FINAL REPORT

ON

PHASE II

CONTRACT DA 30-070-CML-1250

A PRODUCTION ENGINEERING STUDY

OF THE

PROTECTIVE, CIVILIAN, CD V-805 MASK

SUBMITTED TO

U. S. ARMY CHEMICAL PROCUREMENT DISTRICT

346 BROADWAY

NEW YORK 13, NEW YORK

BY

THE GENERAL TIRE & RUBBER COMPANY

INDUSTRIAL PRODUCTS DIVISION

WABASH, INDIANA

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FOREWARD

SUBMITTED MAY 3, 1965 TO
THE OFFICE OF CIVIL DEFENSE
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WASHINGTON, D.C.

SUBMITTED BY
U.S. ARMY, EDGEWOOD ARSENAL
EDGEWOOD ARSENAL, MARYLAND

Studies conducted for the Office of Civil Defense indicate that the threat to the United States posed by chemical and biological agents is relatively less significant than that posed by the nuclear one. Chemical agents are not considered a major strategic threat as they are effective mainly if used against tactical targets of limited area. Although the possibility of employment of biological agents against U.S. population centers cannot be ruled out, neither a chemical nor biological threat against the Continental United States warrants, at this time, the attention and priority given to defense against the effects of nuclear weapons. However, research on methods of detecting, identifying, reporting, analyzing, and defending against biological agents will continue while the potential threat is kept under constant review.

This report has been prepared in fulfillment of one of the conditions of the Memorandum of Understanding, No. CDM-SR-60-53, between the Office of Civil and Defense Mobilization and the Office of Chief Chemical Officer, Department of the Army. This report has been reviewed in the Office of Civil Defense, Department of the Army, and approved for publication. Approval does not signify that the contents of this report necessarily reflect the views and policies of the Office of Civil Defense; findings and recommendations may, in fact, be at variance with current programs.

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This is one of two reports produced under this contract which DDC will make copies available to the Clearinghouse for Federal Scientific and Technical Information, National Bureau of Standards, Department of Commerce, Springfield, Virginia, for sale to the general public.

ABSTRACT

This report presents a detailed descriptive analysis of the manufacturing processes, procedures, and equipment required to produce the Protective Civilian CD V-805 Mask at the rate of 100,000 acceptable mask per month based upon a two-shift, five-day week and a twenty-day work month.

The descriptive analysis is based upon the experience and knowledge gained by The General Tire and Rubber Company during the production of 25,000 CD V-805 Mask produced in accordance with requirements of the Production Engineering Study, Contract DA 30-070-CML-1250 with the U.S. Army Chemical Corps. The assembly line presented in the main body of the report is not an analysis of the assembly line fabricated to produce the 25,000 CD V-805 Mask on the engineering study.

The technical data developed on the engineering study is presented in the appendix along with additional data to aid in the analysis of the large volume production line concept. The appendix also presents a complete Quality Control Plan outlining the quality control requirements for the assembly line in the report.

In addition to the material in this report, a colored movie was produced showing in detail the tooling, the operations, and the quality control procedures actually used during the production engineering study while producing the 25,000 CD V-805 Masks. The tooling developed on this program was not intended to be volume production tooling although many items could very easily be used for volume production. The engineering study relative to tool design proved the feasibility of each operation, provided the drawings of tools and equipment capable of being expanded to volume production and brought out a few desirable engineering changes during the production of a small quantity of CD V-805 Masks.

The Production Engineering Study on the CD V-805 Mask has proven to be a valuable asset in bridging the sometimes difficult and expensive gap between a research program and a volume production program. With the data presented in this report, the movie, and the drawings, a manufacturer should be able to successfully set up a volume production line capable of producing acceptable Protective Civilian CD V-805 Masks.

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I N T R O D U C T I O N

Subject

This report presents a detailed analysis of an assembly line capable of producing 100,000 acceptable Protective Civilian CD V-805 Masks per month based upon a two-shift, five-day week, and a twenty-day work month. The exception to the two-shift basis is the Faceblank Production which shall operate on a three-shift, five-day week, and a twenty-day work month. The assembly line analysis is based upon data acquired during the Production Engineering Study, Contract DA 30-070-CML-1250.

Purpose

The purpose of this report is to provide a competent manufacturer unfamiliar with the CD V-805 Mask with adequate information in the form of assembly line layouts, flow charts, tooling design, quality control, drawings, and specifications to be able to build an assembly line capable of producing 100,000 acceptable CD V-805 Masks a month.

INTRODUCTION

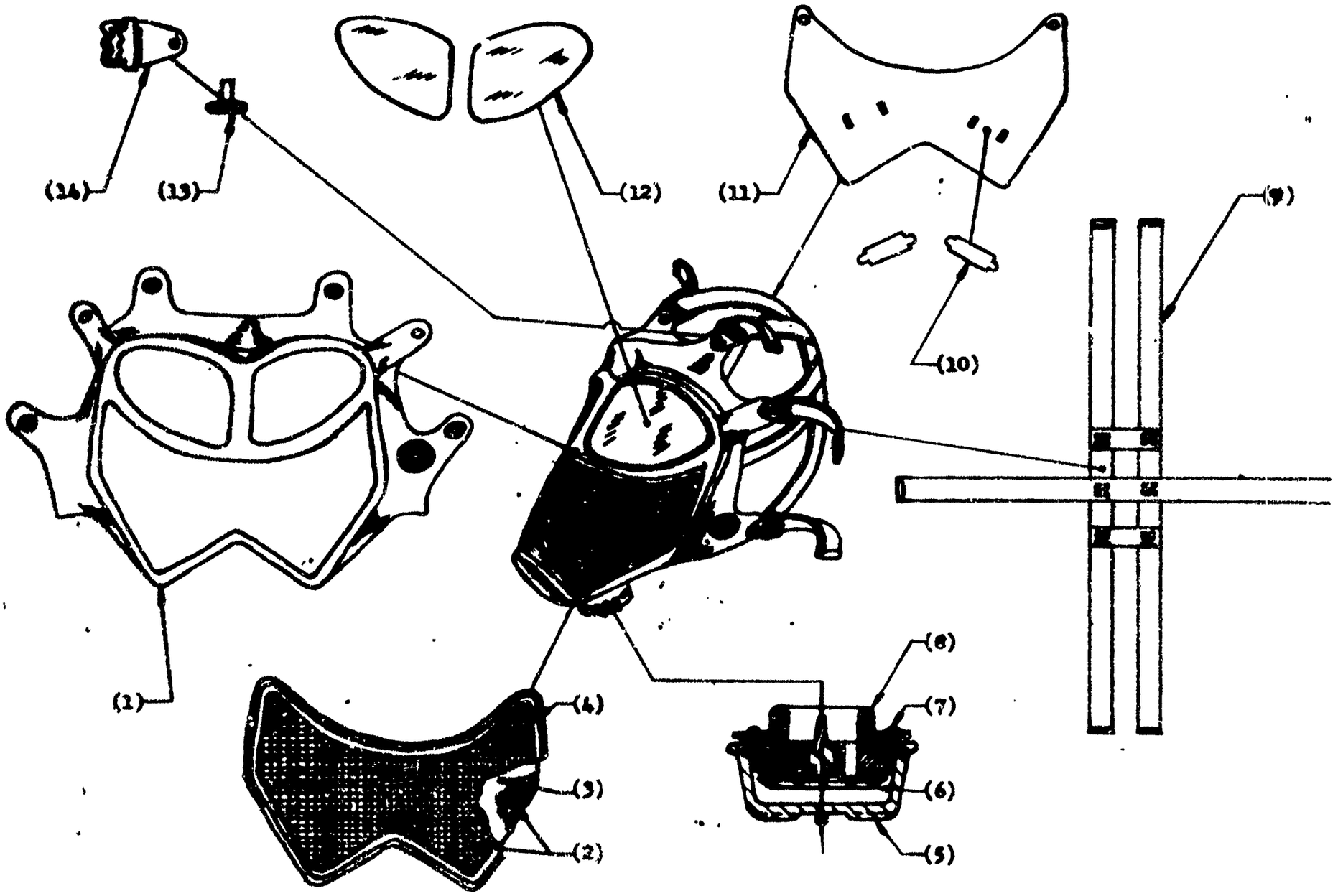
Scope

The assembly line presented in the following paragraphs of this section is a description of one manufacturer's concept of an assembly line capable of producing 100,000 acceptable CD V-805 Masks per month based upon a two-shift, five-day week and a twenty-day work month. This concept of the assembly line is based upon the knowledge obtained from the production of 25,000 CD V-805 Masks produced on the Production Engineering Study. The assembly line presented is "not" a description of the assembly line fabricated to produce the 25,000 CD V-805 Masks.

The operation descriptions follow the sequences presented on Drawing GEC-900 (The Final Assembly Flow Chart for the CD V-805 Protective Civilian Mask). A concept of an idealistic assembly line layout is presented on Drawing GED-902 (Assembly Line For The Protective Civilian CD V-805 Mask). The drawings of the flow chart and the assembly line are included in the appendix and should be used to obtain a comprehensible concept of future production.

The assembly line analysis does not present the various procedures, equipment, and processes related to producing components which would normally be purchased from outside vendors. Problems on various components that would be considered out of the ordinary are presented in the section titled "Component and Assembly Line Production Problems."

A sketch of the CD V-805 Facepiece Assembly is included at the beginning of this section. A more complete concept of the mask and the assembly line can be achieved by reviewing this sketch carefully before progressing with the discussions presented in the report.



ATTACHMENT A

PROTECTIVE, CIVILIAN, CD V-805 FACEPIECE & COMPONENTS

PROTECTIVE, CIVILIAN, CD V-805 FACEPIECE & COMPONENTS (Continued)

INTENDED USE: Protect civilians, except children below the age of four, against chemical bacteriological and radiological warefare agents.

Item No.	Item	Pieces Per Facepiece	Function
1	Faceblank	1	Basic medium for protection and assembly of components
2	Filter Screen	2	Prevent damage to the filter blank
3	Filter Blank	1	To filter chemical, bacteriological and radiological agents
4	Edgeseal Material	-	Bonding medium for bonding filter screens and filterblank
5	Cover, Outlet Valve	1	Protect the outlet valve seat and disc from damage
6	Disc, Outlet Valve	1	One way valve for allowing exhalation only
7	Retainer, Outlet Valve	1	One way lock ring for fastening valve assembly to faceblank
8	Seat, Outlet Valve	1	Medium for holding valve disc and allow exhalation
9	Harness, Head	1	To hold facepiece assembly on the face of the civilian
10	Insert, Deflector	2	Prevent deflector blank from lying flush against the filter unit
11	Blank, Deflector	1	Divert incoming air across the lenses for clear vision
12	Lenses	2	Medium to allow vision through the facepiece
13	Rivets	6	To fasten buckles to the faceblank
14	Buckles, Webstrap	6	To fasten head harness to the faceblank

DESCRIPTIVE ANALYSIS OF FUTURE PRODUCTION

OF THE

PROTECTIVE CIVILIAN CD V-805 MASK

Purchased Components

All of the components delivered into the assembly receiving area either from another department in the plant or an outside vendor are treated the same as purchased components. The following components are classified as purchased components:

1. Plastisol
2. Filter Paper
3. Filter Screens - Cut to Size - Six Sizes Required
4. Vinyl Faceblank Material
5. Lenses - Cut to Size - Six Sizes Required
6. Deflector Assemblies - Assembled With Inserts - Six Sizes Required
7. Outlet Valve Discs
8. Outlet Valve Seats
9. Outlet Valve Retainers
10. Outlet Valve Covers
11. Rivets
12. Buckles
13. Head Harness Assemblies
14. Carrier Assemblies
15. Tissue Paper
16. Carrier Assemblies
17. Water Vapor-Proof Bags
18. W5$_c$ Regular Slotted Cartons
19. Partitions For The Regular Slotted Cartons
20. 1" Wide Tape
21. 3" Wide Tape

All components used in the fabrication of the CD V-805 Mask are required to pass through a receiving area illustrated on Drawing C-903.

Receiving Area

In order for receiving inspection to be performed in accordance with MIL-STD-105, a receiving area should consist of four distinct areas. These areas are the following:

1. Incoming Material Area
2. Inspection Area
3. Rejected Material Area
4. Accepted Material Area

Components delivered to the Incoming Material Area either from outside vendors or other departments are accompanied by either a move ticket (only when delivered from another department in the plant) or a receival if the components are delivered from an outside vendor. All certifications, and test results, accompany the material and are turned over to the Quality Control personnel in charge of this department.

The shipment is inspected in the inspection area by qualified inspection personnel in accordance with the detailed procedures outlined in the Quality Control Plan. All inspection forms are completed and the status of the shipment is determined at the time of the inspection.

If the material meets the requirements of the Quality Control Plan and is acceptable, it is identified and moved to the Accepted Material Area. If the material is rejected, then it is identified and set aside in the Rejected Material Area until disposition from the vendor can be obtained.

In all cases, each time the material is moved from one area to another, scheduling must be kept informed of the location and status of the material received. An explanation of Production Control and Planning is presented in the Appendix under the title "Manufacturing Procedures and Processes."

Filter Blank Cutting, Operation 10

In accordance with the master production plan, filter material from a predetermined lot number is requisitioned out of the Accepted Materials Area and delivered to "storage area for uncut filter paper" in the constant temperature and humidity controlled room, see drawing GED-902.

Filter Material is removed from the outside packing containers and the water vapor-proof barrier material. Sheets of filter material 20" wide by 36" long are loaded into the automatic feeding system of the Filter Blank cutting press.

A Dries & Krump Punch Press, Model 131, equipped with air controlled automatic feed tables is used in this operation. The punch press is equipped with a two (2) cavity steel die of the size called for by the production schedule. This punch press is capable of making 51 strokes a minute therefore cutting 102 filter blanks a minute. It will require at least two people to remove the cut filter blanks from the sheets and load them into suitable containers for delivery into the filter unit press area. There may be times when it will be desirable to blow off excess charcoal from the cut filter blanks. This action will be dependent upon the precautions used to exhaust excess charcoal from the punch press and the cleanliness of the work area. A work area for blowing off the excess charcoal is shown on the assembly line layout, drawing GED 902.

Since the filter blank cutting operation is extremely fast, this operation is performed on one eight hour shift.

Filter Unit Edgeseal Molding, Operation 30

A predetermined quantity of the proper size of filter screens and filter blanks are stored in a storage area directly behind the filter unit molding presses, refer to drawing GED-902.

A filter unit consists of two filter screens, one filter blank, and a molded edgeseal acting as a binder for the screens and the blank. The second purpose of the edgeseal is to provide the means of electronically welding the pad into the faceblank.

Four (4) molding presses are used to mold the six sizes of filter units. Each press is equipped with eight individually mounted filter molds of the same size. Each one of the eight cavities can be replaced by another filter mold of the same size or the complete set of eight cavity molds can be removed as a unit and another set of eight cavities of a different size can be installed. There are numerous advantages to having the molding machines designed to utilize this method of interchangability of mold sets and individual units.

One, due to the variation in market demand of masks of different sizes; the quantities of some sizes are larger than others. By designing the filter presses in such a way as to allow a set of eight cavities of one size in each press; only four presses are required instead of a minimum of six. Also, all cavities in each press are utilized on each cycle therefore increasing the efficiency of each filter press.

Two, by designing the individual molds in such a way that they can be removed separately from the set, the problem of maintenance and repair can be greatly reduced. A single cavity of each size can be in a stand-by condition in case problems occur with any of the individual cavities.

Each filter molding press is also designed to incorporate the following features:

1. An automatic loading fixture
2. A pre-heater for the plastisol container to pre-heat the plastisol to approximately $100^{o}F$.
3. A controlling device that programs each cycle of the molding

operation automatically

4. An automatic device to unload the molded filter units from the molds

The operator loads the loading fixture by placing one screen in each cavity of the fixture, then a filter blank, and finally another screen. At the completion of this cycle which takes approximately 0.864 minutes, a switch is activated to start the cycle.

The cycles performed automatically are the following:

1. The loading fixture moves between the upper and lower plates of the molds.
2. Pressure pads are used to hold the filter components in place while the loading fixture is removed.
3. The mold closes on the positioned components.
4. The plastisol injection nozzles on the injection guns are positioned against the molds.
5. Water pre-heated to 170°F starts to flow through the molds.
6. When the mold temperature reaches 120°F, plastisol pre-heated to 100°F to reduce the viscosity is injected into the molds at a pressure of 40 psi. The plastisol injection cylinders are of the constant volume type and shut off automatically at the end of their individual cycles.
7. After the plastisol is injected, the warm water stops flowing and steam is injected into the molds.
8. When the molds reach 340 °F, the steam is stopped and cold water is injected into the molds for cooling.
9. When the molds reach 120 °F, the molds are opened.
10. The unloading fixture moves into position between the molds.
11. Pressure pads eject the filter pads into the unloading fixture and the fixture moves the untrimmed filter units out of the molds.

12. The cycle is repeated.

The machine cycle time is approximately 2.09 minutes. The total cycle time is the sum of the load, unload and machine time making a total cycle of approximately 4.08 min. Each operator runs two machines therefore, operating the four required machines with only two operators. Total production of each machine is 117 pieces per hour.

The operator lays the untrimmed filter units on a 1 ft. wide belt conveyor which transports them to the trimming operation.

(Note: Operation sheets for all operations in this section are provided in the appendix of the report listed under the title of "Operation Sheets For Future Production of 100,000 Acceptable CD V-805 Masks Per Month.")

Filter Unit Trimming and Inspection, Operation 40

Filter Units moving on the 1 ft. conveyor belt are removed by the operators performing the trimming operation. The trimming operation consists of placing the filter unit on a flat work space in front of a small grinding wheel attached to an electric motor. The operator grinds the flash from the outer periphery of the filter unit in a manner similar to cutting a design out of a board on a jigsaw.

Each filter unit is inspected after trimming and placed in a container positioned on a gravity flow roller type conveyor along side of the trim area. Each container holds a uniform number of filter units and is filled before being allowed to progress down the roller bearing conveyor.

Quality Control Inspection Station 1

As the containers flow past the Q127 DOP Penetrometer operated by Quality Control personnel; a representative sample is pulled and tested for DOP Penetration and resistance. The sampling is based upon continuous

sampling as outlined in the Quality Control plan. If the results of the sampling by Quality Control warrants the action, the filter units are 100% inspected until the quality of the filter units has been brought up to acceptance standards.

A service and supply man removes the accepted filter units from the conveyors and places them in the storage area for accepted filter units.

The filter material used in the production of the filter units has been exposed to only controlled temperature and humidity conditions from the time it was unpacked from the water vapor-proof material until it was fabricated into filter units and stored. The purpose of this control is to prevent deterioration of the filter material due to moisture pick up.

Faceblank Mold, Operation 60

Vinyl Faceblank Compound is requisitioned by lot number from the Accepted Material Storage Area and placed in temporary storage behind each faceblank injection machine. The material is purchased in 300 pound water vapor-proof drums.

Two automatic self supporting vinyl hopper conveyors are used to fill the four horizontal injection machines. At various times when enough reworked vinyl is available, two proportional automatic hopper conveyors are used to fill the hoppers on the injection machines with the desired proportions of virgin and reworked vinyl.

The vinyl injection machines used to mold the CD V-805 Faceblanks are horizontal screw plasticizer injection machines. These injection machines utilize a full hydraulic molding clamp, an in-line screw type plasticizer injection unit and a self-contained hydraulic operating system. The machines used in the production line are S 20-350 In-Line Screw Farrel Watson-Stillman injection molding machines. These machines are capable of the following performance:

a) Maximum amount injected per shot

(General Purpose Polystyrene) ounces - - - - - - - - - 20

b) Maximum shot capacity, cu. in. - - - - - - - - - - - - 36

c) Plasticizing capacity (General Purpose

Polystyrene) lbs/hr. - - - - - - - - - - - - - - - - - -240

d) Rate of Injection, cu. in. per min. - - - - - - - - 1290

e) Clamping Capacity (tons) - - - - - - - - - - - - - - 350

f) Injection Pressure (max.) lbs. per sq. in. - - - -20,000

g) Injection Speed

Maximum Injection (adjustable) in/min. - - - - - - - 169

h) Rate of reloading chamber for next

shot (General Purpose Polystyrene - - - - - - - - - 1.1 oz. per sec.

i) Screw Speed (adjustable) RPM - - - - - - - - - - - - 0 to 90

Five automatic temperature controls are provided to control the temperature on the rear, center and front sections of the heating chamber, the nozzle, and the shut-off valve.

The average running conditions of the injection machines for producing CD V-805 Faceblanks are listed below. These settings are modified slightly with each size.

Rear Zone, Heating Chamber - - - - - - - - - - - - - 290 °F

Center Zone, Heating Chamber - - - - - - - - - - - - 330 °F

Front Zone, Heating Chamber - - - - - - - - - - - - -330 °F

Nozzle Temperature - - - - - - - - - - - - - - - - - 300 °F

Rotary Shut-Off Valve Temperature - - - - - - - - - 320 °F

Inject Time - 5 sec.

Inject Hold - 7 sec.

Total Clamp - 40 sec.

Inject Pressure - - - - - - - - - - - - - - - - - - - 2000 psi

Screw Speed - 30 rpm

Screw Back Pressure - - - - - - - - - - - - - - - - - 50 psi

The molds are single cavity, steel, and composed of three plates, mounted in a vertical position on the platens of the injection machines. The molds incorporate cooling chambers on two of the plates to allow cooling the molds with water while operating. Dual control constant temperature units are positioned behind each machine to facilitate the cooling operations. The back plate is set for 130 ^{o}F while the front plate is set for 110 ^{o}F.

The operator starts the automatic cycle of the machine by closing a rolling type safety gate which allows various electrical contacts on limit switches to close.

The screw starts to rotate and the vinyl pellets are gravity fed from the hopper to the screw. The rotation advances plasticized material to the front end of the plasticizing chamber, filling the space between the front end of the screw and the plunger. Since the plunger is stationary, material under pressure causes the extruder to move back against controlled hydraulic pressure (exerted by the hydraulic cylinder) until it hits a positive stop. This provides a measured shot between the screw and the plunger.

During injection of the measured shot, the hydraulic cylinders push against the extruder causing the extruder barrel to telescope over the fixed plunger. This displaces the plasticized material through the hole in the plunger and nozzle into the mold.

After a short waiting period to allow the vinyl to solidify in the shape of the faceblank, the mold automatically opens. The operator reaches in between the first and second plates and removes the sprue and runners and deposits them into a container for re grinding.

Second, she removes the completed faceblank from between the second and third plates and again closes the gates to start the next cycle.

While the next cycle is taking place, the operator inspects the faceblank for defects defined in the Q.C. plan. After completing the inspection the operator lays the faceblank into a special carton. The faceblanks are nested in stacks of five with five stacks to each carton making a total of 25 faceblanks to each carton. The containers are placed on a gravity type roller conveyor and allowed to move to the next station.

The approximate total cycle time is 1.09 minutes which means that each machine can produce approximately 55 faceblanks per hour. One operator is required for each machine with another operator used as a relief operator for the other four since these machines cannot be easily shut down and must be attended at all times after being started. Due to the start up and shut down time and also to keep the capital equipment cost to a minimum, these machines are run twenty-four hours a day on three-eight hour shifts. Four machines and one single cavity mold of each size except Sizes 4 and 5 are required. It is necessary to produce two, single cavity molds of each of these sizes to meet the production schedule.

(Note: All data developed in reference to weights of each size of faceblank, mold drawing numbers, article drawing numbers, and running conditions applicable to the injection machine used on the engineering study are presented in chart form in the appendix titled, "CD V-805 Faceblank Injection Molding Data".)

Quality Control Faceblank Screening, Inspection Station 2

As the filled cartons of faceblanks flow past the Quality Control inspection station, a representative sample is pulled and inspected in accordance with the classification of defects listed in the Quality Control plan. A sample for physical property tests conducted in the laboratory is also pulled at this station by Quality Control. The sampling is based upon continuous sampling as outlined in the Quality Control plan.

The supply of filter units located along the final assembly line is restricted to not more than two hours supply in the final assembly line area at one time. The reason for this restriction is to control the moisture pick up of the filter material. Until this point in the assembly process, the filter material used to produce the filter elements has been under controlled temperature and humidity conditions. It is imperative that the exposure of the filter material to uncontrolled atmospheric conditions be as limited as possible in order to eliminate a drying process on the final mask assembly.

Faceblank, Lenses, & Filter Unit Welding, Operation 80

Each of these welding stations consists of one 4 kw High Frequency Generator and a numatic press equipped with two station fully-automatic operation. The generators are 220 voltage, 50 to 60 cycle, 25 amperes, and single phase. The generator frequency is 27 megacycles. Arc suppressors are included on the generators in case a short occurs in the material being welded. The two station work area is activated by a series of numatic cylinders, valves, and solenoids which derive their power source from the generators.

Each of the automatic two stations are equipped with a lower welding electrode. The numatic press has one stationary upper electrode which operates in conjunction with the two lower electrodes on separate welding cycles.

The following operations are performed by the operator at this station:

1. Places a filter unit on the lower electrode
2. Positions two lenses on the lower electrode
3. Activates lever to place a vacuum on the lenses to hold them in position on the electrodes

4. Grasps a faceblank and positions the faceblank over the lenses and filter unit located on the lower electrodes

5. Releases vacuum

6. Activates switch to cycle the welding operation

7. Moves to the opposite side of the numatic press, unloads the welded faceblank assembly and lays it on the belt conveyor

8. Repeats steps "1" through "7".

(Note: The approximate welding conditions for all welding operations are presented in the appendix in chart form titled, "Welding Cycles For Generators on All Welding Cycles.")

The overall welding cycle consists of the following sequences:

a) The lower electrode is automatically moved over into position underneath the upper electrode positioned in the numatic press

b) The top electrode moves down on the components located on the lower electrode by action from an air cylinder.

c) When the desired pressure is achieved on the components being welded, a pressure activated solenoid starts the preheat cycle.

d) The preheat cycle is followed by the actual welding cycle.

e) After the welding cycle, the dwell-after-weld cycle follows to allow the components time to cool under pressure.

f) At the completion of the dwell-after-weld cycle, the press opens and waits for the operator to activate the switch for the next cycle.

The capacity of each machine is approximately 150 faceblank assemblies per hour. Three stations for this operation would be required to meet the desired production of 100,000 CD V-805 Mask per month working on two, eight hour shifts each day.

Faceblank Assembly Inspection, Operation 90

As the faceblank assemblies advance on the conveyor belt, they are picked up by trained inspection personnel for inspection of the welded areas. Each faceblank is thoroughly flexed in the weld areas during the inspection process and returned to the conveyor.

Quality Control Inspection Station 3

A sample of faceblank assemblies in accordance with the continuous sampling plan is removed from the assembly line at this station. The inspection and destructive weld test are performed by trained Quality Control personnel. The Q.C. inspector performs the same inspection as the production inspectors perform and also performs an added destructive test. Complete details of this filter weld test are presented in the Q.C. plan and the CD V-805 Protective Civilian Mask specification.

The sample tested for the adequacy of the Filter-Lens-Faceblank Weld is marked and returned to the conveyor to be used again for the chin seam weld test.

Chin Strap Weld, Operation 100

The chin strap welding stations require the same type equipment previously described in the Faceblank-Lens-Filter Unit welding section with the following exceptions:

a) A 2 kw High Frequency Generator is required instead of a 4 kw

b) The welding electrodes are different

The following operations are performed by the operator at this station:

1. Picks up faceblank assembly from conveyor and forms to contour of loading fixture.
2. Positions faceblank assembly in holding fixture.
3. Positions chin straps in grooves provided in lower electrode.

4. Activates switch to move lower welding fixture under the upper electrode and automatically starts welding cycle.
5. Moves to the opposite side of numatic press and unloads faceblank assembly from the second lower electrode.
6. Places welded faceblank assembly back on conveyor.

Again the lower section of the welding press is composed of two lower electrodes in order to utilize the operators time while the welding cycle is being performed.

The welding cycle sequences are the same as previously described with the exception that the times required to perform each of the sequences are different. (Note: Refer to section titled, "Welding Cycles For Generators On All Welding Cycles" in the appendix.)

The cycle time of each machine is approximately 0.217 minutes or total output per hour on each machine is 276 pieces per hour. Two machines would be required to meet the production schedule of 100,000 masks per month.

Deflector Tab Weld, Operation 110

The next operation that is performed on the faceblank assembly is welding the deflector assemblies to the faceblank assemblies. The equipment required for this operation is heavy duty soldering irons equipped with special formed teflon coated electrodes. These soldering irons are mounted on stands adjusted to the right height and angle with special powerstats to control the temperature of the electrodes.

The operator performs the following operations at this station:

1. Picks up mask from conveyor
2. Picks up deflector assembly and positions deflector tabs on the faceblank through the holes in the deflector assembly.

3. Positions deflector tab on electrode of the soldering iron and holds in position until lower side of the deflector tab becomes tacky.
4. Removes from electrode and uses finger pressure to fuse the deflector tab to the faceblank.
5. Repeats steps "3" and "4" on the second tab.
6. Places assembly back on the conveyor.

The cycle time for this operation is approximately 0.454 minutes making the total output per hour 132 pieces for each station. Four stations are required to meet the production schedule.

First Chin Seam Weld, Operation 120

The chin seam welding operation also utilizes the same type of welding equipment described in the Faceblank-Lens-Filter Unit welding operation with the exception of different type electrodes and the use of a 2 kw High Frequency Generator instead of the 4 kw.

The following operations are performed by the operator at this station:

1. Picks up faceblank assembly from the conveyor
2. Positions welding tabs over the pins of the lower electrode
3. Activates switch to move the lower electrode under the top electrode attached to the numatic press
4. Moves to the opposite side of the press and unloads the faceblank assembly from the second lower electrode
5. Removes the excess material from the faceblank assembly by tearing the material along the tear line
6. Discards the excess material in a scrap container and places the faceblank assembly on the conveyor belt.

The cycle time for this operation is approximately 0.308 minutes. The hourly output of each station is 194 faceblank assemblies. Three stations would be required to produce the necessary quantities of the production schedule.

Flatten and Pierce Hole, Operation 130; & Trim Flash, Operation 135

The equipment required to perform the heat flattening and hole punching operation is the same at the equipment already described in the section describing the Faceblank-Lens-Filter Unit weld operation with the exception that different type of electrodes are used. Due to the large weld area, the electrodes for this operation are designed to allow cold water to be run through them. The purpose of the cold water is to remove the excess heat created during the heat flattening cycle.

The operator performs the following operations during the heat flattening and hole punching operation:

1. Removes a faceblank from the conveyor and positions it on the lower electrode
2. Activates switch to start the automatic heat flatten cycles
3. Moves to the opposite side of the numatic press and unloads the faceblank assembly with chin area flattened and outlet valve hole partially punched
4. Removes slug from outlet valve hole with fingers
5. Turns to trimming fixture located in a small numatic press

During the heat flatten operation, excess vinyl faceblank material flows from the chin seam area and leaves a ragged edge on the outside periphery of the chin seam. In order to produce a consistent periphery in this area this excess vinyl is trimmed with a small numatic press attached to the same work table where the numatic press for the welding operation is located. The operator positions the chin seam area in a fixture and

activates a foot pedal to cut the flash from the chin seam area. When the flash has been trimmed, the faceblank assembly is returned to the belt conveyor.

The combined time of the heat flatten and hole punching operation plus the trimming operation is 0.3 minutes. The hourly output of each combined station is 200 pieces. Two stations are required to meet the production schedule.

Quality Control Inspection Station 6

The same faceblank assemblies used for the Faceblank-Lens-Filter Unit weld test (Inspection Station 3) are again used for the chin seam pull test. These same assemblies have also passed through the regular production operations located between the two inspection stations. The quantities required for this test are the same as those required for inspection station three which were taken in accordance with the continuous sampling plan outlined in the Quality Control Plan.

The Q.C. personnel responsible for the chin seam test performs the test in accordance with the instructions presented in the CD V-805 Mask Specification.

Assemble Rivets and Buckles, Operation 140

The rivet and buckle assembly is performed on commercial semi-automatic riveting machines. The operator performs the following operations during this assembly process:

1. Positions a buckle assembly over the mandrel of the rivet machine
2. Positions a tab on the faceblank assembly over the same rivet machine mandrel
3. Activates foot pedal which curls a rivet into position and also automatically feeds another rivet into position in the machine

4. Repeats steps 1 through 3 on each of the buckle tabs (temple area contains two tabs on each side but only six rivets and six buckles are required)
5. Places faceblank assembly on belt conveyor

The rivet and buckle assembly operation requires approximately 0.495 minutes for each faceblank assembly. The capacity of each machine is approximately 121 assemblies per hour. Four (4) stations are required to meet the production schedule.

Assemble Outlet Valve Assembly and Outlet Valve Cover, Operations 150 & 170

Outlet Valve Seats previously assembled with Outlet Valve Disc and tested in accordance with applicable specifications are assembled to the faceblank assemblies at this station. Operation 170 (Assembling Outlet Valve Covers) is also performed at the same work station. The operator performs the following operations:

1. Positions Retainer Ring over mandrel located in a numatic press
2. Positions outlet valve hole in the faceblank assembly over the same mandrel
3. Positions Outlet Valve Seat with Outlet Valve Disc already assembled over the same mandrel
4. Activates foot controlled air valve which releases ram in air cylinder to move into contact with and apply pressure to the Outlet Valve Seat forcing it through the Retainer Ring.
5. Removes faceblank assembly from the mandrel, picks up an Outlet Valve Cover which has been preheated on a small turntable type oven, and assembles the cover over the three holding lugs on the Outlet Valve Seat.
6. Returns Faceblank Assembly to belt type conveyor

Approximately 0.319 minutes are required to perform both Operations 150 and 170. The capacity of each machine is approximately 187 assemblies per hour. Two stations would be required to meet the production schedule.

DOP Penetration and Resistance Test, Operation 180 and The Outlet Valve Leakage Test, Operation 190.

The DOP Penetration and Resistance Test is performed on a Bell Chamber attachment to an E27 DOP Penetrometer. The Bell Chamber is equipped with a series of flow meters, valves, switches and a test head with a transparent bell chamber to enclose the test head. A platform is located on the Bell Chamber to allow an M4 Leakage Indicator to be positioned on the Bell Chamber stand. A test fixture to perform the Outlet Valve Leakage test is mounted on the work area of the Bell Chamber stand and connected to the M4 Leakage Indicator and a foot pedal. The operator performs the following operations at this station:

1. Positions faceblank assembly on the test head. The faceblank assembly is held in place by a vacuum in a groove around the test head.
2. Closes the transparent bell chamber over the test head.
3. Moves a switch from purge to test position
4. Picks up faceblank assembly already tested on bell chamber for DOP Penetration and Resistance and positions it on the Outlet Valve Leakage test fixture - - Presses foot pedal and performs leakage test while the faceblank assembly in the bell chamber reaches a stabilized condition -- Lays faceblank assembly just tested for Outlet Valve Leakage aside on conveyer.

5. Reads the Resistance and DOP Penetration of the faceblank assembly being tested in the bell chamber
6. Turns switch from test position to purge
7. Waits 5 seconds, opens bell chamber, and removes the faceblank assembly just tested - - - Lays the assembly aside to await the Outlet Valve Leakage test and repeats the cycle

The total combined cycle time of Operations 180 and 190 is approximately 0.510 minutes. The hourly output of each combination of testers is approximately 118 pieces per hour. Four sets of testers (DOP Penetrometers, Bell Chamber Attachments, and M4 Leakage Indicators) are required to meet the production schedule of 100,000 masks per month working on two-eight hour shifts.

Assemble Head Harness, Operation 200 and Clean Lenses Operation 210

The faceblank assembly is removed from the conveyor and placed in a holding fixture in order to allow the operator to use both hands while assembling the head harness assembly. The operator threads six ends of the head harness through each of the buckle assemblies attached to the faceblank assembly.

After assembling the head harness the operator proceeds to clean the lenses by washing them with a rag dipped in solox. The operator also removes any other marks or contamination on the faceblank assembly making sure she does not touch the filter unit with the cloth soaked in solox. A chamois cloth is used to finish drying and cleaning the lenses.

The combined times of both Operations 200 and 210 is approximately 0.759 minutes. The total output of each station per hour is 79. Five stations are required to meet production requirements.

The assembly now has all of the necessary components assembled to it to be worn. The nomenclature of the assembly changes from a faceblank assembly to a facepiece assembly.

Quality Control Inspection Station 4

The facepiece assembly is ready to start through the packaging operation. Before it is packaged, Quality Control personnel perform an inspection in accordance with the classification of defects listed in the specifications and the Quality Control manual. The sampling is performed in accordance with the continuous sampling plans also presented in the Quality Control plan.

