

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
OFFICE OF SYNTHETIC LIQUID FUELS
LOUISIANA, MISSOURI

TOM Reel 12
Item 33
Frames 20'77-20'81

0148

T-470
W. M. Sternberg
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OPERATING DIRECTIONS FOR STARTING
THE PRODUCER

November 7, 1941

The starting up of the producer must be under the responsible direction of the shift supervisor of the gas works, and the following directions must be followed:

A. Starting a Cold Producer

- 1). Check all the parts of the producer: the grate drive, the recirculation pumps, the skirt drive, and the scraper of the gas outlet elbow.
- 2). Check to make sure that the flare valve is closed. Separate the pressure release pipeline of the coal pit pocket by turning the elbow at the valve and put in a blind. Test to see that the slide is inserted in the gas outlet.
- 3). The generator is pressured up with air at 20 atm after each major repair. The pressure is next released.
- 4). Water is fed into the jacket until the level of the water can be seen in the sight glass.
- 5). Remove the blind from the steam pipe, start heating the ash pocket, test the condenser head.
- 6). Fill grate with dry, no longer glowing and burned out ash (about 2.5 cbm) through the poker hole lid, arrange four torches of

excelsior and have additional wood within reach near the different poker hole lids.

7). Open the spray cooler circulation drain, while leaving the injection valves and the condensate delivery valves closed. Supply cooling water to the spray cooler jacket.

8). Check the differential pressure gauge for air, oxygen and steam.

9). Open the coal pocket and coal conical ring.

10). Start operating the oxygen compressor with air or else start later the pipeline with 4.5 atm air from the auxiliary compressor.

11). Light the lighting torches and throw them in simultaneously through all the poker holes (it is forbidden to saturate the torches with tar, middle oil, or even with light oil).

12). Supply some air (50 mm Hg) and put in all the wood simultaneously into the four poker openings.

13). Close the poker openings.

14). Open full the flare valve (no flare valve of any other producer must, however, be open at the same time).

15). Close the coal cone, fill the coal pocket bin and close the coal pocket lid.

16). Give 1/4 of a coal pocket-full of gasification coal after about 15 minutes (the coal cone is to be opened for about 12 seconds).

17). The water drain valve of the steam pipeline at the gasification inlet elbow must be opened, the remaining steam shut-off valves are opened, taking care not to permit any steam going through the differential pressure meter.

18). Increase the amount of air to 400 mm Hg and add steam (2 mm Hg).

19). Slowly throttle the flare valve. When the generator pressure begins to exceed 1 atm, close the drain valve of the steam pipeline. Increase the pressure in the generator to 4 atms by additional throttling; and keep this pressure as constant as possible by regulating the flare valve.

20). Regulate the amount of steam to agree with the starting diagram BCG K IV/40.

21). Fill the spray cooler circuit with water, open the suction valve under the spray cooler, start up the circulation pump and open the injection valve. Turn off the condensate drain valve and check the condensate trap. Then send cooling water through the heat exchanger.

22). Add 1/4 pocket-full of gasification coal in half hourly intervals after the first coal addition.

23). Observe the gas outlet temperature. When 150°C is reached, add one additional pocket-full of coal.

24). When the gas outlet temperature reaches at least 180°C again add 1 pocket-full; this is to be continued.

25). Test the gas for O₂ after adding the first pocket-full; with 2% O₂ or less, the gas is lit or else sent through the steam cooler to the pressure release line, while the valve to the flare is closed. Regulate the cooling water supply in the steam coolers. Unless there are some important reasons not to do so, the gas must be sent through the steam cooler.

26). Watch the CO₂ content of the raw gas. It must vary between 22 and 25% CO₂. The carbon monoxide must be determined by analysis.

27). Turn off again the producer about 20 hours after the addition of the first full coal pocket, and release the pressure (see

operating directions for shutting down the producer).

28). Replace the blind disc in the gas outlet with an orifice.

29). Again increase the pressure in the producer to 4 atms and produce the same conditions as existed before shutting down.

