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*for a sustainable future*

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22552

# PERROS

INDUSTRIALE



**PROGRESS**  

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**THROUGH**  

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**ECOLOGY**

**UNIDO PROJECT NUMBER MP/GUY/97/204**

**PHASING-OUT OF CFC-11 AND CFC-12 IN THE MANUFACTURING  
PLANT OF REFRIGERATORS AT GUYANA REFRIGERATOR LTD.  
GEORGETOWN, GUYANA  
CONTRACT NO. 98/113**

<b>FINAL REPORT</b>
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**Report covering all activities at the plant site**

## **TRIAL PRODUCTION OF THE FIRST MODEL AND TEST RUN PRODUCTION**

In this section we summarize all the actions we did to make the test run, the start-up of the production in order to start the mass production of the refrigerators:

- First of all we filled in the Cyclopentane storage tank.
- Then we started the premixing machine Ecomix and the Ecodosing in order to test them with ISO and POL+CP.
- We checked the efficiency of the gas detectors installed on the cyclopentane storage area in order to point out every possible leakage.
- Then we started the cyclopentane feeding pump to fill in the piping line and send the cyclopentane to the Ecomix.
- At this step we adjusted the in line pressure around two (2) bar checking a manometer positioned before the inlet piping to the Ecomix.
- Then we filled in the tank for Polyol and the Isocyanate in order to check the right functioning of the level indicator.
- We switched on a first time the Ecomix and the Ecodosing once to fill in the tanks with polyol and isocyanate in order to check the right functioning of the level indicator and to adjust the temporary pressure and ratio of the materials.
- We checked the efficiency of all the safety devices (gas detectors, firefighting system (flame and thermal detectors) and suction system) installed on the premixing and foaming area in order to point out every possible leakage.
- Then we foamed some bags with the cabinet foaming machine Ecodosing to test the quality of the polyurethane foam and to adjust the pouring time.
- We set up the final adjustments of the ratios and pressures of the materials.
- We injected some samples of cabinets in order to find the right grade of filling and also the right pouring time.

- We got a good quality of cabinets according to the Customer's requirements and we fixed the pouring time.
- We did the same with the doors according to the Customer's requirements and we fixed the pouring time.

For the Dry part:


- We install the suction canalizations around the fixtures (door and cabinet)
- Check the suction system and motors.
- We change the electric resistances and PT100 for temperature control (3 door fixtures)

For Cyclopentane storage area:

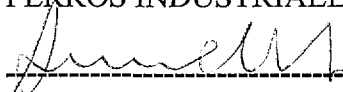
- We prepare the storage area in accord to the safety rules of TUV.

Here below the report signed by the representative of Guyana Refrigerator Ltd.

PERROS INDUSTRIALE S.p.A.

  
-----  
A. Fogliaro  
Sales Department

PERROS INDUSTRIALE S.p.A.

  
-----  
G. Amodeo  
General Manager



Punto 7.5 / 2.105 / 9.3

# Guyana refrigerators Ltd.

SOESDYKE, EAST BANK DEMERARA, GUYANA, SOUTH AMERICA  
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Bankers: G.B.T.L Water Street.

Our Ref:

Your Ref:

MAB:as/GRL

29 March, 2001

Mr. Karl-Josef Richardt,  
Head of Department for Plant Safety,  
TUV Sudddeutschland

Dear Mr. Richardt,

Safety checks and instructions

Further to our discussion with Perros technicians, Mr. Franchino and Mr. Tretzi, we have noted and will ensure the following are done:

1. The gas alarm system will be calibrated every six months. A calibration kit will be obtained.
2. The safety relay in security panel no. 26K1 and 26K1A will be checked every six months.
3. All refrigerator and freezer labels will include "this unit was foamed with C5 as blowing agent".

Yours truly,

  
M. A. Brassington  
Managing Director



# Guyana refrigerators ltd.

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29 March, 2001

## Training for removing excess material in system

### 1. Off loading cyclopentane from tank

- 1.1 Remove stop end from  $\frac{1}{2}$ " ball valve on output end of pipe to cyclopentane pump.
- 1.2 Connect flex hose DN15 to outlet of  $\frac{1}{2}$ " ball valve and attached to small inlet of drum.
- 1.3 Open  $\frac{1}{2}$ " ball valve and cyclopentane will start to flow into drum. Discharge is completed when nitrogen starts to flow.
- 1.4 When completed close  $\frac{1}{2}$ " ball valve and secure stop end to ball valve.

