

MONSANTO CHEMICAL COMPANY
PLASTICS DIVISION
TENTATIVE OPERATING PROCEDURE
FOR OPALON COMPOUND
BANBURY-MILL ROLL LINE

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OPALON COMPOUND
TENTATIVE OPERATING PROCEDURE
FOR #5 AND #6 BLENDERS

August 14, 1953

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510.00 - Blending Procedure - Opalon Compound

511.00 - Objective

This procedure describes the operation of blenders #5 and #6 in preparing a homogeneous mixture of polyvinyl chloride resin, plasticizers, stabilizers, lubricants, fillers and other miscellaneous ingredients. The mixture is termed "premix" and is discharged from the blenders to the Banbury mixer for compounding. Extensive experience in preparing premix for compounding operations in Building 85A has been utilized. Another guide has been the Research Tentative Process entitled "Opalon Dry Blending and Compound" issued on April 28, 1953.

512.00 - Summary

The ingredients are mixed in Robinson ribbon blenders. The blenders are jacketed and piped for either steam or water as required. The stepwise procedure is as follows for typical Opalon formulations:

1. Resin is discharged from a storage hopper into a weigh lorry. The ribbon blender is started, and the weighed resin is charged to the blender. If necessary, steam is applied to the blender jacket to raise the resin to a specified temperature before adding the plasticizer.
2. Plasticizers are charged to the scale tank and preheated.
3. When the plasticizers and resin have reached the proper temperatures, the plasticizer mixture is sprayed into the blender through nozzles.
4. The resin-plasticizer mixture is heated to a specified filler addition temperature. Stabilizers, fillers and miscellaneous ingredients are then charged.
5. The final mixture is heated to the prescribed end temperature and is then ready to be discharged to the Banbury mixer as required.

513.00 - Equipment

See Plastics Division Engineering Report 85D for a complete description of equipment. The major items are described as follows:

<u>Equipment No.</u>	<u>Name and Manufacturer</u>	<u>Description</u>
Item 140-1-2- 3-4	Roof Resin Storage Hoppers	Four hoppers of 33,000 lbs. capacity, Lastiglas lined. In addition, one hopper of 30,000 lbs. capacity, Amercoat lined was moved from Bldg. 85A. The hoppers are fed by a Dracco conveying system from Bldg. 88.
Item 155	Resin Weigh Lorry	Capacity of 3,000 lbs. of resin. Mounted on overhead rails and capable of being placed directly underneath any of the storage hoppers. It is also capable of being placed directly over any of the blenders so as to discharge resin into the charge chute by a hand-operated slide valve.
01-400- 1	Ribbon Blender #6, Robinson (from 85A)	Stainless steel, insulated, jacketed (steam or water), 4,000 lb. capacity, agitator speed of 22 RPM. Equipped with plasticizer spray pipe containing eleven nozzles (Spraco T-30). Removable aluminum covers, charge chute with magnetic grate. Vent port to dust collector system. Blender equipped with thermowell. Discharge air slide valve of Monsanto design. Jacket working pressure of 75 psi with 50 psi relief valves.
01-400-2	Ribbon Blender #5, Robinson (Item 200-3, C-51-J)	See description for 01-400-1. Nozzles are Spraco T-22. Aluminum covers are hinged.

01-410	Plasticizer Scale Tank	Working capacity of 2,500 lbs. Stainless steel. ✓ Equipped with Howe scale, cabinet dial and overhead suspension.
01-412	Scale Tank Heat Exchanger	Steam on shell side. plasticizer in tubes. Steam flow controlled by ✓ Taylor TRC instrument to give prescribed plasticizer temperature.
01-414	Plasticizer Charge and Recirculating Pump, Viking	Gear-type, relief valve mounted on pump housing.
01-416-1-2-3-4	Plasticizer Drum Racks	- - - -
01-418-1-2-3-4	Drum Unloading Pumps, Viking	Gear-type. Relief valve mounted on housing.

514.00 - Formulations

OPALON COMPOUND FORMULATIONS - PARTS/100 PARTS RESIN

Raw Material	1006	1016	1018	1028	1038	1112	1206	1216	1308	1406	1606
Opalon 300	100	100	100	100	100	100	100	100	100	100	100
DOP	50	45	42	42	54	25	15	-	-	-	-
TCP	-	-	-	-	-	-	45	40	-	-	-
Paraplex G-50	-	-	-	-	-	-	-	-	-	45	-
Paraplex G-60	-	-	-	-	3	5	-	15	5	5	-
DOA	-	-	-	-	-	17	-	-	-	-	22
Hercoflex 150	-	-	-	-	-	-	-	-	-	-	30
Santicizer 160	-	-	-	-	-	-	-	-	40	-	-
Panaflex BN-1	-	-	-	22	-	-	-	-	-	-	-
MB-40	-	-	-	-	-	-	-	-	12	-	-
Clorafin 42S	-	-	18	-	-	-	-	-	14	-	-
Flexricin P-8	-	-	-	1	-	-	-	-	-	-	-
#33 Clay	11	5	7	20	20	-	15	10	-	5	10
Whitetex	-	-	14	-	-	-	-	-	-	-	-
Atomite	-	-	-	15	15	-	-	-	25	-	-
Tribase	8	8	8	8	-	-	5	8	-	-	8
Tribase E	-	-	-	-	5	-	-	-	6	-	-
B.S.W.L.	-	-	-	-	-	-	-	-	-	10	-
Sta. #52	-	-	-	-	-	2	-	-	-	-	-
Antimony Oxide	3	-	-	-	-	-	-	-	-	3	3
Barium Stearate	-	-	1/4	-	-	-	-	-	1/4	1/4	-
Stearic Acid	-	-	-	1/4	1/4	1/4	-	-	-	-	-
Fractol A	2	2	-	-	-	-	2	1	-	-	-

Color may be added as required to the basic formulations listed above.