At times, the quality of the facepieces being produced may drop below the acceptable quality level. When this happens additional Quality Control personnel must be added to the assembly line in order to perform inspection on each facepiece until the quality is again established at an acceptable level. For this reason three inspection stations are shown on Drawing GED-902 instead of one. As long as the quality of the facepiece being produced meets the acceptable level, then only one Quality Control station is required. The two additional stations are utilized when this station calls for 100% inspection.

The Quality Control personnel at this station also pull the samples from the assembly line that are destroyed during the Gas Life test. The samples for the Gas Life test are taken to the laboratory where the following operations are performed by Quality Control personnel and Laboratory Technicians:

1. The sample is tested for DOP Penetration, Resistance, and Outlet Valve Leakage.
2. The sample is placed in an E4 Rough Handling machine, rough handled four at a time for 15 minutes and again tested for DC Penetration and Resistance.
3. The Buckles and Outlet Valve Cover are removed from the sample and the outside periphery is welded together with a 2 kw High Frequency Generator and numatic press.
4. The sample is turned over to laboratory technicians for the Gas Life Test performed on the Q95 All Purpose Gas Life Apparatus. Two Q-95 Gas Life Machines requiring one operator per machine will be required to meet the production schedule.

The laboratory work and the Quality Control work will require one Q.C. and two laboratory technicians to meet the requirements of the production schedule.

Wrap Facepiece In Tissue & Tape, Operation 220 and Place Facepiece In Carrier Assembly, Operation 230

After the facepiece assemblies have passed Inspection Station 4, they advance on the belt conveyor to Operations 220 and 230.

Operation 220 consists of placing a piece of tissue paper around the lens area of the facepiece assembly, tucking the ends over the outside periphery down on the deflector assembly, and securing the tissue paper in place with pressure sensitive tape 1" wide x 2" long. Two pieces of tape are used; one on each end. Another piece of tape 1" wide x 2" long is used to hold the outside edges of the mask in a flattened position. The tape is applied to the tissue paper already in place. The same operator proceeds to perform operation 230 which consists of placing the facepiece

assembly into the carrier assembly and closing it by rolling the ends of the carrier over on the fold lines and snapping the snaps.

The approximate combined time required to perform both Operation 220 and 230 is 0.462 minutes. The total output of each operator per hour is approximately 130 assemblies. Three work stations are required to meet the production schedule.

Place Carrier in Bag, Heat-Seal Bag, & Place Bag In Box; Operations 240, 250, and 260

The final packaging and packing consists of the following operations being performed by the operator:

1. Positions water vapor-proof bag in automatic stamper and stamps bag with appropriate lot number
2. Positions carrier assembly with facepiece assembly already inside in water vapor-proof bag
3. Heat seals water vapor-proof bag with a heat sealing unit.
4. Places packaged mask into the carton, five (5) packaged masks in each partition. There are six (6) partitions to a carton making a total of 30 CD V-805 Masks to a carton

The approximate combined time of Operations 240, 250, and 260 is 0.245 minutes. The hourly output of each operator is approximately 244 assemblies. Two stations are required to meet the production schedule.

Quality Control Inspection Station 5

Before the cartons are closed with pressure sensitive tape, a destructive sample is taken from these cartons in accordance with the continuous sampling procedures outlined by the Quality Control Plan and the CD V-805 Mask specification. These packaged masks are tested by Quality Control personnel for the following:

a) Bag Leakage by placing each of the packaged mask under water at a controlled temperature in a dip tank

b) Moisture content by removing the masks from the bags, weighing, drying, weighing the masks again and recording the loss of weight

c) Placing the mask back into the production line to be packaged and shipped

The sample taken for these tests is classified as destructive because of the water vapor-proof bags that are destroyed during the tests.

Shipping

If the packed mask meet all of the specifications, Quality Control makes out the certifications and releases the shipment.

A service and supply man tapes the cartons closed with pressure, sensitive tape and stencils each box in accordance with Military Standard 129. The cartons are removed from the production area to a temporary storage area where the shipping department ships the completed CD V-805 Masks in accordance with the schedules.

Production Area and Personnel Requirements

The total area required to produce 100,000 mask a month, running the faceblank assembly line 24 hours a day, 5 days a week and 20 days a month and running the filter assembly line and the main mask assembly line on two (2) eight hour shifts, 5 days a week and 20 days a month is the following:

1.	Receiving area	3,654 square feet
2.	Production Area	11,104 square feet
3.	Laboratory and Offices	720 square feet
4.	Shipping area	2,000 square feet
	TOTAL	17,478 square feet

Working under the same conditions just stated in the previous paragraph, a breakdown of the personnel requirements is listed below. The personnel listed below are the requirements for the assembly line after the engineering work has been completed and the department is ready for full production:

	Each Shift	Total/100,000 Mask
1. Receiving, Inspection Department		
A. Inspection Personnel	2	4
B. Service and Supply	2	4
2. Filter Line Production Department		
A. Production Personnel	6	12
B. Service and Supply	1	2
C. Foremen	1	2
D. Inspection Personnel	1	2
3. Faceblank Production Department		
A. Production Personnel	6	18
B. Inspection Personnel	1	3
C. Foremen	1	3
D. Service and Supply	2	6
E. Maintenance Men	1	3
4. CD V-805 Mask Production Department		
A. Production Personnel	45	90
B. Inspection Personnel	4	8
C. Foremen	1	2
D. Service & Supply	2	4
E. Maintenance Men	1	2
5. Production Supervisor	1	1
6. Secretaries	2	2
7. Laboratory Technicians	3	3
8. Shipping Department		
A. Foremen	1	1
B. Laborers	2	2
9. Quality Control		
A. Quality Control Engineering	1	1
B. Quality Control Technician	1	1
C. Quality Control Supervisor	1	1

The total personnel required to produce 5,000 masks a day is 181. The majority of these people would be female personnel.

COMPONENT AND ASSEMBLY LINE

PRODUCTION PROBLEMS

This section of the report presents the problems that future manufacturers can be expected to encounter along with the recommendations to solve these problems.

Outlet Valve Retainer Ring; Drawing B5-2-919

Caution should be taken while designing new progressive dies. If the inside hole and the outside periphery are blanked out before the contour of the retainer is formed, the edges of these areas may cause a problem during the assembly. The inside diameter is especially important in reference to obtaining the desired grip during the assembly of the outlet valve seat to the mask. The retainer ring should be free from sharp corners or burrs. If the burrs and sharp edges are not removed from the outside diameter of the retainer ring, the faceblank can be cut during the assembly operation.

Deflector Material

The material used to produce the deflector assemblies on the engineering study was Armite 0.015" thick. The material was manufactured by the Spaulding Fibre Company. Armite conforms to MIL-I-695.

Armite is an extremely strong material and cannot be economically cut with ordinary steel rule dies. A progressive punch press type die using a shearing action was successfully used on the engineering study. These dies are common with most metal manufacturers. The cutting operation is very fast and economical if the dies are designed for automatic feeds.

The main objection to using Armite is its cost. In the quantities General Tire purchased this material, it cost approximately 57¢ a pound. We could average about 21 deflector assemblies per pound making the cost of material per deflector 2.7 cents each.

Future manufacturers should investigate other types of paper to produce the deflectors. The Riegal Paper Corporation did some testing with their Moisture Resistant Board, 0.17" thick and their Weatherproof Bristol Low MF600 M, approximately 0.020" thick. The results of their test indicates that their paper has very good possibilities and we recommend that this area be investigated. The most decisive factor on evaluating this paper is its ability to resist moisture. The second factor to consider is its ability to function in the CD V-805 Mask in reference to flexure and crease resistance.

Seat, Outlet Valve; Drawing B5-2-906

Two problems may occur on future production of this component. One, a knit line may form in the sealing surface of seat caused by improper venting of the mold. If the knit line is too deep, the outlet valve disc will not seal properly.

Second, small blisters have a tendency to form on the molded Outlet Valve Seat if hot spots are created in the barrel of the injection press. If these blisters happen to fall on the critical sealing radius, the outlet valve disc will not seal. Blisters caused by hot spots can be eliminated by re-arranging the heating bands of the injection press.

Cover, Outlet Valve; Drawing C5-2-907

Difficulty may be encountered in the form of a bad knit line in the holding lug areas. The knit line has a tendancy to break while assembling the cover to the Outlet Valve Seat. The producers of this component should be cautioned about this condition and make changes in their molding operations when this defect appears.

Carrier Assembly; Drawing D5-4-337

An alternate design has been included on the drawings for this component which incorporates the use of rounded corners at the bottom of the assembly instead of normal square corners. There are two reasons why the alternate design was incorporated and is recommended.

1. The weakest part of the weld on the carrier assemblies is in the corners. The radius design on the corner provides added strength.
2. A slight bulge occurs at the fold on the bottom of the carrier during the fold-over operation and welding of the side seams on the square corner design. This slight bulge in the material has a tendancy to lay along the electrode during the welding of the seams. The added heat received by this bulge causes a hole to be formed in the lower corners of the carriers along side the seams on each side.

Another item that should be taken into consideration when designing new tools for future production of the CD carrier is the method of creating the fold lines used while closing the carrier. These fold lines should be applied to the carrier after the side seams have been welddd. They should be just deep enough to leave impressions in the side weld areas. This may cause the carrier manufacturer to perform an extra operation but it is necessary to allow the carrier assembly to close properly.

Faceblanks & Faceblank Material

Five vinyl compounds are approved for use in production of the CD V-805 Faceblanks. Four of these compounds were developed and approved by General Tire on the engineering study. The fifth compound was developed and approved during the research and development stage of the CD V-805 Mask.

The nomenclatures of all of the approved compounds are listed below:

Formulation No.	Code No.	Manufacturer
5HA920-BA	2E2	General Tire & Rubber Co.
5HA920-BB	2E3	General Tire & Rubber Co.
5HA920-AZ	2E4	General Tire & Rubber Co.
5HA920-AY	2E5	General Tire & Rubber Co.
Geon 80374	---	B.F. Goodrich Chemical Co.

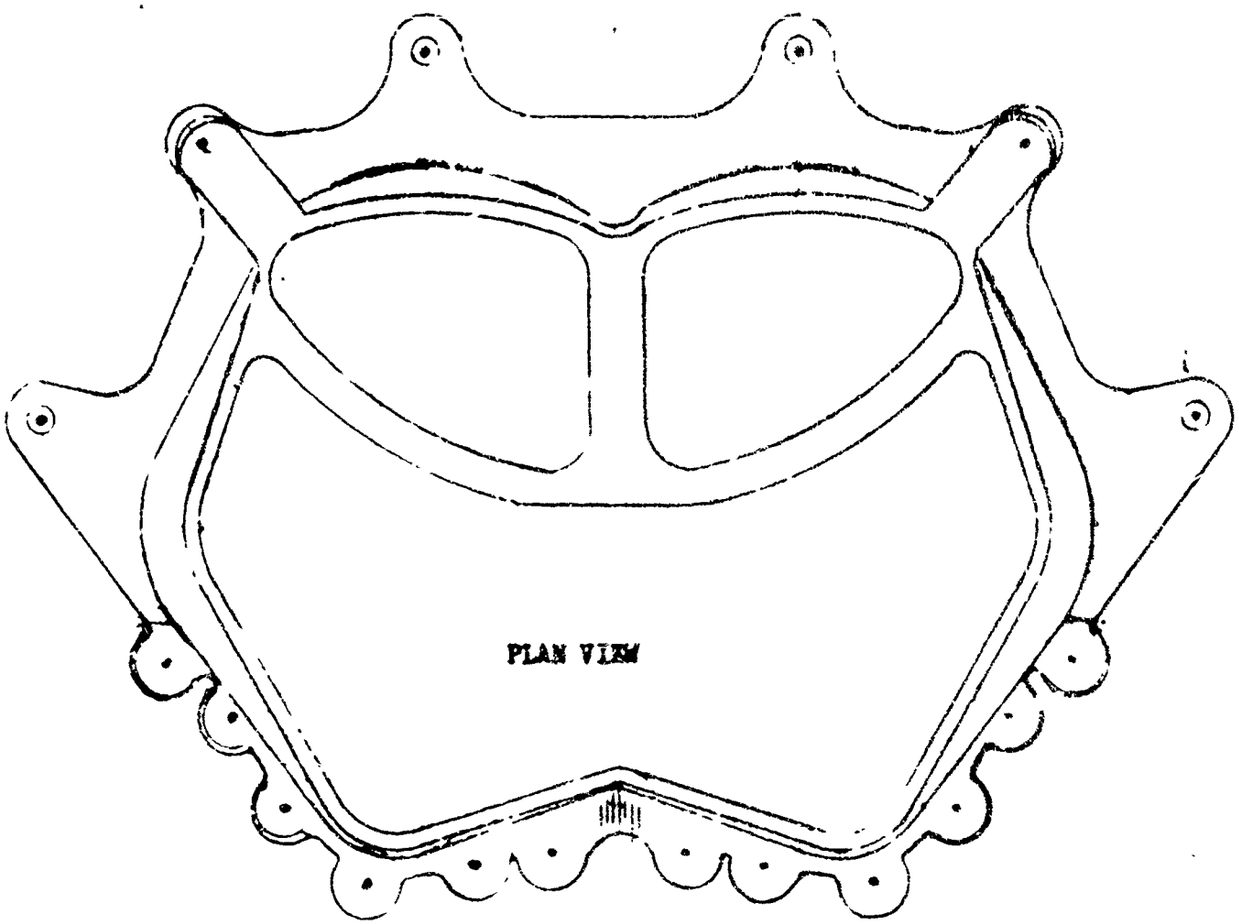
Polyvinyl Chloride Compounds of the type required to produce the CD V-805 Faceblank are extremely difficult to injection mold. The material is very susceptable to degradation and burns. When degradation of the material occurs in the plasticizing chambers of the injection machine, hydrocloric acid is given off and can permanently etch the plasticizing chamber of the injection machines. There are vinyl injection machines on the market built with materials that will withstand the acid reaction much better than others. Future manufacturers should consider these points carefully and obtain a machine that is best suited for Polyvinyl Chloride Compounds.

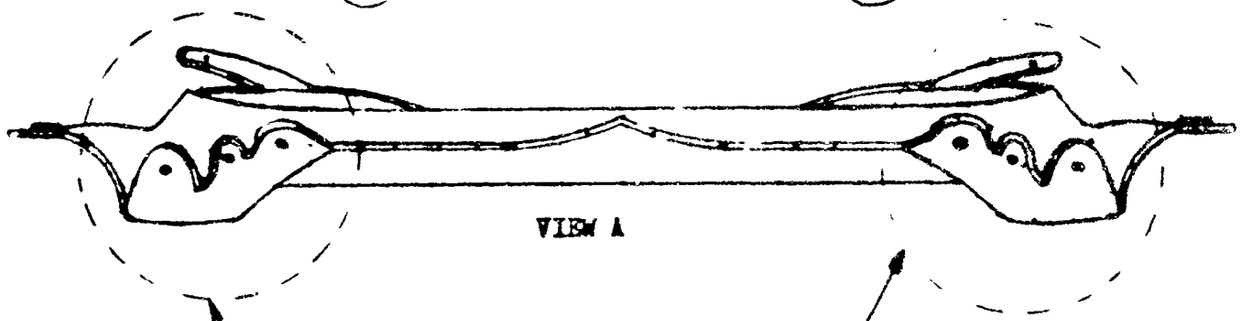
General Tire recommends that the CD V-805 Mask be produced in a much darker color. The light grey is extremely susceptable to showing foreign material and contamination which does not affect the function of the mask.

Faceblank Design Change In Chin Seam Area

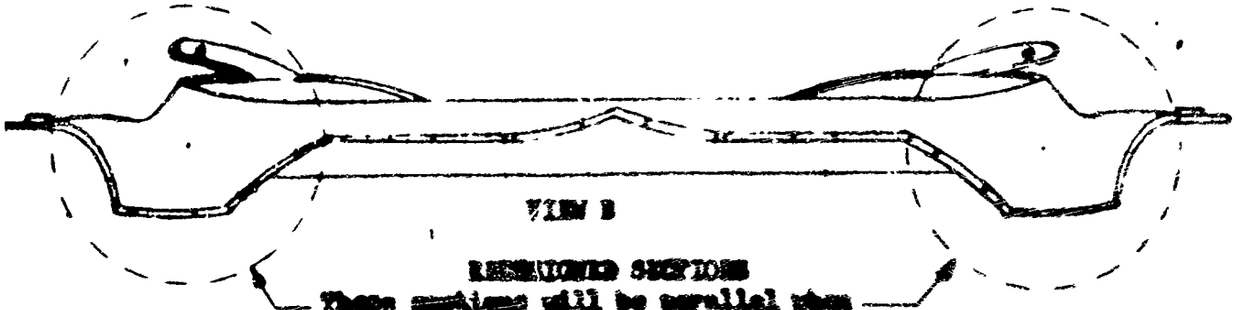
The design of the faceblank should be changed in order to reduce the scrap that occurs on the first chin seam welding operation. The weld tabs used to position the faceblank on the fixture during the first chin seam welding operation are formed at an angle during the molding operation.

These tabs must be placed in a stress while being welded to overcome the resistance caused by the angle. The heat in the stress area created during the electronic welding cycle causes the faceblank to fracture. View A, Figure 1, illustrates the present design of the faceblank in the first chin seam weld area. View B illustrates the recommended design change. The design change was too costly to institute to the molds that were produced on the engineering study. If new molds are built on future contracts, this change should be incorporated.





THESE SECTIONS SHOULD BE REDESIGNED
AS SHOWN IN VIEW B



REDESIGNED SECTIONS
These sections will be parallel when
folded into the weld position

FIGURE 1. FACEPLATE ORIFICE CHANGE IN CHIN BEAM AREA

Faceblank Design Change In Chin Strap Area

We recommend that consideration be given to a modification in the design of these straps if new faceblank molds are produced. This operation presently uses a lap weld to secure these straps together. During Operation 100, two pieces of vinyl are layed together that are approximately 0.050" thick each with a combined overall thickness of 0.100 inches. In order to produce a smooth weld, 0.050" thickness of vinyl must be moved and blended into the rest of the strap. A much smoother weld could be performed if these straps were reduced in thickness to eliminate the necessity of trying to blend this material during the welding operation, see Figure V, page 36. It was impossible to change this area on the engineering study due to the amount of cost involved in reworking the faceblank molds.

General Tire recommends that the ends of the chin straps be reduced from 0.050" thick down to 0.025" + 0.010. The reduction in thickness would be alternated on each chin strap in order to produce matching surfaces and would extend 3/4" back from the end of the strap.

Faceblank Design Change In Chin Strap Area

We recommend that consideration be given to a modification in the design of these straps if new faceblank molds are produced. This operation presently uses a lap weld to secure these straps together. During Operation 100, two pieces of vinyl are layed together that are approximately 0.050" thick each with a combined overall thickness of 0.100 inches. In order to produce a smooth weld, 0.050" thickness of vinyl must be moved and blended into the rest of the strap. A much smoother weld could be performed if these straps were reduced in thickness to eliminate the necessity of trying to blend this material during the welding operation, see Figure V, page 36. It was impossible to change this area on the engineering study due to the amount of cost involved in reworking the faceblank molds.

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CD V-805 Faceblank Chin Straps

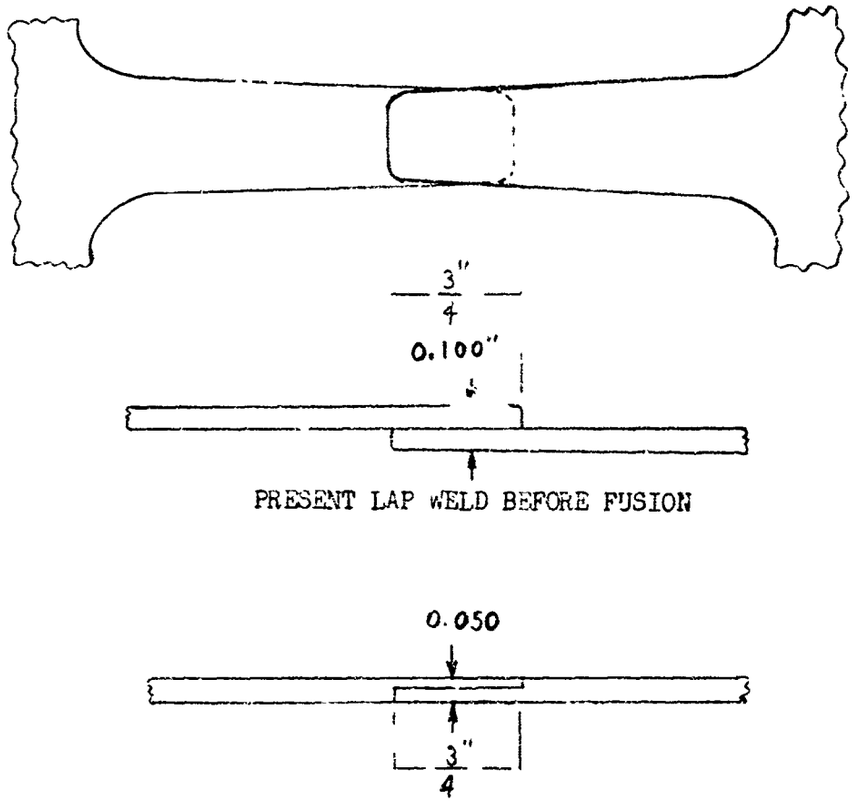

FIGURE II. CHIN STRAP WELD ON CD V-805 MASK

Filter Material

Actual test results along with certifications should be requested for filter material being purchased from subcontractors. The test data is a valuable aid while trying to analize any difficulties that may be encountered in this area during the production of the mask.

General Tire recommends that a rough handling test be performed on the 100 cm^2 test disc taken during the lamination process of the filter material. This rough handling test should be followed by a DOP Penetration test before and after the rough handling operation. The rough handling test would provide added assurance that the final mask assembly would pass the DOP Penetration requirements after they were rough handled and checked for DOP Penetration.

Filter Unit Design Changes; Drawings C5-3-893,-896,-899,-903,-906,-909

There were two major problems encountered after we started our production of filter units on the engineering study. Both of these problems could be corrected by modifying the design of new filter molds.

The first problem was scrap created during our production run. This scrap was mainly due to non-fills between the pinch off of the filter mold and in the edgeseal area of the cavity. Please refer to Figure III

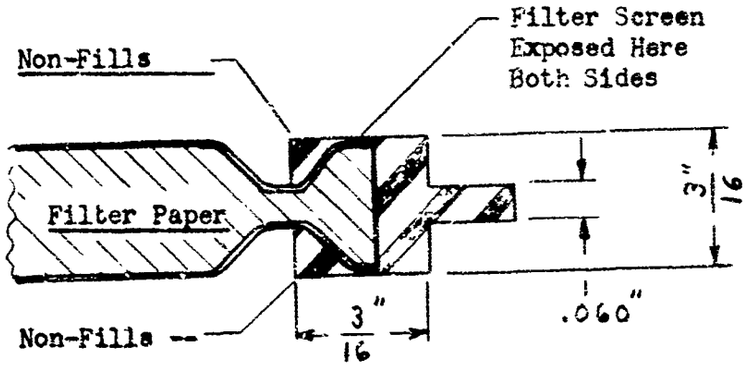

FIGURE III. FILTER UNIT EDGESEAL SECTION

Related to this problem also was the scrap created by the filter material and screen being exposed. The ledge created by the flange on the outside of the filter unit edgeseal has a mating surface on the faceblank. The logical solution to curing the scrap problems would be to increase the edgeseal thickness from 3/16 of an inch to 1/4 inch. A potential manufacture should be cautioned against making this edgeseal too thick because of the problems they will encounter trying to fold the mask into its normal position after the filter unit has been assembled into the masks. We would recommend that only 1/16 of an inch be added to the present design.

Another problem will be encountered by making the 1/16 of an inch change in the filter unit edgeseal. Consideration must be given to the mating ledge on the faceblank. If the 1/16 inch is added to the filter unit then we would recommend that a change be made to the faceblank also, refer to Figure IV.

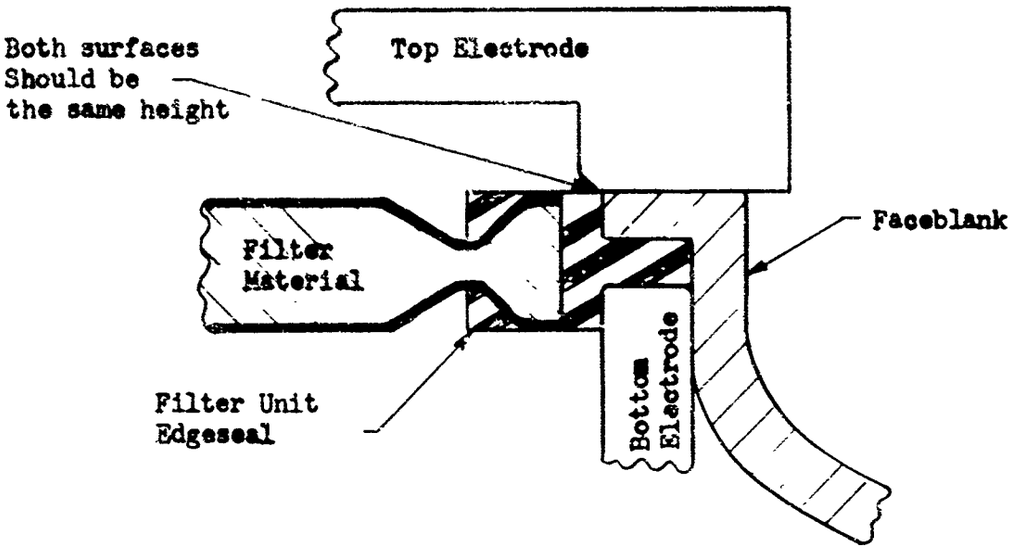

FIGURE IV.. FILTER UNIT-FACEBLANK WELD SECTION

If a change in thickness is not made in both the filter unit edgeseal and the faceblank, there will be a ledge created between the mating surfaces of the faceblank and the filter unit.

Another problem is encountered in these changes also. The welding area of both the faceblank and the welding ledge on the filter units edgeseal should both be the same thickness. The thickness of the filter unit welding ledge and the welding ledge of the faceblank must be the same in order to have the surfaces

that are to be fused together equidistant between the two electrodes during the electronic welding operation. This is important since the intensity of the electronic field is the greatest at the center of the distance between the welding electrodes; therefore creating more heat at this point. If 1/16 of an inch is added on the filter unit edgeseal; then the thickness of both the faceblank weld ledge and the filter unit weld ledge must also be increased in the same proportion. All three items must be changed if the thickness of any one item is changed.

The foregoing changes are recommended only if new faceblank molds are produced along with new filter molds. If only new filter molds are going to be produced then a second alternate design could be used. The edgeseal thickness could be increased to 1/4 inch and the ledge remain the same thickness, 0.060 inches. The only difference would be that the welding ledge would be staggered from the center line, refer to Figure V.

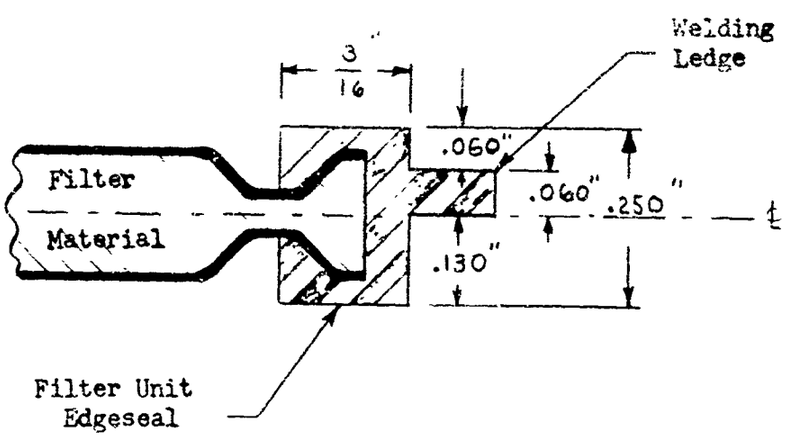

Figure V. Filter Unit Edgeseal With Offset Design

An important reason exists for changing the thickness of the filter unit edgeseal. The electrical conductivity of the filter material varies greatly simply from going from the low to the high side of certain tolerances. The charcoal contained in the filter paper is an excellent conductor of electrical current. If the filter edgeseal thickness is increased, the greater the insulation will be between the electrodes and the filter paper during Operation 100, the faceblank-lens-filter unit weld; therefore lowering the chances of a short circuit.

The recommended changes are summarized below:

1. If new filter molds and new facsblank molds are produced, the following recommendations apply:
   a. The filter edgeseal thickness should be increased from 3/16" to 1/4".
   b. The thickness of the welding flange on the faceblank should be increased from 0.060" to 0.090" to counteract the offset between the faceblank and the filter unit.
   c. The thickness of the welding flange of the filter unit should be increased from 0.060" to 0.090" to allow both of the fusion surfaces to be located equidistant between the welding electrodes.
2. If only new filter molds are produced and the faceblank molds are used that were developed on the engineering study, the following recommendations apply:
   a. Increase the thickness of the filter.
   b. Offset the welding flange of the filter unit to counteract the offset created between the filter unit and the faceblank, refer to Figure V.

Electronic Welding Operations

There are four difficult final assembly operations to be performed on the CD V-805 Masks. The other operations with the exception of testing are simple mechanical operations that should not prove to be any trouble in the design areas. These four assembly operations are the following. Each one of these operations involves the electronic welding principle:

a) Faceblank-lens-filter weld operation, Operation 80

b) Chin strap weld operation, Operation 100

c) First chin seam weld operation, Operation 120

d) Chin seam flatten and hole punching operation, Operation 130

The field of electronic welding is extremely difficult when working with the thicknesses required to be welded on the CD V-805 Mask.

The words dielectric and electronic welding are used by many people to describe the same thing. For the purpose of this report both words can be interchanged.

Dielectric welding is the process of placing two materials to be welded under pressure in a radio-frequency (R.F.) field. The resulting molecular friction or hysteresis results in generation of heat within the material. Under closely controlled conditions the heat created will fuse the two materials together. The welding cycle must be fast enough to not allow the heat to be transferred from the fusion areas to the surfaces of the materials. If the heat generated reaches the same concentration on the surfaces next to the electrodes as the fusion surfaces, the surface texture of the materials being welded will break down and become tacky in the wrong area. Since electronic welding is fast and elininates the problems of welds performed with heated electrodes, it is very understandable why this process was developed on the research and development program for the CD V-805 Mask.

In order to perform an electronic welding operation, it is necessary to have a high frequency generator, a sealing press, and an electronic sealing die. The generator is very similar to a radio transmitter. It converts the standard 60 cycle current into high frequency. The generators used in the engineering production study had power outputs of 2 and 4 kilowatts. The dies are mounted into the presses attached to the generators. The press was operated by an air activated cylinder. The generators, presses, and dies are very clearly illustrated in the colored film included as part of this report.

Almost all of the electronic welding machines presently being manufactured are equipped with arc suppressors. These arc suppressors prevent damage to the dies in case arcing occurs.

The heat sealing dies are the most difficult items to produce relative to electronic welding. The die must perform three functions during the welding operations:

1) It must be capable of applying enough pressure in the fusion area to effect a good weld.
2) It is the means of transferring the R.F. to the fusion areas of the materials being welded.
3) The die must also be capable of removing the excess heat from the vinyl after the welding cycle has been completed.

The materials generally used in the production of electronic welding dies are aluminum, brass, and bronze. General Tire was very successful with aluminum and brass.

It was necessary to present these detailed explanations of the operating principles involved in electronic welding before presenting an explanation of the difficulties that may be encountered on future programs.

With the information just presented, the reader should not have difficulty understanding the following articles.

The generator settings used in the engineering study are included in the appendix. We wish to emphasize these settings are only applicable to the generators, tooling, and the CD V-805 Mask developed on the engineering study. These generator settings will not be applicable if any of these three items are changed.

General Tire offers the following recommendations relative to building new electronic welding tooling:

1. The tolerances in the weld areas on the components used in the welding operations should be held as close to the mean as possible.
2. The mating surfaces of the welding electrodes should be as parallel as possible.

Heat Flatten and Pierce Outlet Valve Hole Tooling Problem

The heat flatten and hole piercing operation (Operation 130 on Drawing GEC-900) involves an area approximately 2 inches wide and 3 inches long. The thickness of the vinyl in the chin seam averages 0.060" thick. The vinyl seam left from the first chin seam weld must be folded over and blended into a smooth uniform weld. This first chin seam weld when folded over adds 0.120" thickness to the 0.060" thickness of the original faceblank. This operation involves blending an area of approximately 6 square inches with thicknesses ranging from 0.060" to 0.180" into a smooth uniform surface. The end result of this operation must be smooth enough to seal the mask around the chin area of the wearer and also be strong enough to withstand normal use.

The following problems will be encountered on future programs:

1) The pressure exerted on the weld area during the welding operation must be large in order to reduce the opening of the electrodes at the "start" of the welding cycle. The high frequency generators can operate only between certain ranges of travel of the electrodes. The generators are set in accordance with the initial opening of the electrodes under pressure. The generators can be damaged if this rule is violated.

2) The electrodes and fixtures must be built strong enough to withstand the pressures necessary to perform the welding operation. If the material used to produce the fixtures is of high tensile strength, the conductivity is usually low. Therefore another difficulty is encountered since it is recommended that aluminum, brass, or copper be used to build the electrodes. These materials may present a problem if they flex under too much pressure.

3) There is also a definite problem with latent heat build up. Since this particular tool involves large areas, the removal of excess heat becomes difficult. As the electrodes tend to get progressively hotter, the welding cycle must be altered. There are several ways this heat build up can be controlled. One method is to drill as many flutes or vents into the electrode to allow a much larger area to be exposed to the atmosphere. The second method is to install thermal cartridge heaters in various areas of the electrodes and preheat the electrodes to a

temperature higher than ambient temperature. The third method of controlling the heat build up is to circulate water through the electrodes. For safety reasons, all water connections should be approved by the company manufacturing the generators. When designing new high volume production tools, the latent heat built up should be considered with "all" electronic welding operations.

The outlet valve hole is partially punched out during the heat flatten operation. Future manufacturers should utilize the following suggestions while designing new volume production tooling:

1) The area inside the cutting diameters of the punch and the lower cutting area must be made of materials that are good conductors. An R.F. field must be created in order to produce enough heat to allow the punch to move through the faceblank during the cutting operation.

2) A good non-conducting high impact material must be used for the blade on the punch and the lower ring that the blade cuts on. We have found that a material called Insurok, Grade T859, TR has given satisfactory results. This material does arc out at times and spare blades and lower rings were kept in reserve. The lower ring that the Insurak blade cuts on was made of ceramic. The ceramic rings were produced from Heliarc Cups, No. 85Z10 produced by the Linde Company. We turned these cups to the proper size on a lathe.

3) A material for the punch and the cutting ring that should be investigated in the ceramic line is alumina. Alumina has the characteristics of low loss in a high-frequency electrical field coupled with high strength and thermal shock resistance.

Special attention should be given to the area around the hole that is punched for the Outlet Valve Seat. There is a radius on the lower side of the Outlet Valve Seat and a matching counter radius on the Retainer Ring that assembles to the Outlet Valve Seat. It is important that the area around the punched hole be as consistent in thickness and free from grooves as possible. The area around the punched hole is the sealing surface between the Reatiner Ring and the Outlet Valve Seat. Problems will be encountered in the form of DOP leakage in this area if these grooves are not eliminated as much as possible and the area is not made as consistent in thickness as possible.

High Frequency Generators and The Federal Communication Requirements

Depending upon the location of a potential manufacturer of the CD V-805 Mask in reference to his location from radio and television transmitters, a manufacturer may be required to enclose all high frequency units in a shield room.

The FCC regulation controlling radiation and the certification of all R.F. generators was made effective on 1 July 1952. Under normal circumstances the radiation effect from most R.F. generators on the market today is negligable. Most of the radiation originates from the electrodes and the dies. Since the manufacturer of the generator does not have control over the production of the welding fixtures, the responsibility of meeting the FCC's requirements must be the manufacturer of the CD V-805 Mask. A manufacturer considering the production of the CD V-805 Mask should acquaint themselves with the FCC's regulations on this area and should consider to the extra cost of shielding all areas where the dielectric welding operations are performed.

SPECIALIZED TEST EQUIPMENT

The Government-Furnished Test Equipment used on the engineering study and also described in the plant layout on Drawing GED-902 is commercially available.

A future manufacturer may want to redesign this test equipment to obtain better stabilization, reliability, and compatibility with their own assembly line. Suggestions for some design changes were presented in a report titled, "An Evaluation of Test Requirements, Methods and Government Furnished Test Equipment", during Phase I of the engineering study. A review of this report may prove helpful to future manufacturers in reference to future test equipment requirements.

