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Report No. 3 SAFETY INSPECTION OF R 600a CHARGING STATION

Project: – MOGANSHAN
Isobutane-Charging Plants

Bau und Betrieb

Plant Location: Moganshan Electric Appliances Co.,
(Zhongke Life Science & Technology Co.,Ltd)
No. 88 Zhiyuan Road Wukang Town
Deqing County / Zhejiang Province
P.R. China

Niederlassung Ulm

Plants: Isobutane-Charging Plants for the production
of refrigerators (Project/Step 1)
Workshop 2 and 4

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Engineering and Manufacturer of the Plants:
1. A'GRAMKOW, Denmark
2. Moganshan, Company , P.R. China

Ulm, 30 March 2003
TÜV-BB-Ulm//RI-Ma-Li
UNI-AGR-Mog-PRC-01-03-rep3

Check-type: Plant inspection in Moganshan

The document contains:
25 Pages

UNIDO-project MP/CPR/99/166

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HRB 96 869

Dates:
• September 27th, 2002 - plant check on site
• October 12th, 2002 - Report
• December 10th, 2002 - inspection of pending points on site

File-No.:
UNI/AGR/MOG-PRC/02/03

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- Mr. Wang Shouguo Moganshan
Report is sent to:
- Dr. Grof UNIDO
- Mr. Soerensen A'Gramkow



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1. Preliminary remark

The MOGANSHAN company is going to use Isobutane as cooling agent for the production of refrigerators.

As Isobutane is a flammable liquid gas safety technical measures against a possible fire- and explosion danger have to be regarded and realized when this gas is used.

UNIDO engaged TÜV Süddeutschland, branch Ulm, to carry out a safety technical evaluation and check of the Isobutane Charging Plants at the Moganshan Company.

The whole TÜV-check of the Isobutane Charging Plants has been carried out divided into the following partial checks:

– 1st Partial Check:

- Safety technical evaluation of the draft documentation of the Isobutane Charging Station made by A`Gramkow.
- The result of this evaluation is contained in the „Report No 1, Safety Technical Plant Pre-inspection“, File No.: UNI/AGR-PRC/01/01, date July 17th, 2001.

– 2nd Partial Check:

- Coordination and fixing of solutions of problems with A`Gramkow, which have been assessed in the 1st partial check.

– 3rd Partial Check:

- TÜV-check, which has been carried out on location, it contained all the Isobutane (HC)-Charging-Plants consisting of HC-Supply and HC-Charging Stations, safety-technical evaluation of the plant-peripherals and evaluation of safety relevant aspects of organizational matters.
- Other technical equipment not being of any safety-relevance to the HC-plants are not part of this check.
- The result is contained in the „ Report No 2, Report of a Safety Technical Plant Inspection“, File No.: UNI/AGR/Mog-PRC/02/02, date 22 October, 2002

– 4th Final Check

- The deficiencies mentioned in Report File No.: UNI/AGR/Mog-PRC/02/02, have been checked during a visit in Moganshan again. The missing informations related the plant were discussed during a visit on A`Gramkow workshop in March 2003.

The TÜV-report at hand is only valid specifically for the mentioned HC-plants at MOGANSHAN company related to Project No. 1.

The extensions of i-Butane step 2 have not been on site complete and were not part of this check. The existing parts as repair station in workshop 4 has been monitored too and are mentioned in this report.