515.00 - Specifications

<u>Raw Material</u>	<u>Source</u>	<u>Sp cification</u>
Opalon 300	Roof Storage Hoppers	FMS-88-1A
DOP	Tank Farm	RMS-155D
TCP	Drums	RMS-58B
Paraplex G-50	Drums	RMS-230
Paraplex G-60	Tank Farm	RMS-272
DOA	Tank Farm	RMS-226
Hercoflex 150	Tank Farm	RMS-293
Santicizer 160	Drums	RMS-171A
Panaflex BN-1	Drums	To be issued.
MB-40	Drums	RMS-223A
Clorafin 42S	Drums	RMS-229
Flexricin P-8	Drums	To be issued.
#33 Clay	Bags	RMS-231
Whitetex	Bags	RMS-239
Aromite	Bags	RMS-219
Tribase	Drums (Fiber)	RMS-310A
Tribase E	Bags	To be issued.
B.S.W.L.	Bags	To be issued.
Stab. #52	Drums	To be issued.
Antimony Oxide	Bags	RMS-312
Barium Stearate	Bags	To be issued.
Stearic Acid	Bags	RMS-281A
Fractol A	Drums	RMS-225

516.00 - Operating Details

The description of the blending process is divided into five sections: resin handling, plasticizer handling, miscellaneous ingredients handling, blender operation and blending cycles.

The resin is drawn from any one of the five storage hoppers mounted on the roof of Building 85B. The resin is delivered to these hoppers from Building 88 by means of a Dracco conveying system.

Four storage tanks are available for plasticizers. The tanks are numbered 1, 2, 3, and 4 and contain dioctyl phthalate, dioctyl adipate, Paraplex G-60 and Hercoflex 150, respectively. Dioctyl phthalate is drawn from #1 tank by activating tank charge pump #1 and operating a quick-closing valve at the scale tank. To direct flow of plasticizer from #2, #3 or #4 tanks to the scale tank, three three-way valves and three tank charge pump controls are located on the control panel. Other plasticizers are supplied from the drum pumping station located on the blender floor. This station consists of four pumps with appropriate piping and controls.

516.10 - Control Panel (See Figure 1)

Figure 1 shows the controls on the panel which apply directly to the Opalon compound line.

1. Plasticizer Scale Tank #3 T.R.C. - Taylor Fulscope instrument which controls and records plasticizer temperature.
2. Blender Temperature - Foxboro Multi-Record six-point instrument which records the temperature of the material in each of the blenders.
3. Plasticizer Scale Tank to Blenders - selector switch which controls the solenoid valves for charging plasticizer to either #5 or #6 blenders.
4. Blenders #5 and #6 - "start-stop" switches for ribbon drives.
5. Plasticizer Charge and Recirculating Pump - "start-stop" switch for pump which recirculates plasticizers through heat exchanger and charges plasticizers to blenders.
6. Drum Unloading Pumps - "start-stop" switches for the four drum unloading pumps located on the blender floor.
7. Tank Charging Pumps - "start-stop" switches for the four pumps located at the four plasticizer storage tanks.
8. Three-Way Valves From Plasticizer Storage Tanks - These three valves will direct flow of plasticizer from #2, #3 and #4 storage tanks, respectively, to either #3 scale tank (Opalon compound line) or #4 scale tank (Farrel calender line).

516.20 - Resin Handling System

A. To Charge the Resin Weigh Lorry

1. Close the manually operated slide valve at the bottom of the weigh lorry.
2. Check the weigh lorry scale as indicating zero.
3. Move the weigh lorry under the desired resin hopper so that the hopper outlet is centered over one of the two lorry inlets.
4. Open the resin hopper slide valve by operating the appropriate air valve (located on posts north of blenders).
5. After 1400-1500 pounds of resin have been withdrawn, close the hopper slide valve.
6. Reposition the lorry to center the hopper outlet over the inlet on the other side of the lorry.
7. Complete the charging to the specified weight.

B. To Charge Resin from the Lorry to the Blender

1. Check that proper blender operating precautions have been taken.
2. Lift the cover on the blender charge chute.
3. Position the weigh lorry so that its outlet valve is directly over the charge chute.
4. Make certain that blender ribbon drive is running.
5. Dump lorry contents into blender by opening outlet valve. Be certain that the lorry scale reads zero. Some tapping of the lorry sides with a rubber-faced mallet may be necessary to run out all the resin.
6. Close the weigh lorry slide valve.
7. Replace blender charge chute.

516.30 - Plasticizer Handling System (See Figure 2)

516.31 - Charging of Plasticizer to Scale Tank #3

A. Preliminaries

1. Check to insure that scale tank is empty and scale reads zero.
2. Close scale tank outlet valves 9 and 18.
3. Close all other valves in plasticizer recirculating and charging system (10 to 17).

B. Drawing Dioctyl Phthalate from Storage Tank #1

1. Open valve 1.
2. Start #1 tank charge pump.
3. Close valve 1 (quick-closing type) so as to deliver the specified charge weight to the scale tank.
4. Immediately stop #1 tank charge pump.

C. Drawing Plasticizers from either Storage Tank #2, #3, or #4.

1. Open the appropriate three-way valve (2, 3, or 4) so that the arrow on the valve handle points to "#3 Scale Tank" (to the left).
2. Start the appropriate tank charge pump (#2, #3 or #4).
3. Close the three-way valve (arrow on valve wheel pointing upwards to "Off") so as to deliver the specified charge weight to the scale tank.
4. Immediately stop the tank charge pump.