30). After the producer is full, increase its pressure slowly by throttling the flare valve (during 2 hours), keeping the amount of air constant at 400 mm Hg and regulating the amount of steam in accordance with the diagram BCG K IV/40.

31). When the producer is full, increase slowly over a two hour period the pressure to the required level, maintaining the amount of air at 400 mm Hg and regulating the steam by the diagram BCG K IV/40.

32). Change over from air to oxygen after 18 atm gauge is reached in the producer (close the intermediate pressure release valve at the second oxygen compressor) and after the air has been turned off, steam is set at first at 25 mm and oxygen at 20 mm.

33). Watch the producer pressure after changing it over to oxygen and regulate the flare valve accurately. Slowly increase the pressure to 20 atm.

34). Connect the producer to the raw gas pipeline by slow opening of the main shut-off valve. Then slowly close the flare valve or the valve to the condensate cooler.

35). Regulate the cooling water of the heat exchanger and of the spray cooler.

36). Increase the load on the producer, while increasing every 10 minutes the oxygen addition by 10 mm differential pressure. The amount of steam is to be regulated correspondingly according to the curves on diagram BCG K IV/41.

B. Starting the Producer after Short Interruption of Operations

- If the operation of the producer were interrupted for less than 8 hours, operations can be resumed directly with oxygen, keeping the following in mind:

- 1). Test whether water can be seen in the sight glass.
- 2). Check whether the ash pocket heating has been started and whether the condensation trap is in order.
- 3). Check to see that the poking holes are closed.
- 4). Check whether the coal cone is set and whether the ash pocket lid is closed according to directions.
- 5). Open the flare valve completely, but no second producer may be simultaneously pressure released through the flare pipeline.
- 6). Control the differential pressure meter for oxygen and steam.
- 7). Should any blinds have been inserted in the gas outlet, they must first be withdrawn. The upper steam shut-off valve is opened, watching that the steam does not go through the differential pressure meter. The steam pipe drain valves at the gasification agents intake must be opened.
- 8). Set the steam and oxygen valve in accordance with the curves, diagram BCG-K IV/41; the drain valve of the steam pipeline is again closed when no more water escapes.
- 9). The flare valve is again throttled until the producer has reached 4 atm gauge pressure.
- 10). Test gas for O_2 . With 2% O_2 or less, the gas is lit or else sent to the pressure release pipeline over the steam cooler, while the valve to the flare is closed. The cooling water in the steam cooler is regulated.

11). The spray cooler circuit is filled with water, the suction valve in the spray cooler is open, the circulation pumps are connected in, and the injection orifices are opened, the condensate drain valve is turned off and the condenser trap is checked.

12). The gas outlet temperature must be watched. When the temperature reaches 180°C the coal may be added as needed. Is the generator full when the gas inlet temperature is 180°C, the heating up can proceed unchecked.

13). The flare valve or the valve to the vapor cooler is slowly throttled, increasing the producer pressure (see Section A, paragraph 32). Normally, the time required for reaching the required operating conditions should be one hour from this moment.

14). The CO₂ content of the gas should be 33-36%. The carbon monoxide is to be checked by analysis.

15). When 20 atm gauge pressure is reached, the main gas outlet valve is opened and the producer connected in parallel. The flare valve or the valve to the vapor cooler is slowly closed.

16). The amount of cooling water in the heat exchanger and the spray cooler are regulated.

17). Slowly bring the performance of the producer up to requirements.

/s/ Otto

OPERATING DIRECTIONS FOR THE PRODUCER PLANT

Boehlen, February 7, 1942

TOM Reel 12, Item 33
Frames 30'22-30'37

1). Askania Regulating Unit

The supervision and operation is not done by the operating crew of the gas works, but is done automatically. Accordingly, no employees of the BCG may be employed at these units.