### 2. Off loading excess polyol (pure )

- 2.1 Close ALFA 20T D21 valve at base of polyol tank.
- 2.2 Connect discharge pipe to container and red valve on the bottom of polyol filter.
- 2.3 Open red valve on bottom of pure polyol filter in ECO mix for polyol to flow into container.
- 2.4 When finished close valve on base of polyol tank and disconnect discharge pipe.

cont'd...2.

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29 March, 2001

Training for removing excess material in system.

3. Removal of excess cyclopentane from ECO mix

- 3.1 Close nitrogen valve (black) at bottom of exhaust pipe and open top valve to releave nitrogen pressure in cyclopentane tank.
- 3.2 Disconnect pipe to cyclopentane filter and connect discharge pipe to container.
- 3.3 Remove metal guard in front of nitrogen control valve at base of eco mix.
- 3.4 Open safety valve feeding cyclopentane pump no. 3. This will open valve and allow cyclopentane to flow into container.
- 3.5 When completed close safety valve feeding cyclopentane pump to stop cyclopentane flow.
- 3.6 Open nitrogen valve at bottom of exhaust pipe and close top valve.
- 3.7 Disconnect discharge pipe.

4. Removal of excess polyol plus cyclopentane from ecodosing

- 4.1 Connect discharge hose to poloyl and cyclopentane filter and container.
- 4.2 Open manual valve on polyol and cyclopentane filter.
- 4.3 Open safety valve feeding polyol and cyclopentane section 3 to start off-loading polyol and cyclopentane.
- 4.4 When completed close polyol and cyclopentane suction valve no. 3 to stop off-loading polyol and cyclopentane.
- 4.5 Disconnect discharge pipe.

cont'd...3.



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29 March, 2001

Training for removing excess material in system.

5. Removal of excess isocyanate

- 5.1 Connect discharge hose to isocyanate filter and container.
- 5.2 Open manual valve on isocyanate filter.
- 5.3 Open safety valve for isocyanate suction pump no. 5 to off-load isocyanate.
- 5.4 When completed close safety valve for isocyanate suction pump n. 5. It may be necessary to increase nitrogen pressure to remove isocyanate at bottom of tank.
- 5.5 Disconnect discharge pipe.

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G.R.L.  
ANA REFRIGERATION LTD.  
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*[Signature]*

X PERROS  
*[Signature]*  
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## **-INSTRUCTIONS FOR LOADING CYCLOPENTANE**

**Ensure Ecomix and Ecodosing Machines are switched off**  
**Calculate the empty space inside the tank (read measuring device)**

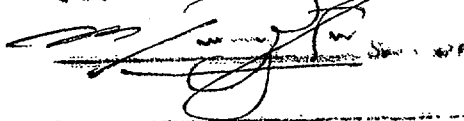
- 1- Put the drum on the grill in a vertical position
- 2- Open valve DN 40 (manual) for the release of Pentane gas and NITROGEN mixed.
- 3- Open Valve G ½" PN 500 in the same position to release pentane gas and Nitrogen to the atmosphere through the exhaust pipe.
- 4- Ensure the black arrow on the pressure valve for the tanker is zero, that is pentane gas and nitrogen pressure in tank is zero.
- 5- Open the valve (manual) DN 50 for intake of CYCLOPENTANE
- 6- Close pressure release valve Mentioned in 3 of instructions.
- 7- Position Capitano pump inside the Cyclopentane drum.
- 8- Disconnect flex pipe DN 12 from flex pipe DN25
- 9- Connect pipe Flex DN 25 to pump Capitano
- 10- Connect flex pipe DN 12 to CYCLOPENTANE drum (small end)
- 11- Connect Earth clamp to EDGE of the drum.