D. Pumping Plasticizers from the Drum Unloading Station

Four unloading pumps are provided to prevent cross-contamination due to line hold-up.

1. Make the drum set-up at the appropriate drum rack. Be sure to remove the side bung after the drum is on the rack.
2. Close the Cuno filter by-pass valve, and open the Cuno filter outlet and inlet valves.
3. Open the pump inlet valve and the drum outlet valve.
4. Open the appropriate quick-closing valve at the scale tank inlet. Valves 5, 6, 7, and 8 apply to pumps #1, #2, #3 and #4, respectively.

5. Start the appropriate drum unloading pump.
6. Close the scale tank inlet valve so as to discharge the specified charge weight.
7. Immediately stop the drum unloading pump.

516.32 - Heating the Plasticizers

A. Preliminaries

1. Check total weight of plasticizers in scale tank.
2. Check to be sure that valves 12 to 17 are closed.
3. Adjust the steam pressure to the plasticizer heat exchanger to the following value depending upon formulation:

<u>Formulation</u>	<u>Heat Exchanger Steam</u>
a. 1006, 1016, 1018, 1028, 1038, 1112, 1308 and 1606	20 psig
b. 1406	40 psig
c. 1206 and 1216	No steam required. Plasticizers charged at less than 40°C.

4. Close the by-pass and open the inlet and outlet valves for steam control valve.
5. Close the steam trap by-pass valve and open the inlet and outlet valves to the trap.

B. Heating

1. Open pump discharge valves 10 and 11.
2. Open scale tank outlet valve 9.
3. Start the plasticizer charge and recirculating pump.
4. Set the T.R.C. instrument to the desired plasticizer temperature. See the section on "Blending Cycles".

516.33 - Charging Plasticizers to Blender

The plasticizers must be sprayed into the blender when the resin has reached the temperature prescribed in the section on "Blending Cycles".

A. Preliminaries

1. Check to insure that the selector switch for the solenoid valves is turned to the "off" position.
2. Open the appropriate manual valve located in the plasticizer charging line (15 for #5 blender or 16 for #6 blender). Check that the valve for the line to the other blender is closed. This is to insure that the plasticizer will not be charged to the wrong blender if the solenoid valve is incorrectly manipulated or malfunctions.
3. Check the plasticizer temperature.

B. Charging

1. Open the by-pass valve (12) for the charge and circulating pump.
2. Open the inlet and outlet valves (13 and 14) for the Cuno filter.
3. Close valve 11 and check to insure that valve 10 is open.
4. Start the charge and circulating pump if it is not already running.
5. Set the selector switch for the appropriate solenoid valve. Turn the selector switch to "ON". This opens the solenoid valve in the plasticizer charging line at the blender.
6. Adjust the pump discharge pressure by partially closing the pump by-pass valve (12) so as to charge the plasticizer to the blender in a 20-minute period. Flow of plasticizer to the blender can be checked through the visual sight box.

Note: The correct pump discharge pressure to give a 20-minute plasticizer addition period will be determined when the equipment is initially operated.

7. When the scale tank is almost empty (20-30 pounds), open valve 17 to drain the heat exchanger.
8. When the scale tank reads zero, stop the pump. Allow about two minutes for complete drainage before closing any valves.
9. Turn the selector switch for the solenoid valve to "Off". Close the valve (15 or 16) in the plasticizer charge line (located immediately before solenoid valve).

10. Close the inlet and outlet valves (13 and 14) to the Cuno filter.

11. Close scale tank discharge valve 9.

516.40 - Miscellaneous Ingredients Handling System

The Color Laboratory is responsible for preparation and weighing of miscellaneous ingredients. This category includes stabilizers, fillers, lubricants and flame-proofing agents. The materials are weighed, identified and placed in appropriate containers. These ingredients are stored in an area on the blender floor and charged to the blenders when required.

To charge miscellaneous ingredients:

1. Collect all miscellaneous ingredients for the blend.
2. Check materials to be added for identity and weight.
3. When the prescribed addition temperature or condition has been reached (see section on "Blending Cycles"), open the blender charge cover.
4. Pour any liquid ingredients into the blender.
5. If solids are to be charged, place the portable charging hood over the charge chute.
6. Connect the exhaust vent line to the hood and check for suction at the vent.
7. Put on dust respirator and charge the solids.
8. Disconnect the vent from the charging hood, remove the hood, and replace the charging chute cover.

516.50 - Blender Operation (See Figure 3)

A. Charging Preparations

1. Make certain that the blender is empty.
2. Make certain the blender discharge valve is closed.
3. Start the blender ribbon drive.

B. Applying Steam to the Jacket

1. Drain any water from the jacket by:
 - a. Close water inlet valve (J) if open.

- b. Open sewer valve (G). Check to be sure that the upper jacket drain valve (H) is open.
 - c. Check to insure that the blender jacket valves are open (B and C). Under normal operation conditions these valves will remain open at all times.
 - d. When the jacket has drained, close the upper jacket drain valve (H).
2. Adjust steam pressure to 30 psig except when preparing to blend either Opalon 1216 or 1206. The latter two formulations require 10 psig jacket steam.
 3. Open the inlet (D) and outlet (F) valves for the condensate traps.
 4. Open the steam inlet valve (A).
 5. Open the steam trap by-pass valve (E) until the trap warms up. Then close the by-pass.