a). Gas Pressure Regulator

The pressures in the generators depend on the setting of the Askania gas pressure regulator behind the desulfurization. The operating personnel may not make any important changes in the setting. Only the shift foreman is permitted to make any changes in pressure, and special attention must be paid to always have sufficiently high gas pressure in the pressure water scrubbers, which will prevent too great a strain on the drive motors of the pump - turbine units. Whenever irregularities in the regulator unit make it impossible to maintain a constant gas pressure, regulations must be done by hand by the regulator operators, and the gas pressure is to be observed after short time intervals (3 minutes). The gas volume recorder must be observed during the opening or closing of the regulation valves. The thrupt must not exceed the capacity of the regulator even for a short while, because this causes troubles with the measuring unit, or else water can be readily entrained by the gas into the pressure scrubber.

b). Steam Pressure

The steam pressure as well must be kept constant at 23 atm gauge by using the Askania regulator. In case of trouble the regulator

must be turned off and the hand regulator set to "open". When the steam pressure is insufficient an alarm is sounded. The purpose of this signal is discussed in another section.

o). Oxygen Pressure

The oxygen pressure is best coupled up with the steam pressure for greater safety of operations, and is also equal to 23 atm gauge. These mining low directions are intended to prevent feeding oxygen alone into the generator when steam is shut off. In spite of this safety measure, the oxygen pressure must be continuously watched. The lead seal tag on the bypass valve of the oxygen regulating valve may be broken only by the snift foreman in case of emergency, and the shift foreman must then describe in his log the urgent necessity for doing so.

When the alarm signal for insufficient steam pressure is sounded, the oxygen regulator must immediately be changed over to hand regulation and the supply turned off. In addition, the super-heater is protected by immediately letting off steam and the gas burner is extinguished. All the oxygen supply valves to the individual generators must be immediately closed. Time losses are avoided by informing the oxygen plant only afterwards about the occurrence.

2). Operating the Producers

a). Setting the Producer Load and Fixing the Oxygen - Steam Proportion

The proper load upon the producer is created by the correct supply of oxygen and gasification steam.

The amounts are read off on the pressure difference meter on the diagram BCG K IV/41. When changing the load, the oxygen plant must be immediately notified under normal operations, to permit the

plant to maintain a constant oxygen pressure. The oxygen:steam ratio must be set in accordance with BCG K IV/41. This set of curves contains different curves (A, B, C, D and E), with each curve representing an increased steam supply in the alphabetic order. The steam supply must be kept as low as possible to maintain a proper quality of the gas (sufficient formation of methane); it must, however, be set depending on the appearance of the ash, to prevent difficulties in ash removal. The producer operators must therefore continuously observe the appearance of the ash. Whenever hard sintered ash pieces are present, the producer must be operated cooler by increasing the steam addition. The producer then must be set to the next higher curve. The increased addition of steam causes a lowering of the temperature in the gasification zone, because the conversion process of the steam with coal to carbon monoxide consumes heat. Only after the ash has again become free of slag, operations can be changed over to a lower steam-oxygen proportion. Slagging may also manifest itself in other ways.

1). The fire zone can be displaced, which will be shown by variations in the jacket temperatures. For this reason the jacket temperatures of the slagged-up producer must be connected to the six-coil recorder, while normally the jacket temperatures of gas generators are only recorded every two hours.

2). The gas production does not correspond to the amount of oxygen introduced. We may make a preliminary assumption of an oxygen consumption of 0.15 cbm oxygen/cbm of pure gas produced.

3). The gas outlet temperature is above normal.

4). The power consumption of the ash removal unit is above normal.

All these points must therefore be continuously watched even when operations proceed free of trouble.

During operations the carbon monoxide content is continuously determined by analysis. Care must always be taken to have the gas samples drained free of water, i.e. kept clean.

b). Feeding Coal to the Producers

The regular supply can be checked by the producer operator by observation of the gas outlet temperature. Should the latter become higher than normal, the coal pocket operators must be informed to permit them to tell whether any irregularities have occurred in the coal supply (coal remaining by hanging). The upper units inside the producer are protected from any danger by reducing the load when the gas outlet temperature exceeds 400°C, and if necessary the producer may have to be shut down. If the coal is supplied normally and yet the gas outlet temperature rises, other causes must be found and the shift supervisor must be informed.

c). Ash Removal from the Producers

The ash to be removed from the producer depends on the producer load. As much ash must always be removed as is introduced in the gasification coal as non-combustibles. If too much ash is introduced, too much unburned material remains in the ash (uneconomical), while when too much is carried out, the gasification zone is shifted upwards, which may also be observed at the gas outlet temperature.