### **CONTROL PANEL ROOM**

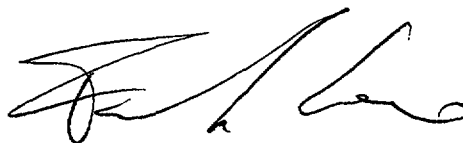
- 1- Enter Control panel room and push Nitrogen By pass button. If on, it will switch off.
- 2- Switch on Control Panel using Main switch. Control Panel will Display in EMERGENCY, press EMERGENCY RESET BUTTON and Emergency Red Light will switch off.
- 3- Start Loading CYCLOPENTANE by turning key clockwise in pentane loading switch.
- 4- After loading is completed turn Pentane loading key Anticlockwise to off position.
- 5- Return to loading Area and Close Valve Manual DN 40 and DN 50
- 6- Disconnect flex pipe DN 25 and Flex Pipe DN 12
- 7- Connect Both ends of Pipe DN25 and DN 12 using Coupling.
- 8- Remove the Capitano pump from drum and store in safety Box
- 9- Remove Earth Clamp from Drum and store in safety box
- 10- Open the Nitrogen Valve (manual) DN 32 on Tanker to Load Nitrogen into Pentane tank to a Pressure of 1 bar. When the Pressure on the pressure release Valve is between the TWO RED INDICATORS NITROGEN PRESSURE IS OK

N.B Do Not Load in excess of 80%CYCLOPENTANE inside the tank.

GUYANA REFRIGERATORS LTD.



Managing Director





# Guyana refrigerators Ltd.

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MAB:as/GRL

2 April, 2001

## Training

During the training period, March 26 to April 2, 2001, the following areas were covered by Mr. R. Franchino and Mr. C. Trezz.

1. Loading of cyclopentane from drums into cyclopentane tank.
2. Loading of pure polyol from drum into polyol tank.
3. Loading of polyol and cyclopentane into ECO mix.
4. Loading of isocyanate from drums into ECO-dosing.
5. Colour coding of pipe network system for pure polyol, polyol and cyclopentane, isocyanate, nitrogen and water.
6. Connecting/disconnecting and loading of nitrogen into system.
7. Instructions for -
  - 7.1 operating ECO-mix
  - 7.2 operating ECO-dosing
  - 7.3 calibrating system
  - 7.4 pouring head 1 - door
  - 7.5 pouring head 2 - cabinet

cont'd...2.

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Training  
2.-----

7. Instructions for cont'd.

- 5.2/ 7.6 pouring into cabinet including opening of jigs after pouring.
- 7.7 safety panels -
- 7.7.1 gas detection system
  - 7.7.2 thermal alarm
  - 7.7.3 flame alarm
  - 7.7.4 extraction from alarm system
- 7.8 removal of excess material in system
- 7.9 machine down-time instruction
- 7.10 starting machine in the morning before work and shut down at the end of the day.
8. Electrical supply system for Guyana integrated into electrical system for Perros.
9. Electrical signal input/output to ECO-mix and ECO-dosing.
10. Resistance element for fixtures control for systems FIX 1, FIX 2, FIX 3.
11. Main power distribution network from 440VAC to 24 VDC.
12. Electrical switching systems for ECO-mix, ECO-dosing and security panel and pentane.
13. Electrical system for gas alarm and notifier for flame and thermal.
14. Safety panel clamp systems for gas and flame.
15. Back-up system for security panel.
16. Electrical back-up system for generator when main power supply is off.
19. Main and submenu input data for ECO-mix and ECO-dosing.

cont'd...3.

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2 April, 2001  
Training  
3.-----

The training system and instruction procedure done by Perros Technicians were detailed and we fully understand all instructions and safety operating systems explained by the Technicians.

Guyana Refrigerators Limited  
GUYANA REFRIGERATORS LTD.

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*Mohamed Zussil*  
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*[Signature]*  
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*H. Jawahar*  
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Perros, S.P.A.

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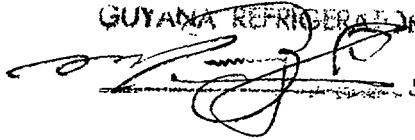
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## MACHINE DOWN TIME INSTRUCTION

If the foaming machine is out of production for the supply of raw materials, follow the following instruction:

- Start and run the entire machine ( eco-mix and ecodosing) including the stirrer for the polyol + c.pentane tank, following the start up procedure.
- 
- Ensure the materials are circulated in the entire system for 30 mins
- 
- Pour a bag shot through one mixing head every 2 days and remember to lubricate the piston with mesamoll.
- 
- If the down time will be greater than one month, it will be advisable to remove all materials from the entire system and load mesamoll lubrication in the system.
- 
- Follow the REMOVAL OF EXCESS MATERIAL INSTRUCTION to offload all material from the entire system and follow the loading procedure for the mesamoll.
- 
- Before loading new material, remove all mesamoll from system.
- 
- It is important to remove all foaming material from the entire system for long delays to avoid damaging the entire foaming machine.
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GUYANA REFRIGERATORS LTD.

  
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14/11/2018



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