier-type pumps motivated by oil supplied by a corresponding unit of the Power Oil System (Part IV, WP-6038). Each unit of the Power Oil System comprises two pairs of rotary-type multiple piston pumps, each pair of which is driven by a 700-horsepower synchronous motor.

The High Pressure Pump Building will be approximately 147 feet long by 90 feet wide by 22 feet ceiling height above the operating floor level. Operating floor level will be five feet above mean grade elevation. Storage and shop rooms will be provided on the westend of the building. The remainder of the building will be divided into two sections each approximately 45 feet by 120 feet by an east-west concrete fire wall. The ten intensifiers specified in this report will be installed in the south half of the building on 12 foot centers. The ten pairs of oil pumps, each pair mounted on a single base plate with a 700-hp motor drive, will be installed opposite in the north half. Piping connections between the Power Oil System and the High Pressure Pumping System will be made through pipe sleeves in the fire wall. Oil lines shall be adequately braced and supported to minimize vibration and noise.

Indoor piping will be installed where possible below the operating floor level. Pipe headers supplying the process will, in general, be installed above grade along the south side of the building. High pressure transfer lines (one from each pair of intensifiers) will be routed above grade from the High Pressure Pump Building southward to the Reaction Building. Distance between these two buildings will be approximately 70 feet.

All lines specified in accordance with the Special High Pressure Specifications will be jacketed with pipe covers. Outside the building, the covers will be fabricated from split 8" Schedule 40 steel pipe, with design similar to that shown on C&CCC drawings A-259102, A-259105, A-259106, and A-259108. Inside the building, such covers will be fabricated similar to the design shown on C&CCC drawings SK-54067A and SK-54072A. The latter covers will be made from 8" Schedule 40 pipe for 1-7/8" OD tubing, and from 4" Schedule 40 pipe for 9/16" OD tubing.

INTRODUCTION (CONT'D)

The proposed location for the master instrument panel for the High Pressure Pumping System is along the west (shop) wall in the northwest corner of the Intensifier room. Individual panels for suction pressure gauges and electrical control switches will be located along the fire wall, one such panel to be provided for each pair of intensifiers comprising a unit.

Details of the electrical control system for the intensifiers will be supplied later.

EQUIPMENT LIST

Flow Diagram H3B-R1043

6037E-301, -301A THRU -305, -305A - HIGH PRESSURE INTENSIFIER-TYPE PUMPING UNITS

Property Nos. CA-6306-1 thru CA-6306-10 respectively

Ten (10) double-acting high pressure intensifier-type pumping units, each consisting of a central double-acting power cylinder and auxiliaries mounted in tandem with two high pressure pumping cylinders, one on each end. For detailed specifications, see pages 37 and 39.

Assembly drawing, H3B-A1522.

H3B Department to direct purchase of pumping units and necessary spare parts.

6037E-301B THRU -305B - LUBRICATORS

Motor Property Nos. CA-6213-1 thru CA-6213-5 respectively

Five (5) Manzel Model 82, 4-feed, 160 to 1 reduction ratio, right-hand end rotary drive lubricators, equipped with bulls-eye sight glasses for 4,500 lb service. Lubricator assemblies to have painted finish. Vendor to supply 1/2-hp, 60-cycle, 3-phase, 440-volt, 1725-rpm motors suitable for Class I, Group D installation. Each lubricator and motor assembly is to be mounted by vendor on a base plate suitable for wall mounting. Refer to Manzel Drawing 82D-578-A2R.

Install along fire wall, adjacent to respective intensifier pairs.

6037E-301C, -301D, -301E, -301F THRU -305C, -305D, -305E, -305F - LIQUID END ASSEMBLIES

Twenty (20) assemblies, each to include high pressure cylinder, cylinder head assembly, valve block assembly, packing, and plunger. To be assembled and installed under supervision of a representative of C&CDC. See outline drawing, H3B-A1661.

H3B Department to direct purchase.

6037E-301G THRU -305G - HIGH PRESSURE GAUGES

Five (5) special mercury column gauges. Install in line along outside wall of intensifier room opposite respective intensifier pairs. For gauge housings, see Items 6037E-301S thru -305S. Illumination shall be provided by a light on the gauge housing. See outline drawing, H3B-A1662.

H3B Department to direct purchase.

6037E-301H, -301J THRU -305H, -305J - HIGH PRESSURE RELIEF VALVES

Ten (10) discharge relief valves. Install in lines P-313 thru P-317 as indicated on flow diagram. See outline drawing, H3B-B1663.

H3B Department to direct purchase.

6037E-301-I THRU -305-I - NOT USED

6037E-301K THRU -305K - HIGH PRESSURE CHECK VALVES

Five (5) high pressure check valves. Install in lines P-313 thru P-317 respectively, in reactor cells of Reaction and Extrusion Building near inlets to reactors, Items 6040E-501 thru -505. See outline drawing, H3B-C1664.

H3B Department to direct purchase.

6037E-301L THRU -305L - SUCTION FILTERS

Five (5) filters, to be installed in intensifier suction lines P-303 thru P-307 respectively, outside of building. See outline drawing, H3B-A1665.

H3B Department to direct purchase.

6037E-301M, -301N, -301P, -301Q THRU -305M, -305N, -305P, -305Q - PUMP LIQUID END HOUSINGS (Not shown on flow diagram)

Twenty (20) housings for liquid end assemblies specified above. Housing design to be similar to that shown on C&CCC drawings SK-54069A, SK-54070A and SK-54071A.

6037E-301-O THRU -305-O - NOT USED

6037E-301R THRU -305R - PRESSURE GAUGES

Five (5) pressure gauges for panel mounting, with pressure taps in lines P-303 thru P-307 respectively.

Specifications

Range	0 - 5,000
Spring, material	Bored alloy steel
type	Single
Dial	6", white
Connection	1/2" IPS bottom back connection

Supply Ashcroft Duragauges, Type ~~1079~~ 10770, or equivalent. Pressure leads to be in accordance with specifications, page 54.

Install on individual panels along fire wall. Gauge nameplates: No. ___ Pump Suction (Numbers 1 thru 5 respectively).

6037E-301S THRU -305S - GAUGE HOUSINGS (Not shown on flow diagram)

Gauge housings for Items 6037E-301G thru -305G. Housing ~~design~~ to be ~~[illegible]~~
FABRICATED PER C&CCC DRAWING NO. H3B-A1345.

6037E-301T THRU -305T - RELIEF VALVES

Five (5) relief valves, each as follows:

~~Crosby JMB-t~~ (no substitution)	
Setting	2,800 psi
Size	3/4" x 1"
Locations	Lines P-303 thru P-307 respectively

6037E-301U THRU -305U - THERMOCOUPLE ASSEMBLIES

Five (5) thermocouple assemblies to be located and connected as shown in schedule, pages 12 and 13.

Instrument Division Specifications

Element	No. 20 B&S gage copper-constantan
Socket	Trinity type T-151 with 3/4" internal thread. 1-1/2", 2,500 lb ring type joint flange. 18-8 Cr-Ni steel barstock. Length below flange facing, 12".
Manufacturer	~~Instrument Division, Plant CS~~ Industrial Equipment

6037E-301V THRU -305V - RELIEF VALVES

Five (5) valves, duplicates of Items 6037E-301T above except that valves shall be set at 3,300 psi. Install in lines P-303 thru P-307 respectively.

6037E-301W, -301X, -301Y, -301Z THRU -305W, -305X -305Y, -305Z - NOT USED

6037E-301AA, BB, CC, DD, EE, FF, GG, HH THRU -305AA, BB, CC, DD, EE, FF, GG, HH - THERMOCOUPLE ASSEMBLIES

Forty (40) thermocouple assemblies to be located and connected as shown in schedule, pages 12 and 13.

Instrument Division Specifications

Embedded bayonet thermocouple per Drawing TE-2678-L. 1026-I-108

Element	Copper-constantan
Adapter	Stainless steel, TA-2670, 3/8-24 NF-3 threads
Insertion depth, "X" dimension	2-9/32"
Flexible metal armor	28" long

6037E-301AA, BB, CC, DD, EE, FF, GG, HH THRU -305AA, BB, CC, DD, EE, FF, GG, HH - THERMOCOUPLE ASSEMBLIES (CONT'D)

Instrument Division Specifications (Cont'd)

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

Manufacturer — Revere Corporation

Installation Notes: To be installed in drilled section of flanges on 1-7/8" OD x 5/8" ID tubing. Reference drawing, H3B-C1550.

See Change #1

6037E-306 - THERMOCOUPLE ASSEMBLY

One (1) thermocouple assembly to be located in line P-301 and connected to Item 6037E-359 ~~as shown on schedule, pages 12 and 13.~~

Instrument Division Specifications

Element	No. 20 B&S gage copper-constantan
Socket	Trinity type T-151 with 3/4" internal thread. 1-1/2", 2,500 lb ring type joint flange. 18-8 Cr-Ni steel barstock. Length below flange facing, 8".
Manufacturer	~~Instrument Division, Plant 65~~

6037E-307 - PRESSURE GAUGE

Pressure gauge for mounting on master instrument panel, with pressure tap located in line P-301. Duplicate Item 6037E-301R above. Instrument panel nameplate: Suction Header

6037E-308 THRU -310 - NOT USED

6037E-311, -311A - SPARE HIGH PRESSURE GAUGES (Not shown on flow diagram)

Two (2) duplicates of Item 6037E-301G.

H3B Department to direct purchase.

6037E-312, -312A - SPARE HIGH PRESSURE RELIEF VALVES (Not shown on flow diagram)

Two (2) duplicates of Item 6037E-301H.

H3B Department to direct purchase.

6037E-313, -313A - SPARE HIGH PRESSURE CHECK VALVES (Not shown on flow diagram)

Two (2) duplicates of Item 6037E-301K.

H3B Department to direct purchase.

6037E-314, -314A - SPARE SUCTION FILTERS (Not shown on flow diagram)

Two (2) duplicates of Item 6037E-301L.

H3B Department to direct purchase.

6037E-315 - OIL SEPARATOR
Property No. CA-6476-1

One (1) ~~1/4" OD x 2" - 1"~~ body length Peerless line separator to remove entrained oil. Install in line P-343. See specifications, page 40.

H3B Department to direct purchase.

6037E-315A - STRAINER

One (1) 3/4" 600 lb cast steel screwed strainer with brass screen having 1/16" diameter perforations. To have 1/2" blowoff connection. Install in line L-351 between Item 6037E-315 and Item 6037E-315B. Steam trace with low pressure steam.

6037E-315B - OIL TRAP

One (1) Nicholson weight-operated trap, Model JR, to operate at 5 psig, eliminating oil of 0.89 specific gravity. Trap to have 3/4" screwed inlet connection and 1/2" screwed outlet connection. Install in line L-351; steam trace with low pressure steam.

6037E-316 - NOT USED

6037E-317 - HIGH PRESSURE TESTING STATION

See page 16.

6037E-318 - NOT USED

6037E-319 - OVERHEAD CRANE (Not shown on flow diagram)
Property No. CA-6550-2
Property No. (Hoist) CA-6514-2

One (1) overhead hand-operated single-girder traveling crane with hand-operated trolley and with hand-operated chain-fall hoist, 4,000 lb capacity.

Crane is to serve entire length of Intensifier room.

6037E-320 - OVERHEAD CRANE (Note change in title) (R)
Property No. CA-6550-3
Property No. (Hoist) CA-6514-3

Provide one (1) hand-operated geared under-hung crane "Transfer" bridge complete with crane tracks, 4,000 lb capacity trolley hoist, and necessary auxiliaries to serve the repair shop area, testing station area, and parts storage room of the High Pressure Pump Building.

6037E-321 - NOT USED

6037E-322 - RELIEF VALVE

One (1) Lunkenheimer relief valve, Figure No. 1045, size 1-1/2" x 2", set at 50 psi. Install in line P-343.

6037E-323 - RELIEF VALVE

One (1) relief valve, duplicate of Item 6037E-301T. Install in line P-302.

6037E-324 - FLEXIBLE CONNECTION

One (1) 2" IPS x 18" overall length flexible hose connection consisting of seamless bronze tubing with double bronze wire braid. Couplings to be screwed hex nut type bronze nipples brazed to tubing and braid. Install in line P-318 downstream of relief valve, Item 6037E-322, similar to C&CCC SK-18520.

6037E-325 - NOT USED

6037E-326 - RELIEF VALVE

One (1) relief valve, duplicate of Item 6037E-301T. Install in line P-301.

6037E-327 - NOT USED

6037E-328 AND -329 - DIFFUSER HEADS

Two (2) 3" standard diffusers for vent header, fabricated in accordance with C&CCC drawing SK-18535. Install in line P-346 at opposite ends of High Pressure Pump Building.

6037E-330 THRU -350 - NOT USED

6037E-351 - PRESSURE RECORDER
Property No. CA-6332-110

To record flow in 4" line P-343. Locate on master instrument panel in High Pressure Pump Building. Instrument Panel Nameplate: 5 Lb Return.

6037E-351 - PRESSURE RECORDER (CONT'D)

Instrument Division Specifications

Range, chart	0 to 20 lb per sq in. 0 to 20 inches of water
Pressure element: both pens	Receiver hydron
Clock, type	Pneumatic, 24 hour
Manufacturer	The Foxboro Company

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

6037E-351A - ORIFICE FLANGES

Install in 4" line P-343.

Instrument Division Specifications

Style	Threaded
Size	4"
Pressure rating	300 lb per sq in. ASA
Facing	1/16" raised
Material	Forged steel

Pressure taps to be 15/16" centerline from raised face of flanges.

Furnish as per General Specification Form A3E-F19.

Installation drawings: IN-101, IN-103, A3E-E105-3, Figure 2.

6037E-351B - ORIFICE PLATE

Install in flanges, Item 6037E-351A, and connect to transmitter, Item 6037E-351D.

Instrument Division Specifications

Style	Eccentric
Size	7" OD; 1.775" ID
Material	18-8 Cr-Ni steel
Eccentricity	Centerline of plate to centerline of orifice, 1". Orifice to be tangent to bottom of line.

Furnish as per General Specification Forms A3E-F19 and A3E-F20.

6037E-351C - THERMOCOUPLE WELL ASSEMBLY

Install in 4" line P-343.

Instrument Division Specifications

Element	Copper-constantan

6037E-351C - THERMOCOUPLE WELL ASSEMBLY (CONT'D)

Instrument Division Specifications (Cont'd)

Separable socket,	material	18-8 Cr-Ni steel
	length	12"
	construction	~~Built-up~~ Drilled per Drawing A3E-E151-9, type 1

Sealed assembly per Drawing A3E-E133-3.

Install minimum of 5 pipe diameters downstream from orifice plate for test temperature measurement.

6037E-351D - PRESSURE AND FLOW INDICATOR TRANSMITTER
Property No. CA-6332-111

Connect to flanges, Item 6037E-351A, and to recorder, Item 6037E-351.

Instrument Division Specifications

Range	0 to 20 inches of water 0 to 20 lb per sq in.
Case	Round
Mounting type	Pipe stand
Manufacturer	The Foxboro Company

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

Installation Notes: Install with 3/8" OD copper tubing leads.

6037E-352 - TEMPERATURE INDICATOR (Not shown on flow diagram)
Property No. CA-6332-112

To indicate system temperatures as listed in schedule on pages 12 and 13.

Locate on master instrument panel in High Pressure Pump Building.
Instrument panel nameplate: Pump Temperatures.

Instrument Division Specifications

Range	Minus 100 to plus 150°C
Actuation	Copper-constantan thermocouple
Scale, special	Minus 100 to plus 150°C
Number points	60. 30 double-throw toggle type switches to be mounted on door of instrument for indicator only. Switch handles on one right-hand row to be red. Switches to be arranged in six vertical rows of five switches each.