2. Checking principles

2.1 Applicable regulations

- EG directive 94/9/EG (Atex 100 a)
- EN 1127-1 Explosion protection, Fundamentals and Methods
- European Pressure Vessel Directive
- Electrotechnical regulations: International: IEC / European: EN / National: DIN VDE e.g.
IEC 60073, IEC 439-1/A2, IEC 204-1, IEC 1210-2, EN 50054, EN 50054, EN 50013, EN 50020, EN 50081, EN 60529, pr. EN 1050, DIN VDE 0165, EN 349, EN 418, EN 294, EN 954-1
- Fundamental safety aspects to be considered for measurement and control equipment: - Germany: DIN V 19250
- Safety requirements for automated manufacturing systems:
Germany VDI 2854
- Personal protection regulations / accidents prevention
European: EN...EC / Germany: UVV/ZH, e.g.
VBG 1, VBG 5, VBG 20, VBG 21, VBG 61, ZH 1/200, ZH 1/255, ZH 1/8, ZH 1/10, ZH 1/134, ZH 1/455
- Technical regulations for combustible liquids and for gases: Germany TRF / TRG e.g.
TRF 1996 / TRG 280
- Technical regulations for ventilators in ex-zones: Ex-proof / spark-proof for ventilators:
Germany VDMA 23169 Part 1
- Homologation of technical plant and equipment - European: conformity certificates (e.g. PTB, Cesi)
- EN 378, Refrigerating systems and heat pumps, Safety and environmental requirements
- EG machine directive (89/392/EEG, revised edition 91/368/EEC)
- IEC 79-10/EN 60079-10/VDE 0165 Part 101: Electrical apparatus for explosive gas atmospheres - classification of hazardous areas
- IEC/EN/DIN VDE Standards: especially DIN 31000 / VDE 1000, DIN VDE 0116, DIN 57 165 / VDE 0165, EN DIN 50014 / VDE 0170/0171.



2.2 Applicable documentation

Basis for the report at hand was following documentation, which were available on site.

- P-I diagram Max 95 F-1,
- P-I diagram RSS HC supply,
- electrical diagram of Max 95 F-1,
- electrical diagram of SAFE 5, drawing number
- electrical diagram of R 600 supply pump, drawing number
- Specifications which were related to above mentioned plants



3. Check extent

3.1 In general

The TÜV-check, that has been carried out, contains the checking and evaluation of the safety-relevant requirements for securing the safety-measurements against fire- and explosion danger of Moganshan project step 1.

Those are in detail:

- Pressure-, -technical and electrotechnic checks and measurements on the plants for HC-supply and HC-charging.
- Check and evaluation of general safety technical measures on the plants for HC-supply and HC-charging.
- Check and evaluation of the safety relevant surrounding of HC-supply and HC-charging.
- Evaluation of safety-relevant organizational measures.
- The check of all safety-relevant aspects in accordance with the requirement of the „Report No 1, Safety Technical Plant Pre-inspection“, File No.: UNI/AGR-PRC/01/01, date July 17th, 2001.

3.2 Plant-specific check included

Following plants, respectively plant-sections are part of this TÜV-check:

- isobutane supply station including room for 3 x 100 cylinders i-Butane and room with A'Gramkow supply station.
- isobutane charging station on refrigerator line in workshop 2
- isobutane charging station on refrigerator line in workshop 4
- repair place for refrigerators with isobutene in workshop 4 – is part of Moganshan Isobutane Project 2

3.3 Not part of the TÜV-check

Following checks and evaluations are not part of this TÜV-check:

- the refrigerators in regard of suitability for Isobutane

- the modifications in using refrigerators with Isobutane as cooling-agent. (e.g. operator manual, requirements for repairs).
- The repair place in workshop 2 (not installed, is step 2)
- All parts which are related to Moganshan i-Butan project step 2

4. Short description of the HC-plants

4.1 HC-storing- / HC-providing and supply-area

a) General:

A storage room for i - Butane is presently not available.
There is only a providing room which contains 2 cylinders – connected to the supply station and additional one cylinder as spare.

In the next room the A'Gramkow supply station is situated.

The complete supply station is located in separate rooms separated from the workshop.

Both rooms are ventilated. The room with the cylinders is equipped with a gas sensor as well as the pump station.

The Isobutane-supply of the HC-charging stations is starting at the pump-station via a rigid pipe.

b) Data of the technical equipment of providing and supply area:

- HC-pump-station:

Producer:	A'Gramkow
Series no.:	182 000 46 – 82 702
Manufactured:	08.05.2002
Refrigerant supply:	R 600a
Working pressure:	19 bar,
Design pressure:	21 bar
Electrical control panel:	AX2

- HC-cylinders:

Producer:	Chinese standard type
Volume:	max 100 Kg
Design pressure:	15,6 bar

4.2 HC-charging stations

a) General

On the refrigerator lines workshop 2 and workshop 4 there are each one HC-charging stations, produced by A'Gramkow.

