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22 p. tables

Cannon polyuretane technology	DOC N.	CR98/104
	Object	Phasing out of CFC's at NRC/JORDAN
	Contract	UNIDO N. 97/098

COMMISSIONING REPORT

RETROFITTING OF THE REFRIGERATOR CABINET AND DOOR FOAMING PLANTS FOR THE REPLACEMENT OF CFC WITH CYCLOPENTANE AS BLOWING AGENT

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C					
B					
A	04/12/98	FIRST ISSUE	M. BARALE		
Rev.	Date	Description	Prepared	Controll.	Approv.

Cannon polyuretane technology	DOC N. ·	CR98/104
	Object	Phasing out of CFC's at NRC/JORDAN
	Contract	UNIDO N. 97/098

1. INTRODUCTION

After the installation phase, completed in October , and after the TUV inspections, carried out in July and October the Contractor has performed the Commissioning and Training on the job phases of the modified plant in accordance with the contract n. 97/098 .

On December 3rd the above mentioned phases have been completed .

Here below it is briefly summarised the work performed under the Contract up to the Commissioning phase.

The Contractor's actions basically concerned the following zone of the modified plant:

- **Cyclopentane storage tank area**
- **Wet area**
- **Process fluid connection piping between wet and dry area**
- **Cabinets /doors foaming area**

2. CYCLOPENTANE STORAGE TANK AREA

- Installation of the C5 storage tank, assembly of the accessory parts and connection of the electrical / pneumatic parts
- Assembly of the C5 piping between C5 storage tank and the the wet area
- Pneumatic and Electric circuit check
- Grounding check
- Flushing of the tank and the piping with nitrogen
- Pressure test of the C5 piping
- Check of the operating sequences (blank test on work/filling/depressurization cycles)
- Tank pressurization

3 WET AREA

- Installation of the cyclopentane/polyol premix and dosing unit.
- Installation of the fan over the box of the premix / dosing unit.
- Installation of the gas sensors.
- Installation of the isocyanate dosing unit
- Assembly of the accessory parts and connection of the electrical and pneumatic part.
- Connection of the machines with the mixing heads (see point n.4).
- Pneumatic and electric circuit check.
- Hydraulic circuit check
- Grounding check.
- Settings of start-up parameters (temperature, pressure etc.)
- Operating test : blank test on machine and safeties
- Filling the tanks
- Service simulation test (dry cycle)
- Pumps adjusting and checking
- Turning on the machine

4. PROCESS FLUID CONNECTION PIPING BETEWEEN WET AND DRY AREA

- Installation of the poliol/isocyanate/oil /nitrogen piping
- Flushing of the piping with nitrogen
- Pressure test of the piping
- Operating test

5. CABINET/DOOR FOAMING AREA

- Installation of the foaming heads, assembly of the accessory parts and connection of the electrical / pneumatic parts
- Installation of the fans
- Installation of the gas sensor
- Pneumatic, electric and hydraulic circuit check
- Grounding check
- Ventilation circuit check
- Gas detection circuit check
- Setting of start-up parameters
- Operating test: blank test on heads, foaming fixtures and safeties

6. RESULTS

All the commissioning have been successful and have met the requirements of the Contract and of the Counterpart.

national refrigeration company
الشركة الوطنية للتبريد NRC

Paid up Capital 500,000 Jo. Dinars
Bankers : Union Bank for Savings and Investment

Phone (962/6) 794634 / 790805 -Fax. 791845
Tlx. 21581 NRC-Jo Jordan - Amman - P.O. Box 2813

Our Ref. : اشارتنا
Date : التاريخ
Subject : الموضوع

REPORT

FIRST PARTY: CANNON BONO
SECOND PARTY: NATIONAL REFRIGERATION

On Thursday Dec 3,1998 Cannon technicians finished the commissioning of A100 foaming machine. Commissiong included loading raw polyol and iso material in the machine.
Due to the delay of supply of generator, startup and trial foam injection cannot occur before commissiong of standby generator. Startup at the A100 foaming machine will be as soon as possible and not later than Feb 1999.
Both parties agree at the above and that

1. Mechanical warranty of the machine as reffed to in paragraph 3.11 of contract 97/098 (project MP\JOR\94\419) shall be effective starting the date of machine startup, and not the commissiong date.
2. Also the Correction of defictive work as reffered to in parargraph 3.12 of contract 97/098 shall be effective starting the startup date in Feb 1999.
3. Instead of Communication \ Calibration unit, Bono will supply portable gas detector before start up
4. Before start up, Bono will supply a suitable 1" capacity pnuematic pump for raw ploy ol. The original raw polyol pump was not suitable for high viscosity raw plyol, but will be used instead for loading C5 tank. Original C5 loading gun pump will shipped back to Bono
5. Bono has only supplied part of spare parts. Remaining spare parts list have to be agreed upon.