Instrument to operate from 115-volt, 60-cycle supply.

6037E-352 - TEMPERATURE INDICATOR (CONT'D)

Instrument Division Specifications (Cont'd)

Model No.	Speedomax
Manufacturer	Leeds and Northrup Company

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

Installation Notes: Install with air purge on case.

6037E-352A - THERMOCOUPLE LEAD WIRE (Not shown on flow diagram)

For thermocouple connections to indicator above.

Instrument Division 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

Furnish as per General Specification Form A3E-F18.

SCHEDULE OF THERMOCOUPLE CONNECTIONS TO ITEM 6037E-352

Thermocouples listed below are to be connected to Item 6037E-352. The potentiometer will have 30 double-throw toggle type switches, arranged in six vertical rows of five switches each. For locating thermocouples in the table below, the vertical rows are lettered A through F, from left to right; switch positions in any vertical row are numbered 1 through 5 from top to bottom. The suffixes "L" and "R" under Switch Designation refer to left or right switch position.

Thermocouple Item No.	Location	Switch Designation	Nameplate Data
6037E-301AA	P-303	A-1-L	No. 1 SW Suction
6037E-301BB	P-303	A-2-L	No. 1 NW Suction
6037E-301CC	P-303	A-3-L	No. 1 SE Suction
6037E-301DD	P-303	A-4-L	No. 1 NE Suction
6037E-301EE	P-313	A-1-R	No. 1 SW Discharge
6037E-301FF	P-313	A-2-R	No. 1 NW Discharge
6037E-301GG	P-313	A-3-R	No. 1 SE Discharge
6037E-301HH	P-313	A-4-R	No. 1 NE Discharge
6037E-301U	P-303	A-5-L	No. 1 Unit Suction
~~6037E-306~~	~~P-301~~	~~A-5-R~~	~~Suction Header~~
6037E-302AA	P-304	B-1-L	No. 2 SW Suction
6037E-302BB	P-304	B-2-L	No. 2 NW Suction
6037E-302CC	P-304	B-3-L	No. 2 SE Suction
6037E-302DD	P-304	B-4-L	No. 2 NE Suction
6037E-302EE	P-314	B-1-R	No. 2 SW Discharge
6037E-302FF	P-314	B-2-R	No. 2 NW Discharge
6037E-302GG	P-314	B-3-R	No. 2 SE Discharge
6037E-302HH	P-314	B-4-R	No. 2 NE Discharge
6037E-302U	P-304	B-5-L	No. 2 Unit Suction
6037E-303AA	P-305	C-1-L	No. 3 SW Suction
6037E-303BB	P-305	C-2-L	No. 3 NW Suction
6037E-303CC	P-305	C-3-L	No. 3 SE Suction
6037E-303DD	P-305	C-4-L	No. 3 NE Suction
6037E-303EE	P-315	C-1-R	No. 3 SW Discharge
6037E-303FF	P-315	C-2-R	No. 3 NW Discharge
6037E-303GG	P-315	C-3-R	No. 3 SE Discharge
6037E-303HH	P-315	C-4-R	No. 3 NE Discharge
6037E-303U	P-305	C-5-L	No. 3 Unit Suction

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SCHEDULE OF THERMOCOUPLE CONNECTIONS TO ITEM 6037E-352 (CONT'D)

Thermocouple Item No.	Location	Switch Designation	Nameplate Data
6037E-304AA	P-306	D-1-L	No. 4 SW Suction
6037E-304BB	P-306	D-2-L	No. 4 NW Suction
6037E-304CC	P-306	D-3-L	No. 4 SE Suction
6037E-304DD	P-306	D-4-L	No. 4 NE Suction
6037E-304EE	P-316	D-1-R	No. 4 SW Discharge
6037E-304FF	P-316	D-2-R	No. 4 NW Discharge
6037E-304GG	P-316	D-3-R	No. 4 SE Discharge
6037E-304HH	P-316	D-4-R	No. 4 NE Discharge
6037E-304U	P-306	D-5-L	No. 4 Unit Suction
6037E-305AA	P-307	E-1-L	No. 5 SW Suction
6037E-305BB	P-307	E-2-L	No. 5 NW Suction
6037E-305CC	P-307	E-3-L	No. 5 SE Suction
6037E-305DD	P-307	E-4-L	No. 5 NE Suction
6037E-305EE	P-317	E-1-R	No. 5 SW Discharge
6037E-305FF	P-317	E-2-R	No. 5 NW Discharge
6037E-305GG	P-317	E-3-R	No. 5 SE Discharge
6037E-305HH	P-317	E-4-R	No. 5 NE Discharge
6037E-305U	P-307	E-5-L	No. 5 Unit Suction

Thermocouples below are specified in Design Report, Part IV - Power Oil System, WP-6038.

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

6037E-353 THRU -357 - NOT USED

6037E-358 AND -359 - TEMPERATURE INDICATOR, RECORDER AND CONTROLLER (R)
Property Nos. CA-6332-113 and CA-6332-114 respectively
(Not shown on flow diagram)

Two (2) instruments to indicate and record pump discharge temperatures. Also, to actuate alarm (Item 6037E-360) and horn (Item 6038E-421L, Part IV) when any temperature exceeds the manually adjustable setting. See connection schedule below. Install on master instrument panel in High Pressure Pump Building.

Instrument Division Specifications

Range	Minus 75 to 0 to plus 125°C
Actuation	Copper-constantan thermocouple
Scale	Minus 75 to plus 125°C
Chart	Minus 75 to plus 125°C
type	Strip without time markings and for speed of 2" per hour
Printing, type	Synchronous
record	Unicolored, numbered points
Number points	12 with 7.2 seconds between points
Type of electrical mechanism	SPDT switch, 1 amp rating, closed below switch setting. To open circuit when any of the points exceed the setting.

Instrument to operate from 115 volt, 60 cycle supply.

Manufacturer — Brown Instrument Division

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

Installation Notes: Install with air purge on case per Drawing A3E-E120C.

SCHEDULE OF THERMOCOUPLE CONNECTIONS
TO ITEMS 6037E-358 AND -359

017161

Instrument, Items No.	Instrument Panel Nameplate	Thermocouples, Items No.
6037E-358	Discharge, Nos. 1, 2, and 3 Intensifiers	6037E-301EE, FF, GG, HH -302EE, FF, GG, HH -303EE, FF, GG, HH
6037E-359	Discharge, Nos. 4 and 5 Intensifiers,	6037E-304EE, FF, GG, HH -305EE, FF, GG, HH

Primary Pump Suction & Discharges (6037E-219 (Part II - WP-6036) 6036E-306

Note: Provide suitable chart with each instrument to indicate thermocouple locations.

6036E-319 (Part II, WP-6036

6037E-306

6037E-360 - ALARM SIGNAL (Not shown on flow diagram)

Visual alarm to be actuated by Items 6037E-358 and -359 when any temperature exceeds setting.

Signal light to consist of a pair of Crouse-Hinds type EGP, or equivalent, ruby pilot lights.

6037E-361-1 THRU -20 - PURGE CONNECTIONS (A)

Twenty (20) purge connections, one to each Pump Liquid and Housing, Items 6037E-301M, -N, -P, -Q thru -305M, -N, -P, -Q. Each connection to consist of following or equivalent: one (1) 1/2" Zenith type 4x4-S40 filter; one (1) U.S. gauge, Fig. 500-S, 2" white dial, 0-100 psi; and (1) 1/2" IPS Clayton mark forged steel orifice union with stainless steel orifice plate with No. 35 drill in center of plate to pass 400 scfh N_2 with 30 psi pressure drop. Use 5/8" OD copper tubing from purge assembly to housing.

6037E-362-1 THRU -5 - PURGE CONNECTIONS (A)

Five (5) purge connections, one to each High Pressure Gauge Housing, Items 6037E-301S thru -305S. Duplicate of Item 6037E-361-1, except orifice to drill size to be No. 66 to pass 40 scfh N_2 with 30 psi pressure drop.

6037E-363 - PRESSURE GAUGE (A)

One (1) Ashcroft Duragauge, Fig. 1279A.

Dial	4-1/2" white
Range	0 - 100 psi
Connection	Bottom
Location	N-303

EQUIPMENT LIST

Flow Diagram H3B-N1055

6037E-317 - HIGH PRESSURE TESTING STATION

The high pressure testing station shall be installed in the shop room of the High Pressure Pump Building. All equipment for the station, with the exception of panel mounted items, shall be enclosed by a 3/8" steel plate safety partition. Floor area required is approximately 300 sq ft (enclosure approximately 15 ft by 20 ft). A 3/8" steel plate control and instrument panel with bullet-proof sight windows shall form a part of the safety partition, and shall be arranged to permit the operator to observe and control the enclosed equipment from a protected position outside the enclosure. Arrangement of instruments on the panel is to be similar to that shown on C&CCC drawing B-257569.

The Testing Station area will be served by the monorail system specified as Item 6037E-320.

Equipment for the Testing Station comprises Items 6037E-317A thru -317S specified below.

6037E-317A - HYDRAULIC POWER SUPPLY UNIT

Property Nos. Pump CA-6306-21
Motor CA-6213-11
Reservoir CA-6476-2

One (1) Model 30010 Sceo Fluid Power Package, single 80 LA pump unit, per Simplex Engineering Company drawing FP60CA, complete with 10-hp, 60-cycle, 3-phase, 440-volt, 1,800-rpm motor suitable for Class I Group D installation, but without motor starter, heat exchanger, or temperature gauge. Furnish Model 80 LAM pump.

Mount start-stop switch for motor on Testing Station instrument panel. Nameplate: Intensifier Pump

6037E-317B - HYDRAULIC DIRECTIONAL CONTROL VALVE

Manually-operated 3/4" four-way valve for 3,000 psi service. Use Denison Model No. DD063513C, with spring-centered spool, type ~~3~~, sub-plate mounted, sub-plate model S35-12050-Y with side connections.

Install on Testing Station instrument panel. Nameplate: Hydraulic Directional Control

6037E-317C - PRIMING PRESSURE SUPPLY UNIT
Property Nos. Pump CA-6306-22
Motor CA-6213-12
Reservoir CA-6476-3

One (1) Vickers hydraulic power unit, separate motor type, to include the following components:

(a) Pump, model No. V-104-~~F~~ C, foot mounting, balanced type.
(b) Balanced piston type relief valve, model No. CT-06-~~C-10~~ B-10
(c) Motor, 3-hp, 60-cycle, 3-phase, 440-volt, 1,800-rpm, NEMA frame 225, for Class I Group D installation.
(d) Oil Reservoir, 20-gallon capacity, complete with oil level gauge, combination filler cap and air cleaner, and suction filter. Pump, relief valve, and motor to be mounted on reservoir by manufacturer.

Mount start-stop switch for motor on Testing Station instrument panel. Nameplate: Prime Pump

6037E-317D - INTENSIFIER

The intensifier for the Testing Station will consist of the following components:

(a) Item 6037E-317D-1 - Power Cylinder Assembly
(b) Item 6037E-317D-2 - Crosshead
(c) Item 6037E-317D-3 - Liquid End Assembly and Base Plate
(d) Item 6037E-317D-4 - Housing for Plunger
(e) Item 6037E-317D-5 - High Pressure Pump Hood

Above items are specified under respective item numbers below.

6037E-317D-1 - POWER CYLINDER ASSEMBLY
Property No. CA-6306-23

Power cylinder assembly, including cylinder, heads, piston, and ram, to be purchased in accordance with specifications, page 42. See 6037E-317D above.

6037E-317D-2 - CROSSHEAD

Crosshead to be purchased in accordance with specifications, page 42. See 6037E-317D above.

6037E-317D-3 - LIQUID END ASSEMBLY AND BASE PLATE

Assembly includes high pressure cylinder, tie rods and spacers, plunger, packing components, and base plate. See 6037E-317D above.

To be assembled and installed under supervision of a representative of C&GOC. See outline drawing, H3B-41667.

H3B Department to direct purchase.

6037E-317D-4 - HOUSING FOR PLUNGER

Housing for plunger of Testing Station intensifier. Fabricate in accordance with C&CCC drawing SK-54274C.

6037E-317D-5 - HIGH PRESSURE PUMP HOOD

Hood for Testing Station intensifier. Fabricate in accordance with C&CCC drawing SK-54275D.

6037E-317E - HIGH PRESSURE GAUGE
Property No. CA-6563-2

One (1) Harwood Engineering Company Manganin pressure cell for 200,000 psi service. Purchase from Harwood Engineering Company, Walpole, Massachusetts, in accordance with Harwood drawing D-1039. Vendor to furnish tubing adapter for 1/8" x 1/2" Harwood tubing. Vendor to furnish complete operating instructions.

6037E-317E-1 - STRAIN INDICATOR
Property No. CA-6332-115

Install on Testing Station instrument panel. Nameplate: Pressure Indicator

Instrument Division Specifications

Concentric dial Dynalog indicator for use with a Harwood 200,000 psi manganin cell.

Dial marking 0 to 200

For operation on 115-volt, 60-cycle supply.

Power switch to be omitted.

Manufacturer The Foxboro Company

Note: Install with air purge on case.

Three-conductor shielded cable should be run inside rigid conduit from the point of pressure measurement to the indicator.

6037E-317E-2 - STAND FOR HIGH PRESSURE GAUGE (Not shown on flow diagram)

Stand for mounting Item 6037E-317E. Fabricate per C&CCC drawing SK-54272.

6037E-317F - EMERGENCY RELIEF VALVE

See outline drawing, H3B-B1666. Air supply to valve to be controlled by solenoid valve, Item 6037E-317P. Solenoid to be controlled by on-off switch installed on Testing Station instrument panel. Switch nameplate: Emergency Blowdown.

H3B Department to direct purchase.

6037E-317F-1 - STAND FOR EMERGENCY RELIEF VALVE (Not shown on flow diagram)

Stand for mounting Item 6037E-317F. Fabricate per C&CCC drawing H3B-C1589.

6037E-317G - HIGH PRESSURE GAUGE

Mercury column gauge, duplicate of Item 6037E-301G, except for glass tube. See outline drawing, H3B-A1662.

H3B Department to direct purchase.

6037E-317G-1 - STAND FOR HIGH PRESSURE GAUGE (Not shown on flow diagram)

Stand for mounting Item 6037E-317G. Fabricate per C&CCC Drawing SK-54273.

6037E-317H, -317J - PRESSURE GAUGES (R)

Two (2) pressure gauges for panel mounting, each as follows:

Specifications

Range	0 - 5,000 psi
Spring, material	Bored alloy steel
type	Single
Dial	6", white
Connections	1/2" IPS bottom back connection

Supply Ashcroft Duragauges, type 1077D or equivalent. Install on Testing Station instrument panel, as follows:

Item No.	Panel Nameplate	Pressure Tap Location
6037E-317H	Power Oil to 4-Way Valve	H-301
6037E-317J	Power Oil to Intensifier	H-303

Note: Connections between gauge and steel piping to be made with Anchor Oil Resistant Flexible Hydraulic Hose, 1/4" ID, 4500 lb working pressure, fitted with reusable couplings. Gauge to be installed with "Chemiquip" Pressure Snubber, Porosity "E" for Oil Service.

6037E-317K - PRESSURE GAUGE (R)

Pressure gauge for panel mounting, as follows:

Specifications

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Range	0 - 3,000 psi
[illegible]ng, material	Bored alloy steel

6037E-317K - PRESSURE GAUGE (CONT'D)

Specifications (Cont'd)

Dial	6", white
Connections	1/2" IPS bottom back connection

Supply Ashcroft Duragauge type 1077D or equivalent. Install on Testing Station instrument panel, with pressure tap in line H-305. Panel nameplate: Prime Oil

Note: Connections between gauge and steel piping to be made with Anchor Oil Resistant Flexible Hydraulic Hose, 1/4" ID, 4500 lb working pressure, fitted with reusable couplings. Gauge to be installed with "Chemiquip" Pressure Snubber, Porosity "E" for Oil Service.