The amount of ash removed may be set by changing the number of teeth moved by the rack and pinion. The ash pocket is to be emptied after 8 tooth-hours (number of teeth pushed forward, multiplied by the number of hours of operation). This is done by the ash pocket

operators who must work under special operating directions, while the setting of the ratchet and the starting and stopping of the starting motor must be done by the producer operator. The latter must also supervise the grate drive. The drive connection must be protected during the deashing by hanging out a notice to prevent any unwanted closing of the circuit.

Shear pins are used for the mechanical protection of the drive, and three different shear pins, numbered 1-3, are available. In the regular operation only the shear pin 1 is to be used. The putting in of the shear pins must be done carefully and the producer plant supervisors must check the correct setting in every case. Should these shear pins break because of the too hard operation of the grate, the man in charge of the operation must be notified, and he in turn must give new directions. It is entirely forbidden to use other shear pins or even steel pins without special directions.

d). The Jacket Feeding

The cooling water jackets of the producer must be steadily supplied with the condensate in amounts based on continuous observation of the water level in the steam collector. The water level may under no conditions drop below the minimum level, and on the other hand only enough must be fed to have the level visible (according to directions). Should the gasifier need to be overfed in order to fill the spray cooler circuit, this may only be done under special directions of the shift supervisor. The producer operator or else the especially responsible feed supervisors must be held responsible for it. The care and servicing of the feed pumps is also entrusted to them. Should the feed pumps get out of order, the emergency feed

line from the pumps of the pressure water scrubbers may be put to use with a specific consent of the men in charge of the operations. This may, however, be only done in exceptional cases because of the unfavorable water supply. After the line had been used, it must be shut down and drained.

The producer jackets must be regularly flushed to remove the sludge accumulations and to prevent too great concentration of evaporation residues of the water in the cooling jacket. A rule must be established that each producer must be flushed at least once a week by the producer operator and later by the feed men, with at least 50 cms of water, measured on the sight glass, drained off. Should only 15 cms be drained, this must be done frequently in time intervals of about one hour. The time of the sludge removal and the amount of water drained is to be entered by the operating personnel into the operation log. In addition, after each draining the boiler water sample must be taken and tested by the main laboratory.

c). Spray Cooler Circuit

Perfect operation of the spray cooler circuit is a necessary prerequisite for trouble-free operations. The condensation traps must be continuously watched. They must be regularly checked by the producer operator. The circulation pumps must use 9-10 amp of current if the amount of water injected is sufficient for cooling of the gas. The heat is removed by the return cooling water in the heat exchanger. The maximum possible amount of water must always be supplied to insure sufficient water in the heat exchanger and must be established by observing the off-water temperature. Should it be necessary, the cooling water may be throttled down in that particular producer, on which the

temperature of the water is the lowest. If the water supply is increased, the temperature of the water should be 45-50°C. The temperature must be lowered to prevent a too rapid destruction of the cooling tubes and corrosion. Should the circuit get out of commission, which is readily recognized by the low current consumption of the circulation pump or by the insufficient gas cooling, the producer load must be immediately reduced and the circuit again refilled by additional feed. This may be done by overfeeding the individual producers, or with a single producer out of operation and the heat exchanger must be strongly flushed under the supervision of the operation supervisor by opening the drain valve while the injection valves or the suction valve on the spray cooler are kept closed. Should this fail to bring about the desired results, the management must be notified. The producer operator is further entrusted with the care of the circulation pumps and with the proper maintenance of the tar draining.

f). Operation of the Skirts

Should the continuous electric drive for operating the skirts not be available in all the producers, the gas outlet space is kept clean by rodding out the skirt once every shift, which will require about 40 half-revolutions. The operation supervisors must pay particular attention to this task and enter the time in the log.

g). Scraper Servicing

The scrapers for the cleaning of the gas outlet bend must be hand operated twice in every shift. When doing this the spindle must be completely drawn up and down. The scraper must not, however, be left in the extreme location, because of the danger of the spindles

becoming stuck during temperature variations in the gas. The supervisor must check during every shift the easy operation of the scrapers.

h). Setting of the Heating Value

The pure gas produced should have an average heat value of 4500 kcal/nobm (± 100 kcal/nobm), and all variations must be avoided as much as possible. Experience has shown that the heat value is higher with smaller gas load than with larger loads. This may be compensated first of all by a different efficiency of removal of carbon dioxide in the pressure scrubbers, for which purpose the operators of the pressure scrubbers must be given more detailed information by the supervisor of the gas production on the operating conditions.