Agreed upon in Amman Dec 3, 1998

Cannon Bono

National Refrigeration Co

TÜV
ANLAGEN UND UMWELT

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K:\AW\RICHARDT\98_DATEN\UNIDO\JORDAN\BR-UNIDO_MALAYERI.DOC

Jordan Projects NRC and MEC

Dear Mr. Malayeri,

attached I send to your information the Final Commission-lists

- NRC-JO/03/98 Revision 2 and

- MEC-JO/03/98 Revision 2

from our inspections made for Cannon Afros/Bono Sistemi.

The X for the responsibilities are mostly agreed during our inspections with both parties. Some pending points could not be agreed with both parties because the reports were not finish during the inspection. So take this only as a help or suggest but it is not our business to fix this finally.

Cannon Afros / Bono Sistemi has done a good job, that stands for the plant and for the documentation and therefore in our opinion an additonal inspection to test the last pending points is not necessary.

To close these matters finally the last pending points in the Commission lists must be realised as soon as possible and confirmed by Bone Sistemi in agreement with the companies.

After we got that confirmation we will issue one certificate for each factory.

Thank you very much for your cooperation.

With kind regards

K-J Richardt

TÜV
ANLAGEN UND UMWELT

Final Commission-List

on Technical Plant Inspections and Evaluations

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File No. NRC-JO/03/98
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AN\MEC\NRC_FINALCOM3.DOC

Plant Location:	National Refrigeration Co. Amman 11181 JORDAN
Responsible / Experts:	Richardt, Karl-Josef TÜV-AW Berger, Hans-Joachim TÜV-BT-E Companygroup TÜV Süddeutschland
Project	UNIDO Contract No. 97 / 098 with BONO SISTEMI Order No.: 98 024 3220-1 and 98 025 3126-1
Dates:	July 1998 - Preinspection Oktober 1998 - Final Plant inspections and evaluations on location August1998 - Preparation of commission list - Meeting on Bono Sistemi October 1998 - Preparation of final commission list
Participants on location:	- Mrs. Barale - Bono Sistemi - Mr. Pulici - Cannon Afros - Mr. Guerra - Cannon Afros - Mr. Hosam Hafez - NRC - Mr. Hasan Hafez - NRC

	Responsible		
	Bon	NRC	Remark (Oktober 1998)
0 Preliminary Remarks			
Following commission list is the result of the Preinspection of July 1998 and has been updated after the final inspection of October 1998			
The remarks after the final inspection are in the right column.			
1.1 Unloading station / pentane storage tank			
1.1 Unloading station			
1.1.1 Basin			
The place where the drums will be unloaded must be constructed as follows:			
a) The place must be designed as a basin with a capacity of min 0.2 m^3.	-	-	Has been done
		X	The metal grill must be grounded
b) The floor must be tight against pentane (concrete), cracks must be less than 0,1 mm wide.		X	The area around the basin must be completed (area on the same-high)
c) Drain trays for rain water are not existing inside the basin.	X		
1.1.2 Filling Pump			
a) The existing pump needs a suitable connection to the drum	-	-	NEC got a drawing from Bono must be done
b) The pump must be included in the switch-off-system of max. and supermax level	-	-	has been done
c) The clamp for earthing the drums is still missing. The existing clamp is only suitable with the particular drum	-	-	has been done
d) The flexible filling pipe and gas return line are still missing		x	the existing lines are not suitable New lines are needed and must be accepted by TÜV
e) The connection from the filling pipe and the gas return line must be different.	-	-	has been done

	Responsible		
	Bon	NRC	Remark (Oktober 1998)
1.2 Pentane storage tanks			
1.2.1 Basin			
a) The cables of the earthing system must be fixed finally.	-	X	Has been done mast be cleaned
1.2.2. Tank			
a) The tank must be fixed on the floor	-	-	Must be done (presently only one screw is used)
b) The correct tank plate is still missing		X	was shipped by Bono Must be fixed by NRC
1.2.3 Pipe			
a) - the valve (automatic fire safe valve) in the pipe before the building is a return spring valve. It must be fail safe.	-	-	Has been done
- The valve should be protected against high temperature of sunshine	-	-	Has been done
- For a final evaluation concerning leakage proof the specification is necessary	-	-	Has been done
- The pressure test and test of tightness must be confirmed	X		is needed
b) The c-5 line must be protected against rust		X	must be done
c) The discharge line in the c-5 line to empty the pipe, must be installed over the basin.		X	must be done
d) Relief pipe of safety reliefe valve		X	must go over the roof (presently the end is in front of a window)
e) Some screws are to short. The screw must fill the whole tread of an flange or a nut.	X		must be changed