6037E-317L - PRESSURE REDUCING REGULATOR

Install on Testing Station instrument panel, for changing air loading pressure on emergency blowdown valve, Item 6037E-317F. Panel nameplate: Air Pressure.

Instrument Division Specifications

Type	B-102-CP
Connections, size	1/4" IPS
Pressure, upstream	100 lb per sq in.
downstream, range	10 to 40 lb per sq in.
Manufacturer	The Foxboro Company

Installation Notes: Panel mount for changing air loading pressure on Emergency Blowdown Valve.

6037E-317M AND -317N - PRESSURE GAUGES

Two (2) pressure gauges for panel mounting, each as follows:

Specifications

Range	0 - 200 psi
Spring, material	Bronze
type	Single
Dial	6" white
Connections	1/4" IPS bottom back connection

Supply Ashcroft Duragauges, type 1077A, or equivalent. Install on Testing Station instrument panel, as follows:

Item Number	Panel Nameplate	Pressure Tap Location
6037E-317M	Air Header	A-307
6037E-317N	Air from Regulator	A-307

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6037E-317P - SOLENOID OPERATED THREE WAY VALVE

To shut off and relieve air pressure from emergency blowdown valve, Item 6037E-317F, in response to panel mounted switch. (See Item 6037E-317F). Locate in line A-307.

6037E-317P - SOLENOID OPERATED THREE WAY VALVE (CONT'D)

Instrument Division Specifications

Connections, size	1/4"
type	Screwed
pressure rating	125 lb per sq in.
Body, type	Three-way
material	Bronze
Operating on	Air at 40 psig and 20°C
Electrical characteristics	115 volt a.c., 60 cycle

Leads to extend 18" from explosion-proof housing.

Form	F; Pressure at B
Catalog No.	830226
Manufacturer	Automatic Switch Company

6037E-317Q - PRESSURE GAUGE (R)

Pressure gauge for panel mounting, as follows:

Specifications

Range	0 - 2,000 psi
Spring, material	Bored alloy steel
type	Single
Dial	6" white
Connections	1/2" bottom back connection

Supply Ashcroft Duragauge type 1077D or equivalent. Install on Testing Station instrument panel, with pressure tap in line H-304. Panel Nameplate: Power Oil Return

Note: Connections between gauge and steel piping to be made with Anchor Oil Resistant Flexible Hydraulic Hose, 1/4" ID, 4500 lb working pressure, fitted with reusable couplings. Gauge to be installed with "Chemiquip" Pressure Snubber, Porosity "E" for Oil Service.

6037E-317R - ADAPTER SET (Not shown on flow diagram)

One set of special adapters, including necessary studs, etc., for mating equipment under test to piping of Testing Station.

H3B Department to direct purchase.

6037E-317S - SPECIAL TOOL SET (Not shown on flow diagram)

Special tool set for use in Testing Station. Purchase in accordance with specifications, page 44.

6037E-317T - TESTING TABLE 017168

One steel table in accordance with H3B-C1974.

6037E-317U - DEAD WEIGHT GAUGE (NOT SHOWN ON FLOW DIAGRAM)
PROPERTY NO. CA-6569-1
ONE (1) DEAD WEIGHT GAUGE FOR CALIBRATION PURPOSES. AMERICAN

LINE LIST

Flow Diagram H3B-R1043

Number	From	To	Size	Material Handled	Spec.	
P-301	3" 6036 P-225 H3B-R1042	(Header)	3/4", 1", 3"	Hydrocarbon Liquid	2500# L.T.	
P-302	P-301	1" 6041 PPP-703, H3B-R1048	3/4", 1"	Hydrocarbon Liquid	2500# L.T.	
P-303	P-301	6037E-301C, -301D, -301E, -301F; P-308, P-347, P-353	3/4", 1-1/2", 5/8"	Hydrocarbon Liquid	2500# L.T.	*
P-304	P-301	6037E-302C, -302D, -302E, -302F; P-309, P-348, P-354	3/4", 1-1/2", 5/8"	Hydrocarbon Liquid	2500# L.T.	*
P-305	P-301	6037E-303C, -303D, -303E, -303F; P-310, P-349, P-355	3/4", 1-1/2", 5/8"	Hydrocarbon Liquid	2500# L.T.	*
P-306	P-301	6037E-304C, -304D, -304E, -304F; P-311, P-350, P-356	3/4", 1-1/2", 5/8"	Hydrocarbon Liquid	2500# L.T.	*
P-307	P-301	6037E-305C, -305D, -305E, -305F; P-312, P-351, P-357	3/4", 1-1/2", 5/8"	Hydrocarbon Liquid	2500# L.T.	*
P-308	6037E-301T	P-346	1"	Hydrocarbon Vapor	52	
P-309	6037E-302T	P-346	1"	Hydrocarbon Vapor	52	
P-310	6037E-303T	P-346	1"	Hydrocarbon Vapor	52	
P-311	6037E-304T	P-346	1"	Hydrocarbon Vapor	52	
P-312	6037E-305T	P-346	1"	Hydrocarbon Vapor	52	

* 5/8" sections to be 5/8" ID x 1-7/8" OD alloy steel tubing in accordance with Special High Pressure Specifications. Details of connections to be in accordance with drawing H3B-11691.

LINE LIST - H3B-R1043 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
P-313	6037E-301C, -301D, -301E, -301F	6040P-571 H3B-R1045	5/8" ID x 1-7/8" OD	Hydrocarbon Liquid	Special High Pressure
P-314	6037E-302C, -302D, -302E, -302F	6040P-572 H3B-R1045	5/8" ID x 1-7/8" OD	Hydrocarbon Liquid	Special High Pressure
P-315	6037E-303C, -303D, -303E, -303F	6040P-573 H3B-R1045	5/8" ID x 1-7/8" OD	Hydrocarbon Liquid	Special High Pressure
P-316	6037E-304C, -304D, -304E, -304F	6040P-574 H3B-R1045	5/8" ID x 1-7/8" OD	Hydrocarbon Liquid	Special High Pressure
P-317	6037E-305C, -305D, -305E, -305F	6040P-575 H3B-R1045	5/8" ID x 1-7/8" OD	Hydrocarbon Liquid	Special High Pressure
P-318	6037E-322	P-346	2"	Hydrocarbon Vapor	52
P-319	P-301	P-346	3/4"	Hydrocarbon Vapor	52
P-320	6037E-326	P-346	1"	Hydrocarbon Vapor	52
P-321	6037E-323	P-346	1"	Hydrocarbon Vapor	52
P-322	NOT USED				
P-323	6037E-301	P-343	2"	Hydrocarbon Vapor	54
P-324	6037E-301A	P-343	2"	Hydrocarbon Vapor	54
P-325	6037E-302	P-343	2"	Hydrocarbon Vapor	54
P-326	6037E-302A	P-343	2"	Hydrocarbon Vapor	54
P-327	6037E-303	P-343	2"	Hydrocarbon Vapor	54
P-328	6037E-303A	P-343	2"	Hydrocarbon Vapor	54
P-329	6037E-304	P-343	2"	Hydrocarbon Vapor	54
P-330	6037E-304A	P-343	2"	Hydrocarbon Vapor	54
P-331	6037E-305	P-343	2"	Hydrocarbon Vapor	54

LINE LIST - H3B-R1043 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
P-332	6037E-305A	P-343	2"	Hydrocarbon Vapor	54
P-333	6037E-301H	P-346	3/4", 1"	Hydrocarbon Vapor	52
P-334	6037E-301J	P-346	3/4", 1"	Hydrocarbon Vapor	52
P-335	6037E-302H	P-346	3/4", 1"	Hydrocarbon Vapor	52
P-336	6037E-302J	P-346	3/4", 1"	Hydrocarbon Vapor	52
P-337	6037E-303H	P-346	3/4", 1"	Hydrocarbon Vapor	52
P-338	6037E-303J	P-346	3/4", 1"	Hydrocarbon Vapor	52
P-339	6037E-304H	P-346	3/4", 1"	Hydrocarbon Vapor	52
P-340	6037E-304J	P-346	3/4", 1"	Hydrocarbon Vapor	52
P-341	6037E-305H	P-346	3/4", 1"	Hydrocarbon Vapor	52
P-342	6037E-305J	P-346	3/4", 1"	Hydrocarbon Vapor	52
P-343	(Header)	6025P-204 H3B-R1271	1-1/2", 3", 4"	Hydrocarbon Vapor	53
P-344	NOT USED				
P-345	NOT USED				
P-346	(Vent Header)	Atmosphere	3"	Hydrocarbon Vapor	52
P-347	P-303	P-343, P-346	3/4"	Hydrocarbon Vapor	2500# L.T., 53
P-348	P-304	P-343, P-346	3/4"	Hydrocarbon Vapor	2500# L.T., 53
P-349	P-305	P-343, P-346	3/4"	Hydrocarbon Vapor	2500# L.T., 53
P-350	P-306	P-343, P-346	3/4"	Hydrocarbon Vapor	2500# L.T., 53
P-351	P-307	P-343, P-346	3/4"	Hydrocarbon Vapor	2500# L.T., 53

LINE LIST - H3B-R1043 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
P-352	NOT USED				
P-353	6037E-301V	P-346	1"	Hydrocarbon Vapor	52
P-354	6037E-302V	P-346	1"	Hydrocarbon Vapor	52
P-355	6037E-303V	P-346	1"	Hydrocarbon Vapor	52
P-356	6037E-304V	P-346	1"	Hydrocarbon Vapor	52
P-357	6037E-305V	P-346	1"	Hydrocarbon Vapor	52

LINE LIST - H3B-R1043 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
N-301	~~Nitrogen Header~~ N-303	P-346	1/2"	Nitrogen	96
N-302	~~Nitrogen Header~~ N-303	P-346	1/2"	Nitrogen	~~96~~
N-303	6047N-936	(Header)	1-1/2"	Nitrogen	96
S-301	Low Pressure Steam Header	Steam Trace Connection	1/2"	Low Pressure Steam	2
L-301	6037E-301B	6037E-301	1/4"	Lubricating Oil	*
L-302	6037E-301B	6037E-301	1/4"	Lubricating Oil	*
L-303	6037E-301B	6037E-301A	1/4"	Lubricating Oil	*
L-304	6037E-301B	6037E-301A	1/4"	Lubricating Oil	*
L-305	6037E-302B	6037E-302	1/4"	Lubricating Oil	*
L-306	6037E-302B	6037E-302	1/4"	Lubricating Oil	*
L-307	6037E-302B	6037E-302A	1/4"	Lubricating Oil	*
L-308	6037E-302B	6037E-302A	1/4"	Lubricating Oil	*
L-309	6037E-303B	6037E-303	1/4"	Lubricating Oil	*
L-310	6037E-303B	6037E-303	1/4"	Lubricating Oil	*
L-311	6037E-303B	6037E-303A	1/4"	Lubricating Oil	*
L-312	6037E-303B	6037E-303A	1/4"	Lubricating Oil	*
L-313	6037E-304B	6037E-304	1/4"	Lubricating Oil	*
L-314	6037E-304B	6037E-304	1/4"	Lubricating Oil	*
L-315	6037E-304B	6037E-304A	1/4"	Lubricating Oil	*
L-316	6037E-304B	6037E-304A	1/4"	Lubricating Oil	*
L-317	6037E-305B	6037E-305	1/4"	Lubricating Oil	*
L-318	6037E-305B	6037E-305	1/4"	Lubricating Oil	*

* 1/4" OD #18 BWG Seamless Copper Tubing light annealed. ASTM Std. B68-46.

LINE LIST - H3D-R1043 (CONT'D)

Number	From	To	Size	Material Handled	Spec.
L-319	6037E-305B	6037E-305A	1/4"	Lubricating Oil	*
L-320	6037E-305B	6037E-305A	1/4"	Lubricating Oil	*
L-321 thru L-340	NOT USED				
L-341	6037E-301	Floor Drain	3/4"	Oil Drainage	1
L-342	6037E-301A	Floor Drain	3/4"	Oil Drainage	1
L-343	6037E-302	Floor Drain	3/4"	Oil Drainage	1
L-344	6037E-302A	Floor Drain	3/4"	Oil Drainage	1
L-345	6037E-303	Floor Drain	3/4"	Oil Drainage	1
L-346	6037E-303A	Floor Drain	3/4"	Oil Drainage	1
L-347	6037E-304	Floor Drain	3/4"	Oil Drainage	1
L-348	6037E-304A	Floor Drain	3/4"	Oil Drainage	1
L-349	6037E-305	Floor Drain	3/4"	Oil Drainage	1
L-350	6037E-305A	Floor Drain	3/4"	Oil Drainage	1
L-351	6037E-315	6037E-315B	3/4"	Hydrocarbon Vapor and Oil	53
L-352	6037E-315B	Drain	1/2"	Oil	1

* 1/4" OD #18 BWG Seamless Copper Tubing light annealed. ASTM Std. B68-46.

LINE LIST

Flow Diagram H3B-N1055

Number	From	To	Size	Material Handled	Spec.
H-301	6037E-317A	6037E-317B	3/4"	Hydraulic Oil	*
H-302	6037E-317B	6037E-317A	3/4"	Hydraulic Oil	*
H-303	6037E-317B	6037E-317D	3/4"	Hydraulic Oil	*
H-304	6037E-317D	6037E-317B	3/4"	Hydraulic Oil	*
H-305	6037E-317C	H-306	1/2"	Hydraulic Oil	*
H-306	6037E-317D and 1/2" H-305	Equipment under Test	1/8" x 1/2"	Hydraulic Oil	**
A-307	Plant Air	6037E-317F	1/2", 1/4"	Air	96 ***

* Use Schedule 160 seamless steel pipe, ASTM Specification A-106, Grade A, with 6,000 lb FS fittings, carbon steel, Vogt or equivalent, seal weld, (do not seal weld valves).

** This line to be installed in accordance with field instructions, using tubing and fittings ~~furnished by C&CCC~~.

*** 1/4" section to be 1/4" OD by 18 BWG copper tubing (Standard K-11), with SAE flared-type fittings.

VALVE LIST

Flow Diagram H3B-R1043

Number	Location	Service	Size	C&CCC No.	
3001	P-301	Shutoff	3/4"	Vogt 1874 (-80°C)	#
3002	P-302	Shutoff	1"	Powell 25031 (-80°C)	*#
3003	P-302	Check	1"	Vogt 1555 (-80°C)	
3004	P-302	Shutoff	3/4"	Vogt 1874 (-80°C)	#
3005	P-301	Shutoff	3/4"	Vogt 1874 (-80°C)	#
3006	P-301	Shutoff	3/4"	Vogt 1874 (-80°C)	#
3007	P-301	Shutoff	1-1/2"	Powell 25031 (-80°C)	*#
3008	P-301	Shutoff	1-1/2"	Powell 25031 (-80°C)	*#
3009	P-301	Shutoff	1-1/2"	Powell 25031 (-80°C)	*#
3010	P-301	Shutoff	1-1/2"	Powell 25031 (-80°C)	*#
3011	P-301	Shutoff	1-1/2"	Powell 25031 (-80°C)	*#
3012 thru 3030 NOT USED					
3031	P-303	Shutoff	1-1/2"	Powell 25031 (-80°C)	*#
3032	P-304	Shutoff	1-1/2"	Powell 25031 (-80°C)	*#
3033	P-305	Shutoff	1-1/2"	Powell 25031 (-80°C)	*#
3034	P-306	Shutoff	1-1/2"	Powell 25031 (-80°C)	*#
3035	P-307	Shutoff	1-1/2"	Powell 25031 (-80°C)	*#
3036 thru 3040 NOT USED					
3041	P-353	Check	1"	212	
3042	P-354	Check	1"	212	
3043	P-355	Check	1"	212	

* These valves to have flanged ends with ring joint facing.