Note: The following valves are located one floor level below the blender floor but have long handles extending up to the blender floor to provide more convenient control:

Inlet valve to steam trap (D)
Steam trap by-pass valve (E)
Sewer drain valve (G)

C. Applying Cooling Water to the Jacket

1. If steam is on the blender jacket, vent it as follows:
 - a. Close steam inlet (A).
 - b. Carefully open the upper jacket drain valve (H).
 - c. After the steam pressure has been dissipated, open the upper drain valve (H) fully.
 - d. Close steam trap inlet valve (D).
2. Open the water inlet valve (J). Check flow of water at upper drain pan.

D. Discharging a Blender

1. The blender operator should notify the Banbury operator when a blend is ready.

2. The Banbury operator will draw premix into the Banbury weigh hopper as required by operating the blender discharge valve and the natural frequency vibrating conveyor.
3. When the blender is empty, the Banbury operator will stop the ribbon drive (start-stop switch at Banbury panel).
4. The red indicating light will go out on the blender control panel signaling the blender operator that the blender is ready to charge again.

516.60 - Blending Cycles

The blending cycle is controlled on a temperature basis. Due to the varying types of plasticizers, blending cycles depend upon formulations. The following cycles apply only for preparation of premix to be compounded.

A. Opalon 1006, 1016, 1018, 1038, 1308, and 1606.

1. Preheat the blender jacket with 30 psig steam.
2. Start the blender ribbon drive.
3. Charge the Opalon 300 resin, dry lubricants (barium stearate) and dry colorants (if specified).
4. Heat the resin to 60°C.
5. Charge the plasticizer mix which has been preheated to 60°C using 20 psig steam on the heat exchanger. Adjust the charge pump pressure so that plasticizer addition time is 20 minutes.

If the formulation requires Fractol A, add this ingredient through the charge chute during the plasticizer addition interval.

6. Heat the resin-plasticizer mix to 90°C.
7. Add the fillers, stabilizers and remaining miscellaneous dry ingredients through the blender charge chute.
8. Continue heating the final mixture to 100°C. The mix should be dry, homogeneous and sandy in texture and is now ready for compounding.
9. Turn off the steam inlet valve to the blender jacket and carefully open the upper jacket drain valve.

B. Opalon 1112

1. Preheat the blender jacket with 30 psig steam.

2. Start the blender ribbon drive.
3. Charge the Opalon 300 resin and stearic acid.
4. Heat the resin to 60°C.
5. Charge the plasticizer mix which has been preheated to 60°C using 20 psig steam on the heat exchanger. Adjust the charge pump pressure so that plasticizer addition time is about 20 minutes. During the plasticizer addition interval, add the Stabilizer #52 and colorant concentrates (if specified).
6. Heat the mix to 110°C. The mix should be dry and homogeneous and is now ready for compounding.
7. Turn off the steam inlet valve to the blender jacket and carefully open the upper jacket drain valve.
8. Do not shut off the blender agitation as Opalon 1112 premix will cake at temperatures near 100°C if not agitated.

C. Opalon 1216 and 1206

1. Apply cold water to the blender jacket and cool to 40°C or lower.
2. Start the blender ribbon drive.
3. Charge the Opalon 300 resin.
4. Charge the plasticizer mix which is at 40°C or lower. Adjust the charge pump pressure so that plasticizer addition time is about 20 minutes. Add the Fractol A through the charge chute during the plasticizer addition interval.
5. Apply 10 psig steam to the blender jacket.
6. Heat the resin-plasticizer mix to 90°C.
7. Add the filler and stabilizer.
8. Continue heating the mix to 100°C. The mix should be dry, homogeneous and sandy in texture and is now ready for compounding.
9. Turn off the steam inlet valve and carefully open the upper jacket drain valve.

D. Opalon 1406

1. Preheat the blender jacket with 30 psig steam.

2. Start the blender ribbon drive.
3. Charge the Opalon 300 resin, barium stearate and dry colorants (if specified).
4. Heat the resin to 90°C.
5. Charge the plasticizer mix which has been preheated to 110°C using 40 psig steam on the heat exchanger. Adjust the charge pump pressure so that plasticizer addition time is about 20 minutes.
6. Heat the resin-plasticizer mix to 110°C.
7. Add the filler, stabilizer and flame-proofing agent.
8. Continue mixing to 115°C. Shut off the steam inlet valve and hold the mixture at 115°C for 20 minutes.
9. The mix should be dry, homogeneous and sandy in texture and is now ready for compounding.

E. Opalon 1028

1. Preheat the blender jacket with 30 psig steam.
2. Start the blender ribbon drive.
3. Charge the Opalon 300 resin, fillers (Clay and Atomite), stearic acid and dry colorants (if specified).
4. Heat the resin, fillers and lubricant to 60°C.
5. Charge the plasticizer mix which has been preheated to 60°C using 20 psig steam on the heat exchanger. Adjust the charge pump pressure so that plasticizer addition time is 20 minutes. Add the Flexricin P-8 through the charge chute during the plasticizer addition.
6. Heat the mix to 90°C.
7. Add the stabilizer (Tribase).
8. Continue heating the mixture to 100°C. The mix should be dry, homogeneous and sandy in texture and is now ready for compounding.
9. Turn off the steam inlet valve to the blender jacket and carefully open the upper jacket drain valve.

F. Approximate Time Cycle

The following estimated time cycle must be considered approximate. This time cycle will vary somewhat due to characteristics peculiar to different formulations. One major exception to this time cycle will be Opalon 1406. Due to the nature of the plasticizers, Opalon 1406 may require a time cycle of approximately three hours.

- | | |
|--|---------|
| 1. Weighing resin and charging to blender | 10 min. |
| * 2. Heating resin to 60°C. | 40 min. |
| * 3. Charging plasticizers to scale tank and preheating to 60°C. | 40 min. |
| 4. Spraying plasticizer to blender. | 20 min. |
| 5. Heating resin-plasticizer mix to 90°C. | 30 min. |
| 6. Adding stabilizers, fillers and other ingredients. | 10 min. |
| 7. Heating mix to 100°C. | 20 min. |

Total cycle, about 2 hours 10 minutes.