Efforts must be made to have the regulation as sensitive as possible and to avoid large variations. The density recorder gives good information on this point and must therefore be continuously observed. Changing the load of the gas works must always be followed by regulating the pressure water scrubbing. With very small gas load the heat value of the gases may exceed 4600 kcal/nobm, in spite of a high CO₂ content. In such case, the producer load must be increased with a possible starting of a second oxygen compressor and feed the excess gas to the pack installation. Should this be impossible for operational reasons, the average heat value is obtained by a higher load of the producers, by non-uniform operations of the different producers, or occasionally by snutting one producer out of operation. Getting one of the producers out of operation must, however, only be done when one may anticipate more than 12 hours of excess capacity of the generators. One should avoid reducing the oxygen concentration because of the difficulties of the regulating and the undesirable effect upon the whole operation.

3). General Remarks

a). Protection Against Gas Leaks. Welding Operations.

The gas produced is combustible and explosive and harmful when breathed in. For this reason, any leaks must be continuously looked for, and the management must be notified in special cases, e.g. in case of breaks of the main packing.

When the gas odor becomes noticeable, good ventilation must be taken care of and any welding operations which are being performed must be immediately stopped. Open fire and welding must, as a general rule, be done only with a written permission of the management. The supervisor must ask for a written permission in all doubtful cases. When the gas odor becomes strong, the scene of the trouble must only be approached with gas masks, and a second man, also with a gas mask, must also be present, and if leaks become very large, efforts must be made to exclude the corresponding parts of the unit or the pipeline, or shutting them off.

The gas producer building must be always sufficiently ventilated. In particular, all the windows and doors of the ash removal and coal service stations must be always open on the windward side even during the coldest time of the year or during the black-out. The shift supervisor or foreman is made responsible for it.

b). Lubrication

All the lubricating places of the equipment and machinery must be regularly serviced. A special oiler is put in charge of this task. Should any lubrication places become plugged up, this must be notified in writing. The supervisors must continuously satisfy themselves that all the lubrication places are in order.

c). Measuring Instruments

The mechanical shops are entrusted with the maintenance and operation of the control instruments except the Junkers calorimeter. Should any instrument fail, a message should be sent by telephone to the shops. In case of minor trouble, such as sticking of the recording paper, this may be helped by the producer operator, or else when great difficulties are to be anticipated in operation and a rapid fixing of the instruments cannot be done by the mechanic, the shift supervisor may be requested to help (e.g. differential pressure gauge for gas and oxygen).

When the Junkers calorimeter breaks down the laboratory is to be informed, and the latter is held responsible for the operation of this instrument.

d). Shift Log and Operation Record

A shift log is provided for the gas production. All the important operation events must be noted in the log, to keep the new shifts informed of all that happens during the shift.

A number of operation records must be kept for the supervision of the machinery and equipment. This must be done with extreme care by the producer operator. The shift supervisor has to watch the entries, because irregularities in operation of the plant can be particularly readily recognized there. The shift foremen have to read the records and initial them at least once during the shift.

OPERATIONS FOR STOPPING THE GASIFIERS, SECOND EDITION

Boehlen, August 30, 1943

TOM-Reel 12, Item 33
Frames 30'38-30'41

The shift supervisor is primarily responsible for the stopping of the producers.

