



SUBJECT: Process Specifications

To assure effective operation and to maintain quality of finished tubes, rotary exhaust machines shall be subject to checks, tests, treatments, etc., as herein specified.

SCHEDULE NO. 1

1. PROCEDURE

MAY 1955

a. Start-Up

1. Open main water valve.

* a. See that valves to high frequency furnace, high frequency coils, and water tank supplying oil diffusion pumps are open.

2. Start bake oven heating.

a. Insert a lighted torch into the gas oven before turning on the gas valve to the oven and leave in the oven till the main burners are lit. If gas is allowed to accumulate in oven before it is lit, there is danger of a serious explosion occurring.

b. F-1 Exhaust - Light oven lighting torch, open main gas valve, and light gas burners. Set regulator to standard setting for type being run.

c. Turn on power switch for strip heaters.

d. F-5 and F-6 - Turn on oven power switch. Set regulator to standard setting for type being run.

3. Check tightness of port rubber on each head.

4. Turn on backer pumps.

* 5. Turn on oil diffusion pump heaters.

6. Allow machine to pump at least 15 minutes while indexing.

* a. Check flow of water through each oil diffusion pump as it indexes to front of machine.

7. Check backer pressures.

a. Machine must not be operated if any backer pump records over 25 microns pressure on McLeod gauge.

b. Finishing Foreman's permission must be secured to operate machine if any backer pump records over 10 microns pressure on McLeod gauge.

c. Machine must not be operated if Pirani gauge on tip off backer reads over 1.0.

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SCALE—

DIMENSIONS IN

UNLESS OTHERWISE SHOWN.

DIMENSIONS SHOWN WITHOUT TOLERANCES ARE DESIGN CENTERS

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1. PROCEDURE (cont'd)

b. Shut-Down Procedure

1. The following steps are necessary in shutting down rotary exhaust machines:
 - a. F-1 Exhaust - Close main gas valve. Turn off the strip heater switch. This should be done after the last tube is in Position #9.
 - b. F-5 and F-6 Exhaust - Turn off oven power switch.
 - c. F-1, F-5, and F-6 Exhaust - Shut off HF furnace after last tube is beyond HF coils.
 1. Turn "off" panel switches marked "HF Grid" and "HF Plate".
 2. Turn furnace rheostat back.
 3. Turn off main switch.
 4. Close water valves on furnace.
 5. Close water valves on HF coils.
 - d. After last tube has been tipped off, allow one index, then turn off switch. Close gas and air valves on tip off torch. Disconnect tip annealer. Turn off timer, index, activation, and meter switches on panel. Turn off main panel switch. Turn off DC switch.
 - * e. Allow approximately 30 minutes to elapse after oil diffusion pumps are off then shut off all backer pumps (Begin with #2 through #15). Break vacuum (through ports) in Positions 13, 14, 15.
 - f. Close hi-pressure air valve. Close low pressure air valve. Close main water valve.
 - g. Do not turn sump pump off.

IMPORTANT: Always double check to see that main gas, air (hi and low) and water valves are closed.

MAY 1955

c. Measurements of Pressures at Exhaust

1. Equipment for measuring exhaust pressure.
 - a. Standard McLeod Gauge (44-2-7).
 - b. McLeod Gauge Adaption.
 - c. Ionization Gauge Type C785.
 - d. Pirani Gauge (C778-A) on tip off backer.
2. Checking pressures with McLeod Gauge and adaption.
 - a. Before running tubes on machine, read backer pumps pressure with McLeod gauge adaption. Backer pumps must reach a maximum pressure of 25 microns before running tubes on machine.
 - b. Read backer pressures every 2 hours of operation.
 - c. Read "tip-off" position with standard McLeod gauge if Pirani gauge reads over 1.0.
 1. Tip off backer must reach a maximum pressure of 5 microns if operation is to continue.
 2. If Pirani gauge continues to read above 1.0 with standard McLeod gauge reading of 5.0 or less microns, replace Pirani tube at first opportunity.