See footnote, page 34.

VALVE LIST - H3B-R1043 (CONT'D)

Number	Location	Service	Size	C&CCC No.	
3044	P-356	Check	1"	212	
3045	P-357	Check	1"	212	
3046 thru 3050 NOT USED					
3051	P-303	Pressure Gauge	3/4"	Vogt 1874 (-80°C)	#
3052	P-304	Pressure Gauge	3/4"	Vogt 1874 (-80°C)	#
3053	P-305	Pressure Gauge	3/4"	Vogt 1874 (-80°C)	#
3054	P-306	Pressure Gauge	3/4"	Vogt 1874 (-80°C)	#
3055	P-307	Pressure Gauge	3/4"	Vogt 1874 (-80°C)	#
3056 thru 3060 NOT USED					
3061	P-323	Check	2"	213	
3062	P-325	Check	2"	213	
3063	P-327	Check	2"	213	
3064	P-329	Check	2"	213	
3065	P-331	Check	2"	213	
3066 thru 3070 NOT USED					
3071	P-324	Check	2"	213	
3072	P-326	Check	2"	213	
3073	P-328	Check	2"	213	
3074	P-330	Check	2"	213	
3075	P-332	Check	2"	213	
3076 thru 3080 NOT USED					
3081	P-343	Shutoff	1-1/2"	24	
3082	P-343	Shutoff	1/2"	55	

See footnote, page 34.

VALVE LIST - H3B-R1043 (CONT'D)

Number	Location	Service	Size	C&CCC No.
3083	P-343	Shutoff	1/2"	55
3084	P-343	Check	4"	209
3085	P-343	Shutoff	4"	20
3086	P-343	Shutoff	4"	20
3087	P-343	Check	4"	209
3088	P-343	Vent	1/2"	55
3089	6037E-351A	Orifice Flange	1/2"	55
3090	6037E-351A	Orifice Flange	1/2"	55
3091	P-308	Check	1"	212
3092	P-309	Check	1"	212
3093	P-310	Check	1"	212
3094	P-311	Check	1"	212
3095	P-312	Check	1"	212
3096 thru 3100 NOT USED				
3101	P-333	Check	1"	212
3102	P-335	Check	1"	212
3103	P-337	Check	1"	212
3104	P-339	Check	1"	212
3105	P-341	Check	1"	212
3106 thru 3110 NOT USED				
3111	P-334	Check	1"	212
3112	P-336	Check	1"	212
3113	P-338	Check	1"	212

VALVE LIST - H3B-R1043 (CONT'D)

Number	Location	Service	Size	C&CCO No.	
3114	P-340	Check	1"	212	
3115	P-342	Check	1"	212	
3116 thru 3120 NOT USED					
3121	P-318	Check	2"	212	
3122	P-318	Vent	1/4"	1	
3123	P-346	Drain	1/2"	1	
3124	P-321	Check	1"	212	
3125	P-320	Check	1"	212	
3126 thru 3140 NOT USED					
3141	P-347	Shutoff	3/4"	Vogt 1874 (-80°C)	#
3142	P-347	Check	3/4"	212	
3143	P-347	Shutoff	3/4"	Vogt 1874 (-80°C)	#
3144	P-347	Check	3/4"	212	
3145	P-348	Shutoff	3/4"	Vogt 1874 (-80°C)	#
3146	P-348	Check	3/4"	212	
3147	P-348	Shutoff	3/4"	Vogt 1874 (-80°C)	#
3148	P-348	Check	3/4"	212	
3149	P-349	Shutoff	3/4"	Vogt 1874 (-80°C)	#
3150	P-349	Check	3/4"	212	
3151	P-349	Shutoff	3/4"	Vogt 1874 (-80°C)	#
3152	P-349	Check	3/4"	212	
3153	P-350	Shutoff	3/4"	Vogt 1874 (-80°C)	#
3154	P-350	Check	3/4"	212	

See footnote, page 34.

VALVE LIST - H3B-R1043 (CONT'D)

Number	Location	Service	Size	C&CCC No.	
3155	P-350	Shutoff	3/4"	Vogt 1874 (-80°C)	#
3156	P-350	Check	3/4"	212	
3157	P-351	Shutoff	3/4"	Vogt 1874 (-80°C)	#
3158	P-351	Check	3/4"	212	
3159	P-351	Shutoff	3/4"	Vogt 1874 (-80°C)	#
3160	P-351	Check	3/4"	212	
3161 thru 3180 NOT USED					
3181	P-343	Shutoff	3"	24	
3182	P-343	Vent	1/2"	55	
3183	P-343	Shutoff	3"	24	
3184	P-301	Shutoff	1"	Powell 25031 (-80°C)	*#
3185	P-301	Vent	3/4"	Vogt 1874 (-80°C)	#
3186	P-301	Shutoff	1"	Powell 25031 (-80°C)	*#
3187	N-301	Shutoff	1/2"	1	
3188	N-302	Shutoff	1/2"	1	
3189 thru 3200 NOT USED					
3201	L-301	Check	1/4"	Manzel No. 877-A	
3202	L-302	Check	1/4"	Manzel No. 877-A	
3203	L-303	Check	1/4"	Manzel No. 877-A	
3204	L-304	Check	1/4"	Manzel No. 877-A	
3205	L-305	Check	1/4"	Manzel No. 877-A	
3206	L-306	Check	1/4"	Manzel No. 877-A	

* These valves to have flanged ends with ring joint facing.

See footnote, page 34.

VALVE LIST - H3B-R1043 (CONT'D)

Number	Location	Service	Size	O&CCC No.
3207	L-307	Check	1/4"	Manzel No. 877-A
3208	L-308	Check	1/4"	Manzel No. 877-A
3209	L-309	Check	1/4"	Manzel No. 877-A
3210	L-310	Check	1/4"	Manzel No. 877-A
3211	L-311	Check	1/4"	Manzel No. 877-A
3212	L-312	Check	1/4"	Manzel No. 877-A
3213	L-313	Check	1/4"	Manzel No. 877-A
3214	L-314	Check	1/4"	Manzel No. 877-A
3215	L-315	Check	1/4"	Manzel No. 877-A
3216	L-316	Check	1/4"	Manzel No. 877-A
3217	L-317	Check	1/4"	Manzel No. 877-A
3218	L-318	Check	1/4"	Manzel No. 877-A
3219	L-319	Check	1/4"	Manzel No. 877-A
3220	L-320	Check	1/4"	Manzel No. 877-A
3221 thru 3238		NOT USED		
3241	L-351	Shutoff	3/4"	55
3242	6037E-315A	Shutoff	1/2"	55
3243	S-301	Shutoff	1/2"	1
3244	P-301	Pressure Gauge	3/4"	Vogt 1874 (-80°C) #
3239	L-351	Shutoff	3/4"	55
3240	L-351	Check	3/4"	212

All valves so marked are to be packed by manufacturer as follows: Two split rings of Garlock 1700 (or equivalent) packing in the bottom of the packing space, followed by split rings of Garlock 733 (or equivalent) used alternately with Garlock 1700 and ending with Garlock 1700. Each packing ring to be covered with a graphite-impregnated grease before packing.

VALVE LIST - H3B-R1043 (CONT'D)

Number	Location	Service	Size	C&CCC No.
3245	N-303	Shutoff	1-1/2"	1
3246	N-303	Pressure Gauge	1/2"	1
3247	N-303	Shutoff	1/2"	1
3248	N-303	Shutoff	1/2"	1
3249	N-303	Shutoff	1/2"	1
3250	N-303	Shutoff	1/2"	1
3251	N-303	Shutoff	1/2"	1
3252	N-303	Shutoff	1/2"	1
3253	N-303	Shutoff	1/2"	1
3254	N-303	Shutoff	1/2"	1
3255	N-303	Shutoff	1/2"	1
3256	N-303	Shutoff	1/2"	1
3257	N-303	Shutoff	1/2"	1
3258	N-303	Shutoff	1/2"	1
3259	N-303	Shutoff	1/2"	1
3260	N-303	Shutoff	1/2"	1
3261	N-303	Shutoff	1/2"	1
3262	N-303	Shutoff	1/2"	1
3263	N-303	Shutoff	1/2"	1
3264	N-303	Shutoff	1/2"	1
3265	N-303	Shutoff	1/2"	1
3266	N-303	Shutoff	1/2"	1
3267	N-303	Shutoff	1/2"	1
3268	N-303	Shutoff	1/2"	1
3269	N-303	Shutoff	1/2"	1
3270	N-303	Shutoff	1/2"	1

VALVE LIST

Flow Diagram H3B-N1055

Number	Location	Service	Size	C&CCC No.
3301	H-301	Pressure Gauge	1/2"	Vogt No. 1503 2
3302	H-303	Pressure Gauge	1/2"	Vogt No. 1503 2
3303	H-305	Pressure Gauge	1/2"	Vogt No. 1333
3304	A-307	Pressure Gauge	1/4"	1
3305	A-307	Pressure Gauge	1/4"	1
3306	A-307	Shutoff	1/2"	1
3307	H-304	Pressure Gauge	1/2"	Vogt No. 1503 2

LIST OF LINES TO BE INSULATED

Flow Diagram H3B-P1043

Number	Size	Temperature, °C	Remarks
P-301	3/4", 1", 3"	-30	
P-302	3/4", 1"	-30	
P-303	3/4", 1-1/2"	-30	
P-304	3/4", 1-1/2"	-30	
P-305	3/4", 1-1/2"	-30	
P-306	3/4", 1-1/2"	-30	
P-307	3/4", 1-1/2"	-30	
S-301	1/2"	---	For safety only
L-351	3/4"	120	Steam trace Insulate for safety only
L-352	1/2"	120	Steam trace Insulate for safety only

1 of 2
6037E-301, -301A thru
-305, -305A
Revised August 4, 1952

SPECIFICATIONS FOR HIGH PRESSURE INTENSIFIER-TYPE PUMPING UNITS

ITEMS 6037E-301, -301A THRU -305, -305A

Ten (10) double-acting high pressure intensifier-type pumping units, each consisting of a central double-acting low pressure power cylinder and auxiliaries, mounted on a base plate in tandem with two high pressure pumping cylinders, one on each end, and a power piston rod supported by crossheads, all in accordance with C&CCC Drawing H3B-R1523.

DESIGN DATA

Stroke	30 inches
Normal operating ram load	144 tons
Maximum operating ram load	168 tons
Normal oil supply pressure	1600 lb per sq in.
Oil cylinder working pressure	2500 lb per sq in.
Maximum speed	20 cycles per minute
Overall length	20 ft - 4-3/4 inches
Overall width	5 ft - 0-5/8 inches
Piston diameter	18 inches
Rod diameter	5-3/4 inches
Materials	As noted on drawings

DRAWINGS

Purchaser shall provide copies of detail and assembly drawings to Manufacturer in quantities sufficient for his use in fabricating and assembling the pumping units. All such copies of drawings remain the property of Purchaser, and shall be returned to Purchaser upon completion of the work.

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.

No parts shall be repaired by welding or brazing without the written approval of the Purchaser or his agent. In the case of repairs to castings which will be subject to pressure stresses, the Purchaser or his agent shall have the right to inspect any such piece prior to the undertaking of repairs, and shall have the privilege of rejecting the casting, if in his opinion the flaw is in a critical location, or if the flaw is considered sufficiently severe to reduce the safety of the piece under maximum operating conditions. If such repair is approved, Purchaser or his agent shall be permitted to witness the repair work.

INSPECTION AND TESTING (CONT'D)

The low pressure power cylinders and the high pressure cylinder cases shall be tested hydrostatically to 4000 lb per square inch. Pumping units shall be assembled at the factory with thorough and complete alignment of the power cylinder and high pressure cylinder cases, and proper adjustment of the crosshead, and shall then be given a running test. No paint shall be applied to the castings until they have been satisfactorily tested and inspected.

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, or regarding repairs outlined above, shall be given.

GUARANTEE

The Manufacturer shall guarantee the equipment furnished by him to be free from all defects in workmanship and/or material, and shall agree to replace at his own expense, fob factory shipping point, any part of the equipment furnished by him proving defective within one year of the date of acceptance, provided that such defect existed at the time of acceptance or was caused by poor workmanship and/or material.

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
6037E-301, -301A thru
-305, -305A
(Spare Parts)
Revised August 4, 1952

SPECIFICATIONS FOR SPARE PARTS

HIGH PRESSURE INTENSIFIER-TYPE PUMPING UNITS

ITEMS 6037E-301, -301A THRU -305, -305A

Following spare parts shall be provided by manufacturer of pumping units specified in "Specifications for High Pressure Intensifier-Type Pumping Units, Items 6037E-301, -301A thru -305, -305A". All conditions of reference specifications, including guarantee, shall apply equally to spare parts listed below:

Part	Drawing Number	Number Required
Power Cylinder	H3B-A1505	1
High Pressure Cylinder Case	H3B-A1506	2
Power Cylinder Flange	H3B-C1508	2
Cylinder Head, Mark A	H3B-B1509	1
Cylinder Head, Mark B	H3B-B1509	1
Stuffing Box Bushing	H3B-B1509	6
Stuffing Box Gland Bushing	H3B-B1509	6
Stuffing Box Gland	H3B-B1509	2
Piston Rod	H3B-C1512	1
Piston Rod Insert	H3B-C1512	2
Piston	H3B-C1512	1
Piston Nut	H3B-C1512	1
Crosshead	H3B-A1513	1
Crosshead Shoe	H3B-A1513	1
Crosshead Shoe Wedge	H3B-A1513	1
Crosshead Flange	H3B-A1513	1
Split Collar	H3B-A1513	6

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
6037E-315*
Revised August 6, 1952

SPECIFICATIONS FOR OIL SEPARATOR

ITEM 6037E-315

One (1) Peerless Manufacturing Company, Type 6A line separator to be fabricated in accordance with this specification and the following design data:

I - DESIGN DATA

Capacity - In accordance with "Specifications for Oil Separator, Item E-315" dated January 14, 1952, and sent with a request for quotation for this item. (R)
Design pressure - 150 psig
Design temperatures, maximum - 500°F
minimum - 32°F
Corrosion allowance - None
Minimum allowable shell and head thickness - 3/8"
Construction - Class B per C&CCC Standard Specifications PVD-101, PVF-101, PVM-100, and PVW-101.
Materials of construction - Per PVF-101, Table 11, Group 1 and the following: (R)

Shell and heads - ASTM A-212, Grade B, firebox quality.
Pipe - None
Welding necks - ASTM A-181, Grade 1

Surface relief, radiography, and magnetic particle inspection not required. To ASME date

To have Code Stamp and National Board Stamp.

II - CONNECTIONS (R)

Nozzle	Size	RP	Type	Facing	Extension from Vessel
Inlet	6"	150 psi	ASA standard welding neck	1/16" RF	6"
Outlet	6"	150 psi	ASA standard welding neck	1/16" RF	6"
Side drain	1-1/2"	300 psi	ASA standard welding neck	1/16" RF	4"
Bottom drain	1-1/2"	300 psi	ASA standard welding neck	1/16" RF	4"

*Was Item E-315.

III - 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.