	Responsible		
	Bon	NRC	Remark (Oktober 1998)
1.2.4 Roof			
a) The roof for the c-5 tank and for the control panel must be in that way that the tank and the panel are protected against the direct sunshine.	-	-	Has been done
1.2.5 Fireprotection			
a) 5 m around the tank no flammable material must be stored		X	must be done always
1.2.5 Labels:			
All electrical and mechanical devices must be marked according to the drawing.	-	-	Has been done
1.2.6 Control panel			
a) The current supply for the control panel should come from the alarm panel, otherwise a overvoltage protection for this panel is necessary.	-	-	An overvoltage protection has been installed
b) The electrical devices must be identified in accordance with the plans.	-	-	Has been done
c) The hand-/ automatic-switches of the pneumatic valves must be secured against unauthorised handling. The switch must be covered additional and a following label is necessary: „Attention, safety equipment. Changes are only allowed by authorised persons.	-	-	an special cover has been installed
d) lamp test	X		A system to check the signal lamps will be installed
1.2.7 Emergency switch The emergency switch must be installed inside the C-5 area.	X		An electrical system using an EEx-i-barriere must be installed Functions will be the same as for all emergency switches (1st level) Signal will go to safety panel and from there to remote panel

	Responsible		
	Bon	NRC	Remark (Oktober 1998)
1.3 Fire fighting / detection system			
The tank is protected by a sprinkler in case of a fire from outside.	-	-	The system is installed and the function has been tested. The water comes from a tank on the roof. The static pressure ist high enough to supply the sprinkler in case the pump will not run.
	-	X	The pressure different switch starts pump and must give an alarm
1.4. Organisation			
a) The operator instruction of the unloading process is missing		x	must be done
b) The warning signs(Ex-area, no smoking, inflammable liquid, c-5-safety datasheet)		x	must be installed
c) The operator instructions of the handling for the empty drums is missing		x	must be done
1.5 Grounding system			
a) The cables of the earthing system must be fixed finally.	-	-	has been done
b) The c-5 pipe must be earthed each 20 m	-	-	has been done
c) It is not allowed to lay the equalisation rope in an plastic pipe inside the earth.	-	-	The plastic pipes has been removed The resistance is correct.
d) The connections must be suitable.	-	-	Has been done

	Responsible		
	Bon	NRC	Remark (Oktober 1998)
2 Wet-part for door and cabinet			
2.1 Equipment			
a) High pressure pump Following proof according to high pressure is necessary:	-	-	The pressure gauge is only adjustable till 300 bar (inside a stoppage has been installed)
How much is the max. pressure of the pump? The pump hasn't inside a overflow valve to limit the pressure?	x		A label with the setpoint will be fixed during the start up.
Remark: The pressure gauge after the high pressure pump is adjustable till 400 bar. The system is designed for max 300 bar.		X	The operator will get instructions about the system
b) Control panel The wires and clamps of the EEx-i electric circuits are not installed separately from the other wires. The wire will be installed in a separate channel or protection pipe which are marked	X		must be done
c) Thermostat The thermostat of the tank-heater must get a safety label with hte set point.	X		The setpoint will be marked
d) Penta twin The valve in the outgoing pipe of the daytank must be fail safe.(presently it is used for both direction by air)	-		has been done
2.2 Enclosure			
a) Electrostatic The transparent plasticmaterial can get a too high electrostatic charge (plain window: 350KV/m; ripped window: >3000 KV/m) Suggest: On the inner side of the windows should be mounted a grounded metal screen.	-	-	has been done
b) Remark Hight of enclosure The uper parts of the devices are bad accessible to maintenance and regularly checks.	-	-	is acceptable but must be changed for further projects

	Responsible		
	Bon	NRC	Remark (Oktober 1998)
2.3 Pentan emergency push button In the wet part area should be installed a pentan emergency push button.	-	-	Has been done
2.4 On the junction box outside the enclosure the number according the drawing is missing.	x		must be done
2.5 The thermostat of the tank-heater must get a safety label.	X		setpoint will be marked
3. Dry Part			
3.1 General			
a) Electrical resistance of the floor	-	-	The results of the measurements for the resistance are < 10^8 Ohm
b) Enclosure The transparent plasticmaterial must be measured	-	-	has been done
c) Junction boxes On the junction boxes the numbers according the drawing are missing.	X		must be done
3.2, Heating system It is not clear which jigs and moulds will be used in future.		X a)	The existing jigs use an electrical heating system which is not suitable for using pentane. This was discussed with the responsible managers from NRC. There are three possibilities: 1. Using hot water For some of the existing jigs it would be a very good system. 2. NRC need the heating system only in the very cold month and it should be tested wether it is enough when the heater works before the production starts. The jigs and moulds will get an thermoregulator and safety thermostat. During the production the heaters are off via a safe system.