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SUBJECT:

CATHODE RAY TUBE ROTARY EXHAUST
 Process Specifications

SUPERSEDED DATE May 31, 1946, pg. 3

1. PROCEDURE

c. Measurements of Pressures at Exhaust (cont'd)

MAY 1955

3. Checking pressures with ionization gauge.

- a. F-1, F-5 and F-6 - These must be 10 microamperes per 10 milliamperes of grid current reading or less for approval of any oil diffusion pump.
- b. Ionization gauges should be so placed in exhaust position that their plates will receive a maximum of high frequency treatments to adequately degas them (800°C. or over)
- c. The index time will generally be that specified for tubes which are being exhausted at the time pressure checks are made.
- d. The ionization gauge filament should not be lighted until a relatively low pressure has been reached, such as of order of 40 microns or less; i.e., tip-off position pressure. After lighting the filament, the gauge may be allowed to operate continuously except when filament circuit is opened to determine leakage after a regular reading. The filament current may be left low until indexing is complete.
- e. Procedure for reading ionization gauges on exhaust machines.

1. Preliminary:

- a. Connect plug in socket to 127V AC outlet. Check condition of battery in meter.
- b. Turn battery switch "on".
- c. Set operating knob on filament check. Reading should be 9 microamperes or better. Then return knob to operating position.
- d. Adjust zero on micrometer by using knob marked zero adjustor.

2. Steps in reading ionization gauges:

- a. Connect proper leads (plate, grid, and filaments) to corresponding elements in gauge. Avoid shorting by keeping leads from touching.
- b. Turn on Line and HT toggle switches.
- c. Set selector switch on "Bombard".
- d. Advance filament volt variac until bombardment current meter indicates 200-250 milliamps DC current. Hold for 2 minutes, or as long as required for plate in gauge to become red.
- e. Return variac to "0" and place selector switch on "gauge". Allow gauge to cool for 1/2 minute.
- f. Advance variac until grid current meter indicates 10 milliamps DC current.
- g. With micrometer switch "on" use range selector switch to find scale giving most accurate reading in microamps. (Highest reading without going off scale.)
- h. Return all switches to "0", normal of "off" positions and disconnect elements of gauge.

3. Additional:

- a. If DC milliamperes meters fail to indicate, check cartridge fuses for open circuits.
- b. When reading new gauges, subsequent bombardings of the plate may be necessary in order to obtain good readings.
- c. Battery switch should be "off" at all times except filament check, zero adjustment, or actual readings to avoid discharging battery.

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SUBJECT:

CATHODE RAY TUBE ROTARY EXHAUST
 Process Specifications

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1. PROCEDURE

d. Washing and Cleaning High Speed Metal Vacuum Systems
 for All Rotary Exhaust Machines

MAY 1955

1. Remove vacuum system from the machine.
 2. Before opening pump, wipe grease from outside of pump and wash hands well to remove grease and dirt.
 3. Open pump, remove and inspect rubbers and, if still usable, put them in clean methanol. Do not get grease on rubbers.
 4. Wash all vacuum system metal parts, including port plug, in carbon tetrachloride to remove oil. (Carbon tetrachloride which has been used for rinsing may be used for washing.) ***
 5. Rinse three times in clean carbon tetrachloride. Use a fresh lot of clean carbon tetrachloride for each rinse.
 6. Use high pressure air and dry in oven.
 7. While vacuum system metal parts are drying, wash rubbers well in methanol. This should preferably be done by completely immersing rubbers in methanol in a glass jar, about 3" greater in depth than length of rubbers, and vigorously joggling them up and down for about 30 seconds. Use about 1 pint of methanol for washing 8 rubbers, discarding methanol each time after 8 rubbers have been washed. Rinse rubbers 2 times in clean fresh methanol, using enough of latter each time to completely cover rubbers. Wear clean neoprene gloves during rinsing and following handling of rubbers. Allow rubbers to dry 48 hours on clean surface in a cabinet away from dust, wrap rubbers in white non-porous paper and store for later use.
- * NOTE: If new rubbers are to be used, they should be washed in methanol as described above, and be inspected for defects before being dried and put into storage.
8. Bake vacuum system, except bearings, washers, and rubbers, 1-1/2 hours at 300°C. with a slow stream of clean air flowing into exhaust port hole.
 9. After pump has cooled to room temperature, assemble using clean cloth gloves. Do not handle any internal parts of vacuum system with the bare hands. Use no oil on rubbers. Use a few drops of clean machine oil on bearings and threads only.
 10. Clamp pump in vertical position and tighten trap rubber. Put clean rubber stopper in low vacuum line connection to pump.