The cooling-circuits of the refrigerators are evacuated by this charging station and filled with Isobutane.

After the HC-charging process the cooling circuits will be closed by an ultrasonic-system.

The HC-charging station and the HC-charging place are equipped with a technical ventilation system and an automatic gas-detector-system.

On the HC-charging station of both lines a 10 litre accumulator with bubble is installed after the transmission pipe.

b) Dates of the HC-charging station workshop 2 and 4:

– HC-charging station	Workshop 2
Producer:	A'Gramkow, Type max 95 F-1
Serial-No	17 200 216 – 82 703
Manufactured	08.05.2002
Supply	R 600a
Supply pressure	16 bar
Design pressure	25 bar
– HC-charging station	Workshop 4
Producer:	A'Gramkow, Type max 95 F-1
Serial-No	17 200 214 – 82 703
Manufactured	08.05.2002
Supply	R 600a
Supply pressure	16 bar
Design pressure	25 bar

4.3 Repair place for refrigerators with HC workshop 4

The repair place isn't contained in the UNIDO isobutene project No 1. But the most parts were installed and therefore TÜV has monitored the existing parts.

The repair place is installed in the same way as the filling stations. It is equipped with a ventilation system as well as with a gas sensor and additional with a explosion proof vacuum pump.

Dates of the HC-charging station at repair place workshop 4:

– HC-charging station	Workshop 4
Producer:	A'Gramkow, Type max 95 F-1
Serial-No	17 200 215 – 82 703
Manufactured	08.05.2002
Supply	R 600a
Supply pressure	16 bar
Design pressure	25 bar



5. Inspection

- Measurements and function tests -

	Plant-components/ Measurement / Function test	Result of measurement	Function conforming to safety strategy		Remarks
			yes	no	
1	<u>HC-Providing room</u>				
	a. Automatic shut down valves after cylinders		x		
	b. Valves connected to all safety panels of all work- shops		x		
	c. Measurement		x		
	– electrical resistance of the floor	< 10 kOhm	x		
	– ground resistance / lightning protection	< 0,8 Ohm	x		
	– resistance of grounding/ potential equalisation	< 0,3 Ohm	x		
	– effectiveness of ventilation (test fog)		x		
	d. Fire protected room/fire fight- ing system		x		
2.	<u>HC-supply-Station</u>				
	a. Function-coupling with safety monitoring panel		x		
	b. Remote panel		x		
	c. Emergency push button		x		
	d. HC Unit				
	– Pressure difference switch / Monitoring of ventilation sys- tem		x		
	– Series function of Solenoid valves		x		



Plant-components/ Measurement / Function test	Result of measurement	Function conforming to safety strategy		Remarks
		yes	no	
- Emergency push button		x		
- Safety relief valve		x		
- Monitoring of compresses air		x		
e. Monitoring of ventilation before fan		x		
f. Safety relief valve in pipe		x		
g. Measurement				
- electrical resistance of the floor	≤ 10 kOhm	x		
- ground resistance / Lightning protection	0,8 Ohm	x		
- resistance of grounding/ potential equalisation	general ≤ 0,3 ohm	x		
- electrostatic conductivity		x		
- effectiveness of ventilation (test fog)	o.K.	x		
- Ventilation: air speed before fan		x		
• Speed V ₁	8,8 m/s	x		
• Speed V ₂	13,0 m/s	x		
h. Gas monitoring				
- pre-alarm (15% LEL)		x		
- alarm (35 % LEL)		x		
Fault		x		
<u>HC-charging area-</u> Line workshop 2				