	Responsible		
	Bon	NRC	Remark (Oktober 1998)
			3. NRC will change all existing heaters against a suitable tight system. It will be equiped with thermoregulator and safety thermostat. The temperature of the surface must be limited for any case. The system will be switched off via the gas alarm system a safe way (ohne failure safe hardware). The production with pentane can not start before this problem is solved.
3.3 Ventilation During the foaming process gas can be collected inside the jig.	X	X	The ventilation must be in a way that no gas can be over some time inside the jigs. An exhausting duct of the ventilation system must be installed over the jigs. Or a system with blowing air.

	Responsible		
	Bon	NRC	Remark (Oktober 1998)
4. Safety panel			
a) The supply of the electrical power is not sufficient.		X	Presently NRC used only electrical power from an intern power generator in the factory. If the production don't run the generators off. In that time the safety system is also off. (e.g. during each break)
		X	This system is not acceptable. The factory needs an second power supply (by an stand by generator which switched on automatically or a connection to the town power supply and the generator will be changed to a back up generator.
b) Type plate The typplate of the panelmaker is missing	X		is available but must be fasten
c) Overvoltage No overvoltage protection has been provided.			has been done
d) Batterie The capacity of the batterie is dimentioned approximitely for 10 min. This is only possible when the normal power supply for the safety panel is interrupt und in this case the backup generator starts automatically.	X		The designed system is correct, but a backup generator was not available.
The type plate of the battery is missing. (Capacity, data of first charging, type)			is available
e) The electricel drawing must be brought up to date.	X		must be done, latest direct after the start up
f) Transformer T 40 and 24-DC The minus-wire of the secondary circuit is not grounded.			has been done

	Responsible		
	Bon	NRC	Remark (Oktober 1998)
g) Gasmonitoring system The center of the gasalarm system has not been labeled concerning the sensor position.	X		must be done
h) Pilz safety relais On the clamp with the ground sign has no ground wire connected. (Final evaluation after documentation is available)	-	-	DC has been used according to the documentation the installation is correct.
i) Timer relais The setpoints of the relais of alarmlevel increasing must be documented and marked.	X	-	All time relais must be marked during the start up.
j) Alarm defination The color and the sound of the different alarmlevels have to be defined and marked on a bourd near the safety panel.	-	-	Has been done
	-		
k) For some connections clamps the numers according the drawing are missing.	-	-	has been done
l) For the acoustic alarm signal (sirene, horn) should have a possibility for reset.l)	-	-	has been done

	Responsible		
	Bon	NRC	Remark (Oktober 1998)
5. Ventilation			
a) Flow sensor The different pressure for all flowswitches must be measured. According to the result the right spring must be installed and the system has to be adjusted. The result must be documented. All flow switches must be marked according the electrical diagram.	-	-	has been done The pipes between duct and flow-switch are very long, the syste, must be adjusted again during the start up phase.
b) Earthing The ducts must get a ground connections to the metal construction of the building near the roof (lighthing protection).	-	-	Has been done
c) Compensators The compensators between the ducts must be briged with wires.		X	must be done
d) The flow switches must get a number according the drawing.	-	-	must be done

	Responsible		
	Bon	NRC	Remark (Oktober 1998)
6. Inertisation			
a) Remark:The Nitrogen system must be investigated.	-	-	The generator was in function. The min working pressure was 6 bar.
b) After the system is finished the O2-concentration should be measured inside the cabinets.	X	-	The 0_2 concentration was during the test 5.1 %. The system can be optimised if the N_2 amount must be reduced.
c) The position control sensor has not been installed.		X	Not installed
d) The system must be calibrated regularly. For that reason suitable plastic bags must be available.	X	X	This must be done regularly.
e) The amount of N_2 can be changed via the PLC	X		Only a special educated maintenance worker is it alowed to charge the system. A special password will be used.

CANNON

GROUP

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Peschiera Borromeo, 14.12.1998

TUV SUDDEUTSCHLAND
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BENZSTRAβE 17
D-89079 ULM
GERMANY
To MR RICHARDT

Subj.:-UNIDO CONTRACT N. 97/098 (NRC JORDAN)

Dear Sir,
With reference to the Final Commission list on Technical Plant Inspection and Evaluations at National Refrigeration Company with the present letter we inform you that :
The remarks written in the list has been fulfilled.
The point still opens are the following:
1.1.2.c)
1.2.3.d)
1.4. b)
1.4. c)
3.3
4 d) Back up generator has been installed but not tested by NRC yet
7.7
NOTE: THE START-UP OF THE PLANT WILL BE DONE AFTER THE FULFILLMENT OF POINTS 3.3 AND 4D) BY NRC

Best regards.

BONO SISTEMI
M. BARALE