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Ceramics

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Ceramic Program - Proposed Recovery Program

[redacted]

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I. General Design

A. The proposed facility shall be located in the 1-C Area of the SW Building. The facility shall be composed of a thermal diffusion column and its auxiliaries, a low temperature distillation unit and its auxiliaries, and a common gas-feed preparation unit.

1. The thermal diffusion column shall be installed in a silo attached to the west wall of the SW Building near its E-W vertical midplane.

2. The high pressure apparatus for refrigerating the low temperature still shall be housed in a lightly constructed building attached to the west wall of the SW Building. This building will be connected to the still area with a blast door. This door shall swing into the refrigeration building and withstand a maximum blast pressure of 12 atmospheres.

B. The 1-C Area shall be divided into operations subareas by means of lightly constructed walls. Subareas shall be as proposed in approved area layout of Engineering Department. Means shall be provided to pass from the still area to the column area without entering the analytical area.

C. An area, to house the mechanical equipment required for the rooms and process dryboxes, shall be provided and may be located in the most suitable place relative to the operations areas.

D. A storage space shall be provided in the 1-C Area. It may be approximately 4 feet by 4 feet by 5 feet high. This space should be provided in or as near the gas preparation area as possible.

E. The raffinate and feed dryboxes of the column area shall be situated above the product drybox on two operating levels adjacent to the column. These levels are to be of suitable open steel construction. The upper level shall support the control section (console) of the column.

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F. The still drybox with its associated raffinate and product dryboxes shall be located near the West wall of the SW Building and as near as possible to the high pressure refrigeration building. All dryboxes in this area are on the ground level.

G. An insulated 14 foot ceiling shall be built in the gas preparation, cryogenic still, analytical, and mechanical equipment areas.

H. The subareas shall be interconnected by airlocks.

II. Ventilation and Air Conditioning

A. The existing facilities of the SW Building shall be used only insofar as they can be modified for use in the proposed facility.

B. The ventilation and atmosphere circulation in all the dryboxes shall be handled by appropriate equipment in the mechanical equipment area.

C. Each subarea shall have separate air supplies and exhausts, with 10-12 air changes per hour. The air supplys and exhausts for each room shall be separated from each other so that there will be a positive sweeping action with no dead air space. The exhausts shall be located near the ceilings of the areas with the supplies near the floor.

D. The relative humidity in analytical area shall be 50 per cent or less.

E. The temperature in the analytical area shall be 75°± 2°F. Means shall be provided to heat the remaining area to 75°F when required.

F. There shall be three pressure levels maintained. The mass spectrograph and analytical area shall be the highest, the other subareas next, with the remainder of the SW Building at the lowest pressure.

G. The ventilation of the column silo shall be incorporated with that of the column drybox area with the exhaust for these areas to be located in the silo.

H. The building housing the high pressure refrigeration equipment shall be constructed so that natural draft will provide sufficient ventilation. An emergency forced draft ventilation shall be provided to exhaust the building at a rate of 60 changes per hour into a sheet metal stack to a point at least five feet above the roof of the SW Building.

I. The mechanical equipment area shall be provided with at least 20 air changes per hour.

J. All hoods (fume) in the area shall be used as a part of the area exhaust system. The air flow in each hood shall be 100 lfm minimum.

K. All instrument consoles shall be purged with a separate compressed air supply.

L. Contamination-level instruments shall monitor the room air at all exhausts.

M. Provision shall be made for absorbing the heat load in the analytical room of the mass spectrometer (2KW) and two men.

N. Means of circulating the air above the ceiling shall be provided.

O. Low pressure filtered air shall be supplied for breathing. Outlets shall be located near all drybox sections and at area entries.

III. Drybox Atmosphere

A. All dryboxes shall be supplied with an argon atmosphere.

B. There shall be 30 argon changes per hour in each drybox.

C. Each drybox system shall have separate supplies and exhausts so that any one drybox system may be isolated from the remainder of the system.

D. The contamination level of the exhaust of each drybox system shall be monitored to detect leaks from the equipment in the box to the box atmosphere.

E. The raffinate, feed, and product junctions on the thermal column shall be enclosed and provided with an argon atmosphere. The exhausts from these shall also be monitored for contamination to detect leaks.