	Plant-components/ Measurement / Function test	Result of measurement	Function conforming to safety strategy		Remarks
			yes	no	
3.	<u>Line workshop 2</u>				
	a. Ventilation of Accumulator		x		
	b. safety relief valve between accumulator and valve charging station		x		
	c. Emergency push button		x		
	d. Gas monitoring				
	– pre-alarm (15% LEL)		x		
	– alarm (35 % LEL)		x		
	– fault		x		
	e. max 95 F-1 unit				
	– Different pressure switch / Monitoring of suction	20 Pa	x		
	– Emergency push button		x		
	– Safety relief valve		x		
	– Monitoring of compressed air		x		Presently provisionally supply
	– Switch for monitoring of pre- filled cooling circuit		x		
	– Grounding charging gun	> 2 MOhm	x		
	f. Safe 5+				
	– UPS / backup supply		x		
	– Overvoltage protection		x		
	– Overcurrent protection		x		
	g. Ventilation system				
	– effectiveness of ventila- tion (test fog)		x		
	– fan in antispark execu- tion		x		Ex-proof class C
	– monitoring of suction be- fore fan		x		



	Plant-components/ Measurement / Function test	Result of measurement	Function conforming to safety strategy		Remarks
			yes	no	
	<ul style="list-style-type: none"> - air speed <ul style="list-style-type: none"> • Speed V₁ • Speed V₂ - Function coupling ventilation to supply station 	7,7 m/s 10,3 m/s	x		
	h. Measurement				
	<ul style="list-style-type: none"> - electrical resistance of the floor - electrical resistance of grounding /potential equalization - electrostatic conductivity 	≤ 10 k ohm general: ≤ 0,3 ohm partly: >0,3 ohm	x		
	i. Remote panel		x		
4.	<u>HC-charging area- Line workshop 4</u>				
	a. Ventilation of Accumulator		x		
	b. safety relief valve between accumulator and valve charging station		x		
	c. Emergency push button		x		
	d. Gas monitoring				
	<ul style="list-style-type: none"> - pre-alarm (15% LEL) - alarm (35 % LEL) - fault 		x		
	e. max 95 F-1 unit				
	<ul style="list-style-type: none"> - Different pressure switch / Monitoring of suction - Emergency push button 	20 Pa	x		



	Plant-components/ Measurement / Function test	Result of measurement	Function conforming to safety strategy		Remarks
			yes	no	
	– Safety relief valve		x		Presently provisionally supply
	– Monitoring of compressed air		x		
	– Switch for monitoring of pre- filled cooling circuit		x		
	– Grounding charging gun	> 2 M Ohm	x		
	f. Safe 5+				
	– UPS / backup supply		x		
	– Overvoltage protection		x		
	– Overcurrent protection		x		
	g. Ventilation system				Ex-proof class C
	– effectiveness of ventila- tion (test fog)		x		
	– fan in antispark execu- tion		x		
	– monitoring of suction be- fore fan		x		
	– air speed				
	• Speed V ₁	6,4 m/s	x		
	• Speed V ₂	9,9 m/s	x		
	– Function coupling venti- lation to supply station		x		
			x		
	h. Measurement				
	– electrical resistance of the floor	≤ 10 k ohm	x		
	– electrical resistance of grounding /potential equalization	general: ≤ 0,3 ohm partly: >0,3 ohm	x		
	– electrostatic conductivity		x		
	i. Remote panel		x		



	Plant-components/ Measurement / Function test	Result of measurement	Function conforming to safety strategy		Remarks
			yes	no	
5.	<u>HC-repair area- Workshop 4</u>				
	a. Ventilation of Accumulator		x		
	b. safety relief valve between accumulator and valve charging station		x		
	c. Emergency push button		x		
	d. Gas monitoring				
	– pre-alarm (15% LEL)		x		
	– alarm (35 % LEL)		x		
	– fault		x		
	e. max 95 F-1 unit				
	– Different pressure switch / Monitoring of suction	20 Pa	x		
	– Emergency push button		x		
	– Safety relief valve		x		
	– Monitoring of compressed air		x		Presently provisionally supply
	– Switch for monitoring of pre- filled cooling circuit		x		
	– Grounding charging gun	0,1 MOhm	x		
	f. Safe 5+				
	– UPS / backup supply		x		
	– Overvoltage protection		x		
	– Overcurrent protection		x		
	g. Ventilation system				
	– effectiveness of ventila- tion (test fog)		x		