IV - GUARANTEE

The Manufacturer shall guarantee the separator to operate continuously and satisfactorily in accordance with the specifications contained herein. If the separator fails to meet the guarantee, the Manufacturer agrees to furnish a new separator or redesign the one furnished so that the guaranteed operating conditions will be met without cost to the Purchaser. The Manufacturer shall further guarantee the separator to be free from defects in design, workmanship and/or material and shall agree to replace at his own expense fob factory shipping point any part 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.

V - 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.

VI - EXPEDITING (A)

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

VII - 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 POWER CYLINDER ASSEMBLY AND CROSSHEAD

ITEMS 6037E-317D-1, -317D-2

Item Number	Description
6037E-317D-1	One (1) 12" ID x 12" stroke single ended power cylinder assembly with cylinder heads, piston, ram, and other parts, all as shown on Oil Gear Co. Drawing No. 57688.
6037E-317D-2	One (1) crosshead 8" thick as shown on Oil Gear Co. Drawing No. 47789.

The power cylinder assembly and crosshead are to be connected by tie-rods with spacers and mounted on a base plate, all supplied by the Purchaser. The tie-rod holes in the crosshead and flange shall be sufficiently accurate to allow close alignment on assembling.

DESIGN DATA

Working pressure of cylinder assembly - 3000 psi

Ram should extend 2" from gland 222028 on the back stroke.

MATERIALS

Cylinder and cylinder heads - Cast steel
Crosshead - Alloy steel forging per ASTM Spec. A 243-46 Class M. An alloy steel with same physical properties may be substituted on approval by Purchaser.

DRAWINGS

The Manufacturer shall prepare parts and assembly drawings and shall submit five copies of same for approval before fabrication is started. Eleven copies of certified drawings shall be furnished.

INSPECTION AND TESTING

The Manufacturer shall give the unit a hydrostatic test of 6000 psi and shall assemble it and perform a running test at the factory.

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 a certified hydrostatic test report shall be furnished.

GUARANTEE

The Manufacturer shall guarantee the equipment furnished by him to be free from all defects in design, workmanship, and/or material; and shall agree to replace, at his expense, fob factory shipping point, any part of the equipment furnished by him that proves defective within one year of the date of acceptance, if such defect existed at the time of acceptance or was caused by poor design, workmanship, and/or material.

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 1
6037E-317S
August 4, 1952

SPECIFICATIONS FOR SPECIAL TOOL SET

FOR HIGH PRESSURE TESTING STATION

ITEM 6037E-317S

Tool set to include the following items:

One (1) special wrench for intensifier cylinder assembly, Drawing H3B-C1157.
One (1) set special wrenches for tie-rod nuts, Drawing SK-54284.
One (1) crescent wrench, 8".
One (1) crescent wrench, 10".
One (1) crescent wrench, 12".
One (1) crescent wrench, 15".
One (1) pair channel-lock pliers.
One (1) pair Cornwell slip-joint pliers
One (1) pair Crestoloy long nose pliers, 7" long, No. 1033.
One (1) screw driver, 3-1/2".
One (1) screw driver, 10".
One (1) pipe wrench, 10".
One (1) pipe wrench, 14".
One (1) pipe wrench, 18".
One (1) pipe wrench, 24".
One (1) box end wrench, 1-13/16" x 2".
One (1) box end wrench, 1-1/16" x 1-1/4".
One (1) spud wrench, 1-1/16".
One (1) spud wrench, 1-1/4".
Two (2) spud wrenches, 1-7/16".
Two (2) spud wrenches, 1-5/8".
Two (2) spud wrenches, 1-7/8".
Two (2) spud wrenches, 1-13/16".
Two (2) spud wrenches, 2".
One (1) spud wrench, 2-1/4".

One (1) oil can.
One (1) sledge hammer, 6 lb.
One (1) sledge hammer, 10 lb.
Two (2) ball-pean hammers, Ampco, size H-4.
One (1) Lufkin micrometer, 1".
One (1) Lufkin micrometer, 2"
One (1) set Lufkin small hole gauges #785 (A, B, C, D), range 1/8" to 1/2".
One (1) set Lufkin telescoping gauges #79L, range 5/16" to 6".
One (1) heavy vise, #504-1/2.
One (1) hack saw, hand.
One (1) set Allen wrenches, range 1/16" to 1/2".
One (1) set easy-outs.

Sheet 1 of 2
Special for High Pressure
Testing Station
Revised April 22, 1953

SPECIFICATIONS FOR SPECIAL TUBING AND FITTINGS

FOR HIGH PRESSURE TESTING STATION

(LINE 6037H-306)

Quantity	Item	Specifications or Reference Drawing
300 ft	Tubing, 1/8" x 1/2"	Seamless solid steel tubing to be purchased from Harwood Engineering Company, in accordance with "Specifications for High Pressure Aircraft Quality Alloy Steel Seamless Tubing 1/8" ID x 1/2" OD
6	High Pressure Tee Valves	SK-49470
12	High Pressure Tube Couplings	SK-49471
12	High Pressure Nuts	SK-49472
25	High Pressure Couplings	SK-49473
75	High Pressure Tubing Collars	SK-49474
10	High Pressure Plugs	SK-49475
10	High Pressure Reducer Couplings 3/16" ID to 1/8" ID Tubing	SK-49476
1,000	High Pressure Wave Rings for 1/8" ID Tubing	SK-49477
500	High Pressure Wave Rings for 3/16" ID Tubing	H3B-D1163
2,000	High Pressure Wave Rings for 5/8" ID Tubing	H3B-D1765
3,000	High Pressure Wave Rings for 11/16" ID Tubing	H3B-D1165
1,000	High Pressure Wave Rings for 7/8" ID Tubing	H3B-D1766
500	Double Cones for 1/8" ID Tubing	SK-49478

017193

Special for High Pressure
Testing Station
Revised April 22, [illegible]

Quantity	Item	Specifications or Reference Drawing	
10	Wave Ring Reducers, 3/16" ID to 1/8" ID Tubing	SK-49479	
12	Reducing Fittings, 5/8" ID to 1/8" ID Tubing	H3B-D1767	
10	Reducing Fittings, 11/16" ID to 1/8" ID Tubing	H3B-D1167	(R)
10	Reducing Fittings, 7/8" ID to 1/8" ID Tubing	H3B-D1768	(R)
20	High Pressure Elbows, 1/8" ID Tubing	SK-54292	
10	High Pressure Tees, 1/8" ID Tubing	SK-54293	
100	5/32" diameter Hoover Ball and Bearing Company Chrome Alloy No. 1 Grade Steel Balls	(For use with High Pressure Tee Valves)	(R)
6	Discharge Adapters for High Pressure Tee Valve	H3B-D1028	(R)
6	Suction Adapters for High Pressure Tee Valve	H3B-D1029	(R)
100	Wave Rings for High Pressure Tee Valves	SK-54295	(R)

CARBIDE AND CARBON CHEMICALS COMPANY

A DIVISION OF UNION CARBIDE AND CARBON CORPORATION

SOUTH CHARLESTON, WEST VIRGINIA

SPECIFICATIONS FOR HIGH PRESSURE AIRCRAFT QUALITY ALLOY STEEL SEAMLESS TUBING 1/8" ID x 1/2" OD

I. SCOPE

These specifications cover heavy wall seamless tubes produced from aircraft quality 4130 steel for high pressure service. Because of the nature of the service conditions, the bore must be as free from all defects and slight surface irregularities as possible.

II. PROCESS

The steel shall be made by the electric-arc-furnace process, or other processes approved by the purchaser.

III. CHEMICAL COMPOSITION

(a) The steel shall conform to the requirements as to chemical composition prescribed in Table I.

(b) The manufacturer shall submit a report showing the ladle analysis of each heat of steel from which the tubes have been made.

Table I

Chemical Requirements

Carbon	.28/.33
Manganese	.40/.60
Phosphorus	.040 maximum
Sulphur	.040 maximum
Silicon	.20/.35
Chromium	.80/1.10
Molybdenum	.15/.25

IV. TENSILE PROPERTIES

The material shall conform to the following requirements as to tensile properties at room temperature:

Yield Strength (90.2% set) - 150,000 psi minimum
Elongation in 2 inches - 15%, minimum

V. DIMENSIONAL TOLERANCES

The tubes shall be produced to the following tolerances:

(a) OD - plus 0.020", minus 0.000"
(b) Wall - plus or minus 5 percent
(c) Length - shall be specified on the Purchase Order.

VI. FINISH

(a) Finished tubes shall be reasonably straight. They shall be free from injurious defects and have a workmanlike finish.

(b) The finished tubes shall be thoroughly and completely coated inside and out with a rust prevention type coating to protect finish during shipment and subsequent storage.

VII. INSPECTION

An inspector, representing the purchaser, shall have free entry at all times while work on the contract of the purchaser is being performed to all parts of the manufacturer's plant that concerns the manufacture of the material ordered.

VIII. HYDROSTATIC TEST

The tubing shall be satisfactorily pressure tested to 120,000 psi by the Vendor.

IX. CERTIFICATION

Unless otherwise specified, three (3) copies of certified chemical, physical, and hydrostatic tests shall be furnished the purchaser.

X. REJECTION

All tubes failing to comply with this specification, or to authorized modifications, may be rejected at destination, and shall be held a reasonable length of time for investigation and disposition by the manufacturer.

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.			

017197

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. 2

Revised July 25, 1951

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

PIPING

Item		Size, incl.	Specification
Construction		To 2½"	Screwed.
		3" to 30"	Welded and flanged.
Pipe	- Material	To 1½"	Steel: ASTM A-53, Grade A, butt-welded.
		2" to 30"	Steel: ASTM A-106 Grade A, seamless.
	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.
	Elbows, stub ends etc.	3" to 30"	Steel: butt-welding, seamless, to match pipe. (2)
	Tees	3" to 30"	Shop fabricated from pipe; reinforced if necessary.
	Unions	To 2½"	Petro or equal.
Flanges	- Type	To 2½"	Cast iron: ASA 125 lb., screwed.
		3" to 30"	Forged Steel: ASA 150 lb., slip-on or lap-joint type.
	Facing	To 30"	Manufacturer's standard.
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.	Garbide 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-56	Crane 47XR	CS	(3)	Flanged
Control	¼" to 2½"	GL-104	Lunk. 1021	CI	NA	Screwed
	3" to 12"	GL-102	Lunk. 1123	CI	Br	Flanged
Angle	¼" to 2"	AGL-569	Lunk. 1022P	CI	NA	Screwed
Check	¼" to 2½"	CK-210	Lunk. 554	Br	Br	Screwed
	3" to 16"	CK-204	Crane 373	CI	Br	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 117 or equal.			
	4" up		Garlock 150 or equal.			

Notes: (1) Pressure and temperature ratings are reduced for valves in sizes over 12"; refer to manufacturer's catalog.
(2) 30" fittings may be shop fabricated from pipe.
(3) Nickel alloy seat, 11-13 Cr steel disk.

VALVE AND PIPING SPECIFICATION

NO. 5

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 ¾"	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 117 or equal.			
	4" up		Garlock 150 or equal.			

NO. 52

VALVE AND PIPING SPECIFICATION

(For Warm Temperature Service)

Revised July 25, 1951

Maximum Pressure: 75 psi
Temperature Range: 32°F to 392°F
0°C to 200°C

PIPING

Item		Size, incl.	Specification
Construction (1)		To 1"	Screwed and seal welded, or welded. (Do not seal weld valves.)
		1½"	Welded, except valves have screwed ends.
		2" to 24"	Welded and flanged.
Pipe -	Material	To 1½"	Steel: ASTM A-53, Grade A, butt-welded.
		2" to 24"	Steel: ASTM A-106, Grade A, seamless.
	Thickness	To 3"	Schedule 80.
		4" to 10"	Schedule 40.
		12"	Schedule 30.
		14" to 24"	Schedule 20.
Fittings -	Elbows, Tees, etc.	To 1"	Forged steel: 2000 lb. (min.), socket-welding.(2)
	Unions	To 1"	Forged steel: 2000 lb. (min.), Petro or equal.
	Elbows, stub ends, etc.	1½" to 24"	Steel: butt-welding, seamless, ASTM A-234-WPA, to match pipe.
	Tees, etc.	1½" to 24"	Shop fabricated from pipe; reinforced if necessary. Or butt-welding seamless steel fittings as above.
	Couplings welded into lines	1½" to 2½"	Forged steel: ¾" 2000 lb. (min.), or "Threadolet."
		3" to 24"	Forged steel: 1" 2000 lb. (min.), or "Threadolet."
Flanges -	Type	1½" to 24"	Forged steel: ASA 150 lb., slip-on or lap-joint type. (2)
	Facing	To 24"	Manufacturer's standard.
Orifice Flanges -	Type	To 12"	Forged steel: ASA 300 lb., screwed. (2)
		14" to 24"	Forged steel: ASA 150 lb., screwed. (2)
	Facing	-	Manufacturer's standard.
Gaskets		-	U.S. No. 4899 or equal; 1/16" thick.
Dope -	Threads	-	Shellac (screwed valves only).
	Gaskets	-	Graphite and oil.
Bolt Studs and Nuts		-	Alloy steel, Carbide Spec. PVM-100, Class I.

VALVE AND PIPING SPECIFICATION

NO. 53

(For Warm Temperature Service)

Revised July 25, 1951

Maximum Pressure: 150 psi
Temperature Range: 32°F to 392°F
0°C to 200°C

PIPING

Item		Size, incl.	Specification
Construction (1)		To 1"	Screwed and seal welded, or welded. (Do not seal weld valves.)
		1½" to 24"	Welded and flanged.
Pipe -	Material	To 1½"	Steel: ASTM A-53, Grade A, butt-welded.
		2" to 24"	Steel: ASTM A-106, Grade A, seamless.
	Thickness	¼" to 3"	Schedule 80.
		4" to 10"	Schedule 40.
		12"	Schedule 30.
		14" to 24"	Schedule 20.
Fittings -	Elbows, Tees, etc.	To 1"	Forged steel: 2000 lb. (min.), socket-welding. (2)
	Unions	¼" to ⅜"	Forged steel: 2000 lb. (min.), Petro or equal.
	Elbows, stub ends, nipples, etc.	1½" to 24"	Steel: butt-welding, seamless, ASTM A-234-WPA, to match pipe.
	Tees, etc.	1½" to 24"	Shop fabricated from pipe; reinforced if necessary. Or butt-welding seamless steel fittings as above.
	Couplings welded into lines	1½" to 2½"	Forged steel: ¾" 2000 lb. (min.), or "Threadolet."
		3" to 24"	Forged steel: 1" 2000 lb. (min.), or "Threadolet."
Flanges -	Type	½" to 1"	Forged steel: ASA 300 lb., screwed. (2)
		1½" to 3"	Forged steel: ASA 300 lb., welding-neck or lap-joint type. (2)
		4" to 24"	Forged steel: ASA 150 lb., slip-on or lap-joint type. (2)
	Facing	To 24"	Manufacturer's standard.
Orifice Flanges - Type		To 12"	Forged steel: ASA 300 lb., screwed. (2)
		14" to 24"	Forged steel: ASA 150 lb., screwed. (2)
	Facing	-	Manufacturer's standard.
Gaskets		-	U.S. No. 4899 or equal; 1/16" thick.
Dope -	Threads	-	Shellac (screwed valves only).
	Gaskets	-	Graphite and oil.
Bolt Studs and Nuts		-	Alloy steel, Carbide Spec. PVM-100, Class 1.