C O N C L U S I O N S

The following conclusions were made during the course of the engineering study:

1. If a demand for a low, priced, protective mask exists on the civilian market; then the Civilian, Protective, CD V-805 Mask can fulfill this demand.
2. The assembly line presented in this report represents a variety of technical fields and production methods. A manufacturer planning to build and maintain an assembly line similar to the one presented in this report must have access to or contain within its own Engineering Department a wide variety of technical knowledge in order to cope with the problems they will encounter while building the assembly line and fabricating the CD V-805 Mask.

RECOMMENDATIONS

The following recommendations are based on the results of General Tires work on the engineering study:

1. For additional strength in the corners of the vinyl carrier assembly, we recommend the alternate design with the rounded corners be used on future programs. This design is shown on the drawings pertaining to this article.
2. The design of the weld tabs on the chin seam should be changed to eliminate the stress caused by the angle on the tabs on the present design.
3. The filter unit edgeseal should be increased 1/16 of an inch in thickness. The design change most applicable to the requirements future production of the CD V-805 Mask should be used. The design changes are illustrated in the report.
4. The tolerances in the weld areas of the faceblanks and the filter units should be held as close to the mean as possible.
5. The ends of the faceblank chin straps should be reduced from 0.050 inches thick to 0.025 inches thick in accordance with the procedures outlined in the report.
6. The mask should be produced in a darker color that is just as appealing as the light grey.
7. Heat build up in all welding tools will be a major problem and every possible effort should be made to compensate for this problem when new tools are produced.

8. Alumina should be investigated as a possible cutting knife and cutting surface on the chin seam heat flatten and hole punching tools. This same material might prove advantageous for use on the tear strip area of the first chin seam welding tools.

9. A rough handling test should be instituted on the filter material similar to the one performed on the molded filter units during the production engineering study. This rough handling test on the filter material must be correlated with a DOP penetration test.

10. An investigation should be made in reference to finding material for producing deflector assemblies that is lower in cost and equal in equality to the material used on the study.

11. In order to produce sufficient quantities of filter units and faceblanks in the same proportion as their estimated demand on the market, it will be necessary to produce at least two sets of Size 4 and 5 Faceblank molds and two sets (8 cavities per set) of Size 4 and 5 Filter Unit edgeseal molding tools.

MANUFACTURING PROCEDURES AND PROCESSES

FOR

PROTECTIVE CIVILIAN CD V-805 MASK

SUBMITTED AS PART

of

FINAL REPORT ON PHASE II

CONTRACT DA 30-C70-CML-1250

By

WALTER E. GOUDY

PROJECT ENGINEER

GENERAL TIRE & RUBBER COMPANY

30 MAY 1963

INTRODUCTION

Purpose

The purpose of this part of the Final Report for Phase II is to present the procedures and processes required by a manufacturing plant necessary to produce good quality Protective, Civilian, CD V-805 Masks. Many manufacturers could possibly produce CD V-805 Mask, but the number of manufacturers equipped with the basic procedures and processes already installed into their production system in order to assure that production schedules and "quality" masks would be produced are few.

DISCUSSION

Process Analysis

Manufacturing plants can be classified into three categories: functional, line-type, or a combination of the two.

The production of the Civilian Protective Mask (six sizes) lends itself to a line-type layout. This type of arrangement requires a comparatively high volume and steady flow of parts in order to justify the additional investment in equipment. The components move directly from one operation to the next to completion. Conveyors and automatic transfer machines may be used to move the pieces from one operation to the next, and work-in-process inventory is kept to a minimum. Each machine is continually set to perform a particular operation.

Production Planning & Control

The general level of operations in the plant are determined by the contract requirements for production planning. Production planning consists of deciding which sizes to make, how many of each to make, and the time when each is to be put into process. The general line of operations for the plant, in turn, become the basis for adjusting the size of the labor force and for making commitments for raw materials and purchased parts.

The master production plan may be stated in terms of the units of each finished product which the plant is expected to produce during each month in the year. The master plan can then be converted into schedules for the operation of machines and the utilization of manpower. Fundamental to such detailed plans is the preparation of routing or operation sheets

DISCUSSION

which describe the operations to be performed and their sequence, the equipment and methods to be used, and the times normally required for each operation. An operation sheet determines the route that a part will follow through the plant. The total processing time and the time needed between operations for moving and temporary storage become the lead time. By maintaining operation sheets for each part and for each subassembly, a schedule can be developed which will insure the availability of materials for final assembly at the rate of output established by the master schedule.

A current manufacturing schedule will be required to send a product through the plant in best-sized lots, with minimum confusion and maximum use of equipment and personnel. Putting this schedule into effect is called dispatching. Dispatching consists of the preparation of work orders for the shop. These orders cover materials requisitions, instructions for direct labor, move orders, and inspection orders. Management policy will determine which orders will be made centrally and which shall be left for the foreman to work out from standard practice instructions.

Control of materials is critical to the smooth functioning of a plant. Raw materials and purchased parts must be on hand in the required quantities and at the time needed if production schedules are to be met. Inventories should be at the lowest practicable level; however, some minimum stock is essential if production is not to be delayed by lack of materials. The quantity for ordering replenishment stocks is determined by such factors as the lead time needed by the suppliers, the reliability of the sources, the volume of the materials, the risks of obsolescence or deterioration.

DISCUSSION

In many instances management must choose between manufacturing the components or procuring them from outside vendors. Where an outside supplier specializes in certain components or processes, he may be able to reach high volume operations and produce more economically then can the individual users. Procurement from outside suppliers may simplify the manufacturing problem within a plant and permit concentration on the phases of the process where critical "know-how" is essential. Extreme quality specifications may preclude the use of outside suppliers. Likewise, if components are in short supply, the user may be forced to manufacture the units in order to ensure an adequate supply.

Materials shrinkage throughout the manufacturing process may be a significant factor for materials control, scheduling and dispatching. Spoilage rates at various stages in the process require that excess quantities of raw materials and component parts be started in the process in order to produce the quantity of finished products desired. Material shrinkage will differ tremendously from product to product, operation to operation and should be determined for each part involved in production.

One of the principle bridges between production interests and costs and accounting interests lies in timekeeping, particularly of direct labor times. Job times are essential for two prime purposes:

(a) As a basis for payroll computations whenever an incentive wage payment system is used.

(b) As a basis for computing costs.

DISCUSSION

Timekeeping involves a record of the time of day an operator starts on an operation and the time he completes the operation. This record is supplementary to the attendance time-card punched by personnel as they enter a plant at the beginning of a shift and as they leave at the end. Accurate timekeeping is essential to both management and labor interests. The operators pay is involved; also manufacturing costs and inventory values are affected.

Counting of parts produced can be the key to smooth production control, or it can be a source of much grief, confusion and perhaps unwarranted pay. Counts may be kept and checked in a number of different ways, such as the following:

(a) Counters on machines

(b) Weighing on a counting scale

(c) Slash counts by operators as he produces

(d) Counting by trays or containers of known quantity

It is good practice to recheck production counts at frequent intervals and to reconcile any differences as a means of keeping the complete control system functioning smoothly.

Movement of materials other than the main assembly line may be by hand, truck carry or conveyor. Instructions to move a product by hand or truck are contained in move orders initiated by foremen and dispatchers. The move order authorizes an assigned materials handler to pick up the material and to carry it to its next station as specified in the move order. This type of a move order works very well for the movement of

material from an accepted materials area to the assembly line stations. A copy of the move order is often used to inform a central production-control office of the progress being made.

During manufacturing, production personnel at all levels, from assistant foremen to the president are concerned with performance. Consequently, there must be an appropriate flow of information, measuring performance against plans, from the producing levels through the control levels of production to top management. Foremen are concerned with hourly and daily output figures for machines and for individual operators. The production-control center requires a steady feedback of actual output data to tie in formulated plans. Control at this level need not involve each operation or operator, but rather only selected key operations along the route of production flow. A good control reporting system will furnish only enough knowledge of the progress of manufacture to give assurance that schedules will be met and to detect any delays in operations in sufficient time to permit correction of all normal causes for failure. Generally, as long as production is moving satisfactorily, top officials will only be interested in reports showing deliveries made of the finished product as compared with manufacturing programs for production.

The following list outlines the common interests of production and traffic functions wherein coordination and consultation are necessary or desirable between personnel responsible for manufacture of the product, and traffic personnel responsible for outside transportation:

DISCUSSION

(a) Scheduling routine arrival of incoming material, freight cars, and trucks for unloading so that help is available.

(b) Designing and packing shipping containers, including materials - handling features of the completed package to insure easy, rapid handling by all transportation and in-transit storage personnel involved.

(c) Marking information and location.

(d) Arranging for freight cars and pick-up by other carriers for outgoing shipment of products in accord with production completion dates.

(e) Tracing lost or delayed shipments, either incoming or outgoing.

(f) Investigating damage to materials or products caused in transit, initiating claims involved and advising on possible corrective steps concerned with package design and handling.

(g) Establishing traffic routings for incoming and/or outgoing shipments in conjunction with traffic personnel in vendors' plants.

The need for close attention to traffic management is immense, for without good control external to a plant, good production control within the plant is very difficult.

DISCUSSION

Quality Control Analysis

Inspection and Quality Control. One sure way to lose money in manufacturing is to produce scrap. It is well understood that inspection never added a penny of value to any product; but it is a necessary and effective guardian against the most costly type of production, the production of scrap.

Inspection and quality control are two separate though closely related functions. Inspection is the function of matching a material, part, or product against the drawing or specification to determine the conformance, or degree of conformance with any one, or all of the following characteristics:

(a) Property

(b) Dimension

(c) Finish

(d) Chemistry

(e) Function or performance

Quality control is the constant periodic observation or measure of a required characteristic of a product to insure that the characteristic is being maintained within tolerance limits, and to forecast or detect trends away from control of the operation so that preventive or corrective steps can be taken.

The different types of inspection are divided into the following groups:

(a) Receiving inspection

(b) Tool and gauge inspection

(c) First piece inspection

(d) Process inspection

(e) Finished goods inspection

(f) Product testing

Receiving inspection is inspection of incoming purchased materials and parts from vendors. Accepted items are passed on to stockroom or production stations; rejected items are referred to production and purchasing interest for disposition.

Tool and gauge inspection consist of inspection tools, dies, molds, and patterns to insure that parts produced from them will meet dimensions specified by past drawings. Also, the working gauges furnished operators must be carefully checked before they are released for use. In production today, the goods manufactured can be no better than the tools from which they are made.

First piece inspection is performed to approve for production a set-up which has been completed. The first pieces produced from any operation including purchased components should be turned over to the inspection department to insure that all dimensions, finishes and other requirements of the drawings and specification sheets are met.

Process inspection is the periodic inspection of parts during the manufacturing process, at the machine or bench where work is being performed. The prime responsibility for quality should rest with producing personnel- the operator and his supervision. Consequently, much of the in-process inspection is performed by the operators. Beyond the inspection given the pieces by the operators themselves, process inspection is also carried on by floor inspectors who report to the inspection department or to the quality control supervisors. Usually the inspectors have the authority to stop any operation where a defective product is being made

even over the foremen's desire to continue in production. It is for this reason that it is not good practice for inspection personnel to report to production personnel. Rather, each should report to a responsible official who has the knowledge to weigh and the authority to decide the merits of continuing or stopping production when quality is in question.

The function of finished-goods inspection is to check the part in its entirety for adherence to establish quality standards to insure that all work at all preceding operations has been up to the specifications called for.

Product testing usually consist of laboratory life tests or periodic destructive tests, wherein products are taken from the manufacturing line and subjected to a set schedule of tests to assure that desired characteristics of wear, strength and gas life, as in the case of Protective Mask, are being maintained.

Up until only a few years ago, quality levels in parts and products were maintained by the sifting process of inspection - screening good parts from bad. It is now recognized that while quality cannot be inspected into the product, the building of a quality product can be promoted and controlled during manufacture in a number of ways as follows:

(a) Process capabilities studies

(b) Design of sampling plans

(c) Analyzing inspection data

(d) Training

While it is generally impractical in high production manufacture to inspect all parts 100 percent, it has been found practical to establish quality acceptance based on sampling of the parts produced, without

DISCUSSION

destroying assurance that satisfactory quality of product will be maintained. No inspection plan, even 100 percent inspection will guarantee that no defects will slip through production. One hundred per cent inspection is subject to human failure to detect faults being looked for, or where some element of inspection judgment is necessary.

A sampling plan of inspection permits concentration of inspection time and costs on fewer pieces, thus promoting more thorough inspection without sacrificing knowledge as to the quality characteristics of the lot from which the sample was taken. A sampling plan operates on the basis of probability that quality characteristics of the entire lot will be typified in samples of proper size taken from the lot. Thus if defects in undue amounts are found in a sample, it will be cause to reject the lot. If they are not found in undue amounts in the sample the lot will be accepted.

There are many sampling plans being used effectively today. There are also many methods of applying sampling plans to a specific type of product. The sampling plan and the method of applying the plan to the CD V-805 is enclosed in this report in the form of the Quality Control Plan for the Protective, Civilian, CD V-805 Mask.

The principles outlined in all of the foregoing paragraphs were used as the basis for the quality control plan written for the CD V-805 Mask. A good thought to remember when discussing the quality control plan for the Protective, Civilian, CD V-805 Mask is the following: "Quality Control and inspection is a necessary and effective guardian against the production of scrap and even more important in reference to a critical item such as the Protective, Civilian, CD V-805 Mask; quality control and inspection is a necessary and effective guardian against the loss of a life due to the production of defective material."

(12/A)

ARTICLE DRAWINGS FOR THE CD V-805 MASK

CONTRACT DA 30-070-CML-1250

DWG. NO.	DESCRIPTION	DATE OF DWG.
C5-1-288	Mask, Protective, Assembly & Bill of Material	7/19/62
C5-2-905	Valve, Outlet, Assembly & Bill of Material	6/27/62
C5-2-907	Cover, Outlet Valve	4/28/62
C5-2-917	Deflector Assembly	5/4/61
C5-2-918	Harness, Head Assembly, Details & Bill of Material	6/11/62
C5-2-920	Deflector Size 2	4/17/62
C5-2-922	Deflector Size 6	4/17/62
C5-2-923	Deflector Size 5	6/11/62
C5-2-924	Deflector Size 4	6/26/62
C5-2-925	Deflector Size 3	4/17/62
C5-2-927	Deflector Size 1	6/19/62
C5-3-893	Filter Unit Size 6, Assembly, Details & Bill of Material	11/11/61
C5-3-896	Filter Unit Size 5, Assembly, Details & Bill of Material	6/11/62
C5-3-899	Filter Unit Size 4, Assembly, Details & Bill of Material	1/19/62
C5-3-903	Filter Unit Size 3, Assembly, Details & Bill of Material	1/2/62
C5-3-906	Filter Unit Size 2, Assembly, Details & Bill of Material	1/15/62
C5-3-909	Filter Unit Size 1, Assembly, Details & Bill of Material	1/24/62
C5-3-931	Filter Blank Size 1	1/24/62
C5-3-932	Filter Blank Size 2	1/17/62
C5-3-933	Filter Blank Size 3	1/2/62
C5-3-934	Filter Blank Size 4	1/19/62

(1/B)

ARTICLE DRAWINGS (Continued)

DWG. NO.	DESCRIPTION	DATE OF DWG.
C5-3-935	Filter Blank Size 5	11/6/61
C5-3-936	Filter Blank Size 6	12/13/61
C5-3-937	Filter Screen Size 1	1/24/62
C5-3-938	Filter Screen Size 2	1/17/62
C5-3-939	Filter Screen Size 3	1/2/62
C5-3-940	Filter Screen Size 4	1/23/62
C5-3-941	Filter Screen Size 5	11/6/61
C5-3-942	Filter Screen, Size 6	12/13/61
C5-4-388	Carrier, Civilian, CD V-805 Bill of Material	6/27/62
B5-1-286	Mask Protective Civilian CD V-805 List of Dwgs. Spec. & Std.	6/15/62
B5-2-794	Medallion	6/15/62
B5-2-868	Disc, Outlet Valve	7/10/62
B5-2-902	Facepiece Civilian CD V-805 List of Dwgs., Spec., & Std.	6/15/62
B5-2-906	Seat, Outlet Valve	10/20/62
B5-2-914	Lens Size 1	6/1/62
B5-2-915	Lens Size 2	6/27/62
B5-2-916	Tip, Clinch	6/11/62
B5-2-919	Retainer, Outlet Valve	7/18/61
B5-2-928	Insert, Deflector	6/19/62
B5-2-1595	Lens, Size 3	6/1/62
B5-2-1596	Lens, Size 4	6/1/62
B5-2-1597	Lens, Size 5	6/1/62
B5-2-1598	Lens, Size 6	6/1/62
B5-4-336	Carrier, List of Dwgs., Spec. & Standards	6/15/62
B5-20-305	Packing, Bill of Material	5/2/63
B5-20-307	Bag, Water-Vaporproof	2/7/63

ARTICLE DRAWINGS (Continued)

DWG. NO.	DESCRIPTION	DATE OF DWG.
B22-4-52	Buckle, Webstrap	6/12/62
B22-10-90	Ring, Snap Fastener (Medium)	2/20/62
B22-10-91	Snap, Eyelet (Medium)	2/21/62
B22-10-92	Socket Snap Size Medium	2/20/62
B22-10-93	Stud Snap Size Medium	2/21/62
B22-21-142	Rivet, Semi-Tubular	6/11/62
D5-2-903	Facepiece, Bill of Material	6/14/62
D5-2-904	Facepiece, Assembly & Detail	5/4/61
D5-2-929	Faceblank Size 1, Sections	8/4/61
D5-2-929	Faceblank Size 1 (Sheet 2), Sections	8/4/61
D5-2-930	Faceblank Size 2, Sections	8/4/61
D5-2-930	Faceblank Size 2 (Sheet 2), Sections	8/4/61
D5-2-931	Faceblank Size 3, Sections	8/4/61
D5-2-931	Faceblank Size 3 (Sheet 2), Sections	8/4/61
D5-2-932	Faceblank Size 4, Sections	8/3/61
D5-2-932	Faceblank Size 4 (Sheet 2), Sections	8/3/61
D5-2-933	Faceblank Size 5, Sections	1/9/62
D5-2-933	Faceblank Size 5 (Sheet 2), Sections	8/29/60
D5-2-934	Faceblank Size 6, Sections	8/4/61
D5-2-934	Faceblank Size 6 (Sheet 2), Sections	8/4/61
D5-4-337	Carrier, Assembly	6/12/62
D5-4-339	Carrier Blank	6/12/62
D5-20-306	Packing (Mask) Assembly	11/12/62
E5-2-908	Faceblank Size 6, Article Drawing	8/3/61
E5-2-909	Faceblank Size 5, Article Drawing	6/26/62
E5-2-910	Faceblank Size 4, Article Drawing	8/3/61

ARTICLE DRAWINGS (Continued)

DWG. NO.	DESCRIPTION	DATE OF DWG.
E5-2-911	Faceblank Size 3, Article Drawing	8/4/61
E5-2-912	Faceblank Size 2, Article Drawing	8/3/61
E5-2-913	Faceblank Size 1, Article Drawing	7/21/61

TOOL & MACHINE DRAWINGS

FOR THE CD V-805 MASK

CONTRACT DA 30-070-CML-1250

DWG. NO.	DESCRIPTION	DATE OF DWG.
EFT-702 thru-3	S/C Inject Mold #5 Faceblank	4/17/64
EFT-805 thru-2	S/C Inject Mold #4 Faceblank	12/5/61
EFT-806 thru-3	S/C Inject Mold #2 Faceblank	12/12/61
EFT-807 thru-3	S/C Inject Mold #6 Faceblank	12/13/61
EFT-808 thru-3	S/C Inject Mold #3 Faceblank	12/12/61
EFT-809 thru-3	S/C Inject Mold #1 Faceblank	12/12/61
GED-810&810-1	Lens & Filter Unit Welding Tool Size 1	1/26/62
GED-811&811-1	Lens & Filter Unit Size #2 Welding Tool	1/19/62
GED-812&812-1	Lens & Filter Unit Size #3 Welding Tool	1/9/62
GED-813&813-1	Lens & Filter Unit Size #4 Welding Tool	1/24/62
GED-814&814-1	Lens & Filter Unit Size #5 Welding Tool	11/17/61
GED-815&815-1	Lens & Filter Unit Size #6 Welding Tool	1/4/62
GMD-816 thru-2	S/C Edge Seal Mold (Plastisol) Size 1	2/5/62
GMD-817 thru-2	S/C Edge Seal Mold (Plastisol) Size 2	1/19/62
GMD-818 thru-2	S/C Edge Seal Mold (Plastisol) Size 3	1/4/62
GMD-819 thru-2	S/C Edge Seal Mold (Plastisol) Size 4	1/26/62
GMD-820&820-1	S/C Edge Seal Mold (Plastisol) Size 5	8/14/62
GMD-821 thru-2	S/C Edge Seal Mold (Plastisol) Size 6	12/13/61
GED-822	Plastisol Injection Machine	11/17/61
GED-823	Welding Unit Chin Seam Size #1	4/20/62
GED-824	Welding Unit Chin Seam Size #2	4/18/62
GED-825	Welding Unit Chin Seam Size #3	4/18/62
GED-826	Welding Unit Chin Seam Size #4	4/18/62

(1/c)

TOOL & MACHINE DRAWINGS (Continued)

Dwg. No.	DESCRIPTION	DATE OF DWG.
GED-827	Welding Unit Chin Seam Size #5	12/6/61
GED-828	Welding Unit Chin Seam Size #6	4/19/62
GED-829	E-27 Penetrometer Test Fixture Element Assembly Size 1	3/21/62
GED-830	E-27 Penetrometer Test Fixture Element Assembly Size 2	4/16/62
GED-831	E-27 Penetrometer Test Fixture Element Assembly Size 3	1/11/62
GED-832	E-27 Penetrometer Test Fixture Element Assembly Size 4	4/17/62
GED-833	E-27 Penetrometer Test Fixture Element Assembly Size 5	3/13/62
GED-834	E-27 Penetrometer Test Fixture Element Assembly Size 6	3/13/62
GED-835&835-1	Facepiece Heat Sealing Fixture For Q-2 Gas Life Test Size #1 thru 6	5/9/62
GED-841	Fixture Gas Life Test Filter Element Size 1 thru 6	5/3/62
GED-847&847-1	Welding Tool Chin Strap Size 1 thru 6	1/10/62
GED-855&855-1	Outlet Valve Assembly Fixture Size 1 thru 6	2/20/62
GED-856&856-1	Deflector Assembly Fixture Size 1 thru 6	3/6/62
GED-857	Head Harness Assembly Fixture Size 1 thru 6	3/12/62
GED-860	Holding Fixture (Mask) Size 1 thru 6 For Tissue Assembly	3/19/62
GED-862	Dip Test Tank Bag Leakage Test	2/28/62
GED-872	Test Head Cover Mask Leakage Assembly, Assembly View	5/28/62
GED-892	Trimmer Air Operated	7/27/62
GMD-896&896-1	4/Cav Inject Mold Seat Outlet Valve	4/10/63
GMD-897&897-1	4/Cav Inject Mold Cover Outlet Valve	4/13/63
GED-902	Assembly Line	6/5/65

TOOL & MACHINE DRAWINGS (Continued)

Dwg. No.	DESCRIPTION	DATE OF DWG.
C-909	Receiving & Material Storage Area	6/5/63
GEC-858	Bracket & Adapter M4 Outlet Valve Leakage Test	3/14/62
GEC-868	No Go Gauge Filter & Screen Blank Size #5	5/21/62
GEC-868-1	Go Gauge Filter & Screen Blank Size #5	5/21/62
GEC-869	No Go Gauge Deflector Blank Size #5	5/22/62
GEC-869-1	Go Gauge Deflector Blank Size #5	5/22/62
GEC-870	Go & No Go Gauge Eye Lens Blank Size #5	5/21/62
GEC-872	Test Head Cover Plastic Chamber	5/28/62
GEC-872-1	Test Head Cover Sections Plastic Chamber	5/28/62
GEC-872-2	Test Head Base	6/2/62
GEC-872-5	Flange Ring (Test Head Cover)	7/18/62
GEC-874	Test Fixture To Rough H andle Filter Units, Civilian CD V-805 Mask	6/9/62
GEC-875	Filter & Screen Blank Go Gauge Size 6	6/15/62
GEC-875-1	Filter & Screen Blank No-Go Gauge Size 6	6/15/62
GEC-876	Go & No Go Lens Size #6	6/15/62
GEC-877	Go Gauge Deflector Blank Size #6	6/21/62
GEC-877-1	No Go Deflector Blank Size #6	6/22/62
GEC-878	Go Gauge Filter & Screen Blank Size #4	6/22/62
GEC-878-1	No Go Filter & Screen Blank Size #4	7/2/62
GEC-879	Go & No Go Lens Blank Size #4	7/2/62
GEC-880	Go & No Go Lens Blank Size #3	7/2/62
GEC-881	Go Gauge Filter & Screen Size #3	7/2/62
GEC-881-1	No Go Gauge Filter & Screen Size #3	7/2/62
GEC-882	Go Gauge Filter & Screen Blank Size #2	6/29/62
GEC-882-1	No Go Filter & Screen Blank Size #2	6/29/62

(3/c)

TOOL & MACHINE DRAWINGS (Continued)

DWG. NO.	DESCRIPTION	DATE OF DWG.
GEC-883	Go & No Go Gauge Lens Blank Size #2	6/29/62
GEC-884	Go Gauge Filter & Screen Blanks Size #1	6/29/62
GEC-884-1	No Go Gauge Filter & Screen Blanks Size #1	6/27/62
GEC-885	Go & No Go Gauge Lens Blank Size #1	6/29/62
GEC-887	No Go Gauge Deflector Blank Size #2	7/18/62
GEC-887-1	Go Gauge Deflector Blank Size #2	7/18/62
GEC-888	No Go Gauge Deflector Blank Size #3	7/18/62
GEC-888-1	Go Gauge Deflector Blank Size #3	7/18/62
GEC-889	Go Gauge Deflector Blank Size #4	7/23/62
GEC-889-1	No Gauge Deflector Blank Size #4	7/23/62
GEC-890	Go Gauge Deflector Blank Size #1	7/24/62
GEC-890-1	No Go Gauge Deflector Blank Size #1	7/24/62
GEC-898	Retainer Ring, Outlet Valve Die	3/20/63
GEC-899	Support Arm for Heat Flatten & Punch Operation	6/25/62
GEC-899-1	Plate Detail	6/26/62
GEC-900	Operational Flow Chart	5/31/63
GEB-859	Adapter Gas Life Test Fixture	3/15/62
GEB-863	[illegible] Gauge Outlet Valve Retaining Ring	5/24/62
GEB-864	Checking Gauge Outlet Valve Seat	5/23/62
GEB-865	Checking Gauge Outlet Valve Cover	5/23/62
GEB-866	Checking Gauge Outlet Valve Seat	5/24/62
GEB-871	Heating Platen For Outlet Valve Cover Assembly	5/22/62
GEB-872-3	Buckle Hooks for #6 Test Head	7/14/62
GEB-891	Test Fixture Outlet Valve Resistance Testing Machine	7/25/62
GEB-894	Adapter for Q-2 Gas Life Tester CD V-805 Mask (All sizes)	9/12/62
GEB-901	Material Flow Chart	8/24/61

4k

CD V-805 FACEBLANK INJECTION MOLDING DATA

The data listed in the chart below is only applicable to the CD V-805 Faceblank Molds produced on the Production Engineering Study of the CD V-805 Mask. The faceblank molds were mounted in a Lewis Welding & Engineering Model 616 converted to a 616 V12 Vinyl Machine. We do not recommend that this machine be used on future contracts. The operating conditions will change from one machine to another.

ITEM	CD V-805 Faceblank Size 5					
	1	2	3	4	5	6
Mold Numbers	10042-1	10039-1	10041-1	10040-1	8057-1	10038-1
Mold Drawing Numbers	EFT-809	EFT-806	EFT-808	EFT-805	EFT-702	EFT-807
Faceblank Article Drawing Number	E5-2-913	E5-2-912	E5-2-911	E5-2-910	E5-2-909	E5-2-908
Weight of Faceblank, Sprues & Runners	.3431bs.	.3441bs.	.3391bs.	.3581bs.	.3561bs.	.3681bs.
Weight of Sprues & Runners Only	.2461bs.	.1441bs.	.2431bs.	.1321bs.	.1501bs.	.1291bs.
Weight of Faceblank only	.1971bs.	.2001bs.	.1961bs.	.2261bs.	.2061bs.	.2391bs.
Front Zone Barrel Temp.	345°F	345°F	345°F	345°F	345°F	340°F
Center Zone Barrel Temp.	325°F	300°F	300°F	325°F	325°F	330°F
Rear Zone Barrel Temp.	310°F	295°F	290°F	300°F	310°F	320°F
Nozzle Temperature	315°F	315°F	315°F	315°F	315°F	315°F
Mold Temperature, Front & Back Plates	130°F	130°F	130°F	130°F	130°F	130°F
No. of Prepacks	3	2	2	2	3	2
Total Clamp Time	40sec.	28sec.	28sec.	29sec.	40sec.	30sec.
Injection Time	9.25sec.	12sec.	12sec.	11sec.	9.25sec.	12sec.
Total Cycle Time	65sec.	60sec.	58sec.	59sec.	64sec.	67sec.
Total Clamp Pressure	200ton	200ton	200ton	200ton	200ton	200ton
Hydraulic Line Injection Pressure	3,0001bs	2,0001bs.	2,500	20001bs.	30001bs.	20001bs.

OPERATING INSTRUCTIONS

FOR THE

CD V-805 FILTER UNIT EDGESEAL MOLDING MACHINE

Step 1. Turn power on, switch 1.

Step 2. Turn on switch 2 to start cold water flowing.

Step 3. Position locator over bottom half of filter unit mold.

Step 4. Load filter unit components (bottom screen, filter blank, top screen) into locator and place small magnetized metal strip on top screen to hold components in place. Remove the locator.

Step 5. Activate switch 3 to close the mold.

Step 6. Move the injection nozzle forward by activating switch 4 to "on" position.

Step 7. Turn 170°F water on by moving switch No. 7 to the "on" position.

Step 8. When pyrometer indicates mold temperature is 120°F, inject plastisol by moving switch 5 to the "on" position. When plastisol starts to flow out of the overflow, approximately twelve seconds; turn off switch 5.

Step 9. Activate the flow of steam through the filter mold by moving the steam switch to the "on" position. Leave on until mold temperature reaches 340°F.

Step 10. Move both the steam switch (switch 6) and the warm water switch (switch 7) to the off position. This action automatically starts the flow of cold water through the filter mold. The cold water switch, the warm water switch, and the steam switch are wired together in order to work progressively from one action to the other.

Step 11. When the mold temperature reaches 120°F move switches 2,3, & 4 to the off position.

Step 12. Remove Filter Unit from the mold and clean flash off the mold surfaces.

Step 13. Repeat the cycle starting with Step 2.

NOTE: These operations are only applicable to the Filter Molding machine developed on the Production Engineering Study of The CD V-805 Mask.

I/E

TOOLING & MACHINES REQUIRED

TO PRODUCE

100,000 CD V-805 MARK PER MONTH

The tools and machines listed in this section are not mandatory and are only suggestions for the equipment that will be required. By using the drawings of the tooling developed on the Production Engineering Study and if possible the actual equipment; a future manufacturer will be able to design and purchase tools and machines to meet the individual manufacturer's requirements. Naturally, it is impossible at this time to provide exact nomenclatures of the equipment due to the designing that must be performed to produce a line capable of producing 100,000 CD V-805 Masks per month.

(1/F)

Operation 10, Blank Filter Pads

		Quantity
a)	2 Cavity Steel Die, Size 1	1
b)	2 Cavity Steel Die, Size 2	1
c)	2 Cavity Steel Die, Size 3	1
d)	2 Cavity Steel Die, Size 4	1
e)	2 Cavity Steel Die, Size 5	1
f)	2 Cavity Steel Die, Size 6	1
g)	Dries & Krump Punch Press Model 131 with automatic feed system or equal	1

Operation 30, Mold Edgeseal on Filter Units

		Quantity
a)	Plastisol Injection Machine automated to load, cycle, and unload	4
b)	Size 1 independently mounted filter cavities	1 set (8 cavities)
c)	Size 2 independently mounted filter cavities	1 set (8 cavities)
d)	Size 3 independently mounted filter cavities	1 set (8 cavities)
e)	Size 4 independently mounted filter cavities	2 sets(16 cavities)
f)	Size 5 independently mounted filter cavities	2 sets(16 cavities)
g)	Size 6 independently mounted filter cavities	1 set (8 cavities)

Operation 40, Trim Flash From Filter Units

		Quantity
a)	Buffer With Buffing Wheel	2

Operation 60 & 70 Injection Mold Vinyl Faceblank & Inspect

		Quantity
a)	In-Line Screw Vinyl Injection Machines - Minimum Capacity 6 ounce Shot	5
b)	Inspection Tables With Lights	5
c)	Vacuum Conveyor To-Feed Vinyl Automatically	2
d)	Size 1 Faceblank Mold	1
e)	Size 2 Faceblank Mold	1
f)	Size 3 Faceblank Mold	1
g)	Size 4 Faceblank Mold	2
h)	Size 5 Faceblank Mold	2
i)	Size 6 Faceblank Mold	1

Operation 80, Weld Faceblank, Filter Unit, & Lenses

	Quantity
a) 4kw Electronic Sealing Generators	3
b) Numatic Press With Automatic Two Station Operation	3
c) Size 1, Welding Tools With 2 Lower Electrodes	3
d) Size 2, Welding Tools With 2 Lower Electrodes	3
e) Size 3, Welding Tools with 2 Lower Electrodes	3
f) Size 4, Welding Tools with 2 Lower Electrodes	3
g) Size 5, Welding Tools with 2 Lower Electrodes	3
h) Size 6, Welding Tools with 2 Lower Electrodes	3

Generators should be equipped arc suppressors and dwell after weld timers.

Operation 90, Inspect Faceblank, Filter Unit, & Lens Weld

	Quantity
a) Inspection Table With Light	2

Operation 100, Weld Chin Straps

	Quantity
a) 2 kw Electronic Sealing Generator with arc Suppressors & Dwell After Weld Timers	2
b) Numatic Press with Fully Automatic Two Station Operation	2
c) Chin Strap Welding Fixture To Fit All Six Sizes	2

Operation 110, Weld Deflector Tabs

	Quantity
a) Heavy Duty Soldering Irons With Foot Pedals & Mounted On Stands	4

Operation 120, Weld First Chin Seam

	Quantity
a) 2 kw Electronic Sealing Generators Equipped With Arc Suppressors and Dwell After Weld Timer	3
b) Numatic Presses With Automatic Two Station Operation	3
c) Size 1 Chin Seam Welding Fixture (2 lower electrodes)	3
d) Size 2 Chin Seam Welding Fixture (2 lower electrodes)	3
e) Size 3 Chin Seam Welding Fixture (2 lower electrodes)	3
f) Size 4 Chin Seam Welding Fixture (2 lower electrodes)	3
g) Size 5 Chin Seam Welding Fixture (2 lower electrodes)	3
h) Size 6 Chin Seam Welding Fixture (2 lower electrodes)	3

Operation 130 & 135, Flatten & Pierce Hole In Chin Seam Area And Trim Flash From Chin Seam

	Quantity
a) 4 kw Electronic Sealing Generators Equipped With Arc Suppressors and Dwell After Weld Timers	2
b) Numatic Presses With Automatic Two Station Operation	2
c) Top Electrodes To Flatten & Pierce Hole	2
d) Size 1, 2, 3 Lower Electrodes With Mounting Plate	4
e) Size 4 & 5 Lower Electrodes With Mounting Plate	4
f) Size 6 Lower Electrode with Mounting Plate	4

Operation 140, Assemble Rivets & Buckles

	Quantity
a) Single Setter Rivet Machine With 2/C Rotary Hopper & Raceway	4
b) Small numatic flash trimmer with interchangeable blades	4

Operation 150 & 170, Assemble Outlet Valve Assembly & Cover

	Quantity
a) Numatic Press Mounted on Table	2
b) Automatic feder and heater to expand Polyethlene Cover	2

Operation 180 & 190, Perform Outlet Valve Leakage Test And DOP Penetration & Inhalation Test

	Quantity
a) Q127 DOP Penetrometer With Bell Chamber Attachment	4
b) M4 Outlet Valve Leakage Indicator With Inboard Leakage Attachment	4

Operation 200 & 210 Assemble Head Harness & Clean Lenses

	Quantity
a) Work Table With Light	5
b) Holding Fixture To Hold Mask In Order To Free Both Hands	5

Operation 220 & 230, Wrap Facepiece & Tape Tissue In Place; Assemble Facepiece In Carrier Assembly

	Quantity
a) Work Tables With Lights	3
b) Tape Dispensers	3
c) Holding Fixture For Holding Facepiece	3

4/F

Operation 240, 250 & 260, Place Carrier In Bag, Heat Seal Bag & Place In W5c Box

	Quantity
a) Heat Sealer To Seal Water-Vaperproof Bag	2
b) Work Tables	2

Operation 270, Tape & Stencil Box

	Quantity
a) Tape Dispenser	1
b) Holding Fixture To Assemble Box	1
c) Stenciling Equipment	1 set

Same Fixtures can be used to perform Operations 330 & 340.