	Plant-components/ Measurement / Function test	Result of measurement	Function conforming to safety strategy		Remarks
			yes	no	
	h. Measurement				
	– electrical resistance of the floor	≤ 10 k ohm	x		
	– electrical resistance of grounding /potential equalization	general: ≤ 0,3 ohm	x		
	– electrostatic conductivity		x		
	– grounding of forceps to empty the cooling circuit		x		
	i. Remote panel		x		
	j. Trivac D16B - Ex				
	– Flame arrestors		x		
	– Grounding with refrigera- tors		x		
	– Overcurrent protection with EEx-e Motor		x		



	Responsible	
	A'Gram-kow	Mogan-shan
Documentation must be updated	able but must be supplied to TÜV	
k) Automatic valves in the outgoing pipes of i-butane cylinders: The type plates with the technical data are missing.	done	
6.1.2 HC-supply room		
a) The dumper in the ventilation channel must be bridged with a ground wire		done
b) Documentation of fan is missing		solved
c) Flexible pipes / hoses Some flexible pipes are electrostatically high chargeable and therefore not suitable. An exchange of these pipes is necessary. This affected following pipes / hoses: - relief pipe after supply system - relief pipe of safety relief valve pipe - ventilation hose between supply station and ventilation channel	done	
d) Butane pipe to the workshop:		done
1. The pipe must be supported additionally behind supply station over the street (angle and support)		done
2. Butane pipe The record about the carried out pressure test and the vacuum test must be submitted.		confirmed
3. Remark If the pipe is as long as in Moganshan it is sufficient to install additional an automatic shut off valve to close the pipe and reduce the amount of Butane in case of an emergency situation. This valve must be mounted before the i-butane pipe entered the workshop.		done
4. The pipe must be marked with the correct colour and arrow (in Moganshan: red/black) in sufficient distances (usually 2 m)		done
5. A'Gramkow will name the maximum distances of supports of the pipe in relation of the diameter	done	
6. Along the i-butane pipe between supply area and workshops about each 20 m a connection of the pipe to the earth system is necessary.		done
e) The gas sensor in the HC-supply unit must be fixed.	done	done
f) .HC-supply unit: The set point of the difference pressure switch for		done



8 Conclusion / Result of the inspection / tests

The HC charging and discharging stations and the HC-supply system at Moganshan were evaluated by the undersigned experts for observance of fire and explosion protection measures.

Measurements/tests in the supply and charging/discharging stations of A'Gramkow with the Safe 5+ safety supervision system were carried out by the undersigned experts on the premises of Moganshan.

Based on the visual inspections and functional tests carried out, the experts come to the conclusion that from a safety point of view the protective measures implemented for the avoidance of fire and explosion hazards reflect the state of the art.

The HC-supply/charging/discharging system as described and illustrated in the documentation meets the requirements of the applicable technical regulations..

The TÜV Süddeutschland BB-Ulm has issued a certificate for the inspected Isobutane-Charging Plant.

The Certificate with the No. TÜV-BB-UL 11 057 will expire on December 2005 or if the plant will not be run according to the regulations.

The experts

signed

E. Mack

signed

K.-J. Richardt

signed

A. Lips

7. Summary

7.1 Handling of the deficiencies and measures

- a. The detected deficiencies and required measures mentioned in chapter 6 were solved by either A Gramkow and Moganshan.
- b. The deficiencies of Report No 2, Report of a Safety Technical Plant Inspection“, File No.: UNI/AGR/Mog-PRC/02/02, date 22 October, 2002 were checked on 10 December 2002 again.
- c. The TÜV experts can issue the certificate after the successful inspection on site.

7.2 Some other regulations

- a. Validity of this report.
The carried out TÜV-inspection is valid till 30th December 2005.
- b. Information under the safety point of view:

During the validity of this TÜV inspection the supervision by the experts will be realised as follow:

- In case of special incidents and especially accidents (e.g. fire, explosion, human accident) the signed experts must be informed immediately.
 - The experts can receive the yearly safety record of the internal competent people (CP's) of MOGANSHAN.
- c. Special request:
The experts can visit the factory at any time e.g. on a request of UNIDO.