VALVE AND PIPING SPECIFICATION

NO. 54

(For Warm Temperature Service)

Revised July 25, 1951

Maximum Pressure: 300 psi
Temperature Range: 32°F to 392°F
0°C to 200°C

PIPING

Item		Size, incl.	Specification
Construction (1)		To 1"	Screwed and seal-welded, or welded. (Do not seal-weld valves.)
		1½" to 12"	Welded and flanged.
Pipe -	Material	To 1½"	Steel: ASTM A-53, Grade A, butt-welded.
		2" to 12"	Steel: ASTM A-106, Grade A, seamless.
	Thickness	¼" to 3"	Schedule 80.
		3½" to 10"	Schedule 40.
		12"	Schedule 30.
Fittings -	Elbows, Tees, etc.	To ¾"	Forged steel: 2000 lb. (min.), socket-welding. (2)
	Unions	¼" to ⅛"	Forged steel: 2000 lb. (min.), Petro or equal. (For instrument piping only.)
	Elbows, stub ends, etc.	1½" to 12"	Steel: butt-welding seamless, ASTM Spec. A-234-WPA, to match pipe.
	Tees, etc.	1½" to 12"	Shop fabricated from pipe; reinforced if necessary. Or butt-welding seamless steel fittings as above.
	Couplings welded into lines	1½" to 2½"	Forged steel: ¾" 2000 lb. (min.), or "Threadolet."
		3" to 12"	Forged steel: 1", 2000 lb. (min.), or "Threadolet."
Flanges -	Type	½" to 1"	Forged steel: ASA 300 lb., screwed. (2)
		1½" to 12"	Forged steel: ASA 300 lb., lap-joint type or welding-neck. (2)
	Facing	½" to 12"	Manufacturer's standard.
Orifice Flanges -	Type	½" to 12"	Forged steel: ASA 300 lb., screwed. (2)
	Facing	-	Manufacturer's standard.
Gaskets		-	U.S. No. 4899 or equal; 1/16" thick.
Dope -	Threads	-	Shellac (on screwed valves only).
	Gaskets	-	Graphite and oil.
Bolt Studs and Nuts		-	Alloy steel, Carbide Spec. PVM-100, Class I.

Sheet 1 of 2
Revised October 27, 1952
"2500 # L.T." of 930-6037

PIPING SPECIFICATIONS

FOR LOW TEMPERATURE SERVICE

Operating Temperature Range	0°C to -100°C
Maximum Pressure	2500 psi
Maximum Temperature	Plus 200°C (392°F)
Minimum Temperature	Minus 100°C (-148°F)
Pipe, Fittings and Flanges	3/4" - 3" - Chromium-Copper-Nickel Steel*

* Where less than minimum mill runs are required for any one size, equivalent Type 304 Stainless Steel pipe, (per ASTM Spec. A-156, Grade P8a), fittings, and flanges, (per ASTM Spec. A-182, Grade F8), may be substituted.

PIPING

Item	Sizes (Incl.)	Specifications
Pipe	Where 1/4" nozzles are required (lubricators, etc.) use 3/16" I.D. x 9/16" O.D. tubing per Special High Pressure Tubing Specification and machine 1/4" pipe threads with lathe.	
	3/4" to 3"	Schedule 160 Cr-Cu-Ni seamless steel pipe per Standard Spec. PVM-103.
Construction	3/4"	Socket weld fittings, seal weld flanges. Do not seal weld screwed valves.
	1" to 3"	Welded and flanged in accordance with Standard Spec. P-227.
Pipe Fittings	3/4"	Elbows and tees to be Cr-Cu-Ni steel socket welding fittings for Schedule 160 pipe per Standard Spec. PVM-103.
	1" to 3"	Elbows and reducers shall be Schedule 160 Cr-Cu-Ni seamless steel welding fittings per Standard Spec. PVM-103. Tees and laterals shall be shop fabricated from pipe specified above, reinforced for strength if necessary; or Schedule 160 Cr-Cu-Ni seamless steel welding fittings per Standard Spec. PVM-103.

Item	Sizes (Incl.)	Specifications
Couplings Welded into Pipe	1-1/2" to 3"	3/4" 3,000 lb Cr-Cu-Ni steel coupling with outside end reduced to required pipe size.
Flanges	3/4"	2,500 lb ASA screwed companion forged Cr-Cu-Ni steel flanges as per Standard Spec. PVM-103
	1" to 3"	2,500 lb ASA welding neck forged Cr-Cu-Ni steel flanges per Standard Spec. PVM-103
Flange Facing	All	Ring joint facing (ASA-B16e-1939)
Gaskets	All	Soft Armco iron rings
Valve Stem+ Packing	All	Two split rings of Garlock 1700 (or equal) packing in the bottom of the packing space, followed by split rings of Garlock 733 (or equal) alternating with Garlock 1700 and ending with Garlock 1700. Each packing ring to be covered with a graphite impregnated grease before packing. (R)
Studs and Nuts	All	Bolts shall be alloy steel studs ASTM Spec. A320, Grade L7, with two hex nuts each and threaded full length in accordance with Standard Spec. PVM-100, Class IV.
Welding Rod	—	Type 304 stainless steel for stainless steel pipe and fittings, 25-20 Cr-Ni for Cr-Cu-Ni pipe and fittings.

VALVES*

Service	Sizes (Incl.)	Make	Fig. No.	Flg. or Scr.
Shutoff or Control	3/4"	*	*	Screwed
	1" to 3"	*	*	Flanged
Check	3/4"	*	*	Screwed
	1" to 3"	*	*	Flanged
Safety	3/4" to 1"	Crosby	JMB-s	Screwed

*Valves to be furnished in accordance with "Valve Specifications for Low Temperature Service".
+The Manufacturer shall furnish this special packing on all valves supplied under this specification. (R)

MACHINED TUBING AND MISCELLANEOUS HIGH PRESSURE FITTING SPECIFICATIONS AND ASSEMBLY DRAWINGS

All items of high pressure tubing and fittings listed in this specification are to be pressure tested at the installation site under the direction of an authorized member of the C&CCC Operating Department.

Item	Sizes	Specification
Tubing	3/16" ID x 9/16" OD	To be purchased from the Harwood Engineering Company, Walpole, Massachusetts, in accordance with "Specifications for Small-Bore Alloy Steel Seamless High Pressure Tubing," revised October 28, 1952.
	1/2" ID x 1-1/2" OD 5/8" ID x 1-7/8" OD 11/16" ID x 1-7/8" OD 7/8" ID x 2-1/4" OD	To be purchased from Timken Roller Bearing Company, Canton, Ohio, in accordance with "Specifications for High Pressure Aircraft Quality Alloy Steel Seamless Tubing," revised October 28, 1952.

Item	Size	Description	Drawing No.
Tube ends -	3/16" ID x 9/16" OD	To be machined per	SK-43001
	1/2" ID x 1-1/2" OD	To be machined per	SK-43002
	1/2" ID x 1-1/2" OD	(32° ring seat) to be machined per	SK-43002A
	5/8" ID x 1-7/8" OD	To be machined per	H3B-D1543
	5/8" ID x 1-7/8" OD	(32° ring seat) to be machined per	H3B-D1544
Tube ends (Reactor tubes only) -			
	1/2" ID x 1-1/2" OD	To be machined per	SK-49706
	5/8" ID x 1-7/8" OD	To be machined per	SK-43003
	11/16" ID x 1-7/8" OD	To be machined per	SK-49691
	7/8" ID x 2-1/4" OD	To be machined per	H3B-D1531
High Pressure Connections -			
	3/16" ID x 9/16" OD	Assembly of connection - tubing to tubing	SK-47274
		Assembly of connection - tubing to fitting	SK-43007
		Coupling, tubing to tubing	SK-47272
		Coupling nut, tubing to tubing	SK-47273
		Coupling, tubing to fitting	SK-43008
		Collar	SK-43009

Item	Sizes	Description	Drawing No.
High Pressure Connections (Cont'd) -			
	1/2" ID x 1-1/2" OD	Assembly of connection, tubing to tubing	SK-43012
		Assembly of connection, tubing to tubing - 32° ring joint	H3B-C1063
		Assembly of connection, tubing to tubing - (in reactor)	SK-49695
		Assembly of connection, tubing to elbow or tee	SK-43025
	5/8" ID x 1-7/8" OD	Assembly of connection, tubing to tubing	H3B-C1555
		Assembly of connection, 5/8" ID tubing to tubing - 32° ring joint	H3B-C1556
		Assembly of connection, tubing to elbow or tee	H3B-C1557
	11/16" ID x 1-7/8" OD	Assembly of connection, tubing to tubing	SK-49697
		Assembly of connection, 11/16" ID to 1/2" ID reducing joint	SK-49698

Item	Sizes	Description	Drawing No.
High Pressure Connections (Cont'd) -			
	7/8" ID x 2-1/4" OD	Assembly of connection, tubing to tubing - (in reactor)	H3B-B1728
		Assembly of connection, 7/8" ID to 11/16" ID reducing joint (in reactor)	H3B-B1729
		Assembly of connection, 7/8" ID to 5/8" ID reducing joint (in reactor)	H3B-B1730
		Assembly of connection, 7/8" ID x 11/16" ID x 11/16" ID tee in reactor	H3B-B1763
Elbows -	3/16" ID x 9/16" OD	90° elbow	SK-43010
	1/2" ID x 1-1/2" OD	90° elbow	SK-43014
	5/8" ID x 1-7/8" OD	90° elbow	H3B-C1552
	1/2" ID x 3/16" ID	Reducing 90° elbow	SK-43022
	5/8" ID x 3/16" ID	Reducing 90° elbow	H3B-C1554
Tees -	1/2" ID x 1-1/2" OD	Tee	SK-43015
	5/8" ID x 1-7/8" OD	Tee	H3B-C1553
	7/8" ID x 11/16" ID x 11/16" ID	Tee for reactor	H3B-C1731

Item	Sizes	Description	Drawing No.
Reducing fittings -			
	1/2" ID to 3/16" ID	Reducing fitting	SK-43018
	5/8" ID to 3/16" ID	Reducing fitting	H3B-D1547
	11/16" ID x 1/2" ID	Reducing fitting	SK-49705
	11/16" ID x 11/16" ID	Dummy reducing fitting	SK-49710
	7/8" ID x 5/8" ID	Reducing fitting (reactor)	H3B-D1732
	7/8" ID x 11/16" ID	Reducing fitting (reactor)	H3B-D1733
	7/8" ID x 1/2" ID	Reducing fitting	H3B-D1533
	7/8" ID x 7/8" ID	Dummy reducing fitting	H3B-D1534
Flanges	1/2" ID x 1-1/2" OD	Tubing flange	SK-43013
		Tubing flange - thermocouple type	SK-43013A
		Flange, 1/2" elbow or tee	SK-43016
		Reactor flange	SK-49696
	5/8" ID x 1-7/8" OD	Tubing flange	H3B-C1549
		Tubing flange - thermocouple type	H3B-C1550
		Flange for elbow or tee	H3B-C1551
	11/16" ID x 1-7/8" OD	Reactor flange	SK-43021
	7/8" ID x 2-1/4" OD	Reactor flange	H3B-C1527

Item	Sizes	Description	Drawing No.
Gaskets -	3/16" ID x 9/16" OD	Ring	SK-43004
	1/2" ID x 1-1/2" OD	Ring	SK-43005
		32° ring	SK-43005A
		Reactor ring	SK-49704
	5/8" ID x 1-7/8" OD	Ring	H3B-D1545
		Ring (reactor)	SK-43006
		32° ring	H3B-D1546
	11/16" ID x 1-7/8" OD	Reactor ring	SK-49699
	7/8" ID x 2-1/4" OD	Reactor ring	H3B-D1532
Washers -	1/2" ID x 1-1/2" OD	Washer (reactor)	SK-43019
	5/8" ID x 1-7/8" OD	" "	"
	11/16" ID x 1-7/8" OD	" "	"
	7/8" ID x 2-1/4" OD	" "	"
Plugs -	3/16" ID x 9/16" OD	Plug	SK-43011
	1/2" ID x 1-1/2" OD	Plug	SK-43017
	5/8" ID x 1-7/8" OD	Plug	H3B-D1548

CARBIDE AND CARBON CHEMICALS COMPANY

UNION CARBIDE AND CARBON CORPORATION

SOUTH CHARLESTON, WEST VIRGINIA

SPECIFICATIONS FOR SMALL BORE ALLOY STEEL SEAMLESS HIGH PRESSURE TUBING 3/16" ID x 9/16" OD

I. SCOPE

(a) These specifications cover heavy wall seamless composite tubes for high pressure service produced from aircraft quality 4130 steel with a Type 316 stainless steel core. Because of the nature of the service conditions, the bore must be as free from all defects and slight surface irregularities as possible.

(b) The tubes covered by these specifications are composite tubes with a 9/16" x 3/8" shroud over a 3/8" x 3/16" tube.

II. PROCESS

The steel shall be made by the electric-arc-furnace process, or other processes approved by the Purchaser.

III. CHEMICAL COMPOSITION

(a) The steel shall conform to the requirements as to chemical composition prescribed in Table I.

(b) The Manufacturer shall submit a report showing the ladle analysis of each heat of steel from which these tubes have been made.

TABLE I
CHEMICAL REQUIREMENTS

	SAE 4130	TYPE 316 STAINLESS
Carbon	.28/.33	.10 maximum
Manganese	.40/.60	2.00 maximum
Phosphorous	.040 max.	.040 maximum
Sulphur	.040 max.	.040 maximum
Silicon	.20/.35	0.75 maximum
Chromium	.80/1.10	16.00/18.00
Nickel	-	10.00/14.00
Molybdenum	.15/.25	2.00/3.00

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IV. TENSILE PROPERTIES

The shroud and core material shall conform to the following minimum requirements as to tensile properties at room temperature:

Yield strength (0.2% set) - 80,000 psi minimum; 90,000 psi maximum
Elongation in 2 inches - 15% minimum

A report of the tensile properties shall be submitted by the Manufacturer.

V. DIMENSIONAL TOLERANCES

The tubes shall be produced to the following tolerances:

(a) OD - plus 0.020", minus 0.000"
(b) Wall - plus or minus 5 percent
(c) Length - 12 ft minimum random lengths
(d) Straightness - the finished tubes shall be reasonably straight

VI. HYDROSTATIC TEST

The tubing shall be satisfactorily pressure tested to 90,000 psi by the Vendor.

VII. FINISH

(a) Finished tubes shall be reasonably straight. They shall be free from injurious defects, and have a workmanlike finish.
(b) The finished tubes shall be protected by some means prior to shipment to prevent rusting during shipment and subsequent storage.

VIII. INSPECTION

The Purchaser, or his agent, shall have free access, at all times when work on the contract of the Purchaser is being performed, to all parts of the Manufacturer's plant that concerns the manufacture of the material ordered.

IX. CERTIFICATION

Unless otherwise specified three (3) copies of certified test reports of the chemical, physical, and hydrostatic tests shall be furnished to the Purchaser.

X. REJECTION

All tubes failing to comply to this specification, or to authorized modifications, may be rejected at destination and shall be held a reasonable length of time for investigation and disposition by the Manufacturer.

CARBIDE AND CARBON CHEMICALS COMPANY

UNION CARBIDE AND CARBON CORPORATION

SOUTH CHARLESTON, WEST VIRGINIA

SPECIFICATIONS FOR HIGH PRESSURE AIRCRAFT QUALITY ALLOY STEEL SEAMLESS TUBING 15/16" OD TO 2-1/4" OD

1. SCOPE

(a) These specifications cover heavy wall seamless tubes produced from aircraft quality 4135 steel for high pressure service. Because of the nature of the service conditions, the bore must be as free from all defects and slight surface irregularities as possible.

(b) The tubes covered by these specifications have the following corresponding inside and outside diameters:

Inside Diameter	Outside Diameter
5/16"	15/16"
1/2"	1-1/2"
5/8"	1-7/8"
11/16"	1-7/8"
3/4"	2-1/4"
7/8"	2-1/4"

2. PROCESS

The steel shall be made by the electric-arc-furnace process, or other processes approved by the purchaser.