- * Steps 2 and 3 are performed simultaneously.

G. Cooling Premix

The premix must be cooled to 45°C by applying water to the blender jacket whenever:

1. The premix has to be drummed out.
2. The premix has to be held in the blender for any period exceeding four hours after completion of blending cycle.

When the premix has cooled to 45°C, turn off cooling water to blender jacket, and stop the blender agitator. Cooling the premix lower than 40-45°C may result in moisture condensing on the inside of the blender walls. Any moisture in the finished premix is detrimental to the compounded stock due to porosity.

516. 70 - Operating Difficulties

A. Wet Blends

The premix should be dry and free-flowing after the blending cycle is completed. If the premix appears wet, the following action should be taken:

1. Check the blender temperature chart. If the blend was not heated to the specified temperature, re-heating to the proper temperature may improve the texture of the blend.
2. If the blender temperature chart indicates that the proper blending cycle was followed, then some raw material may have been mischarged. The blender mixing record should be checked. If raw material mischarging did occur, supervision should specify disposition of the premix. The plasticizer weigh scale should be checked.

B. Mischarging of Plasticizer Weigh Tank

If the plasticizer weigh tank is mischarged, supervision should be notified immediately.

1. If an incorrect ingredient is mixed with the other materials, it will probably be necessary to drain the contents of the weigh tank into drums. Identify the composition of the mixture in the drums.
2. If an ingredient has been overcharged, adjust the proportions of the other ingredients if scale tank capacity permits. The excess mix can be used in subsequent blends of the same formulation.
3. If an ingredient is overcharged to the extent that scale tank capacity does not permit adjustment, drain the contents into properly identified drums.

Note: Before draining any plasticizer from the scale tank, recirculate through the heat exchanger (steam off) for at least 10 minutes to insure a homogeneous mixture.

516.80 - Avoidance of Contamination

The work area and equipment must be kept clean. Contamination of any nature can't be tolerated in the production of Opalon electrical or profile compounds.

1. Keep the blender chute covers closed when not in use.
2. Keep the blender covers on at all times except when cleaning the blenders. This is necessary from both a contamination and safety standpoint.
3. Sweep the blender floor area at the end of each shift. All powder spillages should be cleaned up.
4. Plasticizer spillages are dangerous. Use rags to soak the spillage up immediately.

5. Cut bags containing dry ingredients for proper charging. Pulling out the thread at the top of the bags will leave loose bits of paper and thread which may contaminate the blend. There is no provision for a scalping screen between the blenders and Banbury mixer.
6. Do not allow any foreign material to fall into a blender. A magnetic grate is provided at each charging chute.
7. Keep raw material containers covered until ready to use. Any lead stabilizer containers must not be reused for products or raw materials other than lead stabilizers.

517.00 - Cleaning

A. Major Cleanout

1. Follow the lockout procedure outlined in the "Safety" section.
2. Remove the sock connecting the blender discharge duct to the natural frequency premix conveyor. Place a piece of cardboard or film over the conveyor inlet to prevent material from falling into the conveyor.
3. Remove or open the blender covers, and scrape the undersides. Blender #5 has three hinged-type covers and one fixed-type cover. Blender #6 has two removable type covers and one fixed-type cover. All hinged or removable covers must be opened or removed before entering the blender. The fixed cover contains the exhaust vent port and can be allowed to remain in place during cleaning.
4. Scrape the underside of the fixed cover, the exhaust vent, the ends and sides of the blender jacket and the shaft and ribbon.
5. Place the scrapings in drums. Ticket as code 9014 "no value" stock and classify as "blender cleanout".
6. The scraped surfaces should then be washed with either dioctyl phthalate or soap and water. If soap and water is used, wipe the washed surfaces with DOP afterwards to prevent any possible detrimental effect to the premix electrical properties from soap residue.
7. Notify the Shift Foreman who must inspect the blender before the covers are replaced.
8. If the blender is sufficiently cleaned, remove all tools and cloths, replace the covers, and close the discharge valve.
9. Reconnect the blender discharge duct to the premix conveyor.

B. Surface (Minor) Cleanout

1. Follow the lockout procedure outlined in the "Safety" section.
2. Remove the sock connecting the blender discharge duct to the natural frequency premix conveyor. Place a piece of cardboard or film over the conveyor inlet to prevent material from falling into the conveyor.
3. Remove the blender covers, and scrape any loose material from the undersides.
4. Scrape the underside of the fixed cover. Scrape any loose material from the sides and ends of the blender and the shaft and ribbon.

5. Place the loose material in drums. Ticket as code 9014 "no value" stock and classify as "blender cleanout".
6. Notify the Shift Foreman who must inspect the blender before the covers are replaced.
7. Remove any tools, replace the covers and close the discharge valve.
8. Reconnect the blender discharge duct to the premix conveyor.

C. Miscellaneous

1. The blender exhaust vent ducts are cleaned once per week under preventive maintenance procedure.
2. Clean the Cuno filters in the plasticizer lines once per shift by turning the handle on top one complete revolution. Draining and cleaning the Cuno filters by maintenance personnel will be established as a periodic preventive maintenance procedure.
3. The heat exchanger may require periodic cleaning due to fouling of the tubes with decomposed plasticizer. Indications of this condition will be excessive heating cycles and high pressure drop through the exchanger tubes.
4. The scale tank should be flushed with dioctyl phthalate and drained periodically to remove sediment (usually decomposed plasticizer).