6.6. Further measures

6.6.1 TÜV report UNI/AGR/-PRC/01/01 must be taken into account

6.6.2 Power emergency supply

In connection with the TÜV inspection of the pentane foaming plants in Moganshan company solutions for a new electricity back up systems were decided.

The safety relevant equipments of the i-butane plants must be connected to this new system.

6.6.3 Safety related education

The education of the Moganshan-technicians and responsible persons related to the safety aspects by use of isobutene is still missing.

The education must be carried out and recorded.

6.6.4 Refrigerators / Cooling circuits

Remark

The technical evaluation of the refrigerators / cooling circuits which are foreseen for use of i-butane are not part of this TÜV inspection.

6.6.5 Safety related instructions

Instructions for operating and maintenance of the i-butane plants are still missing.

Responsible	
A Gram-kow	Moganshan
	done
	done
	done
	Must be updated regularly



Has not been part of the TÜV inspection

6.4 HC-charging station – workshop 4

6.4.1 General

All the points mentioned for workshop 2 Chapter 6.2.1 till 6.2.4 are valid too.

6.4.2. Additional

a) The function coupling from 35 % LEL alarm and the ventilation alarm to the HC-supply unit isn't realized.

6.5 HC-repair place – workshop 4

Remark:

This part belongs to step 2, but the existing part has been monitored during the inspection on site.

6.5.1 General

All the points mentioned for workshop 2 Chapter 6.2.1 till 6.2.4 are valid too.

6.5.2. Additional

- a) The pit (contains motor) at the right side of repair place must be cleaned and connected with the ventilation system
- b) Channel before accumulator must be filled with sand that no gas can go inside
- c) Motor for explosion proof pump:
 The power supply is not equipped with a correct over current protection
 The 40 A -fuse must be exchanged for a 16A-fuse and an automatic motor protection device with 2 A maximum must be installed.
- d) The flexible plastic hose, connected to the evacuation pump, isn't under the electrostatic point of view not suitable.
- e) Charging gun: the grounding resistance to the front part of the gun is too high (measured 0.5 M ohm).

Responsible	
A'Gram-kow	Mogan-shan

done

done



		Responsible	
		A'Gram-kow	Mogan-shan
	<p>“Caution ! i-Butane charging place” must be hanged up.</p> <p>j) Fire extinguisher: A fire extinguisher must be positioned near the HC charging place</p>		done
6.2.2	<p>Max 95-F</p> <p>a) The gas sensor within the max 95 must be fixed</p> <p>b) The set point of pressure switch must be marked</p> <p>c) Charging gun The front part of the gun is not grounded (resistance to high, measured 20 M ohm) A'Gramkow must investigate this problem in general too !</p>	done	
6.2.3	<p>Safe 5+</p> <p>a) There is no signal to an remote panel. A'Gramkow has the safe 5+ equipped with the needed contact</p> <p>b) The UPS for supply the SAFE 5+ has to be installed yet.</p> <p>c) The power supply for SAFE 5+ must be connected to the back up generator.</p> <p>d) A lamp in the surrounding of SAFE 5+ must be connected also to the back up generator.</p> <p>e) The cables which are used for connections of the gas sensors are blue now. Blue cables in connection with explosion technical state of affairs are only allowed for EEx-i circuits. The relevant circuits area not EEx-i circuits. This must be taken into account by future plants.</p>		done
6.2.4	<p>Ventilation system</p> <p>a. Control panel: The measures described in chap. 6.1.2 are valid also here.</p> <p>b. Difference pressure switch in the exhaust channel. The measure described in chap. 6.1.2 is valid also here.</p> <p>c. Lightning protector: The measure described in chap. 6.1.2 is valid also here.</p>		done
6.3	<p>HC charging / repair station – workshop 2</p> <p>Remark:</p> <p>This part is foreseen in step two of the project and has not been installed.</p>		