F. The oxygen content of the argon shall be no greater than 2 per cent. Provision shall be made for continuous recording of the oxygen content of the argon supplied to the drybox system.

G. Ten per cent of the contamination of the argon shall be removed during each cycle of the argon processing equipment.

H. The temperature of the argon shall be 75°± 2°F.

I. The pressure in the dryboxes shall be slightly less than that of the air in the area.

J. The equipment to supply the argon atmosphere shall be located in the mechanical equipment area.

K. The cryogenic still drybox shall have a hydrogen detection instrument at its exhaust.

IV. Hoods, Dryboxes and Passboxes

A. General

1. The layout of the dryboxes, fume hoods, and passboxes shall be as shown in the approved Engineering Department sketch. In the column area there shall be a drybox on the ground level running East and West with a passbox and fume hood on the East end. On the second level there shall be two dryboxes running East and West with a passbox and fume hood on the end of the raffinate box.

2. The dryboxes, passboxes, and hoods are to be of welded construction, and with a minimum of flanged and gasketed joints. It is preferred to make these units in sections. Arrangement is left to the designer for the makeup of sections.

3. Adjacent dryboxes shall be interconnected with air-lock doors.

B. Materials of Construction

1. All dryboxes, hoods and passboxes shall be of type 304 stainless steel of thickness to prevent oil canning, and to meet specifications further defined for specific units.

2. All windows shall be of 1/2" Rosalite except for the still drybox and the electrolysis drybox. The windows for these two boxes shall be of a material to withstand impact of fragments from a blast.

3. Refrigerator type hardware for passboxes and air-lock doors shall be brass with a smooth cadmium or chrome plate finish.

4. Gaskets for section joints and window seals shall be Presstite Tape # 590.5.

5. The walls of the still drybox and the electrolysis drybox shall have a fifty per cent greater thickness as a safety factor to contain any fragments in case of explosion.

C. Methods of Construction

1. In general the dryboxes shall be approximately eight feet long, three feet deep, and about five feet high. The still drybox dimensions are to be determined after the design of the still is completed. Exact dimensions for all dryboxes will be determined after process equipment has been designed.

2. The location of glove ports in the boxes will be determined at a later date. Sealed glove ports shall be placed on the rear of each box for use in maintenance.

3. All passboxes shall be connected to a vacuum header and an argon supply.

4. All dryboxes shall be connected to a vacuum header to provide a means of reducing pressure in the box.

5. All dryboxes shall give a zero leak test at a minimum of 1" water pressure using a helium leak detector. Gloves shall be installed in the ports during the testing.

6. Interior and exterior surfaces shall have a standard #4 finish.

7. Interior and exterior surfaces of all dryboxes, hoods, and passboxes shall be free of oil, grease, paint or any other protective coating.

8. All dryboxes shall be equipped with vapor proof lighting fixtures. The working surface shall have an illumination of 45-50 foot candles.

9. All service pipe fittings through drybox walls shall be welded.

10. Dryboxes and hoods shall be supported on a base of angle iron or channels with adjustable legs for leveling during installation. The legs shall be set in flanges.

11. All dryboxes shall have a transparent window on the operation side.

12. All dryboxes shall be supplied with leakproof AC power outlets. The number and location to be determined later.

13. The electrolysis drybox shall be supplied with leakproof AC power outlets.

14. All dryboxes shall be supplied with water for use with heat exchangers. The amounts of water and number of lines to be determined at a later date.

V. Miscellaneous

A. All piping for process gasses between dryboxes shall be double walled and air tight. The outer shell shall have an argon atmosphere.

B. All vacuum pumps for drybox systems shall be enclosed and vented to the stack.

C. The general working area shall have 35-40 foot-candle illumination.

D. Services required in the 1-C Area S.W.:

D.C. Supply 0-5 Volt 0-125 amp.
A.C. Supply 110 Volt and 220 Volt
Cooling water
Argon
Air (compressed and breathing)
Gas
Helium
Hydrogen
Nitrogen
Oxygen

E. Internal surfaces of all pieces of process equipment, piping, and valves shall be free of moisture, protective coatings, greases, oils, welding fluxes, and particulate matter.

F. Each unit of process equipment and each process system shall have a leak rate of not more than 10^{-6} mm Hg. hr^{-1} $cuft^{-1}$ at a pressure of 10^{-3} mm Hg.

WCS:it

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