Operation 160, Assemble Outlet Valve Disc To Valves

	Quantity
a) Work Table	1

S/F

30 MAY 1963

LIST OF MATERIAL REQUIREMENTS
PROTECTIVE, CIVILIAN, CD V-805 MASK

1 Item No.	2 Name of Part Assembly or Material	3 Specification No.	4 Drawing Number	5 Revision Date	6 No. of Pcs. or Ass'ys. Per Item	7 Description of Material	8** No. of Pcs. Req. Per 100,000 Item; Incl. Ass'y. Loss	9 Unit of Measure of Material	10*** Mat. Req. Per 100,000 Item; Incl. Material Lost During Fabrication	11 Assembly Overage Factor	12 Total Gross Material Req'd. Per 100,000 Items	13 Line No.
1	Box, Fiberboard	PPP-B-636	D5-20-306	11-12-62	1/30	Style RSC, Type I, Class 2, Grade 5	3,401			1.02		1
2												2
3	Partitions, Fiberboard	PPP-B-636	D5-20-306	11-12-62	1/30	Style RSC, Type I, Class 2, Grade 5	3,401 Pcs.					3
4												4
5	Tape, 1" Wide	PPP-T-76	D5-20-306	11-12-62	4.44 Yds.	Pressure Sensitive, Adhesive Paper	15,540 Yds.	Yds.		1.05		5
6												6
7	Ink, Marking Stencil	TT-I-559	D5-20-305	2-7-63		Color - Black		Gal.		1.30		7
8												8
9	Packaging	OCD CD V-805 Prot.Civ.Mask										9
10												10
11												11
12	Bag	MIL-B-131	D5-20-307	2-7-63	1	Barrier Material, Flexible, Class 2	103,000			1.03		12
13												13
14	Ink, Marking	TT-I-559	D5-20-307	2-7-63	1	Color-Black		Gal.		1.30		14
15												15
16	Tissue Paper	UU-P-553	C5-1-288	7-19-62	1	Tissue Paper for Lens Protection	103,000			1.03		16
17												17
18	Tape, 1" Wide x 2" Long	PPP-T-76	C5-1-288	7-19-62	3	Pressure Sensitive, Adhesive Paper	17,500 Yds.	Yds.		1.30		18
19												19
20												20
21												21
22												22

** Column 8: Assembly loss is defined as losses from faulty mask assembly operations, handling of components, and tests.

*** Column 10: Fabrication loss is defined as material losses from waste, spillage, and rejects. This column includes the material required to produce the losses defined in Column 8.

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30 MAY 1963

LIST OF MATERIAL REQUIREMENTS
PROTECTIVE, CIVILIAN, CD V-805 MASK

1	2	3	4	5	6	7	8**	9	10***	11	12	13
Line No.	Name of Part Assembly or Material	Specification No.	Drawing Number	Revision Date	No. of Pcs. or Parts Per Item	Description of Material	No. of Pcs. Req. Per 100,000 Items Incl. Ass'y. Loss	Unit of Measure of Material	Mat. Req. Per 100,000 Item: Incl. Material Loss During Fabricating	Assembly Overrun Factor	Total Gross Material Req. Per 100,000 Items	Line No.
1	Box, Fiberboard	PPP-B-636	D5-20-306	11-12-62	1/30	Style RSC, Type I, Class 2, Grade 5	3,401			1.02		1
2												2
3	Partitions, Fiberboard	PPP-B-636	D5-20-306	11-12-62	1/30	Style RSC, Type 1, Class 2, Grade 5	3,401 Sets					3
4												4
5	Tape, 3" Wide	PPP-T-76	D5-20-306	11-12-62	4.44 Yds.	Pressure Sensitive, Adhesive Paper	15,540 Yds.	Yds.		1.05		5
6												6
7	Ink, Marking Stencil	TT-I-559	D5-20-305	2-7-63		Color - Black		Gal.		1.30		7
8												8
9	Packaging	OCD CD V-805 Prot.Civ.Mask										9
10												10
11												11
12	Bag	MIL-B-131	D5-20-307	2-7-63	1	Barrier Material, Flexible, Class 2	103,000			1.03		12
13												13
14	Ink, Marking	TT-I-559	D5-20-307	2-7-63	1	Color-Black		Gal.		1.30		14
15												15
16	Tissue Paper	UU-P-553	C5-1-288	7-19-62	1	Tissue Paper for Lens Protection	103,000			1.03		16
17												17
18	Tape, 1" Wide x 2" Long	PPP-T-76	C5-1-288	7-19-62	3	Pressure Sensitive, Adhesive Paper	17,500 Yds.	Yds.		1.30		18
19												19
20												20
21												21
22	** Column 8: Assembly loss is defined as losses from faulty mask assembly operations, handling of components, and tests.											22
23	*** Column 10: Fabrication loss is defined as material losses from waste, spoilage, and rejects. This column includes the material required to produce the losses defined in Column 8.											23
24												24

30 MAY 1963

LIST OF MATERIAL REQUIREMENTS
PROTECTIVE, CIVILIAN, CD M-805 MASK

1 Line No.	2 Name of Part Assembly or Material	3 Specification No.	4 Drawing Number	5 Revision Date	6 No. of Pcs. or Ass'ys. Per Item	7 Description of Material	8** No./ Pcs. Req. Per 100,000 Items Incl. Ass'y. Loss	9 Unit of Measure of Material	10*** Mat.Req. Per 100,000 Item: Incl. Material Loss During Fabrication	11 Assembly Overage Factor	12 Total Gross Material Req'd Per 100,000 Items	13 Line No.
1	Rivet, Semi-Tubular	MIL-STD-171	B22-21-142	6-11-62	6	Standard Item - Steel	105,000	Pounds	147 lbs.	1.05	154 lbs.	1
2												2
3	Harness, Head, Ass'y. & B/M		05-3-918	2-7-63	1		101,000			1.01		3
4												4
5	Thread	MIL-T-7807				Nylon, Type I						5
6												6
7	Webbing, Textile					Refer to Drawing - 5/8" width		Yds.				7
8												8
9	Tip, Climb		B5-3-916	6-11-62	6	Standard Item - Steel						9
10												10
11	System for Mildew Proofing	JJ-M-155				Webbing, Textile, (Cotton Elastic)						11
12												12
13	Systems for Preparation	MIL-STD-171				Painting & Finishing Metals & Wood						13
14						Surf.						14
15												15
16	Carrier Ass'y, B/M		05-4-388	6-27-62								16
17												17
18	Carrier Ass'y.	L-P-375	D5-4-337	6-12-62	1	Film Flexible Vinyl, .012" Thick	103,000	16,537 lbs.	16,537 lbs.	1.03	17,033 lbs.	18
19												19
20	Snap, Eyelet; Medium		B22-10-91	2-21-62	1	Standard Item						20
21												21
22	Socket, Snap Size Medium		B22-10-92	2-20-62	1	Standard Item						22
23												23
24	Stud, Snap Size Medium		B22-10-93	2-21-62	1	Standard Item						24
25												25
26	Blank, Carrier	L-P-375	B5-4-339	6-12-62	1	Film, Flexible Vinyl, .012" Thick						26
27												27
28	Ink, Printers		D5-4-339	6-12-62		Ink, for Printing Instructions on Vinyl		Gal.		1.30		28
29												29
30	Packing, B/M		B5-20-305	2-7-63								30
31												31
32	Packing, Civilian Mask Ass'y. Cmp to M-805 Prot., Civ. Mask		D5-20-306	11-12-62								32
33												33
34												34
35	** Column 8: Assembly loss is defined as losses from faulty mask assembly operations, handling of components, and tests.											35
36	*** Column 10: Fabrication loss is defined as material losses from waste, spoilage, and rejects. This column includes the material required to produce the losses defined in Column 8.											36
37												37

30 MAY 1963

BILL OF MATERIAL REQUIREMENTS
PROTECTIVE, CIVILIAN, CD M-809 MASK

1 Line No.	2 Name of Part Assembly or Material	3 Specification No.	4 Drawing Number	5 Revision Date	6 No. of Pcs. or Ass'ys. Per Item	7 Description of Material	8** No. of Pcs. Req. Per 100,000 Items (Incl. Ass'y. Loss)	9 Unit of Measure of Material	10*** Mat. Req. Per 100,000 Item: Incl. Material Loss During Fabrication	11 Assembly Overrun Factor	12 Total Gross Material Req. Per 100,000 Items	13 Line No.
1	Lens, Size 6	FD 137-54-750	B5-2-1893	6-1-62	2	Vinyl Chloride Polymer & Copolymer Sheets	244,000	Sq. Feet	23,741 lbs.	1.22	28,946	1
2												2
3												3
4	Deflector Assembly	MIL-I-695	C5-2-937	5-4-61	1	Insulation Electrical Paper *						4
5												5
6	Deflector Blank, Size 1	MIL-I-695	C5-2-937	6-19-61	1	Insulation Electrical Paper *	103,000	Pounds	4982 lbs.	1.03	5128 lbs.	6
7												7
8	Deflector Blank, Size 2	MIL-I-695	C5-2-930	4-17-62	1	Insulation Electrical Paper *	103,000	Pounds	4882 lbs.	1.03	5028 lbs.	8
9												9
10	Deflector Blank, Size 3	MIL-I-695	C5-2-935	4-17-62	1	Insulation Electrical Paper *	103,000	Pounds	4882 lbs.	1.03	5028 lbs.	10
11												11
12	Deflector Blank, Size 4	MIL-I-695	C5-2-924	6-26-62	1	Insulation Electrical Paper *	103,000	Pounds	4882 lbs.	1.03	5028 lbs.	12
13												13
14	Deflector Blank, Size 5	MIL-I-695	C5-2-923	6-11-62	1	Insulation Electrical Paper *	103,000	Pounds	4882 lbs.	1.03	5028 lbs.	14
15												15
16	Deflector Blank, Size 6	MIL-I-695	C5-2-922	4-17-62	1	Insulation Electrical Paper *	103,000	Pounds	4882 lbs.	1.03	5028 lbs.	16
17												17
18	Deflector Inser., All Sizes	MIL-I-695	B5-2-928	6-19-62	2	Insulation Electrical Paper *	206,000	Pounds	150 lbs.	1.03	154 lbs.	18
19												19
20												20
21						* NOTE: Figure Material at 20 inches/lb.							21
22	Outlet Valve Seat	MIL-M-20693	B5-2-906	10-20-62	1	Molding Plastic, Polyamide (Nylon) Rigid	106,000	Pounds	4,079 lbs.	1.06	4,323 lbs.	22
23												23
24												24
25	Outlet Valve Disc	MIL-R-10132	B5-2-368	7-10-62	1	Rubber Compound	107,000	Pounds	956 lbs.	1.07	1,023 lbs.	25
26												26
27	Outlet Valve Retainer	QQ-S-700	B5-2-319	6-12-62	1	Sheet Steel, Carbon, Hot Rolled, FS 1050	106,000	Pounds	1,542 lbs.	1.06	1,635 lbs.	27
28												28
29												29
30	Outlet Valve Cover	L-P-390	C5-2-907	4-23-62	1	Plastic Compounds Polyethelene	107,000	Pounds	1,435 lbs.	1.07	1,533 lbs.	30
31												31
32	Buckle Asbestos	QQ-S-698	B22-4-52	6-12-62	6	Part A, .040", Carbon Cold Rolled Strip Steel	630,000	Pounds	7,056 lbs.	1.05	7,409 lbs.	32
33												33
34						Part B, .027", Carbon Cold Rolled Strip Steel						34
35												35
36												36
37	** Column 8: Assembly loss is defined as losses from faulty manufacturing assembly operations, handling of components, and tests.											
38	*** Column 10: Fabrication loss is defined as material losses from waste, spoilage, and rejects. This column includes the material required to produce the losses defined in Column 8.											

(4/L) (4/2)

30 MAY 1963

LIST OF MATERIAL REQUIREMENTS
PROTECTIVE, CIVILIAN, CD V-805 MASK

1 Line No.	2 Name of Part Assembly or Material	3 Specification No.	4 Drawing Number	5 Revision Date	6 No. of Pcs. or Ass'ys. Per Item	7 Description of Material	8** No. of Pcs. Req. Per 100,000 Items (Incl. Ass'y. Loss)	9 Unit of Measure of Material	10*** Mat. Req. Per 100,000 Items Incl. Material Loss During Fabrication	11 Assembly Overage Factor	12* Total Gross Material Req. Per 100,000 Items	13 Line No.
1	Filter Screen, Size 6	L-3-137	C5-3-942	12-13-61	2	Screening-Polyvinyl Chloride Coated Fibrous Glass	247,000	Sq. Ft.	83,400Ft^2	1.235	103,000Ft^2	1
2												2
3												3
4	Faceblank, Size 1	OCD CD V-805 Faceblank	B5-2-913	7/21/61	1	Polyvinyl Chloride Compound	122,000	Pounds	34,295*	1.22	41,840	4
5		*Note: Maximum quantity of Reclaimed Material Obtainable from 34,295 lbs. = 14,608 lbs.										5
6												6
7	Faceblank, Size 2	OCD CD V-805 Faceblank	B5-2-912	8-3-61	1	Polyvinyl Chloride Compound	122,000	Pounds	34,380*	1.22	41,943	7
8		*Note: Maximum quantity of Reclaimed Material From 34,380 lbs. = 14,380 lbs.										8
9												9
10	Faceblank, Size 3	OCD CD V-805 Faceblank	B5-2-911	8-4-61	1	Polyvinyl Chloride Compound	122,000	Pounds	33,853*	1.22	41,300	10
11		*Note: Maximum quantity of Reclaimed Material Obtainable From 33,853 lbs. = 14,278 lbs.										11
12												12
13	Faceblank, Size 4	OCD CD V-805 Faceblank	B5-2-910	8-3-61	1	Polyvinyl Chloride Compound	122,000	Pounds	35,806*	1.22	43,683	13
14		* Note: Maximum quantity of Reclaimed Material Obtainable from 35,806 lbs. = 13,244 lbs.										14
15												15
16	Faceblank, Size 5	OCD CD V-805 Faceblank	B5-2-909	6-26-61	1	Polyvinyl Chloride Compound	122,000	Pounds	35,625*	1.22	43,462	16
17		*Note: Maximum quantity of Reclaimed Material Obtainable from 35,625 lbs. = 15,000 lbs.										17
18												18
19	Faceblank, Size 6	OCD CD V-805 Faceblank	B5-2-908	8-3-61	1	Polyvinyl Chloride Compound	122,000	Pounds	36,750	1.22	44,835	19
20		*Note: Maximum quantity of Reclaimed Material Obtainable from 36,750 lbs. = 12,[illegible] lbs.										20
21												21
22	Lens, Size 1	FD 197-54-[illegible]	B5-2-914	6-1-62	2	Vinyl Chloride Polymer & Copolymer Sheets	244,000	Sq. Feet	17,812Ft^2	1.22	21,730	22
23												23
24												24
25	Lens, Size 2	FD 197-54-[illegible]	B5-2-915	6-27-62	2	Vinyl Chloride Polymer & Copolymer Sheets	[illegible],000	Sq. Feet	18,005Ft^2	1.22	21,960	25
26												26
27												27
28	Lens, Size 3	FD-197-54-[illegible]	B5-2-1595	6-1-62	2	Vinyl Chloride Polymer & Copolymer Sheets	244,000	Sq. Feet	19,402Ft^2	1.22	23,700	28
29												29
30												30
31	Lens, Size 4	FD-197-54-[illegible]	B5-2-1596	6-1-62	2	Vinyl Chloride Polymer & Copolymer Sheets	244,000	Sq. Feet	22,640Ft^2	1.22	27,600	31
32												32
33												33
34	Lens, Size 5	FD 197-54-[illegible]	B5-2-1597	6-1-62	2	Vinyl Chloride Polymer & Copolymer Sheets	244,000	Sq. Feet	19,536Ft^2	1.22	23,800	34
35												35
36												36

** Column 8: Assembly loss is defined as losses from faulty mask assembly operations, handling of components, and tests.

*** Column 10: Fabrication loss is defined as material losses from waste, spoilage, and rejects. This column includes the material required to produced the losses defined in Column 8.

LIST OF MATERIAL REQUIREMENTS
PROTECTIVE, CIVILIAN, CD V-805 MASK

1 Line No.	2 Name of Part, Assembly or Material	3 Specification No.	4 Drawing Number	5 Revision Date	6 No. of Pcs. or Ass'ys. Per Item	7 Description of Material	8** No. of Pcs. Req. Per 100,000 Items (Incl. Ass'y. Loss)	9 Unit of Measure of Material	10*** Mat. Req. Per 100,000 Items Incl. Material Loss During Fabrication	11 Assembly Overage Factor	12 Total Gross Material Req. Per 100,000 Items	13 Line No.
1	Filter Screen, Size 2	L-S-137	C5-3-938	1-17-62	2	Screening-Polyvinyl, Chloride Coated Fibrous Glass	247,000	Sq. Ft.	76,400Ft²	1.235	94,400Ft²	1
4	Filter Unit, Size 3	OCD CD V-805 Filter Unit	C5-3-905	1-2-62	1	Edgeseal Material		Gallons	358 Gal.	1.235	442 Gal.	4
7	Filter Blank, Size 3	MIL-F-51095	C5-3-933	1-2-62	1	Filter Material, Gas-Aerosol, C18, Type II	123,500	Sq. Ft.	38,200 Ft²	1.235	46,700Ft²	7
10	Filter Screen, Size 3	L-S-137	C5-3-939	1-2-62	2	Screening-Polyvinyl, Chloride Coated Fibrous Glass	247,000	Sq. Ft.	76,400Ft²	1.235	94,400Ft²	10
12	Filter Unit, Size 4	OCD CD V-805 Filter Unit	C5-3-899	1-19-62	1	Edgeseal Material		Gallons	378 Gal.	1.235	467 Gal.	12
15	Filter Blank, Size 4	MIL-F-51095	C5-3-934	1-19-62	1	Filter Material, Gas-Aerosol, C18, Type II	123,500	Sq. Ft.	41,700Ft²	1.235	51,500Ft²	15
18	Filter Screen Size 4	L-S-137	C5-3-940	1-32-62	2	Screening-Polyvinyl, Chloride Coated Fibrous Glass	247,000	Sq. Ft.	83,400Ft²	1.235	103,000Ft²	18
21	Filter Unit, Size 5	OCD CD V-805 Filter Unit	C5-3-896	11-6-62	1	Edgeseal Material		Gallons	365 Gal.	1.235	450 Gal.	21
24	Filter Blank, Size 5	MIL-F-51095	C5-3-935	11-6-62	1	Filter Material, Gas-Aerosol, C18, Type II	123,500	Sq. Ft.	40,000Ft²	1.235	49,400Ft²	24
27	Filter Screen, Size 5	L-S-137	C5-3-941	11-6-62	2	Screening-Polyvinyl, Chloride Coated Fibrous Glass	247,000	Sq. Ft.	80,000Ft²	1.235	98,800Ft²	27
30	Filter Unit, Size 6	OCD CD V-805 Filter Unit	C5-3-893	11-11-61	1	Edgeseal Material		Gallons	395	1.235	487 Gal.	30
33	Filter Blank, Size 6	MIL-F-51095	C5-3-936	12-13-61	1	Filter Material, Gas-Aerosol, C18, Type II	123,500	Sq. Ft.	41,700Ft²	1.235	51,500Ft²	33

** Column 8: Assembly loss is defined as losses from faulty mask assembly operations, handling of components, and tests.

*** Column 10: Fabrication loss is defined as material losses from waste, spoilage, and rejects. This column includes the material required to produce the losses defined in Column 8.

30 MAY 1963

LIST OF MATERIAL REQUIREMENTS
PROTECTIVE, CIVILIAN, CD V-805 MASK

1 Line No.	2 Name of Part Assembly or Material	3 Specification No.	4 Drawing Number	5 Revision Date	6 No. of Pcs. or Ass'ys. per Item	7 Description of Material	8** No. of Pcs. Req. Per 100,000 Items Assembled and Tested	9 Unit of Measure of Material	10*** Mat. Req. Per 100,000 Items Tested, Material Loss During Fabrication	11 Assembly Overage Factor	12 Total Gross Material Req. Per 100,000 Items	13 Line No.
1	Mask; Protective, Civilian											1
2	List of Drawings & Specs.		D5-1-286	6-17-62								2
3												3
4	Mask; Protective, Civilian	DCD CD V-805										4
5	CD V-805 Assembly and Bill of	Prot. Civ.	C5-1-28d	7-19-62								5
6	Material	Mask										6
7												7
8	Facepiece; CD V-805		D5-2-902	6-15-62								8
9	List of Dwgs. & Specs.											9
10												10
11	Facepiece; Bill of Material		D5-2-903	6-14-62								11
12												12
13	Facepiece; Assembly & Detail	DCD CD V-805	D5-2-934	5-4-61	1		119,000					13
14		Prot.Civ.Mask										14
15												15
16	Systems for Preparation	MIL-P-[illegible]-171		Latest Issue		Painting & Finishing Metal & Wood						16
17						Surfaces						17
18												18
19	Medallion		D5-2-734	6-15-62								19
20												20
21	Filter Unit, Size 1	DCD CD V-805	C5-3-909	1-24-62	1	Edgeseal Material		Gallons	342 Gal.	1.235	423 Gal.	21
22		Filter Unit										22
23	Filter Element, Size 1	MIL-F-51095	C5-3-931	1-24-62	1	Filter Material, Gas-Aerosol, C18, Type II	123,500	Sq. Ft.	38,200 Ft.^{2}	1.235	47,200 Ft.^{2}	23
24												24
25												25
26												26
27	Filter Screen, Size 1	L-S-157	C5-3-957	1-24-62	2	Screening-Polyvinyl Chloride Coated Fiberous Glass	247,000	Sq.Ft.	76,400 Ft.^{2}	1.235	94,400 Ft.^{2}	27
28												28
29												29
30	Filter Unit, Size 2	DCD CD V-805	C5-3-936	1-15-62	1	Edgeseal Material		Gallons	347 Gal.	1.235	428 Gal.	30
31		Filter Unit										31
32												32
33	Filter Element, Size 2	MIL-F-51095	C5-3-937	1-17-62	1	Filter Material, Gas-Aerosol, C18, Type II	123,500	Sq. Ft.	38,800 Ft.^{2}	1.235	46,700 Ft.^{2}	33
34												34
35												35
36	** Column 8: Assembly loss is defined as losses from faulty mask assembly operations, handling of components, and tests.											36
37	*** Column 10: Fabrication loss is defined as material losses from waste, spoilage, and rejects. This column includes the material required to produce the losses defined in Column 8.											37
38												38

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6.2 Ordering Data. The Government agency designated with the responsibility of directing future production of the Protective, Civilian, CD V-805 Mask shall designate all data necessary for ordering filter units.

6.3 Objective Evidence. Provisions for objective evidence, inspection records, and maintenance of inspection records shall be designated by the Government agency responsible for production.

6.4 Standard Deviation (σ). The following formulas should be used to determine σ :

a. Square the sum of the individual observations, $(\Sigma X)^2$.

b. Multiply the sum of the squares of the individual observations by the number of observations by the number of observations, $N(\Sigma X^2)$.

c. Subtact (a) from (b) and divide by the number of observations multiplied by the number of observations minus one

$$\frac{N(\Sigma X^2) - (\Sigma X)^2}{N(N-1)}$$

d. Extract the square root of (c). Standard Deviation may be indicated thus.

$$\sigma = \sqrt{\frac{N(\Sigma X^2) - (\Sigma X^2)}{N(N-1)}}$$

4.7.4 Gas Life After Rough Handling (Preproduction Sample). Filter Units from the preproduction sample shall be positioned in a suitable fixture and tested for Gas Life in a Q2, All-Purpose Gas Life Apparatus. The test shall be chloropicrin (PS) at a concentration of 16 mg/l at a continuous flow rate of 12.5 l/m. The test gas concentration shall be maintained within a tolerance of ± 5%. Equilibrium and test air temperatures will be recorded and maintained at 75° ± 5°F. and at 50% relative humidity. The corrected gas life of each sample shall be recorded to the nearest 0.1 minute for determining the mean (average) gas life and standard deviation (sigma), see paragraph 6.4. The DOP Smoke Penetration & Resistance Test shall be performed before and after rough handling of the Gas Life sample. The Gas Life sample shall meet the requirements of paragraphs 3.3, 3.6, and 3.7.

4.7.4.1 Rough Handling of Filter Units (Preproduction Sample). The filter units designated for rough handling shall be centered over a fixture with a one-quarter inch mandrel and flexed in one direction 90° from the horizontal plane for five consecutive times. The filter unit shall then be flexed over the mandrel in the opposite direction for another 5 consecutive times.

4.7.5 Acceptance/Rejection Criteria. The tested samples shall meet the applicable requirements for each specific test listed in section 3. If these requirements are not met, the lot in question shall be rejected.

5. PREPARATION FOR DELIVERY

5.1 Packaging. The filter units shall be packaged in accordance with the requirements of method IA-8, Specification MIL-P-116. The bag shall be approximately 8" x 11" in size. The material shall be class 1 in accordance with MIL-B-131 and shall consist of two or more plies with the heat sealable inside ply of the bag made of polyethylene. The packaging shall be accomplished in such a manner that the moisture content of the packaged element shall not exceed the requirements as specified in 3.5. The package shall not leak when tested as specified in 4.7.3.

5.2 Packing. A uniform quantity of filter units, packaged as specified in 5.1 shall be packed in such a manner as to afford protection against damage to the filter units during direct shipment from the supply source to the first receiving activity for immediate assembly into the masks. Containers shall comply with Uniform Freight Classification Rules or other common carrier regulations applicable to the mode of transportation.

5.3 Marking. In addition to any special marking required by the contract or order; bags, unit packages, intermediate packages and shipping containers shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1 Intended Use. This specification covers filter units intended to be used in the Protective, Civilian, CD V-805 Masks.

TIME STUDIES OF OPERATIONS PERFORMED ON THEPRODUCTION ENGINEERING STUDY OF THE CD V-805 MASK, NEW TOOLING DESIGNS ARE CONSIDERED IN THE CYCLE TIMES

OPERATION SHEETS FOR FUTURE PRODUCTION OF 100,000 ACCEPTABLE CD V-805 MASKS PER MONTH; CYCLE TIMES ARE BASED ON

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OPERATION SHEETS FOR FUTURE PRODUCTION OF 100,000 ACCEPTABLE CD V-805 MASKS PER MONTH; CYCLES TIMES ARE BASED ON TIME STUDIES OF OPERATIONS PERFORMED ON THE PRODUCTION ENGINEERING STUDY OF THE CD V-805 MASK, NEW TOOLING DESIGNS ARE CONSIDERED IN THE CYCLE TIMES

Oper. No.	Description of the Operation	No. of Pcs. Req. to Prod. 100,000 masks	Avg. Work Output in 16 hrs.	No. of Shifts	No. of work Days per Month	No. of Hrs. per month Actual output	Min. Pcs. per Hr. Required	Total cycle time (Minutes)	Capacity each mach. pcs/hour	No. of work stations or machines	No. of operators per station	No. of operators per shift
200 & 210	Assemble Head Harness & Clean Lenses	103,500	13.84	2	20	276.8	374	.7599	79	5	1	5
	INSPECTION STATION 4 DESTRUCTIVE GAS LIFE TEST - 2,000 MASKS											
	REPACK 2,000 MASKS AFTER BEING TESTED FOR MOISTURE & LEAKAGE AT INSPECTION STATION 5											
220 & 230	Wrap Facepiece & Tape Tissues in place; assemble Facepiece in Carrier Ass'y.)	102,000	13.84	2	20	276.8	368	.4617	130	3	1	3
240) 250) 260)	Place Carrier in Waterproof Bag) Heat-Seal Bag) Place in Box)	102,000	13.84	2	20	276.8	368	.2456	244	2	1	2
270) 330) 340)	Tape & Stencil Box) Assemble Boxes &) Separators)	3,334	13.84	2	20	276.8	12.0	2.400	25	1	1	1
	SUB-ASSEMBLY											
160	Assemble Outlet Valve Disc	101,000	13.84	1	20	138.4	730	.0417	1,439	1	1	1
									TOTALS	12		12
							Totals Page 1			38		39
										50		51

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OPERATION SHEETS FOR FUTURE PRODUCTION OF 100,000 ACCEPTABLE CD M-905 MASKS PER MONTH; CYCLES TIMES ARE BASED ON

TIME STUDIES OF OPERATIONS PERFORMED ON THE PRODUCTION ENGINEERING STUDY OF THE CD M-905 MASK, NEW TOOLING DESIGNS ARE CONSIDERED IN THE CYCLE TIMES

Oper. No.	Description of the Operation	No. of Pcs. Req. to Prod. 100,000	Average Work Output in 16 Hours	No. of Shifts	No. of Work Days per Month	No. of Hrs. per month actual output	Min. Pcs. per Hr. Required	Total cycle time (Minutes)	Capacity each mach. Pcs./hour	No. of work stations or machines	No. of operators per station	No. of operator per shift	Notes
10	Blank Filter Pads	123,500 (inc. scrap)	13.84	1	20	138.4	892	.0196 (2 Cavity)	6,120	1	2	2	
30	Weld Edgeseal on Filter Units	123,000	13.84	2	20	276.8	444	(4.080)	117 (8 cavities)	4	2	2	One operator runs two machines
40	Trim Flash From Filter Units	119,500	13.84	2	20	276.8	432	.250	240	2	1	2	
60 & 70	Injection Mold Vinyl Faceblank & Inspect Each Faceblank	122,000	24	3	20	480	254	1.09	55	5	1	6	One operator for relief
80	Weld Faceblank, Filter Unit & Lenses	119,000	13.84	2	20	276.8	430	.4009	150	3	1	3	
90	Inspect Faceblank, Filter Unit & Lens Weld Area	116,000	13.84	2	20	276.8	419	.2226	269	2	1	2	
		INSPECTION STATION THREE - DESTRUCTIVE WELD TEST - SAMPLES CONTINUE ON TO NEXT STATIONS											
100	Weld Chin Strape	114,000	13.84	2	20	276.8	412	.217	276	2	1	2	
110	Weld Deflector Tabs	113,500	13.84	2	20	276.8	410	.454	132	4	1	4	
120	Weld First Chin Seam	113,100	13.84	2	20	276.8	409	.308	194	3	1	3	
130 & 135	Flatten & Pierce Hole In Chin Seam Area; Trim Flash in Chin Seam	111,100	13.84	2	20	276.8	401	.300	200	2	1	2	
		INSPECTION STATION SIX - DESTRUCTIVE CHIN SEAM PULL TEST - 2000 MASKS											
140	Assemble Rivets & Buckles	104,000	13.84	2	20	276.8	376	.495	121	4	1	4	
150 & 170	Assemble Outlet Valve Assembly & Cover	104,000	13.84	2	20	276.8	376	.3197	187	2	1	2	
180 & 190	Perform Outlet Valve Leakage Test & DOP Penetration & Inhalation Test	103,600	13.84	2	20	276.8 (1/4)	374	.5095	118	4	1	4	(1/4)
									TOTALS	38		39	

TEST	EQUIPMENT
	16. One 2 KW Generator, Numatic Press, and Welding Fixtures To Prepare Masks For Gas Life Test.
	17. Test Fixtures For Q.C. To Check Filter Units-Six Sizes
J. Bag Leakage	18. One Dip Tank With Light Attached
K. Moisture Content	19. One circulating oven meeting Specification requirements capable of holding 25 Mask.
	20. Direct Reading Gram Scales (2 Required)

Note: The laboratory should be located in a constant temperature, constant humidity room.

LABORATORY EQUIPMENT TO SUPPORT

PRODUCTION OF 100,000 CD V-805 MASKS

PER MONTH

The equipment mentioned below is not mandatory on future contracts. Any other brand or type of equipment that meets the specifications can be used.

This equipment will be used by Quality Control personnel and the laboratory technicians.

TEST	EQUIPMENT
A. Faceblank Tensile Test, Modulus, & Elongation	1. Tensile Tester For ½" Test Specimen; 75 lbs. minimum; Variable Speed 2"-12"-20" per minute 2. Test Specimen Cutting Die - ½"
B. Faceblank Hardness, Dura A	3. Shore Durometer, Type A
C. Faceblank Tear Resistance	4. Crescent Tear Test Specimen Die and Slitting Equipment 5. Same Tensile Tester Listed For Tensile Test
D. Faceblank Oven Aging	6. Oven, Fisher Scientific, Circulating Air, Type A
E. Faceblank Flammibility Test	7. Bunsen Burner Mounted In Suitable Enclosure
F. Faceblank Low Temperature Flexibility	8. Scott Solenoid Tester 9. Test Specimen Die
G. Faceblank Staining	10. Sunlamp With RS 275 W. Bulb 11. Enclosure To Maintain 140°F Temperature
H. Faceblank Specific Gravity	12. Zinc Chloride Gravity Solutions
I. Mask Gas Life Test	13. One E-27 DOP Penetrometer With Bell Chamber Attachment Equipped With Four Size Heads. 14. One E-2 Rough Handling Machine 15. Two Q-2 All Purpose Gas Life Machines With Adapters For Testing CD V-805 Masks

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DEPARTMENT OF DEFENSE
OFFICE OF CIVIL DEFENSE
Standard Item Specification

May 30, 1963 ITEM: No. CD V-805

NOMENCLATURE: PROTECTIVE, CIVILIAN MASK

1. SCOPE

1.1 This specification covers one type Protective Civilian, Mask produced in six sizes.

2. APPLICABLE DOCUMENTS

2.1 Government Documents. The following documents of the issue in effect on date of authorization by the Government to produce this mask form a part of this specification.

SPECIFICATIONS

FEDERAL

UU-P-553 ----- Paper, wrapping, tissue.
PPP-B-636 ---- Boxes, Fiber
PPP-T-76 ---- Tape, Pressure-Sensitive, Paper, Water Resistant

MILITARY

MIL-P-116 ---- Preservation, Methods of.
MIL-D-10132 -- Discs, Outlet Valve.

OFFICE OF CIVILIAN DEFENSE

Standard Item Specification --- Faceblank, CD V-805.
Standard Item Specification --- Filter Unit, CD V-805.

STANDARDS

FEDERAL

Fed. Std. No. 601 ---- Rubber; Sampling and Testing (Test Method).

MILITARY

MIL-STD-105 ---- Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129 ---- Marking for Shipment and Storage.

DRAWINGS

CHEMICAL CORPS

C5-1-208 ---- Mask; Protective, Civilian; Assembly and Bill of Material
D5-2-903 ---- Facepiece, Bill of Material
D5-2-904 ---- Facepiece, Assembly & Detail
B5-2-914 ---- Lens; Faceblank, Size 1
B5-2-915 ---- Lens; Faceblank, Size 2
B5-2-1595 ---- Lens; Faceblank, Size 3
B5-2-1596 ---- Lens; Faceblank, Size 4
B5-2-1597 ---- Lens; Faceblank, Size 5
B5-2-1598 ---- Lens; Faceblank, Size 6
B5-2-906 ---- Seat, Outlet Valve
B5-2-868 ---- Disc, Outlet Valve
B5-2-919 ---- Retainer, Outlet Valve
B22-21-142 --- Rivet, Semi-Tubular
B22-4-52 ---- Buckle, Webstrap
C5-2-907 ---- Cover, Outlet Valve
C5-2-918 ---- Harness, Head
C5-2-917 ---- Deflector Assembly
C5-4-388 ---- Carrier, Civilian, CD V-805; Bill of Material
D5-20-306 ---- Packing, Mask Assembly

PUBLICATIONS

CHEMICAL CORPS

Directive 136-300-138 ---- Operation of Penetrometer

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer or by the Government agency designated with the responsibility of production of the item in question).

2.2 Other Publications. The following documents form a part of this specification to the extent herein. Unless otherwise indicated, the issue in effect on date of receiving authorization by the Government to produce the Protective Civilian CD V-805 Mask shall apply.

ASTM STANDARDS

D638 Tentative Method of Test For Tensile Properties of Plastics.