A. Stopping of the Producers Without Pressure Release

- 1). Stopping the coal supply of the producer.
- 2). Regulating valve for oxygen is stopped. Warning sign is hung up.
- 3). The steam supply valve is strongly throttled reducing the steam supply to the producer to about 2-3 mm.
- 4). The second shut-down oxygen valve is closed, and the in-between piece is pressure released.
- 5). The steam regulating valve is entirely closed, the upper main steam valve is also closed. A warning sign is hung up.
- 6). The grate drive is stopped, the switch secured.
- 7). The two outlet valves for raw gas are closed after about 15 minutes. The intermediate piece is pressure released and the pressure release valve is left open.
- 8). The pressure in the producer is regulated by opening the flare valve.
- 9). The water level is watched and the water fed as during normal operations.

B. Shutting Down with Pressure Release

- 1-7). As before.

8). Flare valve is slightly opened and the producer pressure drops slowly.

9). The water level is watched and the feed continued. The pressure release may proceed only at a sufficient rate to keep the water level always visible.

10). When a pressure of 5 atm gauge is reached, the spray cooler circuit is taken out of operations, with the circulation pumps stopped, the injection valves and the condensate drain valve closed. The water in the circuit is then slowly let out until gas escapes. This is to be repeated at short intervals until the pressure in the producer permits a steady reduction of the condensate formed.

The switch for the circulation pump is secured.

11). The shut-off steam valve of the stuffing box of the gasifying agents intake and between the ash pocket pressure release valves are closed.

12). When the producer no longer stands under any pressure, the permanent emergency flare is opened. In the absence of a permanent emergency flare the poker hole closure is opened and the ventilating pipe is set up. The heating steam line, the filling line and the shut-off steam lines for the ash pocket are closed with blinds. A blind disc should be put in the gas outlet only in case of a longer stoppage of the producer (over 24 hours), if no work is to be done on the producer.

G. Turning Over the Gas-Producer to the Repair Gang

Work on the producer is permissible only with special precautions as long as there is fire in the producer.

1). Blind discs must be inserted into the gas outlet and into the flare pipeline before beginning of work.

2). It is important to introduce nitrogen for two hours after pressure release through the ash pocket and with the open ash cone.

3). During that time the bolts of the flange connections which may be loosened, i.e. not the ones between the producer and the ash outlet elbow, can be loosened down to the last four bolts.

4). The following work is permitted during this operation condition:

- a). Exchanging the ash elbow closure lids.
- b). Exchanging the ash cones including the drive shaft and the upper drive.

Attention must be paid while working on a and b that a temporary lid on the ash outlet elbow, sufficiently strongly fastened by bolts, is put on even during the short interruption of work.

- c). Changing of the packing of the connecting pipelines. The packing between the ash outlet elbow and the producer can, however, under no conditions be replaced.
- d). The packing of all the stuffing boxes, except the pyrometer stuffing box.
- e). Exchanging the packing between the ash pocket and the ash outlet elbow with a set-ash cone.

5). The producer is flushed for at least 24 hours with a very O_2 -free nitrogen (1-1.5%), then the packing between the producer and the coal hopper can be renewed or work done on the coal cone and the scraper of the gas outlet elbow, after having taken care, however, of creating suction after opening the ash cone and the ash pocket lid after the oxygen was turned off. Attention must here be paid to

have only one opening at a time in the upper part of the producer, to prevent sucking in any air. Moreover, the coal pocket pressure release pipeline must be blinded off.

6). No other repair work may be done in the producer before it is emptied.

D. Emptying the Producer

1). All the work described in Section B, 1-13, must be performed.

2). Inserting the blind into the gas outlet and into the flare line.

3). The grate drive is connected to discharge and the ash, and later coal, are emptied in a strong blast with nitrogen and with the maximum possible motion of the ratchet.

4). The emptying of the ash pocket proceeds in the same operation steps as in normal operations, without, however, first pressure releasing the ash pocket and instead blowing nitrogen during the ash removal. The emptying of the ash pocket must proceed with particular care. The production of much dust must be avoided because of the possibility of dust fires.

E. Flushing of the Producer

When the producer cannot be emptied by means of the grate drive, it must be flushed with water. This work requires the following precautionary measures:

1). First of all, the work described in Section B, 1-13, must be carried out.