3. MANUFACTURE

(a) Tubes shall be made by the seamless process and shall be processed at the Timken Wooster Mill to provide smoother crack-free bore.

(b) The tubes shall be then bored, the ID surface highly finished and cold worked by compression, as in Rotorolling, to the desired size.

(c) The finished processed tubes shall be mechanically straightened prior to shipment.

4. HEAT TREATMENT

The cold worked tubes shall be tempered to the desired physical properties at a sufficiently low temperature to hold scale formation to a minimum, so as to eliminate the necessity for pickling and thus decrease the possibility of irregularities on the ID surface.

5. CHEMICAL COMPOSITION

(a) The steel shall conform to the requirements as to chemical composition prescribed in Table I.

(b) The manufacturer shall submit a report showing the ladle analysis of each heat of steel from which the tubes have been made.

Table I

Chemical Requirements

Carbon	.33/.38
Manganese	.70/.90
Phosphorus	.025 Max.
Sulphur	.025 Max.
Silicon	.20/.35
Chromium	.80/1.10
Molybdenum	.18/.25

6. CHECK ANALYSIS

(a) An analysis shall be made by the manufacturer on a sample of the finished tubing selected at random. Drillings for analysis shall be taken from several points around the tube.

(b) The analysis shall conform to the requirements of Table I, within the AISI permissible variations for check analyses.

7. TENSILE PROPERTIES

The material shall conform to the following requirements as to tensile properties at room temperature:

Yield Strength (0.2% set) - 100,000/125,000 psi min.
Elongation in 2 inches - 15%, minimum

8. MAGNAFLUX TESTS

Samples of the finished tubes shall be magnaflux tested to determine steel quality.

9. MAGNETIC TESTS

The finished tubes are to be magnetic tested, and any showing an indication of a crack shall be discarded.

10. MICROSCOPIC EXAMINATION

The cross-section at the bore of specimens cut from three random tubes, shall be examined at a magnification of 50 diameters. Photomicrographs showing the worst condition at the bore shall be submitted to the purchaser.

11. DIMENSIONAL TOLERANCES

The tubes shall be produced to the following tolerances:

(a) OD - plus 0.020", minus 0.000"
(b) Wall - plus or minus 5 percent
(c) Length - shall be specified on the Purchase Order.

12. NUMBER OF TESTS

(a) Tensile tests - From each heat treated lot of 100 finished tubes, or fraction thereof, two tubes per heat shall be selected at random for the tension test specified in Section 7.

(b) Magnaflux test - Samples 12" in length, taken from 3 tubes selected at random, shall be subjected to the magnaflux test specified in Section 8.

(c) Magnetic test - All the finished tubes shall be subjected to the magnetic test of Section 9.

(d) Microscopic examination - Samples, taken from 3 tubes selected at random, shall be subjected to the microscopic examination of Section 10.

13. RETESTS

If the results of the chemical or mechanical tests do not conform to the requirements specified, retests may be made on tubes of double the original number from the same lot, each of which shall conform to the requirements specified.

14. REHEAT TREAT

If individual tubes, or tubes selected to represent any lot, fail to conform to the test requirements, the tubes or lot represented may be retested and resubmitted for test. Only two reheat treatments will be permitted.

15. FINISH

(a) Finished tubes shall be reasonably straight and have smooth ends free from burrs. They shall be free from injurious defects and have a workmanlike finish.

15. FINISH (CONT'D)

(b) The finished tubes shall be scale free. The surface discoloration produced by heat treatment as specified in Section 4, shall not be considered as scale.

(c) The finished tubes shall be thoroughly and completely coated inside and out with a rust prevention type coating to protect finish during shipment and subsequent storage. This shall be done by dipping the tubes in petrolatum.

16. INSPECTION

An inspector, representing the purchaser, shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's plant that concerns the manufacture of the material ordered.

17. CERTIFICATION

Unless otherwise specified, three (3) copies of certified chemical and physical test reports, including the microstructures of Section 10, shall be furnished the purchaser.

18. REJECTION

All tubes failing to comply with this specification, or to authorized modifications, may be rejected at destination, and shall be held a reasonable length of time for investigation and disposition by the manufacturer.

Sheet 1 of 1
Revised April 22, 1953

SPECIFICATIONS FOR PRESSURE LEADS TO

0 - 5,000 LB PRESSURE GAUGES

Gauge leads to consist of 5/16" x 9/16" type 303 stainless steel tubing (R)
as furnished by Autoclave Engineers, Incorporated. Construction
shall be as follows:

1) Couplings to be Autoclave Engineers, Inc., Catalog No. 2-EEX. (R)

2) Elbows to be constructed by bending tubing on 4" minimum radius.

3) Gauge connectors to be Autoclave Engineers, Inc., Catalog No. 2-EK special*. (R)

4) Pipe adapters to be Autoclave Engineers, Inc., Catalog No. 3-EV1X. (R)

5) Shutoff valves to be Autoclave Engineers, Inc., two-way straight valve, Catalog No. 1L-E1. (R)

*With bore for 5/16" ID tubing.

am

W.P. 6047
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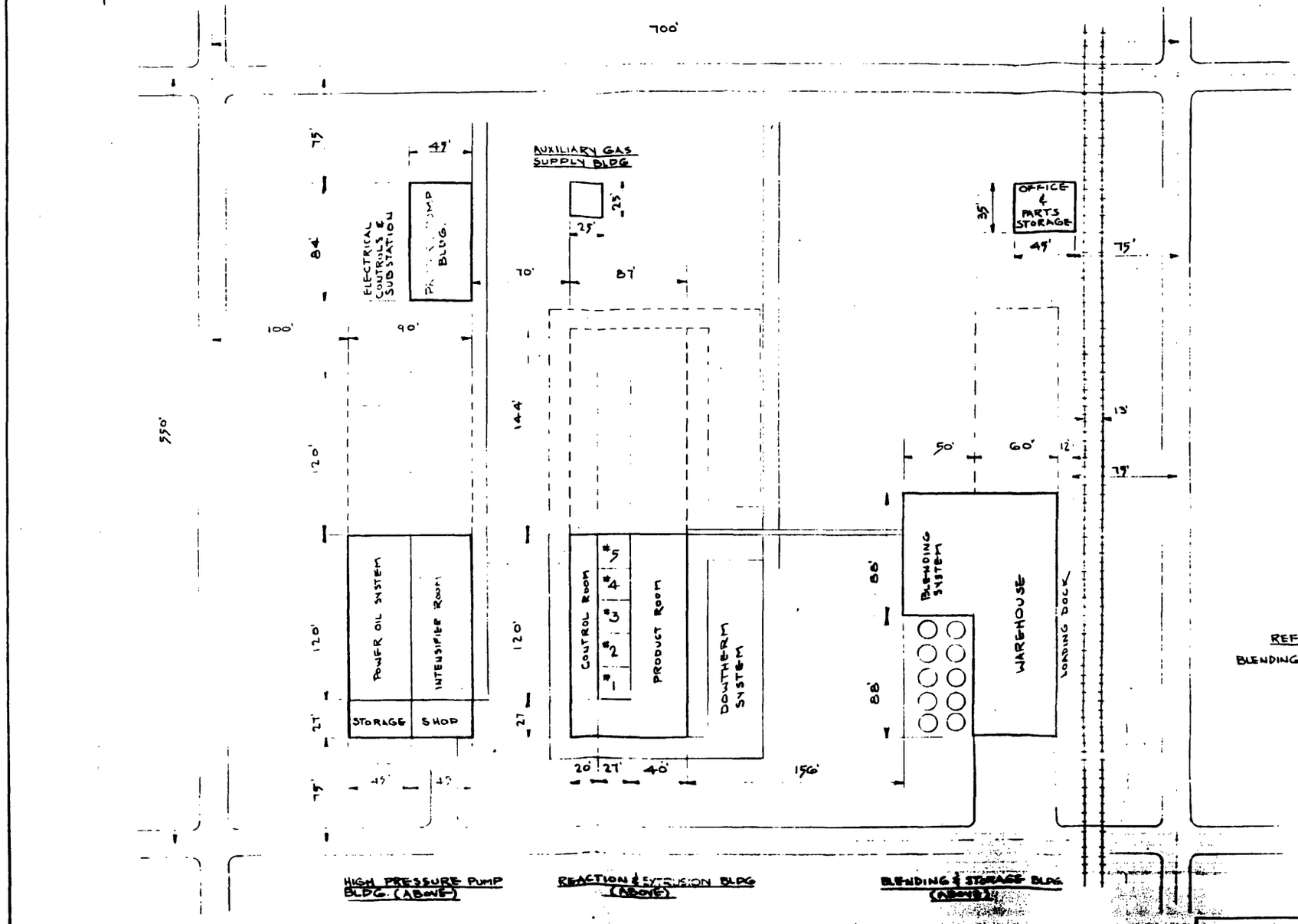

REFERENCE DRAWINGS
BLENDING & STORAGE BLDG. AREA
H3B-B-1484

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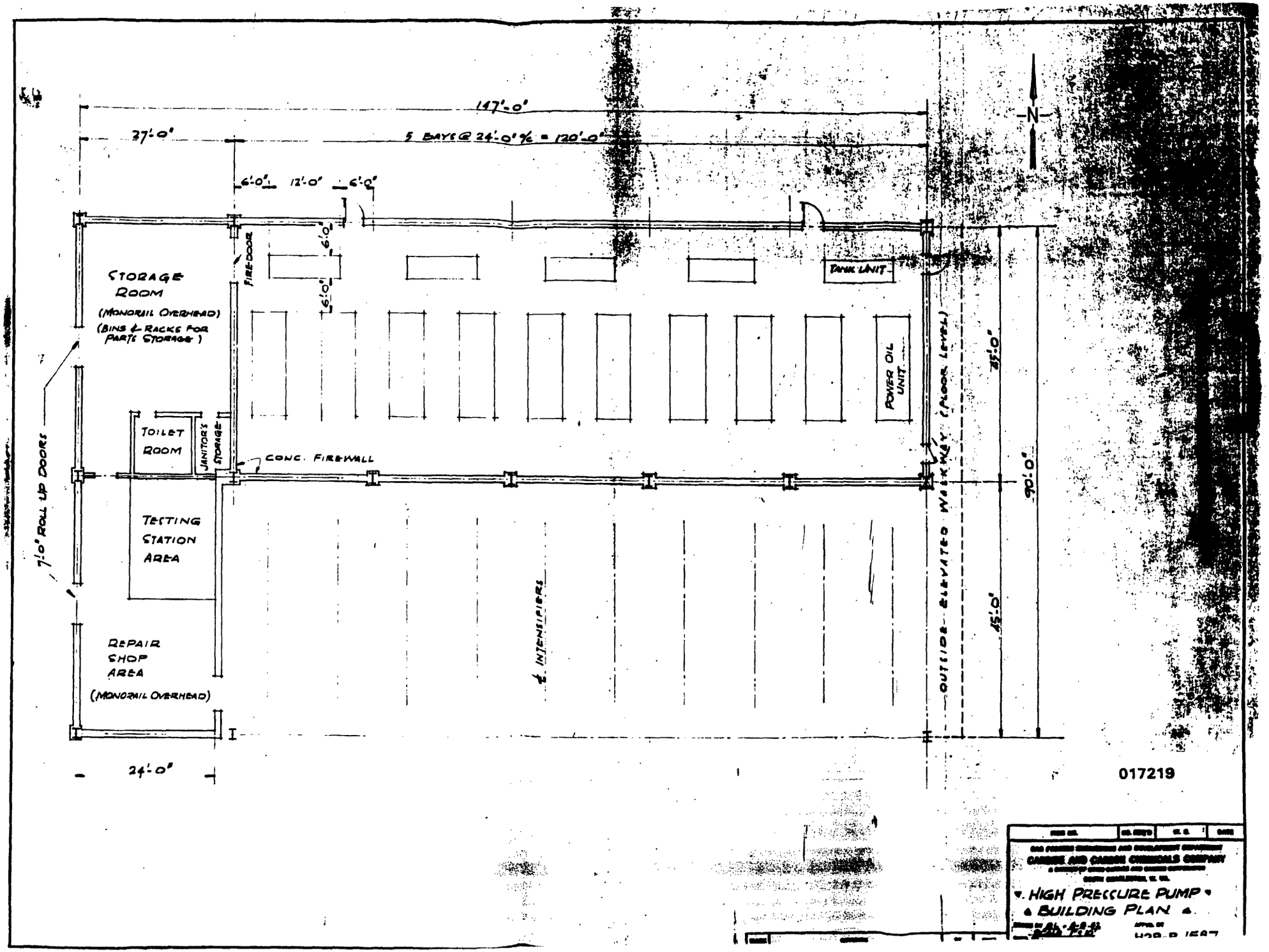
DOW CHEMICAL AND DOWBRAND CHEMICALS COMPANY
POLYETHYLENE PLOT PLAN
SHADRIFT
GENERAL REVISION
H3B-B-1358-1


147'-0"
27'-0"
5 BAYS @ 24'-0" = 120'-0"
6'-0"
12'-0"
6'-0"
6'-0"
6'-0"
FIRE DOOR
STORAGE ROOM
(MONORAIL OVERHEAD)
(BINS & RACKS FOR PARTS STORAGE)
TANK UNIT
POWER OIL UNIT
TOILET ROOM
JANITOR'S STORAGE
CONC. FIREWALL
7'-0" ROLL UP DOORS
TESTING STATION AREA
REPAIR SHOP AREA
(MONORAIL OVERHEAD)
INTENSIFIERS
OUTSIDE ELEVATED WALKWAY (FLOOR LEVEL)
45'-0"
90'-0"
24'-0"
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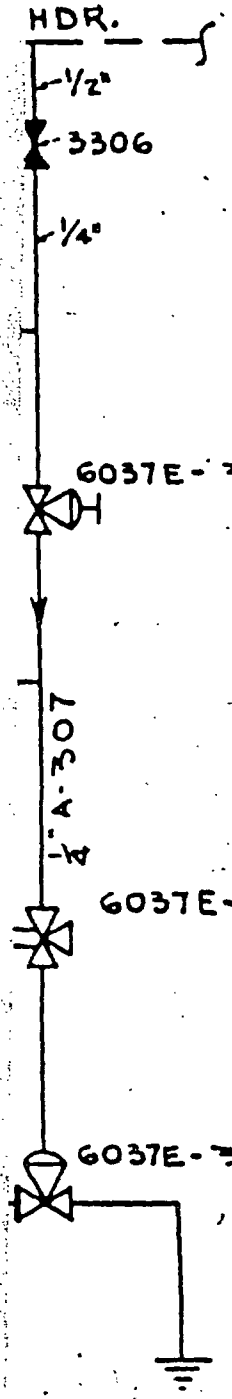
017219
CARBIDE AND CARBON CHEMICALS COMPANY
HIGH PRESSURE PUMP
BUILDING PLAN



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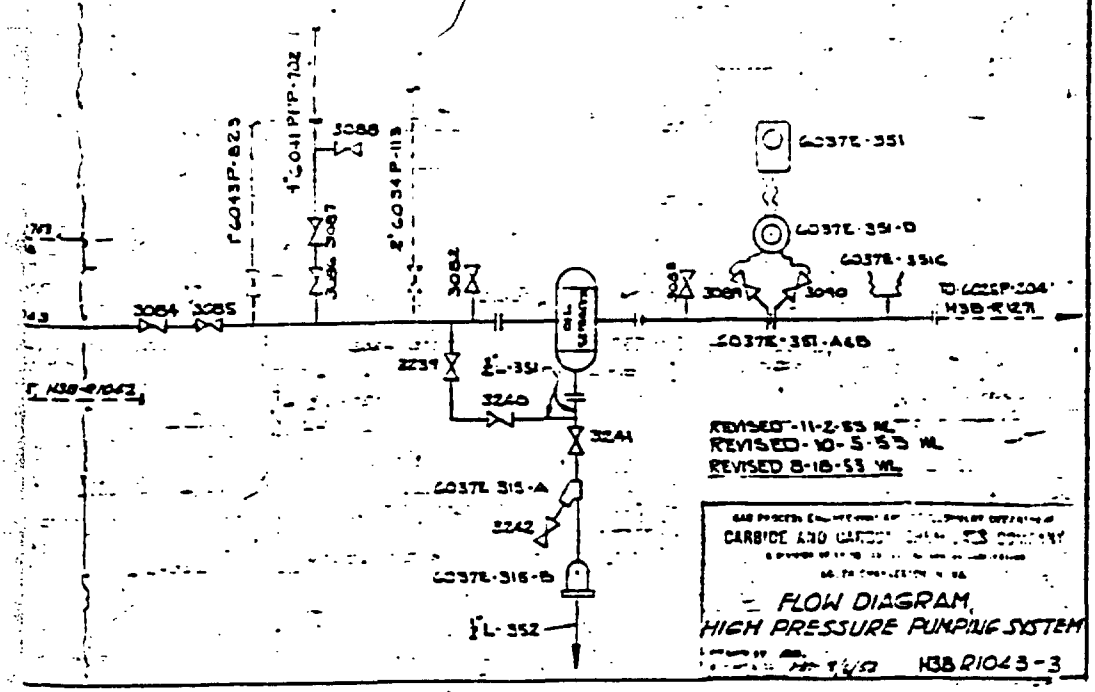
PROPERTY OF
GAS PROCESS ENGINEERING AND DEVELOPMENT DEPT.