(Applications for copies of the above publications should be addressed to the American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa.)

CODE OF FEDERAL REGULATIONS

49 CFR 71-90 Interstate Commerce Commission Rules and Regulations for the Transportation of Explosive and other Dangerous Articles

(The Interstate Commerce Commission regulations are a part of the Code of Federal Regulations (Revised 1956) available from the Superintendent of Document, Government Printing Office, Washington 25, D.C. Orders for the above publications should cite "49 CFR 71-90 (Rev. 1956.")

A/I

UNIFORM CLASSIFACTION COMMITTEE

Uniform Freight Classification Rules

(Application for copies of these freight classification rules should be addressed to the Uniform Classification Committee, 202 Union Station, Chicago 6, Illinois.)

3. REQUIREMENTS

3.1 Component Parts. The Protective, Civilian, CD V-805 Mask shall consist of a facepiece assembly and a carrier assembly.

3.1.1 Facepiece Assembly. The facepiece assembly shall consist of a faceblank, filter unit, six rivets, six buckles, two lenses, outlet valve seat, outlet valve cover, outlet valve disc, retainer ring, deflector assembly, and a head harness assembly. Refer to Attachment A for orientation of components relative to the facepiece assembly.

3.1.1.1 Faceblank. The faceblank shall conform to the Office of Civilian Defense Standard Item Specification for the CD V-805 Faceblank.

3.1.1.2 Filter Unit. The filter unit shall conform to the Office of Civilian Defense Standard Item Specification for the CD V-805 Filter Unit.

3.1.1.3 Rivets. The rivets shall conform to all drawing and specification requirements called for on Drawing B22-21-142.

3.1.1.4 Buckles. The buckles shall conform to all drawing and specification requirements called for on Drawing B22-4-52.

3.1.1.5 Lenses. The lenses shall conform to all drawing and specification requirements called for on Drawings B5-2-914, B5-2-915, B5-2-1595, B5-2-1596, B5-2-1597, B5-2-1598, whatever size is applicable.

3.1.1.6 Outlet Valve Seat. The outlet valve seat shall conform to all drawing and specification requirements called for on Drawing B5-2-906.

3.1.1.7 Outlet Valve Disc. The outlet valve disc shall conform to Type II of Specification MIL-D-10132 with the following exception: all reference to drawings, resistance to airflow, and leakage are not applicable. The outlet valve disc shall conform to drawing requirements on Drawing B5-2-868. The resistance to airflow shall satisfy the requirements of paragraph 3.4 when tested in accordance with paragraph 4.6.1.1. The outlet valve disc leakage shall meet the requirements of paragraph 3.3 when tested as specified in 4.6.1.2.

3.1.1.8 Outlet Valve Cover. The outlet valve cover shall conform to all drawing and specification requirements called for on Drawing C5-2-907.

3.1.1.9 Outlet Valve Retainer. The outlet valve retainer shall conform to all drawing and specification requirements called for on Drawing B5-2-919.

3.1.1.10 Head Harness. The head harness assembly shall conform to all drawing and specification requirements called for on Drawing C5-2-918.

3.1.1.11 Deflectors. The defelctor assembly shall conform to all drawing and specification requirements called for on Drawing C5-2-917, and subsidiary drawings listed thereon.

3.1.2 Carrier. The carrier assembly shall conform to all drawing and specification requirements called for on Drawing C5-4-388, and subsidiary drawings listed thereon.

3.1.2.1 Carrier Seam Strength. The manufacturers welded seam of the carrier shall be not less than 7 pounds on any sample when tested as specified in paragraph 4.6.1.3.

3.2 DOP Facepiece Leakage After Rough Handling. Facepiece leakage after rough handling shall not exceed 0.120 percent when tested as specified in 4.6.3.3 and 4.6.3.4.

3.3 Leakage Outlet Valve Seat and Outlet Valve Disc. Leakage through the outlet valve seat assembled with an outlet valve disc before and after being assembled into a facepiece shall not exceed 15 milliliters of air per minute at a pressure differential of 25 milimeters of water when tested as specified in 4.6.1.2 or 4.6.3.1.

3.4 Resistance, Outlet Valve Seat and Outlet Valve Disc. Resistance through the outlet valve seat and disc before being assembled into a facepiece shall not exceed 15 millimeters of water when tested as specified in 4.6.1.1.

3.5 Facepiece Inhalation Resistance. The inhalation resistance to air flow through assembled facepieces, without head harnesses, shall not exceed the following requirements when tested as specified in 4.6.3.2:

Size 1 ..... 31 millimeters of water
Size 2 ..... 31 millimeters of water
Size 3 ..... 26 millimeters of water
Size 4 ..... 26 millimeters of water
Size 5 ..... 26 millimeters of water
Size 6 ..... 26 millimeters of water

3.6 Gas Life After Rough Handling. When tested as specified in paragraph 4.6.3.5, the gas life of facepiece assemblies after rough handling shall satisfy the following requirements;

Size 1 ..... $\bar{x} - 1.6\sigma \geq 7.5$ minutes
Size 2 ..... $\bar{x} - 1.6\sigma \geq 7.5$ minutes
Size 3 ..... $\bar{x} - 1.6\sigma \geq 9$ minutes
Size 4 ..... $\bar{x} - 1.6\sigma \geq 10$ minutes
Size 5 ..... $\bar{x} - 1.6\sigma \geq 9$ minutes
Size 6 ..... $\bar{x} - 1.6\sigma \geq 10$ minutes

3.7 Chin Seam Strength. The strength of the chin seam test specimens shall be equal to or greater than 175 lbs. per inch when tested in accordance with the requirements of paragraph 4.6.3.5. Any test performed on a test specimen that has been heat flattened in the chin seam area longer than one (1) hour shall not be considered valid. If an invalid test occurs or a test specimen does not meet the requirements, all facepiece assemblies produced since the preceding sample was tested are considered suspect assemblies until the following requirements have been met:

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a) Select ten (10) piece sample at random from suspect facepiece assemblies.

b) Test the ten (10) piece sample using the same procedures as used on the original sample.

c) If all ten (10) facepiece assemblies inspected satisfy the original requirements, then the suspect facepiece assemblies are acceptable.

d) If any of the ten (10) facepiece assemblies fail to satisfy the original requirements, then all the remaining suspect facepiece assemblies are rejected.

3.8 Chin Strap Weld. The welded lap of the chin strap shall show no signs of separation when tested as specified in 4.6.3.6

3.9 Deflector Tab Welds. The deflector tabs shall show no signs of separation from the faceblank at the welded areas when tested as specified in 4.6.3.6.

3.10 Lens, Filter Unit, Faceblank Weld. The faceblank assembly, consisting of two (2) lenses and one filter unit welded into a faceblank shall have a minimum of 1/16 of an inch weld remaining on a cross section of all weld areas after being prepared and tested in accordance with the requirements of paragraph 4.6.2. If a weld less than 1/16 of an inch in width occurrs, all faceblank assemblies produced since the preceding sample was tested are suspect assemblies until the following requirements have been met:

a) Select a ten (10) piece sample at random from the suspected faceblank assemblies.

b) Test the ten (10) piece sample using the same procedures as used on the original sample.

c) If all ten (10) faceblank assemblies inspected satisfy the 1/16" requirement, then the suspected faceblank assemblies are acceptable.

d) If any of the ten (10) faceblank assemblies fail to satisfy the 1/16" requirement, then all suspected faceblank assemblies are rejected.

3.11 Package Leakage. The sealed bag containing the mask shall not leak when tested as specified in 4.6.4.

3.12 Moisture Content. The average moisture content of the sample facepieces, after packaging, shall not exceed 2.0 percent and no individual facepiece shall exceed 2.5 percent moisture when tested as specified in paragraph 4.6.5.

3.13 Manufacture and Assembly. The mask shall be manufactured and assembled as specified on Drawing C5-1-288, and subsidiary drawings listed thereon.

3.14 Workmanship. The mask shall satisfy the requirements of paragraph 4.5 and all other paragraphs pertaining to paragraph 4.5.

3.15 Elimination of Government Responsibility. Any reference to the Government's responsibility shall be eliminated from all applicable specifications and requirements.

4. QUALITY ASSURANCE PROVISIONS

4.1 Suppliers Responsibility. The supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own or any other inspection facilities and services acceptable to the Government. Inspection records of the examination and tests shall be kept complete and available to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to insure that suppliers and services conform to prescribed requirements.

4.2 Special Provisions

4.2.1 Alternate Inspection (Including Testing Procedures). The supplier may utilize any alternate inspection procedure which will insure equal or better quality by submitting a written proposal with justification and obtaining written approval from the Government prior to instituting the procedure. In case of dispute, the procedures of this specification will govern.

4.2.2 Supplemental Evidence. The supplier shall provide evidence acceptable to the Government that the requirements of Section 3. and 5. have been satisfied.

4.3 Lotting. A lot shall consist of one size Protective, Civilian CD V-805 Masks offered for acceptance at one time, which have been produced by one manufacturer under essentially the same manufacturing conditions. However; not more than one lot of faceblanks or filter units shall be presented in any one lot of finished masks.

4.4 Sampling.

4.4.1 For Non-destructive Examination and Tests. Sampling shall be conducted in accordance with MIL-STD-105. A single sample, normal level II shall be used.

4.4.2.2 Destructive Tests: Groups A, B, C, & D. Samples shall be selected at random from each lot in accordance with Standard MIL-STD-105, using Level 7. While using Standard MIL-STD-105, the sample size shall be as stipulated in the column titled "Sample Size", and shall be the number of samples selected for each of the following groups: Group A, Group B, Group C, and Group D. The column titled "AQL" shall not apply. All samples shall satisfy the requirements of Section 3 of this specification.

Group A	Test Para.	Req. Para.
a) Lens, Filter Unit, Faceblank Weld	4.6.2	3.10
b) Chin Seam Strength	4.6.3.5	3.7

NOTE: The same sample shall be used for both tests in this group.

Group B	Test Para.	Req. Para.
a) Outlet Valve Leakage (Before Rough Handling Only)	4.6.3.1	3.3
b) DOP Penetration (Before Rough Handling) & Inhalation Resistance (Before & After Rough Handling)	4.6.3.2	3.2 & 3.5
c) Gas Life After Rough Handling	4.6.3.4	3.6

NOTE: The same sample shall be used for all three tests.

Group C	Test Para.	Req. Para.
a) Package Leakage	4.6.4	3.11
b) Facepiece Moisture Content	4.6.5	3.12

NOTE: The same sample shall be used for both tests.

Group D	Test Para.	Req. Para.
a) Carrier Seam Strength	4.6.1.3	3.1.3.1

4.5 Examination. Sample Protective, Civilian, CD V-805 Facepieces and Masks prepared for delivery shall be examined in accordance with the classification of defects, para. 4.5.1, and Standard MIL-STD-105.

4.5.1. Classification of Defects:

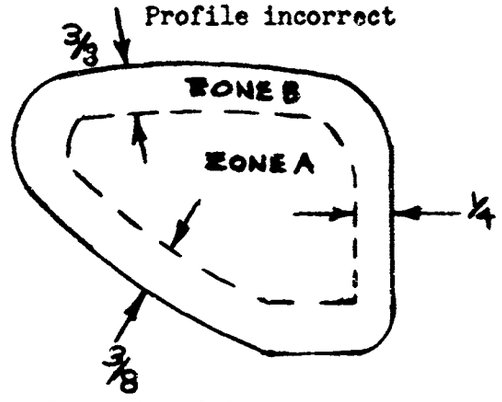
4.5.1.1. Facepiece: Protective, Civilian, CD V-805

Categories	Defects
* Critical:	
1	DOP Facepiece Leakage & Inhalation Resistance
2	Outlet Valve Leakage
Major	AQL 0.65 percent defective
101	Component missing incorrectly located or attached
102	Lens damaged, scratched or distorted
103	Hardware nonfunction
104	Separation of buckle and rivet to facepiece
105	Outlet Valve loose in facepiece
106	Chin Seam incorrect
107	Damage (cracks, holes, tears, or abrasions)
108	Marking incorrect
109	Contamination
110	Outlet Valve resistance incorrect
Minor	AQL 2.5 percent defective
301	Chin strap weld incorrect
302	Deflector tab weld incorrect

*Each item in the lot shall be inspected for these defects

4.5.1.2 Lens, CD V-805

Categories	Defects
Critical	None defined
Major	AQL 1.0 percent defective
101	Bubbles, foreign material, or any defect which impairs normal vision (Zone A)
*102	Bubbles, foreign material or any defect which does not allow proper sealing (Zone B)
103	Discoloration in Zone A or Zone B
104	Contamination (Grease or Oil)
Minor	AQL 2.5 percent defective
201	Rough Surface
202	Contamination other than Major 104
**203	Profile incorrect



*CD V-805 Lens - Zones A and B
**Tool controlled

4.5.1.3 Deflector Assembly

Categories	Defects
Critical	None defined
Major	AQL 1.0 percent defective
101	Correct size
102	Damage
Categories	Defects
Minor	AQL 2.5 percent defective
201	Contamination

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4.5.1.4 Seat, Outlet Valve

Categories	Defects
Critical	None defined
Major	AQL 1.0 percent defective
101	Damage
102	Diameter (1.130-.010) incorrect
*103	Diameter (1.406±.015) incorrect
104	Diameter (.176±.005) incorrect
*105	Thickness (.150±.005) incorrect
106	Dimension (.160±.005) incorrect
107	Diameter (1.605±.005) incorrect
108	Diameter Retainer Ring (1.000) incorrect
Minor	AQL 2.5 percent defective
201	Contamination
Major A	AQL 0.65 percent defective
301	Outlet valve leakage
**302	Molding imperfections on critical area

* Tool controlled
**Critical area is any area that makes contact with the outlet valve disc.

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4.5.1.5 Retainer, Outlet Valve

Categories	Defects
Critical	None defined
Major	AQL 1.0 percent defective
101	Inside diameter (.988-.015) incorrect
102	Damage
Minor	AQL 2.5 percent defective
201	Incorrect finish

4.5.1.6 Cover, Outlet Valve

Categories	Defects
Critical	None defined
Major	AQL 1.0 percent defective
101	Inside diameter (1.608+.005) incorrect
102	Damage
*103	Slot size and location incorrect
Minor	AQL 2.5 percent defective
201	Contamination
202	Molding imperfections

*Tool controlled

4.5.1.7 Head Harness Assembly

Categories	Defects
Critical	None defined
Major	AQL 1.0 percent defective
101	Damage
Minor	AQL 4 percent defective
201	Color
202	Stitching incorrect
203	Dimensions incorrect
204	Contamination

4.5.1.9 Carrier Assembly

Categories	Defects
Critical	None defined
Major	AQL 1.0 percent defective
101	Length 13-3/4± 1/16 incorrect
102	Width 8-3/8±1/32 incorrect
103	Damage
104	Incorrect Assembly
105	Fastener separation
106	Marking missing, incorrect or illegible
107	Interior contamination
Minor	AQL 2.5 percent defective
201	Contamination
202	Fold Lines Missing

4.5.1.10 Preparation for Delivery (Section 5)

Categories	Defects
Critical	None defined
Major	AQL 4 percent defective
101	Initial wrap missing or not secured in place
102	Incorrect assembly
103	Containers incorrect
104	Quantity per container incorrect
105	Partitions missing or incorrect
106	Incorrect sealing
107	Damaged containers
108	Marking incorrect, missing or illegible
109	Chin strap not tucked inside periphery of mask.
110	Mask size incorrect

4.6 Tests

4.6.1 Components

4.6.1.1 Resistance (Outlet Valve Seat and Valve Disc.) Resistance through the outlet valve seat or disc shall be tested on a Q-106 Resistance Indicator using a flow rate for 32 liter per minute.

4.6.1.2 Leakage (Outlet Valve Seat and Valve Disc.) Leakage through the outlet valve seat or disc shall be tested on an M4 Outlet Valve Leakage Indicator.

4.6.1.3 Carrier Seam Strength A dumbbell type test specimen cut from a die conforming to Die I, Method 4111 of Federal Test Method Std 601 (a 1/2" test area) shall be tested on an XL Scott Tensile Tester or equivalent. The test specimen shall be cut so that the full width of the seam is within the restricted portion of the specimen, with the long dimension of the specimen approximately perpendicular to the seam. The rate of travel shall be 20 ± 0.1 inches per minute. A type Z-1 clamp shall be used to clamp the test specimen in the tester.

4.6.2 Lens, Filter Unit, Faceblank Weld. The faceblank assembly, consisting of two (2) lenses and one filter unit welded into the faceblank, shall be cut in the area indicated on the filter unit in Figure 1.

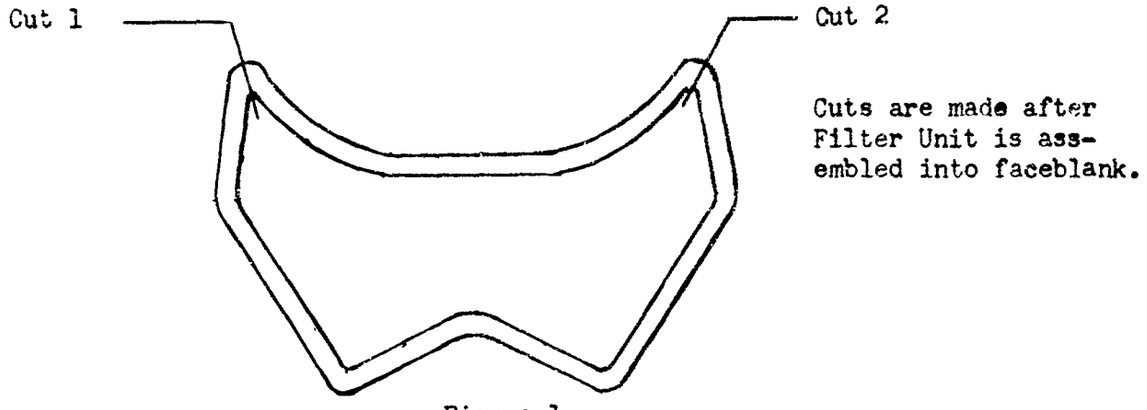


Figure 1

The faceblank shall be flexed back on itself in all welded areas and visually inspected for parting of the filter unit and lens weld to the faceblank. If a suspicious area is found, pressure shall be applied to the suspected area with a rolling motion of the thumb to the filter unit or lens in such a manner as to try and roll the lens or filter unit away from the faceblank. The thumb pressure shall be applied three times only. After the thumb pressure has been applied, the suspicious area shall be measured to determine the width of the weld still holding.

4.6.3 Facepiece Assembly

4.6.3.1 Leakage, Facepiece Outlet Valve Leakage through the facepiece outlet valve assembly shall be tested on M4 Outlet Valve Leakage Indicator adapted with a suitable fixture for seating the valve seat from inside the facepiece.

4.6.3.2 DOP Penetration & Inhalation Resistance, Before and After Rough Handling. The DOP facepiece leakage test shall be determined in accordance with Chemical Corps Directive 136-300-138 with the exception that the flow rate of the air through the Bell Chamber Adapter shall be 32 liters per minute.

4.6.3.3 Rough Handling Test Facepieces shall be rough handled four (4) at a time without head harness for a minimum of 15 minutes in an E-4 Rough Handling Machine. The baffles of the E4 Rough Handling shall be removed and the complete interior of the machine shall be lined with fine mesh screening.

(12/1)

4.6.3.4 Gas Life After Rough Handling The outside periphery of the sample facepiece shall be dielectrically welded together to effect a leakproof seal. The outlet valve cover and disc shall be removed and the outlet valve seat shall be assembled to an adapter suitable for producing a flow through the facepiece filter, into the facepiece and out the outlet valve when placed in the CmlC, C2, All-Purpose Gas Life Apparatus. The test shall be chloropicrin (PS) at a concentration of 16 mg/l at a continuous flow rate of 12.5 l/m. The test gas concentration shall be maintained within a tolerance of ± 5%. Equilibrium and test air temperatures will be recorded and maintained at 75° ± 5°F. and at 50% relative humidity. The corrected gas life of each sample shall be recorded to the nearest 0.1 minute for determining the mean (average) gas life and standard deviation (sigma) (See paragraph 6.5).

4.6.3.5 Chin Seam Strength. A test specimen cut from the facepiece of the same destructive sample used to perform the Lens, Filter Unit, Faceblank Weld Test shall be tested in accordance with ASTM Method D638, Tentative Method of Test for Tensile Properties of Plastics. The specimen shall be cut in accordance with the illustration presented in Attachment B. The speed of the test shall be Speed D, 20 inches per minute. The test speciment shall be tested for only the tear properties specified in this section. Calculations shall be the following:

a) Record the thickness of the test area before testing
b) Record the maximum load in pounds carried by the specimen during the test
c) Calculate the results by using the following equation:

$$\text{Tear Strength} = \frac{\text{Load Carried (lbs)}}{\text{Thickness of Area (inches)}}$$

4.6.3.6 Chin Strap and Deflector Weld The chin strap and the deflector weld areas shall be thoroughly flexed and stretched by the fingers. Excessive force should not be used. The welds shall be inspected for adequacy, separation of the welds, and other defects that are indicative of poor welding procedures.

4.6.4 Package Leakage. Leakage of the sealed bag containing the mask shall be determined by subjecting the bag to the quick-leak test in Specification MIL-P-116.

4.6.5 Moisture Content. Moisture content of the sample masks shall be determined by weighing the masks to the nearest 0.1 gram (wet wt.) immediately after unpackaging. Place the masks in a forced-air drying over at 160° ± 5° and a maximum of 5 percent relative humidity until constant dry weight, within 0.1 gram, is reached. Record the final weighing (dry wt.) to the nearest 0.1 gram and determine the percentage moisture content by the following formula:

$$\text{Percent Moisture Content} = \frac{100\ (\text{wet wt.} - \text{dry wt.})}{\text{wet wt.}}$$

5. PREPARATION FOR DELIVERY

5.1 Packaging. The facepiece shall be wrapped in tissue paper approximately 5" wide x 17" long and conforming to Specification UU-P-553. The tissue paper shall be positioned on the outside of the facepiece and over the lenses. The ends of the tissue paper shall be folded over the outside edge of the facepiece and down toward the deflector weld area. Two pieces of pressure-sensitive tape, approximately 1" wide x 2" long, conforming to Specification PPP-T-76, shall be applied to each end of the tissue paper and the deflector assembly securing the tissue paper to the deflector. The chin strap shall be positioned inside the facepiece. A third piece of pressure sensitive tape, PPP-T-76, and approximately 1" wide x 2" long, shall be applied to the tissue paper in such a way as to clamp the outside periphery of the facepiece in a closed position. Caution: Do not apply any of the tape directly to any of the vinyl areas of the facepiece. Each wrapped facepiece shall then be placed in a plastic carrier as shown on Drawing C5-1-288 making sure that the head harness remains outside the facepiece and positioned inside the carrier in such a way as to make as little contact with the facepiece as possible. The carrier containing the facepiece shall be individually packaged in accordance with Method IA-8 of Specification MIL-P-116.

5.2. Packing Thirty (30) masks of one size, packaged as specified in 5.1 shall be packed in a W5c, Style RSC, fiber board box conforming to Specification PPP-B-636, having approximate inside dimensions of 30-3/8 inches in length by 16-1/8 inches in width by 11-1/2 inches in depth. The box shall be divided into six equal compartments by interlocking fiberboard partitions fabricated from the same material as the box with each compartment containing five (5) masks. The masks shall be positioned in an upright position with the weight of the mask resting on the end containing the valve covers. The masks shall also be positioned at 180° angles in relation to each other so that the valve covers will be in opposite locations. The interlocking partitions shall be of the same dimensions as the inside height of the box. The box shall be closed by taping all seams with minimum 3 inch wide pressure-sensitive tape conforming to Specification PPP-T-76, extending the tape over all corners and edges at least three inches. The packing method presented in this paragraph is illustrated and detailed on drawing D5-20-306.

5.3 Marking. In addition to any special marking required, unit packages and shipping containers shall be marked in accordance with Standard MIL-STD-129.

6. NOTES

6.1 Intended Use This specification covers a protective mask intended for use by civilians, except children below the age of four (4), to protect them against chemical, bacteriological, and radiological warfare agents.

6.2 Ordering Data The Government agency designated with the responsibility of directing future production of the Protective Civilian CD V-805 Mask shall designate all data necessary for ordering this mask.

6.3 Objective Evidence. Provisions for objective evidence, inspection records, and maintenance of inspection records shall be designated by the Government agency responsible for production.

(14/I)

6.4 Pilot Lot A pilot lot may be required to evaluate the suppliers production and quality control systems. The Government agency designate with the responsibility of production of this mask shall specify whether a pilot lot is required and all applicable pilot lot criteria.

6.5 Standard Deviation (σ). The following formulas should be used to determine σ:

a. Square the sum of the individual observations $(\Sigma X)^2$.

b. Multiply the sum of the squares of the individual observations by the number of observations. $N(\Sigma X^2)$.

c. Subtract (a) from (b) and divide by the number of observations multiplied by the number of observations minus one

$$\frac{N(\Sigma X^2) - (\Sigma X)^2}{N(N-1)}$$

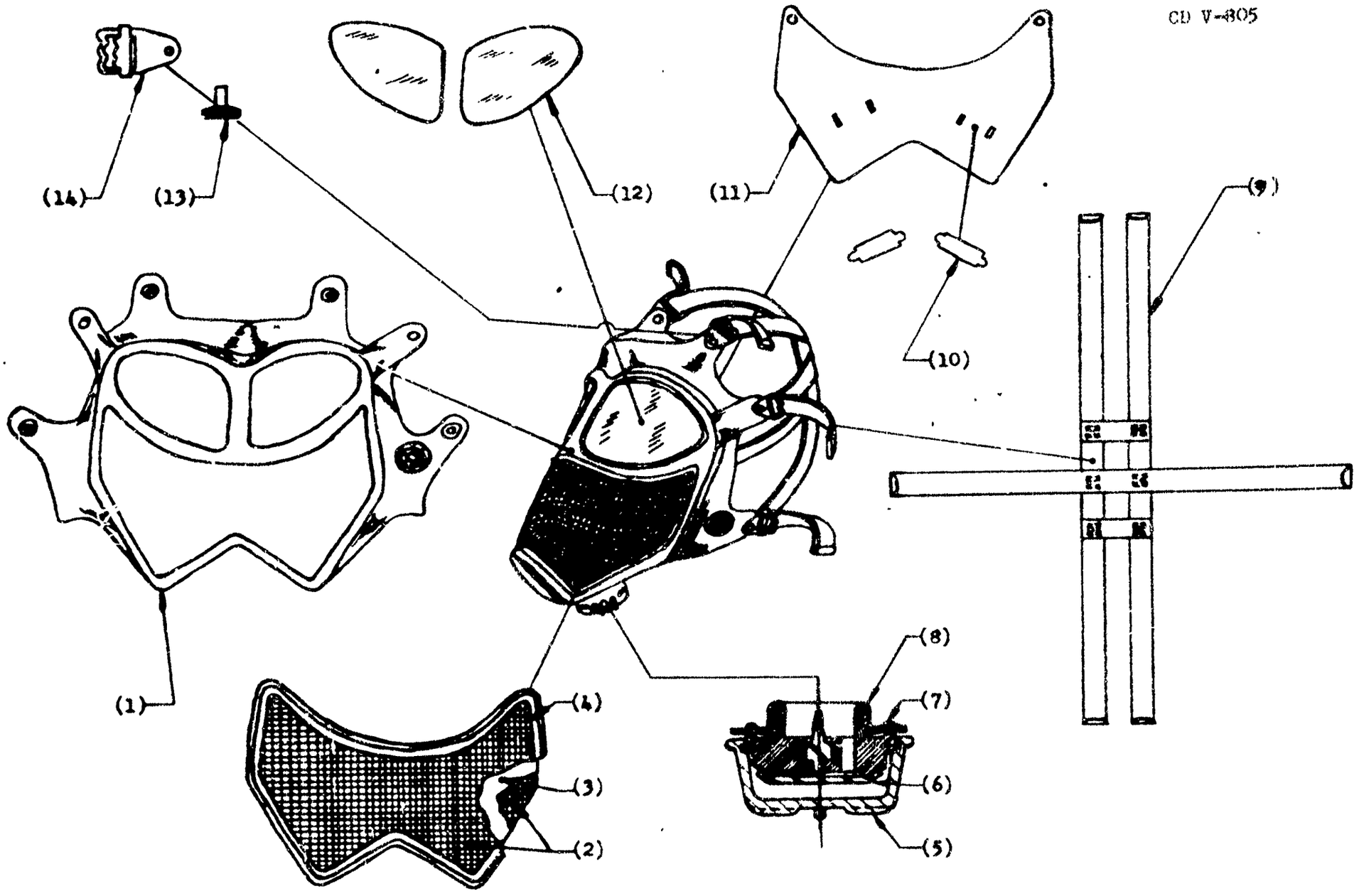
d. Extract the square root of (c). Standard deviation may be indicated thus:

$$\sigma = \sqrt{\frac{N(\Sigma X^2) - (\Sigma X)^2}{N(N-1)}}$$

Notice: When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurrs no responsibility nor any obligation whatever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by complication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related hereto.

15/1

CD V-4305

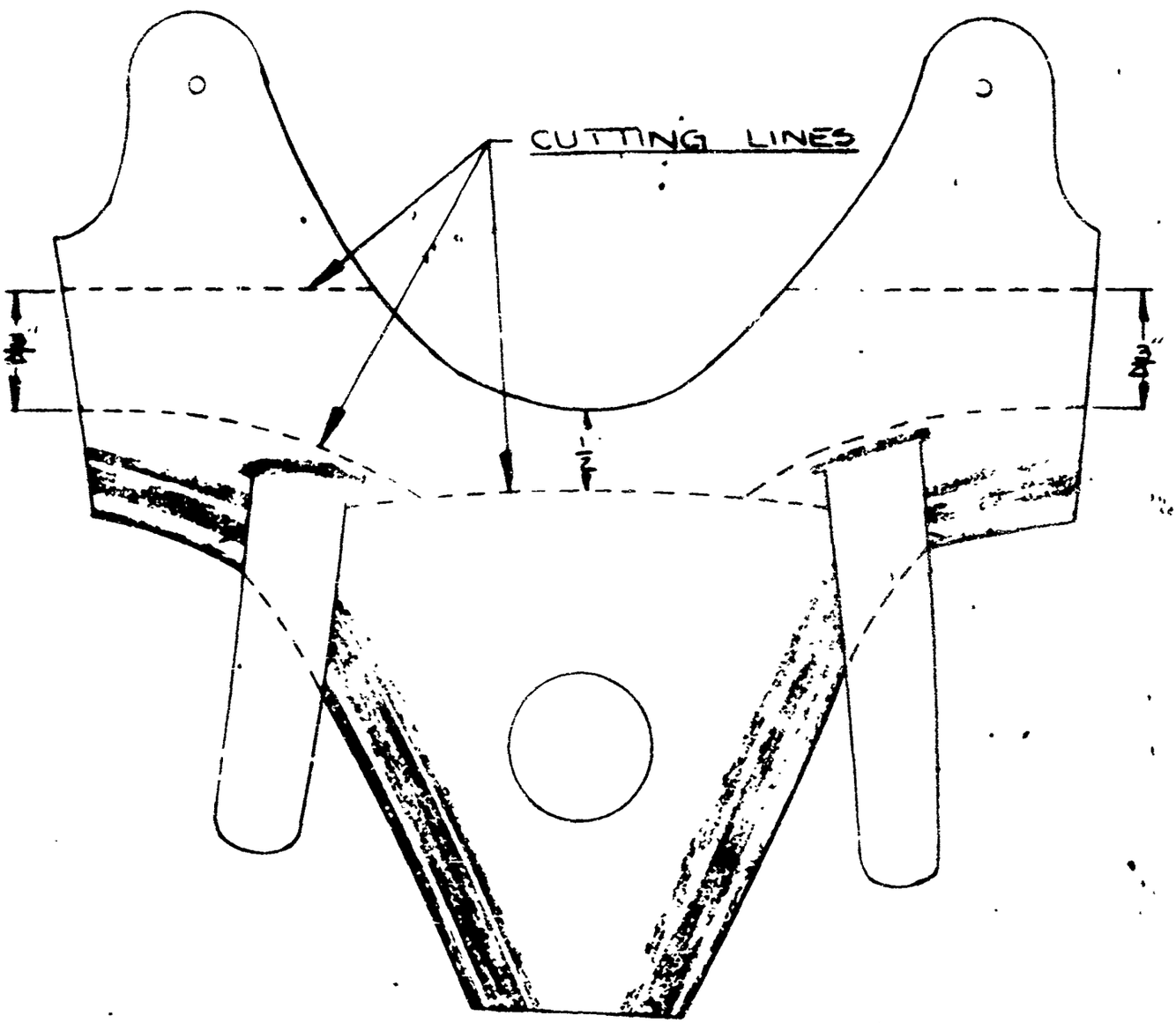


ATTACHMENT A

PROTECTIVE, CIVILIAN, CD V 5 FACEPIECE & COMPONENTS

ATTACHMENT B

PROTECTIVE CIVILIAN CD V-805
TEST SPECIMEN FOR TEAR TEST
IN CHIN SEAM AREA



DRAFT

DEPARTMENT OF DEFENSE
OFFICE OF CIVIL DEFENSE
Standard Item Specification

30 May 1963 Item: No. CD V-805

NOMENCLATURE: FACEBLANK
(Component of the CD V-805 Mask)

1. SCOPE

1.1 This specification covers one type and six sizes of Protective, Civilian, CD V-805 Faceblanks.

1.2 Classification. Faceblanks shall be of the following sizes (see paragraph 3.2 and 6.2);

Size 1	Size 4
Size 2	Size 5
Size 3	Size 6

2. APPLICABLE DOCUMENTS

2.1 Government Documents. The following documents of the issue in effect on date of authorization by the Government to produce faceblanks form a part of this specification.

SPECIFICATIONS

MILITARY

MIL-STD-105 Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129 Marking for Shipment and Storage.

STANDARDS

Federal Std. No. 601 - Rubber; Sampling and Testing
Federal Std. No. 595 - Colors, (For) Ready-Mixed Paints

DRAWINGS

CHEMICAL CORPS

E5-2-908 Faceblank, Size 6
E5-2-909 Faceblank, Size 5
E5-2-910 Faceblank, Size 4
E5-2-911 Faceblank, Size 3
E5-2-912 Faceblank, Size 2
E5-2-913 Faceblank, Size 1

(Copies of military specifications, standards, and drawings required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other Publications. The following documents form a part of this specification to the extent herein. Unless otherwise indicated, the issue in effect on date of receiving authorization by the Government to produce Protective, Civilian, CD V-805 Faceblanks shall apply.

ASTM STANDARDS

D568 - Test For Flammability of Plastics
D746 - Test For Brittleness Temperature of Plastics and Elastomers by Impact
D625 - Descriptive Terms Pertaining to Plastics
D925 - Contact and Migration Stain of Vulcanized Rubber in Contact with Organic Finishes

(Applications for copies of the above publications should be addressed to the American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa.)

CODE OF FEDERAL REGULATIONS

49 DFR 71-90 Interstate Commerce Commission Rules and Regulations for the Transportation of Explosives and other Dangerous Articles.

(The Interstate Commerce Commission regulations are a part of the Code of Federal Regulations (Revised 1956) available from the Superintendent of Documents, Government Printing Office, Washington 25, D.C. Orders for the above publications should cite "49 CFR 71-90 (Rev. 1956).")

UNIFORM CLASSIFICATION COMMITTEE

Uniform Freight Classification Rules

(Application for copies of these freight classification rules should be addressed to the Uniform Classification Committee, 202 Union Station, Chicago 6, Illinois.)

3. REQUIREMENTS

3.1 Materials

3.1.1 Polyvinyl Chloride Compounds. The material furnished under this specification shall consist of polyvinyl chloride compounded with suitable plasticizers, stabilizers, pigments, fillers, and sun checking retardants. The material shall not be hazardous or detrimental to molding equipment and shall be capable of being injection molded.

(2/5)

3.1.1.1 Reclaimed material from faceblanks, sprues, and runners produced from new material of an approved composition may be re-worked and used again for production of faceblanks. The re-worked material may be used separately or in a mixture with new materials of the same composition in percentages from one (1) to ninety-nine (99) percent. No additives of any type may be applied to the reclaimed material. All faceblanks produced from reclaimed material shall meet the requirements of this specification.

3.1.1.2 Color. The color of the compound shall be within or equal to color standards 37231 and 36280 of Federal Specification 595 unless otherwise specified by the contract or order. (See 6.2)

3.1.2 Molding Compound. Sixty (60) faceblanks shall be injection molded in accordance with the proposed manufacturing conditions of time, temperature, and pressure for compound evaluation. Thirty (30) of the faceblanks shall be used for conducting physical property tests in accordance with paragraph 3.4.1. The remaining thirty (30) faceblanks shall be for the purpose of performing toxicity test in accordance with paragraph 3.5.