2). The blinds in the gas outlet pipeline and the flare line are inserted.

3). The blind inserted into the coal hopper pressure release pipeline.

4). The producer is flushed with nitrogen for 24 hours by way of the ash pocket.

5). The coal pocket is kept closed and the coal cone is set. A poker hole is opened and the spraying tube is inserted. The annular space between the poker hole and the spray tube is tightened up by moist cleaning cloth or in other ways.

6). The ash cone is raised and furnace suspended, the ash bin lid is screwed up and swung out of the way.

7). The spray tube is introduced as deep into the ash bed as possible and the water slowly turned on. Only enough water is turned on, not to have the steam pressure great enough to throw out the packing around the spray tube. This work must, however, be done by at least two men. The flushing is continued until the producer is practically clean.

8). If, however, the producer cannot be emptied even in this manner, other methods must be used.

F. Entering a Producer

1). Should it become necessary to enter a producer, all the blinds must be in place and all the drives must be protected (by safety signs).

2). Blinds must be inserted in

- a). Gas outlet
- b). Ash pocket pressure release pipeline
- c). Ash heating line
- d). Sealing steam for the gasification agent stuffing box
- e). The flare valve
- f). Coal hopper pressure release pipeline
- g). Spray cooler drain line

Notice to b, c and d: it is sufficient for the use of the producers to insert a blind into the main pipeline.

3). Sufficient airing of the producer is provided for (natural draft or fresh air blower).

4). The first man entering a shut-down producer must have a second man present.

5). The fire sinders remaining in the producer are eliminated, and after that the repair on the producer work can be carried out without any interference, except for the constant adherence to directions regarding the use of open flames and carrying out of welding.