	Responsible A'Gram- kow	Mogan- shan
monitoring the ventilation must be marked.		
g) Remark: The supply of compressed air is presently temporary made via a cylinder. According to the plan of A'Gramkow /Moganshan the final solution will be the connection to the central compressor air supply.		done
h) Ventilation system of HC-providing room and HC-supply room	done	
1. Control panel:		
— The switches and push buttons which are mounted in the panel door must be secured against operating by not authorized persons. This can be realized with a lockable covering (2 nd door made by glas) over the operating switches.		
— A sign with a text similar like this: Caution – safety devices; use of operating switches is only allowed by authorized persons; switch over from automatic position to manual position means the safety system is not in order.		
— The supply cable of control panel must be connected to the back up generator.		
2. Difference pressure switch in the exhaust channel: The connecting cable of the pressure switch is connected to the EEx-i barrier in the SAFE 5 unit. The use of a blue cable or EEx-i markings on this cable with distances of approx. 2 m is necessary.	marked	
3. The exhaust channel over the roof must be integrated in the lightning protection system (connection to earth system).		con- firmed
i) HC-supply area		
1. i-Butane emergency push button: An emergency push button with the same functions as the 35 % LEL alarm must be installed in the HC-supply area. The design of this emergency push button should have the same design as the pentane emergency push buttons (yellow housing with glas). This emergency push button must be marked with "i-butane emergency".		done
2. Fire extinguisher A fire extinguisher must be positioned in the HC-supply area.		done
3. Supply of the pneumatic-valves is presently temporary realized by N ₂ -cylinders. A supply from the central compressed air station is foreseen.		x



6.2 HC-charging station – workshop 2

6.2.1 HC charging place

- a) The gas sensor with is presently inside of the ventilation system will be removed under the cylinder accumulator (big amount of I-Butane, a lot of connections)
- b) Area of accumulator will be improved:
 - enclosure around accumulator will be installed
 - enclosure will be included in ventilation system
 - enclosure will be equipped with the gas sensor
- c) The Butane alarm push bottom will be installed and will get the same function as gas alarm 35%.
- d) Following flexible pipes are not suitable:
 - relief pipe
 - pipe from max 95 to ventilation system
- e) Ventilation channel behind max 95 must be fixed
- f) Area with I-Butane
 - Will be equipped with a fence
 - Will be marked with: dangerous area
- g) Documentation
 - Drawing 172-12034 A – 00 date: 27-06-2001 must be updated
 - Safety relief valve before automatic valve in ingoing pipe max 95 must be introduced
 - P1 is not availbl
 - The installation is fine!
- h) Surrounding of HC charging station:
 1. In the 5.00 surrounding of HC-charging station the electrical installation must be improved so that IEC-standards are fulfilled (e.g. exist following deficiencies: switches without cover, terminal boxes without cover).
 2. The lamp over the charging place must be exchanged for a lamp with protection degree IP 54-
 3. The switch for start und stop of the conveying belt must be exchanged for an explosion proofed switch.
- i) Identification of hazard area:
 - Over the HC charging place a warning plate with a text like this:

Responsible	
A'Gram-kow	Mogan-shan
	Solution is accepted
	Solution is accepted
done	
done	done
	done
	done
x	
	Solution is accepted
	done
	done
	done



CERTIFICATE

No.: TÜV- BB-UL 11057

This is to certify that

Subject: R 600a - Supply and Charging Line
Max 95 F-1 and Safety Supervision
System Safe 5+

Producer: A'Gramkow, Denmark

Operator: Moganshan Electric Appliances
Zhongke Life Science & Technology
Zhejiang, P.R.China

meets the requirements of the TÜV Süddeutschland BB-ULM.
It was installed according to the relevant International Standards.
The R 600a evacuation and refrigerant charging system has been
submitted to an audit to verify compliance with the state of the art.
The system was audited finally in the period
from 9th to 10th December 2003.

This Certification is based on Report No. 3
Safety Inspection of R 600a Charging Station
UNIDO - MP/CPR/99/166 - R600a
TÜV BB-ULM-Ri/Ma/Li
File No.: UNI/AGR/MOG-PRC/01/03

This Certification is valid until
December 2005

Ulm, 30th March 2003
TÜV Süddeutschland experts


K-J Richardt


E. Mack

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