3.2 Manufacturing. The faceblanks shall be manufactured in molds approved by the Government in accordance with the following drawings:

Size 1 - E5-2-913	Size 4 - E5-2-910
Size 2 - E5-2-912	Size 5 - E5-2-909
Size 3 - E5-2-911	Size 6 - E5-2-908

3.3 Preproduction Sample.

3.3.1 Prior to the start of regular production, a preproduction sample of 200 faceblanks of each size shall be produced using the same methods, materials, and type of equipment as will be used during regular production.

3.3.2 The molding conditions submitted with the preproduction sample of each size faceblank shall include all information necessary for control of the molding process. The following information shall be included as a minimum:

A. Specification for molding compound (powder, pellets, etc.)
B. Method of feeding
C. Specification of molding equipment
D. Molding conditions (Molding temperature, molding times, Molding pressures.)

3.3.3 Any change in formulation, operating conditions, or molds may be justification for requiring a new preproduction sample.

3.4 Physical Properties

3.4.1 Faceblanks. Specimens cut from the faceblanks shall be tested for the physical properties, before and after aging, as specified in Table I.

TABLE I. PHYSICAL REQUIREMENTS

PROPERTY	REQUIREMENTS Before Aging	*After Aging	TEST METHOD
Tensile strength, p.s.i. minimum (min.)	1275	1275	411 Fed. Test Method Std. 601
Elongation, percent at breaking, min.	425	425	4121 Fed. Test Method Std. 601
Modulous at 100 percent elongation	350 to 550	375 to 525	4131 Fed. Test Method Std. 601
Hardness, Duro A	50 to 60	50 to 60	3021 Fed. Test Method Std. 601
Tear Resistance, lbs/ inch, min.	130	----	4211 Fed. Test Method Std. 601 Crescent Tear
*Flammability	self extinguishing	----	Paragraph 4.6.1.1
*Low Temperature	Pass at -40° F	----	ASTM D746
*Staining	Equivalent to Approved Sample Preproduction only		Paragraph 4.6.1.2
Specific Gravity	Compound approval - No restrictions - Production Lot ± .02 of value determined for compound approval		14011 Fed. Test Method Std. 601

*Note: These tests are to be run on compound approval, preproduction sample and a minimum of once a month during regular production.

3.5 Toxicity. The faceblank material shall be non-toxic to the skin when applied locally and tested as specified in paragraph 4.6.4. Thirty (30) faceblanks shall be submitted for toxicity tests. The samples shall be forwarded to the agency designated by the Government. The samples shall be marked with the following information:

Sample for toxicity tests
Name of material
Manufacturer's designation
Manufacturer's name
Range of conditions
  Molding temperatures
  Molding pressures
  Molding times

The supplier shall make no change in plastic formulation or in the molding conditions submitted after receiving approval of the formulation and molding conditions from the Government.

3.6 Workmanship. The faceblank shall be free of all imperfections and damage with the exception of the allowable defects and their limits as defined by this specification.

4. QUALITY ASSURANCE PROVISIONS

4.1 Unless otherwise specified herein, the supplier is responsible for the performance of all inspection requirements. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. Inspection records of the examinations and tests shall be kept complete and available to the Government.

4.1.1 Supplier's Responsibility. The supplier is responsible for the examination and testing as prescribed herein except for those examinations and tests reserved for performance by the Government.

4.2 Objective Evidence. The supplier shall present objective evidence as required by the Government representative that all material and components are in accordance with the requirement of this specification. (See para. 6.3)

4.3 Alternate Inspection (Including Testing) Procedures. The supplier may utilize any alternate inspection procedure which will assure equal or better quality by submitting a written proposal with justification and obtaining written approval from the Government prior to its institution. In case of dispute, the procedures of this specification will govern.

4.4 Preproduction Sample Inspection.

4.4.1 Examination. Samples shall be inspected for all requirements of the drawings and specifications.

4.4.2 Tests. Thirty (30) faceblanks selected at random from each size faceblank shall be tested in accordance with paragraph 4.6.1 and 4.6.2. Thirty (30) additional faceblanks selected at random shall be tested in accordance with 4.6.3. If the manufacturer is using the same compound, operating conditions, temperature ranges, and tools used during the qualification of the molding compound; the thirty (30) faceblanks for toxicity are not required.

4.4.3 Acceptance Rejection Criteria. The samples shall meet the examinations and tests specified by paragraphs 4.4.1 and 4.4.2 to be acceptable. The supplier shall obtain written approval from the Government before proceeding with regular production.

4.5 Inspection Provisions.

4.5.1 Lotting. A lot shall consist of those faceblanks of one size produced from one lot of molding compound or a maximum of one weeks production.

4.5.1.1 Lot of Molding Compound. A lot is defined as that quantity of material that has been manufactured at one plant by one manufacturer in one week under essentially the same manufacturing conditions.

4.5.2 Sampling.

4.5.2.1 Nondestructive Examination and Tests. Sampling shall be conducted in accordance with Standard MIL-STD-105. The level and degree of inspection will be as specified by the Government.

4.5.2.2 Destructive Tests.

4.5.2.2.1 Faceblanks. From each lot, twenty (20) faceblanks selected at random shall be removed for test in accordance with 4.6.1 and 4.6.2.

4.5.3 Examination. Sample faceblanks from the regular production lots shall be examined in accordance with the classification of defects and the AQL's as designated by this specification and with Standard MIL-STD-105. A definition of terminology is presented in ASTM D625.

4.5.4 Classification of Defects

4.5.4.1 Faceblanks

Categories	Defects
Critical	None Defined

Major:	AQL 1.0 percent defective
101.	Incomplete or short shot
102.	Sink or shrinkage marks
103.	Orange Peels
104.	Flow cracks
105.	Blisters or bubbles
106.	Burned spots
107.	Excessive shrinkage around sprues
108	Stock breakdown
109.	Excessive flash
110.	Contamination (grease or oil)
111.	Damage (See para. 3.6)
112.	Foreign material
Minor	AQL 4.0 percent defective
201.	Molding imperfection (other than Major)
202.	Contamination
203.	Color incorrect

4.5.4.2 Preparation For Delivery (refer to section 5).

Categories	Defects
Critical:	None Defined
Major:	AQL 4.0 percent defective
101.	Initial wrap missing or not secured in place
102.	Packaging method incorrect
103.	Containers incorrect
104.	Quantity per container incorrect
105.	Interlocking partitions missing
106.	Closure of container incorrect
107.	Damaged containers
108.	Marking incorrect, missing, or illegible
109.	Nonuniform quantities per pack
110.	Mixed sizes of mask per pack
Minor:	None Defined

4.6 Tests. Tests shall be conducted as follows:

4.6.1 Faceblanks: Faceblanks selected in paragraph 4.5.2.2.1 shall be tested as specified in Table II. The average of 5 results shall be reported.

TABLE II. TEST METHODS

Property	Methods
Tensile strength	4111 Fed. Test Method Std. 601
Elongation	4121 Fed. Test Method Std. 601
Modulous	4131 Fed. Test Method Std. 601
Hardness, Duro A	3021 Fed. Test Method Std. 601
Tear Resistance	4211 Fed. Test Method Std. 601 Cres. Tear
Flammability	Paragraph 4.6.1.1
Low Temperature Flexibility	ASTM D746
Staining	Paragraph 4.6.1.2
Specific Gravity	14011 Fed. Test Method Std. 601

4.6.1.1 Flammability. The flammability test required in 3.4.1 shall be run in accordance with ASTM Method D568-56T except that a six inch by one inch sample cut from a faceblank shall be used. Marking requirements are not applicable. The material must be self extinguishing.

4.6.1.2 Staining. The staining of the faceblank material shall be determined by use of the sunlamp described in ASTM Method D-925, Method B. The sample shall consist of a section of a faceblank in which the lens has been bonded by the proposed production procedure. The assembly shall be placed under the sunlamp and a one inch square section cut from the same faceblank shall be laid on top of the lens. This sample shall be exposed under the sunlamp for 48 hours at 140 °F. A section of lens material with a one inch square piece of aluminum laid on top shall be placed alongside the bonded sample, but not in contact with any faceblank material, and exposed under the same conditions at the same time. When the sample is removed, there shall be no contact or migratory stain on the lens as compared to the control sample. A colorless mark or a distortion of the lens caused by contact with the inch square of plastic shall be acceptable. The lens material used for this test shall be a quality proven compatible with the type of material from which the faceblank is made.

4.6.2. Aging. Specimens for aging shall be placed into an oven for 168 hours at 158 ° ± 2 ° F. They shall be tested for the aged requirements of 3.4.1 with the applicable method required in paragraph 4.6.1.

4.6.3 Toxicity. All samples submitted to the agency designated by the Government for test will be evaluated from the toxicity standpoint by the Office of the Surgeon General, Department of the Army. Such tests, including human skin tests, as are deemed necessary by the Office of the Surgeon General for properly evaluating the toxicity of any test faceblank will be carried out in accordance with the directions of the Surgeon General. (See 6.4)

4.6.4 Acceptance Rejection Criteria. If the sample faceblanks fail to meet the requirements of this specification, the lot of faceblanks represented shall be rejected.

5. PREPARATION FOR DELIVERY

(8/3)

5.1. Packaging. A uniform quantity of faceblanks of one size shall be packaged in accordance with manufacturer's commercial practice, and in such a manner as to prevent deformation or damage to the faceblank.

5.2 Packing. A uniform quantity of faceblanks of one size packaged as specified in 5.1 shall be packed in such a manner as to afford protection against deformation or damage to the faceblanks during direct shipment from the supply source to the first receiving activity for immediate use. Containers used shall comply with Uniform Freight Classification Rules or other common carrier regulations applicable to the mode of transportation.

5.3 Marking. Unless otherwise specified by the Government, all packages and shipping containers shall be marked in accordance with Standard MIL-STD-129.

6. NOTES

6.1 Intended Use. This faceblank is intended for use in the CD V-805 Mask; Protective, Civilian.

6.2 Ordering Data. Procurement documents should specify the following:

(a) Title, number, and date of this specification.
(b) Size of faceblank required.
(c) Color of faceblank.

6.3 Objective Evidence. Provisions for objective evidence and inspection records, and maintenance of inspection records will be specified by the Government.

6.4 Toxicity. The technique of determining toxicity by means of patch tests is given in Schwartez, Tulipau, and Pack. "Occupational Diseases of the Skin", 2d, Ed., pages 54 to 64 and 302 to 308. (1947) This test takes from 3 to 6 months.

Notice. When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

DRAFT

DEPARTMENT OF DEFENSE
OFFICE OF CIVIL DEFENSE
Standard Item Specification

May 30, 1963 ITEM: CD V-805

NOMENCLATURE: FILTER UNIT
(Component of the CD V-805 Mask)

1. SCOPE

1.1 This specification covers Filter Units, Size 1 through 6 for the Protective, Civilian, CD V-805 Mask.

2. APPLICABLE DOCUMENTS

2.1 Government Documents. The following documents, of the issue in effect on date of authorization by the Government to produce faceblanks form a part of this specification.

SPECIFICATIONS

FEDERAL

PPP-B-636 - - -	Boxes, Fiber
L-S-137 - - -	Screening, Plastic Coated Fibrous Glass, Insert

MILITARY

MIL-P-116 - - -	Preservation, Methods of
MIL-B-117 - - -	Bags, Interior Packaging
MIL-E-51065 - -	Edgeseal Material
MIL-F-51095 - -	Filter Material, Gas-Aerosol, E18

STANDARDS

MIL-STD-105 - -	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129 - -	Marking for Shipment and Storage

DRAWINGS

CHEMICAL CORPS

C5-3-893 - - -	Filter Unit, Size 6
C5-3-896 - - -	Filter Unit, Size 5
C5-3-899 - - -	Filter Unit, Size 4
C5-3-903 - - -	Filter Unit, Size 3
C5-3-906 - - -	Filter Unit, Size 2

11/K

C5-3-909 - - - Filter Unit, Size 1
C5-3-936 - - - Filter Blanks, Size 6
C5-3-935 - - - Filter Blank, Size 5
C5-3-934 - - - Filter Blank, Size 4
C5-3-933 - - - Filter Blank, Size 3
C5-3-932 - - - Filter Blank, Size 2
C5-3-931 - - - Filter Blank, Size 1
C5-3-942 - - - Filter Screen, Size 6
C5-3-941 - - - Filter Screen, Size 5
C5-3-940 - - - Filter Screen, Size 4
C5-3-939 - - - Filter Screen, Size 3
C5-3-938 - - - Filter Screen, Size 2
C5-3-937 - - - Filter Screen, Size 1

PUBLICATIONS CHEMICAL CORPS

Directive 136-300-138--Operation of Penetrometer

(Copies of military specifications, standards, and drawings required by contractors in connection with specific procurement functions should be obtained from the Government agency designated with the responsibility of production of the item in question.)

2.2 Publications. The following documents form a part of this specification to the extent herein. Unless otherwise indicated, the issue in effect on date of receiving authorization by the Government to produce Protective, Civilian, CD V-805 Filter Units shall apply.

CODE OF FEDERAL REGULATIONS

49 CFR 71-90 Interstate Commerce Commission Rules and Regulations for the Transportation of Explosives and Other Dangerous Articles.

(The Interstate Commerce Commission regulations are a part of the Code of Federal Regulations (Revised 1956) available from the Superintendent of Documents, Government Printing Office, Washington 25, D.C. Orders for the above publications should cite "49 CFR 71-90 (Rev. 1956).")

UNIFORM CLASSIFICATION COMMITTEE

Uniform Freight Classification Rules

(Application for copies of these freight classification rules should be addressed to the Uniform Classification Committee, 202 Union Station, Chicago 6, Illinois.)

3. REQUIREMENTS

3.1 Materials and Components: All materials and components shall conform to the specifications and drawings forming a part of this specification.

3.1.1 Plastisol. The plastisol shall meet all of the requirements of MIL-E-51065.

2/K

3.1.2 Plastisol Edgeseal. The plastisol edgeseal shall provide a strong uniform bond to the filter material and the screens. The screens shall be imbedded into the plastisol.

3.2 Manufacture. The filter units shall be manufactured in accordance with the drawings listed as part of this specification.

3.3 DOP Smoke Penetration. DOP Smoke Penetration of each size filter unit shall not exceed 0.120 when tested as specified in paragraph 4.7.1 at a flow rate of 32 liters a minute.

3.4 Airflow Resistance. The resistance of each size filter unit shall not exceed the following requirements when tested as specified in paragraph 4.7.1:

Size 1	25 MM of Water
Size 2	25 MM of Water
Size 3	20 MM of Water
Size 4	20 MM of Water
Size 5	20 MM of Water
Size 6	20 MM of Water

3.5 Moisture Content. The average moisture content of the filter unit shall not exceed 2.0 percent after packaging and no individual filter unit shall exceed 2.5 percent moisture when tested as specified in paragraph 4.7.3.

3.6 Gas Life After Rough Handling (Preproduction Sample). When tested as specified in paragraph 4.7.4, the gas life of the filter units before and after rough handling shall satisfy the following requirements:

Size 1	$\bar{x} - 1.60\sigma \geq 7.5$ minutes
Size 2	$\bar{x} - 1.60\sigma \geq 7.5$ minutes
Size 3	$\bar{x} - 1.60\sigma \geq 9$ minutes
Size 4	$\bar{x} - 1.60\sigma \geq 10$ minutes
Size 5	$\bar{x} - 1.60\sigma \geq 9$ minutes
Size 6	$\bar{x} - 1.60\sigma \geq 10$ minutes

3.7 Preproduction Sample. Prior to the start of regular production and following any major change in regular production methods, materials, or equipment; a preproduction sample of 50 filter units or 5 units from each cavity, whichever is greater, shall be produced using the same methods, materials, and equipment planned on being used for regular production.

3.8 Package Leakage. The sealed bags containing the packaged filter units shall not leak when tested as specified in 4.7.2. A vacuum shall not be applied to the inside of the bags during the bag sealing operation.

3.9 Workmanship. The filter units shall satisfy the requirements of 4.6 and all paragraphs pertaining to paragraph 4.6.

3.10 Elimination of Government Responsibility. Any reference to the Government's responsibility shall be eliminated from all applicable specifications and requirements.

4. QUALITY ASSURANCE PROVISIONS

4.1 Suppliers Responsibility. The supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own or any other inspection facilities and services acceptable to the Government. Inspection records of the examination and tests shall be kept complete and available to the Government. The Government reserves the right to perform any of the inspections set forth in the specifications where such inspections are deemed necessary to insure that suppliers and services conform to prescribed requirements.

4.2 Special Provisions

4.2.1 Alternate Inspection (Including Testing Procedures). The supplier may utilize any alternate inspection procedure which will insure equal or better quality by submitting a written proposal with justification and obtaining written approval from the Government prior to instituting the procedure. In case of dispute, the procedures of this specification will govern.

4.2.2 Supplemental Evidence. The supplier shall provide evidence acceptable to the Government that the requirements of Section 3 and 5 have been satisfied.

4.3 Preproduction Sample Inspection

4.3.1 Non-destructive Examination and Tests. Each filter unit of the preproduction sample shall be inspected and tested for all of the characteristics included in the classification of defects.

4.3.2 Destructive Tests. Twenty (20) filter units shall be taken at random from the preproduction sample, rough handled in accordance with paragraph 4.7.4.1, and tested for gas life in accordance with paragraph 4.7.4. The rough handled filter units shall meet the gas life requirements of paragraph 3.6. The filter units designated for rough handling shall be tested for DOP Smoke Penetration as specified in paragraph 4.7.1 both before and after rough handling and shall meet the requirements of paragraph 3.3.

4.3.3 Preproduction Acceptance Criteria. The preproduction sample filter units shall meet the requirements of examinations and tests specified in paragraphs 4.3.1 and 4.3.2 to be acceptable. The supplier shall obtain approval from the Government before proceeding with regular production.

4.4 Lotting

4.4.1 Lot Definition. A lot shall consist of filter units of one size produced by one manufacturer from the same materials, and under the same manufacturing conditions used during the preproduction sample. However, no more than one lot of filter material shall be presented in any one lot of finished filter units.

4.5 Sampling.

4.5.1 For Non-Destructive Examination. Sampling shall be conducted in accordance with Standard MIL-STD-105. A single sample, normal Level II shall be used.

4.5.2 For Tests. Samples for tests shall be selected at random from each lot in accordance with Standard MIL-STD-105. The level and degree of inspection is specified in Table I.

TABLE I.

	TESTS	TEST PAR.	REQ. PAR.	INSPECT LEVEL
A.	DOP Penetration & Resistance	4.7.1	3.3	L-7
B.	Gas Life (Rough Handled)	4.7.4	3.6	Preproduction Sample
C.	Package Leakage	4.7.2	3.8	L-5
D.	Moisture Content	4.7.3	3.5	L-5

NOTE: The same samples used for the "Rough Handled" Gas Life shall be used for the DOP Penetration and Resistance Test. Also the same sample used for the Package Leakage Test shall be used for the Moisture Test.

4.6 Examination

4.6.1 Sample CD V-805 Filter Units shall be examined in accordance with the classification of defects and Standard MIL-STD-105.

4.6.1.1 Classification of Defects:

4.6.1.2 Filter Units, CD V-805; Sizes 1-6

Catagories		Defects
	Critical:	None Defined
	Major:	AQL 1.0 percent defective
101		Component missing, incorrect, or incorrectly assembled
102		Improper edgeseal Filter paper or screen not sealed, exposed charcoal in edgeseal area
103		Imperfections Non-fills, porosity, blisters, thin spots
104		Damage Punctures, tears, holes
105		Contamination Grease, oil, or foreign material

(5/1)

Minor: AQL 2.5 percent defective

* 201 Profile Incorrect

*Tool controlled

4.6.1.3 Preparation for delivery (Section 5)

Catagories	Defects
Critical:	None defined
Major:	AQL 2.5 percent defective
101	Bags incorrectly manufactured
102	Closure of bags incorrect
103	Damaged bags
104	Marking incorrect, missing, or illegible
105	Shipping containers incorrectly assembled or damaged
106	Quantity per container incorrect

4.7 Tests.

4.7.1 DOP Smoke Penetration & Resistance. The DOP Smoke Penetration shall be determined in accordance with Chemical Corps Directive 136-300-138 with the following exceptions:

a. The flow rate of the DOP through the test fixture shall be 32 liters a minute instead of 16 liters a minute.
b. The test fixture shall be the test fixture designed to fit the proper size Filter Unit being tested.
c. A magnehelic gage shall be attached to the test fixture in order to indicate the resistance at the same time the DOP test is being performed.

4.7.2 Package Leakage. Leakage of the sealed bag containing the filter units shall be determined by subjecting the sample to the quick-leak test specified in Specification MIL-P-116.

4.7.3 Moisture Content. The moisture content of the filter elements shall be determined as follows:

Weigh each element to the nearest 0.1 gram (wet weight) immediately after unpackaging. Place the elements in a forced air drying oven at 160° ± 5°F. and a maximum of 5 percent relative humidity until constant dry weight, within 0.1 gram is reached. Record the final weighing (dry weight) to the nearest 0.1 gram. Calculate the percentage moisture as follows.

$$\text{Percent Moisture Content} = \frac{100\ (\text{wet weight} - \text{dry weight})}{\text{wet weight}}$$

WELDING CYCLES FOR GENERATORS ON ALL WELDING OPERATIONS

The data listed below is only applicable to the generators and welding tools used on the Production Engineering Study for the CD V-805 Mask. Any change in the design of the mask, the welding tools or generators will necessitate a variation in these settings.

Oper. No.	Mask Size	Operation	Generator Power (kw)	Power Setting (%)	Sealing Time (Sec)	Preheat Time (Sec)	Dwell After Weld Time (Sec)	Power Switch	Air Pressure (psi)	Grid Tap No.
80	6	Weld Lens & Filter to Faceblank	4	70%	12¼	4	5½	High	80	2
80	5	Weld Lens & Filter to Faceblank	4	70%	10 3/4	4	5½	High	80	2
80	4	Weld Lens & Filter to Faceblank	4	70%	10½	4	5½	High	80	2
80	3	Weld Lens & Filter to Faceblank	4	70%	10	4	5½	High	80	2
80	2	Weld Lens & Filter to Faceblank	4	70%	10¼	4	5½	High	80	2
80	1	Weld Lens & Filter to Faceblank	4	70%	10½	4	5½	High	80	2
100	All Sizes	Weld Chin Strap	2	20%	9¼	2	4	Low	50	1
QC	All	Seal Mask for Gas Life Test	2	50%	11½	1	4	High	80	4
120	2,3, 5,6	Weld Chin Seam & Remove Tear Strip	2	40%	9¼	3½	4	Low	80	3
120	4	Weld Chin Seam & Remove Tear Strip	2	40%	8	3½	4	Low	80	3
120	1	Weld Chin Seam & Remove Tear Strip	2	50%	10¼	3.5	4	Low	80	3
130	1	Heat Flatten & Punch Hole	4	100%	13½	2	3	Low	70	2

WELDING CYCLES FOR GENERATORS ON ALL WELDING OPERATIONS (Continued)

Oper. No.	Mask Size	Operation	Generator Power (kw)	Power Setting (%)	Sealing Time (Sec)	Preheat Time (Sec)	Dwell After Weld Time (Sec)	Power Switch	Air Pressure (psi)	Grid Tap No.
130	2	Heat Flatten & Punch Hole	4	100%	13	2	3	Low	70	2
130	3	Heat Flatten & Punch Hole	4	100%	13½	2	3	Low	70	2
130	4	Heat Flatten & Punch Hole	4	100%	15	2	3	Low	70	2
130	5	Heat Flatten & Punch Hole	4	100%	15	2	3	Low	70	2
130	6	Heat Flatten & Punch Hole	4	100%	15	2	3	Low	70	2

GAS LIFE, MOISTURE, AND CHIN SEAM STRENGTH TEST RESULTS
FROM THE
PRODUCTION ENGINEERING STUDY OF THE MSA V-805 MASK
PHASE II

Test Requirements - - Concentration 16 mg/liter; 50% R.H.; Flow 12½ l/min.
For Gas Life

Size	Percent Moisture	Chin Seam Strength (psi)	GAS LIFE					
			As Received			Rough Handled		
			$\bar{x}$	σ	$\bar{x} - 1.6\sigma$	$\bar{x}$	σ	$\bar{x} - 1.6\sigma$
1	.32	289.4	14.3	.7	13.2	14.2	1.2	12.3
2	.32	289.7	19.5	.9	18.1	19.5	.8	18.2
2	.34	284.5	15.1	.5	14.3	14.5	.8	13.2
3	.39	262.9	16.6	2.4	12.8	17.4	2.1	14.0
3	.26	286.1	17.1	.7	16.0	17.5	.4	16.9
3	.28	256.4	21.2	.8	19.9	22.8	2.4	19.0
4	.40	268.0	23.4	.7	22.3	22.7	.8	21.4
4	.45	278	23.2	1.1	21.4	22.8	.9	21.4
4	.33	282.1	23.6	1.0	22.0	24.5	1.0	22.9
5	.31	256.6	21.9	.9	20.5	21.3	.8	20.0
5	.37	322.6	21.9	.6	20.9	21.0	1.4	18.8
5	.39	289.4	20.6	.7	19.5	21.1	1.2	19.2
5	.34	*	16.1	1.4	13.9	14.4	.8	13.1
5	.48	*	16.6	.6	15.6	16.2	.4	15.6
6	.42	250.9	24.3	1.8	21.4	21.8	1.9	18.8
6	.35	275.6	22.2	1.8	19.3	20.2	1.2	18.3

* Reported in Phase I

GAS LIFE TEST REQ. - - - Concentration 16 mg/l; 50% R.H.; Flow 12.5 l/m

PHASE I

Size	Percent Moisture	Chin Seam Strength (psi)	GAS LIFE					
			As Received			Rough Handled		
			$\bar{x}$	σ	$\bar{x} - 1.6\sigma$	$\bar{x}$	σ	$\bar{x} - 1.6\sigma$
1	1.19	21.0	6.6	.2	6.3	6.5	o	6.5
2	.54	20.7	7.2	.3	6.7	7.3	.3	6.8
3	.64	17.9	7.6	.4	7.0	7.8	.2	7.5
3	.50	16.9	10.1	.1	9.9	10.2	.2	9.9
4	1.08	21.48	9.4	.4	8.8	9.1	.3	8.6
4	.98	19.26	11.4	.3	10.9	10.5	.4	9.9
5		*18.4						
5		*16.6						
5	1.42	20.0	7.2	.3		7.1	.3	6.6
5	1.02	18.3	7.35	.5		6.9	.4	6.3
6	.67	24.28	12.3	.3	11.8	12.2	.3	11.7
6	1.62	20.7	9.2	.4	8.6	8.6	.1	8.4
6	1.24	18.38	8.4	.5	7.6	8.2	.5	7.4

GAS LIFE TEST REQ. - - - Concentration 16 mg/l; 50% R.H.; Flow 25 l/m

H/N

QUALITY CONTROL PROCEDURES

PART OF THE

FINAL REPORT

ON

CONTRACT DA 30-070-CML-1250

A PRODUCTION ENGINEERING STUDY

OF THE

PROTECTIVE, CIVILIAN, CD V-805 MASK

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by

THE GENERAL TIRE & RUBBER COMPANY

INDUSTRIAL PRODUCTS DIVISION

WABASH, INDIANA

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30 MAY 1963

(1/0)

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SECTION I

PURPOSE AND ORGANIZATION

S E C T I O N I

PURPOSE

The purpose of this manual is to present a quality control plan that will maintain an acceptable quality level for a production line capable of producing 100,000 acceptable CD V-805 Masks, Protective, Civilian, per month.

This line shall utilize four injection presses operating 24 hours per day, 5 days per week and 20 days per month. The assembly line shall operate on a 20-day work month and 2 eight-hour assembly shifts per day.

SCOPE

This manual presents the policies, procedures, and methods that will be followed in the maintenance of a quality control program for the CD V-805 Mask; Protective, Civilian.

The procedures and policies formulated in this manual are intended to maintain an effective and economical quality control plan during the monthly production of 100,000 CD V-805 Mask. The quality control plan indicates procedures for the statistical quality of all manufacturing processes, as well as procedures to be used in conforming to specific requirements for inspection and testing which are to be performed in a manner prescribed by the contract.

AUTHORITY AND RESPONSIBILITY

Quality Control. A Quality Control Engineer under the supervision of the Quality Control Manager, will be responsible for the control of product quality through the administration of an approved quality control plan.

SECTION II

GENERAL PROCEDURES FOR THE CONTROL OF QUALITY

S E C T I O N II

CD V-805 MASK, PROTECTIVE, CIVILIAN

The CD V-805 Mask; Protective, Civilian, will be manufactured, examined, and tested in accordance with applicable drawings, specifications, and this quality control plan.

All specifications and standards cited are listed without reference to a revision. However, throughout this manual any reference to a specification or standard shall mean the latest revision of that specification or standard in existence at time production of masks is started.

PROCESS INSPECTION

The Quality Control Engineer responsible for product quality will supervise the following operations and procedures:

1. Lot control - Maintain records of components used and verify marking of faceblanks.
2. Material handling and processing - Inspect for damage to components.
3. Verify all test procedures and check calibration of test equipment.
4. Verify manufacturing specifications for each operation. Instruct operators in inspection procedures used at each operation.
5. Performance of Sampling Inspection at all inspection stations.

INSPECTION DURING MANUFACTURE

In-process control will be established in the following areas:

A. Raw Material Preparation

B. Molding Operation

C. Finishing Operation

D. Facepiece Assembly

E. Component Subassembly

F. Inspection & Packaging

RECEIVING INSPECTION

Receiving inspection will be performed by a Quality Control receiving inspector.

Inspection instructions for each component or assembly will be prepared in accordance with applicable drawings and specifications. These instructions will include the Classification of Defects, Acceptable Quality Levels, the equipment or gage to be used and special instructions as required.

Sampling plans will be in accordance with MIL-STD-105 and the applicable specifications. The level of inspection will be as specified by the Quality Control Manual.

Repetitive discrepancies will be reported by the Quality Control Department to the Engineering and Purchasing Departments so that corrective action may be initiated.

A receiving inspection report will be prepared by the inspector for each lot of items received. A complete file of all receiving inspection reports will be maintained by the Quality Control Department.

RECEIVING INSPECTION

Receiving Inspection will be performed on the following items:

1. Plastisol
2. Filter Material
3. Filter Screen
4. Vinyl
5. Lens
6. Deflector Blank
7. Deflector Insert
8. Standard Rivet
9. Buckle Assembly
10. Outlet Valve Seat
11. Outlet Valve Retainer
12. Outlet Valve Disc
13. Outlet Valve Cover
14. Head Harness Assembly
15. Tissue Paper
16. Tape
17. Carrier Assembly
18. Water-Vapor Proof Bag
19. RSC Fiber Box & Separators

SUBCONTRACTOR CONTROL AND CERTIFICATION

All materials, components, and assemblies delivered under the contract, which will be procured from subcontractors, shall be certified. Three copies of the certification must be received prior to release to production by the receiving inspector.

P/O

The receiving inspector will maintain the following records for each item:

A. Receiving Record

B. Product Certification

C. Inspection Procedure

D. Inspection Data Sheet

E. Summary of Sampling Inspection

Vendors may be rated using the system described on the following pages.

SUBJECT: VENDOR QUALITY ANALYSIS

1. Vendor quality analysis systems consist of three basic parts:
   A. Maintaining a continuous history of individual vendor quality.
   B. Compiling data.
   C. Cooperating with the vendor to solve quality problems.
2. Acceptance sampling in the receiving and inspection area and recording the results of this inspection serve to accomplish item 1B.
3. Maintaining a continuous history of vendors may be accomplished by computing per cent defective from the inspection results. This per cent defective has little meaning unless it is compared with some objective standard such as the Acceptable Quality Level AQL).
4. Basic factors to be considered in establishing vendor quality rating and/or analysis systems are:
   A. Comparison of the per cent defective in the AQL to determine how well standards are met.
   B. A common conversion factor for this comparison so that the quality of various parts can be made both additive and comparable.
   C. A method of removing the effects of purchasing policy, i.e., size and number of shipments per unit of time.
5. The information for comparison of per cent defective and the AQL is available through the data compiled in receiving inspection.

(10/0)

6. The "t" value derived in significance testing provides a valid conversion factor for this comparison. Actual equations for this conversion factor are shown on page 29. This factor gives an index of 0 when the per cent defective is equal to the AQL. A per cent defective lower than the AQL gives a correspondingly high rating. A percentage defective higher than the AQL gives a lower rating. Generally the ratings indicate:
   a. -2 and below-vendors whose material is poor-unsatisfactory.
   b. -2 to + 1.9-vendors whose material is good-acceptable.
   c. +2 and above-vendors whose material is excellent.
7. This conversion factor gives a rating that:
   a. Equalizes the degree of conformance to quality of parts received.
   b. Is additive and is comparable.
   c. Eliminates the effect of number of lots and size of shipments.
8. This rating factor also categorizes the vendors into one of three groups for each part he supplies. This establishing of categories may be used to determine the approach used in handling phase c of a vendor quality analysis rating system.
9. For the vendor who consistently maintains a rating of +2 and above on a particular part, a certified inspection program might be considered or a reduction of inspection to a reduced inspection category might be considered.
10. For the vendor whose part consistently falls in the -2 to +1.9 rating normal sampling should be continued.
11. For vendors who have parts with a rating of -2 and below, special assistance should be offered. Vendor visitations would be concentrated in this group of suppliers. Tightened inspection would be used in evaluating each lot of material received. No weight would be given to certifications.

Calculation of Quality Rating

a. $t_{AQL} = \frac{AQL - p}{\sqrt{\frac{AQL(1-p)}{n}}}$

where p = fraction defective found in sample
n = sample size

b. $t_{\text{Rating Period}} = \frac{\Sigma t \text{ Lot}}{\sqrt{N}}$

Where Σt lot = the sum of the t scores for all shipments inspected.

and N = number of shipments inspected.

c. A summation of ratings for parts having more than one AQL value assigned is

$$t_{Lot} = \frac{\Sigma t \text{ AQL}}{L}$$

Where Σt AQL = the sum of the individual AQL ratings.

and L = the number of different AQL's.

DRAWING AND CHANGE CONTROL PROCEDURES

All documents, drawings, specifications, changes, and revisions pertaining to the CD V-805 Civilian Protective Mask will be received, recorded and filed by the Sales Department.

The Sales Department will furnish copies to the Quality Control Department which will also maintain a complete file of drawings, specification changes, and revisions.

All changes will be processed by the Quality Control Department and the Sales Department in a manner which will assure accomplishment at the specified effective points.

Changes to rubber components, vinyl components, molds, compounds, or problems concerning these areas will be processed by the Sales Department with the department involved. The Sales Department shall notify all subcontractors by registered mail of changes or revisions that directly concern them. Copies of these notifications will be kept on file in the Sales Department files. All obsolete drawings and specifications shall be marked as obsolete and removed from the files of all departments and subcontractors by direction of the Sales Department.

IN-PROCESS INSPECTION FOR RUBBER AND VINYL COMPONENTS

The in-process inspector will verify at least four times each shift that Facepblanks and Outlet Valve Discs are molded in accordance with the manufacturer's operating procedures.

The in-process inspector will also check components from each cavity for molding imperfections such as blisters, tears, non-fills, contamination, mold damage, etc. Any discrepancies from specification requirements or good commercial practice will be immediately brought to the attention of the pressroom supervision and the quality control supervisor.

Sample faceblanks will be taken from each cavity and completely checked for gauge.

The mold operators will inspect each component as it is removed from the press. Obviously defective parts will be segregated at the press.

Roving inspection will also spot check components as they are processed through finishing for proper trimming and secondary operations.

During the initial production phase, each faceblank will be inspected for all defects listed in the Classification of Defects. Sampling inspection for this component will be inaugurated as soon as inspection experience indicates that the manufacturing procedure and process controls are producing components in accordance with applicable specifications and drawings.

GENERAL INSTRUCTIONS FOR INSPECTION OF VINYL COMPONENTS

DEFECT CLASS & DESCRIPTION

Major Imperfections. The inner and outer surfaces of the component shall be free of pits, lumps, porous area, cracks, checks, excess flash, abrasions, blisters, discoloration, burned spots, flow cracks, shrinkage mark, sinks, orange peels or discoloration and other surface imperfections detrimental to the intended function.

Major Contamination. Contact with petroleum products which are detrimental to the vinyl compound from which unit products are made, shall be considered as materially reducing the usability of the unit of products for its intended purpose.