GAS PROCESS ENGINEERING AND DEVELOPMENT DEPT.
CARBIDE AND CARBON CHEMICALS DIVISION
UNION CARBIDE AND CARBON CORP.
SOUTH CHARLESTON, W. VA.

FLOW DIAGRAM
HIGH PRESSURE TEST STATION

DRAWN BY
CHECKED BY

H3B-N1055



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6037E-351
6037E-351-D
6037E-351C
6037E-351-A&B
6037E-315-A
6037E-315-B
REVISED-11-2-53 WL
REVISED-10-5-53 WL
REVISED 8-18-53 WL
CARBIDE AND CARBON CHEMICALS COMPANY
FLOW DIAGRAM,
HIGH PRESSURE PUMPING SYSTEM
H38 R1043-3

017221

Fabricated

DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT CA
PART III - HIGH PRESSURE PUMPING SYSTEM
WP-6037

October 6, 1952
Change No. 1

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

Reference Drawings: H3B-R1043 and H3B-N1055.

EQUIPMENT LIST

H3B-R1043

6037E-301AA, BB, CC, DD, EE, FF, GG, HH THROUGH -305AA, BB, CC, DD, EE, FF, GG, HH - BAYONET THERMOCOUPLE ASSEMBLIES (R)

Note change in title.

Instrument Division Specifications

Element	Copper-constantan
Adapter	Stainless steel, Type 2, AN-4076-1, 3/8" - 24 NF-3 threads
Insertion depth	2 - 9/32" (Distance from beginning of threads on adapter to tip)
Flexible metal armor	28" long

Note: Assembly to be similar to drawing A3E-E121 to include tube adapter and thermocouple head.

Manufacturer	Thermo Electric Company
Installation notes	To be installed in drilled section of flanges on 1-7/8" OD x 5/8" ID tubing. Reference drawing H3B-C1550

6037E-301R THROUGH -305R - PRESSURE GAUGES (R)

Change specifications to . . . . Ashcroft Duragauges, Type 1077D.

Note: This change pertains also to Item 6037E-307, specified as a duplicate of 6037E-301R.

6037E-301U THROUGH -305U AND -306 - THERMOCOUPLE ASSEMBLIES (R)

Change Manufacturer to read: Industrial Equipment Company

Add Note: Assemble as per drawing A3E-E133-3 except element and socket to be as specified

6037E-315 - OIL SEPARATOR (R)

Change dimension to read: 24" OD x 5' - 4" body length. 017222

Stress relief, in difference to specification sheet dated Revised August 6, is now required.

EQUIPMENT LIST

H3B-N1055

6037E-317H AND -317J - PRESSURE GAUGES (R)

Change specifications to . . . Ashcroft Duragauges, Type 1077D.

6037E-317K - PRESSURE GAUGE (R)

Change specifications to . . . Ashcroft Duragauge, Type 1077D.

6037E-317M AND -317N - PRESSURE GAUGES (R)

Change specifications to . . . Ashcroft Duragauges, Type 1077A.

6037E-317Q - PRESSURE GAUGE (R)

Change specifications to . . . Ashcroft Duragauge, Type 1077D.

017223

CHANGED BY: D. D. Dobson
APPROVED BY: R. A. Prosser

bdc

John-Thiel

DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT CA
PART III - HIGH PRESSURE PUMPING SYSTEM
WP-6037

Sheet 1 of 2
October 28, 1952
Change Number 2

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

Reference Drawings: H3B-R1043
H3B-N1055

LINE LIST

H3B-R1043

Lines P-303 through P-307: (R)

In footnote, change last sentence to read "..... in accordance with drawing H3B-C1556."

LINE LIST

H3B-N1055

Line H-306: (R)

Change footnote to read - "This line to be installed in accordance with field instructions, using tubing and fittings purchased in accordance with "Specifications for Specifications for Special Tubing and Fittings for High Pressure Testing Station," pages 44A and 44B.

Attached are pages 53 through 53E, "Machined Tubing and Miscellaneous High Pressure Fitting Specifications and Assembly Drawings." These sheets are to replace the existing page 53 in the report.

Also attached for inclusion in the report are the following pages:

Page No.	Description
44A, 44B	"Specifications for Special Tubing and Fittings for High Pressure Testing Station," revised October 28, 1952.
44C, 44D	"Specifications for High Pressure Aircraft Quality Alloy Steel Seamless Tubing, 1/8" ID x 1/2" OD," revised October 28, 1952.

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DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT CA
PART III - HIGH PRESSURE PUMPING SYSTEM
WF-6037

October 28, 1952
Change Number 2

Page No.	Description
53F, 53G	"Specifications for Small Bore Alloy Steel Seamless High Pressure Tubing, 3/16" ID x 9/16" OD," revised October 28, 1952
53H, 53I, 53J, 53K	"Specifications for High Pressure Aircraft Quality Alloy Steel Seamless Tubing, 15/16" OD to 2-1/4" OD," revised October 28, 1952.
—	Table of Contents, revised October 28, 1952.

Changed by: B. M. Fonville

Approved by: R. A. Prosser

kg

Johnsonville

DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT CA
PART III - HIGH PRESSURE PUMPING SYSTEM
WP-6037

Sheet 1 of 1
November 6, 1952
Change No.3

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

Reference Drawings H3B-R1043 and H3B-N1055 (Not issued at this time).

Attached are "Piping Specifications for Low Temperature Service", revised October 27, 1952.

Changed by: B. M. Fonville
Approved by: R. A. Prosser

am

017226

DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT CA
PART III - HIGH PRESSURE PUMPING SYSTEM
WP-6037

Sheet 1 of 1
November 21, 1952
Change No. 4

(A) in right hand margin indicates an addition, (R) indicates a revision. Revised material indicated by underlining.

Reference Drawings: H3B-R1043 (Not issued at this time)

EQUIPMENT LIST

6037E-301T thru 305T - Relief Valves (R)

Change valve type to Crosby JMB-s, Type A

Note: This change applies also to Items 6037E-301V thru 305V, and Items 6037E-323 & -326

Changed by: D. D. Dobson

Approved by: R. A. Prosser

mw

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PETROLEUM & CHEMICAL DIV.

Fahrenthold

DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT CA
PART III - HIGH PRESSURE PUMPING SYSTEM
WP-6037

Sheet 1 of 1
March 26, 1953
Change No. 5

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

Reference Drawing H3B-N1055 (not issued at this time)

EQUIPMENT LIST

6037E-317C - PRIMING PRESSURE SUPPLY UNIT page 17 (R)

Change Model No. of Pump (a) to V-104-G.
Change Model No. of Relief Valve (b) to CT-06-B-10.

Changed by: B. M. Fonville
Approved by: R. A. Prosser

HW

017228

H. Fahrendhold

DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT CA
PART III - HIGH PRESSURE PUMPING SYSTEM
WP-6037

Sheet 1 of 1
April 22, 1953
Formal Change No. 6

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

Attachments:

"Specifications for Pressure Leads to 0-5000 Lb Pressure Gauges" (revised 4/22/53) p. 54

"Specifications for Special Tubing and Fittings for High Pressure Testing Station (Line 6037H-306)" (revised 4/22/53) p. 44A

By: BMF Approved: RAP

B&R

DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT CA
PART III - HIGH PRESSURE PUMPING SYSTEM
WP-6037

1 of 1
May 4, 1953
Formal Change No. 7

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

EQUIPMENT LIST

6037E-317B - HYDRAULIC DIRECTIONAL CONTROL VALVE p. 16 (R)

Change spool to type 4.

6037E-317T - TESTING TABLE p. 16 (A)

One steel table in accordance with H3F-C1974.

By BMF Approved RAP

Ter Poorten
G. Hahn

jt

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DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT CA
PART III - HIGH PRESSURE PUMPING SYSTEM
WP-6037

June 23, 1953
Formal Change No. 8

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

Reference Drawing H3B-N1055 (Not issued at this time).

VALVE LIST

3301 - Change C&CCC No. to 1502.	(R) p. 35
3302 - Change C&CCC No. to 1502.	(R) p. 35
3307 - Change C&CCC No. to 1502.	(R) p. 35

Attachments: Pages 8, 14, 15, 19, 20, and 21.

017231

BY: BMF

am

DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT CA
PART III - HIGH PRESSURE PUMPING SYSTEM
WP-6037

August 6, 1953
Formal Change No. 9

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

Parts revised or wanted emphasized are underlined.

EQUIPMENT LIST

6037E-301S THRU -305S - GAUGE HOUSINGS (R) p. 5

Change specifications to read as follows:

Gauge housings for Items 6037E-301G thru -305G. Housing to be fabricated per C&CCC Drawing No. H3B-A1345.

Changed by: DDD Approved by: RAP

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DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT CA
PART III - HIGH PRESSURE PUMPING SYSTEM
WP-6037

Sheet 1 of 1
August 11, 1953
Formal Change No. 10

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

Parts revised or wanted emphasized are underlined.

Reference Drawing: H3B-R1043, H3B-N1055 (Not issued at this time)

EQUIPMENT LIST

6037E-317U - DEAD WEIGHT GAUGE (Not shown on Flow Diagram) (A) p. 21
Property No. CA-6569-1

One (1) dead weight gauge for calibration purposes. American Instrument Company, Silver Spring, Maryland, Catalog No. 406-485, 50,000 lb capacity.

LINE LIST

Flow Diagram H3B-N1055

A-307 - Change spec. to 96. (R) p. 28

By BMF Approved RAP

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DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT CA
PART III - HIGH PRESSURE PUMPING SYSTEM
WP-6037

Sheet 1 of 1
August 27, 1953
Formal Change No. 11

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

Parts revised or wanted emphasized are underlined.

Reference Drawing H3B-R1043-1 (revised 8/18/53, attached). p. 58

EQUIPMENT LIST

6037E-351C - THERMOCOUPLE WELL ASSEMBLY (R) p. 10

Change construction to "Drilled per drawing A3E-E151-9, type 1 and "Sealed assembly per drawing A3E-E133-3".

BY BMF APPROVED RAP

017234

H. Fahrenkhold

DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT CA
PART III - HIGH PRESSURE PUMPING SYSTEM
WP-6037

Sheet 1 of 1
October 5, 1953
Formal Change No. 12

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

Parts revised or wanted emphasized are underlined.

Reference Drawing H3B-R1043-2 (Rev. 10-5 -53, attached).

EQUIPMENT LIST

6037E-306 - THERMOCOUPLE ASSEMBLY (R) p. 6

One (1) thermocouple assemble to be located in line P-301 and connected to Item 6037E-359.

SCHEDULE OF THERMOCOUPLE CONNECTIONS TO ITEM 6037E-352 (R) p. 12

Delete Item 6037E-306.

SCHEDULE OF THERMOCOUPLE CONNECTIONS TO ITEMS 6037E-358 AND -359 (R) p. 14

6037E-359 - Change Instrument Panel Nameplate to read:

Discharge Nos. 4 and 5 Intensifiers, Primary Pump Suction and Discharge.

Add to list of Thermocouples, Item Nos.
6037E-219 (Part II - WP-6036)
6036E-306

LINE LIST

H3B-R1043

Number	From	To	Size	Material Handled	Spec.		
N-301	N-303	P-346	1/2"	Nitrogen	96	(R)	p. 26
N-302	N-303	P-346	1/2"	Nitrogen	96	(R)	p. 26
N-303	6047N-936	(Header)	1-1/2"	Nitrogen	96	(A)	p. 26

Attachments: Page 15 Revised 10-5-53, Page 34A Added 10-5-53 and Drawing H3B-R1043-2.

017235

Changed by BMF Approved RAP

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DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT CA
PART III - HIGH PRESSURE PUMPING SYSTEM
WP-6037

Sheet 1 of 1
November 6, 1953
Formal Change No. 13

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

Parts revised or wanted emphasized are underlined.

Reference Drawing H3B-R1043-3 (Revised 11/2/53, attached).

VALVE LIST

H3B-R1043

Number	Location	Service	Size	C&CCC No.		
3221 thru 3238 - NOT USED					(R)	p. 34
3239	L-351	Shutoff	3/4"	55	(A)	p. 34
3240	L-351	Check	3/4"	212	(A)	p. 34

LIST OF LINES TO BE INSULATED

Number	Size	Temperature, °C	Remarks		
L-351	3/4"	120	Steam Trace Insulate for Safety Only.	(A)	p. 36
L-352	1/2"	120	Steam Trace Insulate for Safety Only.	(A)	p. 36

Changed by BMF & DDD Approved RAP

vb

017236

H. Fahrenthold

DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT CA
PART III - HIGH PRESSURE PUMPING SYSTEM
WP-6037

Sheet 1 of 1
February 18, 1954
Formal Change No. 14

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

Parts revised or wanted emphasized are underlined.

Reference Drawing H3B-R1043-3.

EQUIPMENT LIST

6037E-358 and -359 - TEMPERATURE INDICATOR, RECORDER AND CONTROLLER (R) p. 14

Schedule of Thermocouple Connections

Change Thermocouples added on Design Report Change No. 12 to

6036E-219 (Part II, WP-6036)
6037E-306

VALVE LIST

H3B-R1043-3

Number	Location	Service	Size	C&CCC No.	
[illegible]72	P-343	Shutoff	4"	20	(A) p. 34A

Changed by RGZ Approved RAP

jm

017237

Fahrenthold

DESIGN REPORT CHANGE

POLYETHYLENE UNIT - PLANT 3A
PART III - HIGH PRESSURE PUMPING SYSTEM
MP-6037

Sheet 1 of 1
April 19, 1954
Formal Change No. 15

This change covers Informal Design Report Change No. 6.

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

Reference Drawing H3B-R1043-3.

EQUIPMENT LIST

6037E-317U - DEAD WEIGHT GAUGE (Not shown on Flow Diagram)

Change catalog no. to read 406-490. (R) p. 21A

Changed by: RGZ Approved by: RAP

017238