518.00 - Safety

A. Safety Equipment

1. Fire extinguishers
2. R-1000 AD type respirators for use in areas containing premix dust.
3. R-31 type respirators for use in area containing harmful fumes.
4. Goggles, gloves, coveralls, etc.

B. Safe Practices

1. Since lead compounds used in blending operations are known to be toxic, the following must be rigidly adhered to:
 - a. Wear a R-1000 AD type respirator, coveralls and gloves whenever charging dry ingredients or whenever cleaning the blender. The greatest hazard from lead compounds occurs during blender charging due to concentration.
 - b. Respirators should be washed thoroughly after each usage and stored in boxes supplied by the manufacturer. Cartridges should be changed when the breathing becomes restricted.
 - c. Eating or storing food in the operating area is forbidden.
 - d. Hands and face must be washed thoroughly before eating or smoking.
2. The procedure to enter a blender for cleaning or maintenance is as follows with lockouts conforming to Plant Bulletin E-210.
 - a. Obtain the necessary locks from the assistant foreman.
 - b. Lockout the disconnect switch of the blender ribbon motor.
 - c. Chain and lock the blender agitator.
 - d. Close the manually operated valve in the plasticizer charge line located just above blender against south wall of the building. (Valve 15 or 16 in Figure 2).
 - e. Lock out the air control valve for the blender discharge slide valve (Banbury panel).

Note: In the absence of suitable lockout brackets for the air valve, have the area mechanics shut off the air supply to the air valve and break the line at some suitable union. This will insure that the slide valve can't be operated.

- f. Remove or open all removable or hinged covers to insure adequate ventilation.
 - g. Two persons must be on the job at all times whenever entering a blender for cleaning or maintenance.
3. Drums that have contained lead compounds can't be used elsewhere in the building for any other material.
 4. The only permissible cleaning agents are either dioctyl phthalate or soap and water.
 5. Observe proper lifting procedures when handling drums or bags of raw materials.
 6. Good housekeeping is essential to safety. Cleanup all powder or liquid spills immediately.

519.00 - Records

- A. Opalon Blender Schedule (see attached sample form 596 AHB 3582(- This form is issued by Planning containing the following information and is sent to the Color Laboratory Foreman

1. Formulation
2. Color name and number
3. Amount to be produced
4. Blend numbers
5. Disposition of premix

The Color Laboratory Foreman indicates the type of resin to be used and issues the "Blender Mixing Records".

- B. Blender Mixing Record - Opalon Premix (see attached sample form)

This record is prepared by the Color Laboratory Foreman. All ingredients and their weights are indicated on the form. A "Blender Mixing Record" is assigned to each blend number. Indication is made if any of the ingredients are to be added at the Banbury. The completed form is sent to the Color Laboratory where the stabilizers, fillers, lubricants, colorants and small amounts of miscellaneous ingredients are weighed and tagged. The weigher or weighers must initial the form. The form is returned to the Color Laboratory Foreman who forwards it to the Shift Assistant Foreman together with the "Blender Schedule".

The Shift Foreman sends both the "Blender Schedule" and the "Blender Mixing Record" to the blender operator. The blender operator removes the tags from the preweighed materials at time of usage and checks the weights. These tags are attached to the "Blender Mixing Record." The blender operator records the following information:

1. Blender Schedule
 - a. Blend number.
 - b. Date and time blend is ready.
 - c. Time blender emptied.
 - d. Operator's number.
2. Blender Mixing Record
 - a. Resin hopper from which resin is drawn.

- b. Time when each operation is started and finished.
- c. Time when each ingredient was charged.
- d. Source of plasticizers.

C. Shift Blending Log (see attached sample form)- This log is kept by the blender operator as a record of the shift's operations and a guide to the incoming crew. A carbon copy is made. The original is turned into the Shift Foreman at the end of each shift, and the carbon copy is kept at the blender area. The following information is recorded:

- 1. Date, shift, operator's name.
- 2. Blender number.
- 3. Formulation and color.
- 4. Number of blends completed and disposition.
- 5. Amount and type of rework added at blender.
- 6. Total weight blended.
- 7. Status of blenders at end of shift.

D. The following data is tabulated and kept at the blender area:

- 1. Resin data sheet
 - a. Blend number.
 - b. Date of blend.
 - c. Amount of resin used.
 - d. Hopper from which resin was taken.
- 2. Blender data sheet
 - a. Blend number.
 - b. Formulation and color.
 - c. Date and shift.

E. Plasticizer Heating Chart

This chart is recorded by a Taylor Fulscope TRC instrument and gives a record of the plasticizer heating cycle for each blend. The blender operator must change the chart at the end of the 11-7 shift and deliver it to the Shift Foreman.

F. Blend Temperature Chart

This chart is recorded by a Foxboro Multi-Record six-point instrument. The chart serves as a history of the heating cycle for each blend. The blender operator must change the chart at the end of the 11-7 shift and deliver it to the Shift Foreman.