 11. Cover leak detector connection with clean rubber nipple and plug.
 12. Put plug in port hole and clamp rubber lightly.
 13. Transport pump in vertical position and clamp in test position. (For testing refer to Section e)..
 14. Do not allow pump to stand with port rubber tightly clamped when not in use.

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SUBJECT:

CATHODE RAY TUBE ROTARY EXHAUST
Process Specifications

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1. PROCEDURE (cont'd)

e. Testing of High Speed Metal Vacuum Systems for All Rotary Exhaust Machines

MAY 1955

1. Connect vacuum system to test position backing pump line, take out plug, put ionization gauge in port.
2. Tighten rubbers, insert heater.
3. Start backing pump and turn on water after pump gives reading on McLeod gauge of 10 to 15 microns.
4. Bombard ionization gauge at 200 milliamps to plate and grid for 5 to 10 minutes.
5. Allow gauge to cool 5 minutes and check pressure. Turn filament on and off several times at about 1-minute intervals. Gauge reading should be 1 microampere or less per 10 milliamperes grid current.
6. Do not allow pump to stand with port rubber tightly clamped when not in use.

f. Instructions for Gas Testing Immediately After Exhaust

* On the following types only: 7DP4, 10BP4A, 5TP4, 5FP4A, 5FP7A, 5FP14, 7BP7A, 7CP1, 7CP4, 12DF7A, 5WP11, 5WP15, 7TP4, 10SP4, 5ZP16, 10KP7, 7MP7, 7MP14, and 12DF7B.

1. Arrange pee wee clips for tube type to be tested.
2. Connect proper elements in tube to pee wee clips and close interlock.
3. Turn on main switch.
- * 4. Turn on filament voltage according to chart.

Tube Type	Preheat		Fil.	G2	F1	P2
	Fil. Only					
	V	Min.				
5FP4A	10	1/2	8	300	--	-25
5FP7A	"	"	"	"	--	-25
5FP14	"	"	"	"	--	-25
5TP4	"	"	"	"	-25	--
5WP11	"	"	"	"	-25	--
5WP15	"	"	"	"	-25	--
5ZP16	"	"	"	"	-25	--
7BP7A	"	"	"	"	--	-25
7CP1	"	"	"	"	-25	--
7CP4	"	"	"	"	-25	--
7DP4	"	"	"	"	-25	--
7MP7	"	"	"	"	--	-25
7MP14	"	"	"	"	--	-25
7TP4	"	"	"	"	-25	--
10BP4A	"	"	"	"	--	-25

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f. Instructions for Gas Testing Immediately After Exhaust

→ * 4. Turn on filament voltage according to chart. (cont'd)

MAY 1955

Tube Type	Preheat		Fil.	G2	P1	P2
	Fil. Only					
	V	Min.				
10KP7	10	1/2	8	300	--	-25
10SP4	"	"	"	"	-25	--
12DP7A	"	"	"	"	--	-25
12DP7B	"	"	"	"	--	-25

5. Turn up G2 voltage to 300V. Adjust G2 current to 500 microamperes. If unable to obtain 500 microamperes, G2 voltage can be increased to a maximum of 450 volts.
6. Read gas meter in microamperes. If reading is more than 1 microampere with 500 microamperes G2 current, take leakage current by adjusting G1 bias to produce G2 current of 0 microamperes. Read leakage and subtract reading from gas reading to get true gas reading.
7. True gas reading should be consistently below 1 microamperes.

ENGINEERING SECTION
 STANDARDIZING

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