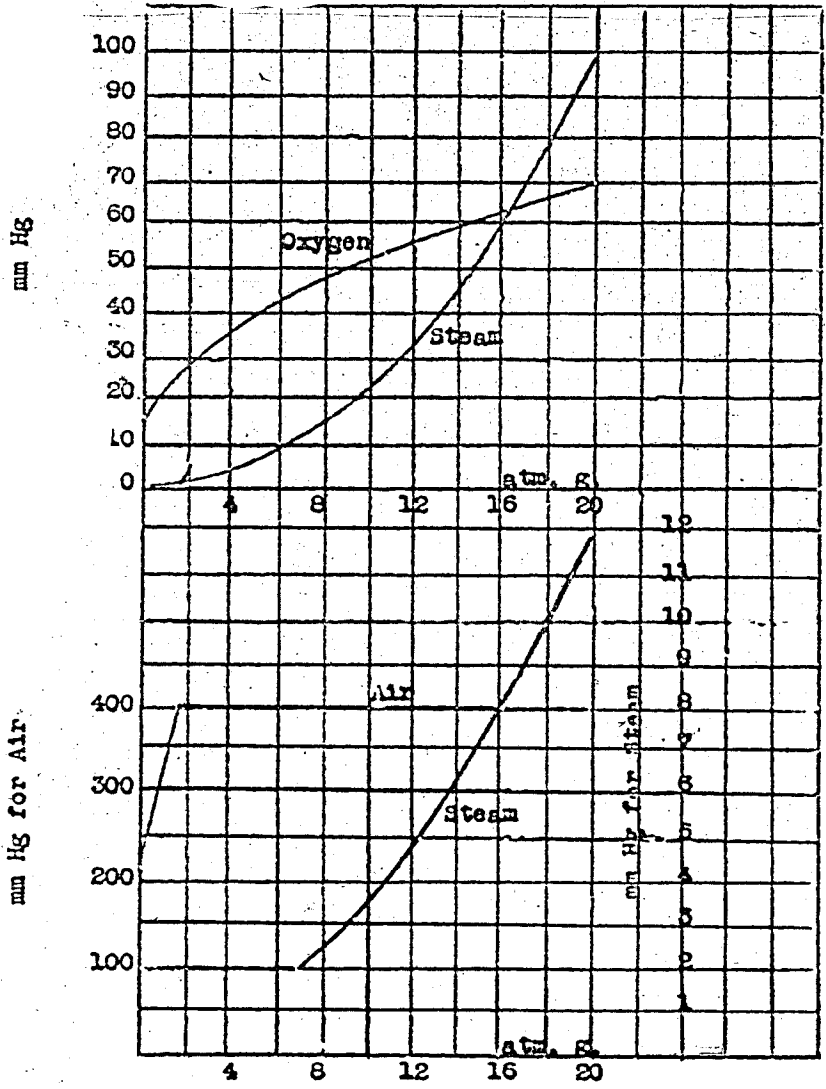
G. Miscellaneous

1). The jacket of the producer can be rinsed with cold water for rapid cooling of the producer after emptying it or after flushing it empty.

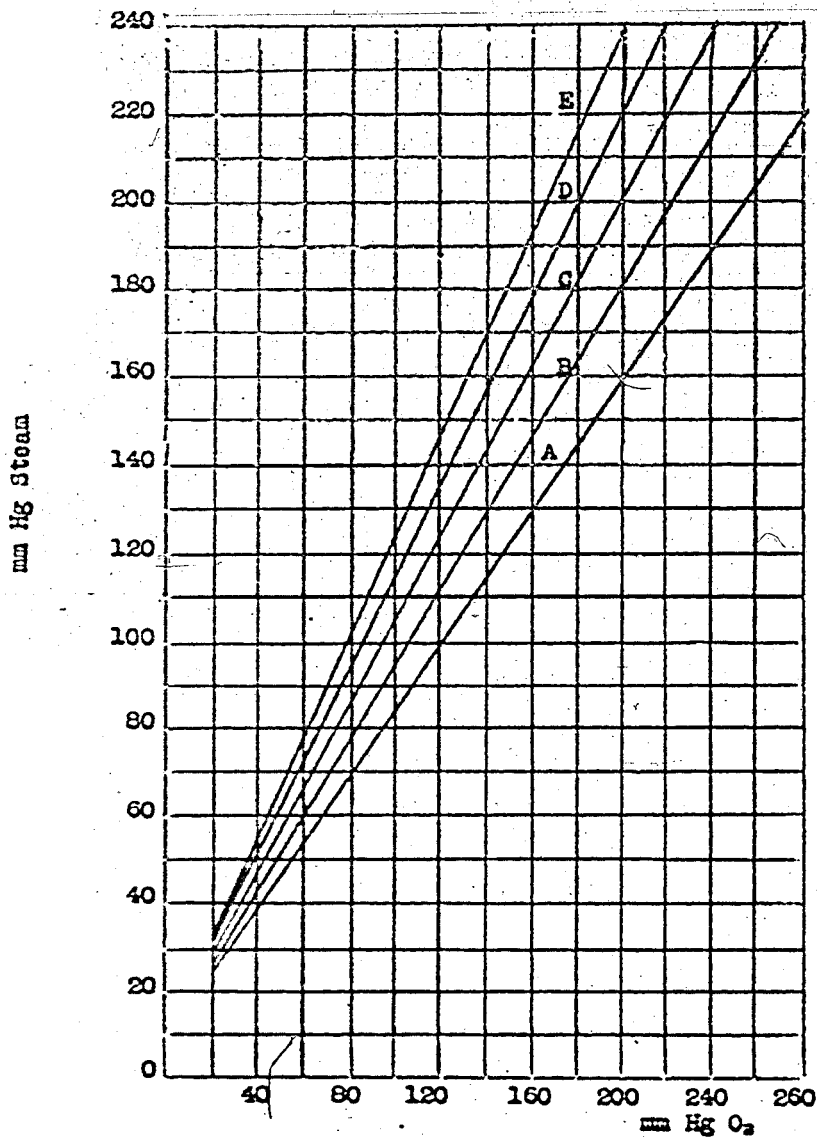
2). As long as there exists the possibility of fire in the producer, the jacket must never be empty, i.e. the water level must be visible.

3). As soon as the absence of a fire has been proven by entering the producer, the water jacket can be completely drained.

/s/ Otto



Starting Curves for Oxygen and Air.



Generator Operating Curves. BCG K IV 41