RSV0023977

6.30-25

Blender Initialing

OPALON ~~XXXXXX~~

FORMULATION NUMBER 1028

8/18/53 7-3

COLOR NAME NATURAL

520
5

PURPLE

DIVISION
CODE

RAW MATERIALS

E A T B

POUNDS

MINUTE
OF DAY
INITIAL

Opalon
~~XXXXXX~~

1900

#7

12:15

12:20

DOP

798

Tank Farm

1:00

Panaflex BN-1

418

Drum

1:20

P-8

19

1:10

1:12

#33 Clay

380

Color Lab
Weigher's
Initial

1:50

Atomite

285

Tribase

152

2:00

Stearic Acid

4.75

12:20

12:21

3956.75

12:00

2:20

12:30

12:50

RSV0023979

Col r Lab Foreman

Blender Op rator

11-7

7/19/53

John Smith

1028 Natural

524

3957

Banbury

#5

1028 Natural, #526 - Resin heating to 60°C and plasticizers heating to 60°C.

1028 Natural

523

3957

Banbury

#6

1028 Natural

525

3957

Banbury

2/3 Full

Standard Method of Shift Test

and Material Starts as and of 11-7 shift

Director L&S
G-1
G-2
G-3

RSV0023980

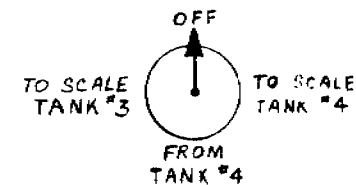
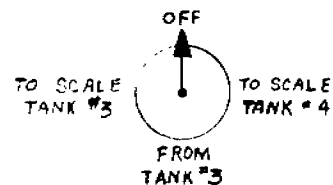
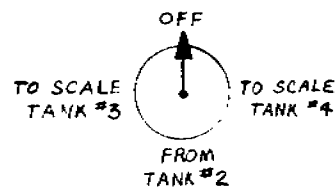
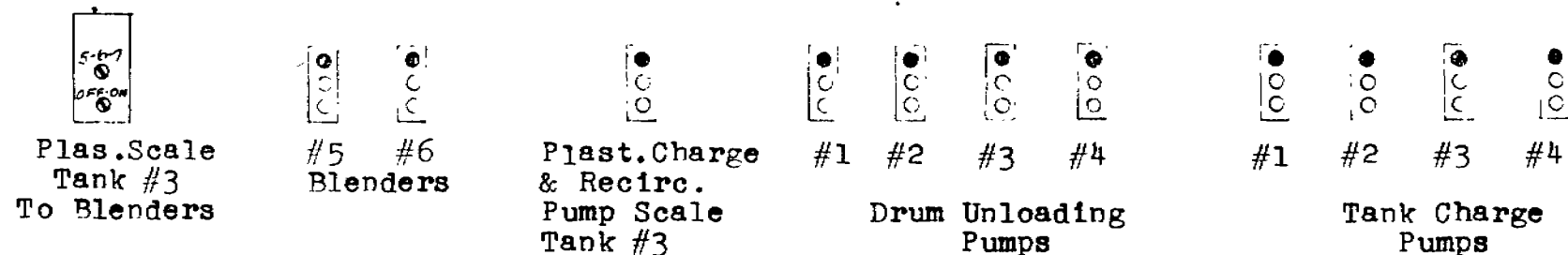
FIGURE 1
BLENDER CONTROL PANEL
OPALON COMPOUND LINE

8/14/53

B.E.S.

Plast. Scale Tank #3
T.R.C.

Blender Temp.