Minor Contamination. The presence of foreign material in the vinyl compound or on the surface, shall be considered as evidence of improper handling or storage. In the event foreign material has contaminated the vinyl compound prior to curing, the defect may be classified as Major Contamination.

Acceptability. Acceptance standards for each class of defect shall be established by the Quality Control Engineer and responsible production personnel.

GENERAL INSTRUCTIONS FOR INSPECTION OF RUBBER COMPONENTS

DEFECT CLASS AND DESCRIPTION

Major Imperfections. The unit of product shall be free from porous or spongy areas, pits, bumps, foreign matter, checks, flash or abrasions; blisters or blow holes and similar voids; laminations, visible folds; cracks or lines which are evidence of poor knitting; back rinding, or pebbling, which could result in failure or materially reduce the usability of the unit of product for its intended purpose.

Major Damage. The unit of product shall be free from tears, distortion, rips, punctures, or pinches that could result in failure or materially reduce the usability of the unit of product for its intended purpose.

Major Contamination. Contact with petroleum products, which are detrimental to the vulcanized rubber compound from which the unit of products are made, shall be considered as materially reducing the usability of the unit of products for its intended purpose.

Minor Imperfections. Spongy areas, pits, bumps, foreign matter, checks, flash or abrasion, blisters, blow holes and similar voids, laminations, visible folds, cracks or lines which are evidence of poor knitting back rinding or pebbling, which do not materially reduce the usability of the unit of product for its intended purpose or are a departure from established standards having no significant bearing on the effective use of the unit of product, are considered imperfections.

(16/0)

Minor Contamination. The presence of foreign material, in the rubber compound or on the surface, shall be considered as evidence of improper handling or storage. In the event foreign material has contaminated the rubber compound prior to vulcanizing, the defect may be classified as Major Contamination.

Acceptability. Acceptance standards for each class of defect shall be established by the Quality Control Engineer and responsible production personnel.

MATERIAL CLASSIFICATION

All material used in the manufacture of the CD V-805 Mask, Protective, Civilian, will be kept properly tagged and segregated at all times. The inspection status, stage of manufacture, quantity, and lot number of all material, may be readily ascertained from the tag. Inspected and verified material will be stored in a bonded type area. Material which does not conform to requirements will be segregated and either reworked or returned to the supplier.

NON-CONFORMING MATERIAL

All non-conforming material will be set aside in predesignated areas. It will be appropriately tagged as non-conforming material, and maximum care will be taken to keep it segregated from acceptable material.

The manufacturer shall take prompt action to correct conditions which might result in the production of defective material or material with recurring discrepancies.

(17/0)

GENERAL QUALITY CONTROL, INSPECTION & TESTING REQUIREMENTS PERTAINING TO SUBCONTRACTED ITEMS

1. The manufacturer shall be responsible for controlling product quality and for offering for acceptance only such lots of items as conform to applicable specifications and drawings.
2. The subcontractor's quality control system should be planned and developed in conjunction with the manufacturer. The system shall assure that adequate control of quality is maintained throughout the entire process of manufacture including packaging and shipping.
3. The procedures which will be used to implement the quality control requirements of the subcontractor will be furnished in writing to the manufacturer. If defects in the procedures appear during performance, the subcontractor will modify its procedures to correct the deficiency.
4. Specific requirements covering inspection and tests to be performed by the subcontractor in a prescribed manner will be contained in the subcontract for the item being procured.
5. The subcontractor will utilize MIL-STD-105, in performance of the requisite sampling inspection.
6. In the event the subcontractor's results and/or the manufacturer's results indicate that quality requirements have not been met, the lot included shall be rejected.
7. In the event a lot of items are rejected when inspected in accordance with the Classification of Defects, Acceptable Quality Levels and procedures of MIL-STD-105, the subcontractor shall not offer the lot to the manufacturer until it has rescreened or reworked and reinspected the lot in accordance with the procedures of MIL-STD-105.

8. Provisions for the disposition of defective lots will be made with each subcontractor.

9. The establishment of a Classification of Defects listing is not intended to include all the specifications and drawings. The omission of a possible defect does not constitute a waiver of that particular requirement.

10. The subcontractor shall have available and utilize correctly all measuring equipment and testing devices as are necessary for examination and testing of supplies for conformance to requirements.

11. All supplies (includes raw materials, components, intermediate assemblies, and end products) shall be subject to inspection and test by the manufacturer throughout the various stages of production. This inspection and test may be conducted to any extent practicable.

12. If any inspection or test is made by the manufacturer on the premises of the subcontractor, the subcontractor shall provide all reasonable facilities and assistance for the safety of the manufacturer's inspectors in the performance of their duties. All inspections and tests made by the manufacturer shall be performed in such a manner as not to unduly delay the work.

13. Acceptance or rejection of the supplies shall be made as promptly as practicable after delivery but failure to inspect and accept or reject supplies shall not relieve the subcontractor from responsibility for such supplies as not in accordance with requirements.

MEASURING AND TESTING EQUIPMENT

Periodic checks of instruments and gages will be conducted in the Tool and Gage laboratory by a trained precision inspector under the supervision of the Quality Control Department. When not possible to move the instruments or gages into the Tool and Gage Laboratory, they will be checked at their normal locations. All gages and instruments will be checked as received and at least once per month thereafter, unless otherwise specified by instrumentation manuals. Gages of the go, no go type will be checked after every one thousand passes. In the event a tool or gage is found to be out of tolerance, the inspector will immediately give the gage control card to the Tool and Gage Laboratory for further action and properly tag the instrument indicating that it is non-functional. The inspector who is in charge of the measuring and testing equipment will be responsible for maintaining a gage control Card for each item of measuring equipment. This card will include the number of passes since the last gage check. The inspector will also verify that inspection testing equipment is being calibrated as required. A calibration card will be attached to each piece of testing equipment; after calibration by qualified personnel, the card will be marked to indicate time and date. Testing equipment will be maintained and calibrated in accordance with the proper directive. The applicable directives are on file in the Quality Control office, or secured to test equipment. Schedules for maintainence and calibration of testing equipment are cited in Section III:

GENERAL INSPECTION PROCEDURES

For the production of 100,000 or more acceptable masks per month a single level continuous sampling plan will be used at each of the six inspection stations.

This sampling plan for continuous production is from the "Inspection and Quality Control Handbook" (H107)* and is as follows:

SINGLE LEVEL CONTINUOUS SAMPLING PROCEDURES

Purpose. 1. To outline these procedures to be followed in the introduction and administration of a continuous sampling plan.

Procedure. 2. Continuous sampling plans have been developed for situations where product is submitted on a continuous basis rather than a series of groupings or lots. Highly conveyorized material handling makes the formation of lots expensive and impractical.

3. The primary advantage of continuous sampling plans, as presented here, is that they allow acceptance of product as the product passes the inspection station. Other advantages are the reduction or elimination of storage facilities and a minimum of interference with production operations due to any lotting which may be required.

4. It is necessary that the following conditions be met prior to applying continuous sampling plans:

A. Moving product flowing past an inspection station.

B. Adequate facilities and trained personnel to permit rapid 100% inspection when necessary.

C. A unit of product which may be inspected with relative ease.

D. A process which is producing or which is capable of producing homogeneous material.

*The latest revision of "Inspection and Quality Control Handbook (H107) is obtainable from the office of the Assistant Secretary of Defense (Supply and Logistics), Washington 25, D.C.

5. It is necessary to define several terms applicable to successful use of these plans. A glossary of these terms taken from the Inspection and Quality Control Handbook (H107), is included on page 28/0.

6. Design equations are included on page 31/0 with an example to illustrate use of these equation.

7. A continuous sampling plan operates as follows:

A. Inspect production consecutively until i items are found with no defects.

B. After i items are inspected and no defects are found, inspect every hth item until a defect is found.

C. Upon finding a defect, resort to 100% inspection until i items are inspected without finding a defect.

D. When this has happened, return to inspecting every hth item.

8. A flow diagram, page 32/0, is included to illustrate operation of a basic continuous sampling plan.

Acceptability of Product

9. Acceptability of product shall be determined by use of the sampling plan associated with the specified AQL value. Operating Characteristic (OC) Curves indicate the percentage of product of any given quality which when submitted to the plan, may be expected to be accepted under the provisions of the plan.

10. During periods of 100% inspection, a screening operation is being performed which allows product conforming to specifications to pass the inspection station and be accepted. Defective units are withdrawn from the flow of product.

11. During periods of sampling inspection, the product is allowed to pass the inspection station and is considered acceptable for the defect (s) concerned, and is not subject to recall for further inspection for those defects except as noted below.

UPON DISCOVERY OF A CRITICAL DEFECT DURING SAMPLING, SCREENING WILL BEGIN WITH THE UNIT OF PRODUCT JUST AFTER THE LAST DEFECT FREE SAMPLE.

12. Sampling plans presented are designed to place a limit on the Average Outgoing Quality (AOQ) of product when the process is operating in a state of statistical control. These limits are designated by the Average Outgoing Quality Limit (AOQL) for each AQL value.

13. CRITICAL DEFECTS SHALL BE CHECKED ON THE BASIS OF 100% (EVERY UNIT) INSPECTION.

Drawing of Samples

14. A sample unit is a unit of product drawn from the flow as it passes a given inspection station.

15. Sample units shall be selected in such a manner as to insure an unbiased sample. The inspector should allow the interval between sample units to vary rather than to draw sample units according to a rigid pattern.

16. There are two types of inspection used in the plans. 100% inspection and sampling inspection.

a. Inspection of each unit of product is termed "100% inspection". When defective units are removed, 100% inspection is also known as "screening". In this procedure, 100% inspection and screening are treated as synonomous.

b. "Sampling inspection" refers to sampling performed at a frequency f, after a period of 100% inspection has ended. Product must not have been previously inspected for acceptance.

Qualification of Product for Sampling Inspection

17. Sampling provisions of the plan may be instituted when the following requirements are satisfied:

a. All units of product are made according to the same drawings and specifications under a stable set of operating conditions. This requirement, termed "homogenity", is satisfied when the process is not altered changes in material sources, strikes, retooling, or interruptions other than those due to the end of shift, day or work week.

b. At least i successive units have been 100% inspected and have been found free of the defect(s) under consideration.

Administration of CSP-1

18. Types of inspection described will be utilized as indicated on page 32. The plan provides for alternating sequences of 100% inspection with no limit on the number of such sequences provided the number of units inspected during 100% inspection does not exceed the appropriate L value listed on page 33/0.

19. At the start of production, the product shall be screened by the screening crew until all requirements are met. Verifying inspection at the rate of f or higher may be performed by the sampling inspector. Inspection is performed for each defect assigned to the inspection station. However, judgement of the product may be either by individual defect or by class of defects.

20. The sampling inspector will tally the number of units of product containing each defect assigned to the station as well as the total number of units inspected under the screening inspection and when required

verifying inspection. When the sampling inspector finds a defect during verifying inspection, he will notify the screening crew that i successive units following the defective unit must be defect free before screening can be terminated.

21. When i successive units have been found free of defects by the screening crew and the sample units drawn from these units for verifying inspection are defect free, screening is terminated and the sampling inspector begins sampling inspection.

22. Whenever the sampling inspector finds that 100% inspection is necessary he proceeds as follows:

a. The flow of product through his station is curtailed.

b. The screening crew is notified that 100% inspection is necessary.

c. While the screening crew is performing 100% inspection the sampling inspector performs verifying inspection, if required.

d. The number of successive units of product, the number of units containing the defect, and the spacing of such units are noted.

e. When i successive units of product have been found free of the defects concerned by the screening crew the sample units drawn from these units for verifying inspection, when required, are free of the defects concerned, the screening crew is released and the sampling inspector resumes sampling inspection.

23. If an excessive number of defects or defectives is observed during verifying inspection, the sampling inspector will cease verifying inspection. Such inspection will not be resumed until the inspector is satisfied that:

a. Action has been taken to improve the process average, and

b. The 100% inspection operation has been made more effective by the supplier's provision of better supervision and/or by retraining the personnel conducting the 100% inspection.

"Excessive Number" is defined as one for critical defects and as two defective units separated by fifty or fewer defect free units in the case of major and minor defects. Where excessively defective product continues to be submitted, the consumer's representative will notify the responsible agency of this condition. The agency may require a return to lot by lot inspection or take whatever action is necessary to assure receipt of product of acceptable quality.

24. Each of the sampling tables presents upper limits to the amount of 100% inspection for the continuous sampling plan. At the option of the consumer 100% inspection will be curtailed whenever the L value (L is the number of units of product inspected under 100% inspection) associated with a given plan is exceeded. The supplier will seek to identify the causes for the manufacture of defective product and correct the process prior to resuming normal production. Inspection records shall identify all stoppages of screening inspection and sight corrective action taken for each. Whenever the L value is exceeded, the supplier should preferably curtail 100% inspection and correct his process prior to resuming normal production, but as a minimum, he should take corrective action to reduce or eliminate the incidence of defective product. Regardless of the option elected, the supplier's screening crew must clear i defect free units prior to the resumption of sampling inspection.

25. Several defect classes or several defects considered individually may be inspected at one station. In this event each defect or defect class is judged independently of all other defects or defect classes at the

station. This means that the screening may be in effect for certain defects or classes while at the same time sampling may be in effect for other defects or classes at the same station.

Disposition of Rejected Material

26. Units containing defects whether found by the sampling inspector or by the screening crew shall be removed from the flow of product. If found by the screening crew such units will be turned over to the sampling inspector who will release them together with all units containing defects found in his own inspection, to the proper agent. The supplier may correct these units, in which case they shall be resubmitted to the sampling inspector separately from the normal flow of product. If the number of resubmitted units is small, the sampling inspector may inspect them himself; if the number is large, the screening crew may be required to inspect them under consumer observation and direction. In either event satisfactory units shall be released into the flow of production beyond the inspection station; units still containing defects shall be returned to the supplier for further processing or scrapping.

All other sampling inspection, including receiving inspection, will be on a lot by lot basis using MIL-STD-105, Single Sample, Normal Level II.

DEFINITION OF INSPECTION TERMS

Inspection. Inspection means the examination of supplies, (including, when appropriate, raw materials, components and intermediate assemblies) to determine whether the supplies conform to contract requirements, which include all applicable drawings, specifications and purchase descriptions.

Inspection by Attributes. Inspection by attributes is inspection wherein certain characteristics of the sample units are inspected and classified simply as conforming, or not conforming, to specified requirements.

Unit of Product. The term "unit of product" is the entity of product inspected in order to determine its classifiaction as defective or non-defective. The unit may be a single article, a pair, a set, a length, an area, a volume, etc., of the finished product or component thereof. The unit of product may or may not be the same as the unit of purchase, supply, production or shipment.

Moving Product. The term "moving product" refers to product which is flowing past the inspection station. In the typical case the product moves on a conveyor belt or line; however, it may be moved in tote boxes, buggies or other conveyances which are operated manually or by mobile materials handling equipment.

Defect. A defect is any deviation of the unit of product from requirements of the specifications, drawings, purchase descriptions and of any changes thereto in the contract or order. Defects are normally classified according to severity. In these sampling plans, inspection may be performed by judging a class of defects or by judging an individual defect from a class independently of all other defects in that class.

Defective. A defective is a unit of product containing one or more defects.

Sampling Frequency, f. The sampling frequency, f, which is stated as a fraction of the form 1/X means that one unit shall be drawn, in a random manner, from approximately every X units.

Clearance Number i. The clearance number i, is the number of successively inspected units which must be found free of defects considered before a certain action to change the inspection procedure can be taken.

Critical Defects. A critical defect is a defect that judgment and experience indicate could result in hazardous or unsafe conditions for individuals using or maintaining the product or, for major end-item units or product, such as ships, aircraft or tanks, a defect that could prevent performance of their tactical function.

Major Defects. A major defect is a defect, other than critical, that could result in failure or materially reduce the usability of the unit of product for its intended purpose.

Minor Defects. A minor defect is one that does not materially reduce the usability of the unit of product for its intended purpose, or is a departure from established standards having no significant bearing on the effective use or operation of the unit of product.

AQL. The Acceptable Quality Level (AQL) is nominal value expressed in terms of percent defective and serves as an index to the sampling plans to be used. Certain numerical values of AQL ranging from 0.015 to 10.0 are presented in Table I. When the AQL is specified in the form of a range,

it should be treated as if it were equal to that value of AQL for which the sampling plans are furnished and which is included within the range. When the specified AQL is a particular value other than those which sampling plans are furnished, the AQL to be used in applying the provisions of this handbook, is shown in Table I.

AOQL. The Average Outgoing Quality Limit (AOQL) (stated as a percentage) is the largest fraction of defective material, which is expected on the average to pass inspection when the associated sampling plan is followed faithfully.

Lot. Although lot size is not used to select a continuous sampling plan, the formation of lots may remain desirable for reasons of homogeneity, shipping convenience and facilitation of payment.

a. Average number of pieces inspected following finding of defective-

$$u = \frac{1 - q^i}{pq^i}$$

b. Average number of pieces passed-

$$v = 1/fp \text{ where } f = \text{fraction inspected}$$

c. Average fraction of total produced units inspected in the long run-

$$F = \frac{u + fv}{u + v}$$

d. Average fraction of produced units accepted without inspection-

$$Pa = 1 - F$$

e. Fraction inspected = f

$$h = 1/f$$

Example:

$p = AOQL = .03$
$i = 50$
$f = .05$
$h = 20$

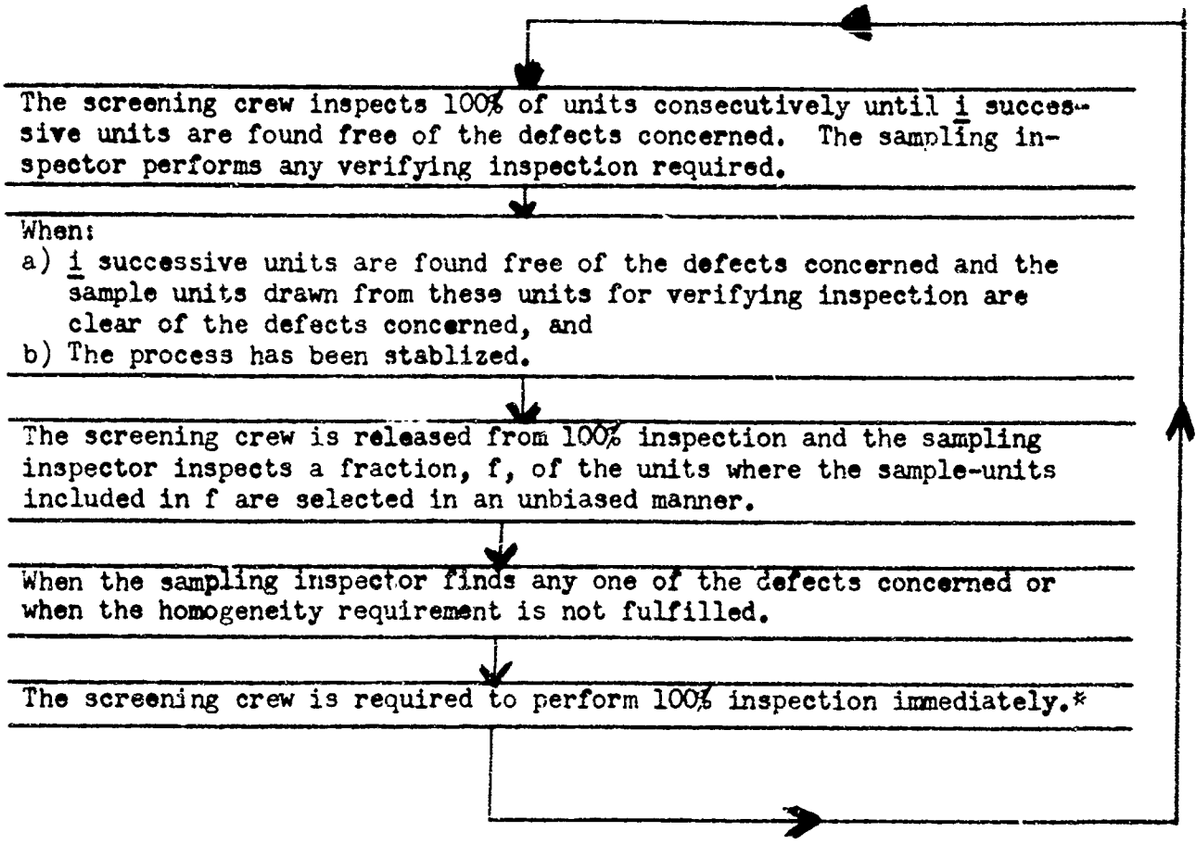
$$u = \frac{1-(.97)50}{.03 \times .97^{50}} = \frac{1 - .21}{.03 \times .21} = \frac{.79}{.0063} = 126$$

$$v = \frac{1}{.05 \times .03} = 667$$

$$F = \frac{126 + (.05 \times 667)}{126 + 667} = \frac{159.35}{793} = .201$$

$$Pa = 1 - .201 = .799$$

Start



*For critical defects, screening should begin with the unit of product just after the last defect-free sample-unit.

Values of $\underline{i}$ and i for CS Plans

i Values

Number of Units of Product Produced in a Production Interval*	f	AQL in %			
		.25	1.0	2.5	10.0
501 - 800	1/10	190	80	35	10
801 - 1300	1/10	190	80	35	10
1301 - 3200	1/15	230	100	43	12
3201 - 8000	1/25	290	130	55	15
8011 - 22000	1/50	370	160	70	19

L Values

Number of Units of Product Produced in a Production Interval	f	AQL in %			
		.25	1.0	2.5	10.0
501 - 800	1/10	725	300	150	40
801 - 1300	1/10	725	300	150	40
1301 - 3200	1/15	1100	475	225	60
3201 - 8000	1/25	1425	650	275	80
8001 - 22000	1/50	2825	1225	550	150

*The Production interval is the period of time, usually a shift or a day, during which a number of units of product or a homogeneous batch of product is produced. The choice of number of units of product or of the duration of the production interval must be estimated from prior information.

CONVERSION FACTORS (AQL TO AOQL)

AQL (Acceptable Quality Level) to AOQL (Average Outgoing Quality Limit) Values.

AQL	AOQL
.015	0.12
.035	0.16
.065	0.23
.10	0.27
.15	0.36
.25	0.59
.40	0.83
.65	1.08
1.00	1.35
1.50	2.20
2.50	3.09
4.00	4.96
6.50	7.24
10.00	10.70

Source; H107, Single Level Continuous Sampling Procedures for Inspection by Attributes, U.S. Government Printing Office, Washington, D.C., 1959.

BILL OF MATERIAL

CD V-805 Mask, Protective, Civilian

Component	Drawing No.	Spec.	Required
Carrier Assy.	B5-4-336	MIL-F-10400	1
Faceblank		OCD Faceblank Spec.	1
Size 1	B5-2-913		
Size 2	B5-2-912		
Size 3	B5-2-911		
Size 4	B5-2-910		
Size 5	B5-2-909		
Size 6	B5-2-908		
Vinyl		OCD Faceblank Spec.	
Filter Unit		OCD Filter Unit Spec.	1
Size 1	C5-3-909		
Size 2	C5-3-906		
Size 3	C5-3-903		
Size 4	C5-3-899		
Size 5	C5-3-896		
Size 6	C5-3-893		
Filter Screen		L-S-137	
Size 1	C5-3-937		
Size 2	C5-3-938		
Size 3	C5-3-939		
Size 4	C5-3-940		
Size 5	C5-3-941		
Size 6	C5-3-942		
Lens		FD 197-54-350	2
Size 1	B5-2-914		
Size 2	B5-2-915		
Size 3	B5-2-1595		
Size 4	B5-2-1596		
Size 5	B5-2-1597		
Size 6	B5-2-1598		
Deflector Blank		MIL-I-695	1
Size 1	C5-2-927		
Size 2	C5-2-920		
Size 3	C5-2-925		
Size 4	C5-2-924		
Size 5	C5-2-923		
Size 6	C5-2-922		
Deflector Insert	B5-2-928	MIL-I-695	2
Outlet Valve Seat	B5-2-906	MIL-M-20693	1

Component	Drawing No.	Spec.	Required
Outlet Valve Retainer	B5-2-872	MIL-STD-171	1
Outlet Valve Disc	B5-2-868	MIL-D-10132	1
Outlet Valve Cover	C5-2-907	L-P-590	1
Buckle Assy.	B22-4-52	MIL-STD-171	6
Rivet	B22-21-142	MIL-STD-171	6
Head Harness Assy.	C5-2-918	MIL-STD-171	1
Tissue Paper	B5-20-305	UU-P-553	1
Tape	B5-20-305	PPP-T-76	3
Water Vapor Proof Bag	B5-20-305	MIL-B-131	1
RSC Fiber Box & Separators	D5-20-306	PPP-B-636	1/30
Tape (For Box)	D5-20-306	PPP-T-76	1/30
Filter Material	C5-1-288	PD197-54-793	-
Plastisol	C5-1-288	MIL-E-51065	-

SECTION III

MAINTENANCE INSTRUCTIONS

FOR

TEST EQUIPMENT

Maintenance. The maintenance man responsible for the operation and performance of the test equipment will observe the minimum preventative maintenance procedures and instructions.

In addition to regular maintenance, the maintenance man will be responsible for the starting and the shutting off of test equipment during production runs and for instructing production and inspection personnel in the operation and calibration of test equipment. At the start of each shift, the calibration of the following test equipment will be checked with furnished standards. The process inspectors and operators will also check calibration as required.

E27	Penetrometer
M4	Outlet Valve Leakage Indicator
E3	Outlet Valve Resistance Indicator
E4	Rough Handling Machine
Q2	All Purpose Gas Life Tester
Q14	Gas Mask Leakage Tester

Other items of test equipment for which standards are not available will be checked by inspectors for proper set up and function prior to use.

Any malfunction of test equipment shall be reported on a malfunction report and filed with the project engineer. The project engineer shall determine what action shall be taken to correct a major breakdown to the test equipment.

Maintenance charts will be made for each piece of test equipment and shall be posted on the equipment. As daily maintenance is completed on each piece of equipment, the maintenance man shall initial the day that the maintenance has been pulled. A roving inspector shall spot check the maintenance charts at daily intervals to assure that proper maintenance is being performed. Any maintenance schedules shall be revised as experience warrants.

MAINTENANCE OF E27 PENETROMETER.

1. Check the DOP level and fill through filling cock to the cold level shown on the indicator card of liquid-level indicator. This should be done before starting the machine.
2. Drain and replace DOP at least once every month.
3. Blow out the upper and lower jaws of the chuck daily with compressed air.
4. Drain air-line filters twice weekly by opening drain cocks located on the bottom of the filters. This operation should be done with air pressure on.
5. The screens inside the air-line filters should be cleaned once a month. Turn off the air-intake valve, unscrew the plugs on top of the filters and lift out the screens.
6. Oil (SAE No. 10) should be added to lubricator weekly.
7. If the percent-penetration indicator is replaced by a spare unit, the scattering chamber should also be replaced by its corresponding spare scattering chamber. These units are calibrated together. Inaccurate penetration readings will result if they are not kept together.

MAINTENANCE OF M4 OUTLET VALVE LEAKAGE INDICATOR

Normal maintenance consists of filling the oil cup on the pulsing pump at least once each month when the equipment is in constant use and normal care of a brush type motor and governor, relays, and contractor. The relay contacts must be kept clean. It is recommended that the indicator be thoroughly checked after one year or after 100,000 test cycles. The relay contacts and valve seats should be replaced if badly worn. The valves have soft neoprene seats which may show wear after extensive use. Remove the vacuum tube and test. Replace if necessary. Make a mark on the plastic body of the contractor assembly and the center bushing to insure reassembly in the same relationship. Remove the moveable element of the contractor assembly by taking out the four screws retaining the flanged bushing. Care must be taken not to rotate the contactor in the thread of the bushing, or the diaphragm may be ruptured upon reassembly. Polish the tip of the moveable element with crocus cloth or other fine abrasive. Polish the contact on the diaphragm by means of a polishing stick, using extreme care not to rupture the diaphragm. Use pipe compound when reassembling bushing into housing as connection must be air tight. If the equipment is being used in exceptionally dirty or dusty surroundings the filters should be examined by removing the six screws around their peripheries. Pipe compound must be used on both flanges of their filter when reassembling, as this connection must also be air tight. Motor brushes and governor brushes must be replaced if worn excessively. Governor contacts should be cleaned if they become fouled.

MAINTENANCE OF E3 OUTLET VALVE RESISTANCE INDICATOR

1. Add only distilled water to gauge glasses.
2. Keep holding jig fixture free from lint, dirty and other obstructions.
3. Occasionally put a few drops of machine oil on various bearings.

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MAINTENANCE OF E4 ROUGH HANDLING MACHINE

1. Under sustained operating condition, the grease cup fittings on either end of the drum shaft should be filled once a day with a suitable lubricating grease.
2. Lubricate the motor with 30 drops of light machine oil every 12 months of operation.
3. Once every six months inspect the gear reduction box and add SAE 10 Motor oil as needed.

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MAINTENANCE OF Q2 ALL PURPOSE GAS LIFE TESTER

All maintenance will be done by the operator of the Q2 All Purpose Gas Life Tester. Maintenance procedures are listed in the Instruction Manual 126-300-4.

MAINTENANCE OF Q14 GAS MASK LEAKAGE TESTER

1. Check DOP level hourly. The DOP level must lie within the red mark shown on the sight gauge. The DOP reservoir is filled by removing pipe cap and pouring DOP into the container.
2. Drain air line filter by opening drain cock located at bottom of filter twice weekly. This should be done with the air pressure on.
3. Settling chamber should be drained daily. This is accomplished by opening drain cock. Note: Chambers may be drained quickly by leaving air pressure on the system.

SECTION IV

INSPECTION AND TESTING

OF

PURCHASED COMPONENTS

CD V-805 MASK & COMPONENTS

Lotting: A lot small normally consist of one shipment of components or assemblies.

Inspection: Components requiring inspection will be sampled in accordance with MIL-STD-105, Single Sample, Normal Level II. All inspection and testing of components will be on a lot by lot basis.

Testing: Destructive Testing on a lot by lot basis will be as follows:

Use MIL-STD-105, Table IIIB and Table IV-A with the AQL as called for in the component specification. Initial sampling for non-destructive testing will be performed using Level L7 of Table IIIB. Later Inspection will be as follows: If the preceding five lots have been accepted reduce the sampling level L5. In the event of a rejected lot, return to level L7 and proceed as above.

Certification: Certification in triplicate, will be required for all components and will state that the requirements of all applicable specifications are being met.

PLASTISOL

Specification: MIL-E-51065

Plastisol will be purchased to meet the requirements of specification MIL-E-51065. Plastisol will be inspected as received to assure that no shipping damage has occurred. Only manufacturers listed on the Qualified Products List (QPL) shall supply this item.

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FILTER MATERIAL

Specification: PD197-54-793

Certification for conformance to the requirements of all applicable specifications will be required. Actual test results shall be included with the certification. Both certification and test results must accompany each shipment.

The lots will be inspected to assure that no shipping damage has occurred.

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FILTER SCREEN

Specification: L-S-137

The lots of filter screen will be inspected to assure that no shipping damage has occurred.

Certification for conformance to the requirements of all applicable specifications will be required for each lot.

FACEBLANK MOLDING COMPOUND

Specification: CD V-805 Faceblank OCD Standard Item Specification;

Faceblank molding compound will be inspected as it is received into the department to assure that no damage has occurred.

Molding compound must be capable of producing acceptable faceblanks in accordance with MIL-F-50022.

(46/C)

LENS

Specification: PD197-54-350

Drawings: B5-2-914, B5-2-915, B5-2-1595, B5-2-1596, B5-2-1597, B5-2-1598.

Certification shall be required for physical properties.

The lens shall not be scratched or damaged so as to affect vision. To determine damaged or suspect lens, reading test and referee samples should be used.

"Lenses which exhibit optical defects, including scratches, will be subjected to a performance examination to determine whether or not the defects adversely affect serviceability or visibility. The facepiece or cut lens containing optical defects will be positioned in its normal use position (lens approximately 2" from eyes of wearer) and the inspector will look through the lens at several objects at various distances under various degrees of light available. The lens (facepiece) will be considered defective if the inspector observes:

a. Reading of type, such as printing on the CD V-805 carrier paragraph or 6 point #4, Gothic Light Condensed Type, at a minimum distance of 18" cannot be easily accomplished through the lens, if such reading can be easily accomplished under identical conditions without sighting through the lens.

b. That details and outlines of the objects, which were clearly discernable without sighting through the lens, became distorted when viewed through the lens under identical conditions.

LENS

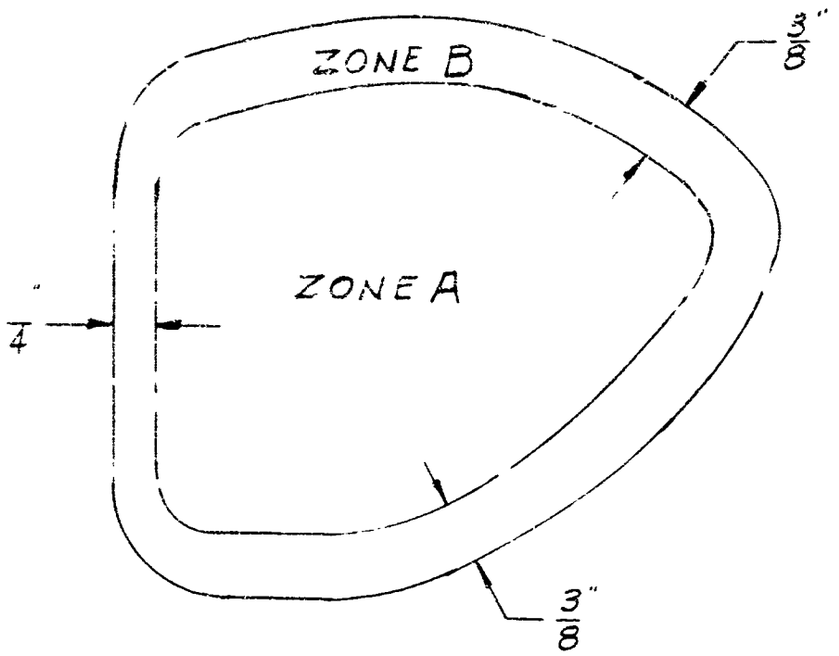
Classification of Defects:	Characteristic	Inspection Method
Class and AQL		
Major 1.0%		
1. Optical defects		Visual
a. Zone A - bubbles, foreign material, or any defect which impairs normal vision.		
b. Zone B - bubbles, foreign material, or any defect which does not allow proper sealing.		
2. Damage		Visual
a. Zone A - Scratches which impair normal vision, tears, holes, or creases.		
b. Zone B- Tears, holes and creases which do not allow proper sealing.		
3. Discoloration		Visual
Any discoloration in Zone A or Zone B of the lens is not permitted.		
4. Contamination		Visual
Grease or oil		
5. Thickness		Gage
Minor 2.5%		
51. Rough Surface		Visual
The surface of the lens shall be smooth and free from any uneven or rough areas.		
52. Contamination		Visual
Other than Major 4.		
*53. Profile incorrect		Template

*Tool controlled

NOTE: Referee standards for the above mentioned defects will be set up between the subcontractor and the manufacturer.

LENS.

Zone A and Zone B of the lens will be as shown on the following drawing:



DEFLECTOR ASSEMBLY

Specification: MIL-I-695

Drawings: C5-2-927, C5-2-920, C5-2-925, C5-2-924, C5-2-923, C5-2-922, B5-2-928, C5-2-917

First piece samples will be inspected for verification of dimensional requirements. Thereafter lots will be accepted upon the certification for conformance to all drawing requirements. The lots will be inspected to assure that no shipping damage has occurred.

Classification of Defects	Characteristic	Inspection Method
Class and AQL		
Major - 1.0%		
1.	Correct Size	Template
2.	Damage - the surface shall be free from cracks, dnets or tears	Visual
Minor - 2.5%		
51.	Contamination	Visual + Tactual

NOTE: Inserts shall be assembled to the rough surface of the defelctor blank.

(50/0)

RIVET

Specification: MIL-STD-171

Drawing: B22-21-142

First piece samples will be inspected for verification of dimensional requirements. Thereafter lots will be accepted upon the certification for conformance to all drawing requirements. The lots will be inspected to assure that no shipping damage has occurred.

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BUCKLE ASSEMBLY

Specification: MIL-STD-171

Drawing: B22-4-52

First piece samples will be inspected for verification of dimensional requirements. Thereafter lots will be accepted upon the certification by the subcontractor for conformance to all drawing requirements. The lots will be inspected to assure that no shipping damage has occurred.