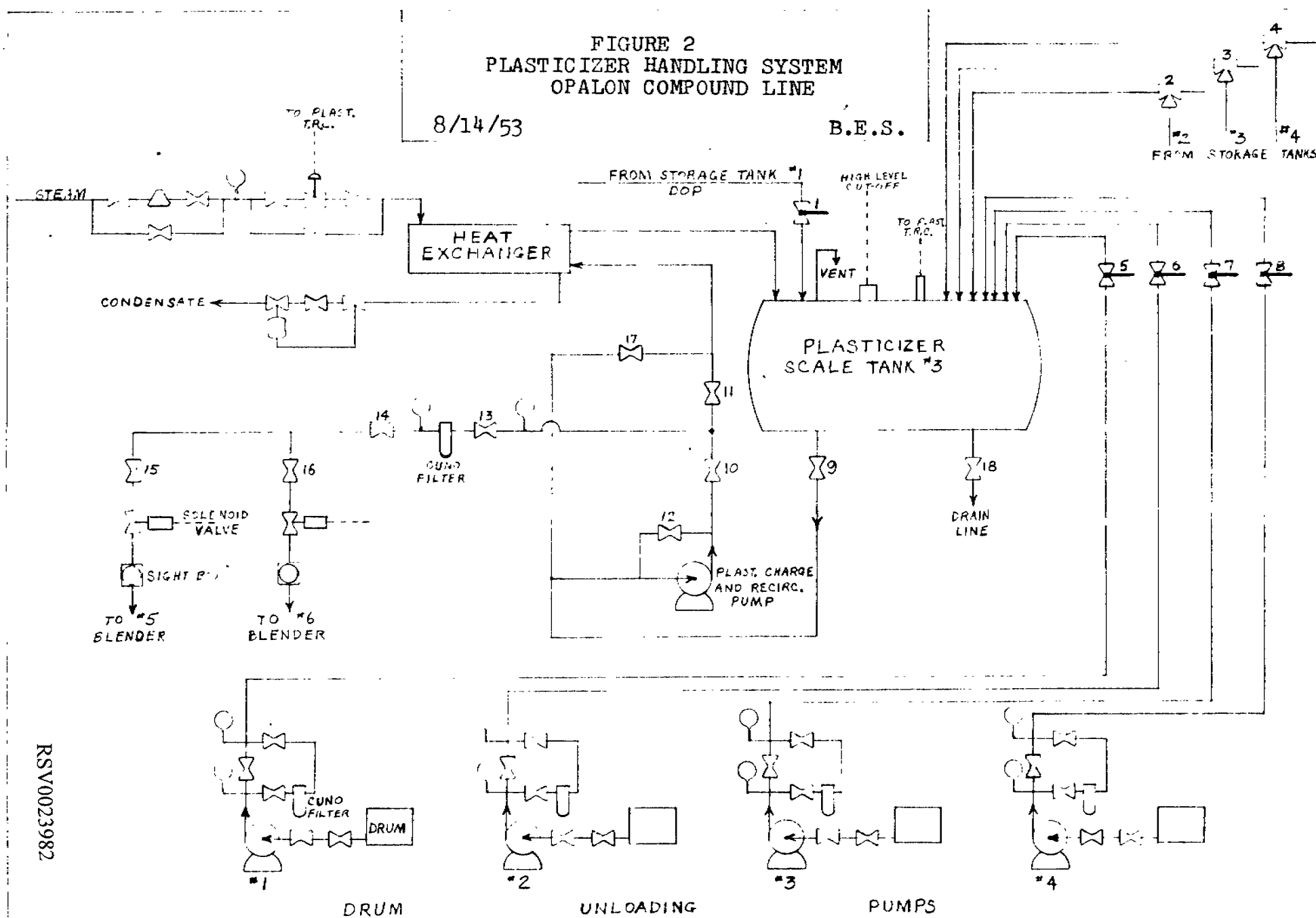
THREE-WAY VALVES FROM PLASTICIZER STORAGE TANKS

RSV0023981

FIGURE 2
PLASTICIZER HANDLING SYSTEM
OPALON COMPOUND LINE

8/14/53

B.E.S.



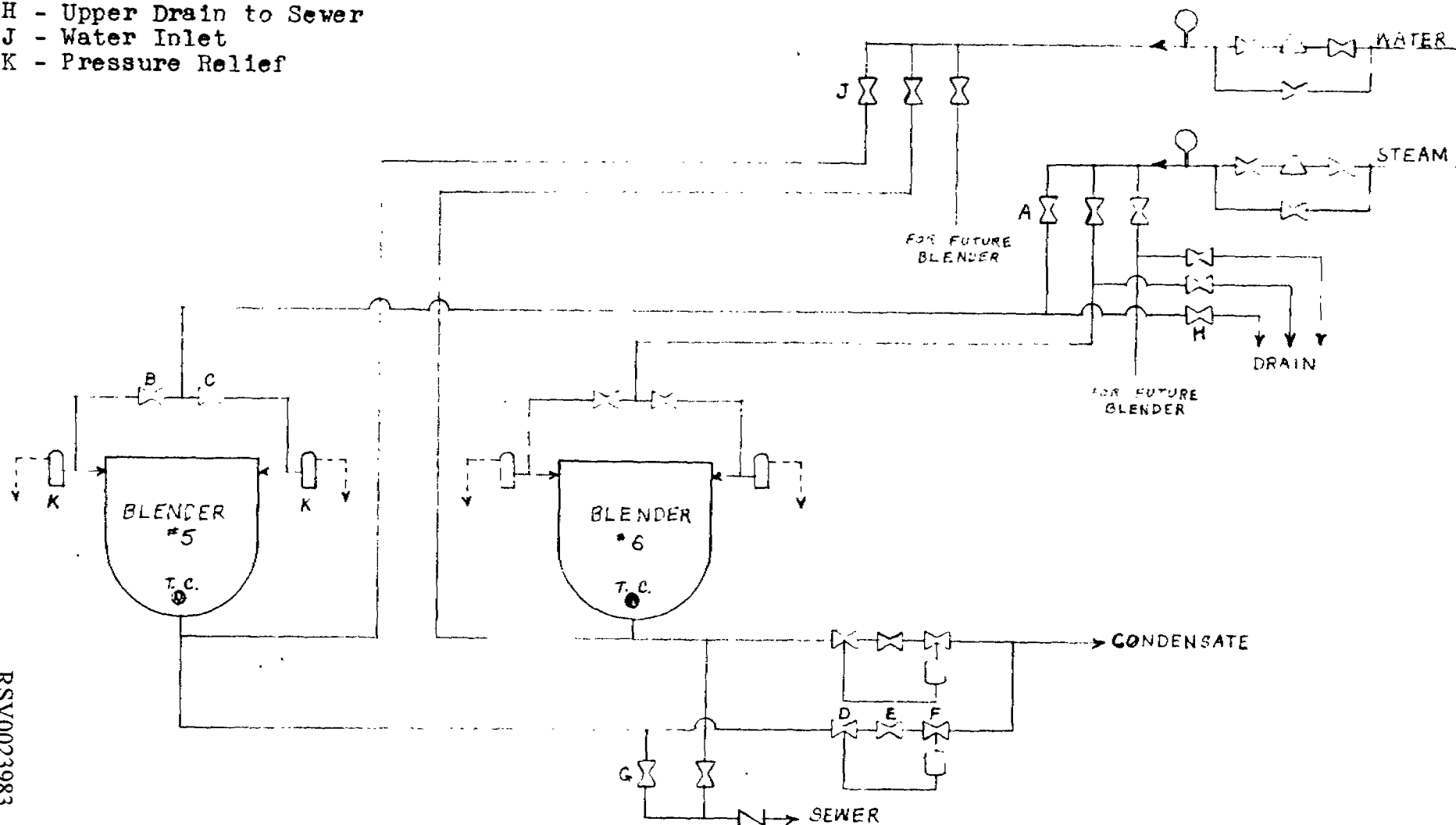
RSV0023982

- A - Steam Inlet
- B & C - Jacket Inlets
- D - Steam Trap Inlet
- E - Steam Trap Bypass
- F - Steam Trap Outlet
- G - Lower Drain to Sewer
- H - Upper Drain to Sewer
- J - Water Inlet
- K - Pressure Relief

FIGURE 3.
BLENDER STEAM AND WATER PIPING
OPALON COMPOUND LINE

8/14/53

B.E.S.



RSV0023983