OUTLET VALVE SEAT

Specification: MIL-M-20693

Drawing: B5-2-906

Classification of Defects	Characteristic	Inspection Method
Major A 0.25%		
	1a. Outlet Valve Leakage Sample testing for outlet valve leakage will be performed on the M4 Outlet Valve Leakage Indicator. Sampling will be as indicated under "Component Inspection" in the front of this section. The AQL shall be 0.25%	
	2a. Molding Imperfections Knit lines, blisters, bubbles, not permitted on sealing surface.	
Major 1.0%		
	1. Damage	Visual
	2. Diameter (1.130 - .010) correct	Gage GA106
**	3. Diameter (1.406 - .015) correct	
	4. Diameter (.176 + .005) correct	Gage GA106
**	5. Thickness (.150 ± .005) correct	
	6. Outlet valve disc sealing ring (.160 ± .005) correct	Gage
	7. Diameter (1.605 ± .005) correct	
Minor 2.5%		
	51. Contamination	

** Tool controlled

* Critical area is that area which comes into contact with the outlet valve disc.

OUTLET VALVE RETAINER

Specification: MIL-STD-171

Drawing: B5-2-872

Classification of Defects	Characteristic	Inspection Method
Class and AQL		
Major 1.0%		
1.	Inside diameter .984 + .015	Gage GA-107
2.	Damage	Visual
Minor 2.5		
51.	Incorrect finish	Visual

OUTLET VALVE DISC

Specification: MIL-D-10132

Drawing: B5-2-868

Classification of Defects	Characteristic	Inspection Method
Class and AQL		
Major A 0.25%		
1a.	Resistance to airflow The outlet valve disc shall be assembled and tested for exhalation resistance using the Q106 Outlet Valve Resistance Indicator.	
2a.	Leakage The outlet valve disc shall be assembled and tested for leakage using the M4 Outlet Valve Leakage Indicator.	
Major 1.0%		
1.	Thickness	Gage
2.	Damage Tears, holes, and excessive distortion Disc shall be stretched 1/4" using thumb and forefinger.	Visual & Tactual
3.	Contamination Grease or oil not permitted	Visual
4.	Depth (0.182) incorrect	Comparator
Minor 2.5%		
51.	Marking missing or incorrect	Visual
52.	Molding imperfections, cracks, checks, abrasions, blisters, tackiness, porous areas	Visual
53.	Excessive flash or improper trim, flash in excess of 1/32 inch.	Visual & Seal
54.	Stem length incorrect	Seals
55.	Contamination, Other than Major Defect #5	Visual
Incidental 10.0%		
101.	Color incorrect, color is black	Visual

OUTLET VALVE COVER

Specification: L-P-590

Drawing No.: C5-2-907

Defect Class and AQL	Characteristic	Inspection Method
Major - 1.0%		
1.	Inside diameter, 1.608 + .005	Gage
2.	Damage, Cracks and holes.	Visual
*3.	Correct slot size and location	Gage
Minor 2.5%		
51.	Contamination	Visual
52.	Mold imperfections, non-fills, blisters	

*Tool controlled.

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HEAD HARNESS ASSEMBLY

Specification: Refer to Drawing

Drawing No.: C5-2-918

Defect No. Class and AQL	Characteristic	Inspection Method
Major 1.0%		
1.	Damage	Visual
Minor		
51.	Color	Visual
52.	Stitching incorrect	Visual & Scale
53.	Dimensions incorrect	Template
54.	Contamination Head harness shall be free of grease and oil and foreign material	

TISSUE PAPER

Specification: UU-P-553

First items will be inspected for meeting dimensional requirements of MIL-M-50023. Thereafter lots will be accepted upon the certification for conformance to the requirements of Specification UU-P-553. The lots will be inspected to assure that no shipping damage has occurred.

TAPE

Specifications: PPP-T-76

First items will be inspected for meeting dimensional requirements. Thereafter lots will be accepted upon the certification for conformance to the requirements of Specification.

The lots will be inspected to assure that no shipping damage has occurred.

CARRIER ASSEMBLY

Specification: MIL-F-10400

Drawing No. C5-4-388

Classification of Defects Class and AQL	Characteristic	Inspection Method
Major 1.0%		
1.	Length 13 3/4 ± 1/16	Scale
2.	Width 8 3/8 ± 1/16	Scale
3.	Damage Tears, holes, burns, and damaged hardware	Visual
4.	Incorrect Assembly All parts shall be welded in the proper place.	Visual
5.	Fastener separation The fastener shall snap open and closed.	Tactual
6.	Marking missing, incorrect or illegible Marking must be legible and as specified.	Visual
7.	Interior Contamination Grease or oil not permitted on interior	Visual & Tactual
Minor 2.5%		
51.	Contamination Grease, oil, and foreign material not permitted.	Visual & Tactual

DESTRUCTIVE TESTING

The lots of Carrier Assemblies will be tested for seam separation. Sampling will be as follows:

Use MIL-STD-105, Table III-B and Table IV-A. Initial sampling for seam separation will be performed using level L7. After 5 consecutive lots have been accepted at this level, reduce the sampling to Level L5. Level L5 shall be the minimum level of inspection. In the event a lot is rejected, return to level L7 and proceed as stated above.

Test specimens will be cut as follows: Using 1/2" x 4" die cut 1 specimen from each manufacturer's seam. These "dumbbell" specimens will be tested on a Scott Tensile Tester with a Type 2-1 clamp and a rate of travel of 20 inches per minute. No individual shall test less than 7 pounds.

Carrier assemblies shall be certified to meet the requirements of all applicable specimens. Certification shall include actual results for the seam separation pull tests.

WATER VAPOR PROOF BAG

Specification: MIL-B-131

Drawing No.: B5-20-305

First items will be inspected for meeting dimensional requirements. Thereafter the lots will be inspected to assure that no shipping damage has occurred.

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RSC FIBER BOX AND SEPARATORS

Specification: PPP-B-636

Drawing No. D5-20-306

First items will be inspected for meeting dimensional requirements. Thereafter the lots will be inspected to assure that no shipping damage has occurred.

SECTION V

INSPECTION AND TESTING

OF

COMPONENTS PRODUCED BY

END ITEM MANUFACTURER

LOTTING

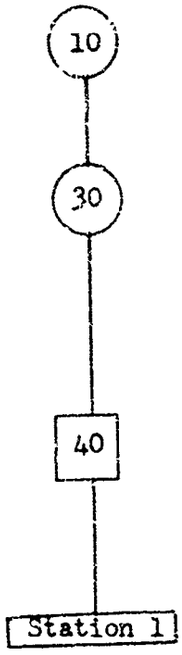
Filter Unit:

A lot shall consist of the filter unit produced from the same material under essentially the same manufacturing conditions. However, not more than one lot of filter material shall be represented in any one lot of filter units.

Faceblank:

A lot shall consist of those faceblanks of one size produced from one lot of molding compound or a maximum of one week's production. A lot of molding compound is that quantity of material that has been manufactured at one plant by one manufacturer in one week under essentially the same manufacturing conditions.

FILTER UNIT



Operation No. 10
Blank Filter paper

Operation No. 30
Assemble paper & Screen in filter unit edge mold. Mold filter unit edge seal

Operation No. 40
Screening
Inspection by operator

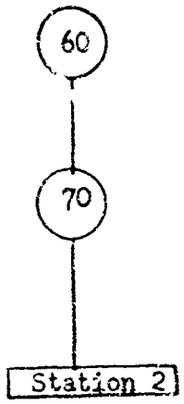
Inspection Station No. 1
Sample Inspection & Testing

FILTER UNIT

Sample inspection for visual defects in accordance with the Classification of Defects will be performed at Station 1, using a continuous sampling plan.

Sampling for critical non-destructive tests will be performed at Station 1, using a continuous sampling plan.

CD V-805 MASK, PROTECTIVE, CIVILIAN FACEBLANK (All Parts)



Operation No. 60
Mold Faceblank

Operation No. 70
Screening Inspection
By Production

Inspection Station No. 2
Sample Inspection

INSPECTION AND TESTING FACEBLANKS

100% screening inspection will be performed by production during operation 70, for visual defects in accordance with the Classification of Defects.

Sample inspection for visual defects in accordance with the Classification of Defects will be performed at Station 2, using the continuous sampling plan.

Twenty (20) faceblanks produced under standard operating conditions shall be selected at least once per month and tested for all physical requirements in accordance with applicable specifications. Sampling will be done by Quality Control personnel. Testing and certification will be done by the Laboratory.

FILTER UNIT

Inspection Station No. 1

Spec.; OCD Specification: CD V-805 Filter Unit

Drawing Nos.: C5-3-893, C5-3-896, C5-3-899, C5-3-903, C5-3-906, C5-3-909

Classification of Defects Class and AQL	Characteristic	Inspection Method
*Critical		
	A. DOP Smoke Penetration Filter assemblies will be tested for DOP Test Smoke Penetration using E27 penetrometer.	
	B. Air Flow Resistance The filter assembly inhalation resistance Test shall be determined by using Q127 penetrometer	
Major 1.0%		
	1. Component missing, incorrect, or incorrectly assembled	Visual
	2. Improper edge seal Filter paper or screen not sealed, exposed charcoal layer at edge	Visual
	3. Imperfections Blisters, thin spots, non-fills, porosity.	Visual
	4. Damage Punctures, tears, holes, exposed charcoal layer.	Visual
	5. Contamination, Grease, oil, or foreign material.	Visual
Minor 2.5%		
**51. Profile incorrect		

**Tool controlled

Referee standards for visual defects shall be established by the Quality Control Department.

(640)

CD V-805 MASK, PROTECTIVE CIVILIAN FACEBLANK (Size 1-6)

Spec.: OCD Specification; CD V-805 Faceblank

Drawing Nos.: C5-2-908, C5-2-909, C5-2-910, C5-2-911, C5-2-912, C5-2-913

Inspection Station 2

Classification of Defects	Characteristic	Inspection Method
Class & AQL		
Major 1.0%		
1. Incomplete or short shot Faceblanks which are not complete in all areas due to non-filling of the cavity.		Visual
2. Sink or shrinkage marks Distortion or reduction in material thickness due to shrinkage which affect the assembly.		Visual
3. Orange peels Rough surface appearance similar to the texture of an orange peel.		Visual
4. Flow cracks - Flow cracks which enlarge upon probing.		Visual
5. Blisters or bubbles - Open or closed or air entrapments.		Visual
6. Burned spots - Areas of deterioration due to excessively high temperatures or hot spots in the mold.		Visual
7. Excessive shrinkage around sprues Excessive shrinkage around stock injection or escapement areas.		Visual
8. Stock breakdown-Deterioration of stock due to improper ingredients or composition.		Visual
9. Excessive flash - Flash in excess of 1/16 inch.		Visual & Scale
10. Contamination - grease, oil, or other petroleum products which are detrimental to the vinyl compound.		Visual
11. Damage - Permanent set, cuts, tears, and holes due to improper handling or storage.		Visual

INSPECTION STATION 2 - Continued

Class and AQL	Characteristic	Inspection Method
12.	Foreign Material Presence of pieces of material which are foreign to the vinyl. Foreign material which is 100% of the thickness of the part, or is made up of large pieces or concentrated areas of small pieces is considered a major defect.	Visual
13.	Marking incorrect, faceblanks shall be correctly marked for size, and medallion correctly placed and dated.	
Minor 4.0%		
51.	Molding imperfection Flow crack which does not enlarge on probing, small blisters in non-critical areas such as the two outside temple tabs and the chin strip which is removed after welding, light discoloration due to burns.	Visual
52.	Contamination Other than Major 10.	Visual
53.	Color As specified in contract	Color Chart

Referee standards for visual defects shall be established by the Quality Control Department.

SECTION VI.

INSPECTION AND TESTING

OF

MASK

CD V-805 MASK, PROTECTIVE, CIVILIAN LOTTING REQUIREMENTS

Mask:

A lot shall consist of the masks from one size faceblank produced by one manufacturer from the same materials and under essentially the same manufacturing conditions. However, not more than one lot of faceblanks or one lot of filter units shall be represented in any one lot of finished masks.

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CD V-805 MASK, PROTECTIVE, CIVILIAN; INSPECTION REQUIREMENTS

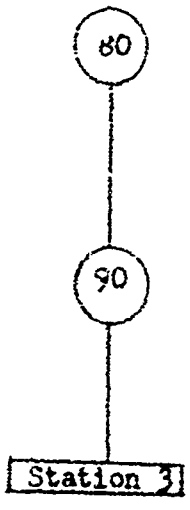
All sample inspection for visual defects on the mask assembly line will be performed using a continuous sampling plan.

100% inspection and testing will apply to all critical defects. The Quality Control inspector will verify the 100" inspection observation.

Sample inspection for non-critical defects will be performed using a continuous sampling plan.

CD V-805 MASK, PROTECTIVE, CIVILIAN

Assembly Process Chart



Operation No. 80
Assemble faceblank, two lenses, and filter unit, and weld

Operation No. 90
Screening Inspection
By Production

Inspection Station No. 3
Sample Inspection

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INSPECTION AND TESTING FACEBLANK ASSEMBLY

100% screening inspection will be performed by production for filter and lens seal in faceblank during Operation 90.

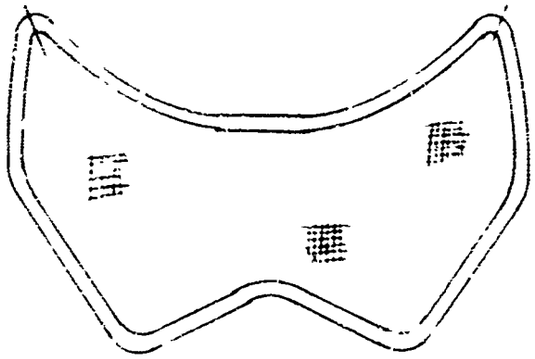
Sample inspection for visual defects will be performed at Station 3, in accordance with the Classification of Defects, using a continuous sampling plan.

Sampling for destructive tests will be performed using an L7 Sample in accordance with MIL-STD-105.

LENS AND FILTER UNIT WELD:

1. Select samples in accordance with MIL-STD-105.

2. Cut a line through the welded area at the points indicated below



3. FLEX the faceblank back on itself and visually inspect for parting of the weld of Filter Unit and lens to faceblank all around the periphery. Apply pressure with rolling motion of the side of the thumb on the filter unit and the lens away (3 times maximum at one place) from the faceblank in all suspect areas of the filter unit and lenses.

4. ANY SEPARATION WHICH REDUCES THE WELD TO LESS THAN 1/16" IS CAUSE FOR REJECTION.

5. When a defect occurs during sampling, all faceblank assemblies produced since the preceding sample was pulled is suspect material. In this situation, the following procedure will be used:

   a. Select a ten (10) piece sample at random from the suspect faceblank assemblies.

   b. Test this sample following steps one (1) through four (4).

   c. If all ten (10) units checked are acceptable, suspect material is to be released to production.

   d. If a defect occurs on any of the ten (10) sample units, suspect faceblank assemblies are to be scrapped, and corrective action be taken to eliminate deficiency.

6. As a check on future production and to verify corrective action, five (5) consecutive units from the corrected process are to be examined using steps one (1) through four (4). These five (5)

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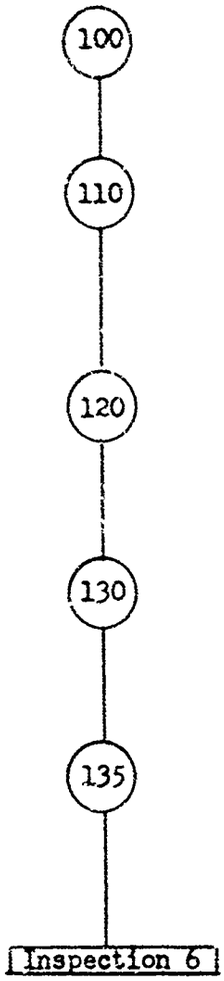
consecutive units must be defect free before resuming normal production and the selection of one (1) random sample from each hour's production.

7. Each of the samples tested for weld acceptability will also be checked for other visual defects described in the Classification of Defects for the assembly. Any discrepancy should be reported to responsible production personnel so that corrective action may be taken.

8. The same destructive sample used for the Lens and Filter Unit Weld Test shall be processed through the applicable operations and be used to perform the Chin Seam Weld Test at Inspection Station 6.

CD V-805 MASK, PROTECTIVE, CIVILIAN

Assembly Process Chart



Operation No. 100
Weld chin strap

Operation No. 110
Assemble deflector assembly and weld two tabs.

Operation No. 120
First Chin seam weld
Trim chin seam weld

Operation No. 130
Heat flatten and pierce for outlet valve seat

Operation No. 135
Trim excess flash from chin seam

Inspection Station 6
Chin Seam Strength

Chin Seam Strength. Chin Seam Strength test will be conducted in accordance with the procedure outlined on the following paragraphs at Inspection Station 6.

1. The same destructive sample taken at Station 3 shall be used for tests at Station 6.

2. A test sample shall be prepared in accordance with the illustration titled "Test Specimen for Tear Test in Chin Seam."

3. A test specimen shall be tested in accordance with ASTM Method D638, Tentative Method of Test for Tensile Properties of Plastics. The speed of testing shall be Speed D, 20 inches per minute. The test specimen shall be tested for tear properties only as specified in this section. Calculations shall be the following:

a. Record the thickness of the test area before testing.

b. Record the maximum load carried by the specimen during the test.

c. Calculate the results by using the following equation:

$$\text{Tear Strength} = \frac{\text{Load Carried (lbs)}}{\text{Thickness of Area (inches)}}$$

4. The results of the test specimen shall be equal to or greater than 175 lbs. per inch.

5. Any test performed on a test specimen that has been heat flattened longer than one hour shall not be considered valid. If an invalid test occurs for this reason all masks produced since the preceding acceptable sample was tested are considered suspect material. Procedures outlined in step six (6) for suspect material are applicable to this situation.

6. If any test specimen fails to meet the requirements of step four (4), all masks produced since the preceding acceptable sample was tested are considered suspect material. The following procedures are applicable to all suspect material:

a. Select ten (10) masks at random from the suspect mask assemblies.

b. Test these ten (10) masks following steps one (1) through four (4).

c. If all ten (10) masks tested meet the requirements of step four (4), the remaining suspect material is acceptable.

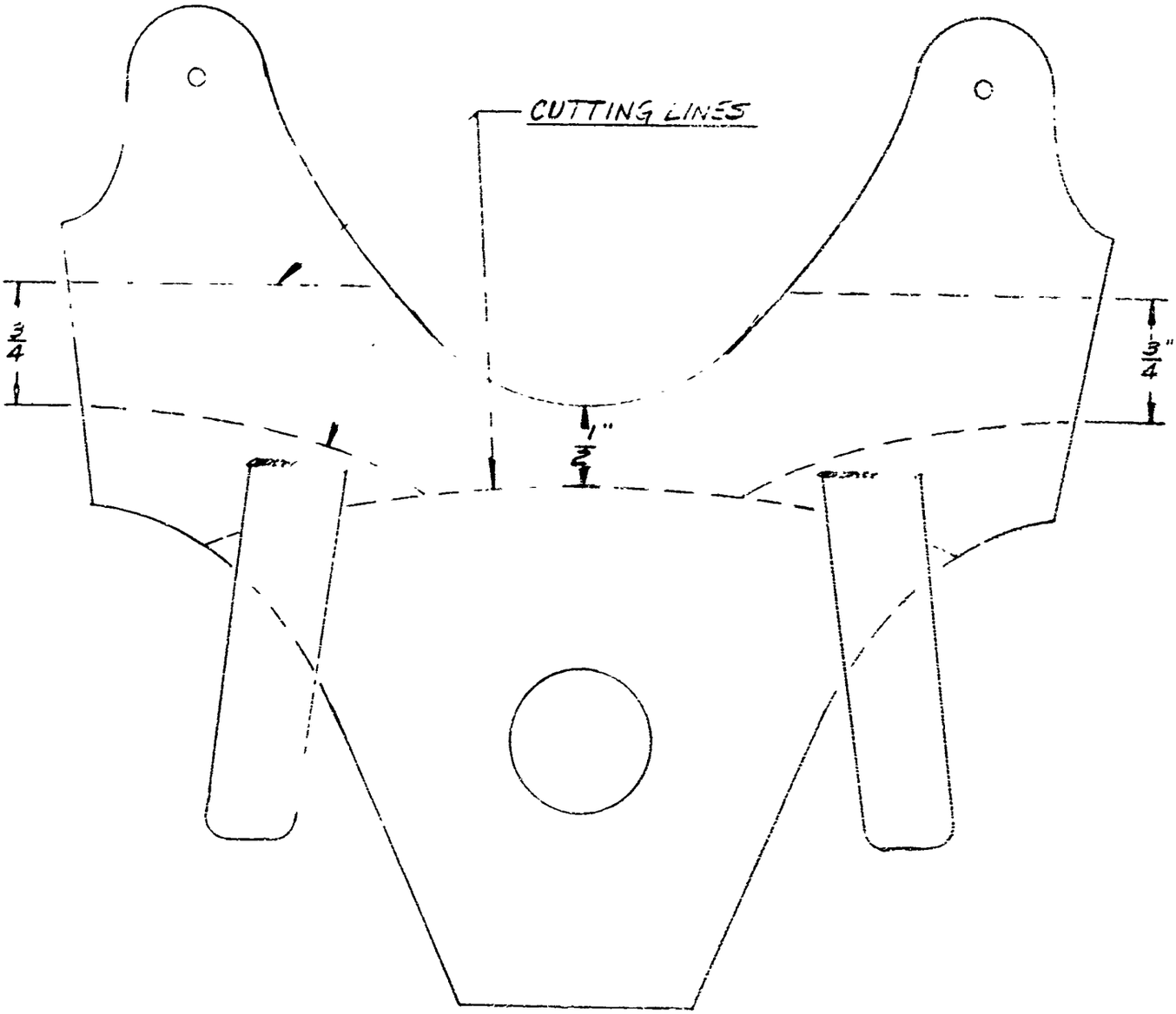
d. If any of the ten (10) masks tested fail to meet the requirements of step four (4), then the remaining suspect material is unacceptable material.

7. As a check on future production and to verify corrective action, two (2) consecutive faceblanks from the corrected operation are to be tested using steps one (1) through five (5). If the two corrected samples meet the requirements of step four (4) production may be resumed.

PROTECTIVE CIVILIAN CD V-805

TEST SPECIMEN FOR TEAR TEST

IN CHIN SEAM AREA



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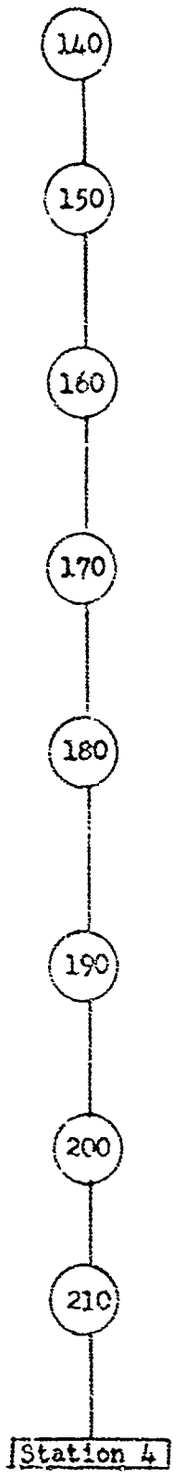
CD V-805 MASK, PROTECTIVE, CIVILIAN

Assembly Process Chart (Continued)



Operation No. 140
Assemble six buckles

Operation No. 150
Assemble outlet valve seat and retainer

Operation No. 160
Assemble outlet valve disc

Operation No. 170
Assemble outlet valve cover

Operation No. 180
Test for resistance to airflow and DOP Smoke Penetration

Operation No. 190
Test for outlet valve leakage

Operation No. 200
Assemble head harness

Operation No. 210
Clean facepiece

Inspection Station No. 4
Sample Inspection and Testing

INSPECTION AND TESTING FACEPIECE

100% testing will be performed by production for the following critical defects:

1. DOP Smoke Penetration
2. Outlet Valve Leakage
3. Mask Resistance to Airflow

Sampling for Visual defects and non-destructive tests will be performed at Station 4, in accordance with the classification of defects using a continuous sampling plan.

A.C. sampling for destructive tests will be performed at Station 4, using an L7 sample in accordance with MIL-STD-105. Destructive tests to be performed are:

*DOP Smoke Penetration

*Airflow resistance

Gas Life after rough handling

*(DOP Smoke Penetration test and airflow resistance test are done as part of complete gas life testing).

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DOP Smoke Penetration and Resistance to Airflow

The assembled facepiece shall be tested for DOP Smoke Penetration and air flow resistance using a E27 penetrometer modified with bell chamber. The valve for DOP smoke penetration and air flow resistance on the assembled facepiece after rough handling shall not exceed requirements for as received tester.

Rough Handling

The sample masks shall be rough handled four (4) masks less head harness at one time for a minimum of 15 minutes in an E4 rough handling machine from which the baffle has been removed. This machine will be further modified by the addition of fine mesh screen on each side. This testing shall be done without the use of a rubber ball on other device on the interior of the machine.

Gas Life (After rough Handling)

The periphery of the sample facepiece shall be electronically welded to effect a leakproof seal. The outlet valve slot shall be assembled to the specified adapter and placed in the All Purpose, Gas Life Tester, Q2. The testing conditions shall be as stated in the applicable specification. The corrected gas life of each sample shall be recorded to the nearest 0.1 minute.

LENS

The lens shall not be scratched or damaged so as to affect vision. To determine damaged or suspect lens, reading test and referee samples should be used.

"Lenses which exhibit optical defects, including scratches, will be subjected to a performance examination to determine whether or not the defects adversely affect serviceability or visibility. The facepiece or cuts lens containing optical defects will be positioned in its normal use position (lens approximately 2" from eyes of wearer) and the inspector will look through the lens at several objects at various distances under various degrees of light available. The lens (facepiece) will be considered defective if the inspector observes:

a. Reading of type, such as printing on the CD V-805 carrier, or a paragraph of 6 point #4, Gothic Light Condensed Type, at a minimum distance of 18", cannot be easily accomplished through the lens. If such reading can be easily accomplished under identical conditions without sighting through the lens.

b. That details and outlines of the objects, which were clearly discernable without sighting through the lens, became distorted when viewed through the lens under identical conditions.

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MATHEMATICAL EXPRESSIONS FOR STATISTICAL TERMS

The following mathematical notations are used in describing and deriving the arithmetic mean ($\bar{X}$) of a series of numbers:

a. X_i = an observation or measurement

Σ = sum of or summation

n = number of observations or measurements

$\sum_{i=1}^{n} Xi$ = summation of a series of numbers with subscripts going from 1 to n

$\frac{1}{n}\sum_{i=1}^{n} X_i$ = arithmetic mean = $\bar{X}$ = the sum of the observations divided by the number of observations in the series

$$\frac{1}{n}\sum_{i=1}^{n} Xi = \frac{X_1 + X_2 + X_3 + \ldots + X_n}{n} = \bar{X}$$

Example: $X_1 = 5$ $X_3 = 7$ $X_5 = 5$

$X_2 = 4$ $X_4 = 6$

then

$$\bar{X} = \frac{1}{n}\sum_{i=1}^{n} Xi = \frac{1}{5}\sum_{i=1}^{n} Xi = \frac{X_1 + X_2 + X_3 + X_4 + X_5}{5} = \frac{27}{5} = 5.4$$

b. The mathematical expression for standard deviation is given below:

1. $$\sigma = \sqrt{\frac{\sum_{i=1}^{n} Xi^2}{n} - \bar{X}^2}$$

2. Standard deviation can also be found by a. determining the deviation of each value from the arithmetic mean ($\bar{X}$), b. squaring each deviation, c. adding or summing the squared deviations, d. dividing by the number of observations, and e. taking the square root.

$$\sigma = \sqrt{\frac{1}{n}\sum_{i=1}^{n} (X_i - \bar{X})^2}$$

The identity between the two expressions for σ may be proved algebraically.

Example:

Find σ using both methods when

$X_1 = 10 \qquad X_3 = 9 \qquad X_5 = 12$

$X_2 = 8 \qquad X_4 = 7$

$$\bar{X} = \frac{1}{n}\sum_{i=1}^{n} X_i = \frac{X_1+X_2+X_3+X_4+X_5}{5} = \frac{10+8+9+7+12}{5} = 9.2$$

$$\sigma = \sqrt{\frac{1}{n}\sum_{i=1}^{n} X_i^2 - \bar{X}^2}$$

$$\sigma = \sqrt{\frac{X_1^2 + X_2^2 + X_3^2 + X_4^2 + X_5^2}{n} - \bar{X}^2}$$

$$\sigma = \sqrt{\frac{100+64+81+49+144}{5} - 9.2^2}$$

$$\sigma = \sqrt{\frac{438}{5} - 84.64} = \sqrt{87.6 - 84.64} = \sqrt{2.96} = 1.72$$

or

$X_1-\bar{X} = 10-9.2 = 0.8$	$(X_1-\bar{X})^2 = (0.8)^2 = 0.64$
$X_2-\bar{X} = 8-9.2 = 1.2$	$(X_2-\bar{X})^2 = (-1.2)^2 = 1.44$
$X_3-\bar{X} = 9-9.2 = 0.2$	$(X_3-\bar{X})^2 = (-0.2)^2 = 0.04$
$X_4-\bar{X} = 7-9.2 = 2.2$	$(X_4-\bar{X})^2 = (-2.2)^2 = 4.84$
$X_5-\bar{X} = 12-9.2 = 2.8$	$(X_5-\bar{X})^2 = (2.8)^2 = \underline{7.84}$
	14.80

then

$$\sigma = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(Xi-\bar{X})^2} = \sqrt{\frac{14.8}{5}} = \sqrt{2.96} = 1.72$$

c. When sample sizes are small (under 35 observations) a more efficient estimate of standard deviation may be obtained by the following method:

$$1.\quad S = \sqrt{\frac{n(\Sigma X^2) - (\Sigma X)^2}{n(n-1)}}$$

This formula is equivalent to the others given when sample sizes are approximately 35 or over.

CD V-805 MASK, PROTECTIVE, CIVILIAN

Inspection Station No. 4
Spec.; OCD Item Specification; Protective, Civilian, CD V-805 Mask.
Dwg. No. C5-1-288

Classification of Defects

AQL and Class	Characteristic	Inspection Method
*Critical		
A.	Test for DOP smoke penetration The assembled facepiece shall be tested for DOP Smoke Penetration using E27 penetrometer, modified with bell chamber.	Test
B.	Airflow Resistance The assembled facepiece shall be tested for airflow resistance using E27 penetrometer modified with bell chamber.	
C.	Test for Outlet Valve Leakage The outlet valve assembly shall be tested for leakage using the M4 Outlet Valve Leakage Indicator. Leakage through the assembled outlet valve shall not exceed 15 millimeters of air per minute, at a pressure differential of 25 millimeters of water, when tested as specified above.	Test
Major 0.65% AQL		
1.	Component missing incorrectly located or attached The assembled facepiece shall not have any component missing or incorrectly located or attached.	Visual
2.	Lens damaged The lens shall be free from damage such as pressure marks, and scratches which will impair vision.	Visual
3.	Hardware nonfunction The hardware shall function as to its specified requirements.	Visual
4.	Separation buckle - rivet to faceblank The buckle - rivet joint shall be thoroughly flexed and stretched by the fingers. The rivet shall not separate from the faceblank when tested as specified above.	Visual

5. Outlet valve loose in faceblank — Visual
The outlet valve shall be tightly sealed to the face-blanks and shall not be loose when pulled with the fingers.

6. Chin seam incorrect — Visual
The chin seam shall be correctly welded and positioned.

7. Damage — Visual
The assembled set of faceblank, cracks, dents, tears, holes, or abrasions. A maximum of 3 cracks per rivet is allowable provided crackes do not extend beyond tops of radius.

8. Marking incorrect — Visual
Facepiece shall be correctly marked for size, and medallion shall be correctly placed and dated.

9. Contamination — Visual
The facepiece shall be free from contamination such as dirt grease, or oil.

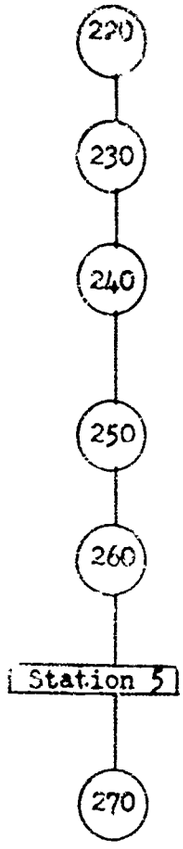
Minor 2.5% AQL

51. Chin strap welded lap incorrect — Visual
The chin strap seal shall be thoroughly flexed and stretched by the fingers. The seal shall be inspected for adequacy, separation of welds and such other defects as are indicative of poor seal technique. The welded lap of the chin strap shall show no signs of the above specified defects when tested as specified above.

52. Deflector assembly seal to faceblank.
The defelctor seal shall be thoroughly flexed and stretched by the fingers. The seal shall be inspected for adequacy, separation of welds, and such other defects as are indicative of poor seal technique. The defelctor seal shall show no signs of separation from the faceblank at the welded seals nor show any tears in deflector material when tested as specified above.

CD V-80 MASK, PROTECTIVE, CIVILIAN

Assembly Process Chart



Operation No. 220
Wrap facepiece in tissue paper and tape

Operation No. 230
Mark carrier and place facepiece in carrier

Operation No. 240
Mark water-vapor proof bag and put carrier in bag.

Operation No. 250
Heat seal water-vapor proof bag

Operation No. 260
Place thirty masks in RSC fiber box

Inspection Station No. 5
Sample inspection and testing

Operation No. 270
Tape box for shipment and mark

INSPECTION AND TESTING OF V-805 MASK

Sample inspection will be performed at Station 5, in accordance with the classification of defects using the continuous sampling plan.

Destructive tests will be as specified on the next page.

CD V-805 MASK, PROTECTIVE, CIVILIAN ; DESTRUCTIVE TESTS

Destructive Testing - Station 5. Package Leakage and Moisture. Sample masks shall be pulled from the assembly line at Station 5, for the purpose of destructive testing using an L7 sample in accordance with MIL-STD-105.

Tests:

Package Leakage. Leakage of the sealed bag containing the mask and carrier shall be determined by subjecting the package to the quick-leak test. Packages shall be immersed in water which has been heated to a temperature of 125°F. to 130°F. The upper face of the package shall be parallel to and not more than one inch below the surface of the water. Each face of the package shall be rotated to the same position until the entire surface of the container has been examined.

Each seam and face of the package shall be observed for a minimum period of 15 seconds and a total elapsed time not to exceed two minutes. Observation and evaluation of air bubbles shall be made at each position of the sample. Bubbles which appear on the surface of the package but are not released shall not be indicative of failure. A steady stream or a recurring succession of bubbles from any surface or seam shall be cause for rejection.

Moisture. Moisture content of the sample facepieces shall be determined by weighing the masks to the nearest 0.1 gram (wet weight) immediately after unpackaging. Place the mask in a forced air drying oven at 150° ± 2°F. until constant dry weight within 0.1 gram and determine the percentage moisture content by the following formula:

$$\text{Percent moisture content} = \frac{100\ (\text{wet wt.} - \text{dry wt.})}{\text{wet wt.}}$$

The average moisture content of the sample facepieces shall not exceed 2.0 per cent and no individual facepiece shall exceed 2.5 per cent moisture when tested as specified above.

CD V-805 MASK, PROTECTIVE, CIVILIAN

Inspection Station No. 5
Spec. OCD Specification; Protective, Civilian, CD V-805 Mask
Dwg. No.

Classification of Defects

AQL and Class	Characteristics	Accept Standards and Inspection Methods
Major 4.0% - AQL		Visual
1.	Initial wrap missing or not secured in place.	
	a. Each facepiece shall be wrapped in the specified tissue paper which will be held in place by a gummed tape.	
2.	Packaging Method incorrect or damaged	Visual
	a. Each mask shall be placed correctly into a carrier. The carrier will be marked as specified.	
	b. Each carrier will be placed in a waterproof bag and sealed.	
3.	Containers incorrect	Visual
4.	Quantity per Container incorrect	Visual
	a. Each container shall contain 30 masks of one size.	
5.	Interlocking Partitions missing. There shall be one set of interlocking partitions for each box of correct dimensions.	Visual
6.	Closure of Container Incorrect	Visual
	a. The box shall be closed by taping all seams including the manufacturer's joint with minimum 3 inch wide gummed or pressure sensitive tape extending the tape over all corners at edges at least three inches.	
7.	Damaged Containers	Visual
	a. The containers shall be free from oil, grease, and water damage. The container should not be Crushed in any way.	
8.	Marking incorrect, missing or illegible. The container should be marked according to MIL-STD-129.	Visual

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